Traffic Safety Improvement Program

Applications for
Site Specific

FY 2012

Received June 15, 2010

Applications for Site Specific
FY 2012

Page No.	Requesting Agency	Description	$ $ $	
			Project	Request
1	District #2	At Intersection of US63 & C-57 in Black Hawk County, Construct off-set right turn lanes for northbound & southbound US 63 traffic entering C-57.	$320,000.00	$320,000.00
23	City of Mount Vernon	Remove existing intersection pavement & medians, lower existing grade, & install a single lane 150' dia. modern single-lane urban roundabout with dedicated right turn lanes for both eastbound & westbound US Hwy 30 traffic at the Intersection of US Hwy 30 and Iowa Hwy 1 in the City of Mount Vernon, Linn county	$1,003,790.00	$384,126.00
39	City of Mount Vernon	Remove existing intersection pavement & medians, lower existing grade, & install a single lane 150' dia. modern single-lane urban roundabout at the Intersection of US Hwy 30 and 10th Ave in the City of Mount Vernon, Linn county	$768,290.00	$500,000.00
53	Buchanan County	D 22, from Independence to Winthrop. Grading to flatten out curve west of Winthrop from a D of 10 & R of 572ft to an R =to 1500ft.	$167,485.00	$133,988.00
67	Allamakee County	Co. Rd. X-22, at curve 3.1 miles north of Harpers Ferry, Widen shoulders to 6 ft, pave widened shoulders, install rumble strips and install Guardrail on outside of curve, and 24" x 30" Chevrons spaced at 125 ft.	$167,016.00	$167,016.00
79	Guthrie County	F65 (Hwy 6) Curve East of Stuart, grade and pave inside corner, add rumble strips and Chevrons	$11,688.60	$11,688.60
87	Guthrie County	F65 (Hwy 6) IAIS RR Underpass West of Stuart, grade and pave inside corner, add rumble strips and Chevrons	$6,506.00	$6,506.00
97	City of Waterloo	At the Intersection of West 4th St & Fletcher Ave. in Waterloo, Modify intersection & Install compact Roundabout	$669,000.00	$500,000.00

Continued on next page

Applications for Site Specific
(Continued)

Page No.	Requesting Agency	Description	$ $ $	
			Project	Request
113	City of Sheldon	At the Intersection of US 18 and Country Club Road, in the City of Sheldon, in O'Brien County, add left turn lanes along US 18 & Country Club Road. The north and south approaches on Country Club Road will be reconstructed, providing short left turn lanes and also adjusting the intersection profile to raise the height to provide a slight benefit for sight distance.	$609,000.00	$200,000.000
141	City of Des Moines	Install (3) HAWK signals with adding two dynamic speed limit display signs @ Mondamin & Hickman. Modifications to traffic signal heads on 19th @ Forest and Hickman (new signal heads with back plates, optical-limited signal heads, and new pedestrian indications w/count-down timers on 19th St./MLK Jr. Parkway From Carpenter Ave. to Hickman Road In the city of Des Moines, Polk County.	$240,000.00	$240,000.00
175	City of Des Moines	Upgrade traffic signals @ 20 existing location by installing vehicle detectors on the side-streets, left-hand turning phases, and adding pedestrian push-buttons and pedestrian signals. Within the City of Des Moines, Polk County	$400,000.00	$80,000.00
193	District #6	Apply a high-friction surface treatment on the South bound lanes of the I-380 (5-in-1) bridge over the Cedar River in District #6, Cedar Rapids Iowa.	$300,000.00	$300,000.00
203	City of Cedar Rapids	At Johnson Ave. NW, From Midway Dr. to 1st Ave, install an asphalt overlay and reflective pavement marking tape to define an 11-foot-wide continuous center turn lane and two 15-foot-wide shared-use (vehicle/bicycle) travel lanes within the existing curb lines, alignment of the opposing through lanes at the all-way STOP controlled 1st Avenue W terminus, and transition to the existing 5-lane cross-section on the east end between Midway Drive and Edgewood Road in the City of Cedar Rapids	$1,695,000.00	$500,000.00

Continued on next page

Applications for Site Specific
(Continued)

Page No.	Requesting Agency	Description	$ $ $	
			Project	Request
263	City of Cedar Rapids	Installation of new traffic signals and all associated equipment at the Intersection of 29th & Prairie Drive, City of Cedar Rapids	$133,000.00	$133,000.00
295	City of Cedar Rapids	Installation of a fully-actuated and interconnected traffic signal @ the intersection of Williams Blvd/US151 & Dean St SW, City of Cedar Rapids	$176,000.00	$176,000.00
337	City of Waterloo	Reduce the two lane right turn lane to a one-lane lane, enlarge and extend the island to more clearly define and separate the trough, also right turn movement and Install far side overhead signal at the intersection of US 63 & University Ave. in the city of Waterloo.	$63,000.00	$63,000.00
351	Scott County	At the US 61 Blue Grass By-Pass from County Line 2.37 miles east to end of by-pass, Partially pave 4' of shoulder on inside and outside lines and mill in rumble strips.	$682,000.00	$500,000.00
365	* Lyon County	Warren County Route G76 - Curve Sign Upgrade & Rumble Stripes	$19,800.00	$19,800.00
	Totals	**18 Projects**	**$7,431,575.60**	**$4,235,124.60**

* Denotes application received after June 15, 2010 deadline

Iowa Department of Transportation

Rev. 3/08

Application for TRAFFIC SAFETY FUNDS

ORIGINAL

GENERAL INFORMATION

Location / Title of Project: US 63 and Black HAwk County Road C-57; Off Set Turn Right Lanes

Applicant: District 2 Office

Contact Person: Dave Little Title: Assistanct District Engineer

Complete Mailing Address: 1420 Fourth Street SE
Mason City, IA 50401

Phone: 641-422-9464 (Area Code) E-Mail: david.little@dot.iowa.gov

If more than one highway authority is involved in this project, please indicate and fill in the information below (use additional sheets if necessary).

Co-Applicant(s) _____

Contact Person _____ Title _____

Complete Mailing Address _____

_____

Phone _____ (Area Code) E-Mail _____

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Application Type

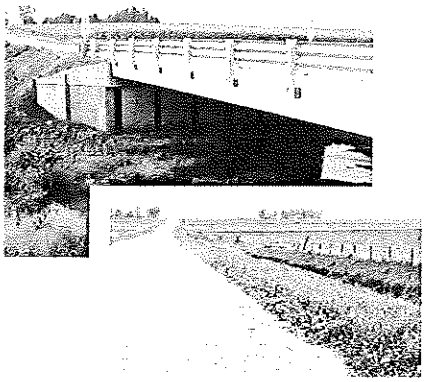
- Site Specific ☒
- Traffic Control Device ☐
- Safety Study ☐

Funding Amount

Total Project Cost $ 320,000

Safety Funds Requested $ 320,000

ATTACHMENT A



Office of the

Black Hawk County Engineer

316 East Fifth Street, Room 211
Waterloo, Iowa 50703-4774
Telephone: 319-833-3008
Fax: 319-833-3139
E-mail: engineer@co.black-hawk.ia.us

Catherine F. Nicholas, PE
County Engineer

Nicholas Amelon, EI
Assistant Engineer I

Dennis A. Clarke
Lynn Kloberdanz
Geoffry A. Tinker, PLS
Engineering Staff

Jan Hix
Budget Administrator

Galen Eilers
Maintenance Superintendent

Rick Buffington
Maintenance Supervisor

June 3, 2010

To: Traffic Safety Improvement Review Committee

From: Catherine F. Nicholas, PE
Black Hawk County Engineer

Re: Proposed US Hwy 63 & C-57 safety improvements

Black Hawk County strongly supports improvements proposed by IDOT at the intersection of US Highway 63 and County C-57 in Black Hawk County which include offset right turn lanes. This is an intersection with one of the county's highest volume secondary roads and there are also high percentages of turning movements in all directions.

We believe that offset right turn lanes should improve visibility of approaching traffic for drivers entering Highway 63 and thereby reduce the number of crashes at this intersection.

Thank you for your consideration of this proposed safety improvement.

NARRATIVE

US 218/IA 27 and C-57 Intersection, Black Hawk County

Existing Conditions

The US 63 and C-57 intersection is in a rural setting with a growing traffic count. Severe crashes have occurred here and the District 2 Office staff sees a need for improvement. This intersection is 3.5 miles North of Waterloo carrying a high amount of commuter traffic.

US 63 is a four lane divided Expressway corridor and county road C-57 is a two-lane paved roadway. One two-lane facility gap remains along US 63 from IA 3 to north IA 188, which is projected to be a four-lane facility in late 2012. Currently, the IA 3 and US 63 interchange is under construction and will to be open to traffic in the same timeframe.

The posted speed limit on US 63 is 65 mph and the posted speed limit on C-57 is 55 mph. At this intersection, there are northbound and southbound left turn lanes in place on US 63, approximately 210' in length. The median width is approximately 40' and is "Yield" sign controlled. Intersection lighting consists of one light Black Hawk County has placed in the northeast quadrant of the intersection. There are dual "Stop Ahead" sign installations and rumble strips in place on eastbound and westbound C 57 in advance of the intersection.

On the C-57 approaches to US 63, there are raised stop islands with "Stop" signs in place and "Stop" signs in place for right turn lanes that follow the radius of the intersection on the east and west sides of US 63. There are supplemental "Cross Traffic Does Not Stop" signs in place with each of the 4 "Stop" sign installations.

Along US 63, there are advance street name installations, 2 route marker installations and guide sign installations in place along northbound and southbound US 63 in advance of this intersection and the longitudinal spacing between these sign installations is appropriate. The intersection sight distance looking north from the intersection is just beyond 1 mile. The intersection sight distance looking south from the intersection is approximately 1,335', with a target placed on the east side of US 63, and approximately 1,255' with a target placed on the west side of US 63. The sight distance is restricted looking south from the intersection due to a vertical and horizontal curve.

The 2005 average annual daily traffic for the two roadways is as follows, as posted on www.dotmaps.com: US 63 Traffic count is 8100 on the north leg of the intersection and 7900 on the south leg of the intersection. Truck counts are 720 on US 53 and C-57 traffic count is 1200 on the east leg and 2200 on the west leg.

Many trucks use C-57 to reach the northeast Waterloo Industrial Park. Trucks travel along C-57 to US 63, then turn east on Donald Street/C-66 and down other Black Hawk County Roads into the industrial park area, or to reach US 20 and I-380.

The 2009 Iowa Department of Transportation Turning Movements for this intersection are as follows:

- Northbound US 63:
  - East turn onto Cedar Wapsi: 363
  - West turn onto Cedar Wapsi: 248
  - Straight through intersection: 3252
- Southbound US 63:
  - East turn onto Cedar Wapsi: 69
  - West turn onto Cedar Wapsi: 567
  - Straight through intersection: 3334
- Eastbound Cedar Wapsi/C-57:
  - South turn on US 63: 275
  - North turn on US 63: 510
  - Straight through intersection: 354
- Westbound Cedar Wapsi/C-57:
  - South turn on US 63: 258
  - North turn on US 63: 50
  - Straight through intersection: 288

The 2031 Iowa Department of Transportation Turning Movement Forecast for this intersection is as follows:

- Northbound US 63:
  - East turn onto Cedar Wapsi: 451
  - West turn onto Cedar Wapsi: 380
  - Straight through intersection: 4786
- Southbound US 63:
  - East turn onto Cedar Wapsi: 86
  - West turn onto Cedar Wapsi: 782
  - Straight through intersection: 4786
- Eastbound Cedar Wapsi/C-57:
  - South turn on US 63: 380
  - North turn on US 63: 782
  - Straight through intersection: 467
- Westbound Cedar Wapsi/C-57:
  - South turn on US 63: 451
  - North turn on US 63: 86
  - Straight through intersection: 467

The overall Turning Movement Forecast shows that US 63 traffic will grow from 8050 AADT in 2009 to 11308 AADT by year 2031.

Eastbound and westbound C-57 traffic is required to stop on each side of the intersection. The District has implemented a number of safety devices at this intersection over the years. They include:

- During early 2010, "Recheck Cross Traffic Before Proceeding" signs were installed at the Yield signs in the median of the intersection as supplemental signs.

- During 2010, "Divided Highway –Symbol Cross Road" signs were placed below the stop signs as supplemental signs on each side of US 63. The "Cross Traffic Does Not Stop" signs were relocated below the Divided Highway symbol sign.

The US 63 vehicles turning right onto either east or west C-57 cause a shadowing problem for C-57 vehicles waiting to enter US 63, contributing to a crash rate of 0.85 crashes per million entering vehicles in the five year period from 1/1/2004 to 12/31/2008, (15 crashes). That is higher than the statewide average crash rate of 0.8 million entering vehicles at an intersection of a primary highway with a secondary highway in a rural setting. The District feels this location is a candidate for safety funds and proposes improvements be designed and constructed with TSIP funds.

Crash History

The 2004-2008 crash history for this intersection according to the Saver Crash History Program showed a total of 15 reportable crashes had occurred during the period with 1 Major Injury, 11 Minor Injuries and 9 Possible Injuries. The 2004-2008 crash rate for this intersection was 0.85 crashes per million entering vehicles which compares with a statewide average crash rate of 0.8 crashes per million entering vehicles, where a rural primary intersects with a secondary route.

Four of 15 crashes were near side right angle crashes involving northbound and westbound vehicles. Five of the 15 crashes were near side right angle crashes involving southbound and east bound vehicles. Two of the Investigating Officers Reports identify shadowing as a contributing factor. See Investigating Officers Reports in Attachment I, with the "possible shadowing" highlighted. These right angle crashes may be addressed with offset right turn lanes by the following: 1) by reducing the potential for shadowing of mainline through vehicles by mainline right turning vehicles, and 2) by committing the mainline vehicles earlier to the off-set turn lane which allows better sight distance for side road vehicles waiting to enter the expressway.

Concept

The District is proposing to construct off-set right turn lanes for northbound and southbound US 63 traffic entering C-57 to improve sight lines and reduce shadowing.

The AADT traffic count for all legs of this intersection totaled 19,400 in 2005 and 19,136 in 2009. The 2031 turning movement forecast for all legs of this intersection totals 27,808. The

projected increase in volume and turning movements will mean fewer gaps for motorists trying to enter or cross US 63 form C-57, increased turning movements from US 63, and increased shadowing. See attached 2031 Turning Movement Forecast.

Crash Reduction Factors and Benefit/Cost Analysis:

Crash reduction factors for this proposed improvement, addition of an offset right turn lane at an expressway intersection, are not readily available from any known research literature.

In *NCHRP Report 500, Volume 5, A Guide for Addressing Unsignalized Intersection Collisions, Strategy 17.1B8 – Provide Offset Right-turn Lanes at Intersections*, it is discussed that no research has been conducted on the safety effectiveness of offset right turn lanes. This document does not give any suggested values for the estimated effectiveness of adding offset right turn lanes.

In this same publication, under *Strategy 17.1 B – Provide Right-Turn Lanes at Intersections,* it is suggested that adding right-turn lanes on the major road reduces total intersection crashes by 5 percent. Also cited is research by the Midwest Research Institute that indicated adding a single right-turn lane on a major road approach would be expected to reduce total intersection crashes at rural unsignalized intersections by 14 percent. These crash reduction factors are not directly applicable to this situation since an offset right-turn lane is being proposed rather than parallel right-turn lanes which were the focus of this research.

In recent research at Iowa State University, *Safety Effects of Offset Right-Turn Lanes at Rural Expressway Intersections*, by Joshua L. Hockstein, the before-after crash history was investigated at an expressway intersection in Floyd County (US 18/US 218 at Floyd) where an existing parallel right-turn lane was replaced with an offset right-turn lane. Though data was very limited, this intersection showed a 44% reduction in near-side right-angle crashes since the offset right turn-lane was put in place. The study noted that there were three "right-turn leaving" crashes following the construction of the offset right-turn lane; crashes involving a right-turning vehicle which turned at a high-rate of speed, lost control, and collided with a sideroad vehicle stopped at the stop sign waiting to enter the intersection. Potential for this problem would exist at the intersection of US 63 and C-57 as well. This research is considered applicable to this situation.

For the purposes of this application, the benefit/cost analysis has been evaluated using a 25% crash reduction factor, chosen to be somewhat conservative when compared to the Floyd County intersection experience. This crash reduction factor has been applied to only the nine near-side right-angle crashes. These crashes resulted in 0 fatal injuries, 0 major injuries, 4 minor injuries, and 7 possible injury. Three of these near-side crashes were property damage only. Total property damage for these nine crashes was $233,800. A project cost of $320,000 was used in this analysis.

On this basis, a B/C ratio of 1.51 to 1 was calculated, as shown on Document L.

Justification

US 63 and C-57 are heavy commuter and delivery routes for the Cedar Falls/Waterloo metropolitan area. Safety improvements are needed at this intersection to reduce the total number of crashes and protect the lives of commuters, as well as the through traffic.

In research at Iowa State University, *Safety Effects of Offset Right-Turn Lanes at Rural Expressway Intersections,* by Joshua L. Hockstein, the before-after crash history was investigated at an expressway intersection in Floyd County (US 18/US 218 at Floyd) where an existing parallel right-turn lane was replaced with an offset right-turn lane. Though data was very limited, this Floyd intersection showed a 44% reduction in near-side right-angle crashes since the offset right turn-lane was put in place.

Near side right-angle crashes at US 63 and C-57 from 2004-2008 make up 9 of the 15 crashes. The Hochstein research shows offset right turn lanes play a major role in reducing or eliminating these types of crashes. His research continues that these turn lanes eliminate the sight distance obstruction created by right turning vehicles leaving the four-lane corridor. An offset right turn lane would allow the side road drivers fewer challenges in selecting gaps to enter the Expressway.

Other options at this intersection could include stop lights or a regulatory speed reduction, both undesirable solutions at this time.

PROJECT CONSTRUCTION ESTIMATE

Earthwork	$35,000
Structures	$20,000
HMA Pavement	$190,000
Traffic Control and Mobilization	$35,000
Miscellaneous and Contingency	$30,000
Right of Way	$10,000
PROJECT TOTAL	$320,000

Anticipated Funding Source for entire project: Traffic Safety Improvement Program 100%

PROJECT SCHEDULE

Application Submittal: June 15, 2010

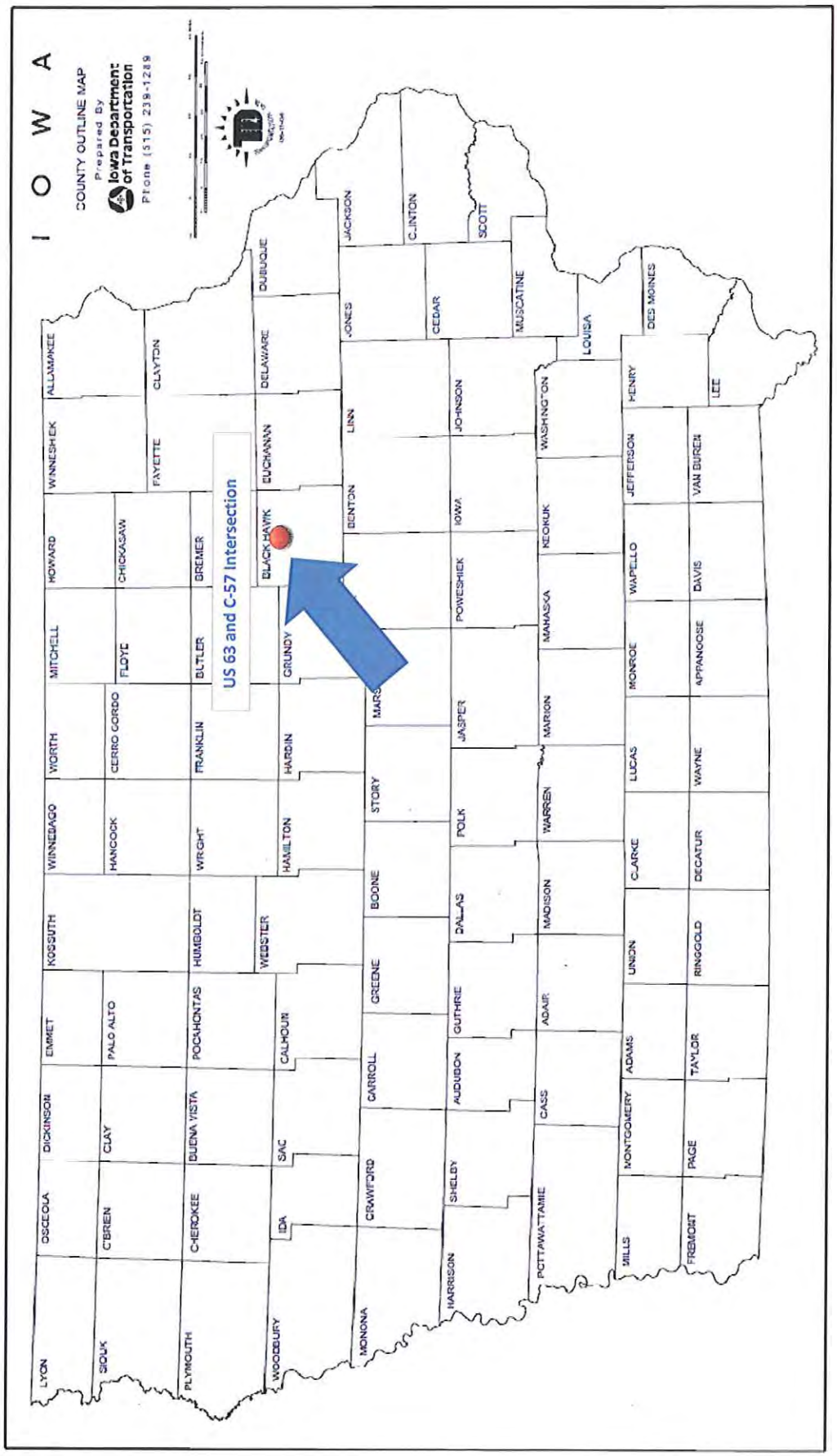
Application Award: January / February 2011

Project Development, including Right of Way: 2011 - 2012

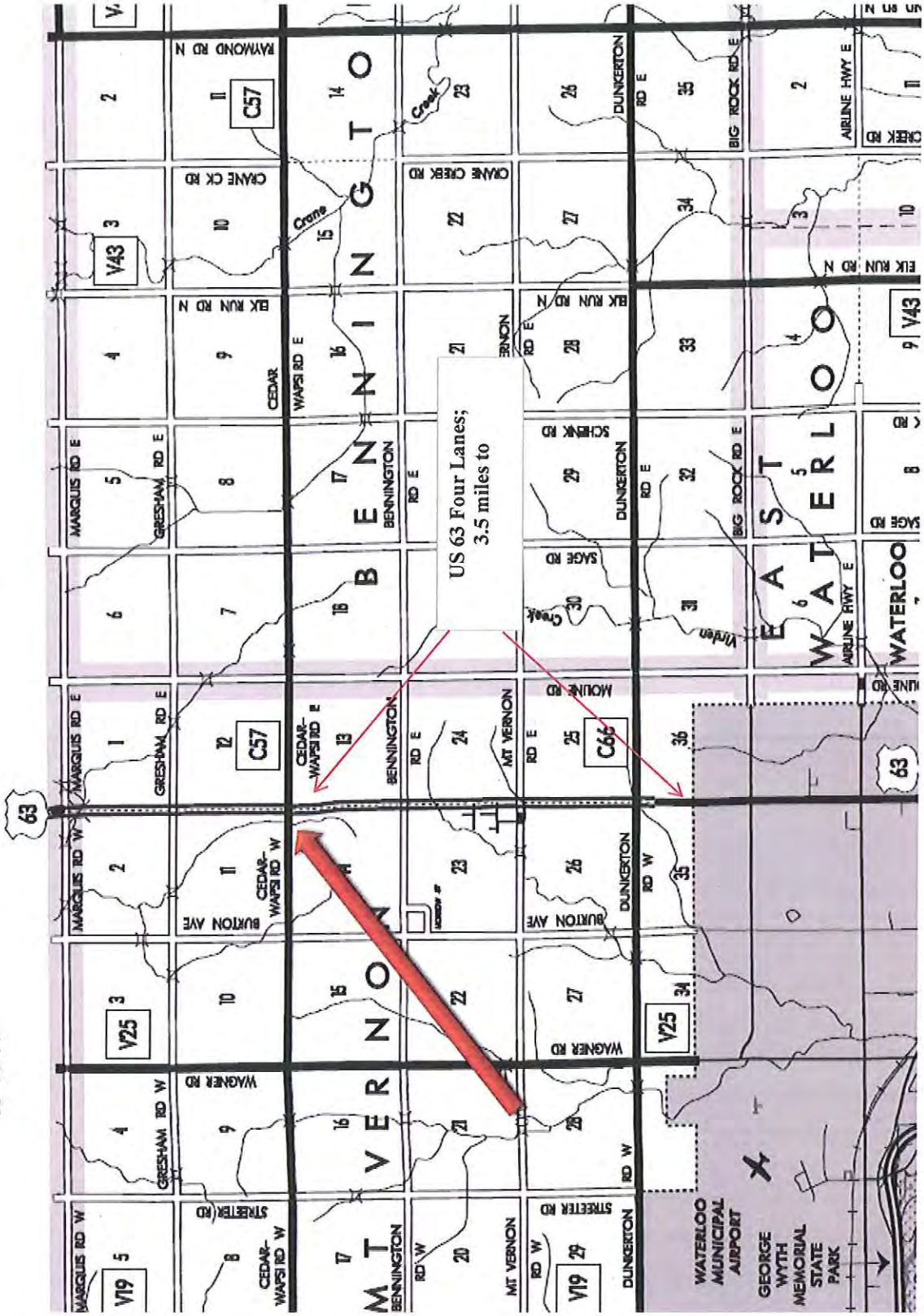
Project Letting: Spring 2012

Project Construction: 2012 - 2013

Project Completion: FY 2013


I O W A
COUNTY OUTLINE MAP
Prepared By
Iowa Department of Transportation
Phone (515) 239-1289
LYON
OSCEOLA
DICKINSON
EMMET
KOSSUTH
WINNEBAGO
WORTH
MITCHELL
HOWARD
WINNESHIEK
ALLAMAKEE
SIOUX
O'BRIEN
CLAY
PALO ALTO
HANCOCK
CERRO GORDO
FLOYD
CHICKASAW
FAYETTE
CLAYTON
PLYMOUTH
CHEROKEE
BUENA VISTA
POCAHONTAS
HUMBOLDT
WRIGHT
FRANKLIN
BUTLER
BREMER
WOODBURY
IDA
SAC
CALHOUN
WEBSTER
HAMILTON
HARDIN
GRUNDY
BLACK HAWK
BUCHANAN
DELAWARE
DUBUQUE
MONONA
CRAWFORD
CARROLL
GREENE
BOONE
STORY
MARSHALL
BENTON
LINN
JONES
JACKSON
HARRISON
SHELBY
AUDUBON
GUTHRIE
DALLAS
POLK
JASPER
POWESHIEK
IOWA
JOHNSON
CEDAR
CLINTON
POTTAWATTAMIE
CASS
ADAIR
MADISON
WARREN
MARION
MAHASKA
KEOKUK
WASHINGTON
MUSCATINE
SCOTT
MILLS
MONTGOMERY
ADAMS
UNION
CLARKE
LUCAS
MONROE
WAPELLO
JEFFERSON
HENRY
DES MOINES
LOUISA
FREMONT
PAGE
TAYLOR
RINGGOLD
DECATUR
WAYNE
APPANOOSE
DAVIS
VAN BUREN
LEE
US 63 and C-57 Intersection

US 63 and C-57 Intersection

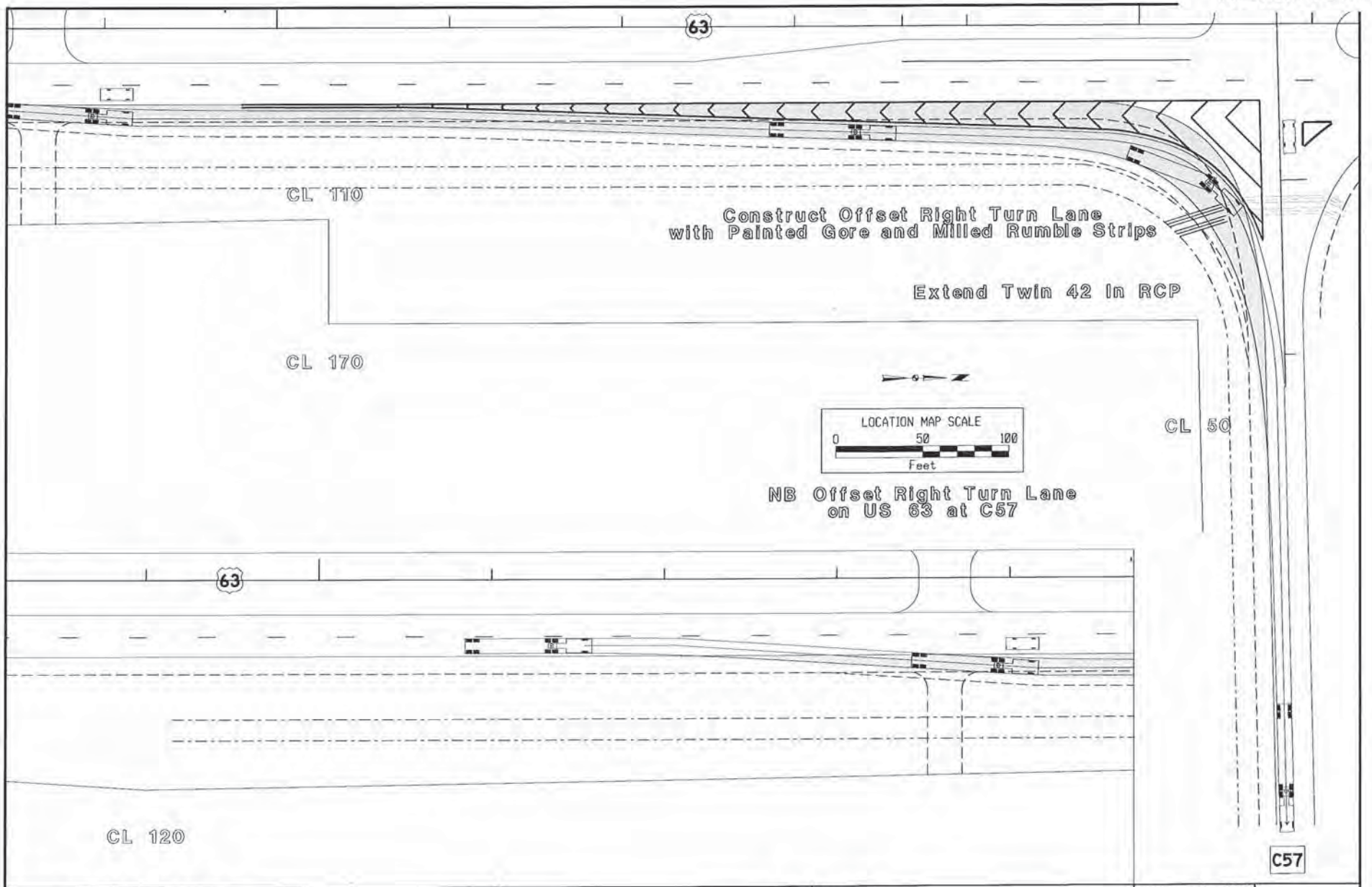


ATTACHMENT F

US 63 SOUTH ←

US 63 NORTH ↑

ATTACHMENT G



ENGLISH	IOWA DOT	DESIGN TEAM	COUNTY	PROJECT NUMBER	SHEET NUMBER 1 of 2

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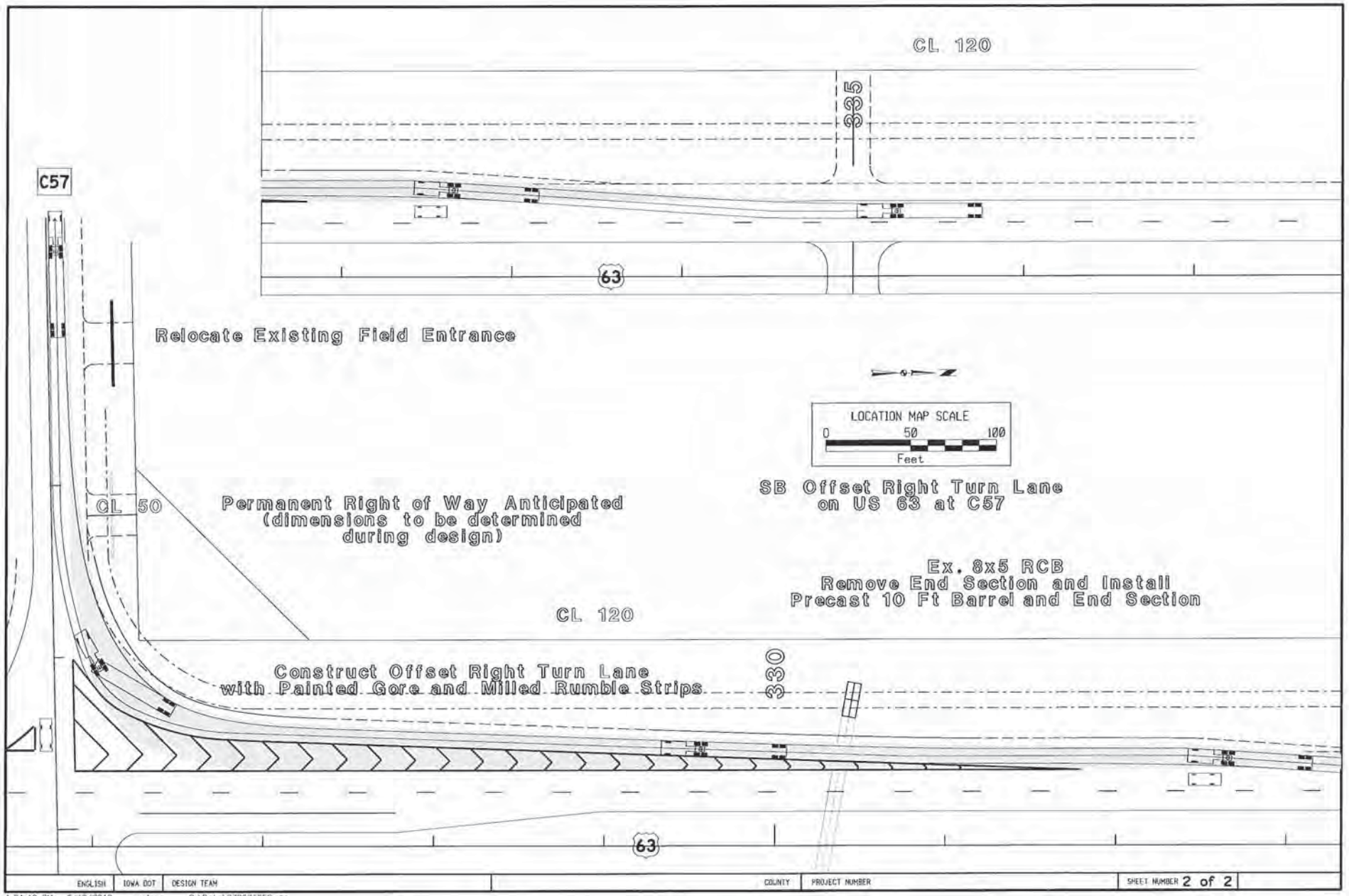
CL 120
C57
63
Relocate Existing Field Entrance
LOCATION MAP SCALE
0 50 100
Feet
SB Offset Right Turn Lane
on US 63 at C57
CL 50
Permanent Right of Way Anticipated
(dimensions to be determined
during design)
Ex. 8x5 RCB
Remove End Section and Install
Precast 10 Ft Barrel and End Section
CL 120
Construct Offset Right Turn Lane
with Painted Gore and Milled Rumble Strips
330
63
ENGLISH
IOWA DOT
DESIGN TEAM
COUNTY
PROJECT NUMBER
SHEET NUMBER 2 of 2
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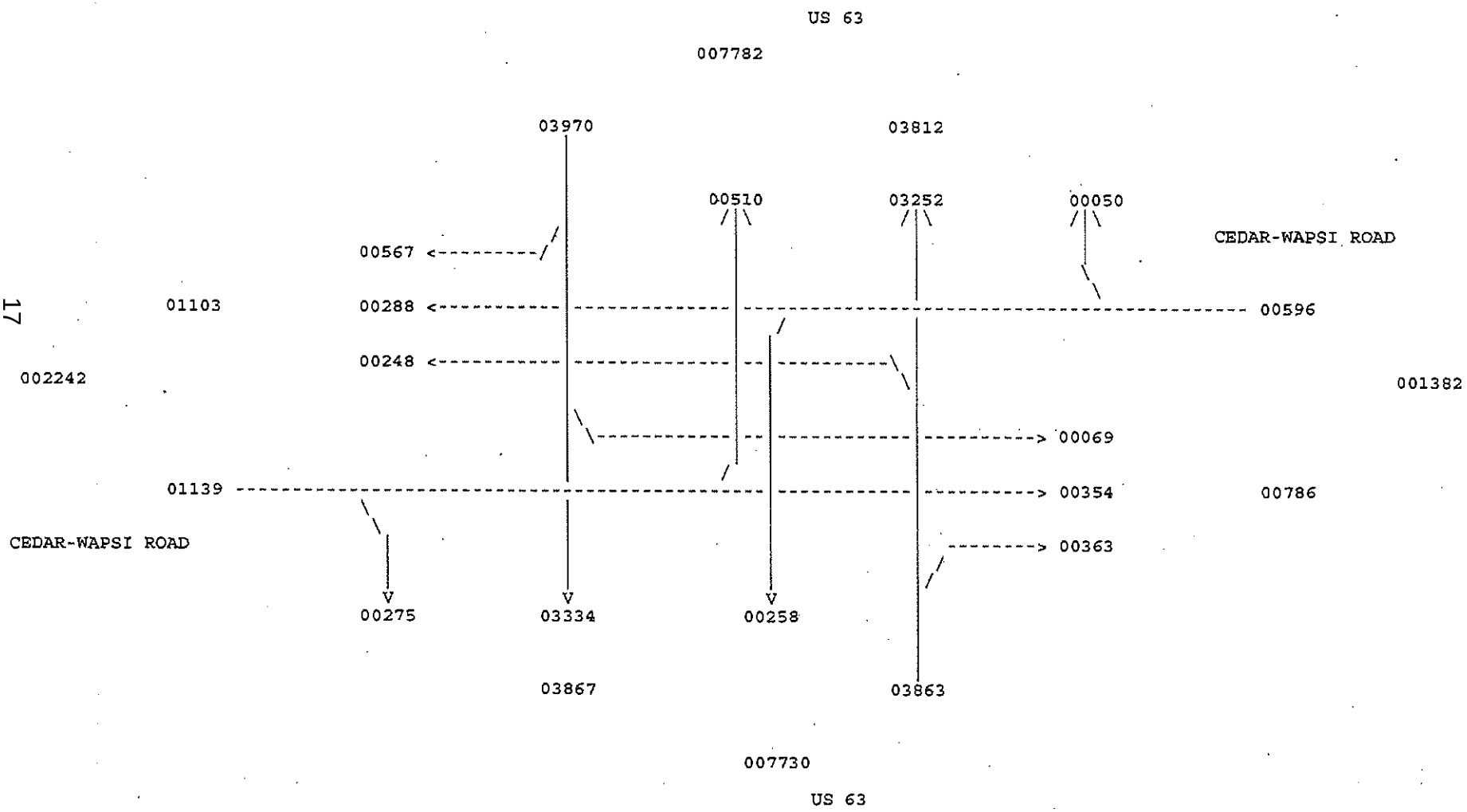
ATTACHMENT H

DATE: 06-01-2010

IOWA DEPARTMENT OF TRANSPORTATION
VEHICULAR TURNING MOVEMENTS
ANNUAL AVERAGE DAILY TRAFFIC - YEAR 2009
LEGAL DESC . SEC 13 TWP 90 RGE 13

COUNTY:BLACK HAWK
US 63 & CEDAR-WAPSI RD

STATION NO. 07 42 6581 0991



ATTACHMENT J

D1530926

COUNTY	TOWNSHIP	NODE	LOCATION	YEAR
07	42	6581	0991	2009

TURNING MOVEMENT SYSTEM
TRAFFIC COUNT SUMMARY
ALL VEHICLES

PRINTER ID: TPRT003W PAGE 0001
CITY:
COUNTY: BLACK HAWK

HOUR	******* NORTH LEG ******* US 63				******* EAST LEG ******** CEDAR-WAPSI ROAD				******* SOUTH LEG ******* US 63				******* WEST LEG ******** CEDAR-WAPSI ROAD			
	RT	ST	LT	TOTAL	RT	ST	LT	TOTAL	LT	ST	RT	TOTAL	LT	ST	RT	TOTAL
07- 8AM	75	406	3	484	1	40	35	76	7	114	11	132	29	15	38	82
08- 9AM	49	252	4	305	4	27	29	60	16	154	8	178	28	17	22	67
11-12PM	28	234	2	264	0	16	10	26	16	180	17	213	15	18	17	50
12-1 PM	26	206	1	233	5	22	20	47	14	185	18	217	27	11	17	55
3- 4PM	33	211	6	250	6	13	15	34	26	316	44	386	51	32	18	101
4- 5PM	37	222	15	274	5	18	18	41	28	361	57	446	52	45	21	118
5- 6PM	47	203	5	255	5	14	7	26	22	381	34	437	63	46	10	119
TOTALS	295	1734	36	2065	26	150	134	310	129	1691	189	2009	265	184	143	592

STATION DISPLAYED
PF4 QUARTER HOUR PF5 CLASS PF7 BKWD PF8 FWD PF15 MAIN MENU PF21 SCREEN PRINT CLEAR EXIT

D1530927

COUNTY	TOWNSHIP	NODE	LOCATION	YEAR
07	42	6581	0991	2009

TURNING MOVEMENT SYSTEM
TRAFFIC COUNT SUMMARY
SINGLE UNIT TRUCKS

PRINTER ID: TPRT003W PAGE 0001
CITY:
COUNTY: BLACK HAWK

HOUR	******* NORTH LEG ******* US 63				******* EAST LEG ******** CEDAR-WAPSI ROAD				******* SOUTH LEG ******* US 63				******* WEST LEG ******** CEDAR-WAPSI ROAD			
	RT	ST	LT	TOTAL	RT	ST	LT	TOTAL	LT	ST	RT	TOTAL	LT	ST	RT	TOTAL
7- 8AM	5	4	1	10	0	2	0	2	0	7	0	7	2	0	2	4
8- 9AM	6	5	1	12	0	4	1	5	1	14	1	16	4	1	2	7
11-12PM	1	11	0	12	0	0	1	1	1	10	2	13	0	3	3	6
12- 1PM	0	13	0	13	0	5	2	7	1	6	0	7	2	1	2	5
3- 4PM	6	15	0	21	1	1	0	2	2	7	1	10	5	3	0	8
4- 5PM	1	11	1	13	0	2	2	4	0	12	0	12	0	7	1	8
5- 6PM	1	8	0	9	0	1	0	1	0	7	0	7	1	2	0	3
TOTALS	20	67	3	90	1	15	6	22	5	63	4	72	14	17	10	41

STATION DISPLAYED
PF4 QUARTER HOUR PF5 CLASS PF7 BKWD PF8 FWD PF15 MAIN MENU PF21 SCREEN PRINT CLEAR EXIT

D1530928

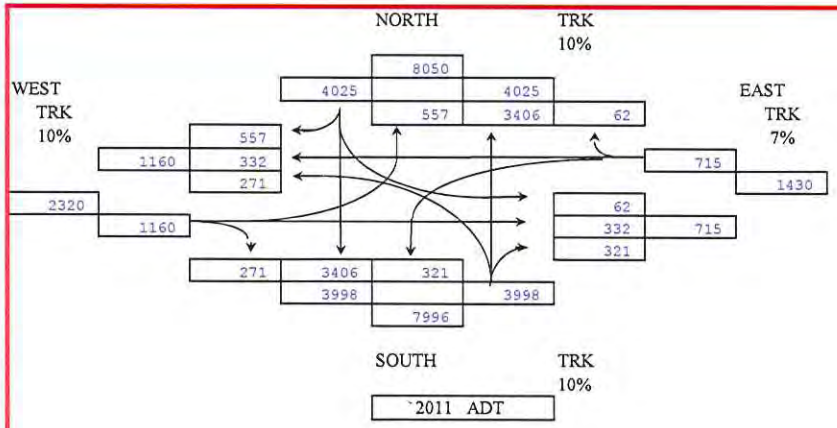
COUNTY	TOWNSHIP	NODE	LOCATION	YEAR
07	42	6581	0991	2009

TURNING MOVEMENT SYSTEM
TRAFFIC COUNT SUMMARY
COMBINATION TRUCKS

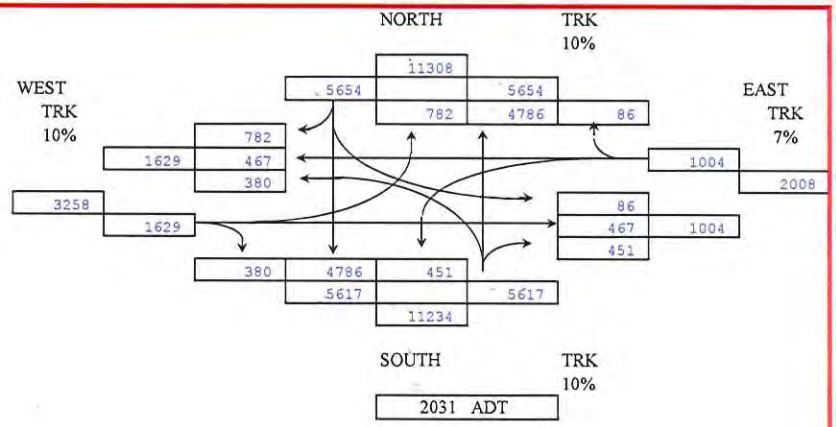
PRINTER ID: TPRT003W PAGE 0001
CITY:
COUNTY: BLACK HAWK

HOUR	******* NORTH LEG US 63			*******	******* EAST LEG CEDAR-WAPSI ROAD			********	******* SOUTH LEG US 63			*******	******* WEST LEG CEDAR-WAPSI ROAD			********
	RT	ST	LT	TOTAL	RT	ST	LT	TOTAL	LT	ST	RT	TOTAL	LT	ST	RT	TOTAL
7- 8AM	2	24	1	27	0	0	0	0	1	13	0	14	4	0	3	7
8- 9AM	0	24	0	24	0	0	0	0	3	17	0	20	0	1	3	4
11-12PM	1	30	0	31	0	2	0	2	3	22	0	25	1	0	0	1
12- 1PM	1	21	1	23	0	0	0	0	1	23	0	24	1	0	1	2
3- 4PM	2	21	0	23	1	0	0	1	2	15	0	17	2	0	2	4
4- 5PM	1	26	0	27	0	0	0	0	2	18	0	20	2	1	2	5
5- 6PM	3	17	0	20	0	1	1	2	1	19	0	20	1	0	1	2
TOTALS	10	163	2	175	1	3	1	5	13	127	0	140	11	2	12	25

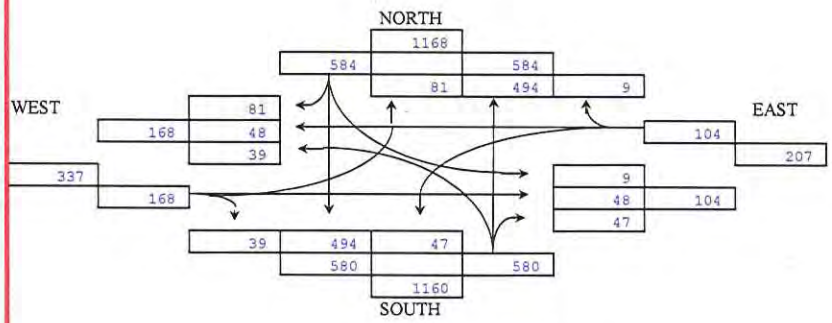
STATION DISPLAYED
PF4 QUARTER HOUR PF5 CLASS PF7 BKWD PF8 FWD PF15 MAIN MENU PF21 SCREEN PRINT CLEAR EXIT



2011 ADT



2031 ADT



2031 DHV

COUNTY : Black Hawk

EST. NO. : 1862

LOCATION : US 63 & CO RD C57

NORTH: US 63
EAST : CO RD C57
SOUTH: US 63
WEST : CO RD C57

PROG YR : 2011
DESIGN YR: 2031

Rev. 8/09

Intersection or Spot Benefit / Cost Safety Analysis

Iowa DOT Office of Traffic & Safety

County: Black Hawk Prepared by: D. Little Date Prepared: Jun 10, 2010

Intersection: Intersection of US 63 and County Road C-57

Improvement

Proposed Improvement(s): Construct offset Right Turn Lanes for both NB and SB roadways

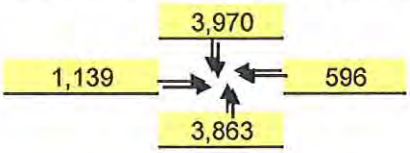
$ 320,000	Estimated Improvement Cost, **EC**	20	Est. Improvement Life, years, **Y**
	Other Annual Cost (after initial year), **AC**	25	Crash Reduction Factor (integer), **CRF**
$ -	Present Value Other Annual Costs, **OC**	4.0%	Discount Rate (time value of $), **INT**
		$ 320,000	Present Value Cost, **COST** = EC + OC

$$OC = \frac{AC}{INT}\left(1 - \frac{1}{(1+INT)^Y}\right)$$

Traffic Volume Data

Source: Office of Transportation Data 2009 - Prelim Date of traffic count

Daily Entering Vehicles by Approach (or AADT / 2)



3,492,320 Current Annual Entering Veh., **AEV** = DEV * 365

14,218 veh / day, Final Year DEV, **FDEV**

84.85 MEV, Total Million Entering Veh. Over life of Project, **TMEV**

2.0% Projected Traffic Growth (0%-10%), **G**

9,568 Current Daily Entering Vehicles, **DEV**

$$TMEV = \frac{AEV}{-G}\left(1 - \left(\frac{1+G}{1}\right)^Y\right) \Big/ 10^6$$

Crash Data

2004 First full year --> 2008 Last full year 5.0 years, Time Period, **T**

Additional months values as of Dec. 2007

0	Fatal Crashes	0	Fatalities @	$3,500,000	$ -
		0	Major Injuries @	$240,000	$ -
6	Injury Crashes	4	Minor Injuries @	$48,000	$ 192,000
		7	Possible Injuries @	$25,000	$ 175,000
3	Property Damage Only		(assumed cost per crash)	$2,700	$ -
		-OR-	enter all Property Costs of all crashes:		$ 233,800
9	Total Crashes, **TA**		Total $ Loss, **LOSS**		$ 600,800

1.80	Current Crashes / Year, **AA** = TA / T	0.52	Crashes / MEV, Crash Rate, **CR** CR = TA x 10^6 / (DEV x 365 x T)
$ 66,756	Cost per Crash, **AVC** = LOSS / TA		
43.7	Total Expected Crashes, **TECR** = CR x TMEV	$ 483,393	Present Value of Avoided Crashes, **BENEFIT**
0.45	Crashes Avoided First Year **AAR** = AA x CRF / 100		
$ 30,040	Crash Costs Avoided in First Year, AAR x AVC		
10.9	Total Avoided Crashes, TECR x CRF/ 100		

$$BEN. = \frac{AVC \times AAR}{(INT - G)}\left(1 - \left(\frac{1+G}{1+INT}\right)^Y\right)$$

Benefit / Cost Ratio

Benefit : Cost = $483,393 : $320,000 = **1.51** : 1

Iowa Department of Transportation

Rev. 3/08

Application for TRAFFIC SAFETY FUNDS

GENERAL INFORMATION

Location / Title of Project US Highway 30 and Iowa Highway 1

Applicant City of Mount Vernon, Iowa

Contact Person Daniel J. Boggs, P.E. Title City Engineer

Complete Mailing Address 213 First Street West
Mount Vernon, Iowa 52314

Phone (319) 895-0880 (Area Code) E-Mail dboggs@cityofmtvernon-ia.gov

If more than one highway authority is involved in this project, please indicate and fill in the information below (use additional sheets if necessary).

Co-Applicant(s) _____

Contact Person _____ Title _____

Complete Mailing Address _____

_____

Phone _____ (Area Code) E-Mail _____

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Application Type

- Site Specific ☒
- Traffic Control Device ☐
- Safety Study ☐

Funding Amount

Total Project Cost $ 1,003,790.00

Safety Funds Requested $ 384,126.00

Application for Traffic Safety Improvement Program Funds
June 14, 2010

PROJECT NARRATIVE

Introduction and Background Information

The City of Mount Vernon, Iowa received a grant from the Iowa Department of Transportation Traffic Engineering Assistance Program (TEAP) to complete an intersection study of the intersection of U.S. Highway 30 and Iowa Highway 1. The City also shared in the cost of the study by expanding the study area of U.S. Highway 30 and Tenth Avenue SW and the intersection of Iowa Highway 1 and Palisades Road SW. This study was completed in November of 2006.

Data and recommendations from the 2006 TEAP study were used to show need and applicability for the use of Iowa Clean Air Attainment Program (ICAAP) funds. Iowa Clean Air Attainment funds were applied for and granted by the Highway Commission based on inefficiencies of the existing intersection of U.S. Highway 30 and Iowa Highway 1 at peak hours. The funds are available for use for the construction of a fully actuated traffic signal or a roundabout type intersection traffic control concept.

Concurrently the City of Mount Vernon contracted outside traffic engineering services from Shive Hattery Engineers for a U.S. Highway 30 Corridor Pre-Design. These services included the preliminary field work (a complete topographic and boundary survey), a total of three corridor design concepts, detailed cost estimates for each design concept, and presentations in a public forum. A number of issues were addressed in the design concepts, safety being a major issue that was addressed in the summary of findings.

The City of Mount Vernon and the Iowa Department of Transportation, along with outside sources has determined a need, a plan of action, and determination of probable costs for intersection and corridor improvements based on the existing level of service (LOS), condition of the present infrastructure, as well as safety. Even with the phasing of the recommended improvements, limiting the project scopes to a minimum, and the inclusion of ICAAP fund sources, the cost of any recommended phase is beyond the bonding capacity of the City or what the City feels comfortable contributing towards a federal aid system roadway.

The city is therefore seeking funding from additional sources, this application based on merit of need based on intersection safety improvements.

Existing Conditions

US Highway 30 (US 30) is a two-lane rural cross section highway with a 50 mph speed limit. According to the Iowa DOT traffic count data, the 2005 average annual daily traffic (AADT) was 10,000 vehicles per day (vpd) west of IA 1 and 8,600 vpd east of IA 1. The two-lane US 30 cross-section widens to a four-lane section with raised medians on approach to the all-way stop controlled IA 1 intersection. The four lanes quickly taper back to a two-lane section downstream of the intersection. The intersection has an approximately 53-degree skew, with IA 1 running in a northeast-southwest direction. Channelized right turns and raised islands are provided for eastbound and westbound right turns from US 30. Rumble strips are provided for traffic approaching the intersection from the west, east and southwest.

Iowa Highway 1 (IA 1) is also a two-lane rural cross-section highway south of US 30. Similar to US 30, IA 1 widens to a four-lane highway with raised medians northeast bound on approach to the US 30 intersection. Northeast of the intersection, the four-lane section is carried through the adjacent Palisades Road intersection then tapers back to two lanes. The 2005 AADT on IA 1 was 7,200 vpd north of US 30 and 5,200 vpd south of US 30. The IA 1 speed limit within the study area is 30mph. Although the intersection lacks lane continuity, it operates reasonably well during off-peak times. However, during peak periods, vehicle queues of approximately 1,200 feet have been observed and noted. This condition has been a major factor in the number of rear end collisions from unexpected stops due to long queues, and front side collisions (T-Bone) due to left turn movements on a busy roadway.

A previous attempt to designate the inside US 30 lanes as left-turn only lanes resulted in increased delays and queuing. As such, the intersection was converted back to the original configuration.

Proposed Project

With funding sources including TSIP, ICAAP, and USTEP, the City wishes to have a modern urban roundabout constructed at the intersection of US Highway 30 and Iowa Highway 1.

Proposed intersection geometric improvements involve removing existing intersection pavements and medians, lowering and the existing grade, and installing a single lane 150' diameter modern urban roundabout with dedicated right turn lanes for both eastbound and westbound US Highway 30 traffic. Safety enhancement feature will include a single lane roundabout which has shown to be safest at the projected intersection peak loadings, dedicated right turn lanes to minimize congestion within the roundabout area from the directions where most turn movements originate, as well as an urban type curb and gutter pavement section as an additional traffic calming feature. Business drive closures and relocations will also be a part of the total project within the proposed scope.

The existing condition is a high speed rural highway design amongst a well developed urban corridor. The intersection congestion and high corridor speeds results in an unsafe accident prone condition.

Project Justification

The review of the crash history for the 5-year period from 2004-2008 indicated a total of 30 crashes affected by vehicular traffic within and around this intersection and within the limits of the US Highway and Iowa Highway 1 corridor study. The analysis of this crash information is summarized in the following table:

CRASH TYPE	NUMBER OF CRASHES
REAR END	8
BROAD SWIPE	11
SIDE SWIPE	5
LEFT TURN/ANGLE	6
TOTAL	30
DAMAGE AMOUNT	$187,018

INJURY TYPE	NUMBER OF INJURIES
POSSIBLE	4
MINOR	6
MAJOR	1
TOTAL	11

Of the 30 crashes reported in the 5 year period, there were 11 personal injury crashes with no fatalities. Of the 30 crashes reported, a total of 8 crashes (27%) were rear end crashes which would indicate crashes caused by long queue lengths combined with high speed and 11 crashes (37%) were broad side which would indicate crashes caused by left turn movements into oncoming traffic caused by long queue lengths and no turn movement opportunities due to no gaps. Both types of crashes would be improved by the construction of a roundabout especially when accompanied by dedicated right turn lanes for the US Highway 30 right turn movements.

The Final Summary of Findings for the Traffic Evaluation and Corridor Preliminary Plans, US Highway 30-from 10th Avenue to Virgil Street (Feb. 16, 2010) State on page 4:

"Further evaluation of the three alternatives led to the recommendation of Alternative 2 – Urban 3-lane with Roundabouts at both the 10th Avenue and the US 30 IA 1 intersection for the interim and Ultimate Plans."

The Roundabout concept for the intersection of US Highway 30 and Iowa Highway 1 provides the best solution in terms of safety and crash reduction/prevention, speed reduction, traffic calming and pedestrian safety at all traffic hours when compared to a signalized intersection. There is also the added benefit of a more aesthetically pleasing environment and a marked reduction in long term facility maintenance costs.

Highway 1 intersection

Urban 3-lane with Roundabout at US Hwy 30

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT COST	EXTENDED COST
1	Modified Subbase - 6 Inch	SY	6,901	$7	$48,307
2	Granular Shoulder - 6 ft Wide	SY	-	$5	$0
3	Median, Curb + Landscape	SY	1,958	$25	$48,950
4	Excavation, Class 13, For Widening	CY	700	$10	$7,000
5	PCC Pavement 7-Inch (Roadway Widening)	SY	6,274	$45	$282,330
6	PCC Pavement 6-Inch (Driveways)	SY	3,178	$35	$111,230
7	HMA Overlay, 3-Inch	SY	3,549	$25	$88,725
8	Removal of Pavement	SY	6,630	$5	$33,150
9	PCC Recreational Trail, 10 ft Wide	SY	-	$35	$0
10	PCC Sidewalk, 5 ft Wide	SY	-	$30	$0
11	Traffic Signalization	LS	-	$160,000	$0
12	Storm Sewer Improvements	LS	1	$40,000	$40,000
13	Traffic Control	LS	1	$50,000	$50,000
14	Mobilization	LS	1	$15,000	$15,000
15	Seeding and Fertilizing (Rural)	LS	1	$5,000	$5,000
16	Misc. Utility Relocations	LS	1	$5,000	$5,000
17	Construction Survey	LS	1	$5,000	$5,000
	Construction Cost Subtotal				$739,690
	15% Contingency				$111,000
	Construction Cost Subtotal				$850,690
	Engineering (18%)				$153,100
	Alternative 2				**$1,003,790**

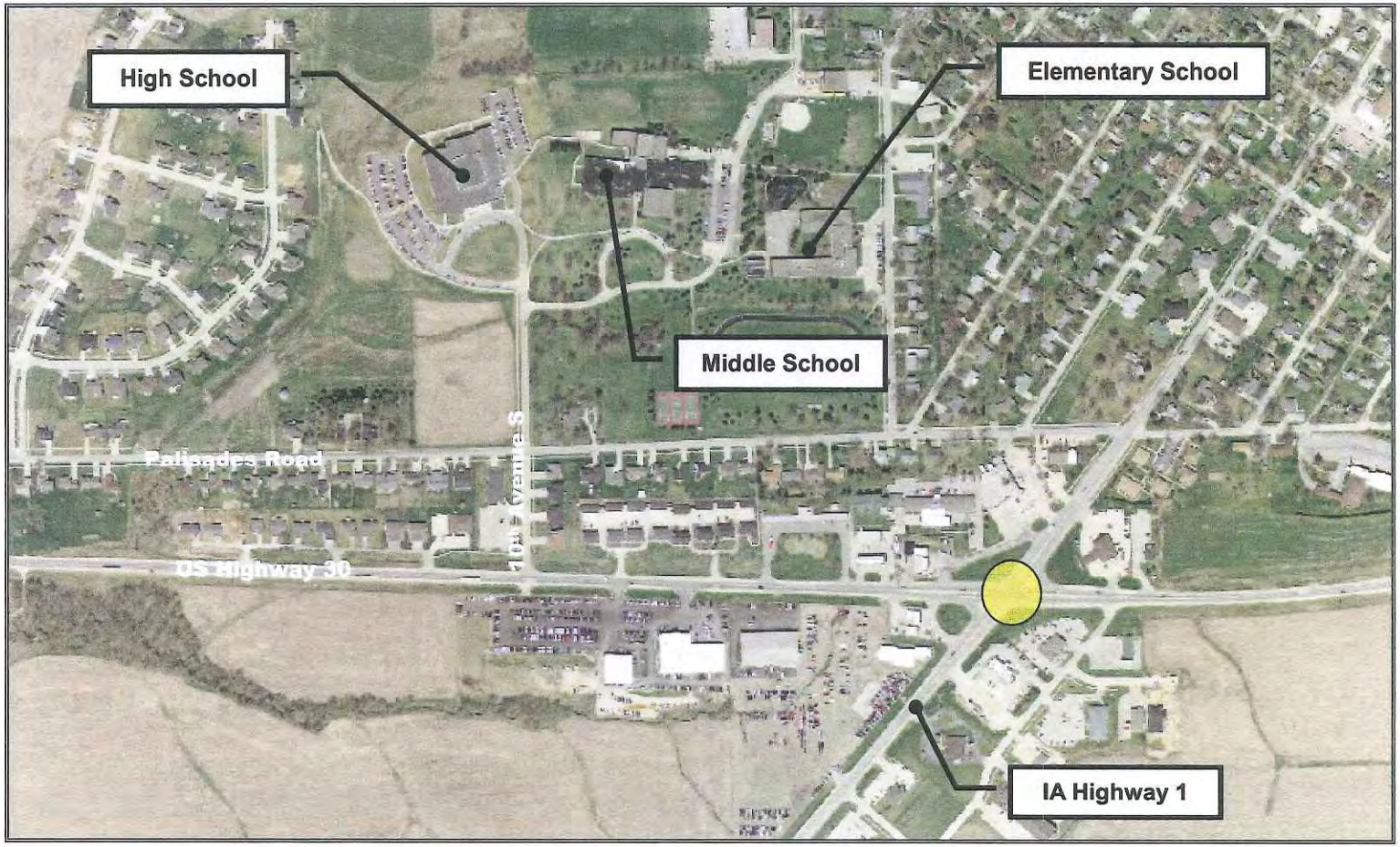
HIGHWAY 1 INTERSECTION
Urban 3-Lane with Roundabout at US Hwy 30

FUNDING SOURCE	PROJECTED COST
ICAAP	$373,419.00
REQUIRED CITY ICAAP MATCH	$93,355.00
TSIP FUNDING REQUEST	$384,126.00
ENGINEERING FUNDED BY THE CITY	$153,100.00
TOTAL PROJECT COST	$1,004,000

TSIP FUNDS APPLICATION

PROJECT SCHEDULE

PROJECT SCHEDULE BREAKDOWN	START DATE	COMPLETION DATE
PROJECT DESIGN	MAY 2011	NOVEMBER 2011
NEGOTIATE CONSOLIDATION OF ACCESS WITH ADJACENT PROPERTY OWNERS	JUNE 2011	OCTOBER 2011
BID LETTING	NOVEMBER 2011	N/A
CONSTRUCTION PERIOD	APRIL 2012	NOVEMBER 2012



Project Location

APPLICATION FOR
IOWA TRAFFIC SAFETY IMPROVEMENT PROGRAM
FUNDING

INTERSECTION INMPROVEMENTS AT
US HIGHWAY 30 AND IOWA HIGHWAY 1
CITY OF MOUNT VERNON, IOWA

LOOKING WEST

LOOKING NORTH (STANDING ON EAST SIDE)

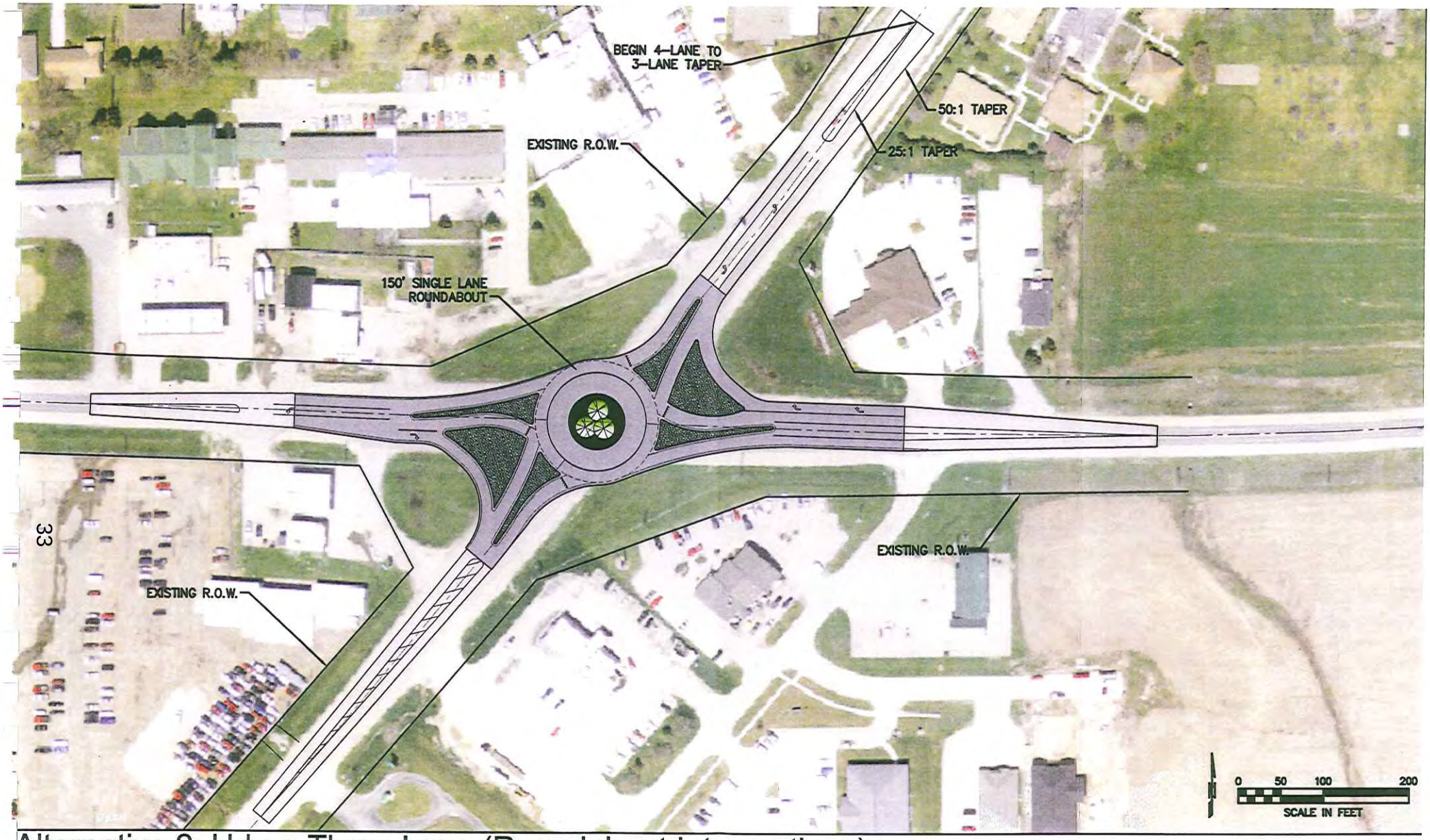
LOOKING SOUTHWEST

LOOKING NORTH (STANDING ON WEST SIDE)

LOOKING SOUTH (STANDING ON WEST SIDE)

LOOKING SOUTH (STANDING ON WEST SIDE)

JUNE 2010



Alternative 2: Urban Three-Lane (Roundabout Intersections)

(Highway 1 Intersection - Interim Plan)

ISSUED FOR APPROVAL 6.4.2010
PROJECT NO. 210175

APPLICATION FOR
IOWA TRAFFIC SAFETY IMPROVEMENT PROGRAM FUNDING

INTERSECTION INMPROVEMENTS AT
US HIGHWAY 30 AND IOWA HIGHWAY 1
CITY OF MOUNT VERNON, IOWA

SCALE: 1"=200'

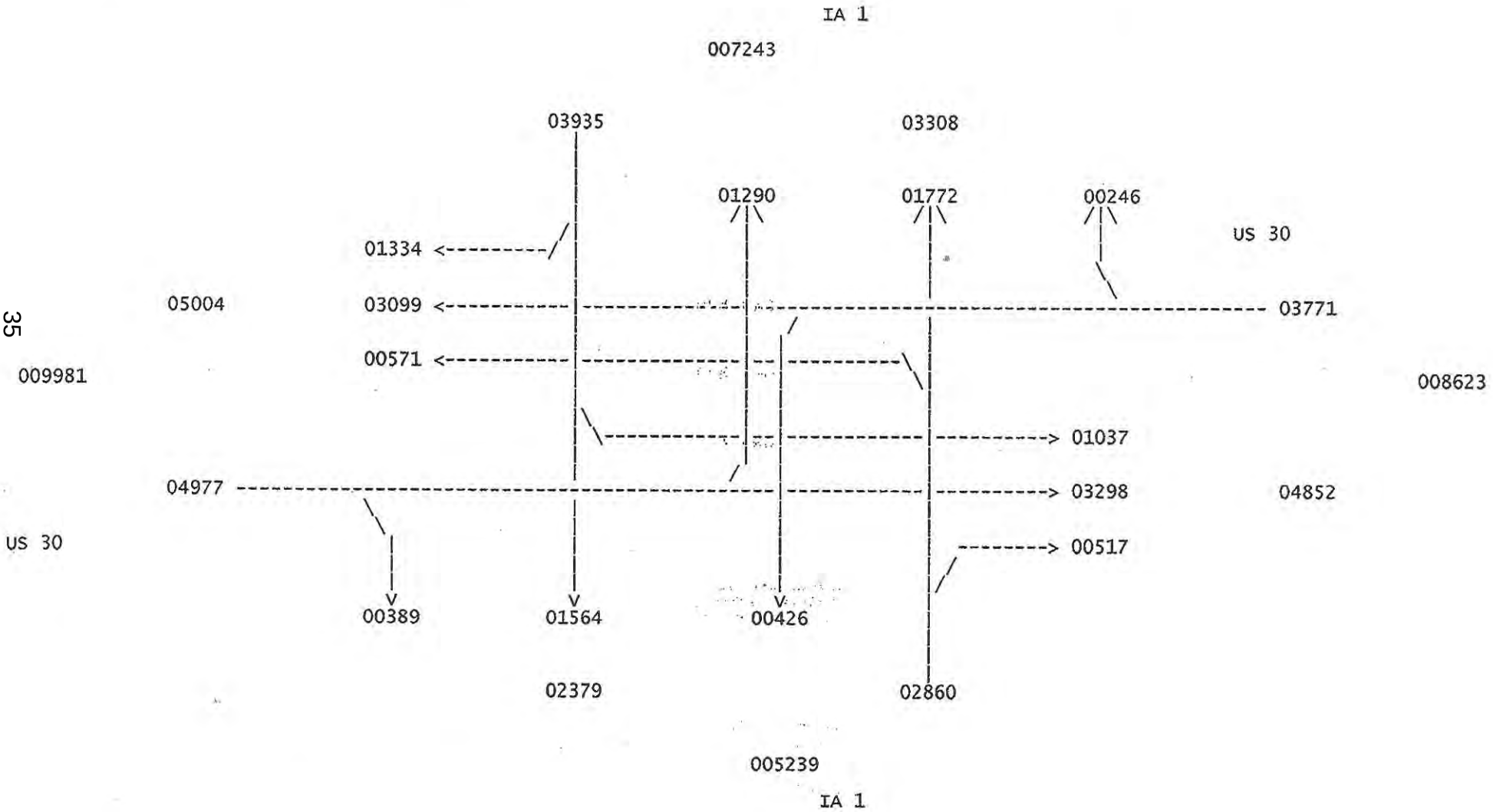
JUNE 2010

DATE: 01-29-2008

IOWA DEPARTMENT OF TRANSPORTATION
VEHICULAR TURNING MOVEMENTS
ANNUAL AVERAGE DAILY TRAFFIC - YEAR 2005
IN MOUNT VERNON

COUNTY:LINN
US 30 & IA 1

STATION NO. 57 14 6549 0991



D1530926

COUNTY	TOWNSHIP	NODE	LOCATION	YEAR
57	14	6549	0991	2005

TURNING MOVEMENT SYSTEM
TRAFFIC COUNT SUMMARY
ALL VEHICLES

PRINTER ID: TPRT003W
CITY: MOUNT VERNON
COUNTY: LINN

HOUR	******* NORTH LEG ******* IA 1				******* EAST LEG ******** US 30				******* SOUTH LEG ******* IA 1				******* WEST LEG ******** US 30			
	RT	ST	LT	TOTAL	RT	ST	LT	TOTAL	LT	ST	RT	TOTAL	LT	ST	RT	TOTAL
07- 8AM	214	158	45	417	1	459	69	529	48	79	25	152	67	136	37	240
08- 9AM	84	127	50	261	23	215	48	286	38	76	21	135	56	125	29	210
09-10AM	89	110	52	251	16	240	35	291	45	95	13	153	59	149	37	245
11-12PM	69	95	75	239	27	168	21	216	36	99	31	166	63	139	52	254
12-1 PM	80	121	74	275	25	162	23	210	37	92	41	170	78	169	29	276
3- 4PM	80	103	88	271	21	184	15	220	39	165	39	243	136	307	5	448
4- 5PM	95	108	112	315	13	172	20	205	48	246	89	383	147	454	18	619
5- 6PM	53	74	98	225	15	175	13	203	36	163	37	236	133	410	16	559
TOTALS	764	896	594	2254	141	1775	244	2160	327	1015	296	1638	739	1889	223	2851

STATION DISPLAYED
PF4 QUARTER HOUR PF5 CLASS PF7 BKWD PF8 FWD PF15 MAIN MENU PF21 SCREEN PRINT CLEAR EXIT

Intersection or Spot Benefit / Cost Safety Analysis

Rev. 8/09

Iowa DOT Office of Traffic & Safety

County: Linn Prepared by: Shive-Hattery Date Prepared: Jun 4, 2010

Intersection: US Highway 30 and US Highway 1

Improvement

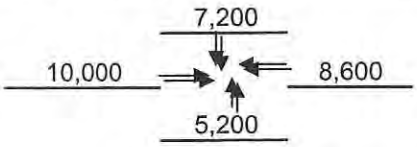
Proposed Improvement(s): Reconstruct existing all stop 45-degree skew intersection to a roundabout configuration.

$ 851,000	Estimated Improvement Cost, **EC**	20	Est. Improvement Life, years, **Y**
$ -	Other Annual Cost (after initial year), **AC**	72	Crash Reduction Factor (integer), **CRF**
$ -	Present Value Other Annual Costs, **OC**	4.0%	Discount Rate (time value of $), **INT**
	$$OC = \frac{AC}{INT}\left(1 - \frac{1}{(1+INT)^Y}\right)$$	$ 851,000	Present Value Cost, **COST** = EC + OC

Traffic Volume Data

Source: IA DOT Traffic Flow Map of Mount Vernon 2005 Date of traffic count

Daily Entering Vehicles by Approach (or AADT / 2)



		11,315,000	Current Annual Entering Veh., **AEV** = DEV * 365
		82,252	veh / day, Final Year DEV, **FDEV**
		374.14	MEV, Total Million Entering Veh. Over life of Project, **TMEV**
5.0%	Projected Traffic Growth (0%-10%), **G**		$$TMEV = \frac{AEV}{-G}\left(1 - \left(\frac{1+G}{1}\right)^Y\right) \Big/ 10^6$$
31,000	Current Daily Entering Vehicles, **DEV**		

Crash Data

2004 First full year --> 2008 Last full year 5.0 years, Time Period, **T**

Additional months values as of Dec. 2007

0	Fatal Crashes	0	Fatalities @	$3,500,000	$ -
		1	Major Injuries @	$240,000	$ 240,000
11	Injury Crashes	6	Minor Injuries @	$48,000	$ 288,000
		4	Possible Injuries @	$25,000	$ 100,000
19	Property Damage Only		(assumed cost per crash)	$2,700	$ 81,000
			-OR- enter all Property Costs of all crashes:		
30	Total Crashes, **TA**			Total $ Loss, **LOSS**	$ 709,000

6.00	Current Crashes / Year, **AA** = TA / T	**0.53**	Crashes / MEV, Crash Rate, **CR** CR = TA x 10^6 / (DEV x 365 x T)
$ 23,633	Cost per Crash, **AVC** = LOSS / TA		
198.4	Total Expected Crashes, **TECR** = CR x TMEV	$ 2,153,515	Present Value of Avoided Crashes, **BENEFIT**
4.32	Crashes Avoided First Year **AAR** = AA x CRF / 100		
$ 102,096	Crash Costs Avoided in First Year, AAR x AVC		$$BEN. = \frac{AVC \times AAR}{(INT - G)}\left(1 - \left(\frac{1+G}{1+INT}\right)^Y\right)$$
142.8	Total Avoided Crashes, TECR x CRF/ 100		

Benefit / Cost Ratio

Benefit : Cost = $2,153,515 : $851,000 = **2.53** : 1

Iowa Department of Transportation

Rev. 3/08

Application for TRAFFIC SAFETY FUNDS

GENERAL INFORMATION

Location / Title of Project: US Highway 30 and Tenth Avenue SW

Applicant: City of Mount Vernon, Iowa

Contact Person: Daniel J. Boggs, P.E. Title: City Engineer

Complete Mailing Address: 213 First Street West
Mount Vernon, Iowa 52314

Phone: (319) 895-0880 (Area Code) E-Mail: dboggs@cityofmtvernon-ia.gov

If more than one highway authority is involved in this project, please indicate and fill in the information below (use additional sheets if necessary).

Co-Applicant(s) _____

Contact Person _____ Title _____

Complete Mailing Address _____

_____

Phone _____ (Area Code) E-Mail _____

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Application Type

- Site Specific ☒
- Traffic Control Device ☐
- Safety Study ☐

Funding Amount

Total Project Cost $ 768,290.00

Safety Funds Requested $ 500,000.00

Application for Traffic Safety Improvement Program Funds
June 14, 2010

PROJECT NARRATIVE

Introduction and Background Information

The City of Mount Vernon, Iowa received a grant from the Iowa Department of Transportation Traffic Engineering Assistance Program (TEAP) to complete an intersection study of the intersection of U.S. Highway 30 and Iowa Highway 1. The City also shared in the cost of the study by expanding the study area of U.S. Highway 30 and Tenth Avenue SW and the intersection of Iowa Highway 1 and Palisades Road SW. This study was completed in November of 2006.

Data and recommendations from the 2006 TEAP study were used to show need and applicability for the use of Iowa Clean Air Attainment Program (ICAAP) funds. Iowa Clean Air Attainment funds were applied for and granted by the Highway Commission based on inefficiencies of the existing intersection of U.S. Highway 30 and Iowa Highway 1 at peak hours. The funds are available for use for the construction of a fully actuated traffic signal or a roundabout type intersection traffic control concept.

Concurrently the City of Mount Vernon contracted outside traffic engineering services from Shive Hattery Engineers for a U.S. Highway 30 Corridor Pre-Design. These services included the preliminary field work (a complete topographic and boundary survey), a total of three corridor design concepts, detailed cost estimates for each design concept, and presentations in a public forum. A number of issues were addressed in the design concepts, safety being a major issue that was addressed in the summary of findings.

The City of Mount Vernon and the Iowa Department of Transportation, along with outside sources has determined a need, a plan of action, and determination of probable costs for intersection and corridor improvements based on the existing level of service (LOS), condition of the present infrastructure, as well as safety. Even with the phasing of the recommended improvements, limiting the project scopes to a minimum, and the inclusion of ICAAP fund sources, the cost of any recommended phase is beyond the bonding capacity of the City or what the City feels comfortable contributing towards a federal aid system roadway.

The city is therefore seeking funding from additional sources, this application based on merit of need based on intersection safety improvements.

Existing Conditions

US Highway 30 (US 30) is a two-lane rural cross section highway with a 50 mph speed limit. 10th Avenue is a local urban street extending north of US Highway 30, creating a 3-way intersection with stop condition for southbound 10th Avenue and no traffic control for either leg of Us Highway 30.

In 2006, construction of a new Mount Vernon High School was completed on a site northwest of the referenced intersection. With anticipated increases in traffic in the area, a capacity analysis was completed. Ultimately, the analysis anticipated an increase of 205 trips (or 1,215 vpd) during peak school hours. When these traffic volumes are considered in the context of time of day and level of service (LOS), the existing conditions create an overall score of E, D, and E for peak hour morning travel, school dismissal, and afternoon trips, respectively. The LOS for off peak travel involving the study intersection is A.

In the fall of 2007, the city of Mount Vernon requested that a speed study be conducted at the US Highway 30 and Iowa Highway 1 intersection corridors. The primary results of the study indicated that no change be made to the existing speed zone. This would result in a 50 MPH speed limit on a congested 2-lane rural section in an urbanized commercial district with a significant number of access points on both sides of the roadway leading to a dangerous number of opportunities for left turn movements on a high speed roadway corridor.

The recommendation of the Iowa Department of Transportation to modify this unsafe condition was to insert a 45 MPH speed zone and a 35 MPH speed zone within the existing 50 MH speed zone. The resulting US Highway 30 speed zone is shown in Exhibit "A".

The speed study results showed no significant change to the Iowa Highway 1 speed zone, which is also shown in Exhibit "A".

To compliment the speed zone modification, in the spring of 2009, as the result of a City of Mount Vernon request, the Iowa Department of Transportation installed advanced warning signage for the intersection of U.S. Highway 30 and Tenth Avenue SW for the Eastbound lane of US Highway 30.

As part of the 2009 Shive-Hattery services, hose counts and peak-hour traffic turn movement counts were taken at this intersection. A 8-hour, 15-minute interval exhibit of the data is attached. Conversion of these numbers to AADT yields volumes of 11,400 vpd on US Highway 30 and 700 vpd on 10th Avenue.

Proposed Project

With funding sources including TSIP, the City wishes to have a modern urban roundabout constructed at the intersection of US Highway 30 and 10th Avenue.

Proposed intersection geometric improvements involve removing existing intersection pavements and medians, lowering and the existing grade, and installing a single lane 150' diameter modern single-lane urban roundabout.

Project Justification

The review of the crash history for the 5-year period from 2004-2008 indicated a total of 14 crashes affected by vehicular traffic within and around this intersection and within the limits of the US Highway and 10th Avenue. The analysis of this crash information is summarized in the following table:

CRASH TYPE	NUMBER OF CRASHES
REAR END	9
BROAD SWIPE	3
SIDE SWIPE	0
LEFT TURN/ANGLE	2
TOTAL	14
DAMAGE AMOUNT	$137,900

INJURY TYPE	NUMBER OF INJURIES
POSSIBLE	6
MINOR	2
MAJOR	1
TOTAL	9

Of the 14 crashes reported in the 5 year period, there were 3 personal injury crashes with no fatalities. Of the 14 crashes reported, a total of 9 crashes were rear end crashes which would indicate crashes caused a combination of high speed and lack of a left turn lane on US Highway 30. The Broad Swip and Left turn/angle crashes are also an indication of difficulties southbound 10th Avenue have turning safely onto US Highway 30. The number and severity of crashes would be improved by the construction of a roundabout.

The Final Summary of Findings for the Traffic Evaluation and Corridor Preliminary Plans, US Highway 30-from 10th Avenue to Virgil Street (Feb. 16, 2010) State on page 4:

"Further evaluation of the three alternatives led to the recommendation of Alternative 2 – Urban 3-lane with Roundabouts at both the 10th Avenue and the US 30 IA 1 intersection for the interim and Ultimate Plans."

The Roundabout concept for the intersection of US Highway 30 and 10th Avenue provides the best solution in terms of safety and crash reduction/prevention, speed reduction, traffic calming and pedestrian safety at all traffic hours when compared to a signalized intersection. There is also the added benefit of a more aesthetically pleasing environment and a marked reduction in long term facility maintenance costs.

10th Ave Intersection

Urban 3-lane with Roundabout at 10th Ave. Intersection (sta 0+55 - sta 16+50)

ITEM	DESCRIPTION	UNIT	QUANTITY	UNIT COST	EXTENDED COST
1	Modified Subbase - 6 Inch	SY	5,992	$7	$41,944
2	Granular Shoulder - 6 ft Wide	SY	-	$5	$0
3	HMA Shoulder, 4 ft Wide	SY	-	$25	$0
4	Excavation, Class 13, For Widening	CY	3,000	$10	$30,000
5	PCC Pavement 10-Inch	SY	2,816	$55	$154,880
6	PCC Pavement 6-Inch (Driveways)	SY	750	$40	$30,000
7	HMA Overlay, 3-Inch	SY	-	$15	$0
8	HMA Tapers	SY	2,631	$40	$105,240
9	Removal of Pavement	SY	4,431	$5	$22,155
10	PCC Recreational Trail, 10 ft Wide	SY	-	$35	$0
11	PCC Sidewalk, 5 ft Wide	SY	-	$30	$0
12	Traffic Signalization	LS	-	$180,000	$0
13	Storm Sewer Improvements	LS	1	$75,000	$75,000
14	Traffic Control/ Temp Detour Road	LS	1	$65,625	$65,625
15	Mobilization	LS	1	$25,000	$25,000
16	Seeding and Fertilizing (Rural)	LS	1	$3,750	$3,750
17	Misc. Utility Relocations	LS	1	$7,500	$7,500
18	Construction Survey	LS	1	$5,000	$5,000
	Construction Cost Subtotal				$566,090
	15% Contingency				$85,000
	Construction Cost Subtotal				$651,090
	Engineering (18%)				$117,200
	Alternative 2				**$768,290**

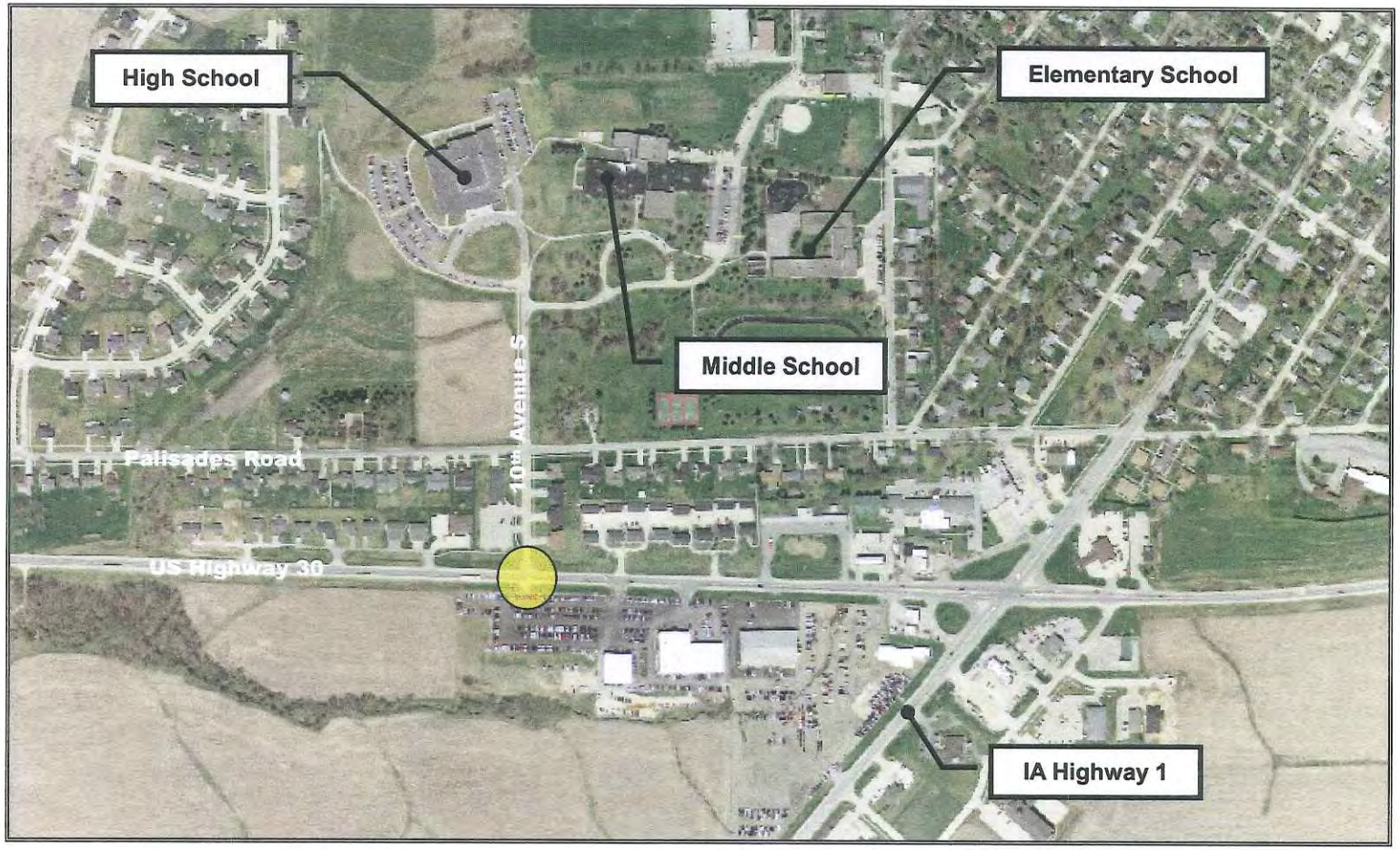
TENTH AVENUE SW
Urban 3-Lane with Roundabout at US Hwy 30

FUNDING SOURCE	PROJECTED COST
TRAFFIC SAFETY	$500,000.00
LOCAL FUNDS	$268,000.00
TOTAL PROJECT COST	$768,000

TSIP FUNDS APPLICATION

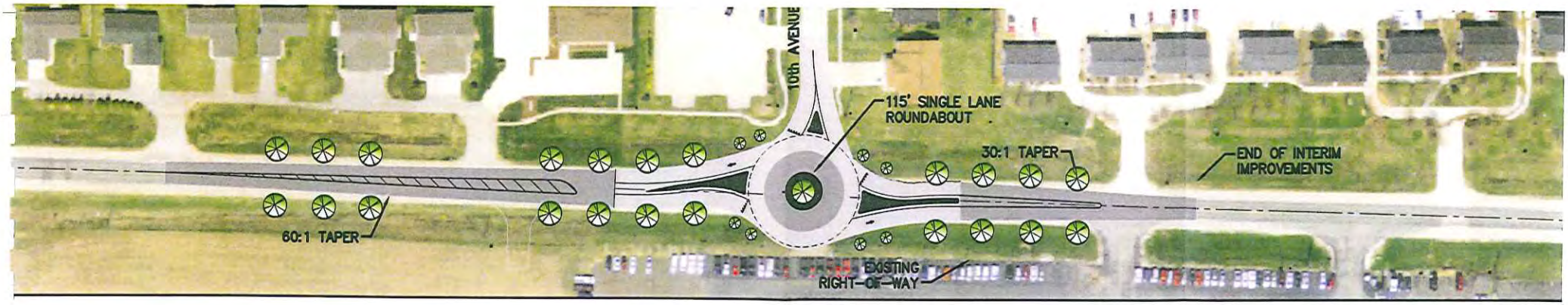
PROJECT SCHEDULE

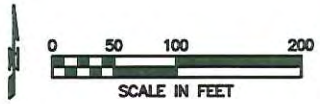
PROJECT SCHEDULE BREAKDOWN	START DATE	COMPLETION DATE
PROJECT DESIGN	MAY 2011	NOVEMBER 2011
NEGOTIATE CONSOLIDATION OF ACCESS WITH ADJACENT PROPERTY OWNERS	JUNE 2011	OCTOBER 2011
BID LETTING	NOVEMBER 2011	N/A
CONSTRUCTION PERIOD	APRIL 2012	NOVEMBER 2012



Project Location

210175





Alternative 2: Urban Three-Lane (Roundabout Intersection)

(10th Avenue Intersection - Interim Plan)

ISSUED FOR APPROVAL 6.4.2010
PROJECT NO. 210175

APPLICATION FOR
IOWA TRAFFIC SAFETY IMPROVEMENT PROGRAM FUNDING

INTERSECTION INMPROVEMENTS AT
US HIGHWAY 30 AND TENTH AVENUE SW
CITY OF MOUNT VERNON, IOWA

SCALE: 1"=200'

JUNE 2010

Mt. Vernon US HWY 30 Preliminary Design
207314-0
October 14, 2009

	SOUTHBOUND				WESTBOUND				NORTHBOUND				EASTBOUND				Approach Volume		
	Right	Thru	Left		Right	Thru	Left		Right	Thru	Left		Right	Thru	Left		Major	Minor	Total
0700	12	0	1		16	167	0		0	0	0		0	40	9				
0715	13	0	2		3	176	0		0	0	0		0	68	10				
0730	24	0	1		8	209	0		0	0	0		0	56	13				
0745	12	0	6		23	132	0		0	0	0		0	72	17				
	61	0	10	71	50	684	0	734	0	0	0	0	0	236	49	285	920	109	1029
0800	21	0	7		27	127	0		0	0	0		0	48	25				
0815	8	0	5		8	114	0		0	0	0		0	62	8				
0830	8	0	3		6	79	0		0	0	0		0	41	1				
0845	4	0	3		4	71	0		0	0	0		0	58	1				
	41	0	18	59	45	391	0	436	0	0	0	0	0	209	35	244	600	98	698
0900	5	0	3		0	74	0		0	0	0		0	58	8				
0915	1	0	1		1	76	0		0	0	0		0	59	3				
0930	4	0	2		5	73	0		0	0	0		0	56	4				
0945	2	0	0		4	82	0		0	0	0		0	57	1				
	12	0	6	18	10	305	0	315	0	0	0	0	0	230	16	246	535	32	567
1100	8	0	4		7	47	0		0	0	0		0	39	3				
1115	4	0	3		7	59	0		0	0	0		0	62	2				
1130	5	0	6		3	62	0		0	0	0		0	55	6				
1145	3	0	3		5	41	0		0	0	0		0	49	2				
	20	0	16	36	22	209	0	231	0	0	0	0	0	205	13	218	414	51	465
1200	5	0	7		2	53	0		1	0	0		0	61	3				
1215	4	0	1		4	63	0		0	0	0		0	68	5				
1230	2	0	4		1	75	0		0	0	0		1	59	4				
1245	4	0	2		8	69	0		0	0	0		0	68	1				
	15	0	14	29	15	260	0	275	1	0	0	1	1	256	13	270	516	44	560
1400	1	0	1		0	65	0		0	0	0		0	78	2				
1415	2	0	6		1	80	0		0	0	0		0	68	5				
1430	1	0	3		5	66	0		0	0	0		0	94	2				
1445	3	0	2		7	60	0		0	0	0		0	71	18				
	7	0	12	19	13	271	0	284	0	0	0	0	0	311	27	338	582	52	634
1500	14	0	12		13	62	0		0	0	0		0	89	10				
1515	18	0	11		3	60	0		0	0	0		0	126	3				
1530	8	0	9		9	85	0		0	0	0		0	107	10				
1545	3	0	7		7	61	0		0	0	0		0	161	14				
	43	0	39	82	32	268	0	300	0	0	0	0	0	483	37	520	751	108	859
1600	8	0	5		9	54	0		0	0	0		0	122	9				
1615	4	0	2		5	82	0		0	0	0		0	161	21				
1630	14	0	1		8	76	0		0	0	0		0	145	10				
1645	3	0	2		4	56	0		0	0	0		0	190	16				
	29	0	10	39	26	268	0	294	0	0	0	0	0	618	56	674	886	92	978
1700	12	0	1		10	60	0		0	0	0		0	154	16				
1715	5	0	4		15	70	0		0	0	0		0	216	31				
1730	9	0	4		10	69	0		0	0	0		0	175	24				
1745	13	0	3		11	60	0		0	0	0		0	150	8				
	39	0	12	51	46	259	0	305	0	0	0	0	0	695	79	774	954	137	1091

Intersection or Spot Benefit / Cost Safety Analysis

Rev. 8/09

Iowa DOT Office of Traffic & Safety

County: Linn Prepared by: Shive-Hattery Date Prepared: Jun 5, 2010

Intersection: US Hightway 30 & 10th Avenue - Mount Vernon

Improvement

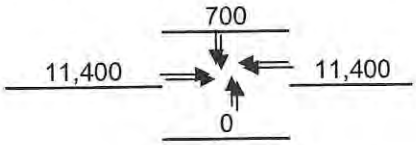
Proposed Improvement(s): Convert existing Tee intersection with stop condition on 10th Avenue to a Roundabout

$ 651,000	Estimated Improvement Cost, **EC**	20	Est. Improvement Life, years, **Y**
$ -	Other Annual Cost (after initial year), **AC**	78	Crash Reduction Factor (integer), **CRF**
$ -	Present Value Other Annual Costs, **OC**	4.0%	Discount Rate (time value of $), **INT**
	$$OC = \frac{AC}{INT}\left(1 - \frac{1}{(1+INT)^Y}\right)$$	$ 651,000	Present Value Cost, **COST** = EC + OC

Traffic Volume Data

Source: AADT based on hose counts taken by Shive-Hattery 10/14/2009 Date of traffic count

Daily Entering Vehicles by Approach (or AADT / 2)



8,577,500 Current Annual Entering Veh., **AEV** = DEV * 365

62,352 veh / day, Final Year DEV, **FDEV**

283.62 MEV, Total Million Entering Veh. Over life of Project, **TMEV**

5.0% Projected Traffic Growth (0%-10%), **G**

23,500 Current Daily Entering Vehicles, **DEV**

$$TMEV = \frac{AEV}{-G}\left(1 - \left(\frac{1+G}{1}\right)^Y\right) \Big/ 10^6$$

Crash Data

2004 First full year --> 2008 Last full year 5.0 years, Time Period, **T**

0 Additional months values as of Dec. 2007

0	Fatal Crashes	0	Fatalities @	$3,500,000	$ -
		1	Major Injuries @	$240,000	$ 240,000
9	Injury Crashes	2	Minor Injuries @	$48,000	$ 96,000
		6	Possible Injuries @	$25,000	$ 150,000
5	Property Damage Only		(assumed cost per crash)	$2,700	$ 37,800
			-OR- enter all Property Costs of all crashes:		
14	Total Crashes, **TA**			Total $ Loss, **LOSS**	$ 523,800

2.80 Current Crashes / Year, **AA** = TA / T

$ 37,414 Cost per Crash, **AVC** = LOSS / TA

92.6 Total Expected Crashes, **TECR** = CR x TMEV

2.18 Crashes Avoided First Year **AAR** = AA x CRF / 100

$ 81,713 Crash Costs Avoided in First Year, AAR x AVC

72.2 Total Avoided Crashes, TECR x CRF/ 100

0.33 Crashes / MEV, Crash Rate, **CR**

CR = TA x 10^6 / (DEV x 365 x T)

$ 1,723,572 Present Value of Avoided Crashes, **BENEFIT**

$$BEN. = \frac{AVC \times AAR}{(INT - G)}\left(1 - \left(\frac{1+G}{1+INT}\right)^Y\right)$$

Benefit / Cost Ratio

Benefit : Cost = $1,723,572 : $651,000 = **2.65** : 1

Rev. 3/08 A_1

Iowa Department of Transportation

Application for TRAFFIC SAFETY FUNDS

GENERAL INFORMATION

Location / Title of Project D-22 Curves

Applicant Buchanan County Secondary Roads

Contact Person Brian P. Keierleber Title Buchanan County Engineer

Complete Mailing Address 1511 1st. St. East
Independence Ia. 50644

Phone 319-334-6031 (Area Code) E-Mail engineer@co.buchanan.ia.us

If more than one highway authority is involved in this project, please indicate and fill in the information below (use additional sheets if necessary).

Co-Applicant(s) _____

Contact Person _____ Title _____

Complete Mailing Address _____

_____

Phone _____ (Area Code) E-Mail _____

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Application Type

- Site Specific ☒
- Traffic Control Device ☐
- Safety Study ☐

Funding Amount

Total Project Cost $ 167,485

Safety Funds Requested $ 133,988

B

D-22 Curves Narrative

Buchanan County is developing a grading project from Independence to Winthrop on D-22. A very tight curve west of Winthrop has a history of severe accidents. Fatalities have occurred there on a reoccurring basis. Flashing warning lights were installed and a double fatality occurred after their installation. We are searching for funding to flatten this curve from a D of 10 and an R of 572 ft. to an R=to 1500ft. The Buchanan County Board is firmly in support of making these improvements.

D-22 Cost estimate Winthrop curves.

L = 772 ft

Pavement

Removal

772 ft x 24 /9 = 2058 sy. x $14/sy = $28, 812

replacement 9"
2058 sy x $41.48 = $85, 365

Excavation Class 10
772 x 50 x 3 x 1.3 x 1/27 x $3.00 = $ 16,726

rock base

772 x 44 x .5 x 130/2000 x $15.00 = $16,555

ROW .5 acres X $1500/ acre =$7500.

Miscellaneous, shoulder construction, pavement markings, compaction, etc. =$12,500.

TOTAL = $167,458.00

We plan to use FM funds to supplement TSIP funds as necessary.

TIME SCHEDULE

D

D-22 Curve Flattening.

CURRENT Archaeology and Wetlands are completed and we are awaiting environmental Concurrence.

Design underway
July 2011 letting
Construction Fall 2011- spring 2012
Completion Fall 2012

PROJECT LOCATION

HIGHWAY AND TRANSPORTATION MAP

BUCHANAN COUNTY IOWA

E

Prepared By

Iowa Department of Transportation

Phone (515) 239-1282

In Cooperation With

United States Department of Transportation

SCALE IN MILES

SCALE IN KILOMETERS

JANUARY 1, 2009

10 - 14 - 09

LEGEND

DIVIDED HIGHWAY
PAVED ROAD
BITUMINOUS ROAD
GRAVEL ROAD
EARTH ROAD

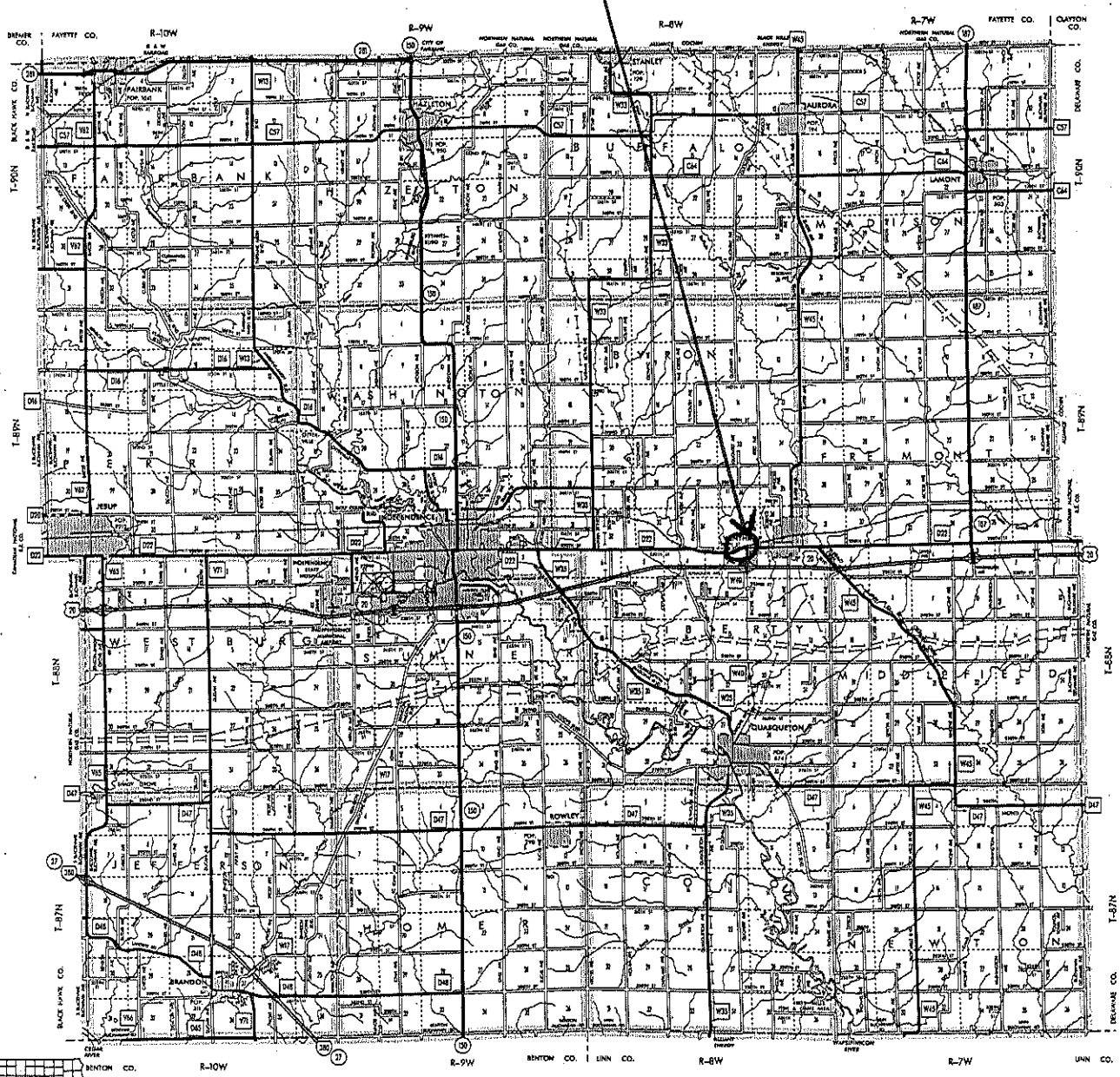
INTERSTATE HIGHWAY
UNITED STATES HIGHWAY
STATE HIGHWAY
COUNTY HIGHWAY

RAILROAD
PIPELINE
AIRPORT
HYDROLOGY
BRIDGE

STATE BOUNDARY
COUNTY BOUNDARY
CORPORATE LIMIT LINE
TOWNSHIP LINE
SECTION LINE
ROAD NAMES

STATE PARKS

INSTITUTIONS



10

F_1

EAST BOUND

WEST BOUND

F3

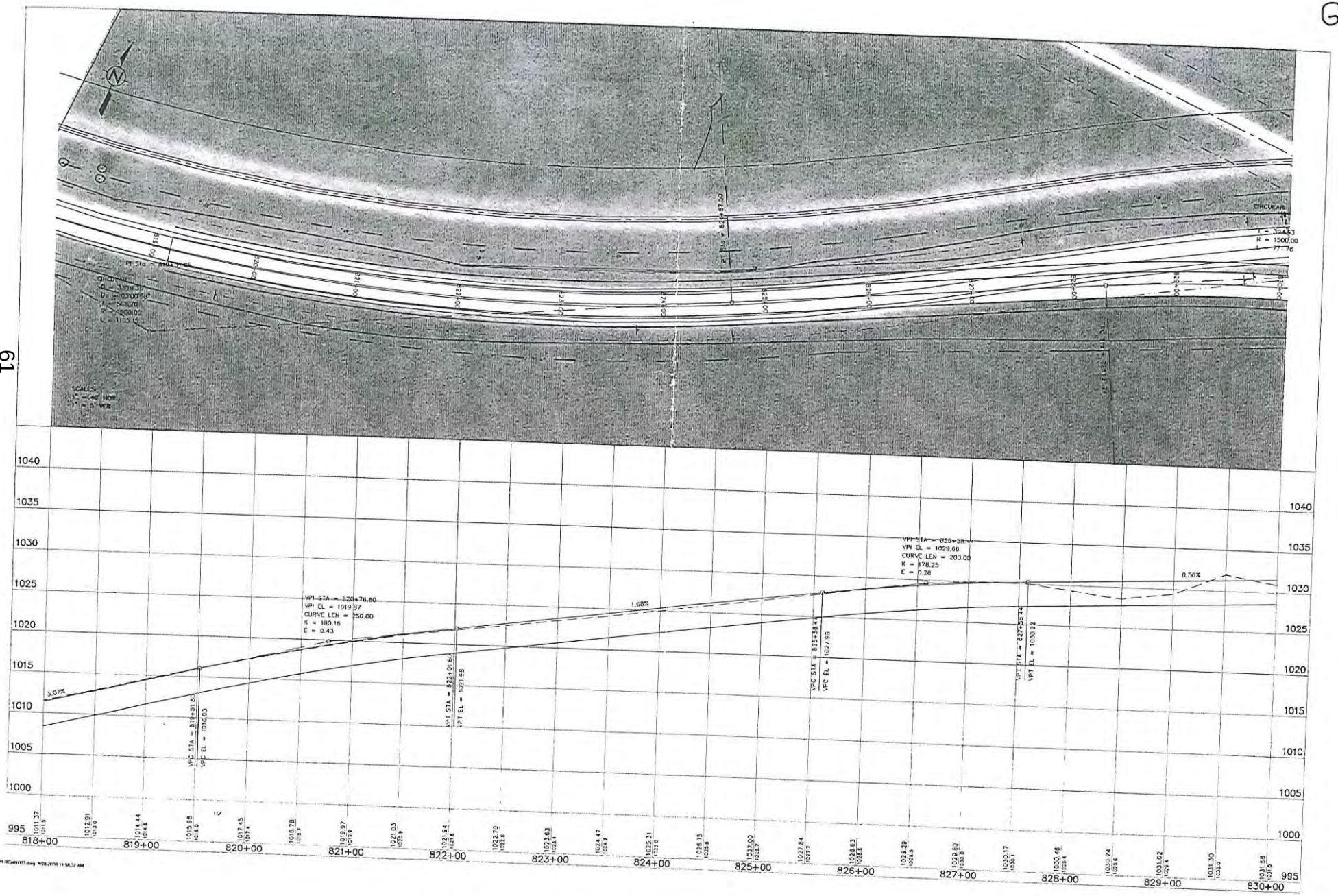
EAST BOUND AT ADVANCE WARNING FLASH LIGHT

GCS Abutments

F4

GCS ABUTMENTS

West Bound


VPI STA = 820+76.80
VPI EL = 1019.97
CURVE LEN = 250.00
K = 180.16
E = 0.43
VPI STA = 828+58.44
VPI EL = 1029.66
CURVE LEN = 200.00
K = 178.25
E = 0.28
3.07%
1.68%
0.56%
VPC STA = 818+51.83
VPC EL = 1016.03
VPT STA = 822+01.85
VPT EL = 1021.98
VPC STA = 825+58.44
VPC EL = 1027.65
VPT STA = 827+58.44
VPT EL = 1030.32
1040
1035
1030
1025
1020
1015
1010
1005
1000
995
818+00
819+00
820+00
821+00
822+00
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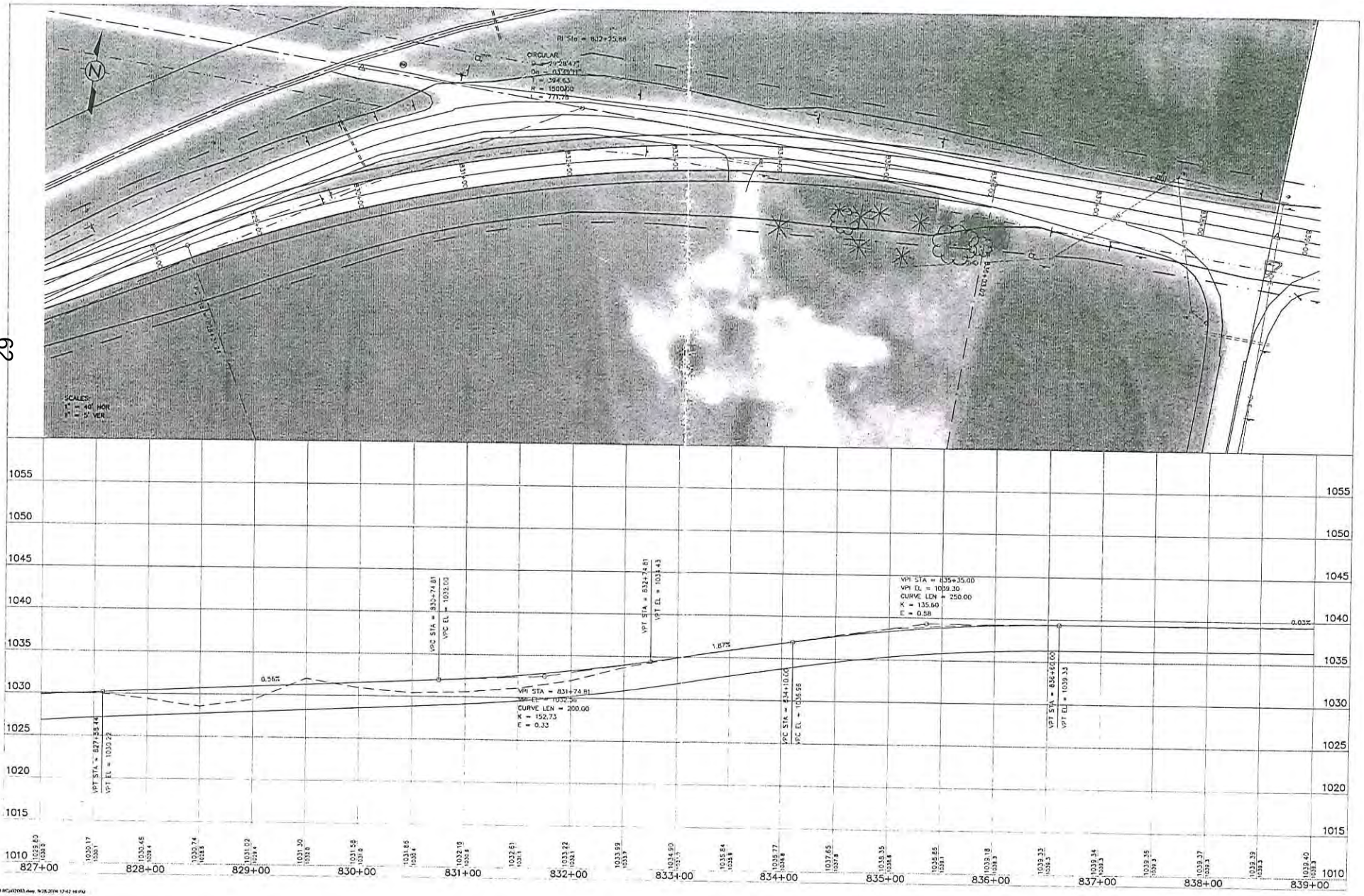
824+00
825+00
826+00
827+00
828+00
829+00
830+00

G2


CIRCULAR
D = 29°28'47"
Do = 3°29'11"
T = 394.63
R = 1600.00
L = 771.78
SCALES:
1" = 40' HOR
1" = 5' VER
VPI STA = 827+55.74
VPI EL = 1030.22
VPC STA = 829+74.81
VPC EL = 1032.03
VPT STA = 832+74.81
VPT EL = 1031.43
VPI STA = 831+74.81
CURVE LEN = 200.00
K = 152.73
E = 0.33
VPC STA = 834+10.00
VPC EL = 1035.58
VPI STA = 835+35.00
VPI EL = 1039.30
CURVE LEN = 250.00
K = 135.60
E = 0.58
VPT STA = 836+60.00
VPT EL = 1039.33
0.56%
1.87%
0.03%
827+00
828+00
829+00
830+00
831+00
832+00
833+00
834+00
835+00
836+00
837+00
838+00
839+00
1055
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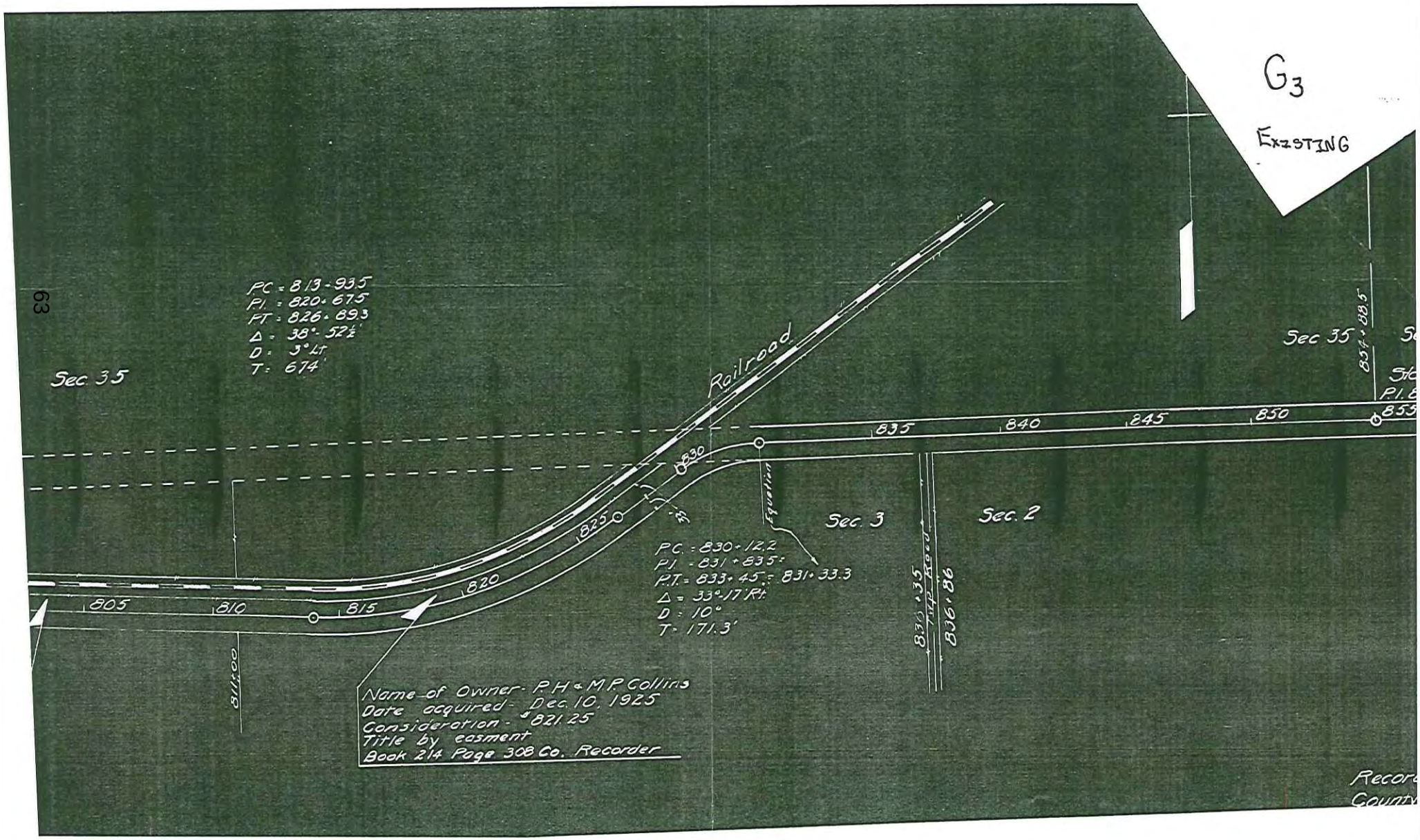
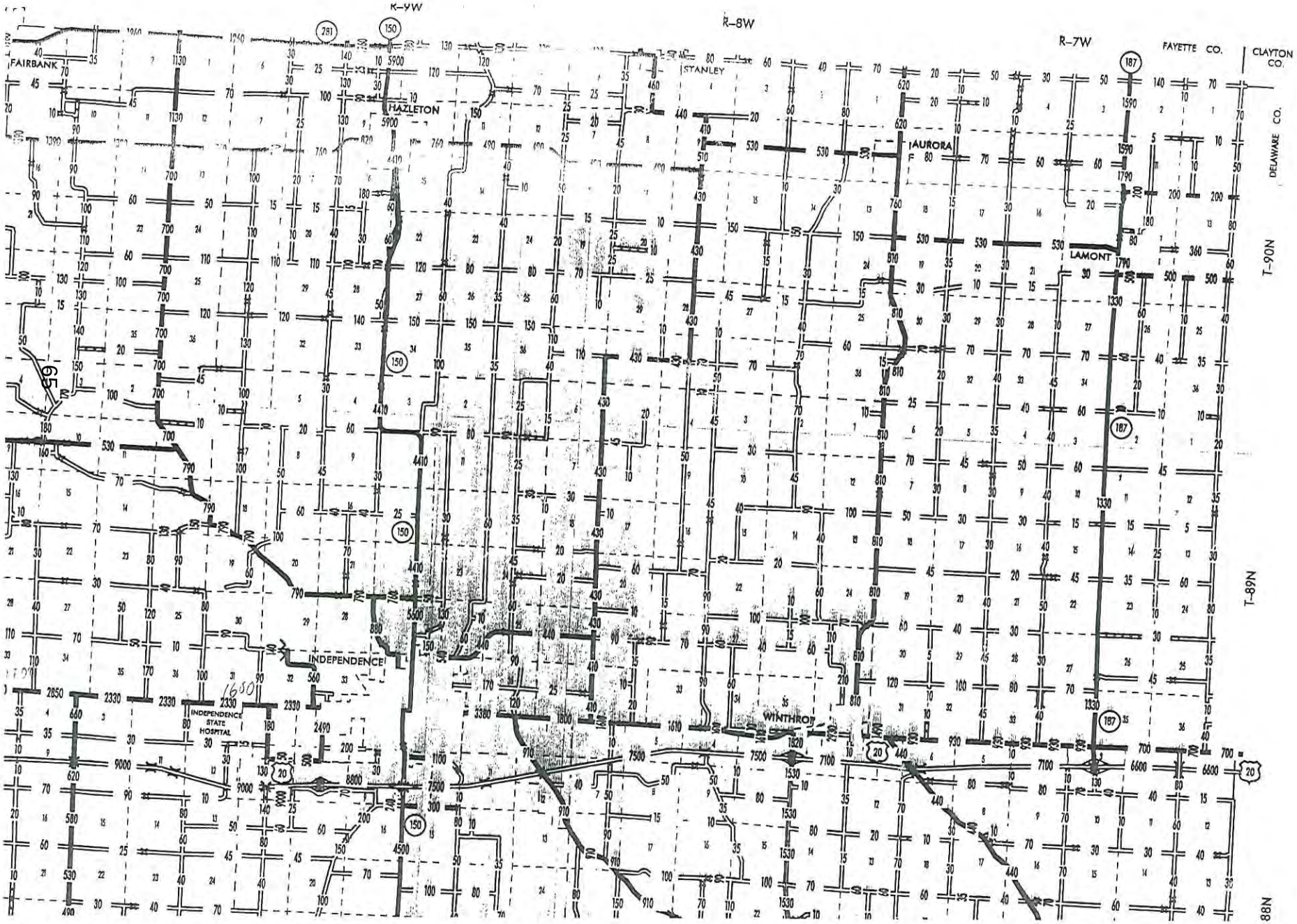
1025
1020
1015
1010


G3
EXISTING
PC = 813+93.5
PI = 820+67.5
PT = 826+89.3
Δ = 38°-52½'
D = 3° LT
T = 674'
Sec. 35
Railroad
Sec 35
854+88.5
835
840
845
850
830
825
820
815
810
805
Equation
Sec. 3
Sec. 2
PC = 830+12.2
PI = 831+83.5
PT = 833+45 = 831+33.3
Δ = 33°-17' Rt
D = 10°
T = 171.3'
836+35
Top Road
836+86
811+00
Name of Owner - P.H. & M.P. Collins
Date acquired - Dec. 10, 1925
Consideration - $821.25
Title by easment
Book 214 Page 308 Co. Recorder

H



Departn

DIVIDED HIGHWAY
PAVED ROAD
BITUMINOUS ROA
GRAVEL ROAD
EARTH ROAD
LEGAL NOT OPEN

Rev. 8/09

Road Segment Benefit / Cost Safety Analysis

Iowa DOT Office of Traffic & Safety

County: Buchanan County Prepared by: Brian Keierleber Date Prepared: 5?26/10

Location: D-22 west of W-40 in sec 3 of Liberty Twp.

Improvement

Proposed Improvement(s): Flatten the existing curvesfrom R=~~286~~ 572 to R = 1500 ft.

$ 167,485	Estimated Improvement Cost, **EC**	20	Est. Improvement Life, years, **Y**
$ -	Other Annual Cost (after initial year), **AC**	0	Crash Reduction Factor (integer), **CRF**
$ -	Present Value Other Annual Costs, **OC**	4.0%	Discount Rate, **INT**
	$OC = \frac{AC}{INT}\left(1 - \frac{1}{(1+INT)^Y}\right)$	$ 167,485	Present Value All Costs, **COST** = EC + OC

Traffic Volume Data

Source: IDOT traffic Counts 2005 Date of traffic count

Length (mi.)	Two-way veh/day	Description
0.15	1,610	Curve Reconstruction
0.15	miles total	

242 Current Vehicle Miles / Day, **VM**

529 End of Life Veh. Miles / Day

88,148 Current Veh. Miles / Year, **AM**

2,624,863 Total Projected Veh. Miles Over Life of Project, **TVMT**

$$TVMT = \frac{AM}{-G}\left(1 - \left(\frac{1+G}{1}\right)^Y\right)$$

4.0% Projected Traffic Growth (0%-10%), **G**

Crash Data

2003 First full year --> 2009 Last full year 7.0 years, Time Period, **T**

0 Additional months values as of Dec. 2007

1	Fatal Crashes	2	Fatalities @	$3,500,000	$ 7,000,000
			Major Injuries @	$240,000	$ -
	Injury Crashes		Minor Injuries @	$48,000	$ -
			Possible Injuries @	$25,000	$ -
2	Property Damage Only		(assumed cost per crash)	$2,700	$ 8,100
			-OR- enter all Property Costs of all crashes:		
3	Total Crashes, **TA**			Total $ Loss, **LOSS**	$ 7,008,100

0.43 Current Crashes / Year, **AA** = TA / T

$2,336,033 Cost per Crash, **AVCR** = LOSS / TA

12.8 Total Expected Crashes, **TCR** = CR x TVMT/10^8

0.00 Crashes Avoided First Year **AAR** = AA x CRF / 100

$ 3,604 Crash Costs Avoided in First Year, AAR x AVCR

0.0 Total Avoided Crashes, TCR x CRF/ 100

486.2 Crashes / HMVM, Crash Rate, **CR**

CR = TA x 10^8 / (AM x T)

$ 69,311 Present Value of Avoided Crashes, **BENEFIT**

$$BEN. = \frac{AVCR \times AAR}{(INT - G)}\left(1 - \left(\frac{1+G}{1+INT}\right)^Y\right)$$

Benefit / Cost Ratio

Benefit : Cost = $69,311 : $167,485 = **0.41** : 1

Iowa Department of Transportation

Rev. 3/08

Application for TRAFFIC SAFETY FUNDS

GENERAL INFORMATION

Location / Title of Project: 3.1 Miles North of Harpers Ferry IA , Great River Road Curve Improvement Project

Applicant: Allamakee County Secondary Roads

Contact Person: Brian T. Ridenour Title: County Engineer

Complete Mailing Address: P.O. 493 , 870 4th St. NW
Waukon IA 52172

Phone: 563-568-4574 (Area Code) E-Mail: bridenour@co.allamakee.ia.us

If more than one highway authority is involved in this project, please indicate and fill in the information below (use additional sheets if necessary).

Co-Applicant(s) _____

Contact Person _____ Title _____

Complete Mailing Address _____

_____

Phone _____ (Area Code) E-Mail _____

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Application Type

- Site Specific ☒
- Traffic Control Device ☐
- Safety Study ☐

Funding Amount

Total Project Cost $ 167,016.00

Safety Funds Requested $ 167,016.00

ALLAMAKEE COUNTY ENGINEER'S OFFICE
Brian T. Ridenour, P.E.
County Engineer
870 Fourth Street NW
PO Box 493
Waukon IA 52172-0493
Office: (563)568-4574
Shop: (563)568-2736
Fax: (563)568-6904
email address: engineer@co.allamakee.ia.us

We are applying for Traffic Safety Improvement Funds for a curve on County Road X-52(Great River Road) 3.1 miles north of Harpers Ferry, Iowa.

The curve is an 8° Spiral Curve, 200 ft spirals and a 645 ft. Circular Curve. Long straight roadway sections precede the curve from each end. The South Approach being relatively flat, while the North Approach is on a down grade of 7.8%.

Curve signs along with 40MPH Advisory Speed plates and red metal flags extending from the top left of each sign are currently in place. The curve also has 18" x 24" Chevrons spaced at 200 ft. in place. The existing roadway has a Portland Cement Concrete Surface 22 ft. wide with 2'8" Aggregate shoulders.

Crash Data shows one(1) Fatality in the last 5 years. Two(2) additional Fatal crashes have occurred prior to the 5 Year Reporting Period. One(1) motorcycle and one(1) car.

Allamakee County is proposing to widen the shoulders to 6 ft., pave them, install shoulder rumble strips, along with installing guardrail on the outside of the curve, and 24" x 30" Chevrons spaced at 125 ft.

By implementing these safety improvements the traveling public will see the curve in advance to reduce their speed to a safe level and have a curve with safety features to alert them as they drift on to the shoulder and give them more recovery area.

C

ESTIMATED QUANTITIES

LINE NO.	ITEM NO.	ITEM DESCRIPTION	UNIT	TOTAL	UNIT PRICE	TOTAL
1	2102-2625000	EMBANKMENT-IN-PLACE	CY	2,375	15.00	35,625.00
2	2121-8450810	TRENCHING AND RESHAPING	STA	25.3	85.00	2,150.50
3	2122-5500060	PAVED SHOULDER, HOT MIX ASPHALT MIXTURE, 6 INCH	SY	1,688	50.00	84,400.00
4	2505-6000111	HIGH TENSION CABLE GUARDRAIL	LF	1,265	15.00	18,975.00
5	2505-6000121	HIGH TENSION CABLE GUARDRAIL, END ANCHOR	EACH	2	1,925.00	3,850.00
6	2524-9130011	GUIDANCE MARKER, CHEVRON W1-8 (SPECIAL)	EACH	11	400.00	4.400.00
7	2528-8445110	TRAFFIC CONTROL	LS	LS	1,000.00	1,000.00
8	2528-8445112	FLAGGERS	DAY	20	300.00	6,000.00
9	2533-4980005	MOBILIZATION	LS	LS	5,000.00	5,000.00
10	2548-0000100	MILLED SHOULDER RUMBLE STRIPS,HMA SURFACE	STA	25.3	50.00	1,265.00
11	2601-2636043	SEEDING AND FERTILIZING (RURAL)	ACRES	1.282	550.00	705.10
12	2602-0000020	SILT FENCE	LF	1440	1.50	2,160.00
13	2602-0000030	SILT FENCE FOR DITCH CHECKS	LF	180	1.50	270.00
14	2602-0000060	REMOVAL OF SILT FENCE	LF	1440	.75	1,080.00
15	2602-0000070	REMOVAL OF SILT FENCE FOR DITCH CHECKS	LF	180	.75	135.00
			GRAND TOTAL			167,015.60

D

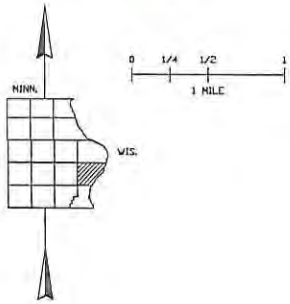
ALLAMAKEE COUNTY ENGINEER'S OFFICE
Brian T. Ridenour, P.E.
County Engineer
870 Fourth Street NW
PO Box 493
Waukon IA 52172-0493
Office: (563)568-4574
Shop: (563)568-2736
Fax: (563)568-6904
email address: engineer@co.allamakee.ia.us

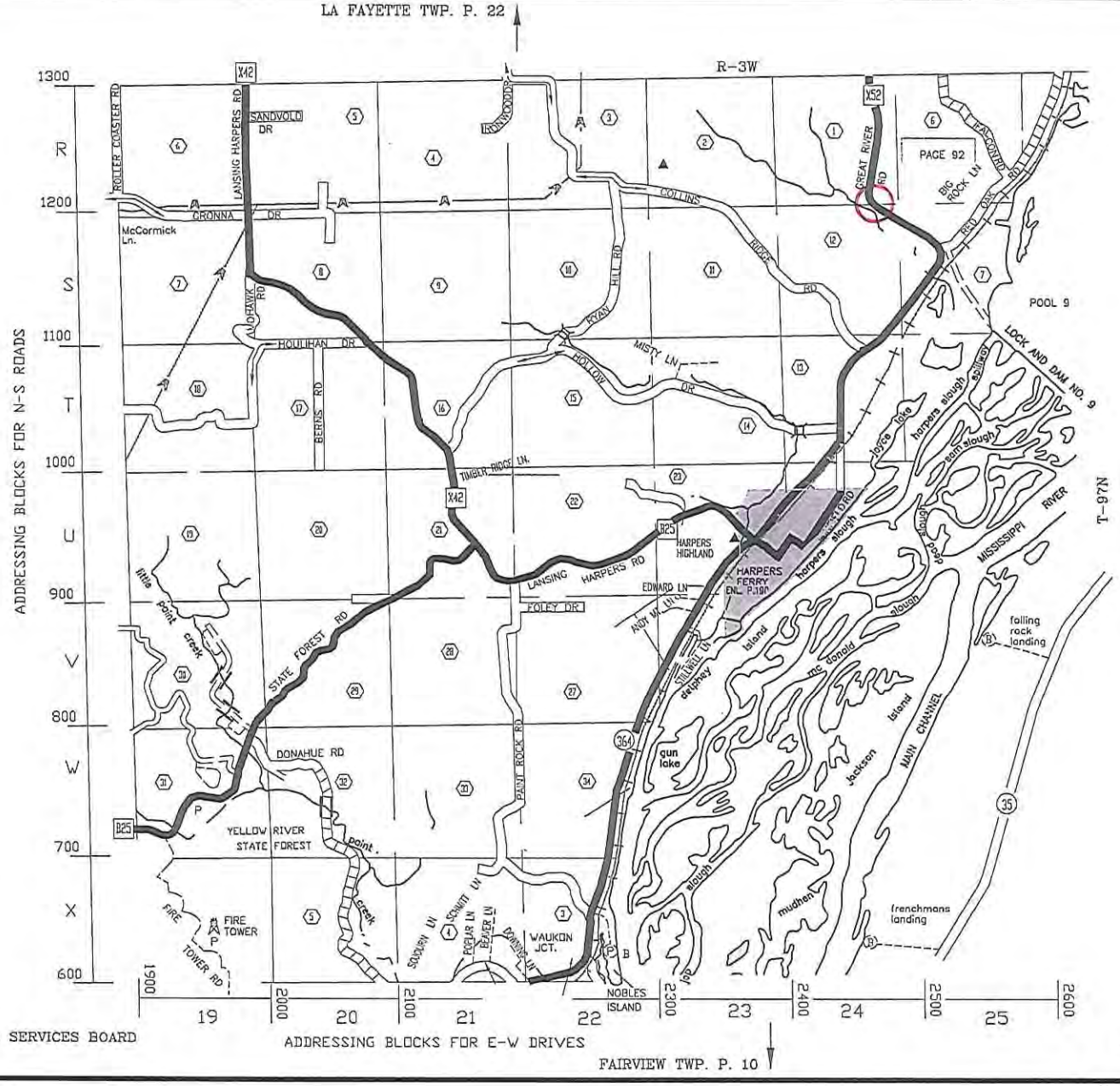
Allamakee County is planning to put this project in the FY 2012 Budget and Program. A proposed letting date will be after July 1, 2011 with a completion date of September 30, 2011.

E

TAYLOR TOWNSHIP

ALLAMAKEE COUNTY
IOWA





ORIGINAL MAP EDITION 07-15-93
AMENDMENTS 01-11-10


3 10:36AM


3 10:37AM

F

F

Ref to P.O.T. Sta 30+17.5

Ref to TS Sta 33+45.0

Ref to SC Sta 35+45.0

Ref to P.I. Sta 39+26.0

Ref to CS Sta 41+90.0

Ref to ST Sta 43+90.0

Taylor Twp.

Pasture

NENE Sec. 12 ②

Pasture

dry run

SESE Sec. 1 ②

Timber + Bluff

+73 - 18"X24' RCP
Ac. Road Contr. to Remove,
+ Place 36"X78' CMP & Meas.
loped 2:1 Outlet sloped 4:1
1 Rt. FL Elev. = 543.5
8' Lt. FL Elev. = 534.8
3 Excav. = 79 Cu. Yds.

Curve Data
P.I. Sta 39+26.0
Δ = 67° 36' Rt.
D = 8°
Ls = 200'
θs = 8°
P = 2.33
K = 99.93
LT = 133.5
ST = 66.8
Ts = 581.0
Es = 148.5

Δc = 51° 36' Rt.
Dc = 8°
Tc = 396.3
Lc = 645.0
Ec = 79.3
Rc = 716.25
B.T. = S 56° 30' E

Sta 42+30 - 24"X28' CMP
DA = Road
Road Contractor to Remove.

Sta 39+75 - 18"X26' RCP
DA = Road.
Road Contractor to Remove.

Sta 47+30 - 30"X30'
DA = 79 Ac.
Road Contractor to
Furnish + Place 72"X
Ends sloped 3:1 @ S
Inlet 43' Rt. FL Elev.
Outlet 51' Lt. FL Elev.
Class 23 Excav. = 39
Salvage old Pipe.

Pasture

NENE Sec. 12 ②

Shed

Timber + Bluff

Feed Yard

Cistern

Sta 30+47 - Ent Lt + Rt
Road Contractor to
Place Dry Fill Lt. + Rt.

Delaney
+ F. & Margie B. May

Station 32+35 - 45+00

10.25%

Inlet 543.5
Outlet 534.8

Inlet
Outlet

Allamakee County, IA

beacon™

Date Created: 4/30/2010
Map Scale: 1 in = 308 ft

Overview

Legend

- Road Centerlines
- PLS Quarter-Quarters
- PLS Sections
- Political Townships
- City Limits

Last Data Upload: 4/30/2010 2:00:08 AM

Schneider developed by The Schneider Corporation www.schneidercorp.com

Rev. 8/09

Road Segment Benefit / Cost Safety Analysis

Iowa DOT Office of Traffic & Safety

County: Allamakee Prepared by: A. Rissman Date Prepared: June 1,2010

Location: X-52 /Great River Road 3.1 Miles North of Harpers Ferry IA

Improvement

Proposed Improvement(s): Install guardrail outside curve, Install chevron signs on horizontal curve, Install shoulder rumble strips, Widen shoulder, Pave shoulder

$ 167,016	Estimated Improvement Cost, **EC**	6	Est. Improvement Life, years, **Y**
$ -	Other Annual Cost (after initial year), **AC**	89	Crash Reduction Factor (integer), **CRF**
$ -	Present Value Other Annual Costs, **OC**	4.0%	Discount Rate, **INT**
	$OC = \frac{AC}{INT}\left(1 - \frac{1}{(1+INT)^Y}\right)$	$ 167,016	Present Value All Costs, **COST** = EC + OC

Traffic Volume Data

Source: Iowa DOT 2009 Date of traffic count

Length (mi.)	Two-way veh/day	Description
0.24	530	
0.24	miles total	

127 Current Vehicle Miles / Day, **VM**

161 End of Life Veh. Miles / Day

46,428 Current Veh. Miles / Year, **AM**

307,956 Total Projected Veh. Miles Over Life of Project, **TVMT**

$$TVMT = \frac{AM}{-G}\left(1 - \left(\frac{1+G}{1}\right)^Y\right)$$

4.0% Projected Traffic Growth (0%-10%), **G**

Crash Data

2005 First full year --> 2009 Last full year 5.0 years, Time Period, **T**

Additional months values as of Dec. 2007

0	Fatal Crashes	0	Fatalities @	$3,500,000	$ -
		2	Major Injuries @	$240,000	$ 480,000
3	Injury Crashes	1	Minor Injuries @	$48,000	$ 48,000
		0	Possible Injuries @	$25,000	$ -
0	Property Damage Only		(assumed cost per crash)	$2,700	$ -
			-OR- enter all Property Costs of all crashes:		$ 12,400
3	Total Crashes, **TA**			Total $ Loss, **LOSS**	$ 540,400

0.60 Current Crashes / Year, **AA** = TA / T

$ 180,133 Cost per Crash, **AVCR** = LOSS / TA

4.0 Total Expected Crashes, **TCR** = CR x TVMT/10^8

0.53 Crashes Avoided First Year **AAR** = AA x CRF / 100

$ 96,191 Crash Costs Avoided in First Year, AAR x AVCR

3.5 Total Avoided Crashes, TCR x CRF/ 100

1,292.3 Crashes / HMVM, Crash Rate, **CR**

CR = TA x 10^8 / (AM x T)

$ 554,949 Present Value of Avoided Crashes, **BENEFIT**

$$BEN. = \frac{AVCR \times AAR}{(INT - G)}\left(1 - \left(\frac{1+G}{1+INT}\right)^Y\right)$$

Benefit / Cost Ratio

Benefit : Cost = $554,949 : $167,016 = **3.32** : 1

Iowa Department of Transportation

Rev. 3/08

Application for TRAFFIC SAFETY FUNDS

GENERAL INFORMATION

Location / Title of Project: Sign Upgrade and Safety Improvement on F65 Curves East of Stuart, IA

Applicant: Guthrie County, IA Road Department

Contact Person: Josh Sebern Title: Engineer

Complete Mailing Address: 2211-215th Street, Guthrie Center, IA 50115

Phone: 641-747-2274 (Area Code) E-Mail: engr39@netins.net

If more than one highway authority is involved in this project, please indicate and fill in the information below (use additional sheets if necessary).

Co-Applicant(s): N/A

Contact Person: _____ Title: _____

Complete Mailing Address: _____

Phone: _____ (Area Code) E-Mail: _____

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Application Type

- Site Specific ☒
- Traffic Control Device ☐
- Safety Study ☐

Funding Amount

Total Project Cost $ 11,688.60

Safety Funds Requested $ 11,688.60

B

Sign Upgrade and Safety Improvement of F65 Curves East of Stuart, IA
Guthrie County, IA

NARRATIVE

This site is old State Highway 6 and was transferred to Guthrie and Adair Counties in 2004. It is vintage late 20's early 30's highway design that has been resurfaced several times. It was resurfaced before the jurisdictional transfer in 2004 so the surface is in reasonably good shape at this point. There are no plans to resurface or rebuild this section in the foreseeable future. The road in this section carries 1780 vehicles per day according to the 2008 IDOT traffic study. This portion of F65 has had 10 accidents from 2006 to the present time including a fatal one on February 2, 2010.

Guthrie County proposes to replace all the existing signs (warning, advisory, and chevrons) with larger florescent signs. The existing chevrons are spaced farther apart than is currently recommended so we propose to use the current chevrons in other place in the county and place all new at the current spacing at this location. We also propose to install the newer style, 4-1/2" rumble strips along both edges and down the centerline through the site. A listing of number and type of signs is included in Section C of this application along with a current estimate of the cost of installing warning edge rumble strips.

This project would provide what we believe to be the best possible signage and safety improvements to one of the most problematic locations for the motorists of the County.

Sign Upgrade and Safety Improvement on F65 Curves East of Stuart, IA **C**
Guthrie County Road Department 2211 215th Street, Guthrie Center, IA 50115

sign type	number of signs	Description	unit price	sign cost
W1-2L	2	Left Curve	$52.90	$105.80
W1-2R	2	Right Curve	$52.90	$105.80
W14-3	3	No Passing	$42.80	$128.40
W1-8	12	Chevron	$61.90	$742.80
W13-1	2	Specify Speed	$52.90	$105.80
	21		Total sign cost	$1,188.60

Specialty Work - Installation of warning rumble strips at shoulders

150 Stations	$70.00/Sta	$10,500.00
	Total Project Cost	$11,688.60

Sign Upgrade and Safety Improvement at F65 Curves East of Stuart, IA

Guthrie County Road Department

Time Schedule

This project would include upgrading signs and installing edge rumble strips throughout the approximately one mile of curves from Zepher Trail north to Zebra Avenue.

It is expected to take our sign man a total of 2 days once we have the signs. The specialty work could be done in 2 days. The total project schedule should take 4 days.

We would start ASAP but definitely need to have the work done prior to November 1, 2010.

E.

HIGHWAY AND TRANSPORTATION MAP

GUTHRIE COUNTY
IOWA

Prepared By

Iowa Department of Transportation

Phone (515) 239-1289

In Cooperation With

United States Department of Transportation

SCALE IN MILES

SCALE IN KILOMETERS

JANUARY 1, 1993

CADD 09-21-93 CARTOGRAPHIC SECTION

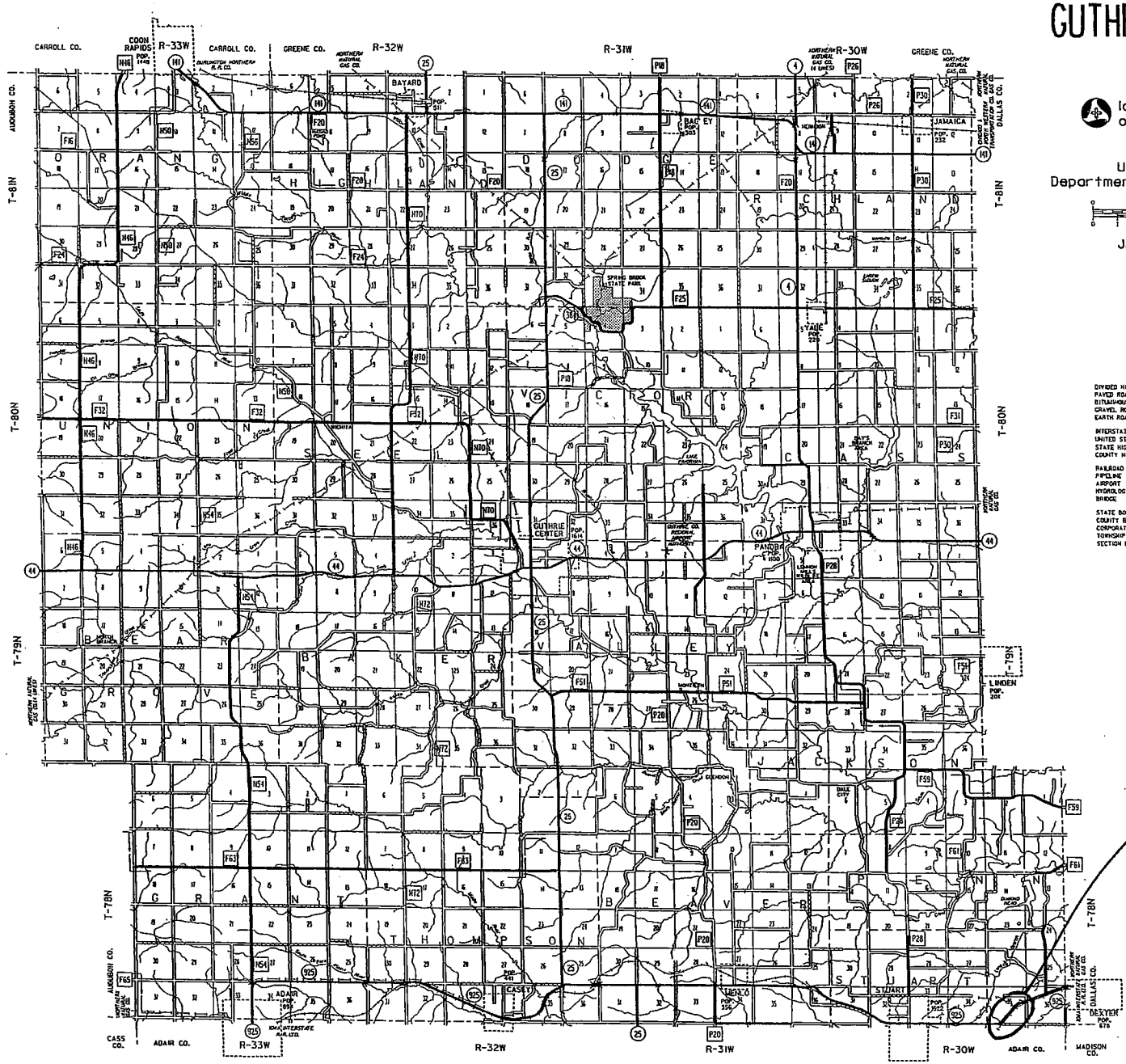
LEGEND

DIVIDED HIGHWAY
PAVED ROAD
BITUMINOUS ROAD
GRAVEL ROAD
EARTH ROAD

INTERSTATE HIGHWAY
UNITED STATES HIGHWAY
STATE HIGHWAY
COUNTY HIGHWAY

RAILROAD
PIPELINE
AIRPORT
HYDROLOGY
BRIDGE

STATE BOUNDARY
COUNTY BOUNDARY
CORPORATE LIMIT LINE
TOWNSHIP LINE
SECTION LINE



FGS OUTCROPS EAST OF STUART, IA

83

39

(H)


State Hwy 925
6
Image USDA Farm Service Agency
©2010 Google
Google
Imagery Dates: Apr 7, 2006 - Jul 6, 2006
41°30'21.93" N 94°16'26.40" W elev 1155 ft
Eye alt 15508 ft

(J)

2008 ANNUAL AVERAGE DAILY TRAFFIC

TRAFFIC FLOW MAP OF

GUTHRIE COUNTY IOWA

Prepared By

Iowa Department of Transportation

Phone (515) 239-1282

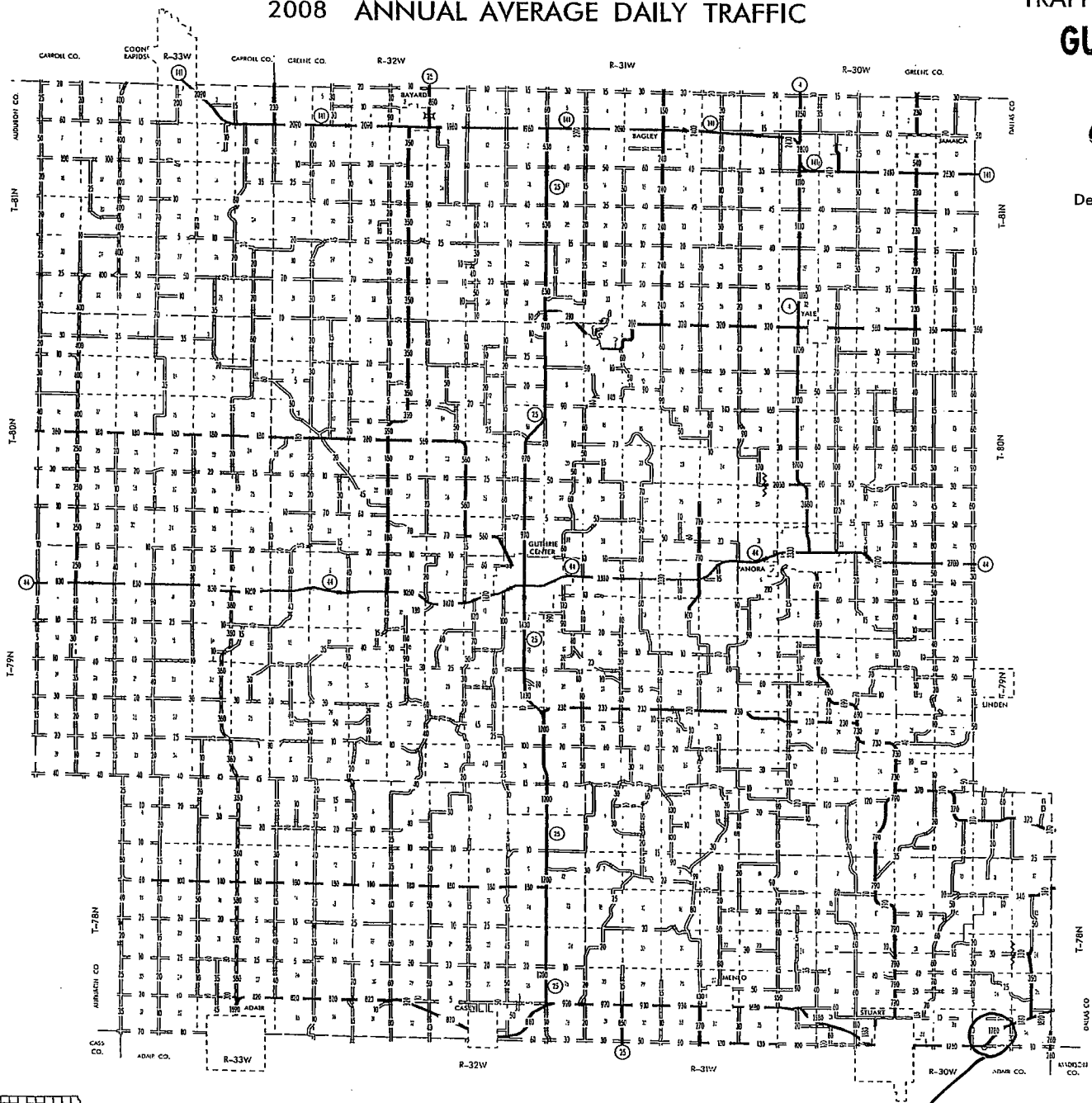
In Cooperation With

United States Department of Transportation

JANUARY 1, 2008

01-30-03

LEGEND



2008

39

FGS CURVES EAST OF STUART, IA.
ADT = 1780

85

L-1

Rev. 8/09

Road Segment Benefit / Cost Safety Analysis

Iowa DOT Office of Traffic & Safety

County: Guthrie Prepared by: James K. Jordan Date Prepared: Jun 10, 2010

Location: F65 Curves East of Stuart, IA

Improvement

Proposed Improvement(s): Sign Upgrade and Safety Improvements on F65 Curves East of Stuart, IA

$ 11,689	Estimated Improvement Cost, **EC**	6	Est. Improvement Life, years, **Y**
$ -	Other Annual Cost (after initial year), **AC**	7	Crash Reduction Factor (integer), **CRF**
$ -	Present Value Other Annual Costs, **OC**	4.0%	Discount Rate, **INT**
	$OC = \frac{AC}{INT}\left(1 - \frac{1}{(1+INT)^Y}\right)$	**$ 11,689**	Present Value All Costs, **COST** = EC + OC

Traffic Volume Data

Source: 2008 IDOT Traffic Study 2008 Date of traffic count

Length (mi.)	Two-way veh/day	Description
1.00	1,790	W end S curve to E end N curv
1.00	miles total	

4.0% Projected Traffic Growth (0%-10%), **G**

1,790 Current Vehicle Miles / Day, **VM**

2,265 End of Life Veh. Miles / Day

653,350 Current Veh. Miles / Year, **AM**

4,333,655 Total Projected Veh. Miles Over Life of Project, **TVMT**

$$TVMT = \frac{AM}{-G}\left(1 - \left(\frac{1+G}{1}\right)^Y\right)$$

Crash Data

2005 First full year --> 2009 Last full year 5.2 years, Time Period, **T**

2 Additional months values as of Dec. 2007

1	Fatal Crashes		Fatalities @	$3,500,000	$ -
		3	Major Injuries @	$240,000	$ 720,000
2	Injury Crashes	1	Minor Injuries @	$48,000	$ 48,000
			Possible Injuries @	$25,000	$ -
5	Property Damage Only		(assumed cost per crash)	$2,700	$ 21,600
			-OR- enter all Property Costs of all crashes:		
8	Total Crashes, **TA**			Total $ Loss, **LOSS**	$ 789,600

1.55	Current Crashes / Year, **AA** = TA / T	**237.0**	Crashes / HMVM, Crash Rate, **CR** CR = TA x 10^8 / (AM x T)
$ 98,700	Cost per Crash, **AVCR** = LOSS / TA	**$ 61,718**	Present Value of Avoided Crashes, **BENEFIT**
10.3	Total Expected Crashes, **TCR** = CR x TVMT/10^8		
0.11	Crashes Avoided First Year **AAR** = AA x CRF / 100		
$ 10,698	Crash Costs Avoided in First Year, AAR x AVCR		
0.7	Total Avoided Crashes, TCR x CRF/ 100		

$$BEN. = \frac{AVCR \times AAR}{(INT - G)}\left(1 - \left(\frac{1+G}{1+INT}\right)^Y\right)$$

Benefit / Cost Ratio

Benefit : Cost = $61,718 : $11,689 = **5.28** : 1

Iowa Department of Transportation

Rev. 3/08

Application for TRAFFIC SAFETY FUNDS

GENERAL INFORMATION

Location / Title of Project: Sign Upgrade and Safety Improvement at F65 IAIS RR Underpass West of Stuart, IA

Applicant: Guthrie County, IA Road Department

Contact Person: Josh Sebern Title: Engineer

Complete Mailing Address: 2211-215th Street, Guthrie Center, IA 50115

Phone: 641-747-2274 (Area Code) E-Mail: engr39@netins.net

If more than one highway authority is involved in this project, please indicate and fill in the information below (use additional sheets if necessary).

Co-Applicant(s): N/A

Contact Person: _____ Title: _____

Complete Mailing Address: _____

Phone: _____ (Area Code) E-Mail: _____

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Application Type

- Site Specific ☒
- Traffic Control Device ☐
- Safety Study ☐

Funding Amount

Total Project Cost $ 6506.00

Safety Funds Requested $ 6506.00

B

Sign Upgrade and Safety Improvement of F65 IAIS RR Underpass
West of Stuart, IA
Guthrie County, IA

NARRATIVE

This site is a narrow RR underpass which is very tight and prone to accidents. Today's budget realities make a realignment and bridge replacement out of the question. Such a project was planned before the jurisdiction of was transferred from IDOT to Guthrie County but was never constructed. Guthrie County hopes to upgrade all sign to large, florescent type and install warning rumble strips at each shoulder edge and centerline through the site. This paved road is our most heavily traveled road with ADT ranging from 820 on the west end to 1890 on the east section. At this location the ADT is 1680. It is also heavy truck traffic due to a close by ethanol plant. A listing of number and type of signs is included in Section C of this application along with a current estimate of the cost of installing warning edge rumble strips.

This project would provide what we believe to be the best possible signage and safety improvements to an exceptionally problematic location for the motorists of the County.

F65 IAIS RR Underpass Improvement

C

Guthrie County Road Department 2211 215th Street, Guthrie Center, IA 50115

sign type	number of signs	Description	unit price	sign cost
W1-2L	1	Left Curve	$52.90	$52.90
W1-2R	1	Right Curve	$52.90	$52.90
W1-4L	1	Left Curve	$52.90	$52.90
W1-4R	1	Right Curve	$52.90	$52.90
W12-2	2	Height	$52.90	$105.80
W14-3	2	No Passing	$42.80	$85.60
H-1L	4	Object Marker	$25.40	$101.60
H-1R	4	Object Marker	$25.40	$101.60
W1-8	15	Chevron	$61.90	$928.50
W13-1	2	Specify Speed	$52.90	$105.80
W8-5	2	Slippery Road	$52.90	$105.80
	35		Total sign cost	$1,746.30

Specialty Work - Installation of warning rumble strips at shoulders

68 Stations	$70.00/Sta	$4,760.00
	Total Project Cost	$6,506.30

Sign Upgrade and Safety Improvements at F65 IAIS RR Underpass

Guthrie County Road Department

Time Schedule

This project would include upgrading signs and installing edge rumble strips throughout the entrance and exit curves including the RR underpass.

It is expected to take our sign man a total of 2 days once we have the signs. The specialty work could be done in 2 days. The total project schedule should take 4 days.

We would start ASAP but definitely need to have the work done prior to November 1, 2010.

E.

HIGHWAY AND TRANSPORTATION MAP

GUTHRIE COUNTY

IOWA

Prepared By

Iowa Department of Transportation

Phone (515) 239-1289

In Cooperation With

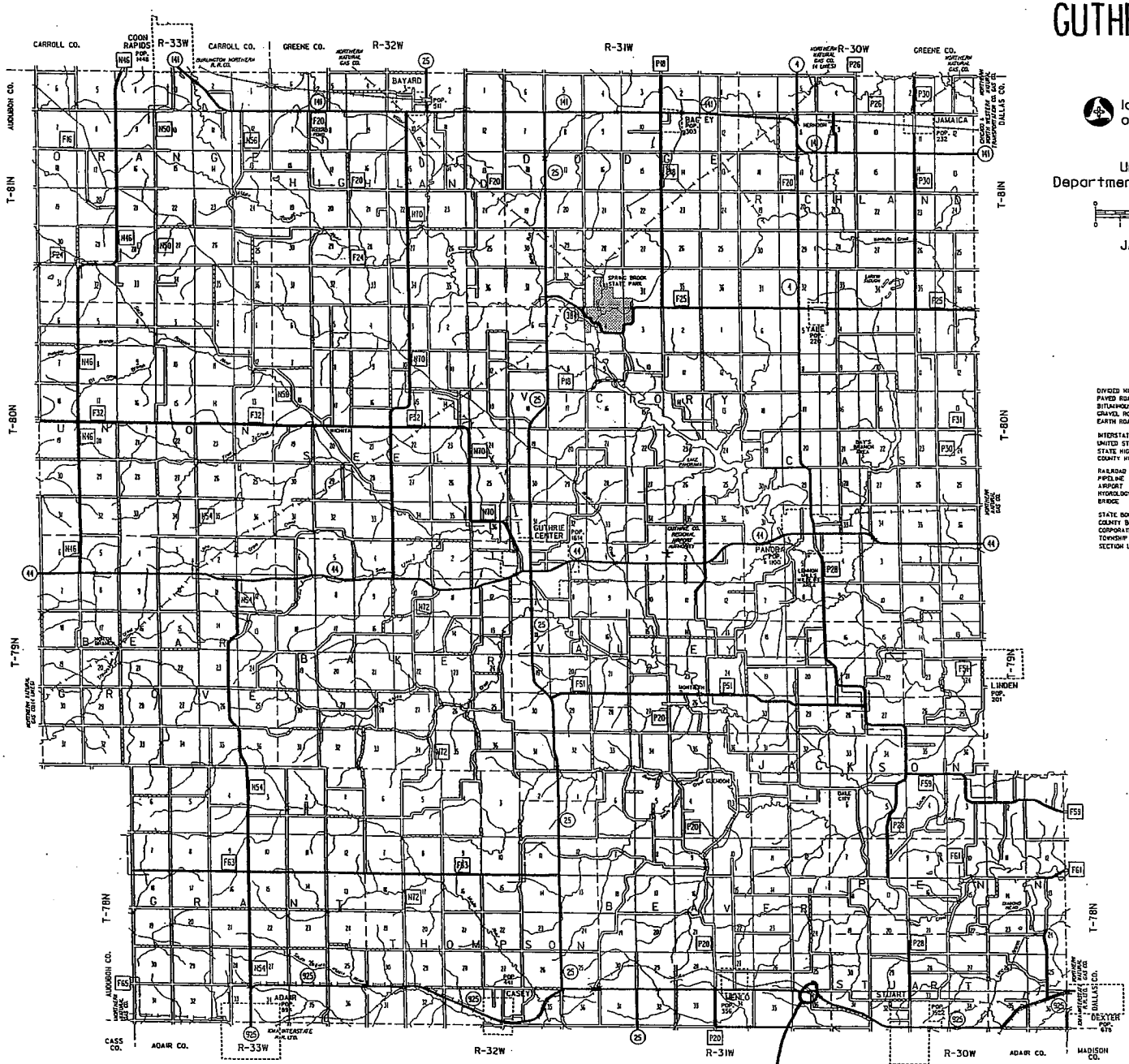
United States Department of Transportation

SCALE IN MILES

SCALE IN KILOMETERS

JANUARY 1, 1993

PRODUCED WITH CADD 09-21-93 CARTOGRAPHIC SECTION



LEGEND

DIVIDED HIGHWAY
PAVED ROAD
BITUMINOUS ROAD
GRAVEL ROAD
EARTH ROAD

INTERSTATE HIGHWAY
UNITED STATES HIGHWAY
STATE HIGHWAY
COUNTY HIGHWAY

RAILROAD
PIPELINE
AIRPORT
HYDROLOGY
BRIDGE

STATE BOUNDARY
COUNTY BOUNDARY
CORPORATE LIMIT LINE
TOWNSHIP LINE
SECTION LINE

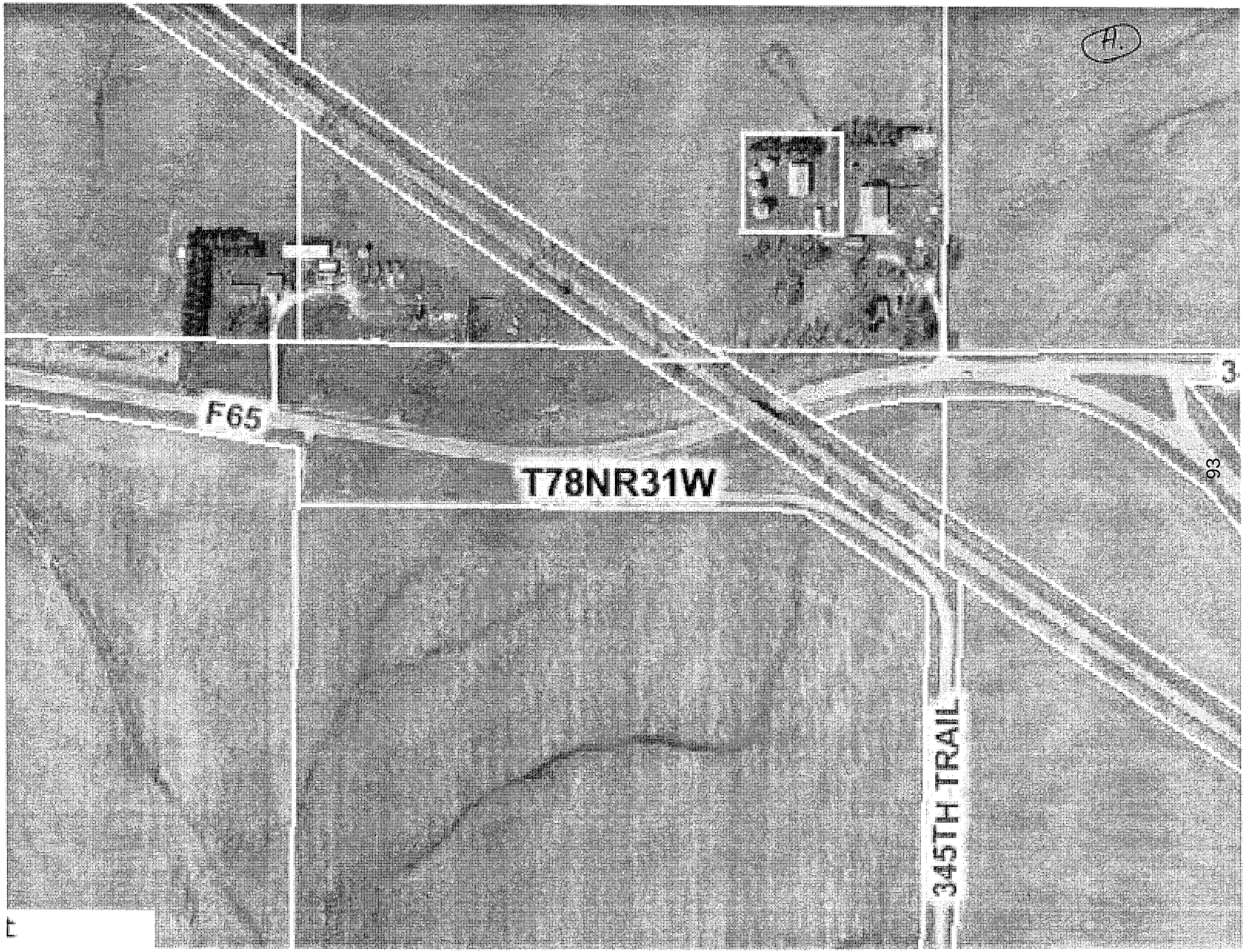
IAIS RAILROAD, F65 UNDERPASS BETWEEN STUART AND MENLO, IA

39

T6

F.

TRAVELING WEST TO EAST THROUGH PROJECT AREA.


A
F65
T78NR31W
345TH TRAIL
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2008 ANNUAL AVERAGE DAILY TRAFFIC

TRAFFIC FLOW MAP OF

GUTHRIE COUNTY IOWA

Prepared By

Iowa Department of Transportation

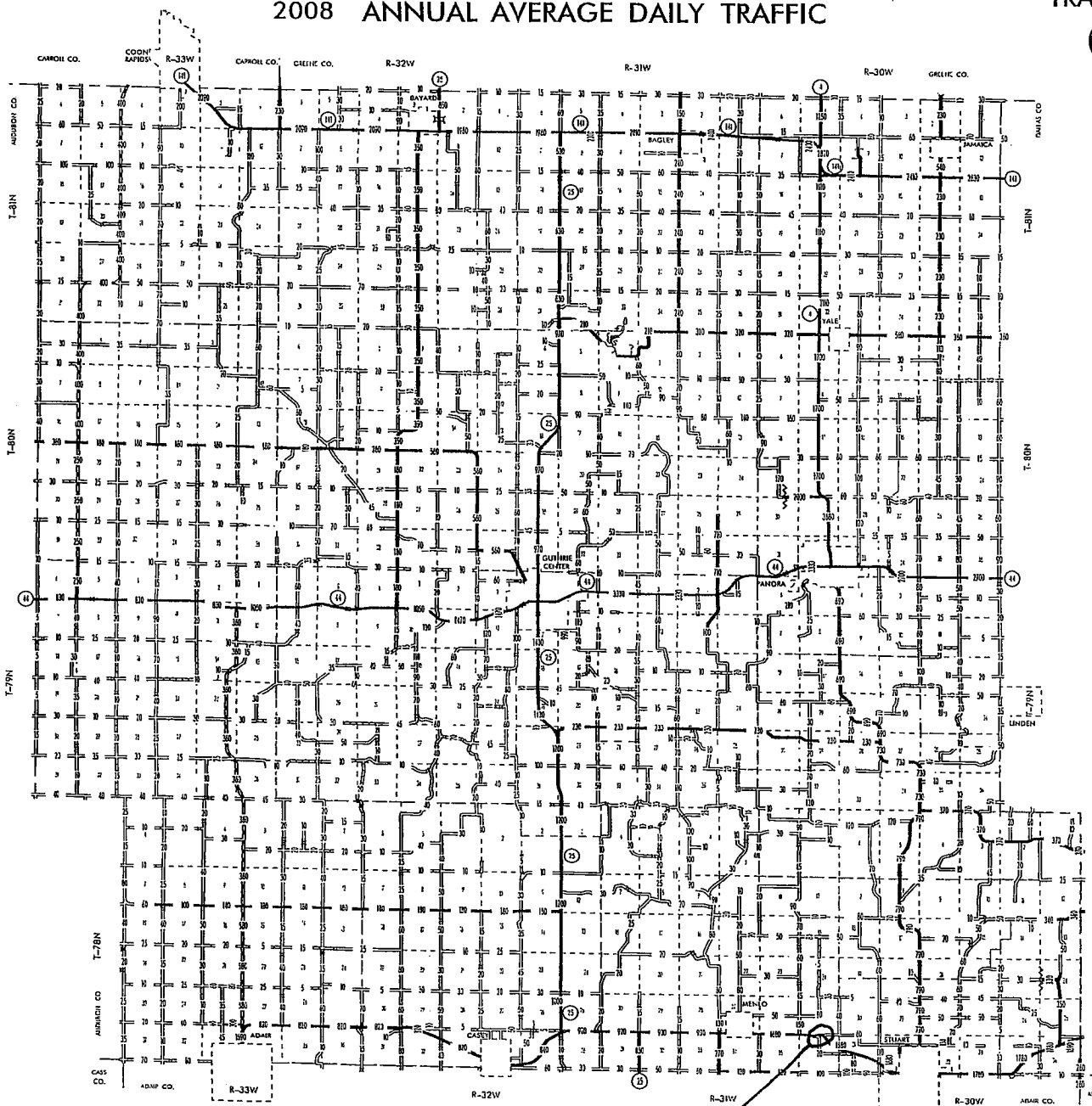
Phone (515) 239-1282

In Cooperation With

United States Department of Transportation

JANUARY 1, 2008

LEGEND



SIGN UPGRADE & SAFETY IMPROVEMENT
FGS 1A/S RR UNDERPASS
ADT = 1680

2008

39

94

(L)

Rev. 8/09

Road Segment Benefit / Cost Safety Analysis

Iowa DOT Office of Traffic & Safety

County: Guthrie Prepared by: James K. Jordan Date Prepared: Jun 10, 2010

Location: IAIS RR Underpass on F65 West of Stuart, IA

Improvement

Proposed Improvement(s): Sign Upgrade and Safety Improvements on IAIS RR Underpass on F65 West of Stuart, I

$ 6,506	Estimated Improvement Cost, **EC**	6	Est. Improvement Life, years, **Y**
$ -	Other Annual Cost (after initial year), **AC**	7	Crash Reduction Factor (integer), **CRF**
$ -	Present Value Other Annual Costs, **OC**	4.0%	Discount Rate, **INT**
	$OC = \frac{AC}{INT}\left(1 - \frac{1}{(1+INT)^Y}\right)$	$ 6,506	Present Value All Costs, **COST** = EC + OC

Traffic Volume Data

Source: 2008 IDOT Traffic Study 2008 Date of traffic count

Length (mi.)	Two-way veh/day	Description
0.46	1,680	W end W curve to E end E cur
0.46	miles total	

764 Current Vehicle Miles / Day, **VM**

967 End of Life Veh. Miles / Day

279,006 Current Veh. Miles / Year, **AM**

1,850,640 Total Projected Veh. Miles Over Life of Project, **TVMT**

$$TVMT = \frac{AM}{-G}\left(1 - \left(\frac{1+G}{1}\right)^Y\right)$$

4.0% Projected Traffic Growth (0%-10%), **G**

Crash Data

2005 First full year --> 2009 Last full year 5.2 years, Time Period, **T**

2 Additional months values as of Dec. 2007

0	Fatal Crashes		Fatalities @	$3,500,000	$ -
		1	Major Injuries @	$240,000	$ 240,000
4	Injury Crashes	3	Minor Injuries @	$48,000	$ 144,000
			Possible Injuries @	$25,000	$ -
0	Property Damage Only		(assumed cost per crash)	$2,700	$ 10,800
			-OR- enter all Property Costs of all crashes:		
4	Total Crashes, **TA**		Total $ Loss, **LOSS**		$ 394,800

0.77	Current Crashes / Year, **AA** = TA / T	**277.5**	Crashes / HMVM, Crash Rate, **CR** CR = TA x 10^8 / (AM x T)
$ 98,700	Cost per Crash, **AVCR** = LOSS / TA	$ 30,859	Present Value of Avoided Crashes, **BENEFIT**
5.1	Total Expected Crashes, **TCR** = CR x TVMT/10^8		
0.05	Crashes Avoided First Year **AAR** = AA x CRF / 100		
$ 5,349	Crash Costs Avoided in First Year, AAR x AVCR		
0.4	Total Avoided Crashes, TCR x CRF/ 100		

$$BEN. = \frac{AVCR \times AAR}{(INT - G)}\left(1 - \left(\frac{1+G}{1+INT}\right)^Y\right)$$

Benefit / Cost Ratio

Benefit : Cost = $30,859 : $6,506 = **4.74** : 1

Iowa Department of Transportation

Rev. 3/08

Application for TRAFFIC SAFETY FUNDS

GENERAL INFORMATION

Location / Title of Project: West 4th St & Fletcher Av Traffic Safety Improvements

Applicant: City of Waterloo

Contact Person: Mohammad Elahi Title: Traffic Engineer

Complete Mailing Address: 408 E. 6th Street
Waterloo, Iowa 50703

Phone: (319) 291-4440 (Area Code) E-Mail: mohammad.elahi@waterloo-ia.org

If more than one highway authority is involved in this project, please indicate and fill in the information below (use additional sheets if necessary).

Co-Applicant(s) _____

Contact Person _____ Title _____

Complete Mailing Address _____

_____

Phone _____ (Area Code) E-Mail _____

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Application Type

- Site Specific ☒
- Traffic Control Device ☐
- Safety Study ☐

Funding Amount

Total Project Cost $ 669,000

Safety Funds Requested $ 500,000

B. NARRATIVE

Existing Condition

West 4th Street is a two lane 30 MPH minor arterial. West 4th is a long stretch of uncontrolled roadway, which is conducive to speeding. Fletcher Avenue is stop controlled at its intersection with W. 4th Street. The traffic crashes at this intersection are normally severe. Not too many accidents happen, but when they do they could easily involve injuries. Drivers at the stop signs have sight distance problems due to the vertical alignment of W. 4th Street. Cars on W. 4th can easily drive well above the speed limit, which adversely affects the departure sight distance. The potential for injury and perhaps fatal accidents is high. Some pdo crashes could have been serious. The diagram below is out of the police report for a 03/08/2008 pdo accident. Fortunately no one was hurt.

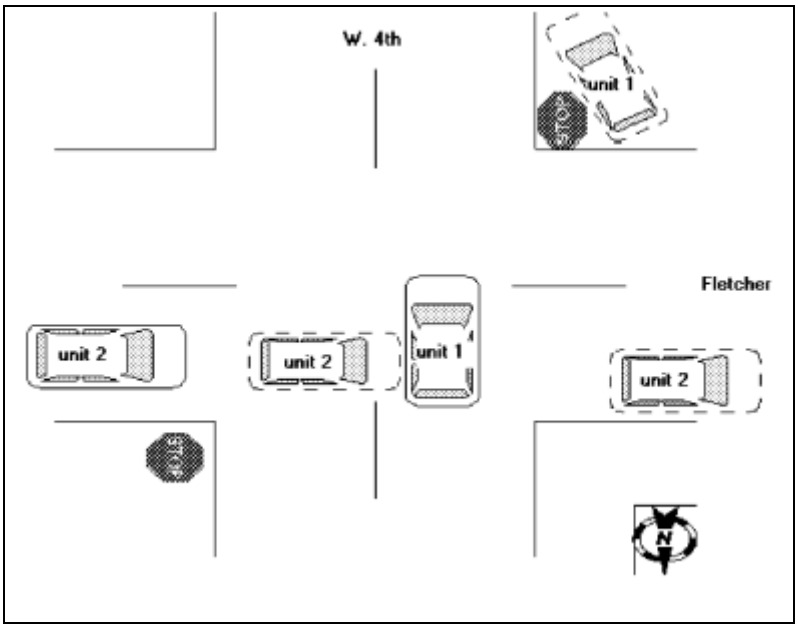


Figure 1: A pdo crash on 03/08/2008

All of the crashes are broad side right angle type. Improvements to eliminate broadside collisions are needed. Countermeasures with a high chance of success would eliminate most of the crashes, particularly high severity ones.

Proposed Concept.

Several counter measures were investigated. A compact roundabout was selected as the best overall and long term alternative with secondary positive impact on pedestrian and school crossings. A very high crash reduction factor, CRF, is anticipated. All the accidents are right angle collisions. A roundabout is likely to eliminate these crash types, particularly the severe ones. Some sideswipe crashes may be experienced but the severity is expected to be low.

Among other alternatives were traffic signals and correction of the departure sight distance. Traffic signals would not cause a reduction in speeds. Given the sight distance deficiencies, signals could cause red light running. Crashes caused by red light running would be more severe. Collisions would be with a car traveling on a green light.

Currently the collisions involve cars leaving the stop sign from a stopped position. Signals may also cause some rear-end crashes. Overall, signal could make the situation worse. Flattening the vertical profile of West 4th Street to eliminate the sight distance problem was considered. This option will not remedy speeding. Drivers might actually feel more comfortable to go even faster because of the opened up sight distance; they could see farther. Another problem is the elevation difference between some properties and W. 4th Street. Some properties currently have steps connecting their higher elevation property to the sidewalk. Lowering the roadway will adversely affect this condition and will also affect their driveway slopes.

A roundabout would be a plausible solution. According to www.cmfclearinghouse.org CRF can be 72% for all crash types when converting a stop controlled intersection to a single lane roundabout in an urban area. This particular location and crash patterns could easily experience such crash reduction factors.

Countermeasure: Conversion of stop-controlled intersection into single-lane roundabout

CMF	CRF(%)	Quality	Crash Type	Crash Severity	Roadway Type	Area Type	Reference
0.28	72	★★★★☆	All	All	Not specified	Urban	Persaud et al., 2001
0.42	58	★★★★☆	All	All	Not specified	Rural	Persaud et al., 2001
0.12	88	★★★★☆	All	Serious injury,Minor injury	Not specified	Urban	Persaud et al., 2001
0.18	82	★★★★☆	All	Serious injury,Minor injury	Not specified	Rural	Persaud et al., 2001

Figure 2: CRF values of 72% and 88% for stop-controlled replacement by an urban single lane roundabout

A 15 mph 80' inscribed radius one-lane compact urban roundabout is proposed. The low circulating speed of 15 mph will reduce the impact of any future collisions. This will address the severity of the crashes, a major concern at this location. Slower approach speeds should provide for better sight distance for cross traffic. Secondary benefits are to pedestrian and school crossing. Pedestrian who cross W. 4th will have an improved crossing opportunity given the proposed mid-street refuges provided by splitter islands. The north leg of this location is a school zone. Slower traffic will improve the school crossings. Figure 3 is out of an FHWA report. It shows the fundamental design elements of the proposed roundabout[1].

[1] "Roundabouts: An Informational Guide" U.S. Department of Transportation, Federal highway Administration, Publication No. FHWA-RD-00-067

1.6.1 Comparison of roundabout categories

Exhibit 1-7 summarizes and compares some fundamental design and operational elements for each of the six roundabout categories developed for this guide. The following sections provide a qualitative discussion of each category.

Exhibit 1-7. Basic design characteristics for each of the six roundabout categories.

For W 4th & Fletcher

Design Element	Mini-Roundabout	Urban Compact	Urban Single-Lane	Urban Double-Lane	Rural Single-Lane	Rural Double-Lane
Recommended maximum entry design speed	25 km/h (15 mph)	25 km/h (15 mph)	35 km/h (20 mph)	40 km/h (25 mph)	40 km/h (25 mph)	50 km/h (30 mph)
Maximum number of entering lanes per approach	1	1	1	2	1	2
Typical inscribed circle diameter[1]	13 m to 25 m (45 ft to 80 ft)	25 to 30 m (80 to 100 ft)	30 to 40 m (100 to 130 ft)	45 to 55 m (150 to 180 ft)	35 to 40 m (115 to 130 ft)	55 to 60 m (180 to 200 ft)
Splitter island treatment	Raised if possible, crosswalk cut if raised	Raised, with crosswalk cut	Raised, with crosswalk cut	Raised, with crosswalk cut	Raised and extended, with crosswalk cut	Raised and extended, with crosswalk cut
Typical daily service volumes on 4-leg roundabout (veh/day)	10,000	15,000	20,000	Refer to Chapter 4 procedures	20,000	Refer to Chapter 4 procedures

1. Assumes 90-degree entries and no more than four legs.

Figure 3: Fundamental design and operational elements of the proposed roundabout

C. ITEMIZED BREAKDOWN OF ALL COSTS:

	Pavement Removal & Clearing	$ 83,000
	New Pavement	220,000
	Curb & Gutter	24,000
	Storm / Sanitary Work/ Adjustments	15,000
	Seed/Sod/Rebuild Disturbed Areas	10,000
	Islands, Truck Apron, Driveways	57,000
	Construction Surveying	15,000
	Traffic Control	25,000
	Signs & Pavement Markings	10,000
	Lighting	9,000
	Mobilization	5,000
	Landscaping / Retaining Wall	8,000
	Sidewalk	9,600
	Incidentals	$ 49,000
CONSTRUCTION	**TOTAL** ($500,000 TSF+ $39,000 Local Funds)	**$ 539,000**
R.O.W. (Local Funds)		$ 10,000
ENGINEERING SERVICES (Local Funds)		$ 120,000
TOTAL		$ 669,000

D. TIME SCHEDULE

W. 4th Street & Fletcher Avenue Roundabout in Waterloo, Iowa

	2011											2012											
	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPT	OCT	NOV	DEC	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPT.	OCT	NOV	DEC
START	♦																						
DOT Agreement Exchange	▬	▬	▬	▬																			
Consultant Selection				▬	▬	▬																	
Preliminary Design							▬	▬	▬	▬													
Final Design / Acquisitions										▬	▬	▬											
Bidding / Award Process												▬	▬	▬	▬	▬							
Construction																▬	▬	▬	▬	▬	▬	▬	
END																						♦	

E. LOCATION MAP

F. COLOR PICTURES

F

Figure 4: Looking at south leg of W. 4th Street

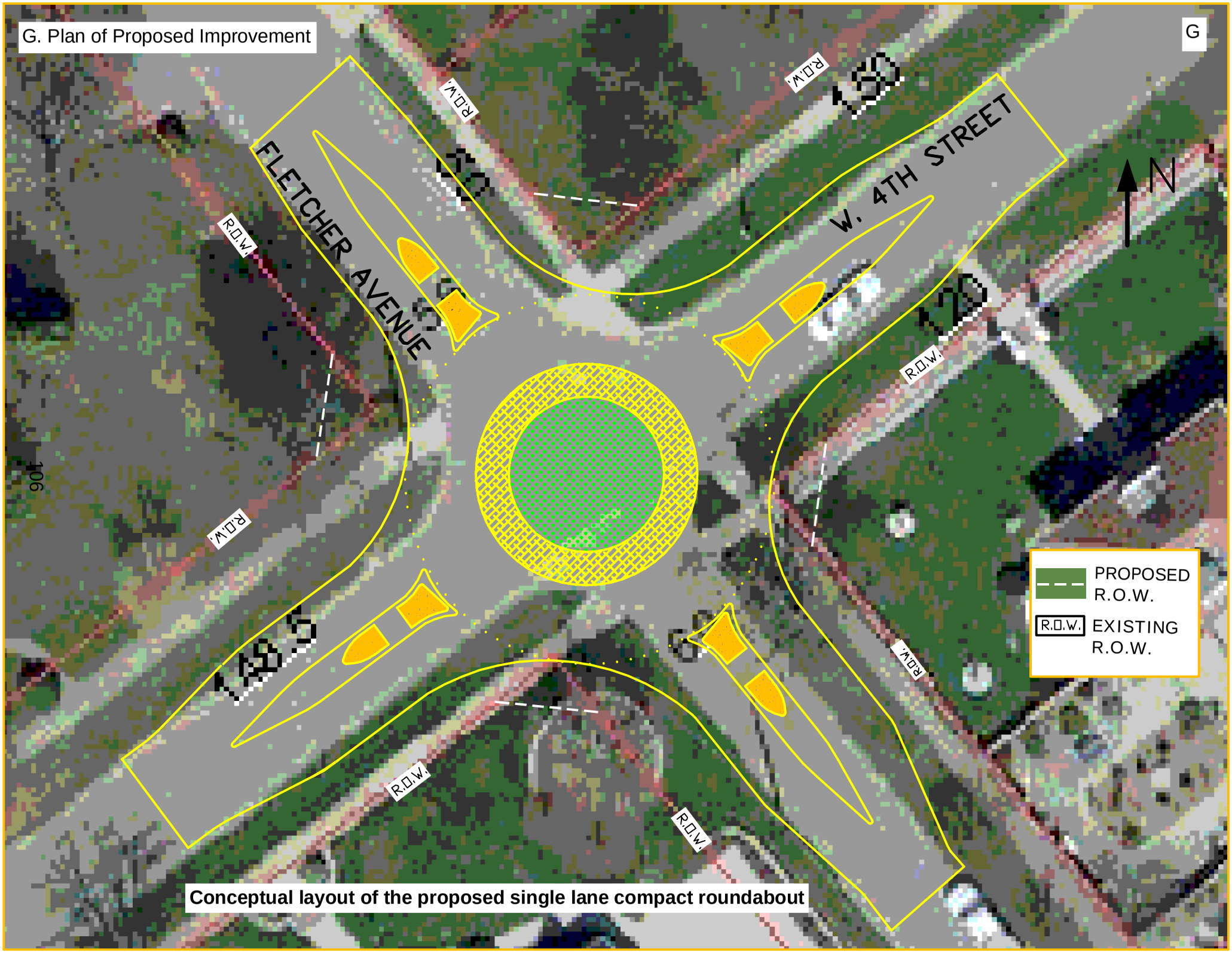
Figure 5: Looking at north leg of W. 4th Street.

Figure 6: West leg of Fletcher Avenue

Figure 7: East leg of Fletcher Avenue

G. Plan of Proposed Improvement

G



Conceptual layout of the proposed single lane compact roundabout

H. AERIAL PHOTOGRAPH

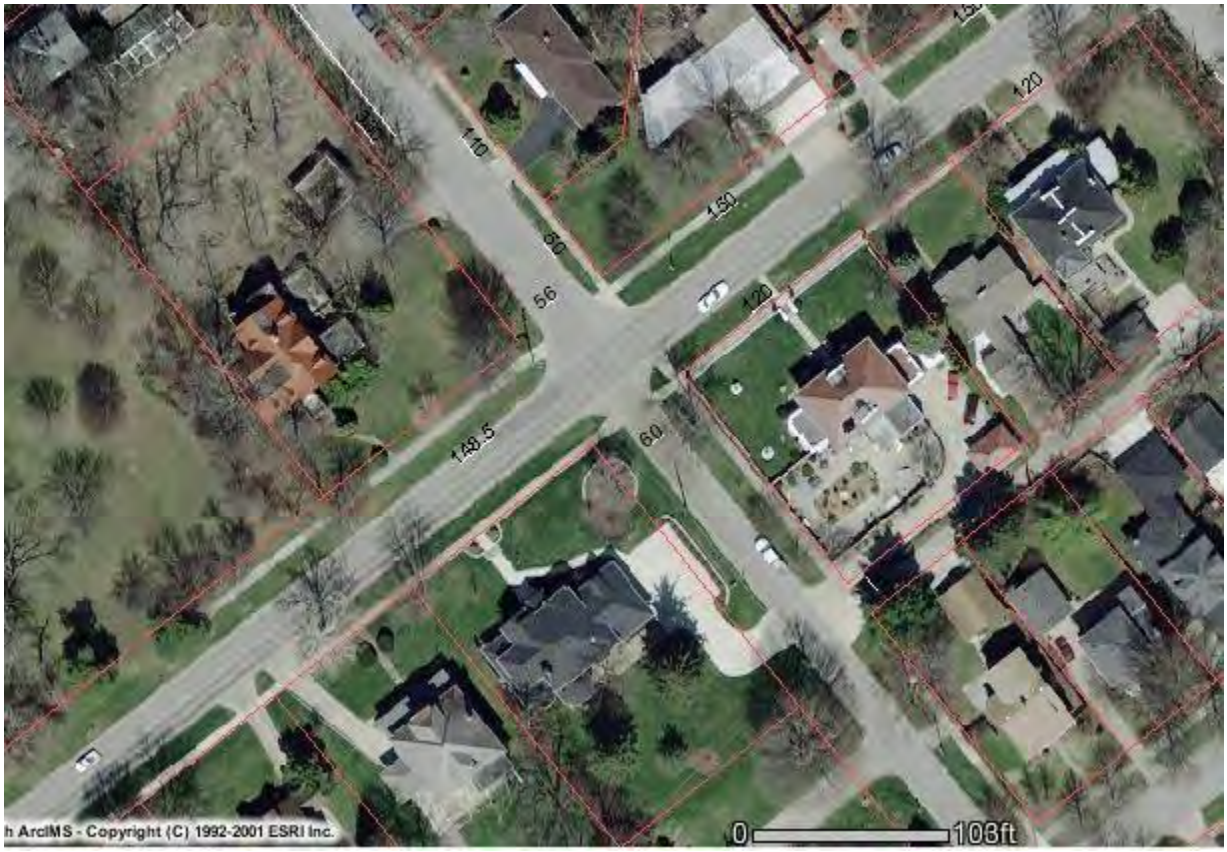
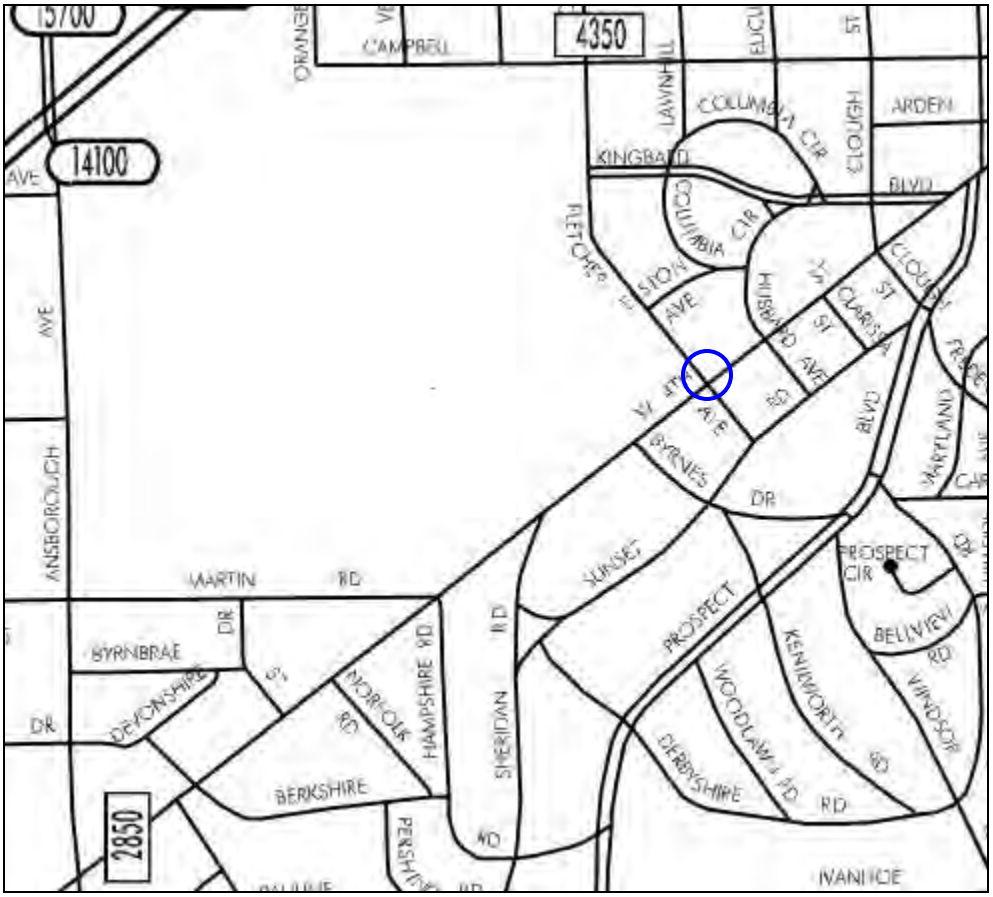


Figure 8: Aerial photo of W. 4th - Fletcher intersection

J. TRAFFIC VOLUMES AND/OR TURNING MOVEMENT

Source: 2005 Iowa DOT Counts;
http://www.iowadotmaps.com/msp/traffic/2005/cities/WaterlooC.pdf



L. BENEFIT/COST

The intersection has a high potential for severe crashes. Given the type of crash experience, a roundabout would eliminate the majority of the crashes. Elimination of all injury/fatal crashes has even a higher probability of success. The CRF of 72% indicated by www.cmfclearinghouse.org for all crash types when converting stop controlled intersection to a single lane roundabout in an urban area can materialize at this location. The following table lists the crashes for about 4.5 years. It shows the potentials for severe crashes and also the potential for crash reduction.

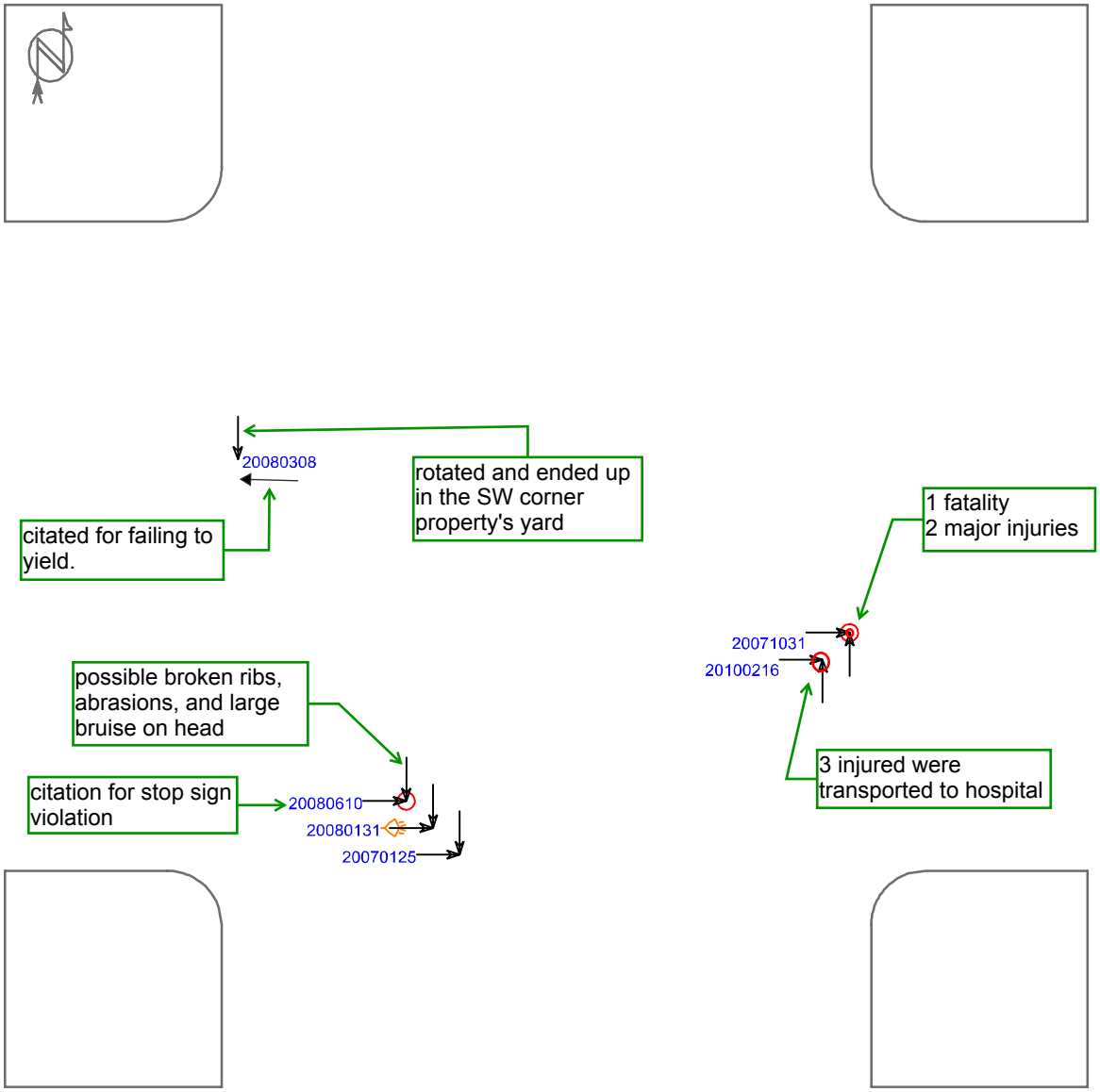
Figure 9: W 4th Street/ Fletcher Avenue Crashes 01/01/2006 thru 05/24/2010

No.	Call Number	Date	Fatality	Injured			PDO ($)	Collision Type	Description	Correctible by Roundabout?
				Major	Minor	Possible				
1	07-008067	1/25/2007					4000	Right Angle Broadside	Failed To Yield From Stop Sign	Yes
2	07-112948	10/31/2007	1	2			2,000	Right Angle Broadside	Failed To Yield From Stop Sign	Yes
3	08-010256	1/31/2008					10,000	Right Angle Broadside	Failed To Yield From Stop Sign	Yes
4	08-022800	3/8/2008					4,000	Right Angle Broadside	Failed To Yield From Stop Sign	Yes
5	08-057640	6/10/2008		1			500	Right Angle Broadside	Failed To Yield From Stop Sign	Yes
6	10-016496	2/16/2010			3		20,000	Right Angle Broadside	Failed To Yield From Stop Sign	Yes

There are also other direct non-quantifiable safety benefits. One benefit is the effect on the school zone north of the intersection. A roundabout will actively reduce driving speeds. Another benefit be the positive impact on pedestrian crossing at this location. Pedestrians will have a raised refuge island in the middle of the road. They will be crossing only 1/2 street width at a time. With reduced speeds the pedestrians will find it easier to cross W. 4th. Currently W. 4th Street has higher speeds and no refuge islands. Fletcher is stopped controlled. Crossing Fletcher may or may not improve but crossing one lane at a time and a refuge island should help.

West 4th & Fletcher

2006 - 5/25/2010



(0) crashes could not be placed in this schematic

Straight	Parked	Pedestrian	Fixed objects:
Stopped	Erratic	Bicycle	General, Signal, Tree, Pole, Curb, Animal
Unknown	Out of control	Injury	
Backing	Right turn	Fatality	
Overtaking	Left turn	Nighttime	3rd vehicle
Sideswipe	U-turn	DUI	Extra data

Pd' Programming, Inc. 05/27/2010

Intersection or Spot Benefit / Cost Safety Analysis

Rev. 8/09

Iowa DOT Office of Traffic & Safety

County: Black Hawk Prepared by: ME Date Prepared: Jun 2, 2010

Intersection: W. 4th Street and Fletcher Avenue in Waterloo

Improvement

Proposed Improvement(s): Replacing two-way stop control with a compact 15 mph urban one-lane roundabout.

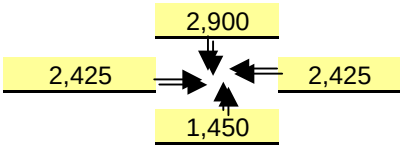
$ 669,000	Estimated Improvement Cost, **EC**	20	Est. Improvement Life, years, **Y**
	Other Annual Cost (after initial year), **AC**	72	Crash Reduction Factor (integer), **CRF**
$ -	Present Value Other Annual Costs, **OC**	4.0%	Discount Rate (time value of $), **INT**
		$ 669,000	Present Value Cost, **COST** = EC + OC

$$OC = \frac{AC}{INT}\left(1 - \frac{1}{(1+INT)^Y}\right)$$

Traffic Volume Data

Source: Iowa DOT Maps -Traffic 2005 Date of traffic count

Daily Entering Vehicles by Approach (or AADT / 2)



3,358,000 Current Annual Entering Veh., **AEV** = DEV * 365

11,226 veh / day, Final Year DEV, **FDEV**

73.94 MEV, Total Million Entering Veh. Over life of Project, **TMEV**

1.0% Projected Traffic Growth (0%-10%), **G**

9,200 Current Daily Entering Vehicles, **DEV**

$$TMEV = \frac{AEV}{-G}\left(1 - \left(\frac{1+G}{1}\right)^Y\right) \Big/ 10^6$$

Crash Data

2006 First full year --> 2009 Last full year 4.4 years, Time Period, **T**

5 Additional months values as of Dec. 2007

1	Fatal Crashes	1	Fatalities @	$3,500,000	$	3,500,000
		3	Major Injuries @	$240,000	$	720,000
2	Injury Crashes	3	Minor Injuries @	$48,000	$	144,000
			Possible Injuries @	$25,000	$	-
3	Property Damage Only		(assumed cost per crash)	$2,700	$	-
		-OR-	enter all Property Costs of all crashes:		$	40,500
6	Total Crashes, **TA**		Total $ Loss, **LOSS**		$	4,404,500

1.36 Current Crashes / Year, **AA** = TA / T

$ 734,083 Cost per Crash, **AVC** = LOSS / TA

29.9 Total Expected Crashes, **TECR** = CR x TMEV

0.98 Crashes Avoided First Year **AAR** = AA x CRF / 100

$ 718,017 Crash Costs Avoided in First Year, AAR x AVC

21.5 Total Avoided Crashes, TECR x CRF/ 100

0.40 Crashes / MEV, Crash Rate, **CR**

CR = TA x 10^6 / (DEV x 365 x T)

$ 10,605,612 Present Value of Avoided Crashes, **BENEFIT**

$$BEN. = \frac{AVC \times AAR}{(INT - G)}\left(1 - \left(\frac{1+G}{1+INT}\right)^Y\right)$$

Benefit / Cost Ratio

Benefit : Cost = $10,605,612 : $669,000 = **15.85** : 1

Iowa Department of Transportation

Rev. 3/08

Application for TRAFFIC SAFETY FUNDS

GENERAL INFORMATION

Location / Title of Project U.S. 18 & Country Club Road Improvements

Applicant City of Sheldon, IA

Contact Person Scott Wynja Title City Manager

Complete Mailing Address 416 9th Street P.O. Box 276
Sheldon, IA 51201

Phone (712) 324-4651 (Area Code) E-Mail swynja@cityofsheldon.com

If more than one highway authority is involved in this project, please indicate and fill in the information below (use additional sheets if necessary).

Co-Applicant(s) _____

Contact Person _____ Title _____

Complete Mailing Address _____

_____

Phone _____ (Area Code) E-Mail _____

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Application Type

- Site Specific ☒
- Traffic Control Device ☐
- Safety Study ☐

Funding Amount

Total Project Cost $ 609,000

Safety Funds Requested $ 200,000

NARRATIVE

Existing Conditions

US 18 through the City of Sheldon in Iowa DOT District 3 is an east/west national highway as well as an arterial for local city traffic. The US 18 corridor through the City was previously studied as part of a joint City/Iowa DOT Traffic Engineering Assistance Program (TEAP) corridor study in year 2008, finalized February 2009.

A specific topic of concern for the City during the TEAP study was the intersection of US 18 & Country Club Road, specifically the safety performance and traffic changes as a result of the 2006 opening of the IA 60 bypass around Sheldon. The TEAP study's recommendations for that intersection form the basis for this Traffic Safety Improvement Program (TSIP) application. The project area is centered on the intersection of US 18 & Country Club Road, and includes length to the east and west for widening, and can be seen in the project area map in Section E of this application.

US 18 near the project area is currently a rural two-lane cross section with a 23' wide road with 9' wide asphalt shoulders and rumble strips west of Country Club Road. East of Country Club Road the cross section transitions to a three lane width due to widening as part of the 2006 Iowa DOT IA 60 bypass project. This section provides one through lane in each direction plus a center two way left turn lane (TWLTL).

Land use around the area is changing from residential and agricultural to also including light industry and commercial. This trend will continue as currently vacant land develops.

The TEAP study also noted that the sight distance looking west for at the intersection is only marginally satisfactory. Further analysis was undertaken using guidelines for older drivers, as discussed in the TEAP study. When the older driver requirements were taken into consideration, the available sight distance and required sight distance were almost identical.

Traffic Counts

Traffic counts were collected by the Iowa DOT in 2007. In addition, additional peak hour traffic counts were obtained by the City in 2008. These showed an AADT on US 18 of approximately 6,900 vehicles per day (vpd) at the Country Club Road intersection. Iowa DOT year 2007 counts can be viewed in Section J of this application.

Traffic growth along the corridor as a whole is low, estimated at 1.5 % in 2008 TEAP Study Report. However, local traffic growth on US 18 at Country Club Road experienced a "jump" as US 18 traffic shifted with the Iowa DOT's construction of the IA 60 bypass east of Sheldon. At the Country Club Road intersection, AADT jumped approximately 35% from approximately 5000 vpd in 2003 to 6800 vpd in 2007. This traffic increase had a corresponding decrease near the Old IA 60 corridor at the western end of US 18, indicating some traffic growth but primarily a shift to the east part of the US 18 corridor. This shift is shown in a graph included in Section J of this application.

In addition to re-routing traffic accessing IA 60, the new bypass has also spurred new development on the east side of the City. Furthermore, an interchange was constructed south

along Country Club Road at IA 60. Paving was completed on a final segment north of the interchange in 2009, which is expected to cause an increase of traffic on Country Club Rd and to the study intersection.

Crash History
Crash data for the US 18 project area were obtained from the Iowa DOT CMAT and SAVER software, with crash reports obtained from the City of Sheldon Police Department. The data include the period from January 2005 through December 2009.

During this five year analysis period, 12 crashes occurred. These crashes included five injury crashes, resulting in nine injuries (two each of fatal, major, minor injuries and three possible injuries).

Six of the crashes were rear end collisions, and six were broadside collisions. The IA 60 bypass opened in Fall 2006, and it is noted that 10 of the 12 crashes occurred after November 2006.

A double fatality occurred in April of 2008 at the Fareway driveway/public access intersection east of Country Club Road on US 18. This crash involved an elderly driver and passenger incorrectly yielding to a westbound truck. After discussion with the Iowa DOT Office of Traffic and Safety, this crash will be treated as one major injury for the application. This reflects Iowa DOT practice of counting the first fatality as a major injury due to the random nature of severe crashes, as well as the consideration that the crash may not have been directly preventable with the proposed improvements.

Proposed Improvement Plan
In order to improve traffic safety at the intersection as well as proactively reduce future crashes at the intersection and commercial driveway to east, the City of Sheldon, in coordination with the Iowa DOT District 3 proposes to add left turn lanes along US 18 & Country Club Road. As part of these improvements the north and south approaches on Country Club Road will be re-constructed, providing short left turn lanes and also adjusting the intersection profile to raise the height to provide a slight benefit for sight distance. The City will also work with the business in SW corner of intersection to close the US 18 driveway immediately west of Country Club Road. Plan view sheets of these proposed improvements are shown in Section G of this application.

This improvement will require adding width to the north side of two lane cross section west of the intersection to provide for a left turn lane. A current project will extend this three lane cross section west to the existing four lane cross section west of N 18th Avenue, providing an opportunity for an ultimate consistent three lane cross section through the entire corridor. On the east side of Country Club Rd, widening on the north side of US 18 will connect with existing widening to the three-lane cross section (one through lane in each direction with a two-way left turn lane (TWLTL)) created by the Iowa DOT as part of the IA 60 bypass. This TWLTL will be an exclusive left turn lane at the Country Club intersection.

These improvements will improve safety performance by providing storage for left turning vehicles along Country Club intersection and thereby reducing the opportunities for rear end crashes. Furthermore, auxiliary lanes and an improvement in sight distance on the north and south approaches will help drivers choose better gaps and reduce turning and broadside crashes.

Plans have been prepared for these improvements, and were reviewed by Iowa DOT staff in Spring 2010 related to possible TIGER II funding.

In addition to the proposed TSIP project, the City has worked with the local utility to provide street lighting along the US 18 corridor from 19th Avenue to the IA 60 interchange. This will provide better lighting for the increase in traffic and turning movements, and complements the change to a more "urbanized" corridor as the corridor has developed following the by-pass construction. To date, lighting has been added from the by-pass west to near Country Club Rd, with the remaining distance to be completed following proposed roadway improvements.

As noted above, the existing two lane segment from the west limits of the proposed US 18 & Country Club Road improvements to the existing four lane cross section west of 18th/19th Avenue is also proposed for widening to three lanes. This improvement was recommended in the corridor TEAP study as development warranted. A new grocery store is planned north of US 18 near 21st Street, and therefore the three lane widening is being designed for this section as well, with construction in Fall 2010/Spring 2011.

Financing
The proposed improvements are estimated to cost $609,000. The City is requesting $200,000 in TSIP funding. Per Iowa DOT District 3, the City plans to also apply for Urban State Traffic Engineering Program (U-STEP) funding to match the balance of funding and to consider a full width HMA overlay to improve the surface course.

Complementarity
The project is consistent with the jointly funded TEAP study (City and Iowa DOT), City planning documents, including the *City of Sheldon Comprehensive Land Use Plan* (2004) developed with the Northwest Iowa Planning and Development Commission and other City planning documents associated with anticipated development following construction of the IA 60 bypass.

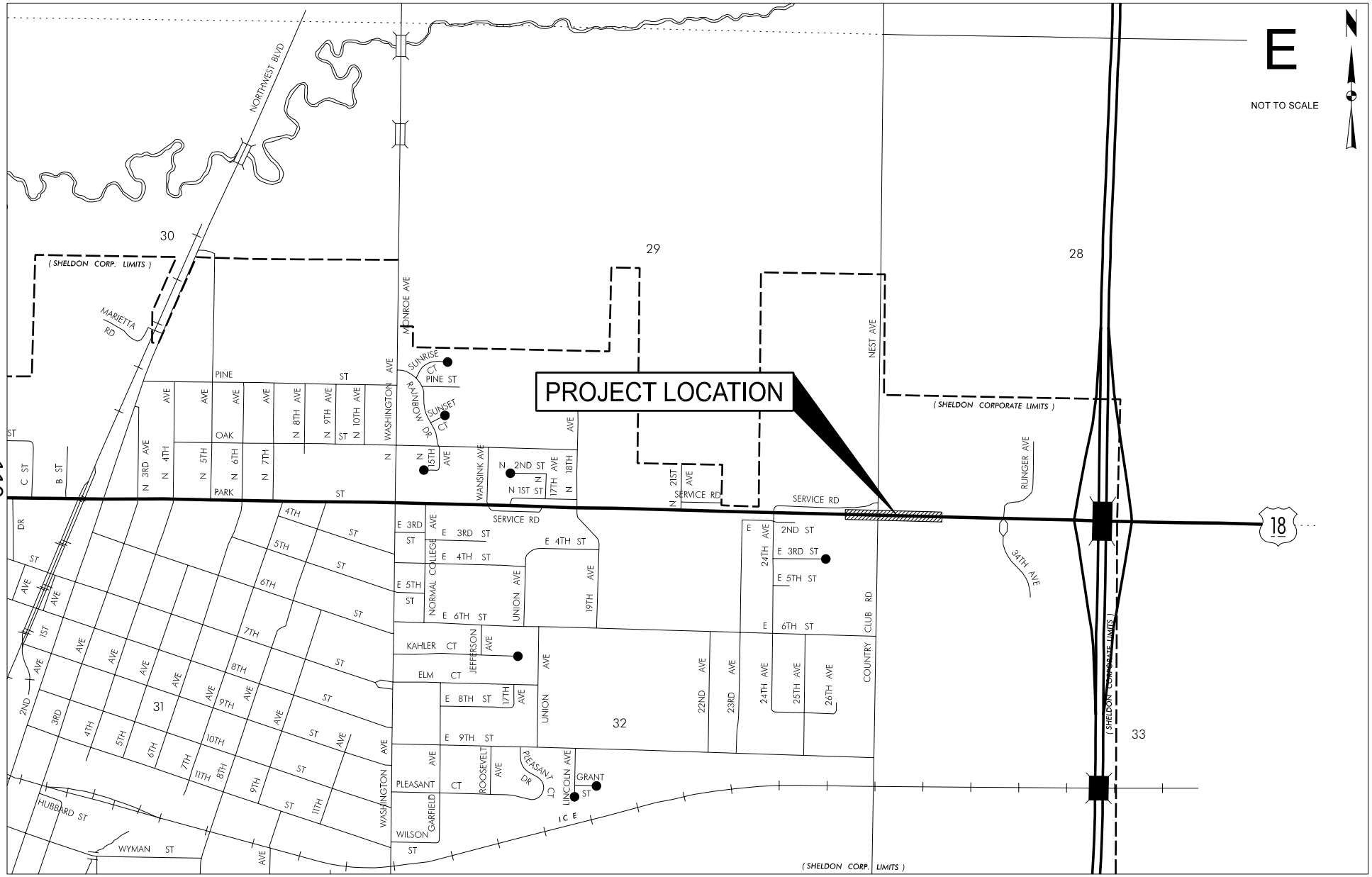
Iowa DOT District 3 is in support of the proposed safety improvements and TSIP application, and was also supportive of the guiding 2008 US 18 Corridor Study performed under the Iowa DOT TEAP program.

OPINION OF PROBABLE COST
US 18 & COUNTRY CLUB ROAD IMPROVEMENTS
SHELDON, IA

Item	Item Code	Description	Unit	Unit Price	Quantity	Amount
1	2101-0850001	Clearing & Grubbing	AC	$ 2,000.00	1	$ 2,000.00
2	2102-0425070	Special Backfill	TON	$ 12.00	782	$ 9,384.00
3	2102-2710070	Excavation, Class 10, Roadway and Borrow	CY	$ 7.00	3500	$ 24,500.00
4	2105-8425015	Topsoil, Strip, Salvage, Respread	CY	$ 8.00	1800	$ 14,400.00
5	2115-0100000	Modified Subbase	CY	$ 25.00	2080	$ 52,000.00
6	2122-5500080	Paved Shoulder, HMA, 8"	SY	$ 30.00	2179	$ 65,370.00
7	2123-7450000	Shoulder Construction, Earth	STA	$ 150.00	28	$ 4,200.00
8	2128-0000120	Furnish And Apply Granular Shoulder Material	TON	$ 18.00	160	$ 2,880.00
9	2213-7100400	Relocation of Mail Box	EA	$ 100.00	7	$ 700.00
10	2301-1033100	PCC Pavement, Class C, 10"	SY	$ 35.00	1715	$ 60,025.00
11	2302-1200100	PCC Pavement Widening, 10"	SY	$ 45.00	3588	$ 161,460.00
12	2312-8260051	Granular Surfacing on Road, Class A Crushed Stone	TON	$ 30.00	170	$ 5,100.00
13	2401-6745650	Removal of Existing Structure	LS	$ 1,000.00	1	$ 1,000.00
14	2402-2720100	Excavation, Class 20, for Roadway Pipe Culvert	CY	$ 10.00	100	$ 1,000.00
15	2416-0100024	Apron, Concrete, 24"	EA	$ 1,200.00	4	$ 4,800.00
16	2416-0100036	Apron, Concrete, 36"	EA	$ 1,500.00	1	$ 1,500.00
17	2416-1180024	Culvert, Concrete Roadway Pipe, 24"	LF	$ 50.00	63	$ 3,150.00
18	2416-1180036	Culvert, Concrete Roadway Pipe, 36"	LF	$ 80.00	34	$ 2,720.00
19	2435-0600010	Manhole Adjustment, Minor	EA	$ 500.00	4	$ 2,000.00
20	2502-8212034	Subdrain, Longitudinal, (Shld) 4"	LF	$ 10.00	2733	$ 27,330.00
21	2502-8220193	Subdrain Outlet (RF-19C)	EA	$ 200.00	4	$ 800.00
22	2502-8220196	Subdrain Outlet, RF 19E	EA	$ 300.00	16	$ 4,800.00
23	2510-6745850	Removal of Pavement	SY	$ 5.00	5194	$ 25,970.00
24	2510-6750600	Removal of Intakes and Utility Accesses	EA	$ 600.00	1	$ 600.00
25	2511-7526006	Sidewalk, PCC, 6"	SY	$ 35.00	20	$ 700.00
26	2511-7528100	Detectable Warning - Curb Ramp	SF	$ 25.00	16	$ 400.00
27	2518-6910000	Safety Closure	EA	$ 300.00	3	$ 900.00
28	2524-6765010	Remove and Reinstall Sign as per Plan	EA	$ 200.00	8	$ 1,600.00
29	2526-8285000	Construction Survey	LS	$ 6,500.00	1	$ 6,500.00
30	2527-9263109	Painted Pavement Marking, Waterborne	STA	$ 35.00	139	$ 4,865.00
31	2527-9263137	Painted Symbol and Legend, Waterborne	EA	$ 70.00	16	$ 1,120.00
32	2528-8445110	Traffic Control	LS	$ 4,000.00	1	$ 4,000.00
33	2528-8445113	Flagger	EA	$ 280.00	20	$ 5,600.00
34	2533-4980005	Mobilization	LS	$ 20,000.00	1	$ 20,000.00
35	2554-0214000	Fire Hydrant Adjustment	EA	$ 500.00	1	$ 500.00
36	2599-9999005	Relocate Fire Hydrant	EA	$ 1,500.00	1	$ 1,500.00
37	2601-2634100	Mulch	AC	$ 500.00	1.9	$ 950.00
38	2601-2636044	Seed and Fertilize (Urban)	AC	$ 1,000.00	1.9	$ 1,900.00
39	2601-2643401	Turf Reinforcement Mat	SQ	$ 100.00	30	$ 3,000.00
40	2602-0000020	Silt Fence	LF	$ 2.00	360	$ 720.00
41	2602-0000060	Removal of Silt Fence	LF	$ 1.00	360	$ 360.00
42	2602-0000090	Clean-out of Silt Fence	LF	$ 2.00	360	$ 720.00
					Construction Subtotal:	$ 533,024.00
					Contingency (3%):	$ 15,990.72
					Total Estimated Construction:	**$ 549,014.72**
					Additional Paving to match future widening to west:	$ 60,000.00
					TOTAL Estimated Construction Cost:	**$ 609,000.00**

PROPOSED PROJECT SCHEDULE
US 18 & COUNTRY CLUB ROAD IMPROVEMENTS
SHELDON, IA

May-September 2009	Project Engineering, Right-of-Way, Prelim Design
Spring 2010-06-03	Design Completed
June 2010	TSIP Application
January 2011	TSIP Agreement
January/February 2011	Design/Plan Modifications
March 2011	Project Letting
April-October 2011	Project Construction



LOCATION MAP
US 18 & COUNTRY CLUB ROAD
SHELDON, IOWA

Photo 1: Country Club Road South Approach Looking West Along US 18

Photo 2: Country Club Road South Approach Looking East Along US 18

Photo 3: Country Club Road South Approach Looking North

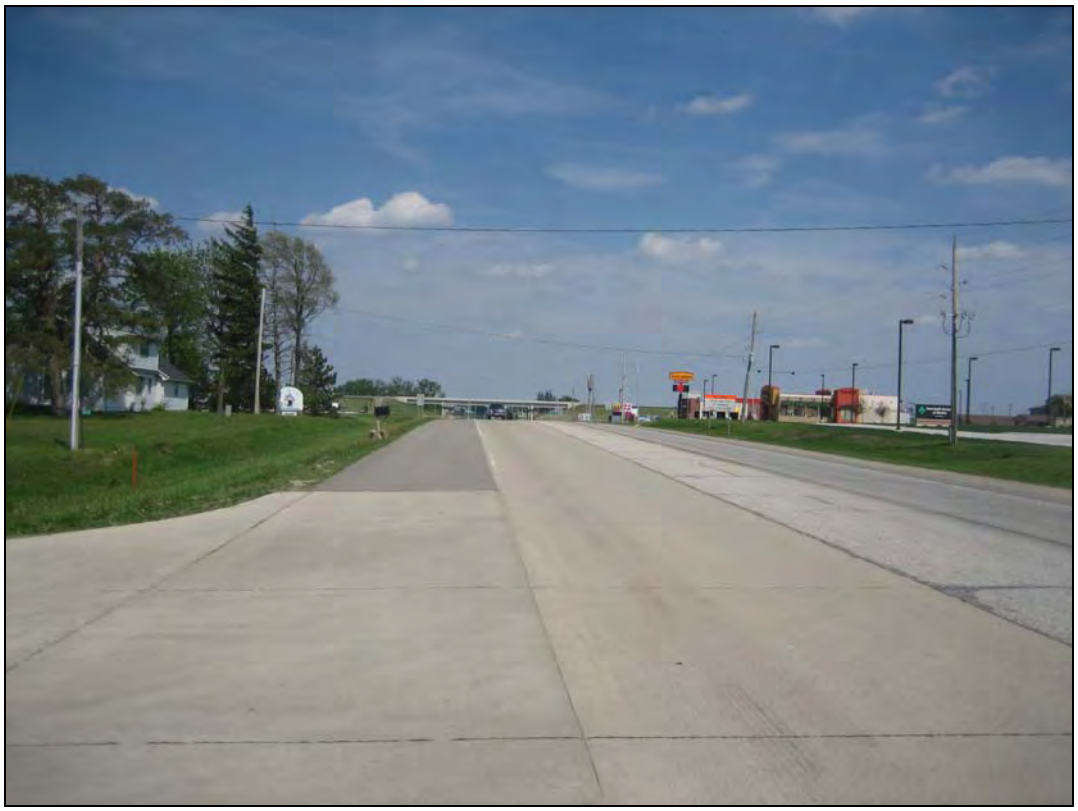


Photo 4: Fareway Driveway North Approach Looking East Along US 18

LETTING DATE

HIGHWAY IMPROVEMENTS
JP-18-2(103)--3R-71

O'BRIEN Co.

THIS PROJECT IS COVERED BY THE IOWA DEPARTMENT OF NATURAL RESOURCES NPDES GENERAL PERMIT NO. 2. THE CONTRACTOR SHALL CARRY OUT THE TERMS AND CONDITIONS OF GENERAL PERMIT NO. 2 AND THE STORM WATER POLLUTION PREVENTION PLAN WHICH IS A PART OF THESE CONTRACT DOCUMENTS. REFER TO SECTION 2602 OF THE IOWA DOT STANDARD SPECIFICATIONS FOR ADDITIONAL INFORMATION.

Iowa Department of Transportation

Highway Division

PRIMARY ROAD SYSTEM
O'BRIEN COUNTY
PCC PAVEMENT WIDENING

US HIGHWAY 18 - FROM N. 24TH AVENUE EAST
0.41 MILES TO S. 34TH AVENUE IN SHELDON

SCALES: As Noted

The Iowa Department of Transportation Standard Specifications for Highway and Bridge Construction, series 2004, plus General Supplemental Specifications; and applicable Supplemental Specifications, Developmental Specifications, and Special Provisions, shall apply to construction on this project.

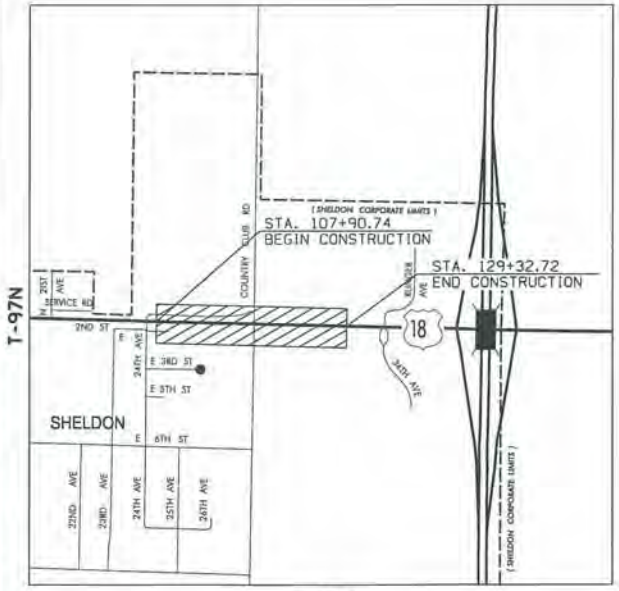
JP-18-2(103)--3R-71

INDEX OF SHEETS

105-3
10-18-05

NO.	DESCRIPTION
A.01	TITLE SHEET
A.02	LEGEND SHEET
B.01-B.03	TYPICAL SECTIONS AND DETAILS
C.01-C.06	QUANTITIES AND TABULATIONS
D.01-D.04	PLAN AND PROFILE - U.S. HIGHWAY 18
E.01	PLAN AND PROFILE - COUNTRY CLUB ROAD
J.01-J.04	TRAFFIC CONTROL, STAGING & PAVEMENT MARKINGS
L.01-L.02	JOINTING & GEOMETRICS
W.01-W.45	CROSS SECTIONS - U.S. HIGHWAY 18

IOWA ONE CALL
800 /292-8989
CALL - BEFORE - YOU - DIG



MILEAGE SUMMARY

105-1
09-27-94

DIV.	LOCATION	LIN. FT.	MILES
	U.S. HIGHWAY 18 STA. 107+90.74 TO STA. 129+32.72	2,141.98	0.41
	COUNTRY CLUB ROAD STA. 1000+67.28 TO STA. 1004+97.98	430.70	0.08
	TOTAL:	2,572.68	0.49

04-30-02 101-5

DESIGN DATA URBAN

2010	AADT	7,200	V.P.D.
2020	AADT	8,400	V.P.D.
2020	DHV	800	V.P.H.
TRUCKS		12	%
TOTAL DESIGN ESALS		4,832,600	

CITY OF SHELDON

This Engineering Document is Approved:

State Aynja Date
City of Sheldon

LICENSED PROFESSIONAL ENGINEER
GABRIEL A. NELSON
17382
IOWA

I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.

02/23/10
Gabriel A. Nelson, P.E. Date

License Number 17382

My License Renewal Date is December 31, 2010

Pages or sheets covered by this seal:
A.01-A.02, B.01-B.03, C.01-C.06, D.01-D.04, E.01, J.01-J.04, L.01-L.02, W.01-W.45

ENGLISH	IOWA DOT	DESIGN TEAM	SNYDER & ASSOCIATES	PLAN FILE NO. XXX-XX	O'BRIEN COUNTY	PROJECT NUMBER JP-18-2(103)--3R-71	SHEET NUMBER A.01

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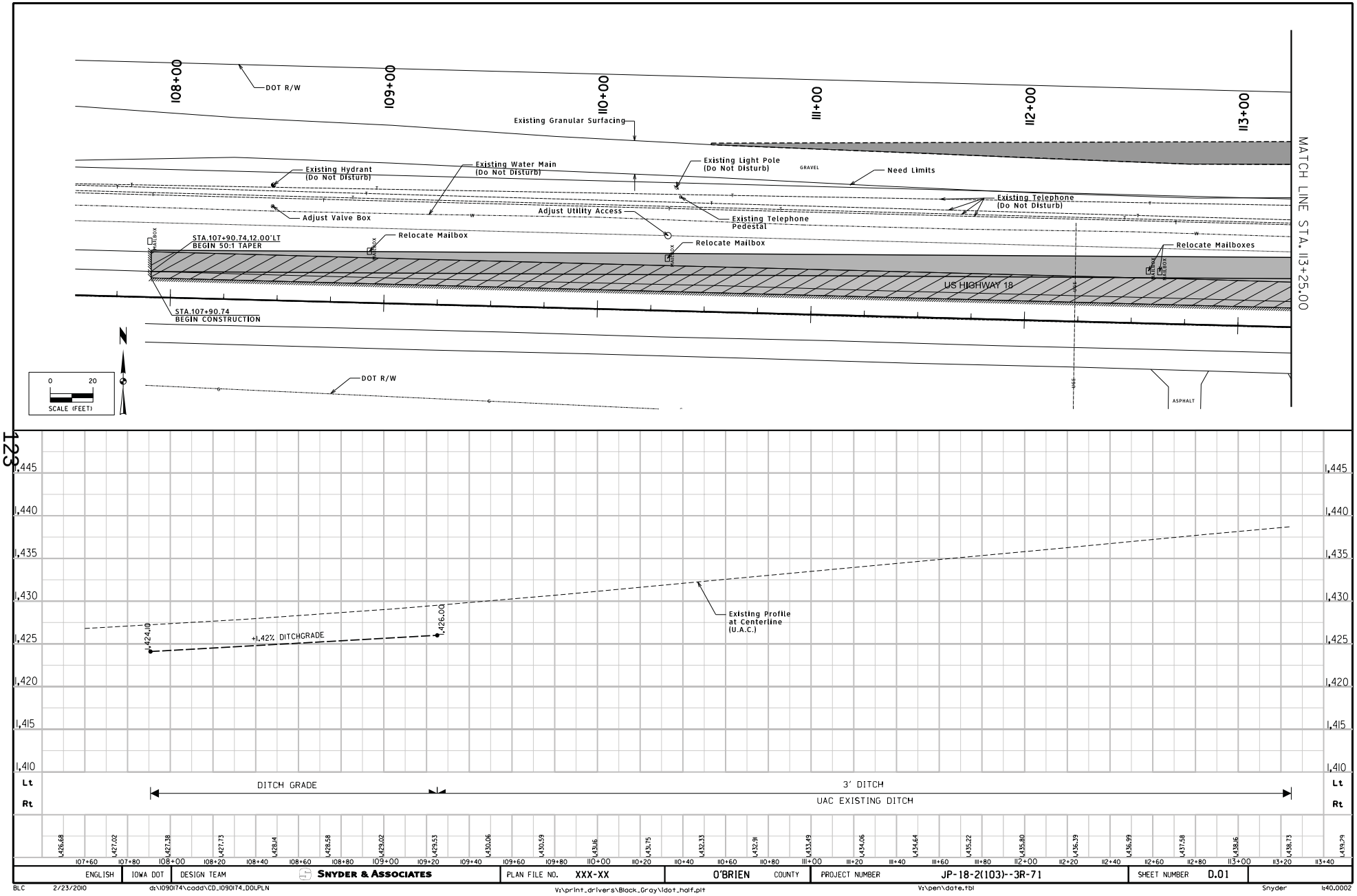

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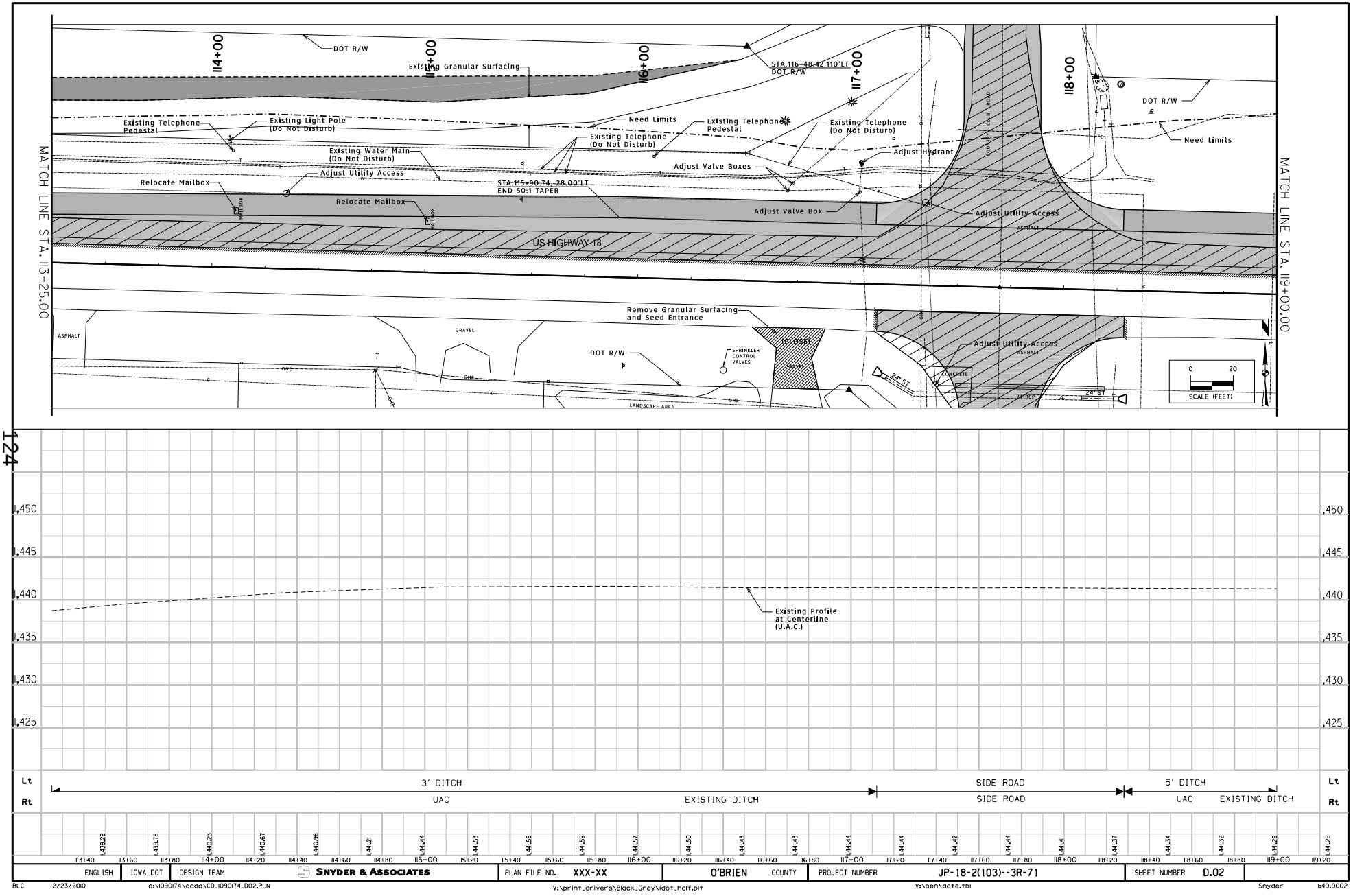
114+00
115+00
116+00
117+00
118+00
DOT R/W
Existing Granular Surfacing
STA.116+48.42,110'LT
DOT R/W
Existing Telephone Pedestal
Existing Light Pole (Do Not Disturb)
Need Limits
Existing Telephone Pedestal
Existing Telephone (Do Not Disturb)
Existing Telephone (Do Not Disturb)
Existing Water Main (Do Not Disturb)
Adjust Hydrant
Adjust Valve Boxes
Adjust Utility Access
Relocate Mailbox
STA.115+90.74, 28.00'LT
END 50:1 TAPER
Relocate Mailbox
Adjust Valve Box
Adjust Utility Access
US HIGHWAY 18
MATCH LINE STA. 113+25.00
MATCH LINE STA. 119+00.00
Remove Granular Surfacing and Seed Entrance
ASPHALT
GRAVEL
DOT R/W
SPRINKLER CONTROL VALVES
(CLOSED)
GRASS
Adjust Utility Access
ASPHALT
CONCRETE
24" ST
24" RCP
LANDSCAPE AREA
COUNTRY CLUB ROAD
0 20
SCALE (FEET)
1,450
1,445
1,440
1,435
1,430
1,425
Existing Profile at Centerline (U.A.C.)
Lt
Rt
3' DITCH
UAC
EXISTING DITCH
SIDE ROAD
SIDE ROAD
5' DITCH
UAC
EXISTING DITCH
1,439.29
1,439.78
1,440.23
1,440.67
1,440.98
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113+40
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118+60
118+80
119+00
119+20
ENGLISH
IOWA DOT
DESIGN TEAM
SNYDER & ASSOCIATES
PLAN FILE NO. XXX-XX
O'BRIEN COUNTY
PROJECT NUMBER JP-18-2(103)--3R-71
SHEET NUMBER D.02
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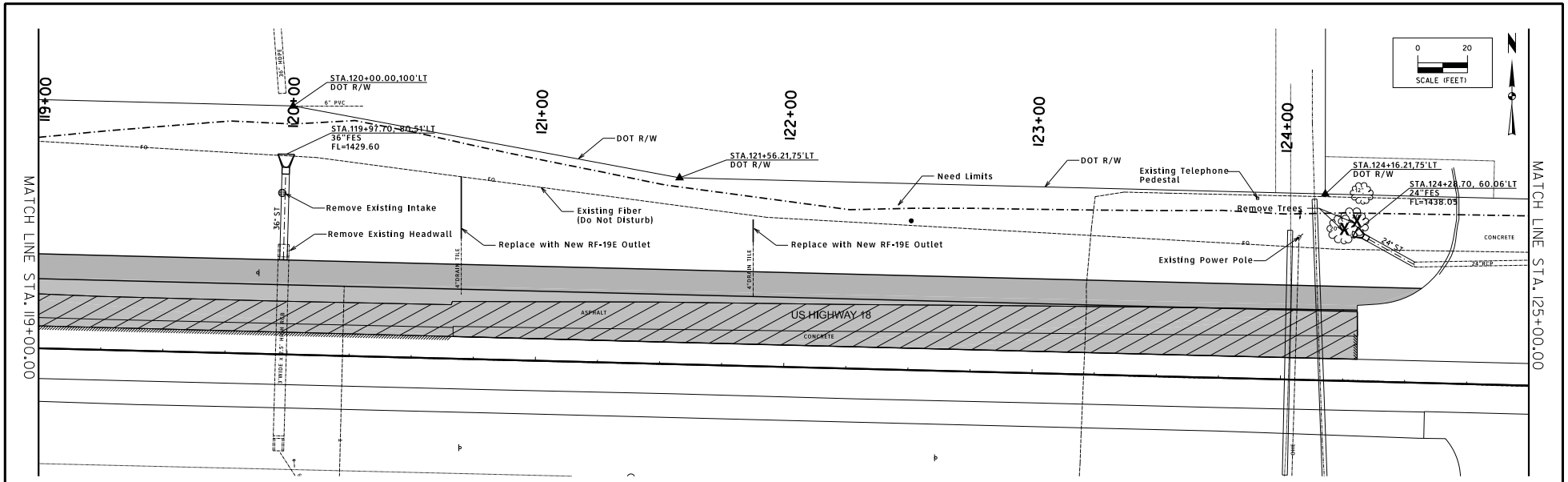

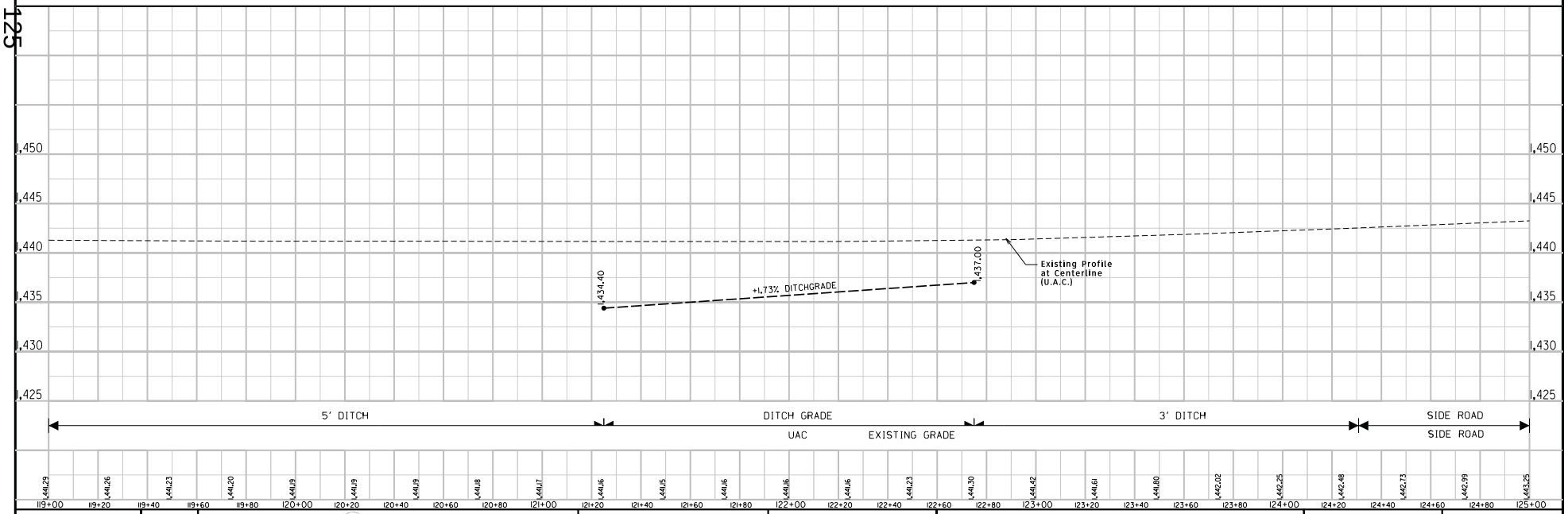

ENGLISH	IOWA DOT	DESIGN TEAM	SNYDER & ASSOCIATES	PLAN FILE NO. XXX-XX	O'BRIEN COUNTY	PROJECT NUMBER JP-18-2(103)--3R-71	SHEET NUMBER D.03

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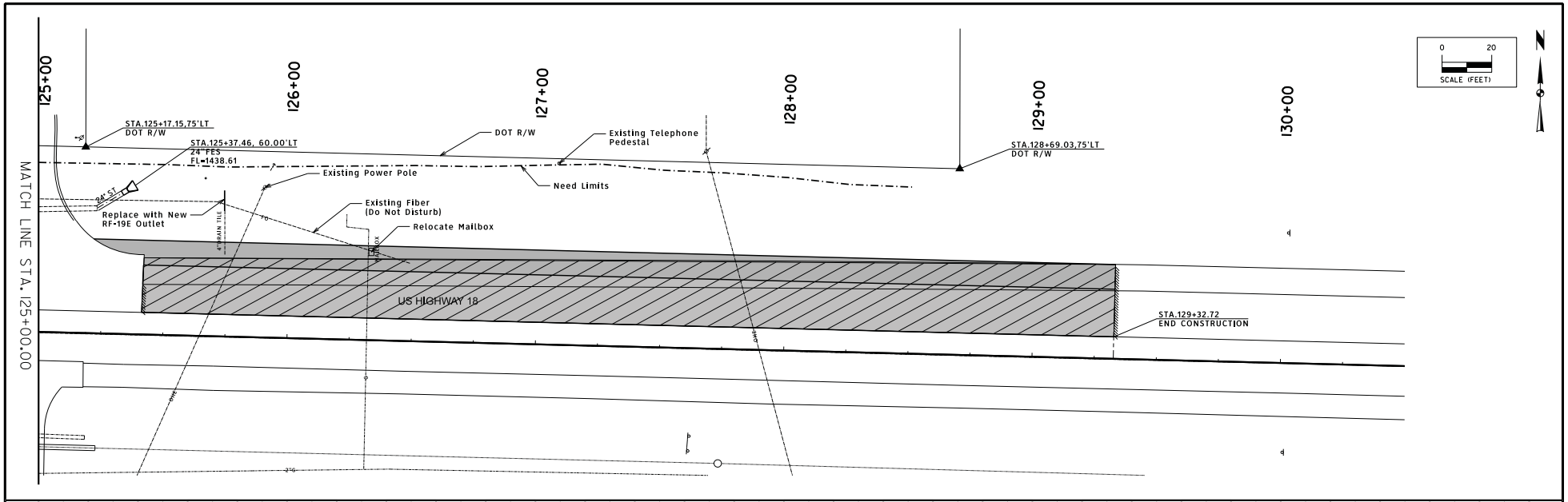

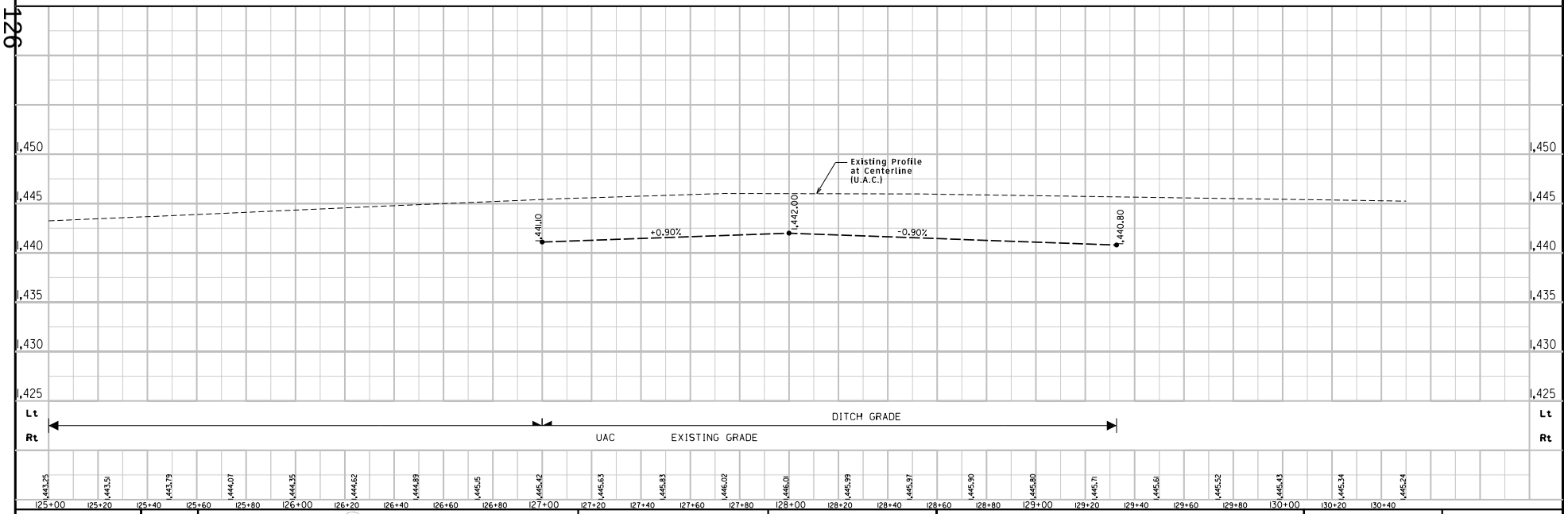

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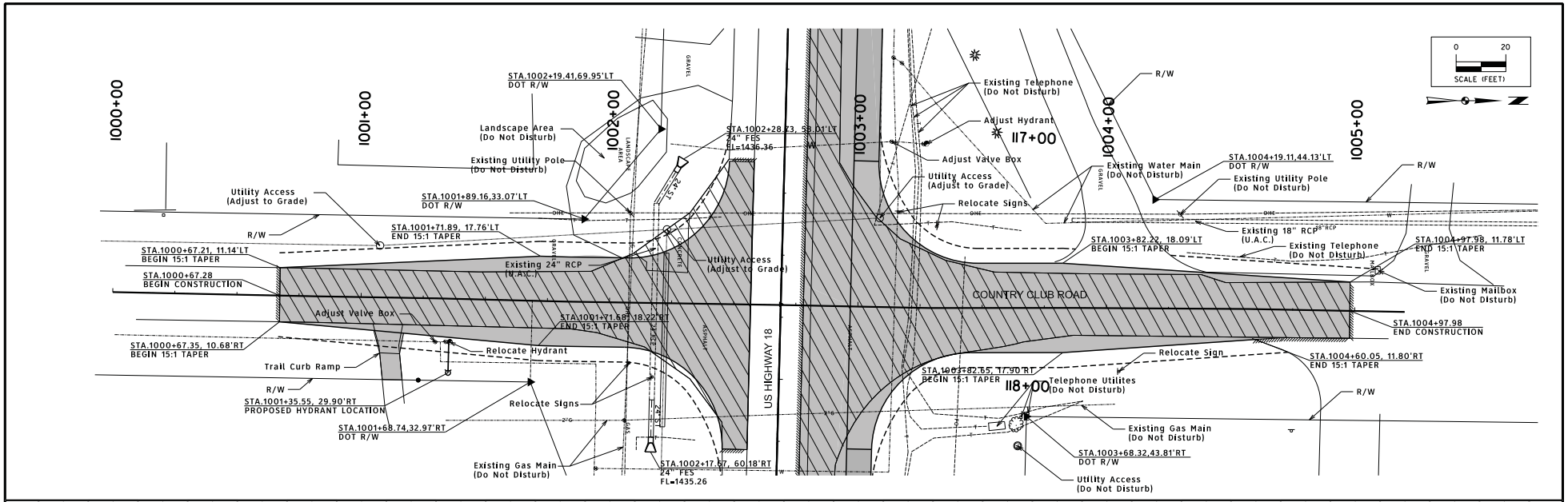

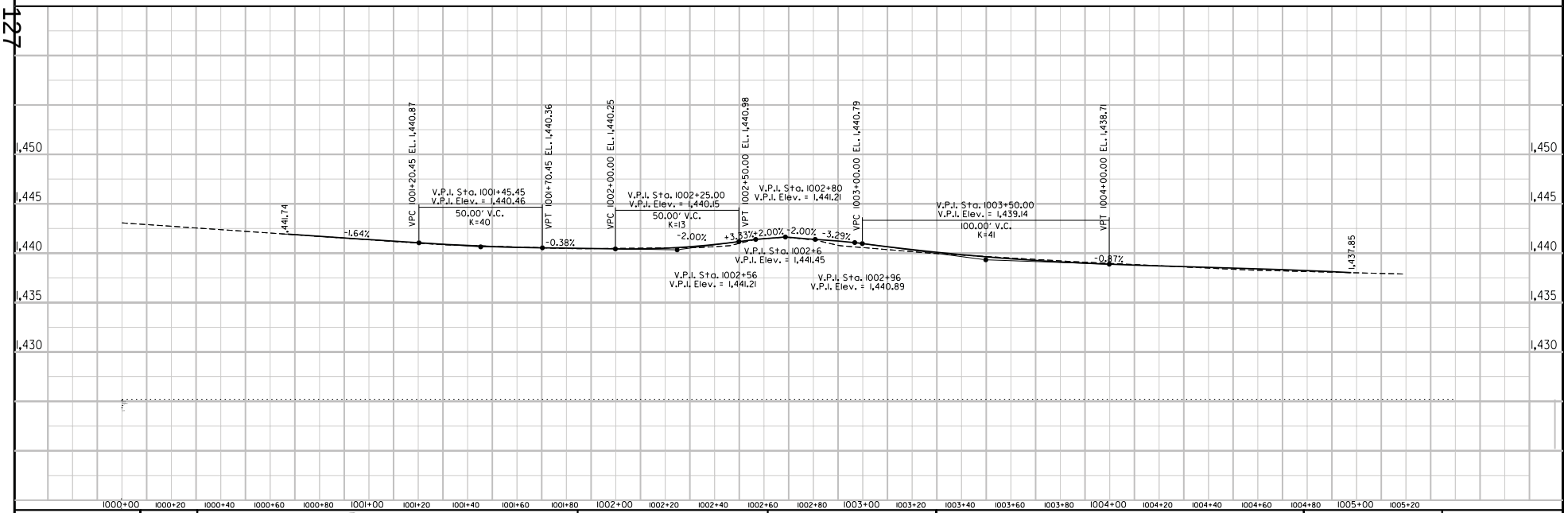

ENGLISH	IOWA DOT	DESIGN TEAM	SNYDER & ASSOCIATES	PLAN FILE NO. XXX-XX	O'BRIEN COUNTY	PROJECT NUMBER JP-18-2(103)--3R-71	SHEET NUMBER E.01

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PROPOSED IMPROVEMENTS AREA
US 18 & COUNTRY CLUB ROAD
SHELDON, IOWA

CRASH DATA SUMMARY
US 18 & COUNTRY CLUB ROAD IMPROVEMENTS
SHELDON, IA

Crash data for the US 18 project area were obtained from the Iowa DOT CMAT and SAVER software, with crash reports obtained from the City of Sheldon Police Department. The data include the period from January 2005 through December 2009.

During this five year analysis period, 12 crashes occurred. These crashes included five injury crashes, resulting in nine injuries (two each of fatal, major, minor injuries and three possible injuries).

Six of the crashes were rear end collisions, and six were broadside collisions. The IA 60 bypass opened in Fall 2006, and it is noted that 10 of the 12 crashes occurred after November 2006.

A double fatality occurred in April of 2008 at the Fareway driveway/public access intersection east of Country Club Road on US 18. This crash involved an elderly driver and passenger incorrectly yielding to a westbound truck. After discussion with the Iowa DOT Office of Traffic and Safety, this crash will be treated as one major injury for the application. This reflects Iowa DOT practice of counting the first fatality as a major injury due to the random nature of severe crashes, as well as the consideration that the crash may not have been directly preventable with the proposed improvements.

CRASH DAMAGES SUMMARY
US 18 & COUNTRY CLUB ROAD
SHELDON, IA

Location: US 18 & Country Club Rd
City: Sheldon, IA
County: O'Brien
Time Period: 2005-2009
Prepared by: City/S&A

Ref. No.	Date	Time	Surface Condition	Crash Type	PI	Injuries Fatal	Injuries Major	Injuries Minor	Injuries Poss	Injuries Total	Property Damage Only	Property Damage Amount	Correctable Y / N
1	11/7/2005	4:45 PM	Dry	Rear End							X	$7,000	Y
2	9/21/2006	12:45 PM	Wet	Rear End							X	$4,600	Y
3	12/4/2006	3:20 PM	Dry	Broadside	X				1	1		$4,300	Y
4	1/16/2007	8:10 AM	Snow	Broadside							X	$3,000	N
5	7/16/2007	2:00 PM	Dry	Rear End							X	$1,250	N
6	10/15/2007	11:28 AM	Wet	Rear End							X	$3,500	Y
7	12/14/2007	5:03 PM	Dry	Broadside	X		2			2		$15,000	Y
8	4/30/2008	3:55 PM	Dry	Broadside	X	2				2		$14,000	N
9	9/20/2008	8:09 AM	Dry	Rear End	X			2	1	3		$5,000	Y
10	6/4/2009	11:51 AM	Dry	Broadside							X	$10,000	Y
11	7/3/2009	11:00 AM	Dry	Rear End	X				1	1		$10,000	Y
12	12/26/2009	11:09 AM	Snow	Broadside							X	$4,000	N
13													
14													
15													
16													
17													
18													
19													
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36													
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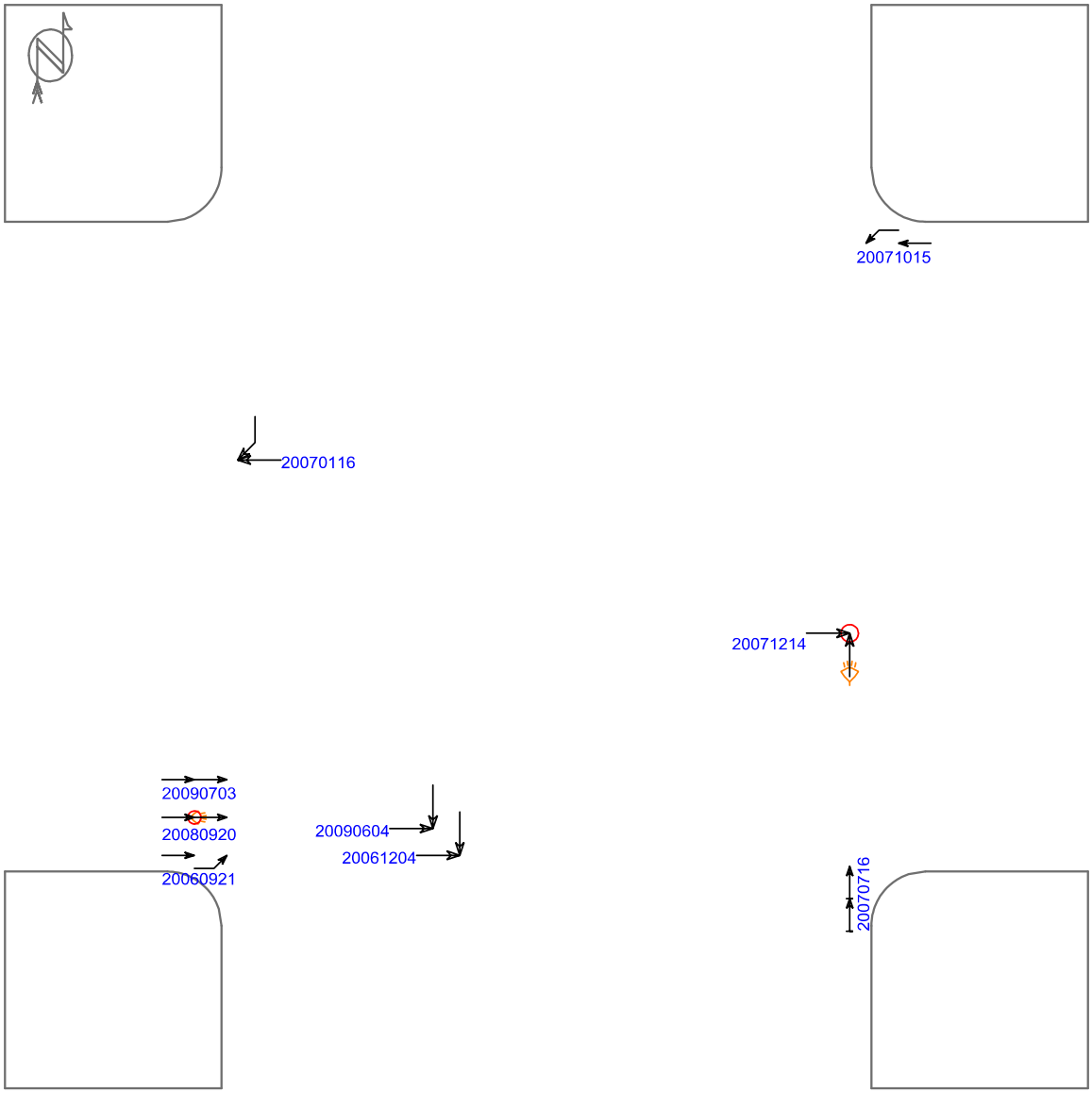
38													
39													
40													
41													
42													
43													
44													
45													
TOTAL (All Crashes)					5	2	2	2	3	**9**	7	81,650	
TOTAL (Correctable)					4	0	2	2	3	7	4	59,400	

COLLISION DIAGRAM - 1 OF 2
US 18 & COUNTRY CLUB ROAD
SHELDON, IA

2005-2009 Reportable Crashes



(0) crashes could not be placed in this schematic

Straight
Stopped
Unknown
Backing
Overtaking
Sideswipe

Parked
Erratic
Out of control
Right turn
Left turn
U-turn

Pedestrian
Bicycle
Injury
Fatality
Nighttime
DUI

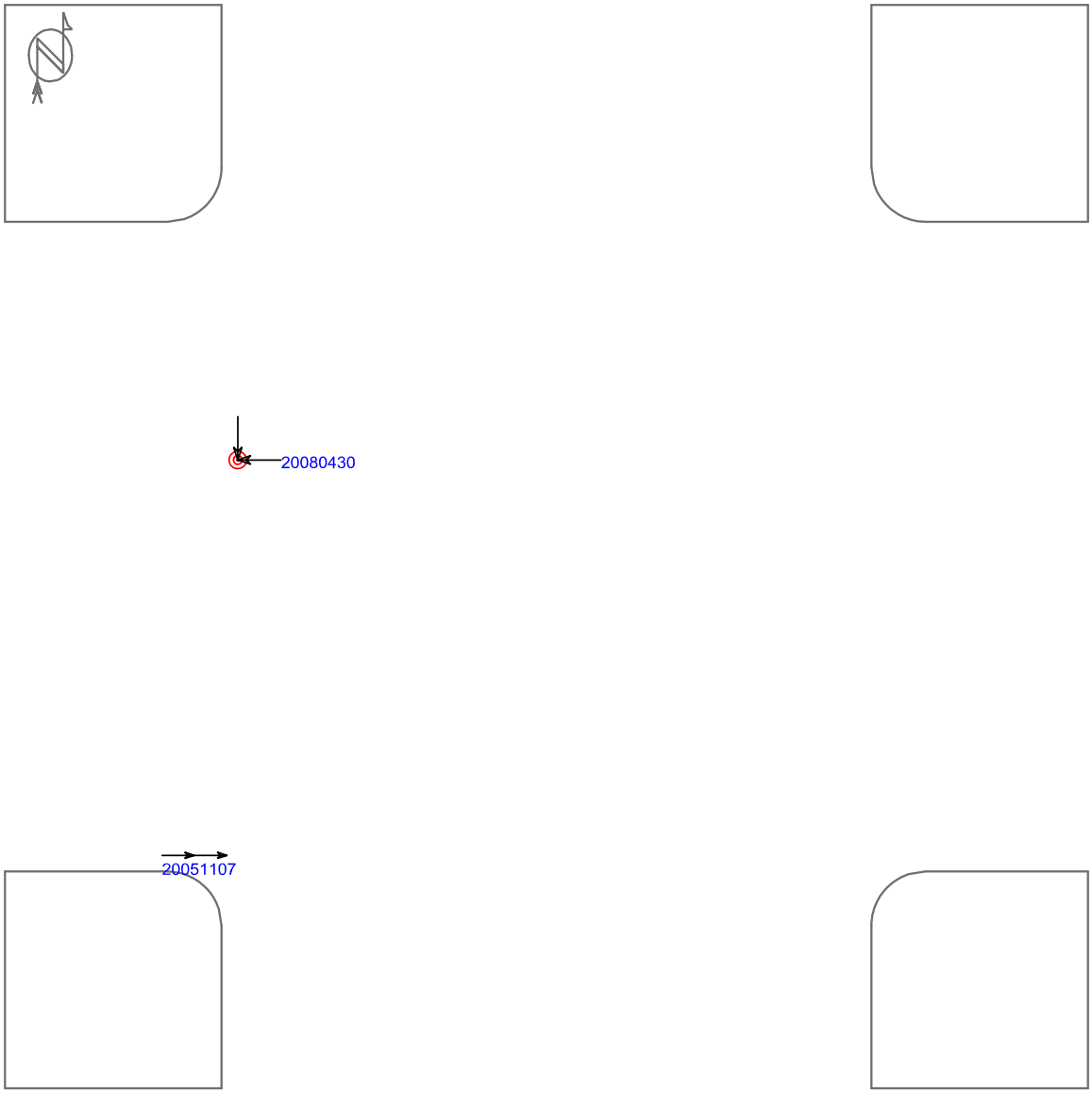
Fixed objects:
General
Signal
Tree
Pole
Curb
Animal

3rd vehicle
Extra data

Pd' Programming, Inc. 06/14/2010

COLLISION DIAGRAM - 2 OF 2
US 18 & FAREWAY/PUBLIC ACCESS DRIVEWAY
(EAST OF COUNTRY CLUB RD)
SHELDON, IA

2005-2009 Reportable Crashes



(0) crashes could not be placed in this schematic

Straight
Stopped
Unknown
Backing
Overtaking
Sideswipe

Parked
Erratic
Out of control
Right turn
Left turn
U-turn

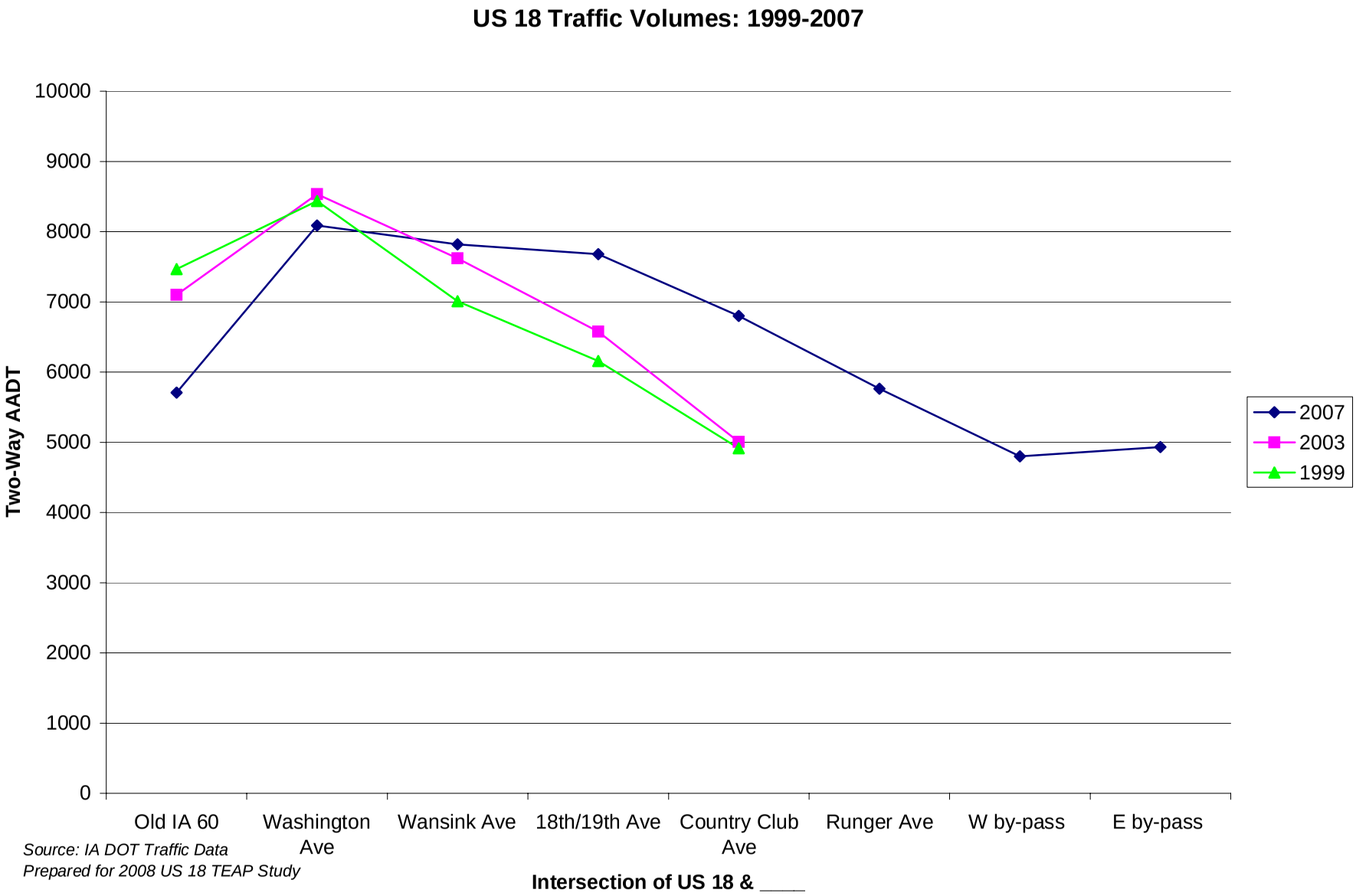
Pedestrian
Bicycle
Injury
Fatality
Nighttime
DUI

Fixed objects:
General
Signal
Tree
Pole
Curb
Animal

3rd vehicle
Extra data

Pd' Programming, Inc. 06/14/2010

J


US 18 Traffic Volumes: 1999-2007
Two-Way AADT
10000
9000
8000
7000
6000
5000
4000
3000
2000
1000
0
Old IA 60
Washington Ave
Wansink Ave
18th/19th Ave
Country Club Ave
Runger Ave
W by-pass
E by-pass
Intersection of US 18 & ____
2007
2003
1999
Source: IA DOT Traffic Data
Prepared for 2008 US 18 TEAP Study

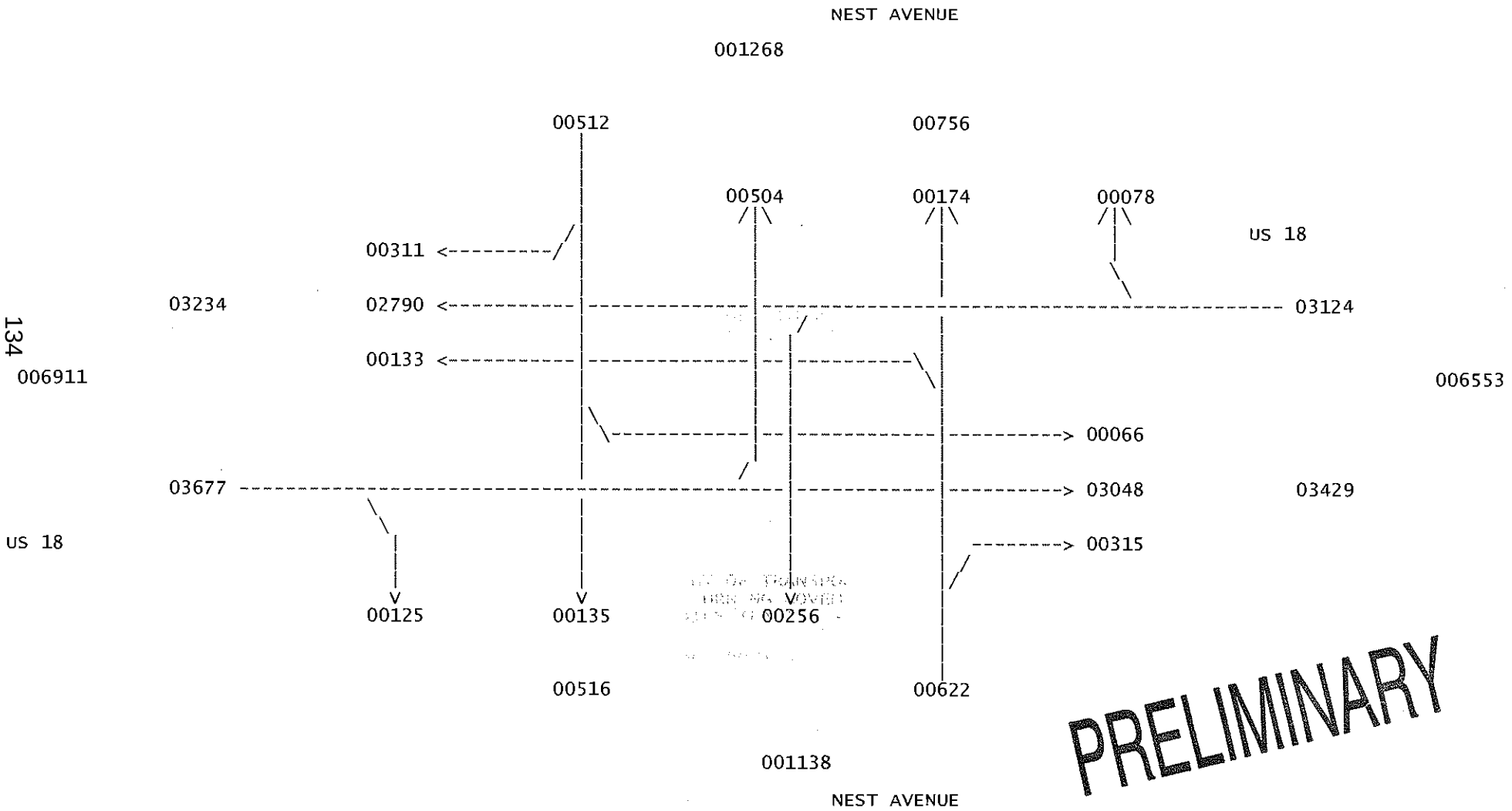
DATE: 04-04-2008

IOWA DEPARTMENT OF TRANSPORTATION
VEHICULAR TURNING MOVEMENTS
ANNUAL AVERAGE DAILY TRAFFIC - YEAR 2007
IN SHELDON
PRELIMINARY AADT

J

COUNTY:OBRIEN
US 18, NEST AVE & COUNTRY CLUB RD

STATION NO. 71 41 1733 0991



PRELIMINARY

D1530926
COUNTY TOWNSHIP NODE LOCATION YEAR
71 41 1733 0991 2007

TURNING MOVEMENT SYSTEM
TRAFFIC COUNT SUMMARY
ALL VEHICLES

PRINTER ID: TPRT003W PAGE 0001 J
CITY: SHELDON
COUNTY: OBRIEN

HOUR	******* NORTH LEG NEST AVENUE RT	ST	LT	TOTAL	******* US 18 RT	EAST LEG ST	LT	******** TOTAL	******* SOUTH LEG NEST AVENUE LT	ST	RT	TOTAL	******* US 18 LT	WEST LEG ST	RT	******** TOTAL
07- 8AM	9	4	3	16	1	181	14	196	6	1	18	25	7	139	3	149
08- 9AM	14	4	2	20	3	200	7	210	8	11	16	35	21	134	4	159
11-12PM	39	18	2	59	7	219	11	237	7	11	20	38	35	232	7	274
12-1 PM	22	13	3	38	4	246	29	279	12	15	24	51	36	263	19	318
3- 4PM	24	7	9	40	7	184	25	216	9	16	25	50	48	229	9	286
4- 5PM	33	12	8	53	10	189	18	217	13	13	25	51	51	275	12	338
5- 6PM	18	11	7	36	8	208	27	243	13	22	33	68	60	287	10	357
TOTALS	159	69	34	262	40	1427	131	1598	68	89	161	318	258	1559	64	1881

STATION DISPLAYED
PF4 QUARTER HOUR PF5 CLASS PF7 BKWD PF8 FWD PF15 MAIN MENU PF21 SCREEN PRINT CLEAR EXIT

D1530927
COUNTY TOWNSHIP NODE LOCATION YEAR
71 41 1733 0991 2007

TURNING MOVEMENT SYSTEM
TRAFFIC COUNT SUMMARY
SINGLE UNIT TRUCKS

PRINTER ID: TPRT003W PAGE 0001
CITY: SHELDON
COUNTY: OBRIEN

J

HOUR	******* NORTH LEG NEST AVENUE RT	ST	LT	TOTAL	******* US 18 RT	ST	LT	TOTAL	******* EAST LEG NEST AVENUE LT	ST	RT	TOTAL	******* SOUTH LEG US 18 LT	ST	RT	TOTAL	******* WEST LEG ********
7- 8AM	1	0	0	1	0	7	1	8	0	1	1	2	0	15	0	15	
8- 9AM	1	1	0	2	0	13	0	13	0	1	0	1	0	18	0	18	
11-12PM	0	1	0	1	0	9	4	13	0	0	1	1	0	16	1	17	
12- 1PM	0	0	0	0	2	9	1	12	0	0	0	0	0	14	1	15	
3- 4PM	0	0	1	1	0	9	2	11	2	0	1	3	0	9	0	9	
4- 5PM	1	0	0	1	0	5	0	5	0	1	0	1	0	13	0	13	
5- 6PM	0	0	0	0	0	6	0	6	0	0	0	0	1	9	0	10	
TOTALS	3	2	1	6	2	58	8	68	2	3	3	8	1	94	2	97	

STATION DISPLAYED
PF4 QUARTER HOUR PF5 CLASS PF7 BKWD PF8 FWD PF15 MAIN MENU PF21 SCREEN PRINT CLEAR EXIT

D1530928
COUNTY TOWNSHIP NODE LOCATION YEAR
71 41 1733 0991 2007

TURNING MOVEMENT SYSTEM
TRAFFIC COUNT SUMMARY
COMBINATION TRUCKS

PRINTER ID: TPRT003W PAGE 0001
CITY: SHELDON
COUNTY: OBRIEN

J

HOUR	******* NORTH LEG NEST AVENUE RT	ST	LT	TOTAL	******* US 18 RT	EAST LEG ST	LT	******** TOTAL	******* SOUTH LEG NEST AVENUE LT	ST	RT	******* TOTAL	******* US 18 LT	WEST LEG ST	RT	******** TOTAL
7- 8AM	0	0	0	0	0	12	0	12	0	0	0	0	0	21	0	21
8- 9AM	0	0	0	0	0	11	0	11	0	0	0	0	0	16	0	16
11-12PM	0	0	0	0	0	13	0	13	0	0	0	0	1	14	0	15
12- 1PM	0	0	0	0	0	14	0	14	0	0	0	0	0	9	0	9
3- 4PM	0	0	0	0	1	13	0	14	0	1	0	1	0	14	0	14
4- 5PM	0	0	0	0	0	14	0	14	0	0	0	0	0	7	0	7
5- 6PM	0	0	0	0	0	7	0	7	0	0	0	0	0	8	0	8
TOTALS	0	0	0	0	1	84	0	85	0	1	0	1	1	89	0	90

STATION DISPLAYED
PF4 QUARTER HOUR PF5 CLASS PF7 BKWD PF8 FWD PF15 MAIN MENU PF21 SCREEN PRINT CLEAR EXIT

BENEFIT/COST ANALYSIS
US 18 & COUNTRY CLUB ROAD IMPROVEMENTS
SHELDON, IA

In order to improve traffic safety at the intersection as well as proactively reduce future crashes at the intersection and commercial driveway to east, the City of Sheldon, in coordination with the Iowa DOT District 3 proposes to add left turn lanes along US 18 & Country Club Road. As part of these improvements the north and south approaches on Country Club Road will be re-constructed, providing short left turn lanes and also adjusting the intersection profile to raise the height to provide a slight benefit for sight distance. The City will also work with the business in SW corner of intersection to close the US 18 driveway immediately west of Country Club Road.

This improvement will require adding width to the north side of two lane cross section west of the intersection to provide width for a left turn lane. As discussed on pg 3 of Section B of this application, a current project will extend this three lane cross section west to the existing four lane cross section west of N 18th Avenue, providing an opportunity for an ultimate consistent three lane cross section through the entire corridor. On the east side of Country Club Rd, widening on the north side of US 18 will connect with existing widening to the three-lane cross section (one through lane in each direction with a two-way left turn lane (TWLTL)) created by the Iowa DOT as part of the IA 60 bypass. This TWLTL will be an exclusive left turn lane at the Country Club intersection.

These improvements will improve safety performance by providing storage for left turning vehicles along Country Club intersection and thereby reducing the opportunities for rear end crashes. Furthermore, auxiliary lanes and an improvement in sight distance to the west for the north and south approaches will help drivers choose better gaps and reduce turning and broadside crashes.

A 15-year improvement life was assumed for the improvements. A CRF of 25 was selected for the application. This is lower than the CRF of 35-40 that could be interpreted from the provided FHWA report *Desktop reference for Crash Reduction Factors* and the website reference http://www.cmfclearinghouse.org. After 2009 meetings with the Iowa DOT Office of Traffic and Safety, this slightly lower CRF was selected to account for the lower percentage of rear-end crashes at the intersection that would likely be more susceptible to correction by an auxiliary lane, as well to not over-emphasize the “major injuries” resulting from the crash at the Fareway intersection.

In addition, crash injury history was adjusted to be consistent with Iowa DOT adjustments of the 2009 TSIP application. **Therefore, the nine injuries resulting from twelve crashes are represented in the TSIP B/C worksheet as five total injuries: two major injuries, one minor injury and two possible injuries.**

Intersection or Spot Benefit / Cost Safety Analysis

Rev. 8/09

Iowa DOT Office of Traffic & Safety

L

County: O'Brien Prepared by: Snyder & Associates Date Prepared: May 19, 2010

Intersection: US 18 & Country Club Rd (Nest Ave), Sheldon, IA

Improvement

Proposed Improvement(s): Add left turn lanes to all approaches. Currently two-way stop. Recommend turn lanes due to increasing through and turning traffic with marginal sight distance.Signalization possible in futu

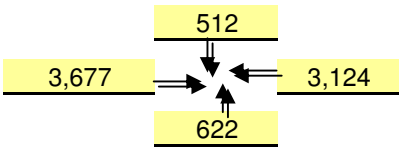
$ 200,000	Estimated Improvement Cost, **EC**	15	Est. Improvement Life, years, **Y**
	Other Annual Cost (after initial year), **AC**	25	Crash Reduction Factor (integer), **CRF**
$ -	Present Value Other Annual Costs, **OC**	4.0%	Discount Rate (time value of $), **INT**
		$ 200,000	Present Value Cost, **COST** = EC + OC

$$OC = \frac{AC}{INT}\left(1 - \frac{1}{(1+INT)^Y}\right)$$

Traffic Volume Data

Source: Iowa DOT 2007 Date of traffic count

Daily Entering Vehicles by Approach (or AADT / 2)



2,896,275 Current Annual Entering Veh., **AEV** = DEV * 365

9,921 veh / day, Final Year DEV, **FDEV**

48.32 MEV, Total Million Entering Veh. Over life of Project, **TMEV**

1.5% Projected Traffic Growth (0%-10%), **G**

7,935 Current Daily Entering Vehicles, **DEV**

$$TMEV = \frac{AEV}{-G}\left(1 - \left(\frac{1+G}{1}\right)^Y\right) \Big/ 10^6$$

Crash Data

2005 First full year --> 2009 Last full year 5.0 years, Time Period, **T**

Additional months values as of Dec. 2007

0	Fatal Crashes	0	Fatalities @	$3,500,000	$	-
		2	Major Injuries @	$240,000	$	480,000
5	Injury Crashes	1	Minor Injuries @	$48,000	$	48,000
		2	Possible Injuries @	$25,000	$	50,000
7	Property Damage Only		(assumed cost per crash)	$2,700	$	-
		-OR-	enter all Property Costs of all crashes:		$	81,650
12	Total Crashes, **TA**			Total $ Loss, **LOSS**	$	659,650

2.40	Current Crashes / Year, **AA** = TA / T	0.83	Crashes / MEV, Crash Rate, **CR**
$ 54,971	Cost per Crash, **AVC** = LOSS / TA		CR = TA x 10^6 / (DEV x 365 x T)
40.0	Total Expected Crashes, **TECR** = CR x TMEV	$ 403,429	Present Value of Avoided
0.60	Crashes Avoided First Year **AAR** = AA x CRF / 100		Crashes, **BENEFIT**
$ 32,983	Crash Costs Avoided in First Year, AAR x AVC		
10.0	Total Avoided Crashes, TECR x CRF/ 100		

$$BEN. = \frac{AVC \times AAR}{(INT - G)}\left(1 - \left(\frac{1+G}{1+INT}\right)^Y\right)$$

Benefit / Cost Ratio

Benefit : Cost = $403,429 : $200,000 = **2.02** : 1

Iowa Department of Transportation

Rev. 3/08

Date JUN 14 2010

Agenda Item 8

Roll Call # 10-884

Application for TRAFFIC SAFETY FUNDS

GENERAL INFORMATION

Location / Title of Project: 19th Street/ML King Jr. Parkway Corridor Safety Improvements

Applicant: City of Des Moines

Contact Person: Michael P. Ring, P.E. Title: Principal Traffic Engineer

Complete Mailing Address: 600 East Court Avenue, Suite 200
Des Moines, IA 50309

Phone: 515-283-4070 (Area Code) E-Mail: mpring@dmgov.org

If more than one highway authority is involved in this project, please indicate and fill in the information below (use additional sheets if necessary).

Co-Applicant(s) _____

Contact Person _____ Title _____

Complete Mailing Address _____

Phone _____ (Area Code) E-Mail _____

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Application Type

- Site Specific ☒
- Traffic Control Device ☐
- Safety Study ☐

Funding Amount

Total Project Cost $ 240,000

Safety Funds Requested $ 240,000

PROJECT DESCRIPTION

19th Street / ML King Jr. Parkway Corridor Safety Improvements

Proposed Project:

This project consists of two components. First, corridor safety improvements are proposed on ML King Jr. Parkway between Mondamin Avenue and Hickman Road. These consist of the installation of three HAWK (High-intensity Activated crosswalk) signals along with adding two dynamic speed limit display signs in this section. Examples of each are shown below. Second, traffic signal head modifications are planned on 19th Street and ML King at Forest and Carpenter Avenues. This work includes new signal heads with backplates, several optically-limited signal heads, and new pedestrian indications with count-down timers.

The total project cost is estimated to be $240,000, which is being requested from State Traffic Safety funds.

Example of HAWK signal installation

Example of dynamic speed limit display sign

Existing Conditions:

The ML King / 19th Street corridor is a heavily travelled north-south roadway system through the north side of Des Moines. It is classified as a "Principal Arterial" roadway facility according to the Des Moines Area Metropolitan Planning Organization's (DMAMPO) "Functional Classification Map". Between I-235 northerly to its intersection with Mondamin Avenue, ML King Jr. Parkway and 19th Street form a one-way north-south street pair, each carrying approximately 14,000 – 15,000 vehicles per day. There are 2-3 through lanes in each direction. The speed limit is 30 mph.

Just north of Mondamin Avenue, the two streets merge together to form a 4-lane undivided roadway, which continues north to Euclid Avenue. This northern section carries approximately 24,500 vehicles per day. The current speed limit is 30 mph, which was changed from 35 mph in May 2010.

Over the past 12 to 18 months, city staff has worked with the Mondamin/Presidential and King Irving Neighborhood Associations to conduct a traffic safety study of the Martin Luther King Jr. Parkway corridor (including 19th Street) from Carpenter Avenue to Hickman Road. The study, named the "Thrivent Traffic Safety Study" (because of its funding source), was completed in March 2010. An abbreviated version of this safety study is included on the following pages.

Thrivent Traffic Safety Study
March 5, 2010

Gary L. Fox, P.E.
City Traffic Engineer

Martin Luther King Jr. Parkway—Mondamin Avenue to Hickman Road

1. Crash History
   - Total of 119 crashes in past 5 years (2004-2008), excluding Hickman Road
     - 78 crashes at intersections
     - 41 crashes non-intersection
   - Average of 24 crashes/year
   - Total of 4 major injury crashes
   - Total of 10 minor injury crashes
   - **5 pedestrian crashes**
   - 40% rear-end crashes
   - 16% sideswipe crashes
   - 15% broadside (right-angle) crashes
   - 15% non-collision
   - Crash rate of 598/HMVM is somewhat above average

2. Site conditions
   - Martin Luther King Jr. Parkway is thru street, stop signs on all side streets
   - Very heavy traffic volume
     - 24,500 vehicles per day (vpd), Monday-Friday
     - 18,600 vpd Saturday
     - 15,900 vpd Sunday
   - Speed limit 35 mph (changed to 30 MPH in May 2010)
   - Speed data collected October 14-19, 2009
     - M-F NB: Avg = 34 MPH 85%-ile = 39 MPH 35.8% > 35 MPH
     - M-F SB: Avg = 33 MPH 85%-ile = 38 MPH 27.7% > 35 MPH
     - Sa-Su NB: Avg = 35 MPH 85%-ile = 40 MPH 47.2% > 35 MPH
     - Sa-Su SB: Speed data not available
   - Generally flat and level; reverse curve south of Mondamin Avenue
   - Continuous sidewalks on Martin Luther King Jr. Parkway and side streets
   - DART Route No. 4
     - Approx 30 buses/day each direction
     - 40-60 passengers at Washington Avenue, Franklin Avenue, Lincoln Avenue
     - Few passengers at other stops
     - Includes school students

3. Short-Term Recommendations
   - Reduce speed limit to 30 mph, same as area south (keep 35 mph north of Hickman Road)
     - Install new speed limit signs, with red flags
     - Request speed enforcement by Police Traffic Unit—speed trailers

- Monitor speeds after change

- **Apply for State Traffic Safety Funds (TSF) for 2011**
  - **Pedestrian crossings at Washington Avenue, Franklin Avenue, and Lincoln Avenue, consisting of HAWK signals and corresponding pavement markings**
  - **Real-time speed display signs (one northbound and one southbound)**

4. Long-Term Recommendations
   - Reconstruction to a "Complete Street" as part of overall corridor improvements to North-South Metro Parkway, from IA 415 near Ankeny to I-235
   - Elements to be considered in the reconstruction would include
     - Two lanes in each direction, plus center left-turn lane
     - Bike lanes on each side
     - 5' sidewalk on one side and 8-10' trail on other side (probably east)
     - Appropriate setbacks behind curbs to sidewalk, trail
     - Potential traffic signal at Franklin Avenue, with pedestrian crossing signals, eliminate offset
     - Enhanced pedestrian crossings at Lincoln & Washington
     - Center islands at some locations for aesthetics and safer pedestrian crossings
     - Enhanced bus transit service and stops
   - Above items to be considered in the Environmental Impact Study (EIS)

Martin Luther King Jr. Parkway and 19th Street—Mondamin Avenue to Forest Avenue

1. Crash History: 2004 to mid-2009 (5.7 years)

Intersection	Total Crashes	Crashes / Year	Crash Rate	Crashes w/Injury	Comments
19th & Carpenter	41	7.2	1.20	2	Signals
19th & Forest	22	3.9	0.52	2	Signals, crossing guard
19th & Clark	20	3.5	0.66	1	Signals, crossing guard
19th & College	19	3.4	0.70	1	Stop signs - College
MLK & Carpenter	29	5.1	0.81	1	Signals
MLK & Forest	51	9.0	1.20	10	Signals
MLK & College	4	0.7	0.15	0	Stop signs - College
MLK & Clark	23	4.1	0.75	4	Signals, crossing guard

- Total 209 intersection crashes
  - Average of 37 crashes per year
  - Individual intersection rates are generally below average
  - Total of 9 major injury crashes
  - Total of 12 minor injury crashes

2. Site conditions
   - Martin Luther King Jr. Parkway
     - 3 lanes one-way SB to Carpenter Avenue
     - 14,700 vehicles per day (vpd) north of Carpenter Avenue
     - No Parking 7-9 AM on west side
     - Signals, crosswalks at Clark upgraded 2008/09 – Safe Route to School funds
     - Speed limit 30 mph
   - 19th Street
     - Three lanes one-way northbound to Forest Avenue, then two lanes
     - 14,000 vpd north of Carpenter Avenue
     - Adjacent to King Elementary School, Forest Avenue to Clark Street
     - Signals, crosswalks at Clark Street upgraded 2008/09—Safe Route to School funds
     - Speed limit 30 mph – 25 mph WHEN FLASHING by school

3. Short-Term Recommendations

   - **Apply for State Traffic Safety Funds (TSF) for 2011 to upgrade signals:**
     - **Martin Luther King Jr. Parkway and Forest Avenue: new heads, change to "countdown" pedestrian signals**
     - **19th Street and Forest Avenue: new heads, change to "countdown" pedestrian signals**
     - **Martin Luther King Jr. Parkway and Carpenter Avenue: new heads, add "countdown" pedestrian signals**
     - **19th Street and Carpenter Avenue: new heads, add "countdown" pedestrian signals**

4. Long-Term Recommendations
   - Reconstruction to a "Complete Street" as part of overall corridor improvements to North-South Metro Parkway, from IA 415 near Ankeny to I-235
   - Elements to be considered in the reconstruction would include
     - Existing one-way configuration and number of lanes
     - Bike lanes on one side of each street
     - Five-foot sidewalks and 8-10' trail (probably east side of 19th Street)
     - Appropriate setbacks behind curbs to sidewalk, trail
     - Enhanced bus transit service and stops
   - Above items to be considered in the Environmental Impact Study (EIS)

[

[End of March 2010 Thrivent Traffic Safety Study]

Project Justification:

In order to further describe the project, we have divided it into two segments. The north segment consists of the two-way portion of ML King between Mondamin Avenue and Hickman Road. The south segment consists of 4 signalized intersections within the one-way pair section of the 19th/ML King corridor.

The entire project was developed based on substantial input from the leaders and citizens of the Mondamin/ Presidential and King Irving Neighborhoods, and there is considerable support from these neighborhoods for the proposed improvements.

A review of each of the segments is as follows:

North Segment:

In the 5-year time period from January 2005 to December 2009, there were a total of 102 reported crashes in this ¼ mile section of ML King (not including the intersections with Hickman or Mondamin). A breakdown of these crashes is as follows:

Accident Type	Number
Broadside	16
Rear End	43
Sideswipe – same direction	13
Sideswipe – opposite direction	2
Left-turning	7
Head-on	2
Non-Collision (Pedestrian)	5
Non-Collision (Other)	9
Unknown	2
Not Reported	3
Total	**102**
Average per year :	**20.4**

Within this north section between Mondamin Avenue and Hickman Road, the crash rate is 598 Crashes per 100 Million Vehicles Entering (Crashes/100MVE), which is approximately 35% higher than the statewide average of 445 Crashes/100MVE for similar city streets. (This rate would be higher if the Hickman Road intersection was included.) There were a total of 5 pedestrian crashes within this area.

Because of the high volume of traffic, pedestrians have considerable difficulty in crossing the corridor. The Des Moines School District utilizes the Des Moines Area Regional Transit (DART) to transport middle- and high-school age students to their respective schools. A large number of these students must cross ML King to get to the DART bus stop, which are located at Washington, Franklin, and Lincoln Avenues. ML King Jr. Parkway also bisects a large portion of the neighborhood area, so there are many other pedestrians crossing the street on a daily basis.

The corridor is not "pedestrian friendly", and has the feel of a high-speed arterial through a residential neighborhood. The street itself is 50' wide, and is constructed within a 66' right-of-way (ROW). This narrow ROW provides for limited separation between the sidewalks and the street.

Following the "complete streets" philosophy, the neighborhoods and city staff desire to develop a context-sensitive project that would improve the safety and ease for pedestrians to cross the street, along with a design that would tend to slow the speed of the traffic through the area.

The proposed project should have a positive safety affect on all types of crashes, since the goal of the project is to reduce the speed of traffic through the corridor to match the surrounding neighborhood conditions. Specifically, the 5 pedestrian crashes in the past 5 years would be targeted for reduction.

A "Benefit-Cost" analysis was conducted on the north section. The cost of improvements is $140,000 for this portion of the project. Using a Crash Reduction Factor of 10 percent, this segment has a B/C ratio of 3.76:1.

South Segment

The signalized intersections within the south (one-way) section of ML King and 19th Street have been reviewed, specifically for signal visibility and pedestrian indications. There are 4 intersections that have not been fully upgraded to incorporate backplates and pedestrian indications. These are the intersections of ML King/Forest; ML King/ Carpenter; 19th/ Forest, and 19th/ Carpenter-Keo. The crash history for the 5-year period from Jan 2005 to Dec 2009 is shown below. (Note: these numbers are different from the tabulations in the March 2010 study, which was based on a different analysis period).

	MLK/ Forest	MLK/ Carpenter	19th/ Forest	19th/ Carpenter	Total	Percent
Accident Type						
Broadside	30	5	8	4	47	41%
Rear End	5	5	6	5	21	18%
Sideswipe	5	8	4	21	38	33%
Left-turning	1	1	0	1	3	3%
Head-on	0	0	0	1	1	1%
Non-Collision	2	1	0	2	5	4%
Total	**43**	**20**	**18**	**34**	**115**	
Average per year :	**8.4**	**4.0**	**3.2**	**8.6**	**23.0**	

In reviewing the collision diagrams for each of these 4 intersections, the "Broadside", "Rear End", and "Sideswipe" crashes account for 92% of all of the crashes. The project proposes to reduce these types of crashes by providing better signal visibility through adding backplates and side-of-pole mounted signals. Also, specifically for the Forest Avenue traffic, the signals at 19th and at ML King are only a short block apart, and the "far intersection" signal indications are very visible from traffic approaching the near intersection. The project would install optically limiting signal heads for the "far

intersection" approach to limit the visibility of these heads to motorists that are past the upstream signalized intersection.

A "Benefit-Cost" analysis was conducted on the south section. The cost of improvements is $100,000 for this portion of the project. Using a Crash Reduction Factor of 10 percent, this segment has a B/C ratio of 7.60:1.

Benefit/Cost for Entire Project (north and south sections combined)

Based on current IDOT value factors, the total estimated loss from crashes during the described five-year period is $5,427,952 (See Exhibit "L-1"). Assuming a crash reduction of 10 percent and an estimated project life of 15 years, the request for $240,000 of Traffic Safety Funds relates to a benefit-cost factor of **5.36:1.**

6/14/2010 MPR

Exhibit "C"

COST ESTIMATE

19th Street / ML King Jr. Parkway Corridor Safety Improvements

South Section – traffic signal modifications:

ML King and Forest	$25,000
ML King and Carpenter	$25,000
19th and Forest	$25,000
19th and Carpenter/Keo	$25,000

North Section – corridor safety improvements:

HAWK Signals at:

ML King and Washington	$40,000
ML King and Franklin	$40,000
ML King and Lincoln	$40,000

Dynamic Speed Limit Signs

2 @ $10,000 each	$20,000

TOTAL CONSTRUCTION COST: $240,000

Exhibit "D"

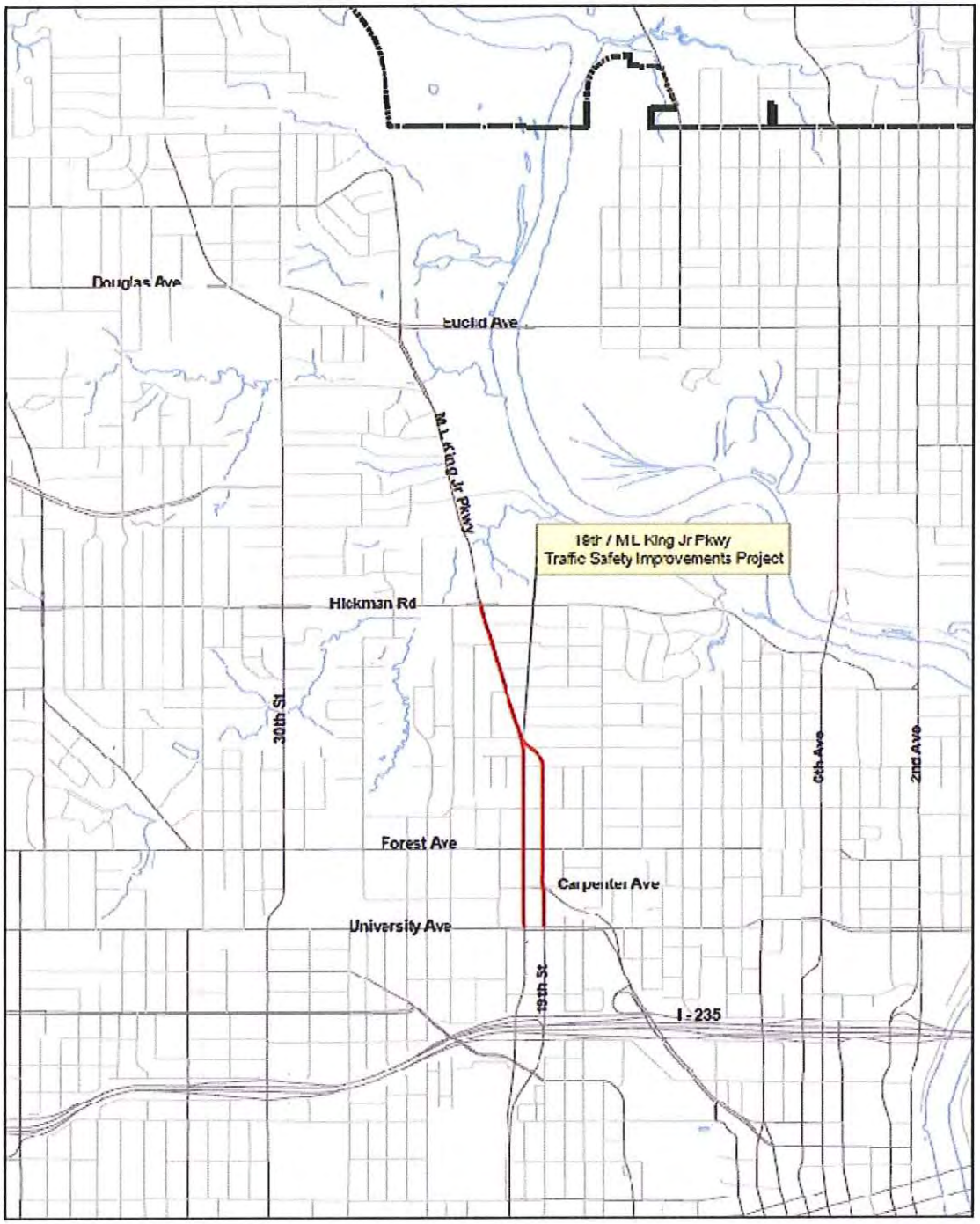
TIME SCHEDULE

19th Street / ML King Jr. Parkway Corridor Safety Improvements

Project Approval:	**December 2010**
Agreement Signed:	**March 2011**
Project bid:	**June 2011**
Construction completed:	**October 2011**
Project Closeout:	**June 2012**

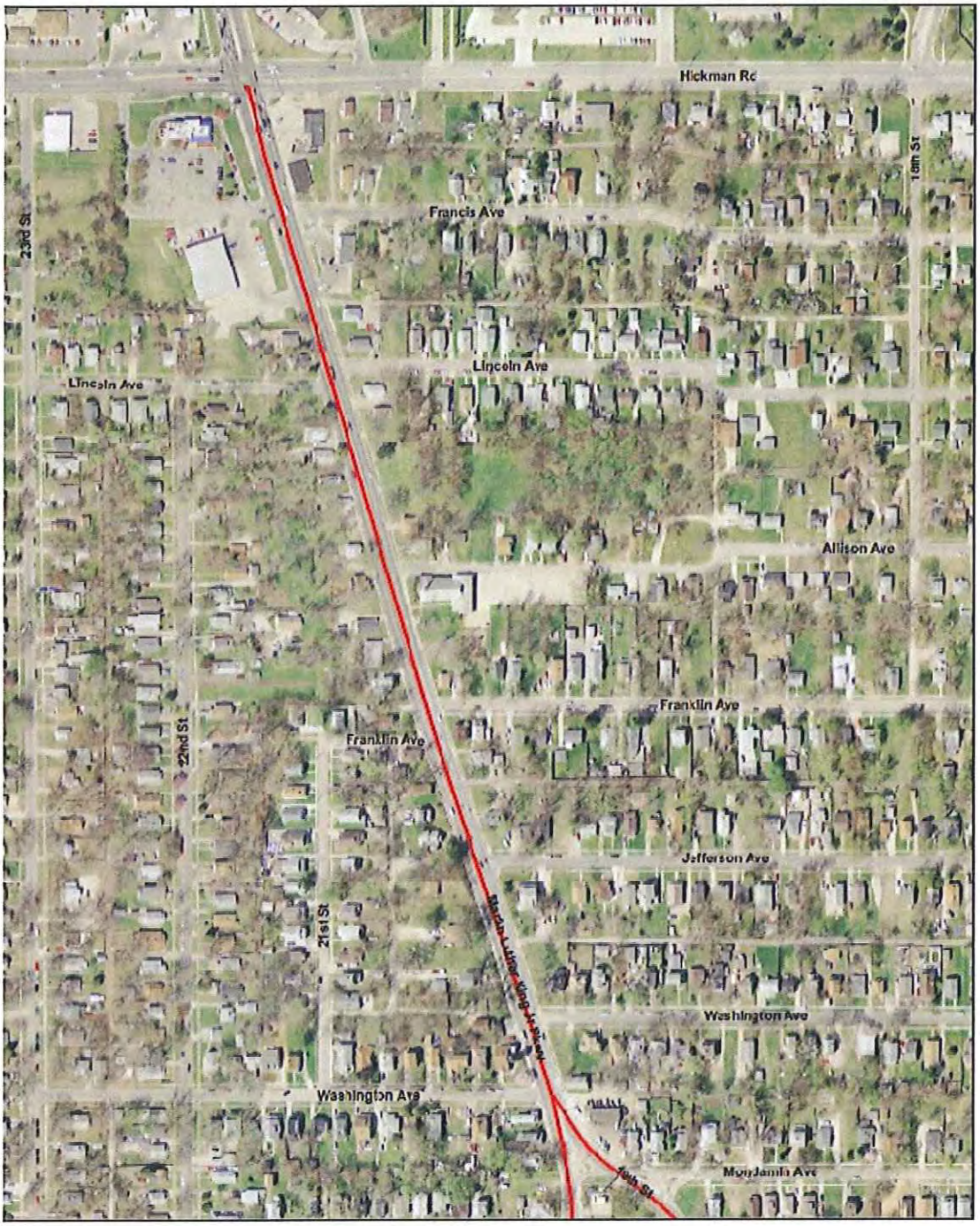
19th St / Martin luther King Jr Pkwy Traffic Safety Improvements

Exhibit E-1



19th St / Martin Luther King Jr Pkwy Traffic Safety Improvements

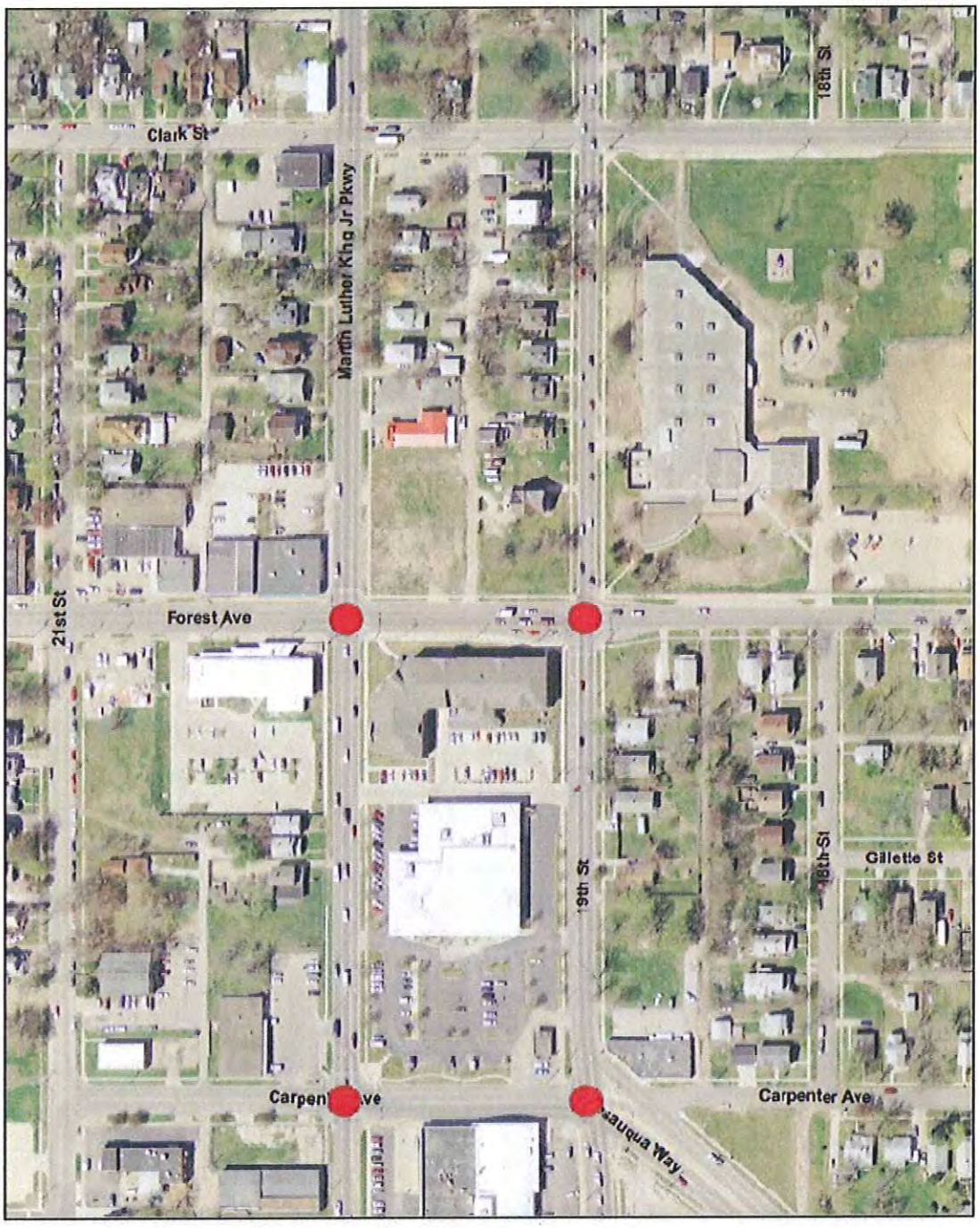
Exhibit E-2



North Section map

19th St / Martin Luther King Jr Pkwy Traffic Safety Improvements

Exhibit E-3



South Section map showing locations of proposed traffic signal improvements

On M L King Jr Pkwy, looking northerly toward Lincoln Avenue.

On M L King Jr Pkwy, looking southerly toward Lincoln Avenue.

On M L King Jr Pkwy, looking northerly toward Washington Avenue.

On M L King Jr Pkwy, looking southerly toward Washington Avenue.

On M L King Jr Pkwy, looking south toward Forest Avenue.

On Forest Avenue, looking east toward M L King Jr Pkwy.

On Forest Avenue, looking west toward M L King Jr Pkwy.

On M L King Jr Pkwy, looking south toward Carpenter Avenue.

On Carpenter Avenue, looking east toward M L King Jr Pkwy.

On Carpenter Avenue, looking west toward M L King Jr Pkwy.

On 19th Street, looking north toward Carpenter Avenue.

On Carpenter Avenue, looking east toward 19th Street.

Exhibit F-7

On Keosauqua Way, looking northwesterly toward 19th Street.

On 19th Street, looking north toward Forest Avenue.

Exhibit F-8

On Forest Avenue, looking east toward 19th Street.

On Forest Avenue, looking west

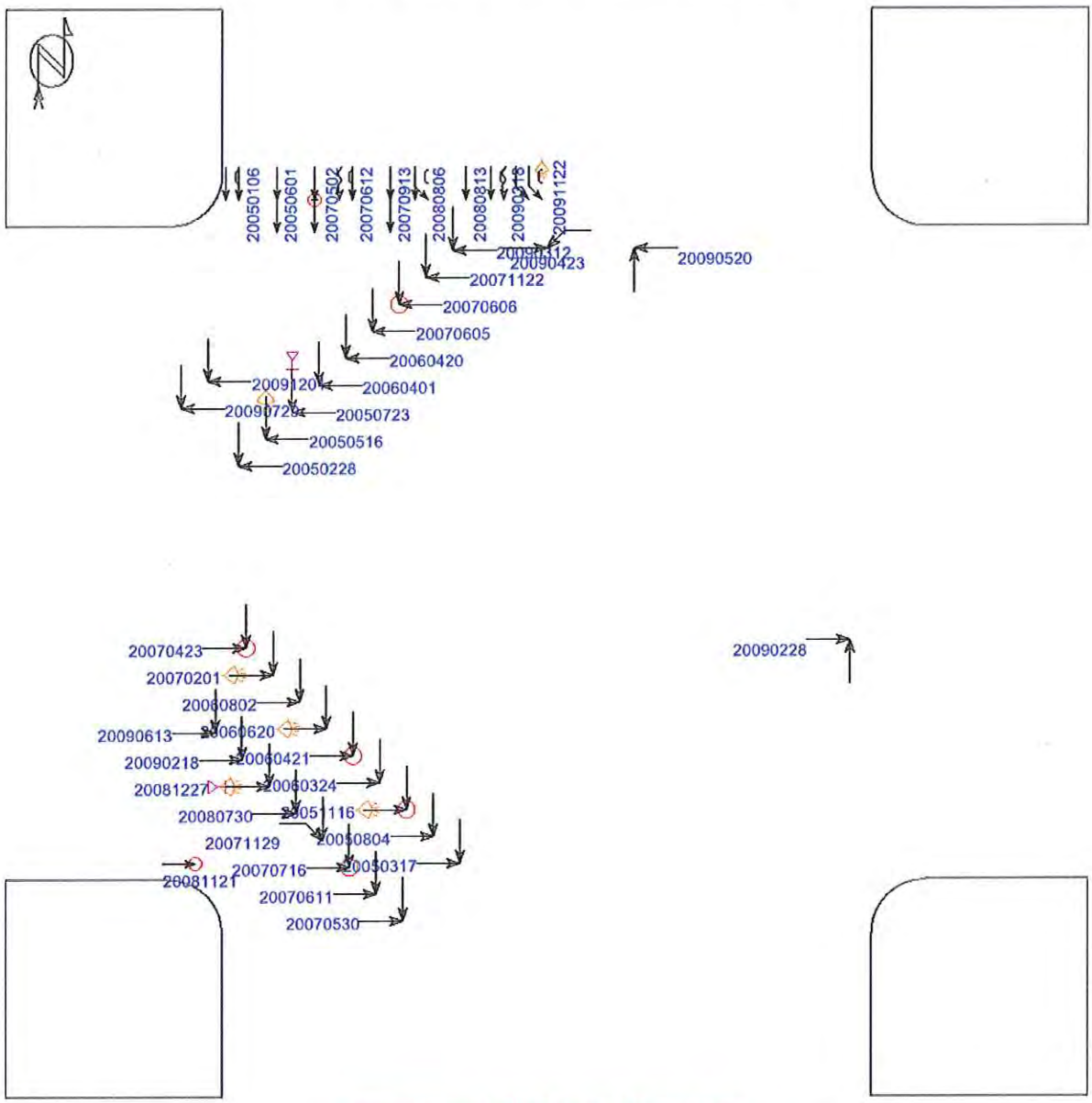
19th St / Martin Luther King Jr Pkwy Traffic Safety Improvements

Exhibit G

Exhibit I-1

MLK and Forest

2005-2009 Reportable Crashes



(2) crashes could not be placed in this schematic

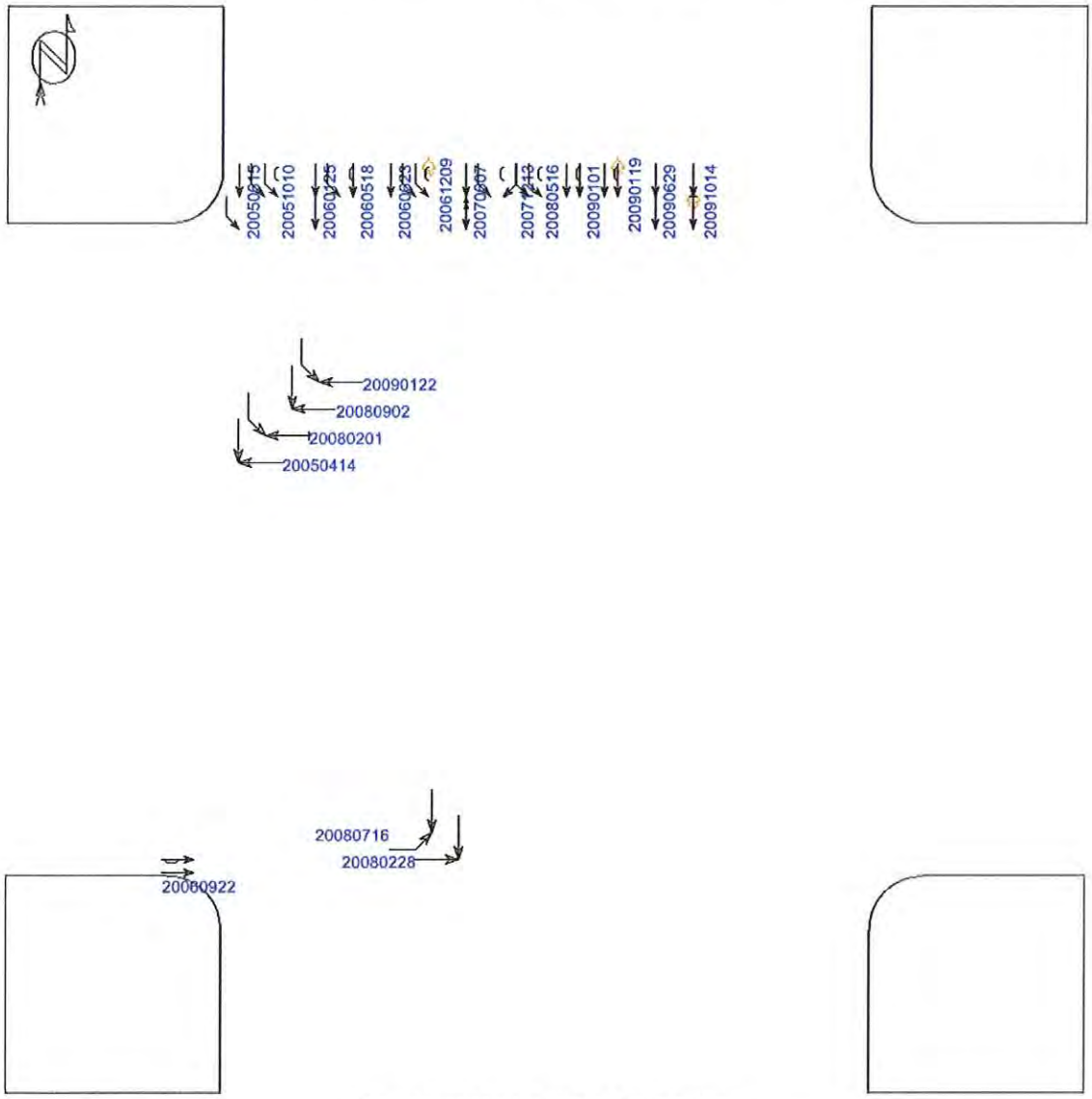
Straight	Parked	Pedestrian	Fixed objects:
Stopped	Erratic	Bicycle	General, Pole, Signal, Curb, Tree, Animal
Unknown	Out of control	Injury	
Backing	Right turn	Fatality	
Overtaking	Left turn	Nighttime	3rd vehicle
Sideswipe	U-turn	DUI	Extra data

Pd Programming, Inc. 06/12/2010

Exhibit I-2

MLK and Carpenter

2005-2009 Reportable Crashes



(0) crashes could not be placed in this schematic

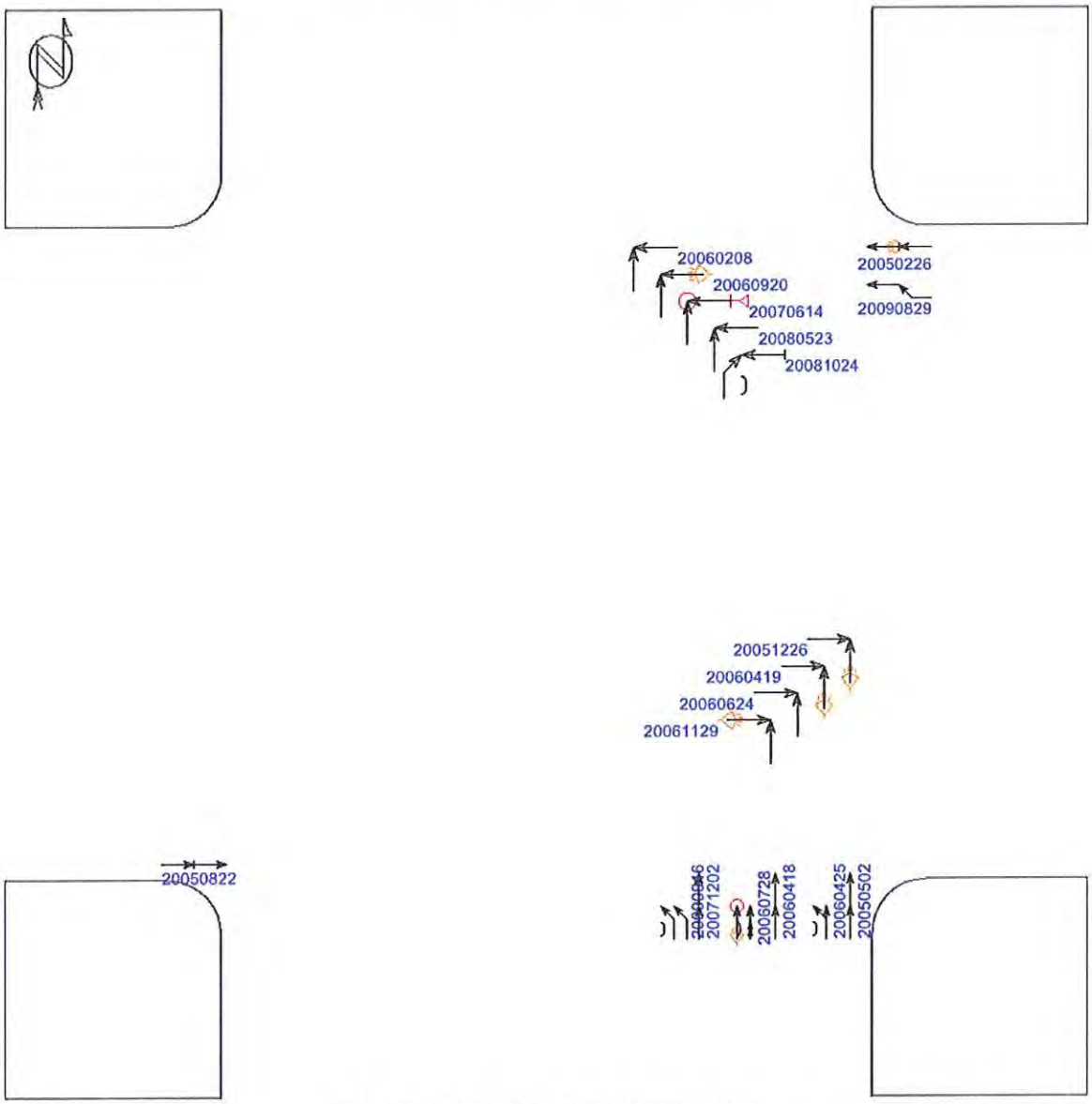
Straight	Parked	Pedestrian	Fixed objects:
Stopped	Erratic	Bicycle	General, Signal, Tree, Pole, Curb, Animal
Unknown	Out of control	Injury	
Backing	Right turn	Fatality	
Overtaking	Left turn	Nighttime	3rd vehicle
Sideswipe	U-turn	DUI	Extra data

Pd' Programming, Inc. 06/12/2010

Exhibit I-3

19th and Forest

2005-2009 Reportable Crashes



(0) crashes could not be placed in this schematic

- Straight
- Stopped
- Unknown
- Backing
- Overtaking
- Sideswipe
- Parked
- Erratic
- Out of control
- Right turn
- Left turn
- U-turn
- Pedestrian
- Bicycle
- Injury
- Fatality
- Nighttime
- DUI

Fixed objects:

- General
- Signal
- Tree
- Pole
- Curb
- Animal

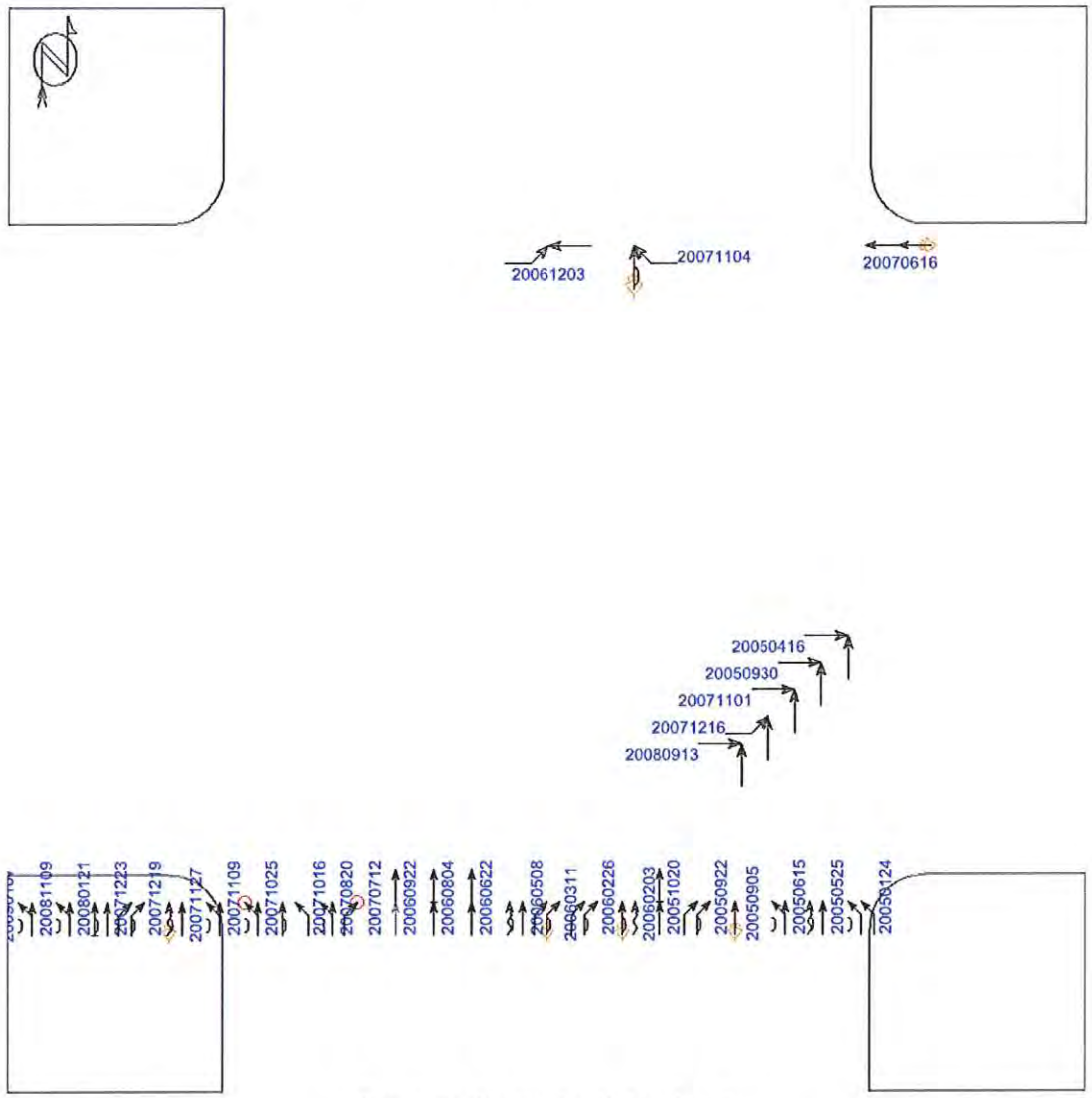
- 3rd vehicle
- Extra data

Pd' Programming, Inc. 06/12/2010

Exhibit I-4

19th and Carpenter

2005-2009 Reportable Crashes



(0) crashes could not be placed in this schematic

Straight	Parked	Pedestrian	Fixed objects:
Stopped	Erratic	Bicycle	General / Pole
Unknown	Out of control	Injury	Signal / Curb
Backing	Right turn	Fatality	Tree / Animal
Overtaking	Left turn	Nighttime	3rd vehicle
Sideswipe	U-turn	DUI	Extra data

Pd' Programming, Inc. 06/12/2010

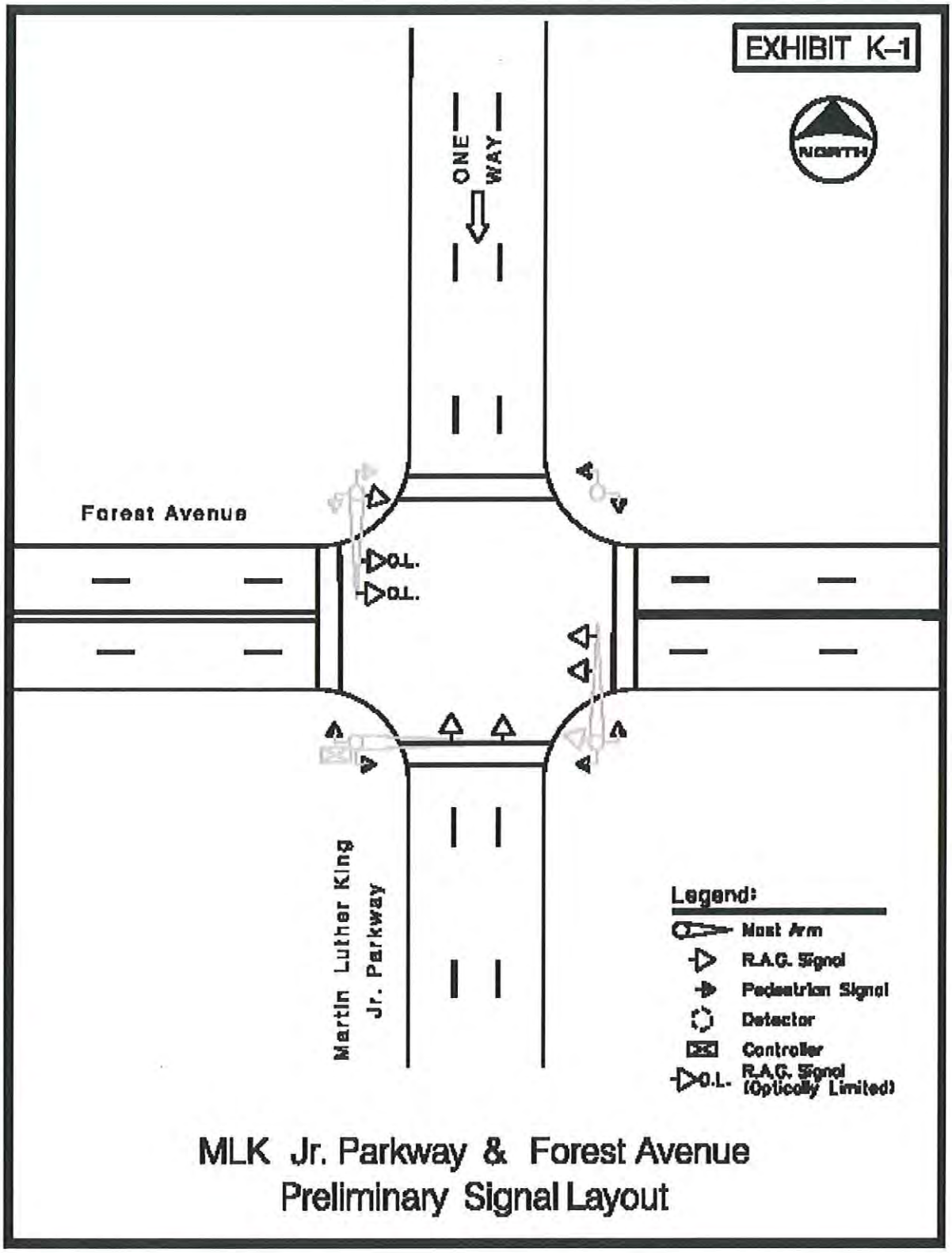
City of Des Moines, Iowa

600 E. Court Avenue, Suite 200
Des Moines, IA 50309
515-283-4973

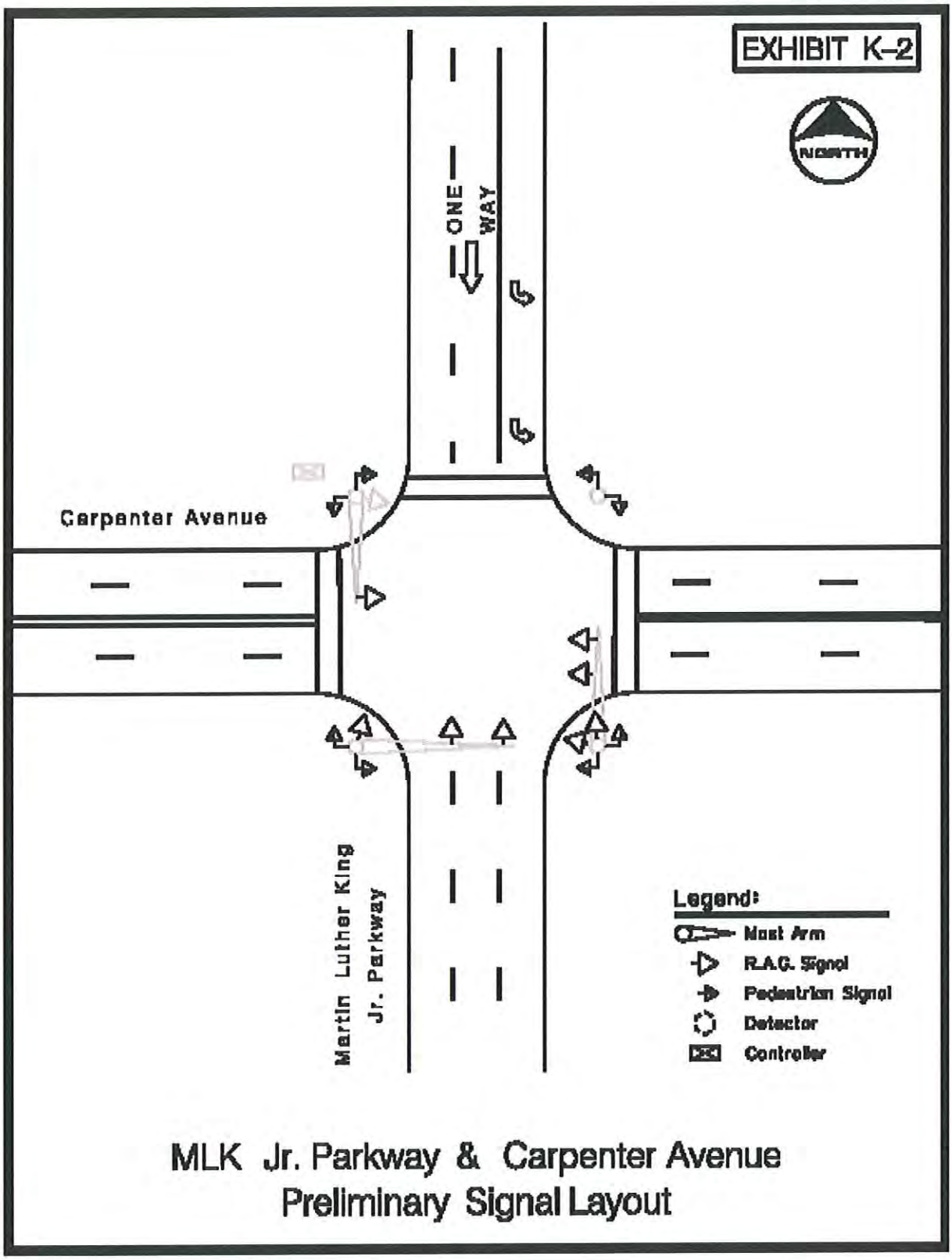
Site Code:
Station ID:
ML King Pkwy
s of Hickman Road
Latitude: 0' 0.000 Undefined

Start	12-Oct-09		Tue		Wed		Thu		Fri		Sat		Sun		Week Average	
Time	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB	NB	SB
12:00 AM	*	*	*	*	*	*	157	136	157	178	257	197	240	230	203	185
01:00	*	*	*	*	*	*	85	77	119	93	178	183	199	157	145	128
02:00	*	*	*	*	*	*	63	56	73	72	176	181	201	190	128	125
03:00	*	*	*	*	*	*	48	35	46	47	118	78	80	99	73	65
04:00	*	*	*	*	*	*	35	59	37	64	56	50	67	51	49	56
05:00	*	*	*	*	*	*	110	126	102	130	68	66	55	65	84	97
06:00	*	*	*	*	*	*	264	432	232	428	113	151	73	127	170	284
07:00	*	*	*	*	*	*	474	1014	412	**927**	213	259	107	188	302	597
08:00	*	*	*	*	*	*	559	**1149**	533	894	279	326	161	258	383	**657**
09:00	*	*	*	*	*	*	573	697	563	667	342	450	226	303	426	529
10:00	*	*	*	*	*	*	616	650	572	613	503	537	389	**469**	520	567
11:00	*	*	*	*	*	*	**696**	743	**659**	630	**555**	**578**	**432**	434	**586**	596
12:00 PM	*	*	*	*	*	*	796	763	824	614	**642**	626	562	490	706	623
01:00	*	*	*	*	604	479	822	769	887	641	591	589	558	522	692	600
02:00	*	*	*	*	799	762	751	747	806	811	639	606	549	546	709	694
03:00	*	*	*	*	843	777	905	792	895	**841**	630	636	**572**	592	769	728
04:00	*	*	*	*	1047	789	1142	**870**	1104	784	610	**641**	557	**614**	892	**740**
05:00	*	*	*	*	**1178**	**800**	**1163**	812	**1127**	821	628	562	537	571	**927**	713
06:00	*	*	*	*	735	653	851	686	745	696	530	584	545	559	681	636
07:00	*	*	*	*	574	510	600	516	591	605	541	517	501	471	561	524
08:00	*	*	*	*	499	418	487	441	486	435	413	457	395	385	456	427
09:00	*	*	*	*	418	353	408	356	445	438	408	434	311	291	398	374
10:00	*	*	*	*	325	263	309	296	428	373	347	374	264	297	335	321
11:00	*	*	*	*	205	191	251	214	365	299	352	313	185	157	272	235
Lane	0	0	0	0	7227	5995	12165	12436	12208	12101	9189	9395	7766	8066	10467	10501
Day	0		0		13222		24601		24309		18584		15832		20968	
AM Peak							11:00	08:00	11:00	07:00	11:00	11:00	11:00	10:00	11:00	08:00
Vol.							696	1149	659	927	555	578	432	469	586	657
PM Peak					17:00	17:00	17:00	16:00	17:00	15:00	12:00	16:00	15:00	16:00	17:00	16:00
Vol.					1178	800	1163	870	1127	841	642	641	572	614	927	740

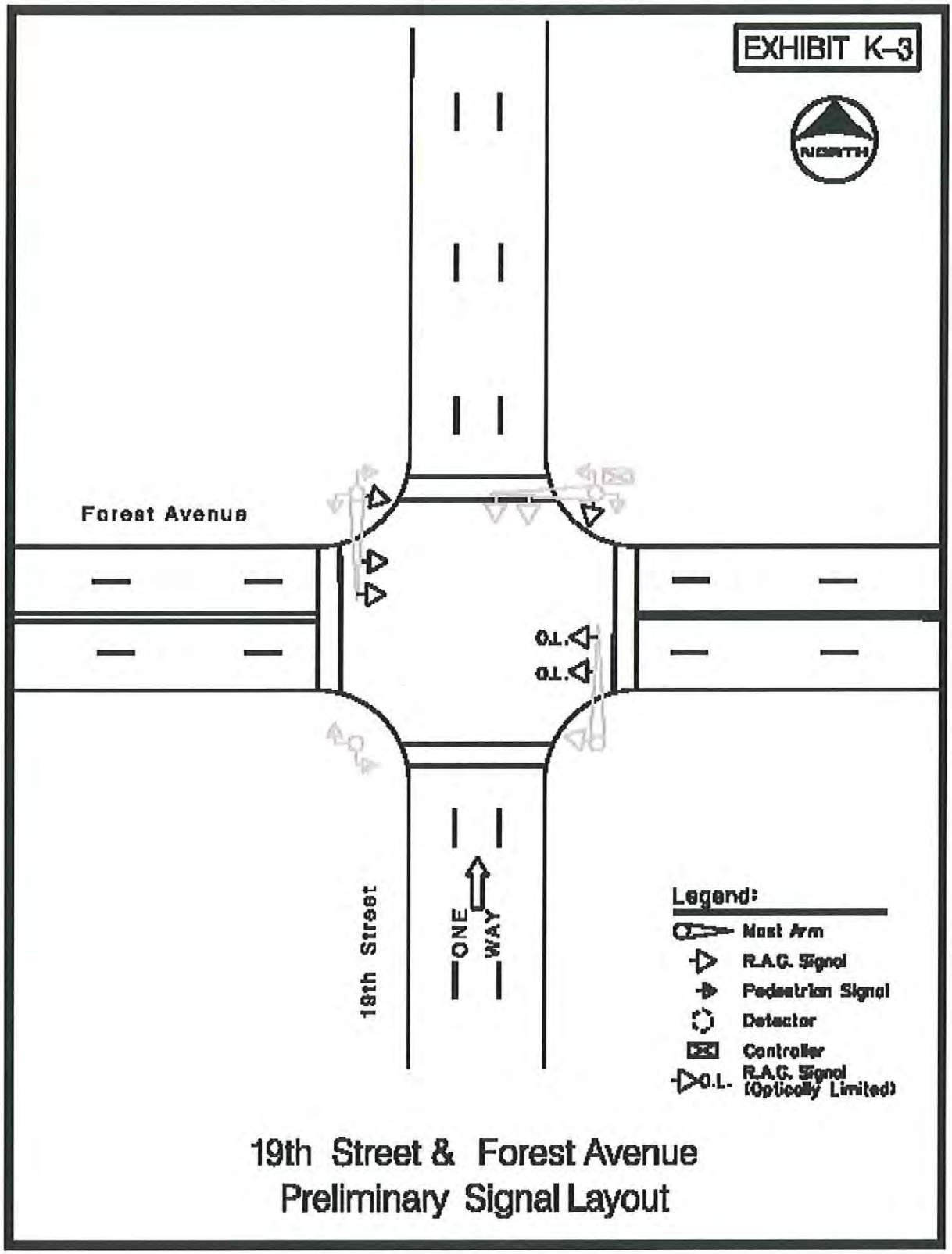
Exhibit J-1



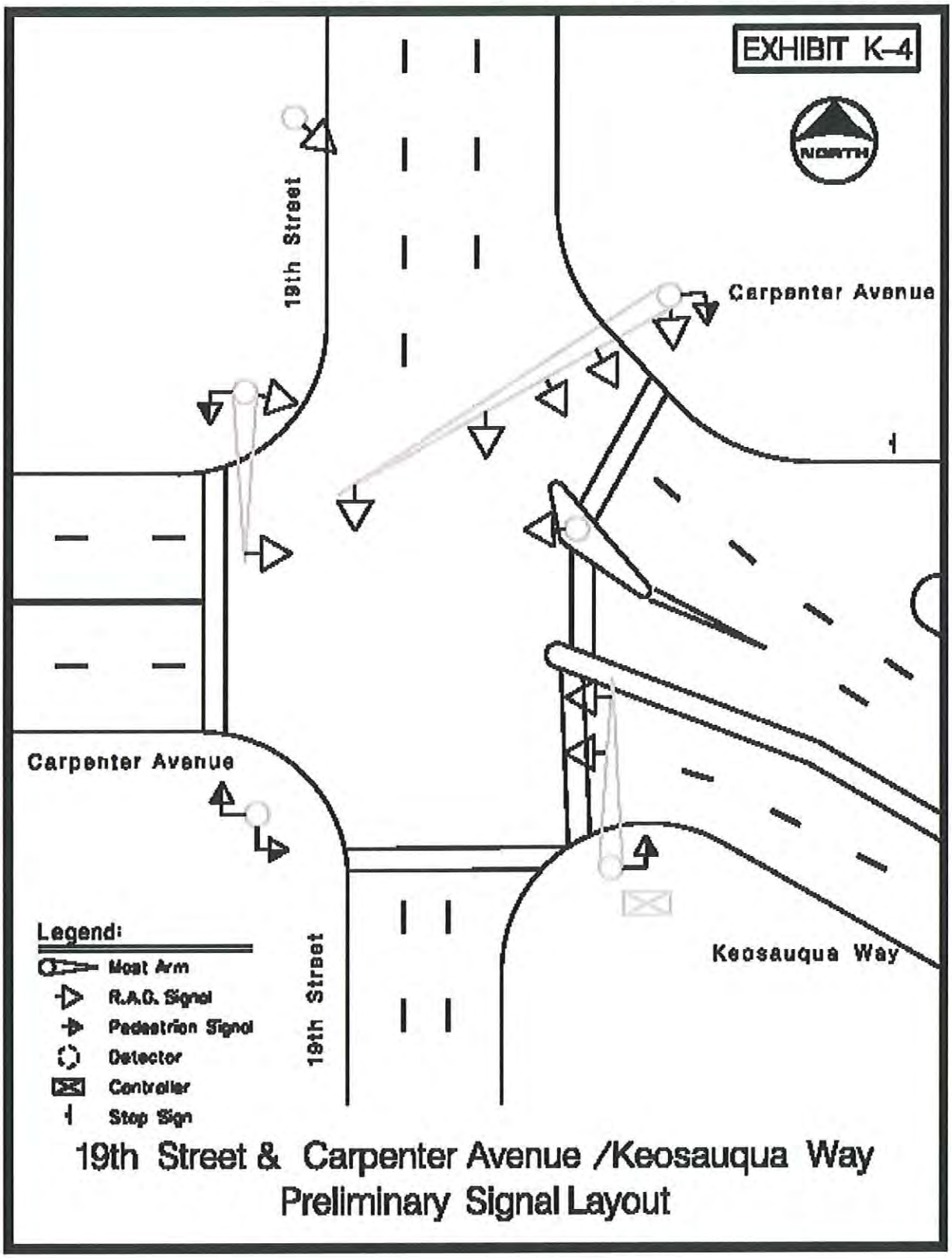
MLK Jr. Parkway & Forest Avenue
Preliminary Signal Layout



MLK Jr. Parkway & Carpenter Avenue
Preliminary Signal Layout



19th Street & Forest Avenue
Preliminary Signal Layout



19th Street & Carpenter Avenue /Keosauqua Way
Preliminary Signal Layout

Rev. 8/09

Intersection or Spot Benefit / Cost Safety Analysis

Iowa DOT Office of Traffic & Safety

County: Polk | Prepared by: Mike Ring | Date Prepared: Jun 4, 2010

Intersection: 19th St/ML King Traffic Improvements - Carpenter to Hickman

Improvement

Proposed Improvement(s): HAWK, dynamic speed limit signs - Hickman to Mondamin

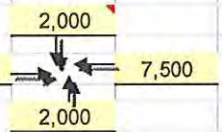
speed display signs; 4 signal upgrades on MLK and 19th at Carpenter and Forest

$ 240,000	Estimated Improvement Cost, **EC**	15	Est. Improvement Life, years, **Y**
$ -	Other Annual Cost (after initial year), **AC**	10	Crash Reduction Factor (integer), **CRF**
$ -	Present Value Other Annual Costs, **OC**	4.0%	Discount Rate (time value of $), **INT**
	$OC = \frac{AC}{INT}\left(1 - \frac{1}{(1+INT)^Y}\right)$	$ 240,000	Present Value Cost, **COST** = EC + OC

Traffic Volume Data

Source: Iowa DOT | 2008 Date of traffic count

Daily Entering Vehicles by Approach (or AADT / 2)



6,935,000	Current Annual Entering Veh., **AEV** = DEV * 365
22,058	veh / day, Final Year DEV, **FDEV**
111.63	MEV, Total Million Entering Veh. Over life of Project, **TMEV**
1.0%	Projected Traffic Growth (0%-10%), **G**
19,000	Current Daily Entering Vehicles, **DEV**

$$TMEV = \frac{AEV}{-G}\left(1 - \left(\frac{1+G}{1}\right)^Y\right) \Big/ 10^6$$

Crash Data

2005 First full year --> 2009 Last full year — 5.0 years, Time Period, **T**

Additional months — values as of Dec. 2007

0	Fatal Crashes	0	Fatalities @	$3,500,000	$ -
		7	Major Injuries @	$240,000	$ 1,680,000
79	Injury Crashes	21	Minor Injuries @	$48,000	$ 1,008,000
		78	Possible Injuries @	$25,000	$ 1,950,000
138	Property Damage Only		(assumed cost per crash)	$2,700	$ -
		-OR-	enter all Property Costs of all crashes:		$ 789,952
217	Total Crashes, **TA**			Total $ Loss, **LOSS**	$ 5,427,952

43.40	Current Crashes / Year, **AA** = TA / T	6.26	Crashes / MEV, Crash Rate, **CR**
$ 25,014	Cost per Crash, **AVC** = LOSS / TA		CR = TA x 10^6 / (DEV x 365 x T)
698.6	Total Expected Crashes, **TECR** = CR x TMEV	$ 1,285,900	Present Value of Avoided Crashes, **BENEFIT**
4.34	Crashes Avoided First Year **AAR** = AA x CRF / 100		
$ 108,559	Crash Costs Avoided in First Year, AAR x AVC		
69.9	Total Avoided Crashes, TECR x CRF/ 100		

$$BEN. = \frac{AVC \times AAR}{(INT - G)}\left(1 - \left(\frac{1+G}{1+INT}\right)^Y\right)$$

Benefit / Cost Ratio

Benefit : Cost = $1,285,900 : $240,000 = **5.36** : 1

Iowa Department of Transportation

Rev. 3/08

Date JUN 14 2010

Agenda Item 8

Roll Call # 10-884

Application for TRAFFIC SAFETY FUNDS

GENERAL INFORMATION

Location / Title of Project: Citywide Fixed-Time Traffic Signal Upgrade Project

Applicant: City of Des Moines

Contact Person: Michael P. Ring, P.E. Title: Principal Traffic Engineer

Complete Mailing Address: 600 East Court Avenue, Suite 200
Des Moines, IA 50309

Phone: 515-283-4070 (Area Code) E-Mail: mpring@dmgov.org

If more than one highway authority is involved in this project, please indicate and fill in the information below (use additional sheets if necessary).

Co-Applicant(s) _____

Contact Person _____ Title _____

Complete Mailing Address _____

Phone _____ (Area Code) E-Mail _____

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Application Type

- Site Specific ☒
- Traffic Control Device ☐
- Safety Study ☐

Funding Amount

Total Project Cost $ 400,000

Safety Funds Requested $ 80,000

PROJECT DESCRIPTION

CITYWIDE FIXED TIME SIGNAL UPGRADE PROJECT

Proposed Project:

This project consists of upgrading the traffic signal operation at 20 existing intersections in Des Moines that currently operate as fixed- time signals. The proposed project would provide "semi-actuated" operation by installing vehicle detectors on the side-street and left-turning phases, along with adding pedestrian push-buttons and pedestrian signals.

The locations are along four of the city's more important traffic-carrying corridors – 2nd Avenue, University Avenue, Grand Avenue, and Keo Way. The specific locations are as follows (also see Exhibit E):

1. 2nd Avenue at College Avenue
2. 2nd Avenue at Holcomb Avenue
3. 2nd Avenue at New York Avenue
4. 2nd Avenue at Euclid Avenue
5. 2nd Avenue at University Avenue
6. University Avenue at 9th Street
7. University Avenue at 13th Street
8. University Avenue at 19th Street
9. University Avenue at ML King
10. University Avenue at 24th Street
11. University Avenue at 25th Street
12. University Avenue at 28th Street
13. University Avenue at Polk Boulevard
14. Grand Avenue at East 9th Street
15. Grand Avenue at East 12th Street
16. Grand Avenue at 19th Street
17. Grand Avenue at 28th Street
18. Grand Avenue at 35th Street
19. Grand Avenue at 42nd Street
20. Keo Way at 12th Street

The total construction cost is estimated to be $400,000. FY2011 Iowa Clean Air Attainment (ICAAP) funds have been approved in the amount of $320,000. State Traffic Safety funds in the amount of $80,000 are being requested in order to complete the funding package for this project.

Existing Conditions:

The twenty traffic signal locations proposed for upgrading on this project are all "fixed-time" signals. They were installed many years ago as part of an original coordinated signal system along the 2nd Avenue, Grand Avenue, University Avenue, and Keo Way corridors. Although the traffic signal poles and indications have all been upgraded in recent years, the intersections have remained with "fixed-time" operation. Since there is no side-street vehicle or pedestrian detection, the traffic signals cycle through their phases on a pre-timed basis, regardless of the presence or absence of vehicles. This operation results in the main-street vehicles stopping or waiting unnecessarily when no vehicles are present on the side street.

Traffic volumes vary on these streets. 2nd Avenue carries approximately 13,000 to 16,500 vehicles per day (veh/day). University Avenue volumes vary from 10,000 to 20,000 veh/day along the proposed corridor. Grand Avenue handles between 11,000 and 14,000 veh/day. Keo Way volumes are approximately 15,000 veh/day.

Speed limits also vary, but are generally in the 25-35 mph range.

Project Justification:
Because of the fixed-time signal operation, drivers on the main street are exposed to more rear-end and sideswipe-same direction crashes than if the signals remained green for their approaches. Motorists on the main street are not required to stop as often, thereby reducing the number of rear-end and sideswipe conflicts.

Research numbers for the Crash Mitigation Factors (CMF) vary from 10-80 percent reduction. For our analysis, a very conservative approach was taken, in that ONLY rear-end and sideswipe crashes were considered to be correctable, and then a 10% CMF was applied. (All other types of crashes, including right-angle, were not considered to be "correctable" in this analysis.)

A review of the crash history for the 3-year period between 2007-2009 indicated a total of 291 crashes at the 20 subject intersections. The analysis of this crash information indicates the following:

Accident Type	Number
Broadside	112
Rear End	**92**
Sideswipe – same direction	**21**
Sideswipe – opposite direction	3
Head-on	6
Non-Collision	23
Unknown	2
Total	**291**
Average per year per intersection:	**4.9**

There were a total of 113 reported crashes that are considered correctable (Rear-end and Sideswipe-same direction). Of these, there were 22 personal injury crashes involving 31 injuries.

Based on current IDOT value factors, the total estimated loss from crashes during the described three-year period is $393,298 (See Exhibit "L-1"). Assuming a crash reduction of 10 percent of the correctible crashes and an estimated project life of 15 years, the request for $80,000 of Traffic Safety Funds relates to a benefit-cost factor of **7.17:1.**

6/14/2010 MPR

Exhibit "C"

COST ESTIMATE

Citywide Signal Upgrade Project

1. 2nd Avenue at College Avenue	$15,000
2. 2nd Avenue at Holcomb Avenue	$15,000
3. 2nd Avenue at New York Avenue	$15,000
4. 2nd Avenue at Euclid Avenue	$20,000
5. 2nd Avenue at University Avenue	$20,000
6. University at 9th Street	$20,000
7. University Avenue at 13th Street	$15,000
8. University Avenue at 19th Street	$20,000
9. University Avenue at ML King	$20,000
10. University Avenue at 24th Street	$15,000
11. University Avenue at 25th Street	$15,000
12. University Avenue at 28th Street	$15,000
13. University Avenue at Polk Boulevard	$20,000
14. Grand Avenue at East 9th Street	$20,000
15. Grand Avenue at East 12th Street	$20,000
16. Grand Avenue at 19th Street	$20,000
17. Grand Avenue at 28th Street	$15,000
18. Grand Avenue at 35th Street	$15,000
19. Grand Avenue at 42nd Street	$20,000
20. Keo Way at 12th Street	$25,000
TRAFFIC SIGNAL MODIFICATIONS:	$360,000
CONTINGENCY:	$40,000
TOTAL CONSTRUCTION COST	$400,000

Exhibit D

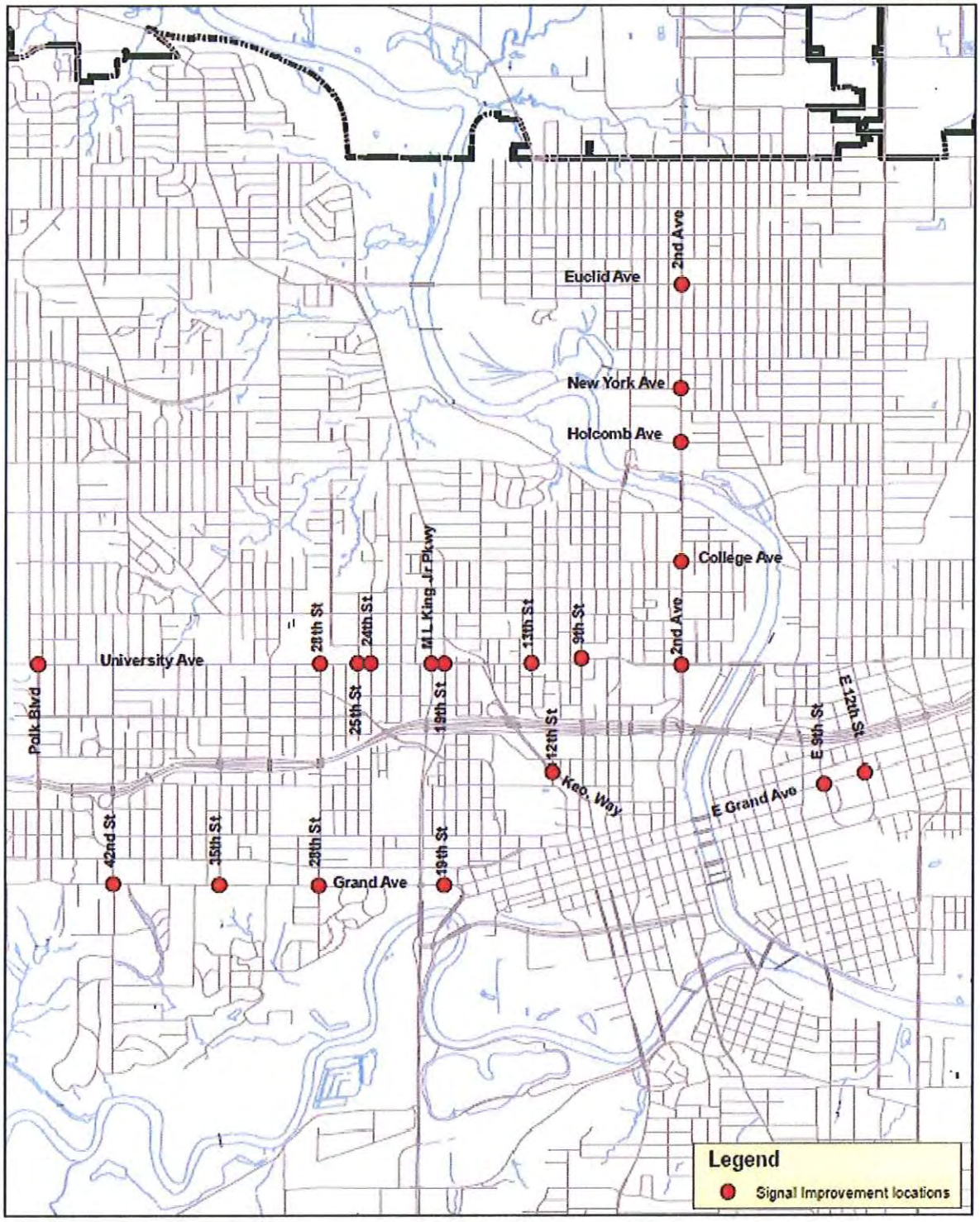
TIME SCHEDULE

CITYWIDE FIXED-TIME TRAFFIC SIGNAL UPGRADE PROJECT

Project Approval:	**December 2010**
Agreement Signed:	**March 2011**
Project bid:	**June 2011**
Construction completed:	**October 2011**
Project Closeout:	**June 2012**

Citywide Fixed-time Signal Upgrade Project

Exhibit E



Photos of 3 typical intersections that are part of project Exhibit F-1

On E 12th Street, looking north toward E Grand Avenue.

On E 12th Street, looking south toward E Grand Avenue.

On E Grand avenue, looking east toward E 12th Street.

On E Grand Avenue, looking west toward E 12th Street.

On 2nd Avenue, looking north toward Holcomb Avenue.

On 2nd Avenue, looking south toward Holcomb Avenue.

On Holcomb Avenue, looking east toward 2nd Avenue.

On Holcomb Avenue, looking west toward 2nd Avenue.

On 42nd Street, looking north toward Grand Avenue.

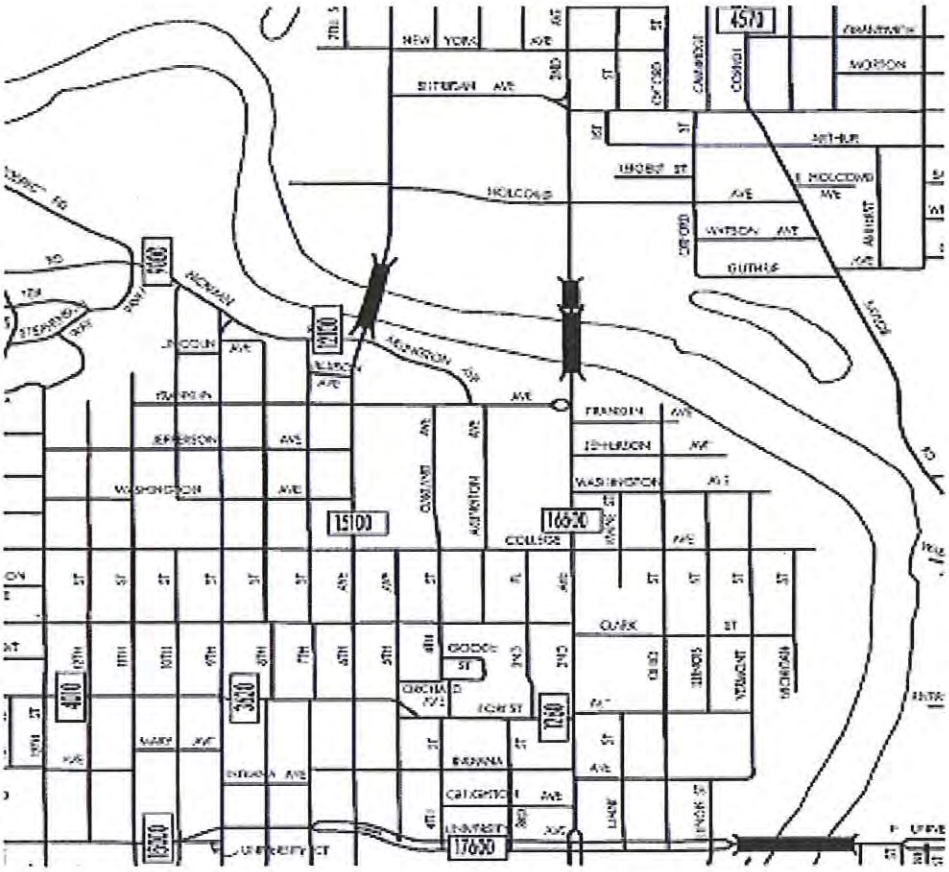
On 42nd Street, looking south toward Grand Avenue.

On Grand Avenue, looking west toward 42nd Street.

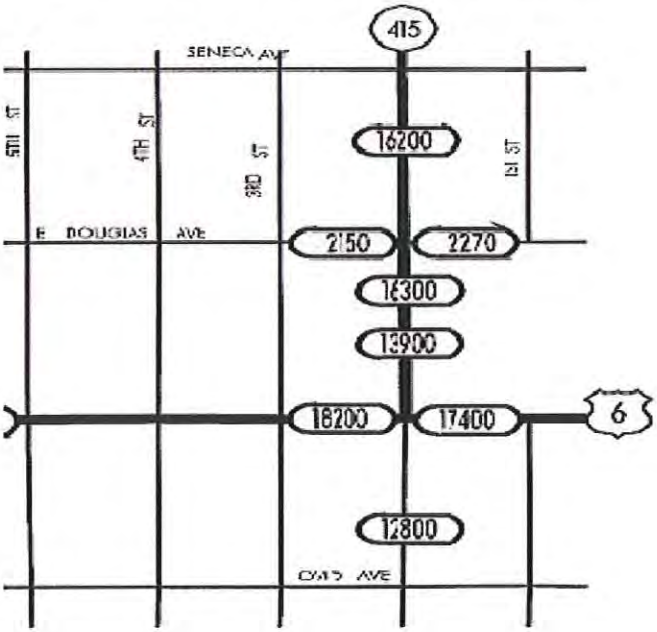
On Grand Avenue, looking east toward 42nd Street.

Exhibit J-1

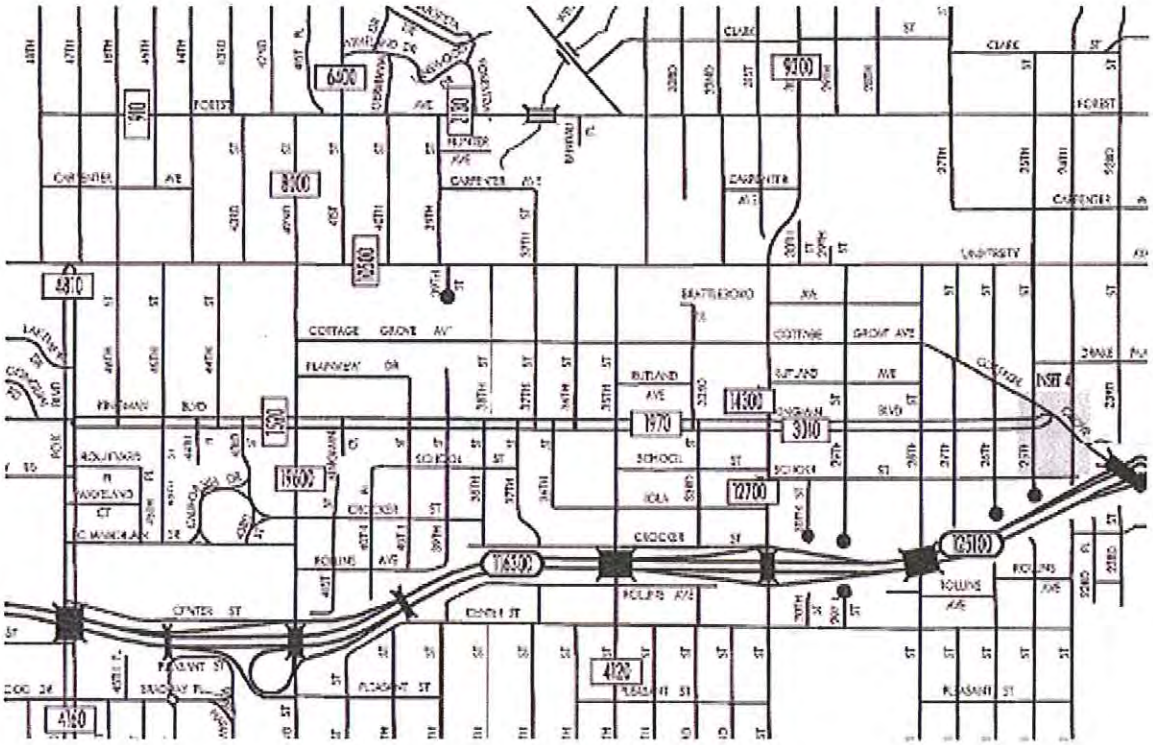
University Avenue / 2nd Avenue Corridor - 2008 IDOT Counts



2nd Avenue Corridor - 2008 IDOT Counts



University Avenue Corridor - 2008 IDOT Counts



Keo Way Corridor - 2008 IDOT Counts

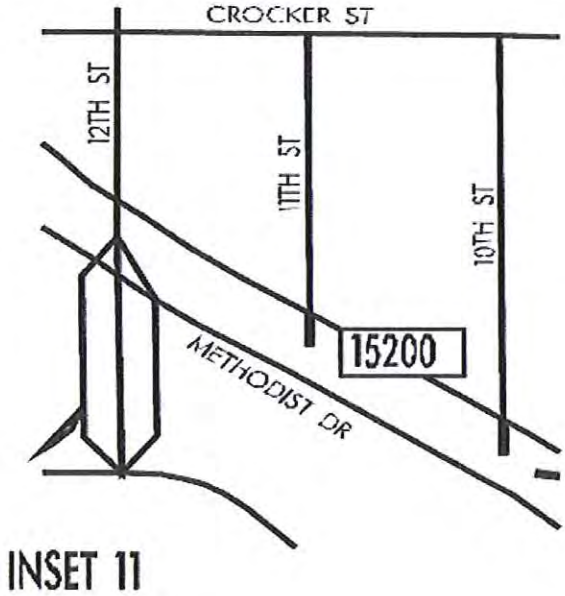
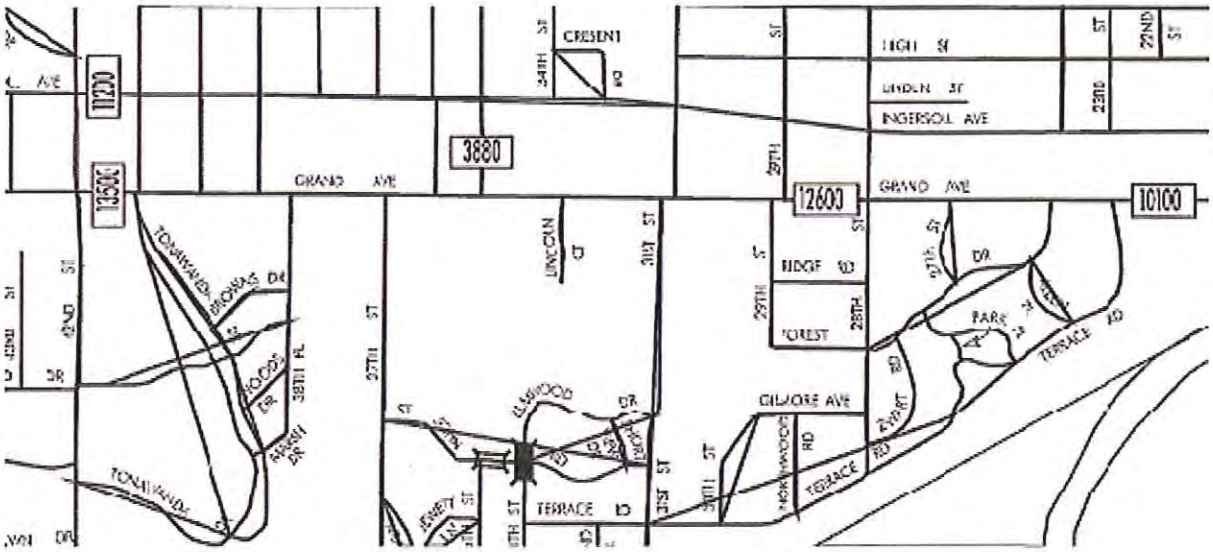
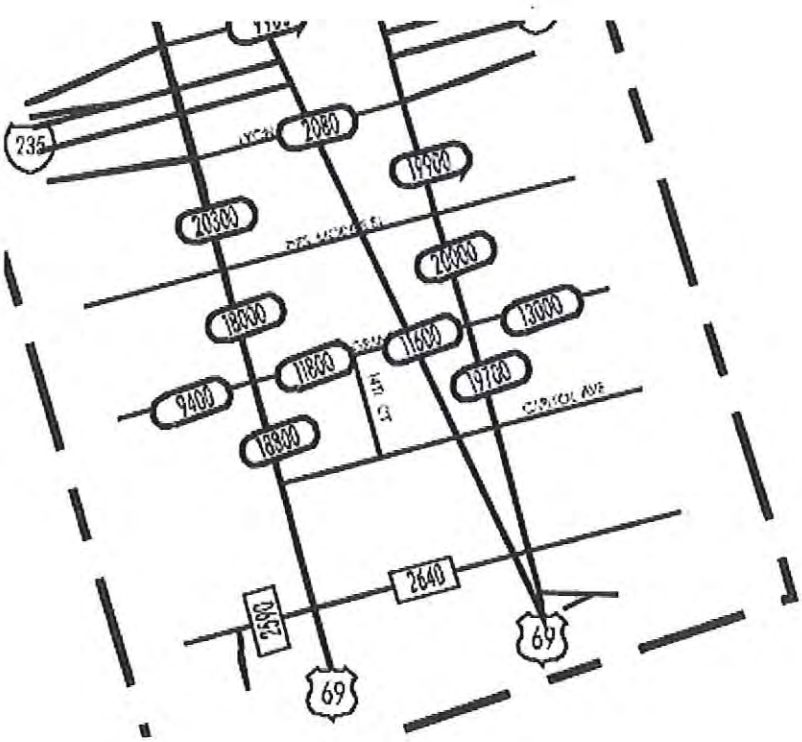


Exhibit J-3

Grand Avenue Corridor - 2008 IDOT Counts



East Grand Avenue Corridor - 2008 IDOT Counts



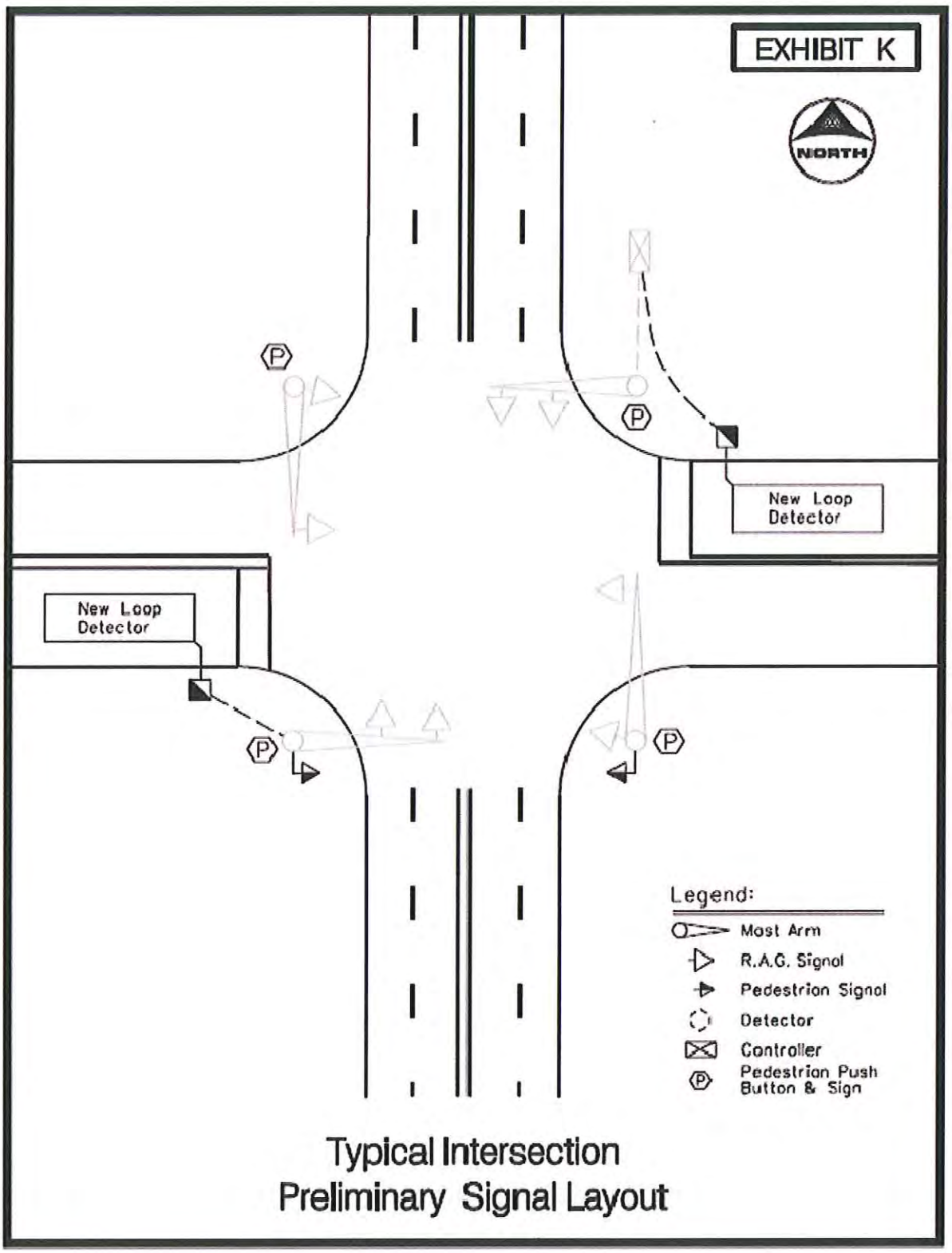


EXHIBIT K
NORTH
New Loop Detector
New Loop Detector
Legend:
Mast Arm
R.A.G. Signal
Pedestrian Signal
Detector
Controller
Pedestrian Push Button & Sign
Typical Intersection
Preliminary Signal Layout

Rev. 8/09

Intersection or Spot Benefit / Cost Safety Analysis

Iowa DOT Office of Traffic & Safety

County: Polk | Prepared by: Mike Ring | Date Prepared: Jun 4, 2010

Intersection: Citywide Fixed-Time Traffic Signal Upgrade (20 intersections)

Improvement

Proposed Improvement(s): Upgrade existing fixed-time signals to semi-actuated

Note: Only "Correctable" crashes are included (sideswipe-same direction, rear-end)

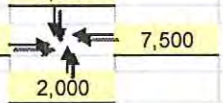
$ 80,000	Estimated Improvement Cost, **EC**	15	Est. Improvement Life, years, **Y**
$ -	Other Annual Cost (after initial year), **AC**	10	Crash Reduction Factor (integer), **CRF**
$ -	Present Value Other Annual Costs, **OC**	4.0%	Discount Rate (time value of $), **INT**
		$ 80,000	Present Value Cost, **COST** = EC + OC

$$OC = \frac{AC}{INT}\left(1 - \frac{1}{(1+INT)^Y}\right)$$

Traffic Volume Data

Source: Iowa DOT | 2008 Date of traffic count

Daily Entering Vehicles by Approach (or AADT / 2)



6,935,000	Current Annual Entering Veh., **AEV** = DEV * 365
22,058	veh / day, Final Year DEV, **FDEV**
111.63	MEV, Total Million Entering Veh. Over life of Project, **TMEV**
1.0%	Projected Traffic Growth (0%-10%), **G**
19,000	Current Daily Entering Vehicles, **DEV**

$$TMEV = \frac{AEV}{-G}\left(1 - \left(\frac{1+G}{1}\right)^Y\right) \Big/ 10^6$$

Crash Data

2007	First full year -->	2009	Last full year		3.0 years, Time Period, **T**	
	Additional months				values as of Dec. 2007	
0	Fatal Crashes	0	Fatalities @		$3,500,000	$ -
		1	Major Injuries @		$240,000	$ 240,000
22	Injury Crashes	3	Minor Injuries @		$48,000	$ 144,000
		27	Possible Injuries @		$25,000	$ 675,000
91	Property Damage Only		(assumed cost per crash)		$2,700	$ -
		-OR-	enter all Property Costs of all crashes:			$ 393,298
113	Total Crashes, **TA**				Total $ Loss, **LOSS**	$ 1,452,298

37.67	Current Crashes / Year, **AA** = TA / T	5.43	Crashes / MEV, Crash Rate, **CR**
$ 12,852	Cost per Crash, **AVC** = LOSS / TA		CR = TA x 10^6 / (DEV x 365 x T)
606.3	Total Expected Crashes, **TECR** = CR x TMEV	$ 573,424	Present Value of Avoided Crashes, **BENEFIT**
3.77	Crashes Avoided First Year **AAR** = AA x CRF / 100		
$ 48,410	Crash Costs Avoided in First Year, AAR x AVC		
60.6	Total Avoided Crashes, TECR x CRF/ 100		

$$BEN. = \frac{AVC \times AAR}{(INT - G)}\left(1 - \left(\frac{1+G}{1+INT}\right)^Y\right)$$

Benefit / Cost Ratio

Benefit : Cost = $573,424 : $80,000 = **7.17** : 1

Iowa Department of Transportation

Rev. 3/08

Application for TRAFFIC SAFETY FUNDS

GENERAL INFORMATION

Location / Title of Project I-380 in Cedar Rapids

Applicant Iowa DOT - District 6

Contact Person Tom Storey Title District Staff Engineer

Complete Mailing Address 5455 Kirkwood Blvd. SW

Cedar Rapids IA 52404

Phone 319-365-6984 (Area Code) E-Mail thomas.storey@dot.iowa.gov

If more than one highway authority is involved in this project, please indicate and fill in the information below (use additional sheets if necessary).

Co-Applicant(s) _____

Contact Person _____ Title _____

Complete Mailing Address _____

_____

Phone _____ (Area Code) E-Mail _____

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Application Type

- Site Specific ☒
- Traffic Control Device ☐
- Safety Study ☐

Funding Amount

Total Project Cost $ 300,000

Safety Funds Requested $ 300,000

B

B.1. Existing Conditions

The proposed project is located on southbound I-380 in Cedar Rapids near milepost 20. It is on the south approach bridge to the 5-in-1 bridge over the Cedar River. I-380 at this location has three through lanes and an additional intermittent auxiliary lane in each direction. The horizontal alignment includes a horizontal curve with a radius of 1146 ft. The bridge deck is Portland cement concrete. The bridge barrier rails are aluminum. The aluminum barrier rail is obsolete, and errant trucks are able to penetrate the barrier. The posted speed limit is 55 mph. The average traffic volume in 2007 was approximately 62,000 vehicles per day.

B.2. Proposed Concept

The proposed concept is to apply a thin high friction surface treatment on the existing bridge deck from the PC of the curve to the PT, in the southbound driving lanes only.

B.3. Justification

From 2005 to 2009 there were 15 wet-weather crashes within the project limits. These included no fatal crashes, 1 major injury crash, 4 minor injury crashes, and 9 possible injury crashes. These resulted in no fatalities, 1 major injury, and 4 minor injuries. A Road Safety Audit involving representatives from FHWA, CTRE, ISU, City of Cedar Rapids, City of Hiawatha, and Iowa DOT was conducted on November 12, 2008. The final report issued in March 2009 said on page 18, “Consider corrective action for low-friction areas when warranted, including diamond milling and placement of high-friction treatment such as “Italgrip” or similar proprietary products, especially in the s-curves area.”

B.4. Cost Estimate and Proposed Funding Sources

The cost of the proposed improvements is estimated at $300,000. It is proposed to fund 100% of the cost of the project with TSIP funds.

B.5. Proposed Schedule

The project is proposed for letting and construction in calendar year 2011.

C. Cost Estimate

Item Number	Cat	Description	Units	Quantity	Unit Price	Cost
		COST ESTIMATE				
10		HIGH FRICTION SURFACE TREATMENT	SY	8000	$32.00	$256,000
20		PAVEMENT MARKINGS	STA	50	$40.00	$2,000
30		TRAFFIC CONTROL	LS	1	$8,000.00	$8,000
40		MOBILIZATION	LS	1	$16,000.00	$16,000
		SUBTOTAL				$282,000
		MISC. & CONT.				$18,000
		TOTAL				$300,000

D. Time Schedule

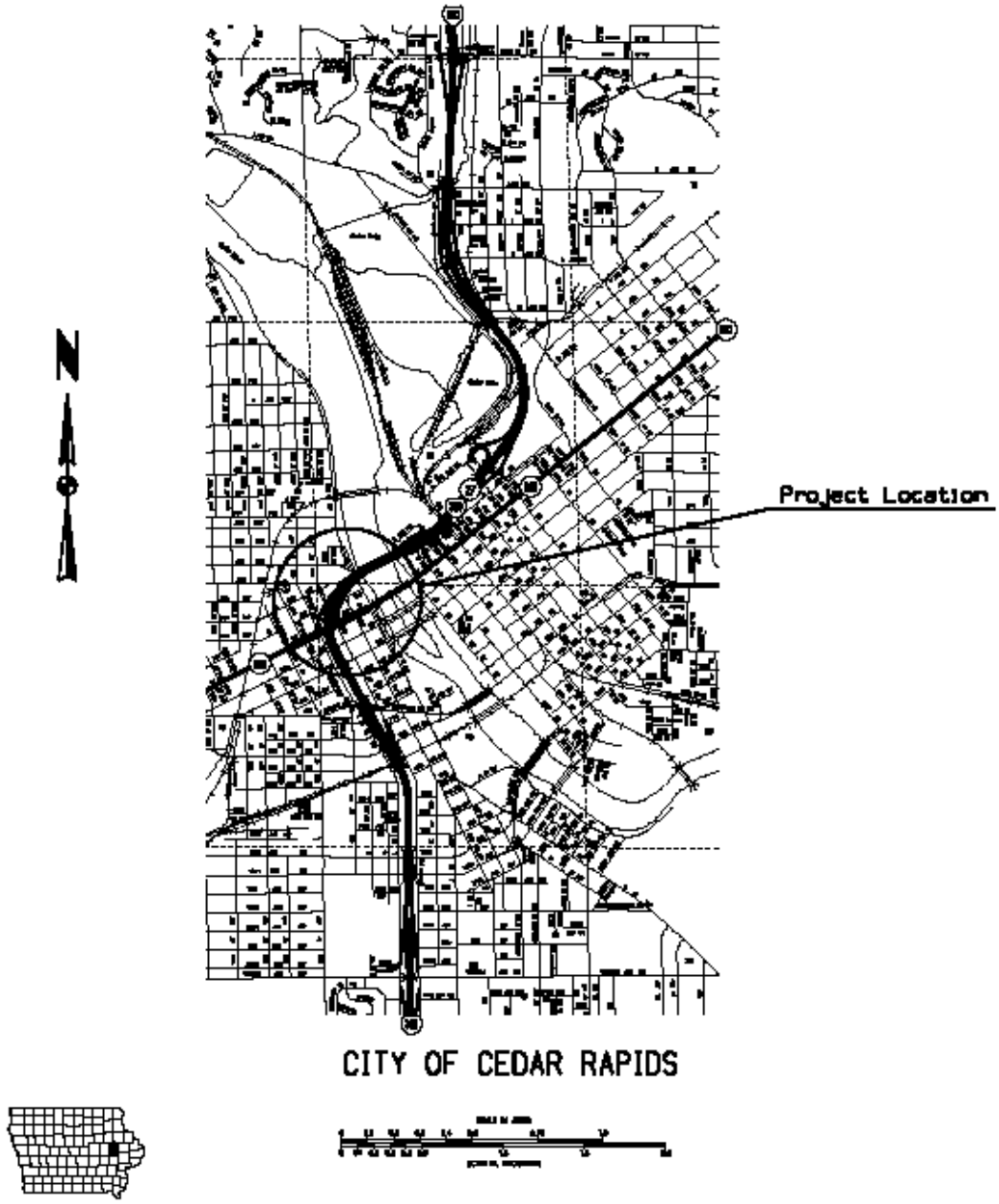
It is proposed to let and construct the proposed project in calendar year 2011.

E. Location Map

E

I-380, Linn County, High Friction Surface Treatment

Location Map



F. Color Picture

I-380 Southbound in Cedar Rapids near Milepost 20

H. Aerial Photograph

I-380 in Cedar Rapids, South Approach to the Cedar River

curve@1st.xlsx

CASENUMBER	CRCOMANNER	DATE	TIME	LIGHT	SURF_C	MAJORCAUSE	VEHICLE	INITDIR	DCONTCIRC1	INJURYUNIT	ISTATUS
2005211908	Sideswipe - same direction	20050510	540	Daylight	Ice	Swerving/Evasive Action	1	North	Lost Control	0	
2005211908			0				2	North	Swerved to avoid: vehicle-object-no	0	
2005211908			0				3	North	Swerved to avoid: vehicle-object-no	0	
2005211908			0				4	North	Swerved to avoid: vehicle-object-no	0	
2005221024	Non-collision	20050507	438	Dark - roadway lighted	Wet	Ran off road - left	1	North	Lost Control	1	Possible
2006215830	Non-collision	20060418	1330	Daylight	Wet	Lost Control	1	Not Reported	Lost Control	0	
2006234035	Non-collision	20060809	620	Dawn	Wet	None Indicated	1	Not Reported	Not Reported	0	
2006240165	Non-collision	20060910	1201	Daylight	Wet	Lost Control	1	North	Lost Control	1	Fatal
2006257303	Non-collision	20061216	543	Dark - roadway lighted	Dry	Lost Control	1	North	Lost Control	0	
2007208463	Non-collision	20070217	48	Dark - roadway not lighted	Snow	Over correcting/over steering	1	South	Over correcting-over steering	1	Possible
2007370416	Non-collision	20070506	1312	Daylight	Water	Driving too fast for conditions	1	South	Driving too fast for conditions	0	
2007373225	Non-collision	20070524	1209	Daylight	Wet	Driving too fast for conditions	1	East	Driving too fast for conditions	1	Non-incapacit
2007375038	Non-collision	20070603	1228	Daylight	Wet	Lost Control	1	South	Lost Control	1	Possible
2007392736	Sideswipe - same direction	20070907	238	Dark - roadway lighted	Wet	Swerving/Evasive Action	1	South	Unknown	1	Possible
2007392736			0				2	South	Swerved to avoid: vehicle-object-no	0	
2007392736			0				3	South	Swerved to avoid: vehicle-object-no	0	
2007414881	Sideswipe - same direction	20071215	531	Dark - roadway lighted	Wet	Driving too fast for conditions	1	North	Driving too fast for conditions	0	
2007414881			0				2	North	Other (explain in narrative): No imp	0	
2008420048	Non-collision	20080118	1226	Daylight	Snow	Lost Control	1	South	Lost Control	1	Non-incapacit
2008420049	Non-collision	20080118	1226	Daylight	Snow	Lost Control	1	South	Lost Control	1	Possible
2008422952	Rear-end	20080124	705	Dawn	Snow	Lost Control	1	South	Lost Control	2	Possible
2008422952			0				2	South	Other (explain in narrative): No imp	0	
2008422954	Non-collision	20080124	710	Daylight	Slush	Driving too fast for conditions	1	South	Driving too fast for conditions	1	Incapacitating
2008428189	Non-collision	20080219	900	Daylight	Ice	Other (explain in narrative): No imp	1	Not Reported	Other (explain in narrative): No imp	0	
2008439974	Non-collision	20080428	2152	Dark - roadway lighted	Dry	Lost Control	1	South	Lost Control	1	Non-incapacit
2008456660	Non-collision	20080821	1000	Daylight	Wet	Over correcting/over steering	1	North	Lost Control	0	
2008457422	Non-collision	20080722	24	Dark - roadway lighted	Dry	Exceeded authorized speed	1	East	Exceeded authorized speed	1	Non-incapacit
2008457422			0				0			1	Incapacitating
2008459010	Non-collision	20080908	947	Daylight	Wet	Lost Control	1	North	Lost Control	1	Non-incapacit
2008463886	Non-collision	20081003	2005	Dark - roadway lighted	Dry	Exceeded authorized speed	1	South	Exceeded authorized speed	1	Non-incapacit
2008463892	Non-collision	20081005	314	Dark - roadway not lighted	Wet	Ran off road - right	1	North	Lost Control	0	
2008467808	Sideswipe - same direction	20081016	1410	Daylight	Dry	Unknown	1	Not Reported	Unknown	0	
2008467808			0				2	Not Reported	Unknown	0	
2008476022	Sideswipe - same direction	20081115	920	Daylight	Dry	Unknown	1	Not Reported	Unknown	2	Possible
2008476022			0				2	Not Reported	Unknown	0	
2009484705	Sideswipe - same direction	20090104	1420	Daylight	Dry	Other (explain in narrative): Other	1	North	Other (explain in narrative): Other	1	Possible
2009484705			0				2	North	Other (explain in narrative): Other	0	
2009490101	Sideswipe - same direction	20090115	1730	Dark - roadway lighted	Snow	Swerving/Evasive Action	1	South	Lost Control	777	Possible
2009490101			0				2	South	Other (explain in narrative): No imp	0	
2009497127	Rear-end	20090310	1053	Daylight	Wet	Lost Control	1	North	Lost Control	0	
2009497127			0				2	North	Other (explain in narrative): No imp	0	
2009497127			0				3	North	Other (explain in narrative): No imp	0	
2009500878	Rear-end	20090328	1750	Daylight	Snow	Lost Control	1	South	Lost Control	1	Possible
2009500878			0				2	South	Lost Control	0	
2009503934	Non-collision	20090425	2104	Dark - roadway lighted	Wet	Swerving/Evasive Action	1	South	Lost Control	1	Non-incapacit
2009512908	Non-collision	20090623	1913	Daylight	Wet	Lost Control	1	North	Lost Control	0	
2009517640	Non-collision	20090721	1154	Daylight	Wet	Lost Control	1	South	Lost Control	1	Non-incapacit
2009520390	Non-collision	20090813	333	Dark - roadway lighted	Wet	Lost Control	1	South	Lost Control	1	Possible
2009523367	Non-collision	20090827	1030	Daylight	Wet	Driving too fast for conditions	1	South	Driving too fast for conditions	0	
2009544709	Rear-end	20091227	1025	Daylight	Snow	Lost Control	1	South	Lost Control	1	Possible
2009544709			0				2	South	Other (explain in narrative): No imp	2	Non-incapacit
2009549142	Sideswipe - same direction	20091212	915	Daylight	Other (	Unknown	1	Not Reported	Unknown	0	
2009549142			0				2	Not Reported	Unknown	0	
2009549142			0				3	Not Reported	Unknown	0	

36 11 NB 17 SB 6 Not Rpt'd

NB S F W/ 111 (2) W/ 111 (4)

Rev. 8/09

Road Segment Benefit / Cost Safety Analysis

Iowa DOT Office of Traffic & Safety

County: Linn | Prepared by: Tom Storey | Date Prepared: Jun 29, 2010

Location: I-380 southbound, south approach to the 5-in-1 bridge over the Cedar River in Cedar Rapids

Improvement

Proposed Improvement(s): Apply high friction surface treatment

$ 300,000	Estimated Improvement Cost, **EC**	10	Est. Improvement Life, years, **Y**
$ -	Other Annual Cost (after initial year), **AC**	54	Crash Reduction Factor (integer), **CRF**
$ -	Present Value Other Annual Costs, **OC**	4.0%	Discount Rate, **INT**
	$OC = \frac{AC}{INT}\left(1 - \frac{1}{(1+INT)^Y}\right)$	**$ 300,000**	Present Value All Costs, **COST** = EC + OC

Traffic Volume Data

Source: Iowa DOT 2007 Traffic Book | 2007 Date of traffic count

Length (mi.)	Two-way veh/day	Description
0.33	57,800	5th Ave SW to Iowa 922
0.41	66,300	Iowa 922 to 1st St. NE
0.74	miles total	

46,505	Current Vehicle Miles / Day, **VM**
68,839	End of Life Veh. Miles / Day
16,974,398	Current Veh. Miles / Year, **AM**
203,796,441	Total Projected Veh. Miles Over Life of Project, **TVMT**

$$TVMT = \frac{AM}{-G}\left(1 - \left(\frac{1+G}{1}\right)^Y\right)$$

4.0% Projected Traffic Growth (0%-10%), **G**

Crash Data

2005 First full year --> 2009 Last full year — 5.0 years, Time Period, **T**

Additional months — values as of Dec. 2007

	Fatal Crashes		Fatalities @	$3,500,000	$	-
		1	Major Injuries @	$240,000	$	240,000
14	Injury Crashes	4	Minor Injuries @	$48,000	$	192,000
		9	Possible Injuries @	$25,000	$	225,000
1	Property Damage Only		(assumed cost per crash)	$2,700	$	40,500
		-OR-	enter all Property Costs of all crashes:			
15	Total Crashes, **TA**			Total $ Loss, **LOSS**	$	697,500

3.00	Current Crashes / Year, **AA** = TA / T	**17.7**	Crashes / HMVM, Crash Rate, **CR** CR = TA x 10^8 / (AM x T)
$ 46,500	Cost per Crash, **AVCR** = LOSS / TA		
36.0	Total Expected Crashes, **TCR** = CR x TVMT/10^8	**$ 724,327**	Present Value of Avoided Crashes, **BENEFIT**
1.62	Crashes Avoided First Year **AAR** = AA x CRF / 100		
$ 75,330	Crash Costs Avoided in First Year, AAR x AVCR		
19.4	Total Avoided Crashes, TCR x CRF/ 100		

$$BEN. = \frac{AVCR \cdot AAR}{(INT - G)}\left(1 - \left(\frac{1+G}{1+INT}\right)^Y\right)$$

Benefit / Cost Ratio

Benefit : Cost = $724,327 : $300,000 = **2.41** : 1

Iowa Department of Transportation

Rev. 3/08 A

Application for TRAFFIC SAFETY FUNDS

GENERAL INFORMATION

Location / Title of Project: Johnson Avenue NW from 1st Avenue to Midway Drive

Applicant: City of Cedar Rapids

Contact Person: Leslie Hart, P.E. PTOE Title: Associate Traffic Engineer

Complete Mailing Address: 1201 6th St SW
Cedar Rapids, IA 52404

Phone: 319-286-5802 (Area Code) E-Mail: l.hart@cedar-rapids.org

If more than one highway authority is involved in this project, please indicate and fill in the information below (use additional sheets if necessary).

Co-Applicant(s) _____

Contact Person _____ Title _____

Complete Mailing Address _____

_____

Phone _____ (Area Code) E-Mail _____

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Application Type

- Site Specific ☒
- Traffic Control Device ☐
- Safety Study ☐

Funding Amount

Total Project Cost $ 1,695,000

Safety Funds Requested $ 500,000

EXHIBIT "B"

PROJECT NARRATIVE

Johnson Avenue NW from
1st Avenue W to Midway Drive

EXISTING CONDITIONS:

Johnson Avenue NW is a minor arterial serving active residential and commercial areas in Cedar Rapids, and carrying approximately 9,500 vehicles per day. The proposed project will convert the 41-foot-wide roadway from a 4-lane undivided street to a 3-lane street with continuous center turn lane and shared-use through lanes.

Over the past five years, the corridor has been the site of 83 vehicle crashes, 31 resulting in 46 personal injuries including one fatality. The segment crash rate is 480 crashes per hundred-million vehicle-miles (HMVM), approximately 10% higher than comparable Iowa municipal facilities. The personal injury crash rate is 185 crashes per HMVMT, approximately 55% higher than the municipal rate.[1]

The crash types experienced on Johnson Avenue NW are typical for a 4-lane undivided cross-section, where driver's view of on-coming vehicles can be hidden by other vehicles, and turning vehicles slow or stop within through travel lanes to await acceptable gaps. Conversion to a 3-lane street with center turn lane is expected to reduce all crash types and personal injuries by 37%.[2] Refer to Table 1.

PROJECT CONCEPT:

The project will install an asphalt overlay and reflective pavement marking tape to define an 11-foot-wide continuous center turn lane and two 15-foot-wide shared-use (vehicle/ bicycle) travel lanes within the existing curb lines. The project will include alignment of the opposing through lanes at the all-way *STOP* controlled 1st Avenue W terminus of the project, and transition to the existing 5-lane cross-section on the east end between Midway Drive and Edgewood Road.

[1] "Crash Rates and Crash Densities in Iowa by Road System", 2001-2009", Office of Traffic and Safety, 2010
[2] "The Safety and Operational Effects of Road Diet Conversion in Minnesota", Gates et al, 2007
http://www.cmfclearinghouse.org/study_detail.cfm?stid=68

B

Table 1. Five-Year Crash History: 2005 – 2009

Crash Type	Typical Cause	Total Crashes	Personal Injury Crashes	Personal Injuries	Correctable by 3-lane section?
Left-turn	'Failure to Yield'	23	8	10	Provides "zero offset" for left-turning drivers
Right-angle	'Failure to Yield' or 'Disobey Stop Sign'	26	13	24	Reduces number of conflicting traffic lanes & improves sightline to oncoming vehicles
Fixed Object	'Lost Control'	10	1	1	Provides additional space between traveled way and fixed objects
Rear end	'Failure to Control'	7	4	5	Removes left-turning vehicles from through travel lanes
Sideswipe	'Illegal Lane Change'	5	1	2*	Provides wider travel lane & reduces need for lane changes
Head-on	'Crossing Center Line'	2	none	none	Provides buffer between opposing travel lanes
Unknown	-----	10	4	4	-----
TOTALS		83	31	46	

* Includes 1 fatality

C

JOHNSON AVENUE NW FROM EAST OF 1st AVENUE TO MIDWAY DRIVE
ENGINEER'S ESTIMATE OF PROBABLE COST
CITY OF CEDAR RAPIDS ENGINEERING DEPARTMENT
June 14, 2010

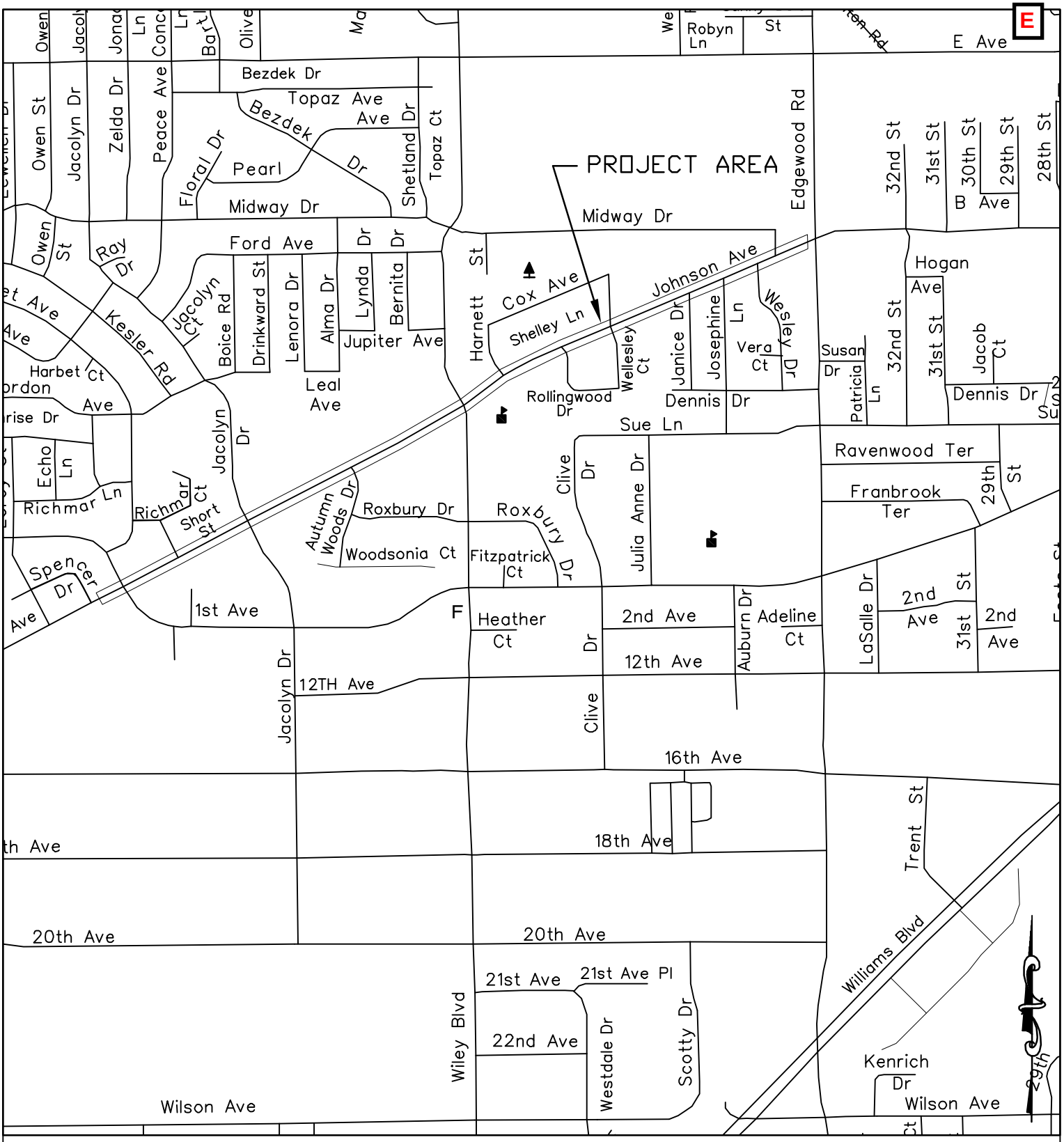
				ENGINEER ESTIMATE	
ITEM NO.	DESCRIPTION	EST. QTY.	UNIT	UNIT PRICE	EXTENDED AMOUNT
1.	Mobilization	1	LS	$75,000.00	$75,000.00
2.	Construction Surveys	1	LS	4,000.00	$4,000.00
3.	Subgrade and Subbase Compaction Testing	1	LS	1,500.00	$1,500.00
4.	Concrete Maturity Testing for PCC Pavement	1	LS	1,200.00	$1,200.00
5.	Traffic Control	1	LS	25,000.00	$25,000.00
6.	Temporary Pavement Markings and Symbols (Special Provisions)	1	LS	7,500.00	$7,500.00
7.	Flaggers	40	DAY	206.00	$8,240.00
8.	Removal of Existing Sidewalks (Special Provisions)	180	SY	10.00	$1,800.00
9.	Milling of ACC Pavement (Special Provisions)	24,800	SY	7.00	$173,600.00
10.	Subbase, Class A Roadstone, 6" (Special Provisions)	2,500	SY	7.00	$17,500.00
11.	Subgrade Stabilization With Crushed Rock Material (Special Provisions)	250	CY	50.00	$12,500.00
12.	Adjustment of Existing Structures, Manhole Type B	5	EA	1,000.00	$5,000.00
13.	Adjustment of Existing Structures, Valve Box	10	EA	2,000.00	$20,000.00
14.	Portland Cement Concrete Pavement Repair, Full Depth (Special Provisions)	2,500	SY	75.40	$188,500.00
15.	Portland Cement Concrete Curb Repair, 24" (Special Provisions)	700	LF	41.00	$28,700.00
16.	Portland Cement Concrete Sidewalk, 4" (Special Provisions)	70	SY	70.00	$4,900.00
17.	Portland Cement Concrete Sidewalk Pedestrian Ramp (Special Provisions)	90	SY	68.00	$6,120.00
18.	Installation of Owner-Supplied Tactile Warning Devices	170	SF	10.00	$1,700.00
19.	Portland Cement Concrete Ramp Cut, 18" - 30"	120	LF	42.00	$5,040.00
20.	Hot Mix Asphalt Pavement Repair, Partial Depth Patching (Special Provisions)	500	SY	53.00	$26,500.00
21.	Hot Mix Asphalt Overlay, 1/2" Mix, Leveling Course, PG 70-28, 3M ESAL (Special Provisions)	2,600	TON	73.00	$189,800.00
22.	Hot Mix Asphalt Overlay, 1/2" Mix, Surface Course, PG 70-28, 3M ESAL (Special Provisions)	2,000	TON	73.00	$146,000.00
23.	Tack Coat, CSSH-1	1,800	GAL	3.00	$5,400.00
24.	Cleaning and Preparation of Streets (Special Provisions)	24,800	SY	1.00	$24,800.00
25.	Hot Mix Asphalt, Miscellaneous (Wedge & Temporary)	500	TON	90.00	$45,000.00
26.	Pavement Markings, Polymer Tape	140.0	STA	250.00	$35,000.00
27.	Pavement Symbols, Polymer Tape	30	EA	350.00	$10,500.00
28.	Imported Topsoil	100	CY	35.00	$3,500.00
29.	Hydroseeding With Liquid Mulch Binder, Type 1A	1	LS	3,500.00	$3,500.00
30.	Parkway Grading	500	SY	5.00	$2,500.00
31.	Vehicle Detection Replacement	1	LS	6,000.00	$6,000.00
					$1,086,300.00
				Contingency (30%)	**$325,890.00**
				Engineering Design and Construction, Admin (20%)	**$282,438.00**
				TOTAL	**$1,694,628.00**

EXHIBIT "D"

TIME SCHEDULE FOR PROPOSED PROJECT

TRAFFIC SAFETY IMPROVEMENTS on JOHNSON AVE NW from 1ST AVENUE to MIDWAY DRIVE

June 15, 2010	**--**	**T.S.I.P. Project submittal deadline**
December 15, 2010	**--**	**Traffic Safety Improvements Program approval**
July 15, 2011	**--**	**Project agreement approval**
December 15, 2012	**--**	**Project letting**
April 15, 2013	**--**	**Project construction start**
October 15, 2013	**--**	**Project construction completion**



LOCATION MAP

LEGEND

F FIRE STATION
SCHOOL
PARK

FILE NO.: 60-10-004	
DRAWN BY: JLR	
APPROVED BY: LH	
DATE: 6/14/10	
SCALE: 1" = 1000'	

JOHNSON AVE NW FROM 1ST AVE TO MIDWAY DR

CEDAR RAPIDS
City Of Five Seasons

EXHIBIT "F"

COLOR PICTURES OF THE PROJECT SITE

Johnson Avenue NW from 1st Avenue to Midway Drive

Photo 1. Eastbound view of Johnson Avenue at 1st Ave W, the west terminus of the project.
Note all-way STOP control at intersection and signalized pedestrian crossing approximately 500' downstream.

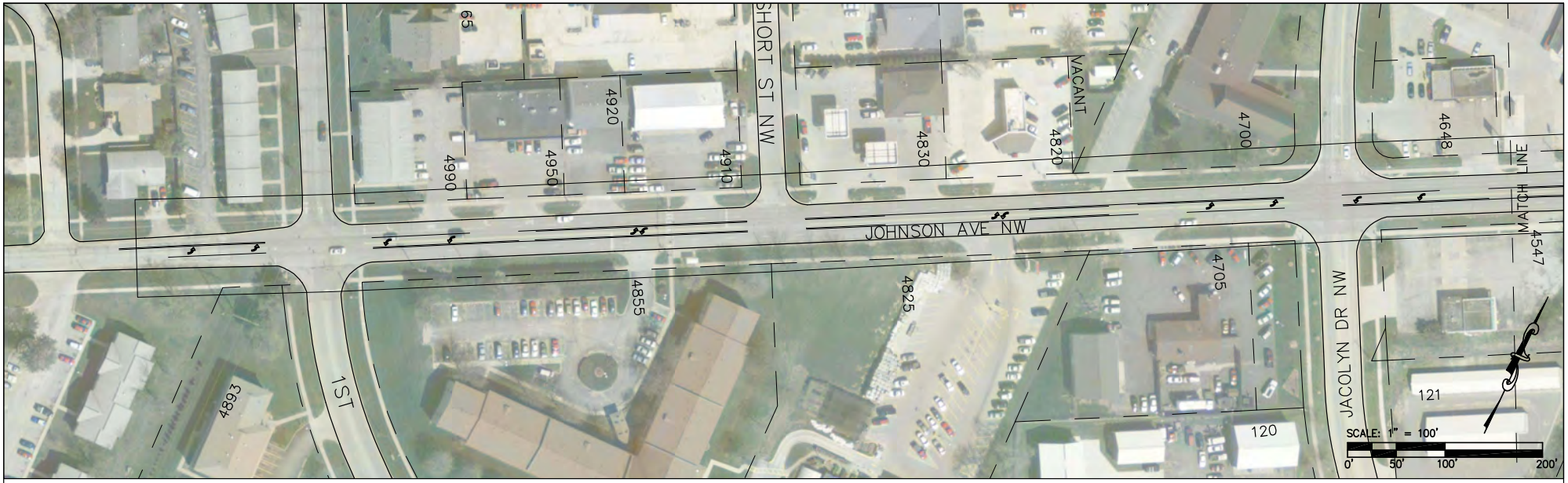
Photo 2. Eastbound view of Johnson Avenue NW at Wiley Blvd. Note elementary school in upper right.

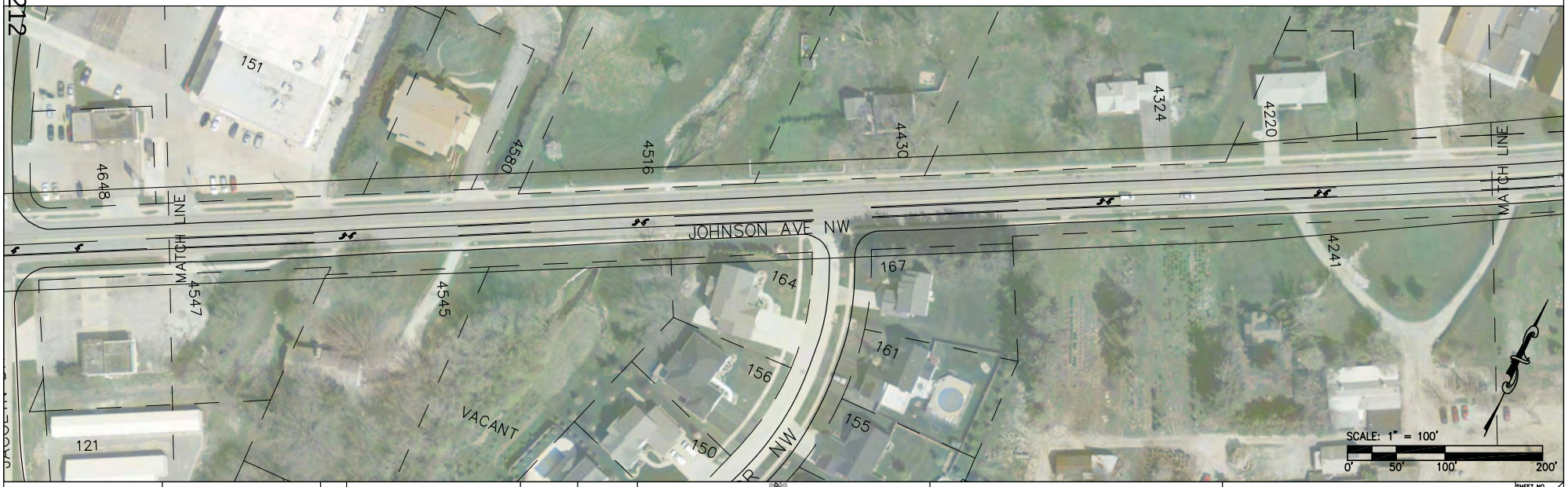
Photo 3. Westbound view of Johnson Avenue NW at Wiley Blvd. Note school crosswalks on north and east legs.

Photo 4. Westbound view of Johnson Avenue NW approach to Wiley Blvd.

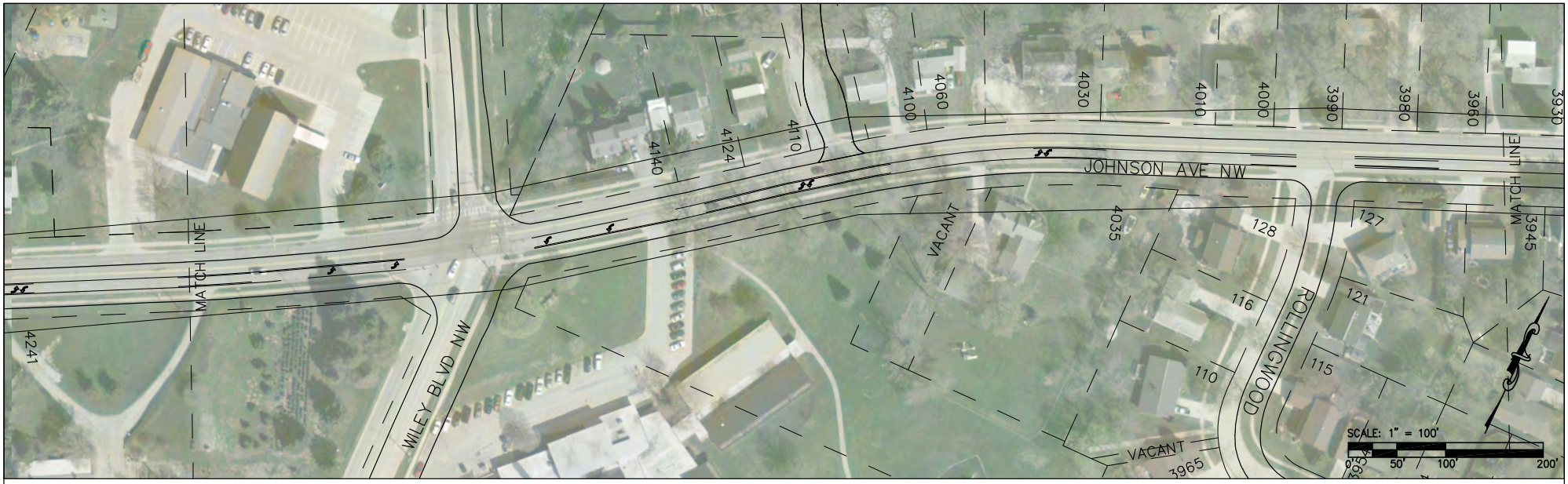
Photo 5. Westbound view of Johnson Avenue NW between Midway Drive and Wiley Blvd.
Note residential drives and several side streets.

Photo 6. Eastbound view of Johnson Avenue NW toward Midway Drive, the east terminus of the project.
Proposed 3-lane section will transition into existing 5-lane section on approach to Edgewood Road.

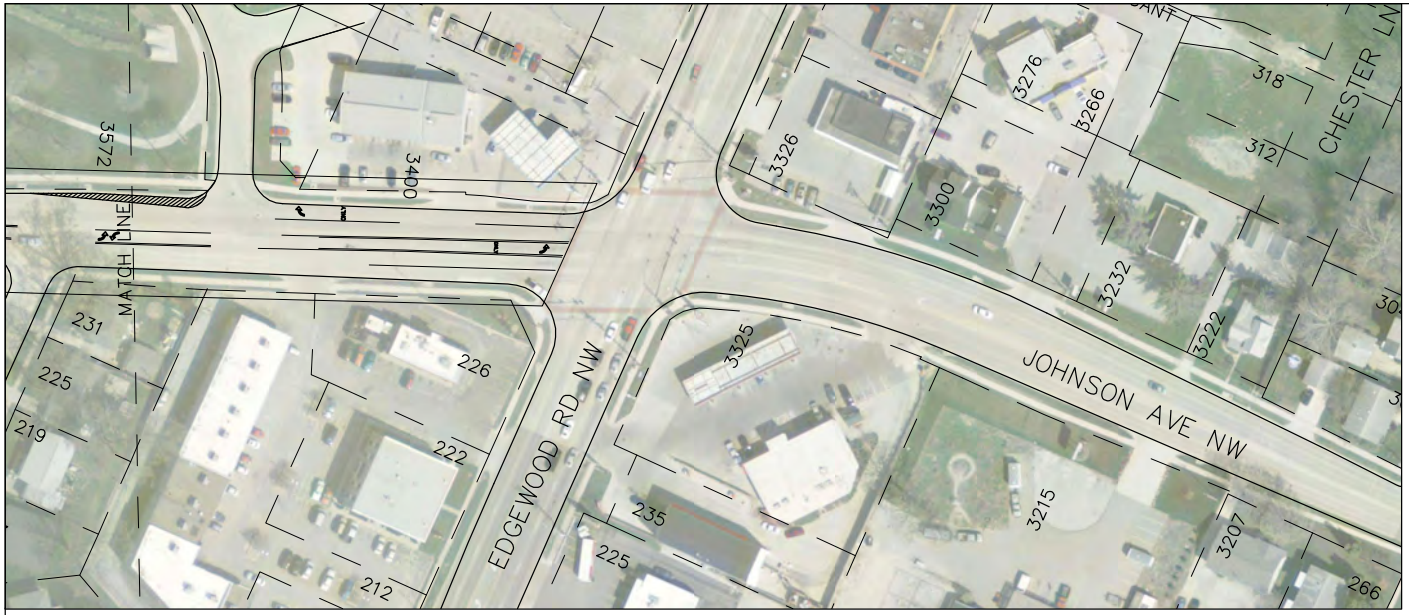


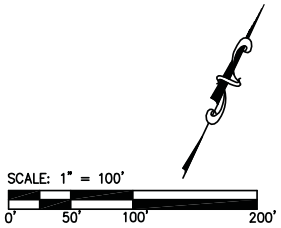


FILE NAME: PLAN–JOHNSON.DWG	DRAWN BY: APPROVED BY:	NO.	REVISION DESCRIPTION	APPROVED	DATE	CEDAR RAPIDS City Of Five Seasons	JOHNSON AVE NW FROM 1ST AVE TO MIDWAY DR FILE NO: 60–10–004	PLAN SHEET 1	SHEET NO. 1 OF 3
		0	INITIAL ISSUE	LH	X/ X/XX				



FILE NAME: PLAN-JOHNSON.DWG	DRAWN BY: APPROVED BY:			CEDAR RAPIDS City Of Five Seasons	JOHNSON AVE NW FROM 1ST AVE TO MIDWAY DR FILE NO: 60-10-004	PLAN SHEET 2	SHEET NO. 2 OF 3
		0	INITIAL ISSUE	LH	X/ X/XX
		NO.	REVISION DESCRIPTION	APPROVED	DATE





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FILE NAME: PLAN–JOHNSON.DWG	DRAWN BY: APPROVED BY:	NO.	REVISION DESCRIPTION	APPROVED	DATE	CEDAR RAPIDS City Of Five Seasons	JOHNSON AVE NW FROM 1ST AVE TO MIDWAY DR FILE NO: 60–10–004	PLAN SHEET 3	SHEET NO. 3 OF 3
		0	INITIAL ISSUE	LH	X/ X/XX				

AERIAL PHOTOGRAPH

LEGEND

F FIRE STATION
SCHOOL
PARK

FILE NO.: 60-10-004	
DRAWN BY: JLR	
APPROVED BY: LH	
DATE: 6/14/10	
SCALE: 1" = 1000'	

JOHNSON AVE NW FROM 1ST AVE TO MIDWAY DR

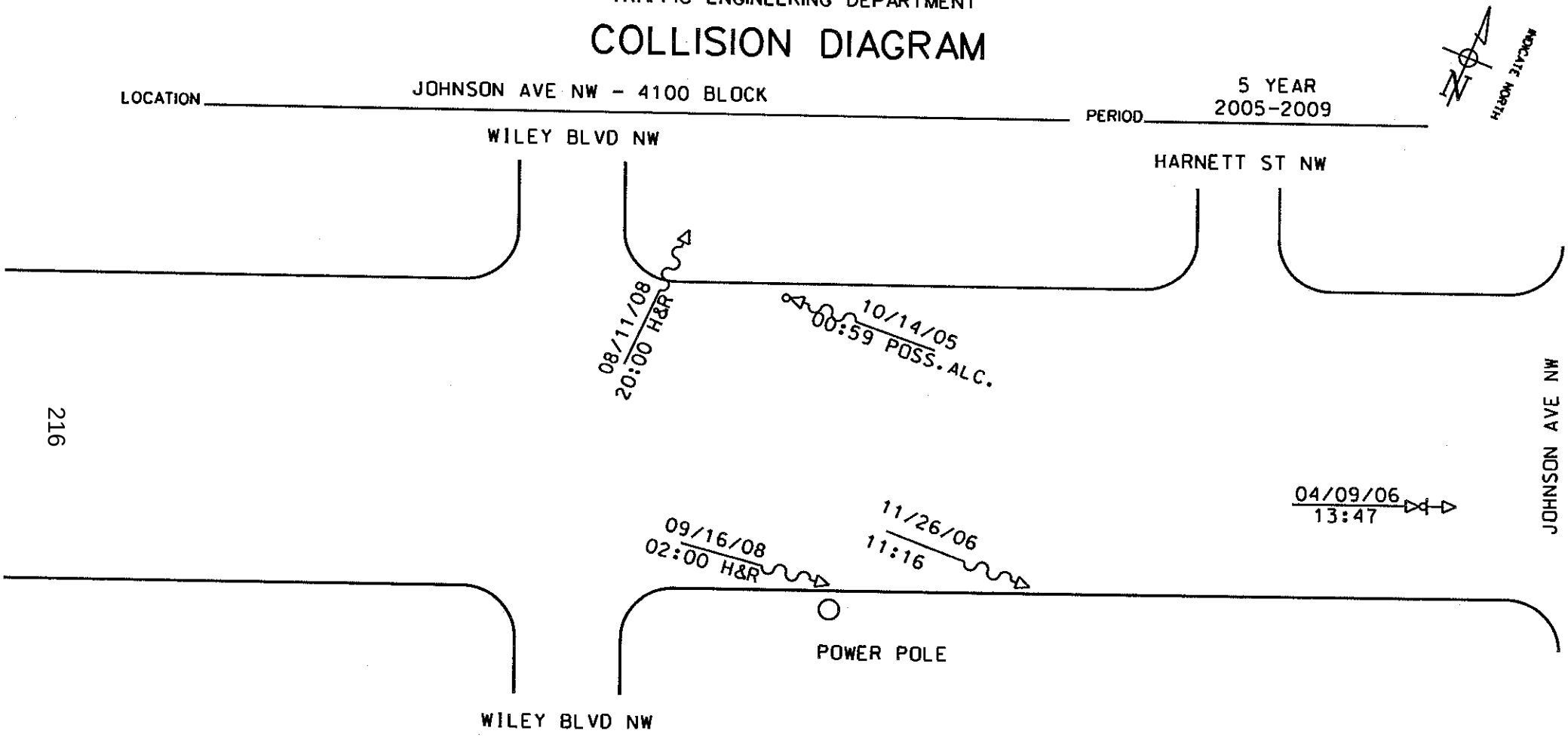
CEDAR RAPIDS
City Of Five Seasons

CITY OF CEDAR RAPIDS, IOWA
TRAFFIC ENGINEERING DEPARTMENT

COLLISION DIAGRAM

LOCATION JOHNSON AVE NW - 4100 BLOCK

PERIOD 5 YEAR 2005-2009



LEGEND

- M.V. BACKING
- M.V. MOVING AHEAD
- PEDESTRIAN
- PARKED(ING) VEHICLE
- FIXED OBJECT
- REAR END COLLISION
- SIDE SWIPE
- OUT OF CONTROL VEHICLE
- FATAL ACCIDENT
- PERSONAL INJURY
- PROPERTY DAMAGE ONLY

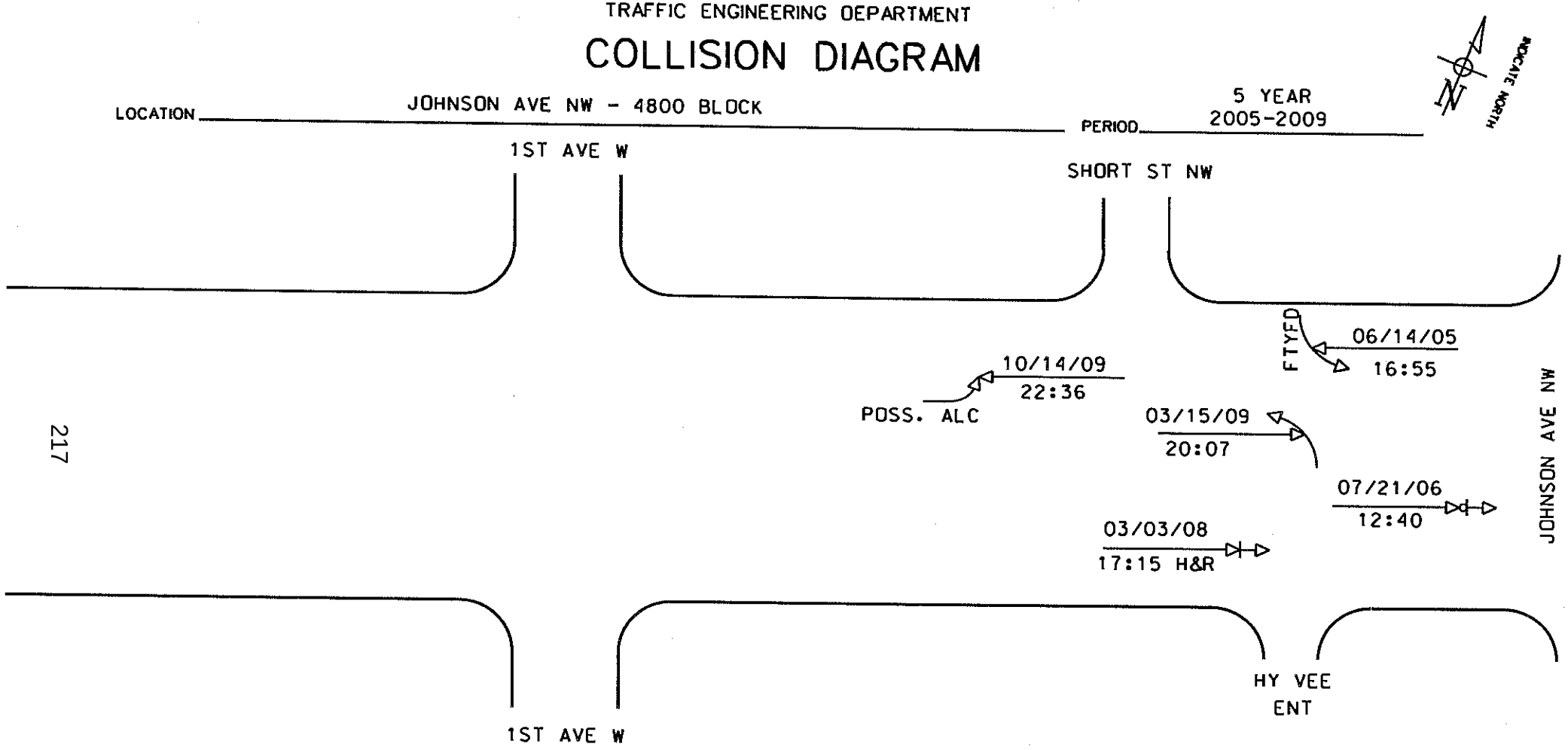
TIME: A=A.M. P=P.M.
PAVEMENT: D=DRY I=ICY W=WET
WEATHER: C=CLEAR F=FOG R=RAIN S=SNOW SL=SLEET CL=CLOUDY

CITY OF CEDAR RAPIDS, IOWA
TRAFFIC ENGINEERING DEPARTMENT

COLLISION DIAGRAM

LOCATION JOHNSON AVE NW - 4800 BLOCK

PERIOD 5 YEAR 2005-2009



LEGEND

- M.V. BACKING
- M.V. MOVING AHEAD
- PEDESTRIAN
- PARKED(ING) VEHICLE
- FIXED OBJECT
- REAR END COLLISION
- SIDE SWIPE
- OUT OF CONTROL VEHICLE
- FATAL ACCIDENT
- PERSONAL INJURY
- PROPERTY DAMAGE ONLY

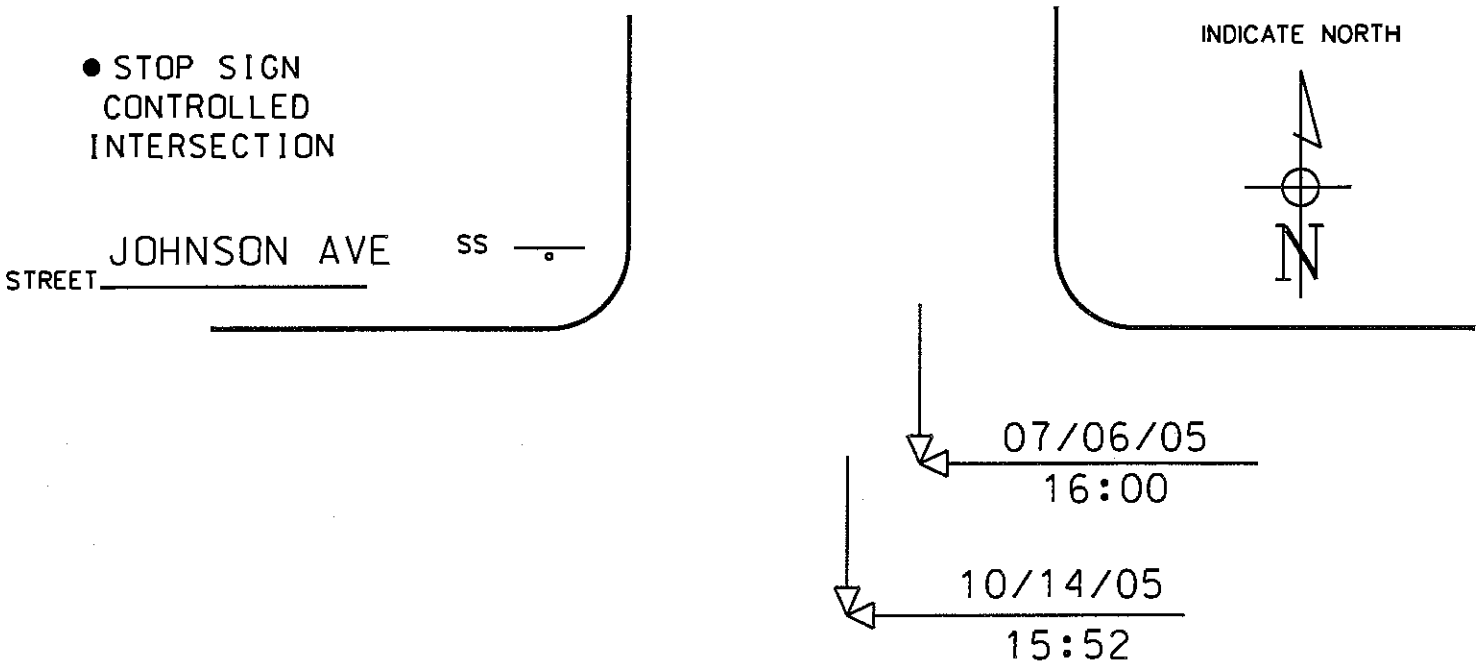
TIME: A-A.M. P-P.M.
PAVEMENT: D-DRY I-ICY W-WET
WEATHER: C-CLEAR F-FOG R-RAIN S-SNOW SL-SLEET CL-CLOUDY

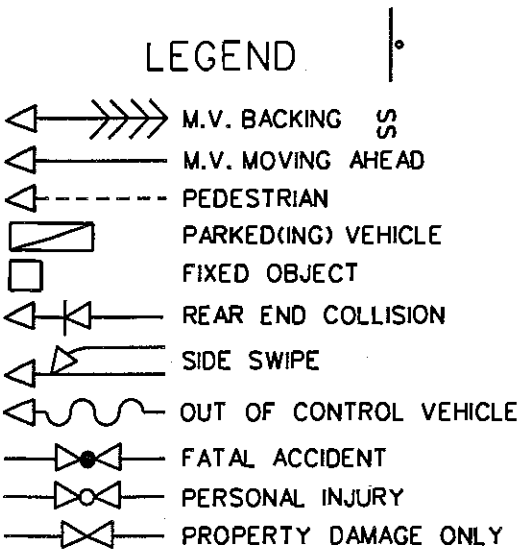
CITY OF CEDAR RAPIDS, IOWA
TRAFFIC ENGINEERING DEPARTMENT

COLLISION DIAGRAM

LOCATION JOHNSON AVE AND MIDWAY DR

PERIOD 5 YEAR 2005-2009





STREET JOHNSON AVE

STREET MIDWAY DR

TIME: A=A.M. P=P.M.
PAVEMENT: D=DRY I=ICY W=WET
WEATHER: C=CLEAR F=FOG R=RAIN
S=SNOW SL=SLEET
CL=CLOUDY

CITY OF CEDAR RAPIDS, IOWA
TRAFFIC ENGINEERING DEPARTMENT

COLLISION DIAGRAM

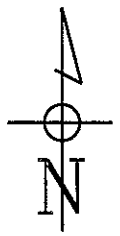
LOCATION JOHNSON AVE AND WESLEY DR NW

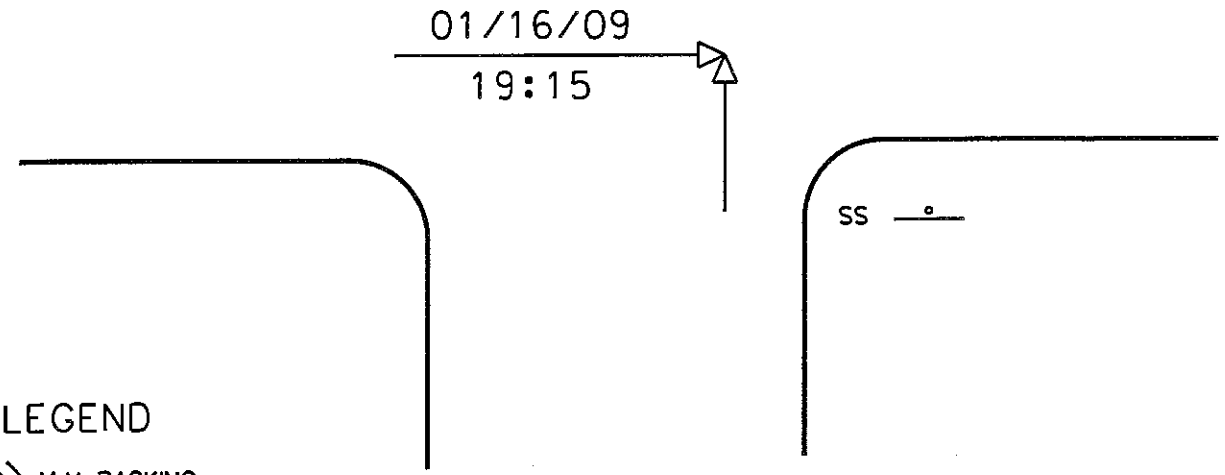
PERIOD 5 YEAR 2005-2009

● STOP SIGN CONTROLLED INTERSECTION

STREET JOHNSON AVE

INDICATE NORTH





STREET WESLEY DR

LEGEND

- M.V. BACKING
- M.V. MOVING AHEAD
- PEDESTRIAN
- PARKED(ING) VEHICLE
- FIXED OBJECT
- REAR END COLLISION
- SIDE SWIPE
- OUT OF CONTROL VEHICLE
- FATAL ACCIDENT
- PERSONAL INJURY
- PROPERTY DAMAGE ONLY

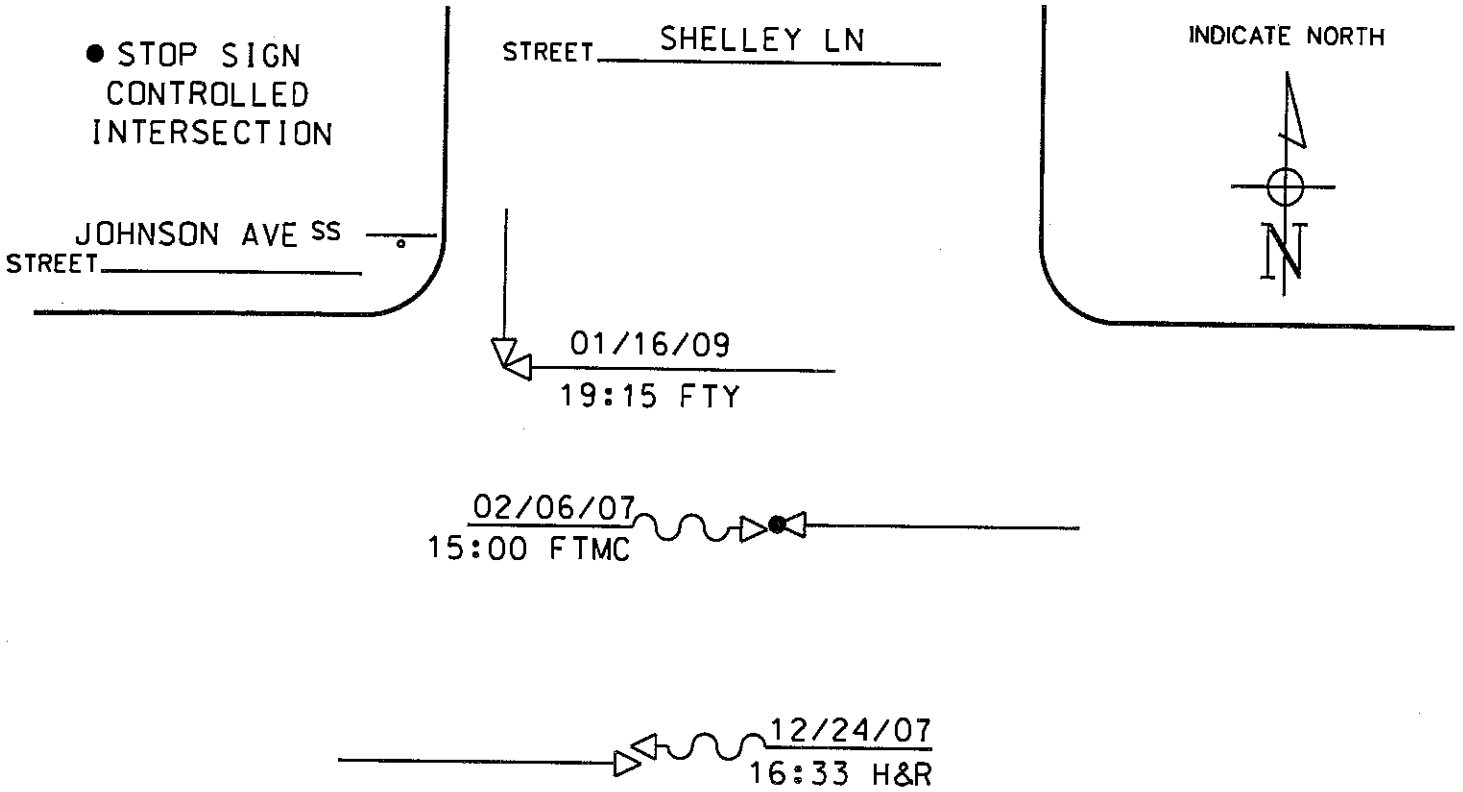
TIME: A=A.M. P=P.M.
PAVEMENT: D=DRY I=ICY W=WET
WEATHER: C=CLEAR F=FOG R=RAIN
S=SNOW SL=SLEET
CL=CLOUDY

CITY OF CEDAR RAPIDS, IOWA
TRAFFIC ENGINEERING DEPARTMENT

COLLISION DIAGRAM

LOCATION JOHNSON AVE & SHELLEY DR/WELLESLEY CT

PERIOD 5 YEAR 2005-2009



LEGEND

- M.V. BACKING
- M.V. MOVING AHEAD
- PEDESTRIAN
- PARKED(ING) VEHICLE
- FIXED OBJECT
- REAR END COLLISION
- SIDE SWIPE
- OUT OF CONTROL VEHICLE
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CITY OF CEDAR RAPIDS, IOWA
TRAFFIC ENGINEERING DEPARTMENT

COLLISION DIAGRAM

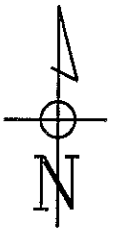
LOCATION JOHNSON AVE AND ROLLINGWOOD DR NW

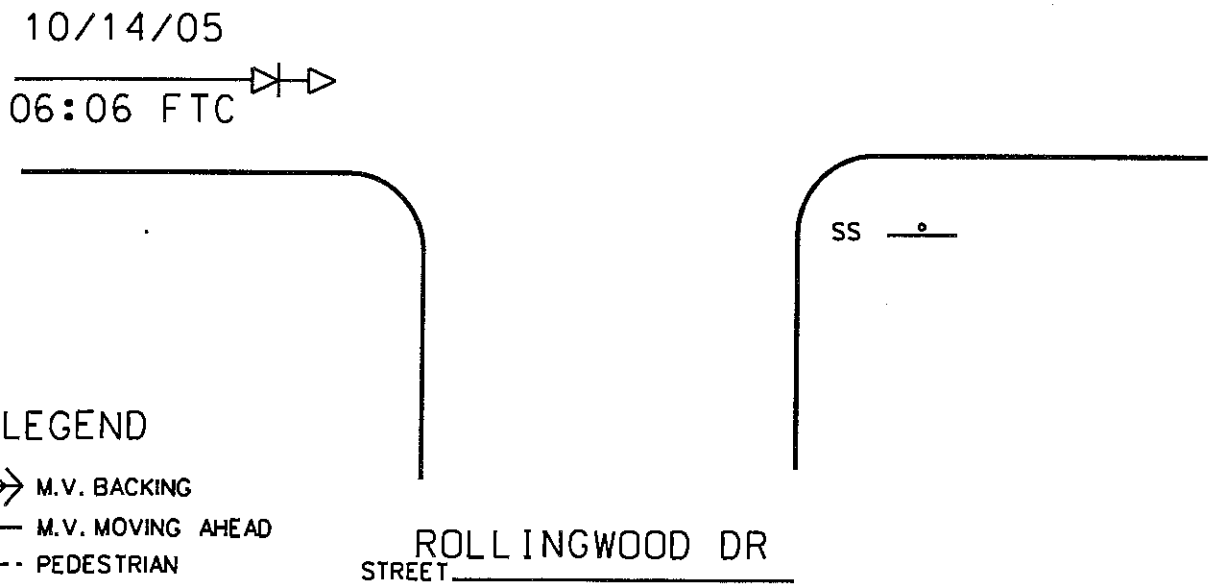
PERIOD 5 YEAR 2005-2009

● STOP SIGN CONTROLLED INTERSECTION

STREET JOHNSON AVE

INDICATE NORTH





LEGEND

- M.V. BACKING
- M.V. MOVING AHEAD
- PEDESTRIAN
- PARKED(ING) VEHICLE
- FIXED OBJECT
- REAR END COLLISION
- SIDE SWIPE
- OUT OF CONTROL VEHICLE
- FATAL ACCIDENT
- PERSONAL INJURY
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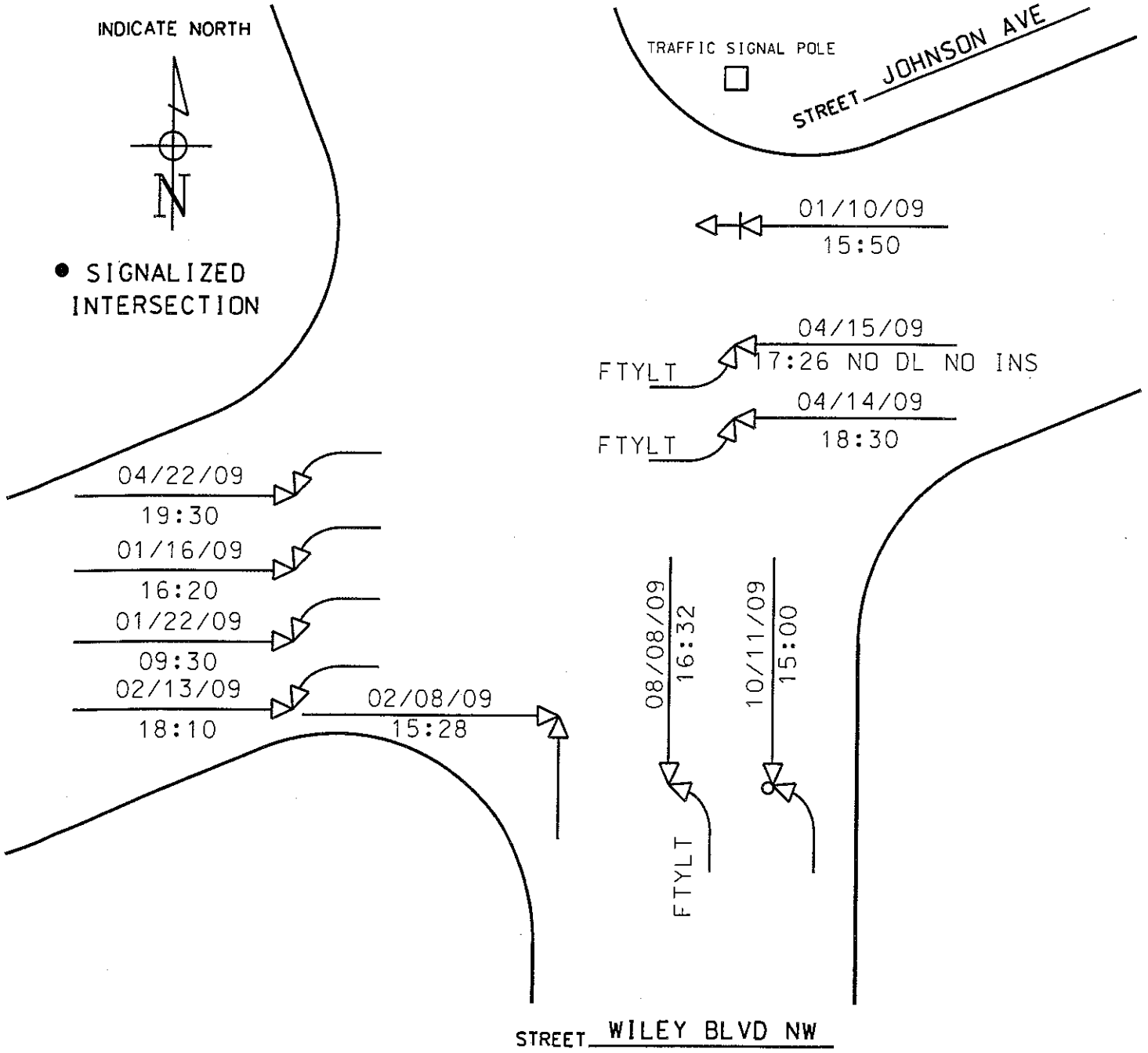
CITY OF CEDAR RAPIDS, IOWA
TRAFFIC ENGINEERING DEPARTMENT

COLLISION DIAGRAM

LOCATION JOHNSON AVE AND WILEY BLVD NW PERIOD 2009



LEGEND

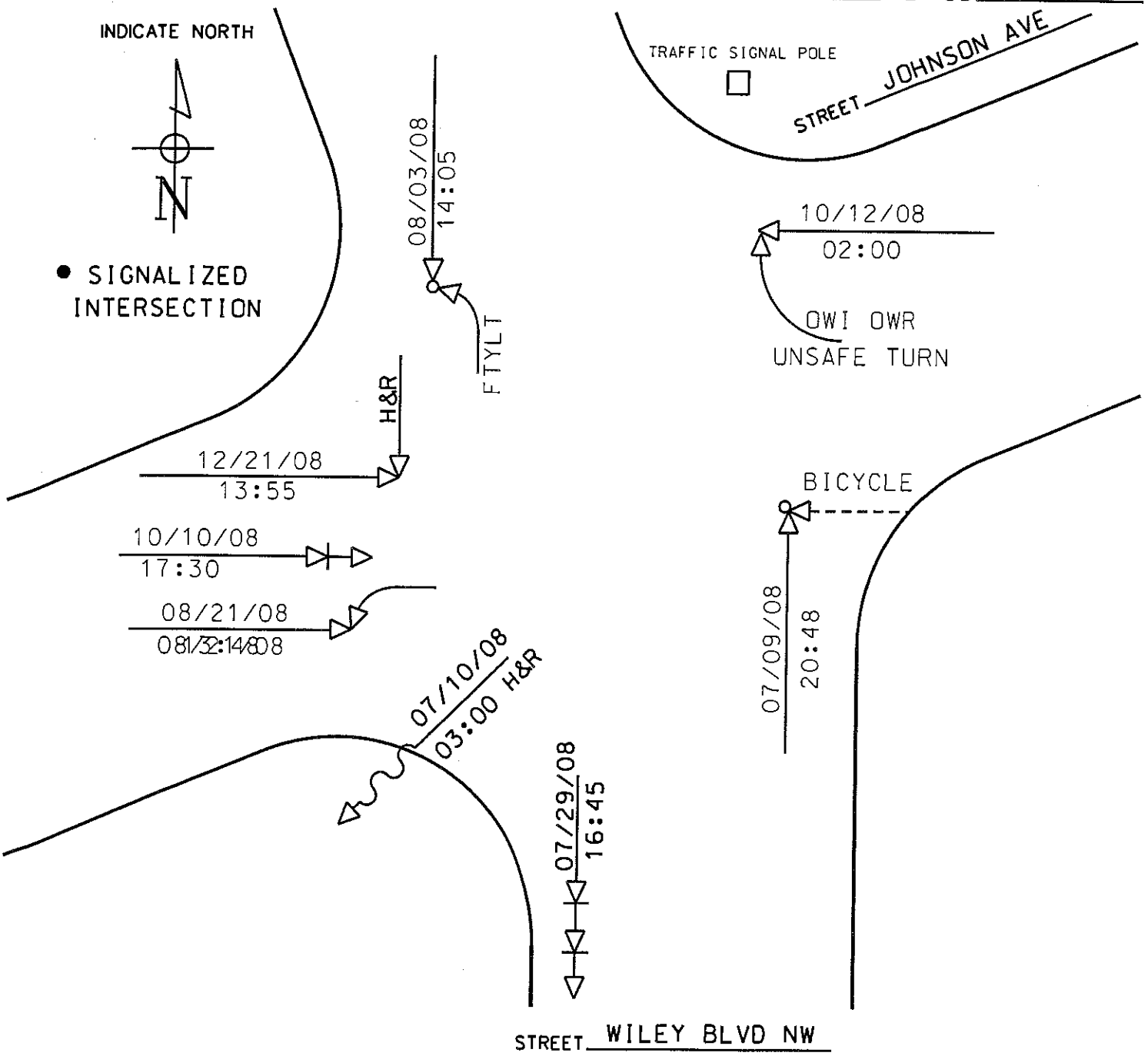
- M.V. BACKING
- M.V. MOVING AHEAD
- PEDESTRIAN
- PARKED(ING) VEHICLE
- FIXED OBJECT
- REAR END COLLISION
- SIDE SWIPE
- OUT OF CONTROL VEHICLE
- FATAL ACCIDENT
- PERSONAL INJURY
- PROPERTY DAMAGE ONLY

TIME: A=A.M. P=P.M.
PAVEMENT: D=DRY I=ICY W=WET
WEATHER: C=CLEAR F=FOG R=RAIN S=SNOW SL=SLEET CL=CLOUDY

CITY OF CEDAR RAPIDS, IOWA
TRAFFIC ENGINEERING DEPARTMENT

COLLISION DIAGRAM

LOCATION JOHNSON AVE AND WILEY BLVD NW PERIOD 2008



LEGEND

- M.V. BACKING
- M.V. MOVING AHEAD
- PEDESTRIAN
- PARKED(ING) VEHICLE
- FIXED OBJECT
- REAR END COLLISION
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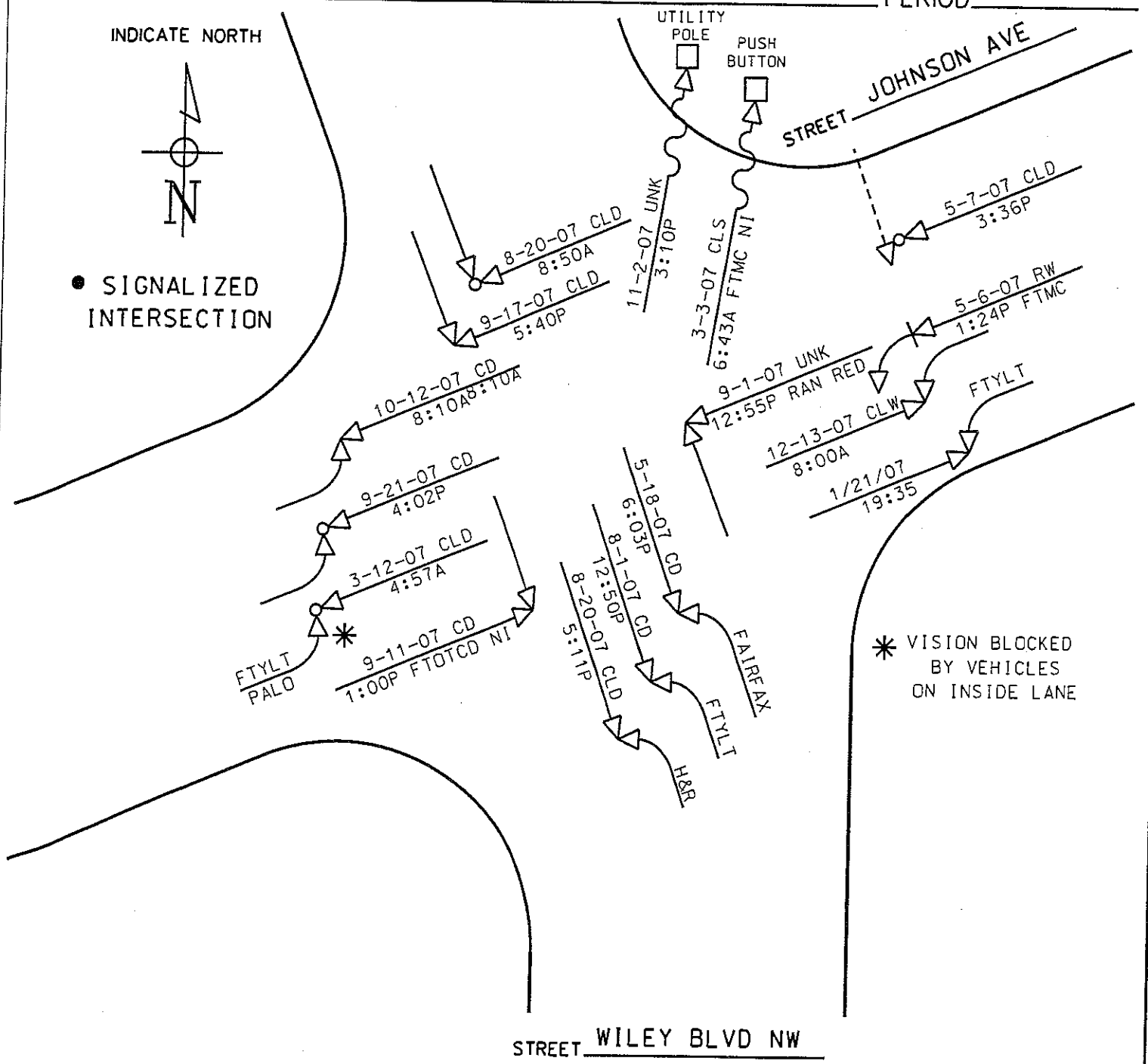
CITY OF CEDAR RAPIDS, IOWA
TRAFFIC ENGINEERING DEPARTMENT

COLLISION DIAGRAM

LOCATION JOHNSON AVE AND WILEY BLVD NW PERIOD 2007



LEGEND

- M.V. BACKING
- M.V. MOVING AHEAD
- PEDESTRIAN
- PARKED(ING) VEHICLE
- FIXED OBJECT
- REAR END COLLISION
- SIDE SWIPE
- OUT OF CONTROL VEHICLE
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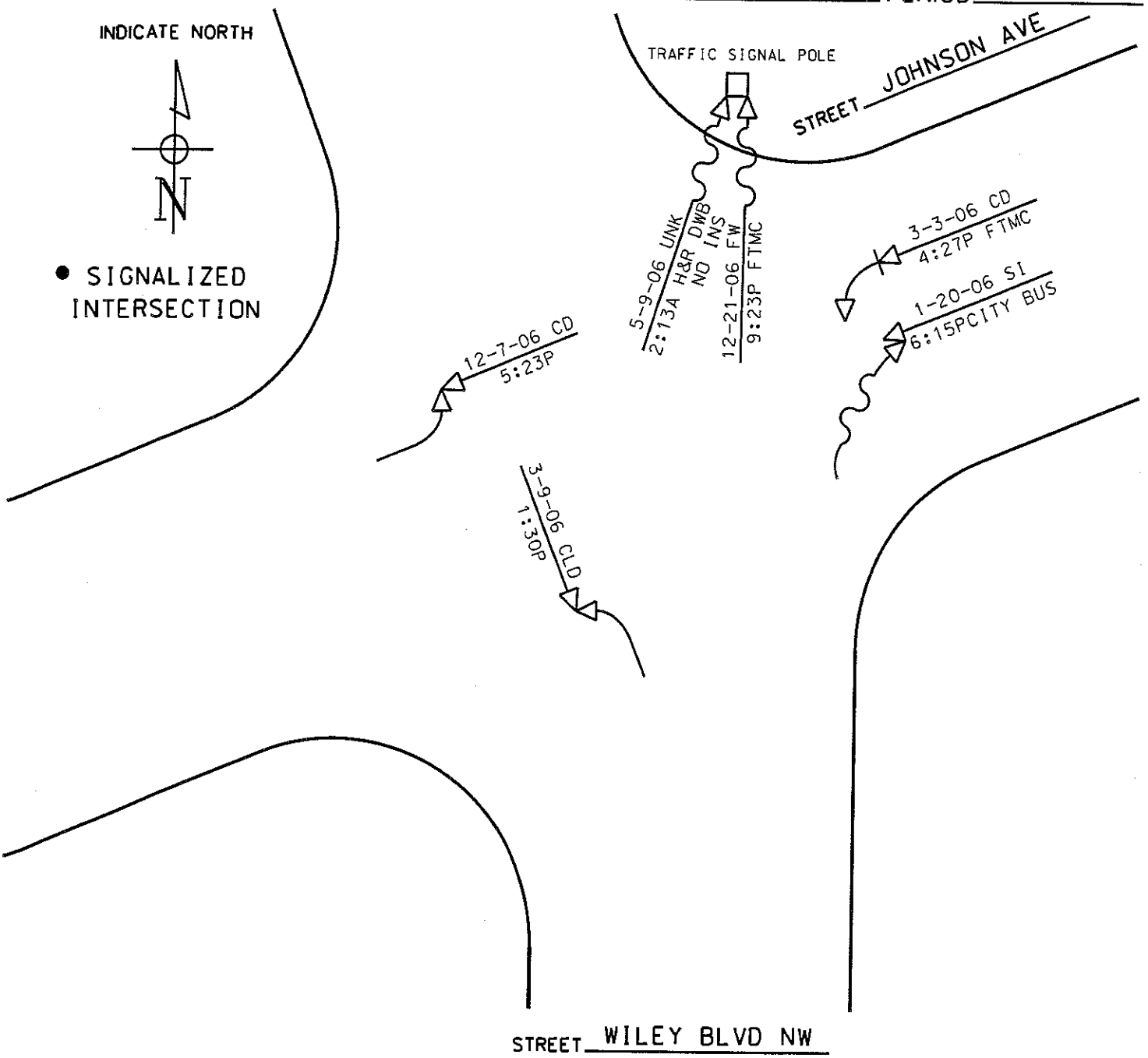
PAVEMENT: D=DRY I=ICY W=WET
WEATHER: C=CLEAR F=FOG R=RAIN S=SNOW SL=SLEET CL=CLOUDY

CITY OF CEDAR RAPIDS, IOWA
TRAFFIC ENGINEERING DEPARTMENT

COLLISION DIAGRAM

LOCATION JOHNSON AVE AND WILEY BLVD NW PERIOD 2006



LEGEND

- M.V. BACKING
- M.V. MOVING AHEAD
- PEDESTRIAN
- PARKED(ING) VEHICLE
- FIXED OBJECT
- REAR END COLLISION
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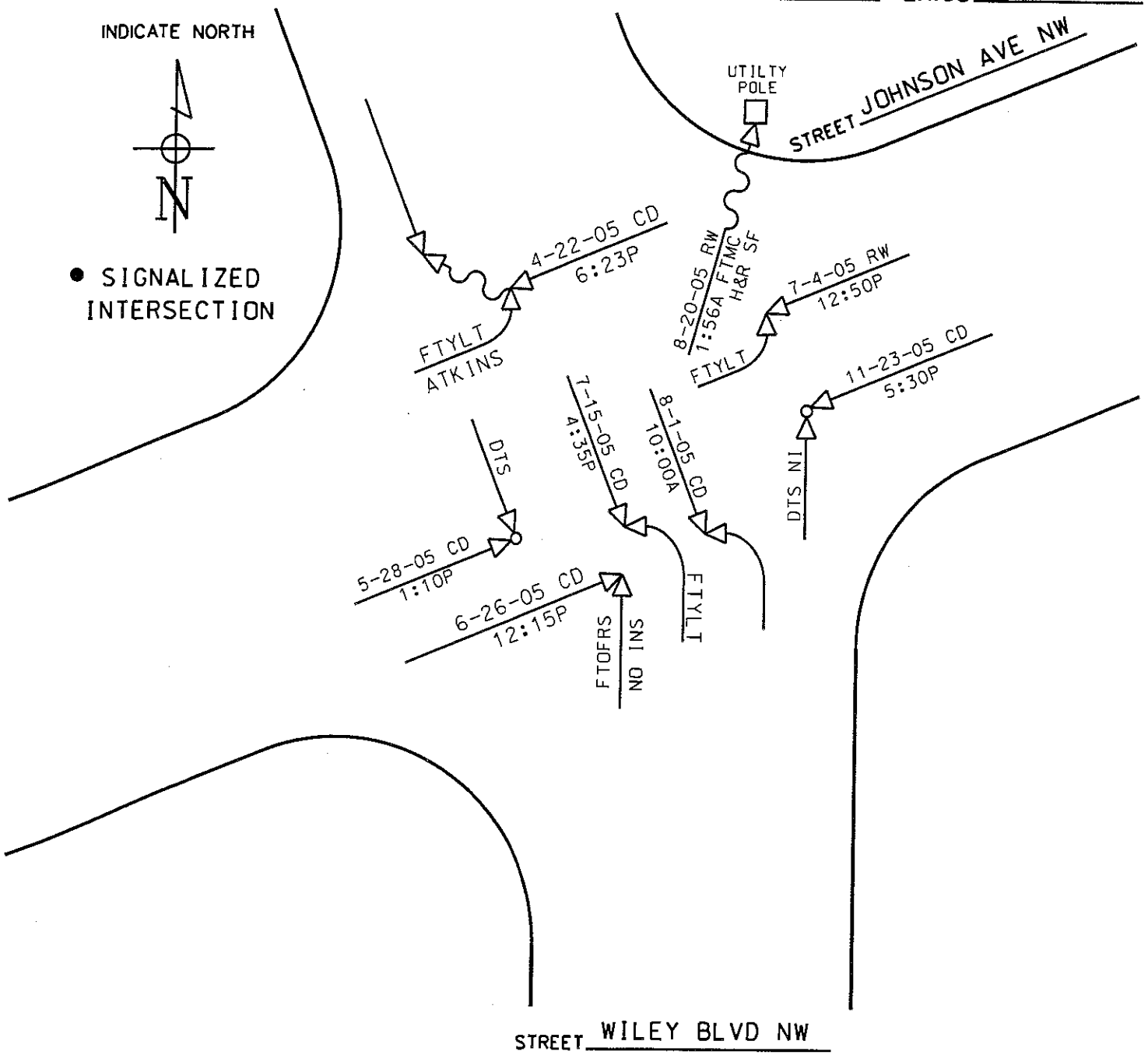
CITY OF CEDAR RAPIDS, IOWA
TRAFFIC ENGINEERING DEPARTMENT

COLLISION DIAGRAM

LOCATION JOHNSON AVE AND WILEY BLVD NW PERIOD 2005



LEGEND

- M.V. BACKING
- M.V. MOVING AHEAD
- PEDESTRIAN
- PARKED(ING) VEHICLE
- FIXED OBJECT
- REAR END COLLISION
- SIDE SWIPE
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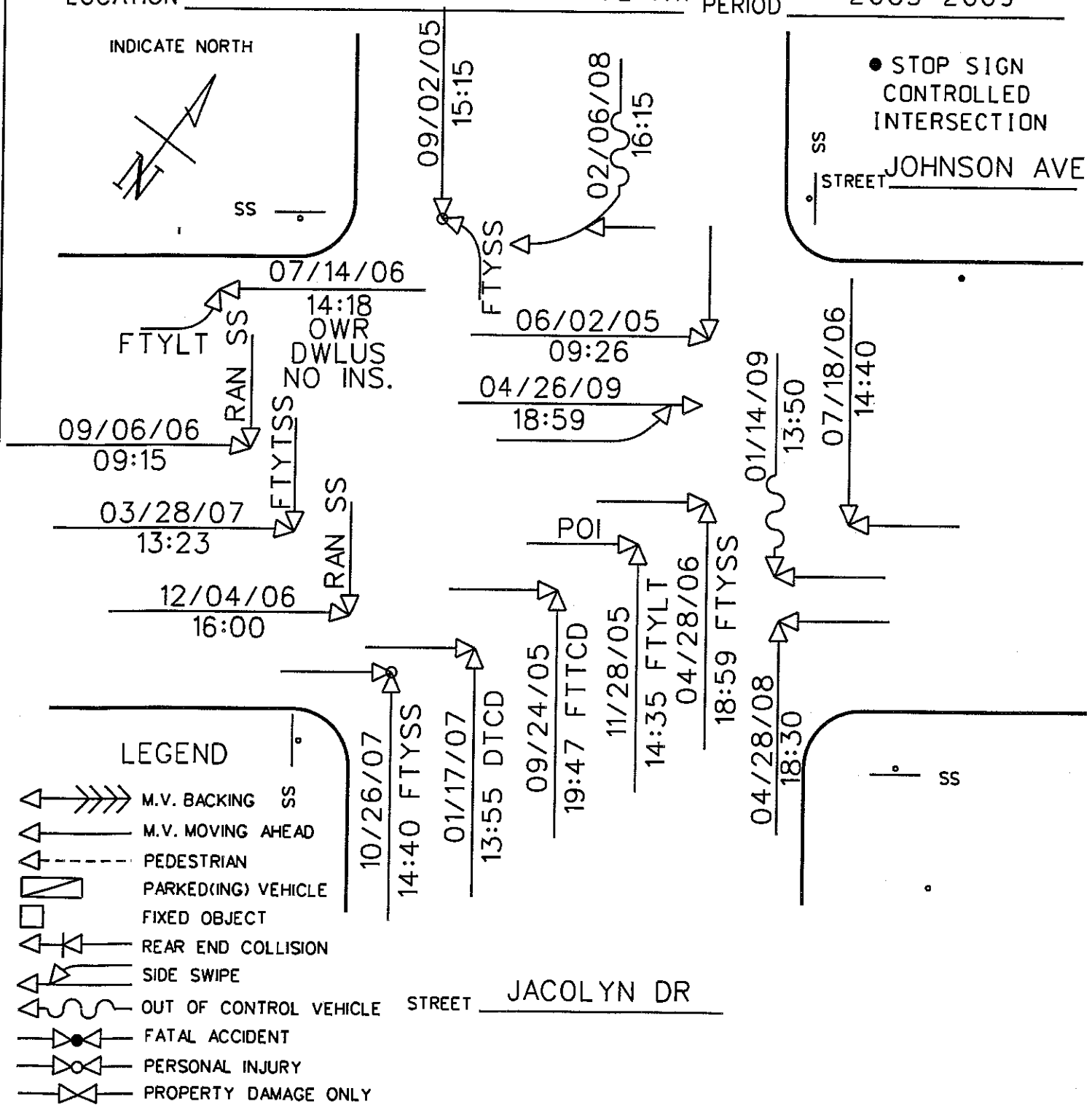
CITY OF CEDAR RAPIDS, IOWA
TRAFFIC ENGINEERING DEPARTMENT

COLLISION DIAGRAM

LOCATION JACOLYN DR & JOHNSON AVE NW PERIOD 2005-2009



TIME: A=A.M. P=P.M.
PAVEMENT: D=DRY I=ICY W=WET
WEATHER: C=CLEAR F=FOG R=RAIN
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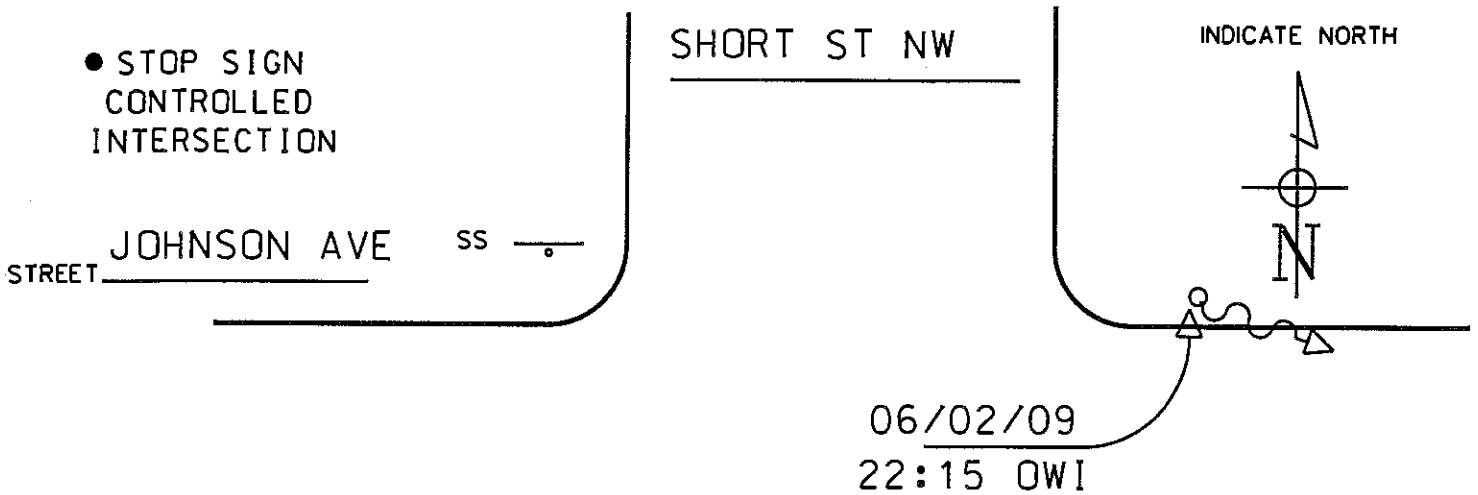
CL=CLOUDY

CITY OF CEDAR RAPIDS, IOWA
TRAFFIC ENGINEERING DEPARTMENT

COLLISION DIAGRAM

LOCATION JOHNSON AVE AND SHORT ST NW

PERIOD 5 YEAR 2005-2009



LEGEND

STREET JOHNSON AVE

- M.V. BACKING
- M.V. MOVING AHEAD
- PEDESTRIAN
- PARKED(ING) VEHICLE
- FIXED OBJECT
- REAR END COLLISION
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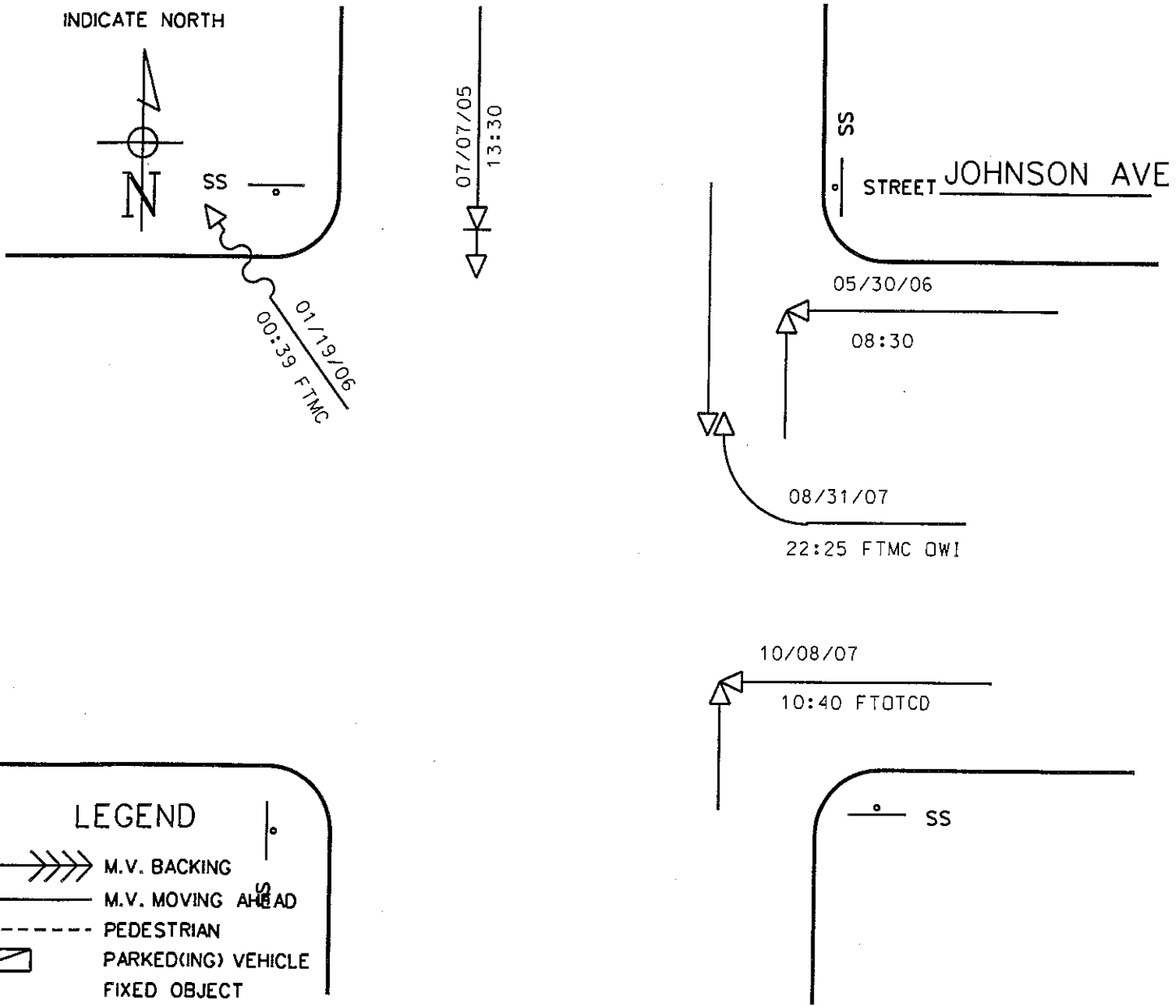
CITY OF CEDAR RAPIDS, IOWA
TRAFFIC ENGINEERING DEPARTMENT

COLLISION DIAGRAM

LOCATION JOHNSON AVE & 1ST AVE W PERIOD 5 YEAR 2005-2009



LEGEND

- M.V. BACKING
- M.V. MOVING AHEAD
- PEDESTRIAN
- PARKED(ING) VEHICLE
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- REAR END COLLISION
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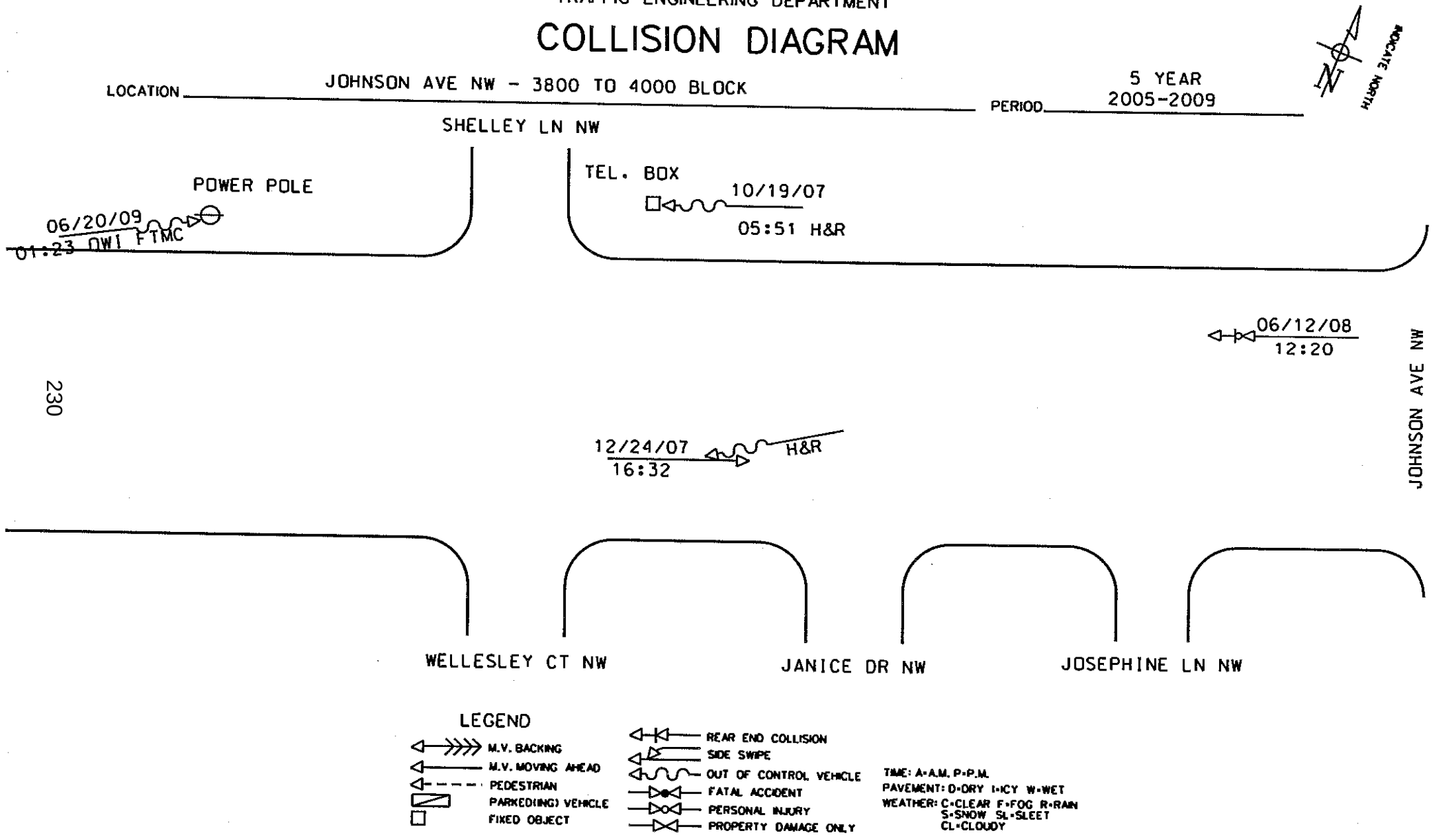
CITY OF CEDAR RAPIDS, IOWA
TRAFFIC ENGINEERING DEPARTMENT

COLLISION DIAGRAM

LOCATION JOHNSON AVE NW - 3800 TO 4000 BLOCK

PERIOD 5 YEAR 2005-2009



J

Nu-Metrics Traffic Analyzer Study
Computer Generated Summary Report
City: CEDAR RAPIDS
Street: JOHNSON AVE WEST OF WILEY BLVD
Location: Added: 3, 7

A study of vehicle traffic was conducted with HI-STAR unit number 3392. The study was done in the EB BOTH lane at JOHNSON AVE WEST OF WILEY BLVD in CEDAR RAPIDS, IA in LINN county. The study began on May/08/08 at 00:00 and concluded on May/09/08 at 00:00, lasting a total of 24.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 4810 vehicles passed through the location with a peak volume of 140 on May/08/08 at [07:30-07:45] and a minimum volume of 1 on May/08/08 at [01:15-01:30]. The AADT count for this study was 4,281.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 20 - 25 MPH range or lower. The average speed for all classifed vehicles was 26 MPH with 13.59% vehicles exceeding the posted speed of 30 MPH. The HI-STAR found 0.07 percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 20MPH and the 85th percentile was 34.55 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >					
0	198	618	1265	1056	702	445	130	18	5	3	2	1	0	0					

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin.

Most of the vehicles classified during the study were Vans & Pickups. The number of Passenger Vehicles in the study was 0 which represents 0 percent of the total classified vehicles. The number of Vans & Pickups in the study was 4329 which represents 97 percent of the total classified vehicles. The number of Busses & Trucks in the study was 57 which represents 1 percent of the total classified vehicles. The number of Tractor Tailers in the study was 57 which represents 0 percent of the total classified vehicles.

< to 20	21 to 27	28 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80 to >												
4329	57	46	9	2	0	0	0												

CHART 2

HEADWAY

During the peak traffic period, on May/08/08 at [07:30-07:45] the average headway between vehicles was 6.383 seconds. During the slowest traffic period, on May/08/08 at [01:15-01:30] the average headway between vehicles was 450 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 52.00 and 108.00 degrees F. The HI-STAR determined that the roadway surface was Dry 100.00% of the time.

J

[Raw] Volume Report

Added: 5, 6

HI-Star ID: 3614
Street: JOHNSON AVE WEST OF JACOLYI
State: IA
City: CEDAR RAPIDS
County: LINN

Begin: Oct/30/08 00:00
Lane: WB BOTH
Oper: CAL
Posted: 35
AADT Factor: 0.9

End: Oct/31/08 00:00
Hours: 24.00
Period: 15
Raw Count: 4556
AADT Count: 4,100

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Thu,Oct/30/08						
[00:00-00:15]	10	29 MPH	46 F	Dry		0
[00:15-00:30]	9	33 MPH	46 F	Dry		0
[00:30-00:45]	5	33 MPH	46 F	Dry		0
[00:45-01:00]	10	35 MPH	46 F	Dry		0
[01:00-01:15]	7	32 MPH	46 F	Dry		0
[01:15-01:30]	6	35 MPH	46 F	Dry		0
[01:30-01:45]	2	33 MPH	46 F	Dry		0
[01:45-02:00]	5	28 MPH	46 F	Dry		0
[02:00-02:15]	5	36 MPH	45 F	Dry		0
[02:15-02:30]	2	25 MPH	45 F	Dry		0
[02:30-02:45]	4	35 MPH	44 F	Dry		0
[02:45-03:00]	2	38 MPH	44 F	Dry		0
[03:00-03:15]	3	37 MPH	44 F	Dry		0
[03:15-03:30]	2	25 MPH	44 F	Dry		0
[03:30-03:45]	2	30 MPH	44 F	Dry		0
[03:45-04:00]	2	33 MPH	44 F	Dry		0
[04:00-04:15]	2	27 MPH	44 F	Dry		0
[04:15-04:30]	2	20 MPH	44 F	Dry		0
[04:30-04:45]	0	0 MPH	44 F	Dry		0
[04:45-05:00]	3	37 MPH	44 F	Dry		0
[05:00-05:15]	2	38 MPH	44 F	Dry		0
[05:15-05:30]	4	35 MPH	44 F	Dry		0
[05:30-05:45]	8	36 MPH	44 F	Dry		0
[05:45-06:00]	9	29 MPH	44 F	Dry		0
[06:00-06:15]	5	31 MPH	43 F	Dry		0
[06:15-06:30]	22	28 MPH	43 F	Dry		0
[06:30-06:45]	21	28 MPH	42 F	Dry		0
[06:45-07:00]	28	30 MPH	42 F	Dry		0
[07:00-07:15]	55	32 MPH	42 F	Dry		0
[07:15-07:30]	44	31 MPH	42 F	Dry		0
[07:30-07:45]	57	32 MPH	42 F	Dry		0
[07:45-08:00]	59	31 MPH	44 F	Dry		0
[08:00-08:15]	66	30 MPH	44 F	Dry		1
[08:15-08:30]	48	30 MPH	46 F	Dry		0
[08:30-08:45]	58	32 MPH	48 F	Dry		2
[08:45-09:00]	68	30 MPH	49 F	Dry		1
[09:00-09:15]	64	31 MPH	50 F	Dry		0
[09:15-09:30]	53	30 MPH	52 F	Dry		0
[09:30-09:45]	54	30 MPH	52 F	Dry		0
[09:45-10:00]	41	29 MPH	54 F	Dry		0

J

[Raw] Volume Report

Added: 5, 6

HI-Star ID: 3614
Street: JOHNSON AVE WEST OF JACOLYI
State: IA
City: CEDAR RAPIDS
County: LINN

Begin: Oct/30/08 00:00
Lane: WB BOTH
Oper: CAL
Posted: 35
AADT Factor: 0.9

End: Oct/31/08 00:00
Hours: 24.00
Period: 15
Raw Count: 4556
AADT Count: 4,100

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Thu,Oct/30/08						
[10:00-10:15]	60	30 MPH	56 F	Dry		1
[10:15-10:30]	53	31 MPH	59 F	Dry		1
[10:30-10:45]	63	31 MPH	61 F	Dry		0
[10:45-11:00]	54	31 MPH	63 F	Dry		0
[11:00-11:15]	56	30 MPH	65 F	Dry		1
[11:15-11:30]	61	30 MPH	67 F	Dry		4
[11:30-11:45]	65	31 MPH	69 F	Dry		0
[11:45-12:00]	61	32 MPH	71 F	Dry		0
[12:00-12:15]	59	32 MPH	73 F	Dry		0
[12:15-12:30]	64	32 MPH	75 F	Dry		1
[12:30-12:45]	54	31 MPH	76 F	Dry		0
[12:45-13:00]	56	30 MPH	76 F	Dry		0
[13:00-13:15]	72	32 MPH	77 F	Dry		1
[13:15-13:30]	71	30 MPH	77 F	Dry		1
[13:30-13:45]	64	31 MPH	78 F	Dry		1
[13:45-14:00]	66	32 MPH	79 F	Dry		1
[14:00-14:15]	70	30 MPH	79 F	Dry		0
[14:15-14:30]	58	31 MPH	79 F	Dry		0
[14:30-14:45]	81	31 MPH	79 F	Dry		1
[14:45-15:00]	79	32 MPH	79 F	Dry		1
[15:00-15:15]	92	31 MPH	78 F	Dry		1
[15:15-15:30]	85	33 MPH	77 F	Dry		1
[15:30-15:45]	96	31 MPH	77 F	Dry		1
[15:45-16:00]	137	31 MPH	76 F	Dry		1
[16:00-16:15]	94	32 MPH	76 F	Dry		1
[16:15-16:30]	99	31 MPH	76 F	Dry		1
[16:30-16:45]	97	32 MPH	75 F	Dry		1
[16:45-17:00]	129	32 MPH	73 F	Dry		2
[17:00-17:15]	139	30 MPH	72 F	Dry		2
[17:15-17:30]	119	33 MPH	70 F	Dry		1
[17:30-17:45]	97	30 MPH	68 F	Dry		1
[17:45-18:00]	115	30 MPH	67 F	Dry		1
[18:00-18:15]	113	30 MPH	66 F	Dry		1
[18:15-18:30]	82	31 MPH	65 F	Dry		1
[18:30-18:45]	107	30 MPH	64 F	Dry		1
[18:45-19:00]	83	30 MPH	63 F	Dry		1
[19:00-19:15]	62	32 MPH	62 F	Dry		1
[19:15-19:30]	53	31 MPH	62 F	Dry		0
[19:30-19:45]	66	31 MPH	61 F	Dry		0
[19:45-20:00]	64	32 MPH	60 F	Dry		1

J

[Raw] Volume Report

Added: 5, 6

HI-Star ID: 3614
Street: JOHNSON AVE WEST OF JACOLY
State: IA
City: CEDAR RAPIDS
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Begin: Oct/30/08 00:00
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Oper: CAL
Posted: 35
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End: Oct/31/08 00:00
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[20:00-20:15]	61	33 MPH	60 F	Dry		0
[20:15-20:30]	71	31 MPH	59 F	Dry		1
[20:30-20:45]	39	33 MPH	58 F	Dry		0
[20:45-21:00]	44	32 MPH	58 F	Dry		0
[21:00-21:15]	43	33 MPH	58 F	Dry		0
[21:15-21:30]	43	35 MPH	57 F	Dry		0
[21:30-21:45]	37	32 MPH	57 F	Dry		0
[21:45-22:00]	33	35 MPH	56 F	Dry		0
[22:00-22:15]	33	35 MPH	56 F	Dry		0
[22:15-22:30]	26	34 MPH	56 F	Dry		0
[22:30-22:45]	15	34 MPH	56 F	Dry		0
[22:45-23:00]	19	32 MPH	56 F	Dry		0
[23:00-23:15]	12	29 MPH	55 F	Dry		0
[23:15-23:30]	11	38 MPH	54 F	Dry		0
[23:30-23:45]	11	30 MPH	54 F	Dry		0
[23:45-00:00]	13	30 MPH	54 F	Dry		0
	4556	31 MPH	58 F			

J

Nu-Metrics Traffic Analyzer Study
Computer Generated Summary Report
City: CEDAR RAPIDS
Street: JOHNSON AVE WEST OF JACOLYN DR
Location: Added: 5, 6

A study of vehicle traffic was conducted with HI-STAR unit number 3614. The study was done in the WB BOTH lane at JOHNSON AVE WEST OF JACOLYN DR in CEDAR RAPIDS, IA in LINN county. The study began on Oct/30/08 at 00:00 and concluded on Oct/31/08 at 00:00, lasting a total of 24.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 4556 vehicles passed through the location with a peak volume of 139 on Oct/30/08 at [17:00-17:15] and a minimum volume of 0 on Oct/30/08 at [04:30-04:45]. The AADT count for this study was 4,100.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 30 - 35 MPH range or lower. The average speed for all classifed vehicles was 31 MPH with 7.05% vehicles exceeding the posted speed of 35 MPH. The HI-STAR found 0.13 percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 30MPH and the 85th percentile was 38.31 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >					
0	41	359	502	735	1520	1074	248	52	11	4	3	3	0	0					

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin.

Most of the vehicles classified during the study were Vans & Pickups. The number of Passenger Vehicles in the study was 0 which represents 0 percent of the total classified vehicles. The number of Vans & Pickups in the study was 4429 which represents 97 percent of the total classified vehicles. The number of Busses & Trucks in the study was 85 which represents 2 percent of the total classified vehicles. The number of Tractor Tailers in the study was 38 which represents 0 percent of the total classified vehicles.

< to 20	21 to 27	28 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80 to >												
4429	85	31	4	3	0	0	0												

CHART 2

HEADWAY

During the peak traffic period, on Oct/30/08 at [17:00-17:15] the average headway between vehicles was 6.429 seconds. During the slowest traffic period, on Oct/30/08 at [04:30-04:45] the average headway between vehicles was 900 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 42.00 and 79.00 degrees F. The HI-STAR determined that the roadway surface was Dry 100.00% of the time.

J

[Raw] Volume Report

Added: 7, 8

HI-Star ID: 3408
Street: JOHNSON AVE WEST OF JACOLY
State: IA
City: CEDAR RAPIDS
County: LINN

Begin: Oct/30/08 00:00
Lane: EB BOTH
Oper: CAL
Posted: 35
AADT Factor: 0.9

End: Oct/31/08 00:00
Hours: 24.00
Period: 15
Raw Count: 4418
AADT Count: 3,976

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Thu,Oct/30/08						
[00:00-00:15]	3	29 MPH	44 F	Dry		0
[00:15-00:30]	4	34 MPH	44 F	Dry		0
[00:30-00:45]	9	32 MPH	44 F	Dry		0
[00:45-01:00]	7	35 MPH	44 F	Dry		0
[01:00-01:15]	6	38 MPH	44 F	Dry		0
[01:15-01:30]	0	0 MPH	43 F	Dry		0
[01:30-01:45]	1	32 MPH	43 F	Dry		0
[01:45-02:00]	7	37 MPH	43 F	Dry		0
[02:00-02:15]	5	32 MPH	43 F	Dry		0
[02:15-02:30]	1	38 MPH	43 F	Dry		0
[02:30-02:45]	0	0 MPH	43 F	Dry		0
[02:45-03:00]	1	42 MPH	42 F	Dry		0
[03:00-03:15]	0	0 MPH	42 F	Dry		0
[03:15-03:30]	1	38 MPH	42 F	Dry		0
[03:30-03:45]	2	35 MPH	42 F	Dry		0
[03:45-04:00]	4	24 MPH	42 F	Dry		0
[04:00-04:15]	0	0 MPH	42 F	Dry		0
[04:15-04:30]	1	18 MPH	42 F	Dry		0
[04:30-04:45]	5	36 MPH	42 F	Dry		0
[04:45-05:00]	6	37 MPH	42 F	Dry		0
[05:00-05:15]	7	37 MPH	42 F	Dry		0
[05:15-05:30]	14	35 MPH	42 F	Dry		0
[05:30-05:45]	15	27 MPH	42 F	Dry		0
[05:45-06:00]	16	34 MPH	42 F	Dry		0
[06:00-06:15]	28	31 MPH	42 F	Dry		0
[06:15-06:30]	39	34 MPH	42 F	Dry		4
[06:30-06:45]	48	33 MPH	42 F	Dry		0
[06:45-07:00]	62	32 MPH	42 F	Dry		1
[07:00-07:15]	80	33 MPH	42 F	Dry		1
[07:15-07:30]	90	32 MPH	42 F	Dry		1
[07:30-07:45]	127	35 MPH	42 F	Dry		1
[07:45-08:00]	97	33 MPH	42 F	Dry		1
[08:00-08:15]	55	34 MPH	42 F	Dry		0
[08:15-08:30]	70	32 MPH	44 F	Dry		1
[08:30-08:45]	76	32 MPH	46 F	Dry		1
[08:45-09:00]	94	33 MPH	48 F	Dry		1
[09:00-09:15]	69	31 MPH	50 F	Dry		0
[09:15-09:30]	60	29 MPH	51 F	Dry		1
[09:30-09:45]	57	29 MPH	52 F	Dry		0
[09:45-10:00]	70	30 MPH	54 F	Dry		1

J

[Raw] Volume Report

Added: 7, 8

HI-Star ID: 3408
Street: JOHNSON AVE WEST OF JACOLY
State: IA
City: CEDAR RAPIDS
County: LINN

Begin: Oct/30/08 00:00
Lane: EB BOTH
Oper: CAL
Posted: 35
AADT Factor: 0.9

End: Oct/31/08 00:00
Hours: 24.00
Period: 15
Raw Count: 4418
AADT Count: 3,976

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Thu,Oct/30/08						
[10:00-10:15]	53	29 MPH	58 F	Dry		0
[10:15-10:30]	69	30 MPH	60 F	Dry		1
[10:30-10:45]	58	30 MPH	62 F	Dry		0
[10:45-11:00]	59	31 MPH	64 F	Dry		1
[11:00-11:15]	59	31 MPH	67 F	Dry		0
[11:15-11:30]	68	30 MPH	69 F	Dry		1
[11:30-11:45]	65	30 MPH	72 F	Dry		1
[11:45-12:00]	68	32 MPH	72 F	Dry		1
[12:00-12:15]	66	30 MPH	76 F	Dry		1
[12:15-12:30]	61	29 MPH	76 F	Dry		1
[12:30-12:45]	51	31 MPH	76 F	Dry		0
[12:45-13:00]	66	29 MPH	78 F	Dry		0
[13:00-13:15]	59	30 MPH	78 F	Dry		0
[13:15-13:30]	78	29 MPH	79 F	Dry		1
[13:30-13:45]	64	30 MPH	80 F	Dry		0
[13:45-14:00]	71	32 MPH	80 F	Dry		0
[14:00-14:15]	59	30 MPH	80 F	Dry		7
[14:15-14:30]	59	31 MPH	80 F	Dry		0
[14:30-14:45]	74	30 MPH	80 F	Dry		1
[14:45-15:00]	56	31 MPH	80 F	Dry		0
[15:00-15:15]	71	32 MPH	80 F	Dry		1
[15:15-15:30]	96	31 MPH	78 F	Dry		1
[15:30-15:45]	93	30 MPH	78 F	Dry		1
[15:45-16:00]	97	31 MPH	76 F	Dry		1
[16:00-16:15]	72	31 MPH	76 F	Dry		1
[16:15-16:30]	100	28 MPH	76 F	Dry		1
[16:30-16:45]	91	29 MPH	74 F	Dry		1
[16:45-17:00]	93	30 MPH	72 F	Dry		1
[17:00-17:15]	102	31 MPH	71 F	Dry		1
[17:15-17:30]	86	31 MPH	69 F	Dry		1
[17:30-17:45]	97	29 MPH	67 F	Dry		1
[17:45-18:00]	85	30 MPH	65 F	Dry		1
[18:00-18:15]	97	30 MPH	64 F	Dry		1
[18:15-18:30]	82	30 MPH	63 F	Dry		1
[18:30-18:45]	65	28 MPH	62 F	Dry		1
[18:45-19:00]	58	28 MPH	61 F	Dry		1
[19:00-19:15]	51	31 MPH	59 F	Dry		0
[19:15-19:30]	37	31 MPH	59 F	Dry		0
[19:30-19:45]	54	31 MPH	58 F	Dry		1
[19:45-20:00]	46	29 MPH	57 F	Dry		0

J

[Raw] Volume Report

Added: 7, 8

HI-Star ID: 3408	Begin: Oct/30/08 00:00	End: Oct/31/08 00:00
Street: JOHNSON AVE WEST OF JACOLY	Lane: EB BOTH	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 35	Raw Count: 4418
County: LINN	AADT Factor: 0.9	AADT Count: 3,976

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Thu,Oct/30/08						
[20:00-20:15]	39	29 MPH	57 F	Dry		0
[20:15-20:30]	32	30 MPH	57 F	Dry		0
[20:30-20:45]	35	31 MPH	56 F	Dry		0
[20:45-21:00]	29	31 MPH	56 F	Dry		0
[21:00-21:15]	25	32 MPH	55 F	Dry		0
[21:15-21:30]	24	30 MPH	55 F	Dry		0
[21:30-21:45]	33	31 MPH	55 F	Dry		0
[21:45-22:00]	18	30 MPH	55 F	Dry		0
[22:00-22:15]	21	28 MPH	54 F	Dry		0
[22:15-22:30]	23	31 MPH	54 F	Dry		0
[22:30-22:45]	20	28 MPH	53 F	Dry		0
[22:45-23:00]	9	32 MPH	53 F	Dry		0
[23:00-23:15]	8	31 MPH	53 F	Dry		0
[23:15-23:30]	9	34 MPH	52 F	Dry		0
[23:30-23:45]	13	31 MPH	52 F	Dry		0
[23:45-00:00]	7	32 MPH	52 F	Dry		0
	4418	31 MPH	57 F			

J

Nu-Metrics Traffic Analyzer Study
Computer Generated Summary Report
City: CEDAR RAPIDS
Street: JOHNSON AVE WEST OF JACOLYND DR
Location: Added: 7, 8

A study of vehicle traffic was conducted with HI-STAR unit number 3408. The study was done in the EB BOTH lane at JOHNSON AVE WEST OF JACOLYND DR in CEDAR RAPIDS, IA in LINN county. The study began on Oct/30/08 at 00:00 and concluded on Oct/31/08 at 00:00, lasting a total of 24.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 4418 vehicles passed through the location with a peak volume of 127 on Oct/30/08 at [07:30-07:45] and a minimum volume of 0 on Oct/30/08 at [01:15-01:30]. The AADT count for this study was 3,976.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 30 - 35 MPH range or lower. The average speed for all classifed vehicles was 31 MPH with 6.07% vehicles exceeding the posted speed of 35 MPH. The HI-STAR found 0.09 percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 30MPH and the 85th percentile was 38.09 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >					
0	87	450	418	671	1488	1033	223	31	8	2	0	1	0	3					

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin.

Most of the vehicles classified during the study were Vans & Pickups. The number of Passenger Vehicles in the study was 0 which represents 0 percent of the total classified vehicles. The number of Vans & Pickups in the study was 4314 which represents 98 percent of the total classified vehicles. The number of Busses & Trucks in the study was 62 which represents 1 percent of the total classified vehicles. The number of Tractor Tailers in the study was 39 which represents 0 percent of the total classified vehicles.

< to 20	21 to 27	28 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80 to >												
4314	62	32	5	2	0	0	0												

CHART 2

HEADWAY

During the peak traffic period, on Oct/30/08 at [07:30-07:45] the average headway between vehicles was 7.031 seconds. During the slowest traffic period, on Oct/30/08 at [01:15-01:30] the average headway between vehicles was 900 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 42.00 and 80.00 degrees F. The HI-STAR determined that the roadway surface was Dry 100.00% of the time.

J

[Raw] Volume Report

Added: 1, 12

HI-Star ID: 3413
Street: JOHNSON AVE EAST OF WILEY BI
State: IA
City: CEDAR RAPIDS
County: LINN

Begin: May/08/08 00:00
Lane: WB BOTH
Oper: CAL
Posted: 30
AADT Factor: 0.89

End: May/09/08 00:00
Hours: 24.00
Period: 15
Raw Count: 5444
AADT Count: 4,845

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Thu,May/08/08						
[00:00-00:15]	11	32 MPH	62 F	Dry		0
[00:15-00:30]	10	30 MPH	62 F	Dry		0
[00:30-00:45]	14	34 MPH	61 F	Dry		0
[00:45-01:00]	7	34 MPH	61 F	Dry		0
[01:00-01:15]	8	33 MPH	61 F	Dry		0
[01:15-01:30]	5	32 MPH	60 F	Dry		0
[01:30-01:45]	9	33 MPH	59 F	Dry		0
[01:45-02:00]	5	33 MPH	59 F	Dry		0
[02:00-02:15]	7	36 MPH	58 F	Dry		0
[02:15-02:30]	4	32 MPH	58 F	Dry		0
[02:30-02:45]	3	26 MPH	58 F	Dry		0
[02:45-03:00]	0	0 MPH	57 F	Dry		0
[03:00-03:15]	0	0 MPH	56 F	Dry		0
[03:15-03:30]	2	35 MPH	56 F	Dry		0
[03:30-03:45]	6	30 MPH	56 F	Dry		0
[03:45-04:00]	1	28 MPH	56 F	Dry		0
[04:00-04:15]	0	0 MPH	56 F	Dry		0
[04:15-04:30]	4	35 MPH	55 F	Dry		0
[04:30-04:45]	4	38 MPH	55 F	Dry		0
[04:45-05:00]	2	22 MPH	55 F	Dry		0
[05:00-05:15]	0	0 MPH	54 F	Dry		0
[05:15-05:30]	4	33 MPH	54 F	Dry		0
[05:30-05:45]	10	31 MPH	54 F	Dry		0
[05:45-06:00]	17	31 MPH	54 F	Dry		0
[06:00-06:15]	16	29 MPH	54 F	Dry		0
[06:15-06:30]	20	25 MPH	54 F	Dry		0
[06:30-06:45]	31	26 MPH	54 F	Dry		0
[06:45-07:00]	41	23 MPH	54 F	Dry		2
[07:00-07:15]	52	24 MPH	56 F	Dry		1
[07:15-07:30]	62	21 MPH	58 F	Dry		5
[07:30-07:45]	63	25 MPH	59 F	Dry		5
[07:45-08:00]	72	22 MPH	64 F	Dry		5
[08:00-08:15]	64	22 MPH	66 F	Dry		2
[08:15-08:30]	62	22 MPH	67 F	Dry		2
[08:30-08:45]	79	20 MPH	69 F	Dry		5
[08:45-09:00]	93	21 MPH	71 F	Dry		3
[09:00-09:15]	76	23 MPH	73 F	Dry		3
[09:15-09:30]	70	23 MPH	74 F	Dry		2
[09:30-09:45]	70	22 MPH	77 F	Dry		4
[09:45-10:00]	59	26 MPH	81 F	Dry		3

J

[Raw] Volume Report

Added: 1, 12

HI-Star ID: 3413
Street: JOHNSON AVE EAST OF WILEY BI
State: IA
City: CEDAR RAPIDS
County: LINN

Begin: May/08/08 00:00
Lane: WB BOTH
Oper: CAL
Posted: 30
AADT Factor: 0.89

End: May/09/08 00:00
Hours: 24.00
Period: 15
Raw Count: 5444
AADT Count: 4,845

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Thu,May/08/08						
[10:00-10:15]	64	25 MPH	83 F	Dry		2
[10:15-10:30]	71	25 MPH	85 F	Dry		1
[10:30-10:45]	47	22 MPH	88 F	Dry		1
[10:45-11:00]	70	23 MPH	90 F	Dry		2
[11:00-11:15]	80	23 MPH	90 F	Dry		17
[11:15-11:30]	77	23 MPH	92 F	Dry		3
[11:30-11:45]	70	23 MPH	94 F	Dry		2
[11:45-12:00]	86	24 MPH	96 F	Dry		5
[12:00-12:15]	80	24 MPH	98 F	Dry		2
[12:15-12:30]	79	22 MPH	98 F	Dry		4
[12:30-12:45]	79	24 MPH	99 F	Dry		2
[12:45-13:00]	84	23 MPH	101 F	Dry		4
[13:00-13:15]	90	25 MPH	101 F	Dry		11
[13:15-13:30]	71	23 MPH	103 F	Dry		2
[13:30-13:45]	83	22 MPH	105 F	Dry		3
[13:45-14:00]	91	22 MPH	105 F	Dry		5
[14:00-14:15]	88	26 MPH	106 F	Dry		5
[14:15-14:30]	87	24 MPH	106 F	Dry		4
[14:30-14:45]	92	24 MPH	105 F	Dry		2
[14:45-15:00]	111	22 MPH	104 F	Dry		6
[15:00-15:15]	93	21 MPH	106 F	Dry		6
[15:15-15:30]	102	23 MPH	105 F	Dry		21
[15:30-15:45]	130	19 MPH	102 F	Dry		29
[15:45-16:00]	133	23 MPH	101 F	Dry		20
[16:00-16:15]	115	24 MPH	101 F	Dry		10
[16:15-16:30]	133	22 MPH	101 F	Dry		8
[16:30-16:45]	120	26 MPH	100 F	Dry		12
[16:45-17:00]	148	23 MPH	98 F	Dry		18
[17:00-17:15]	132	22 MPH	98 F	Dry		8
[17:15-17:30]	146	23 MPH	97 F	Dry		17
[17:30-17:45]	118	26 MPH	96 F	Dry		10
[17:45-18:00]	105	25 MPH	94 F	Dry		12
[18:00-18:15]	92	24 MPH	92 F	Dry		5
[18:15-18:30]	76	25 MPH	89 F	Dry		5
[18:30-18:45]	82	21 MPH	88 F	Dry		4
[18:45-19:00]	91	25 MPH	85 F	Dry		3
[19:00-19:15]	72	22 MPH	83 F	Dry		3
[19:15-19:30]	80	23 MPH	80 F	Dry		2
[19:30-19:45]	68	26 MPH	79 F	Dry		1
[19:45-20:00]	67	27 MPH	77 F	Dry		1

J

[Raw] Volume Report

Added: 1, 12

HI-Star ID: 3413
Street: JOHNSON AVE EAST OF WILEY BI
State: IA
City: CEDAR RAPIDS
County: LINN

Begin: May/08/08 00:00
Lane: WB BOTH
Oper: CAL
Posted: 30
AADT Factor: 0.89

End: May/09/08 00:00
Hours: 24.00
Period: 15
Raw Count: 5444
AADT Count: 4,845

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Thu,May/08/08						
[20:00-20:15]	80	25 MPH	76 F	Dry		2
[20:15-20:30]	77	24 MPH	76 F	Dry		2
[20:30-20:45]	74	23 MPH	75 F	Dry		2
[20:45-21:00]	69	26 MPH	74 F	Dry		2
[21:00-21:15]	77	25 MPH	72 F	Dry		1
[21:15-21:30]	45	26 MPH	71 F	Dry		1
[21:30-21:45]	38	26 MPH	70 F	Dry		1
[21:45-22:00]	39	24 MPH	70 F	Dry		0
[22:00-22:15]	34	29 MPH	70 F	Dry		1
[22:15-22:30]	24	28 MPH	68 F	Dry		0
[22:30-22:45]	31	27 MPH	68 F	Dry		0
[22:45-23:00]	24	29 MPH	67 F	Dry		0
[23:00-23:15]	16	33 MPH	66 F	Dry		0
[23:15-23:30]	25	33 MPH	65 F	Dry		0
[23:30-23:45]	11	29 MPH	64 F	Dry		0
[23:45-00:00]	14	30 MPH	65 F	Dry		0
	5444	25 MPH	77 F			

J

Nu-Metrics Traffic Analyzer Study
Computer Generated Summary Report
City: CEDAR RAPIDS
Street: JOHNSON AVE EAST OF WILEY BLVD
Location: Added: 1, 12

A study of vehicle traffic was conducted with HI-STAR unit number 3413. The study was done in the WB BOTH lane at JOHNSON AVE EAST OF WILEY BLVD in CEDAR RAPIDS, IA in LINN county. The study began on May/08/08 at 00:00 and concluded on May/09/08 at 00:00, lasting a total of 24.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 5444 vehicles passed through the location with a peak volume of 148 on May/08/08 at [16:45-17:00] and a minimum volume of 0 on May/08/08 at [02:45-03:00]. The AADT count for this study was 4,845.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 15 - 20 MPH range or lower. The average speed for all classifed vehicles was 24 MPH with 14.49% vehicles exceeding the posted speed of 30 MPH. The HI-STAR found 0.44 percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 15MPH and the 85th percentile was 34.78 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >					
0	531	1246	760	491	476	387	142	32	7	8	6	1	7	4					

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin.

Most of the vehicles classified during the study were Vans & Pickups. The number of Passenger Vehicles in the study was 0 which represents 0 percent of the total classified vehicles. The number of Vans & Pickups in the study was 3871 which represents 94 percent of the total classified vehicles. The number of Busses & Trucks in the study was 144 which represents 4 percent of the total classified vehicles. The number of Tractor Tailers in the study was 83 which represents 0 percent of the total classified vehicles.

< to 20	21 to 27	28 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80 to >												
3871	144	58	11	5	3	4	2												

CHART 2

HEADWAY

During the peak traffic period, on May/08/08 at [16:45-17:00] the average headway between vehicles was 6.04 seconds. During the slowest traffic period, on May/08/08 at [02:45-03:00] the average headway between vehicles was 900 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 54.00 and 106.00 degrees F. The HI-STAR determined that the roadway surface was Dry 100.00% of the time.

J

[Raw] Volume Report

Added: 11, 13

HI-Star ID: 3424
Street: JOHNSON AVE EAST OF WILEY BI
State: IA
City: CEDAR RAPIDS
County: LINN

Begin: May/08/08 00:00
Lane: EB BOTH
Oper: CAL
Posted: 30
AADT Factor: 0.89

End: May/09/08 00:00
Hours: 24.00
Period: 15
Raw Count: 5614
AADT Count: 4,996

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Thu,May/08/08						
[00:00-00:15]	8	27 MPH	61 F	Dry		0
[00:15-00:30]	7	27 MPH	61 F	Dry		0
[00:30-00:45]	7	34 MPH	60 F	Dry		0
[00:45-01:00]	8	33 MPH	59 F	Dry		0
[01:00-01:15]	5	33 MPH	59 F	Dry		0
[01:15-01:30]	2	28 MPH	59 F	Dry		0
[01:30-01:45]	8	26 MPH	59 F	Dry		0
[01:45-02:00]	1	32 MPH	58 F	Dry		0
[02:00-02:15]	7	23 MPH	57 F	Dry		0
[02:15-02:30]	5	31 MPH	57 F	Dry		0
[02:30-02:45]	4	31 MPH	56 F	Dry		0
[02:45-03:00]	2	40 MPH	56 F	Dry		0
[03:00-03:15]	1	38 MPH	55 F	Dry		0
[03:15-03:30]	4	26 MPH	55 F	Dry		0
[03:30-03:45]	5	27 MPH	55 F	Dry		0
[03:45-04:00]	3	31 MPH	55 F	Dry		0
[04:00-04:15]	2	27 MPH	55 F	Dry		0
[04:15-04:30]	2	28 MPH	54 F	Dry		0
[04:30-04:45]	8	35 MPH	54 F	Dry		0
[04:45-05:00]	9	32 MPH	54 F	Dry		0
[05:00-05:15]	9	29 MPH	53 F	Dry		0
[05:15-05:30]	13	29 MPH	53 F	Dry		0
[05:30-05:45]	26	31 MPH	53 F	Dry		0
[05:45-06:00]	24	32 MPH	53 F	Dry		0
[06:00-06:15]	38	30 MPH	53 F	Dry		0
[06:15-06:30]	44	27 MPH	53 F	Dry		1
[06:30-06:45]	75	29 MPH	53 F	Dry		1
[06:45-07:00]	63	29 MPH	54 F	Dry		1
[07:00-07:15]	80	28 MPH	55 F	Dry		1
[07:15-07:30]	126	28 MPH	59 F	Dry		2
[07:30-07:45]	152	28 MPH	61 F	Dry		2
[07:45-08:00]	121	29 MPH	64 F	Dry		1
[08:00-08:15]	96	28 MPH	66 F	Dry		1
[08:15-08:30]	76	29 MPH	68 F	Dry		1
[08:30-08:45]	91	26 MPH	70 F	Dry		1
[08:45-09:00]	84	26 MPH	72 F	Dry		1
[09:00-09:15]	76	27 MPH	74 F	Dry		1
[09:15-09:30]	82	26 MPH	75 F	Dry		1
[09:30-09:45]	77	26 MPH	79 F	Dry		1
[09:45-10:00]	60	26 MPH	83 F	Dry		1

J

[Raw] Volume Report

Added: 11, 13

HI-Star ID: 3424
Street: JOHNSON AVE EAST OF WILEY BI
State: IA
City: CEDAR RAPIDS
County: LINN

Begin: May/08/08 00:00
Lane: EB BOTH
Oper: CAL
Posted: 30
AADT Factor: 0.89

End: May/09/08 00:00
Hours: 24.00
Period: 15
Raw Count: 5614
AADT Count: 4,996

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Thu,May/08/08						
[10:00-10:15]	62	27 MPH	85 F	Dry		1
[10:15-10:30]	75	26 MPH	88 F	Dry		1
[10:30-10:45]	84	27 MPH	90 F	Dry		1
[10:45-11:00]	93	26 MPH	92 F	Dry		1
[11:00-11:15]	87	26 MPH	93 F	Dry		1
[11:15-11:30]	93	26 MPH	94 F	Dry		1
[11:30-11:45]	97	25 MPH	97 F	Dry		2
[11:45-12:00]	76	27 MPH	99 F	Dry		1
[12:00-12:15]	92	27 MPH	100 F	Dry		1
[12:15-12:30]	89	26 MPH	100 F	Dry		1
[12:30-12:45]	89	27 MPH	102 F	Dry		1
[12:45-13:00]	71	27 MPH	104 F	Dry		1
[13:00-13:15]	84	27 MPH	104 F	Dry		1
[13:15-13:30]	88	26 MPH	106 F	Dry		1
[13:30-13:45]	76	27 MPH	108 F	Dry		1
[13:45-14:00]	89	27 MPH	108 F	Dry		1
[14:00-14:15]	85	28 MPH	109 F	Dry		1
[14:15-14:30]	84	27 MPH	109 F	Dry		1
[14:30-14:45]	83	26 MPH	108 F	Dry		1
[14:45-15:00]	74	26 MPH	107 F	Dry		1
[15:00-15:15]	80	26 MPH	109 F	Dry		5
[15:15-15:30]	86	25 MPH	109 F	Dry		1
[15:30-15:45]	127	24 MPH	107 F	Dry		2
[15:45-16:00]	120	26 MPH	107 F	Dry		2
[16:00-16:15]	115	27 MPH	105 F	Dry		1
[16:15-16:30]	98	28 MPH	104 F	Dry		1
[16:30-16:45]	120	27 MPH	103 F	Dry		1
[16:45-17:00]	111	28 MPH	102 F	Dry		1
[17:00-17:15]	142	28 MPH	99 F	Dry		2
[17:15-17:30]	106	27 MPH	98 F	Dry		4
[17:30-17:45]	108	27 MPH	95 F	Dry		1
[17:45-18:00]	102	27 MPH	94 F	Dry		1
[18:00-18:15]	88	28 MPH	91 F	Dry		1
[18:15-18:30]	91	27 MPH	87 F	Dry		1
[18:30-18:45]	103	27 MPH	86 F	Dry		1
[18:45-19:00]	61	28 MPH	84 F	Dry		1
[19:00-19:15]	74	27 MPH	80 F	Dry		1
[19:15-19:30]	82	27 MPH	79 F	Dry		1
[19:30-19:45]	71	27 MPH	78 F	Dry		1
[19:45-20:00]	45	28 MPH	76 F	Dry		0

J

[Raw] Volume Report

Added: 11, 13

HI-Star ID: 3424	Begin: May/08/08 00:00	End: May/09/08 00:00
Street: JOHNSON AVE EAST OF WILEY BI	Lane: EB BOTH	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 30	Raw Count: 5614
County: LINN	AADT Factor: 0.89	AADT Count: 4,996

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Thu,May/08/08						
[20:00-20:15]	64	27 MPH	76 F	Dry		1
[20:15-20:30]	63	27 MPH	74 F	Dry		1
[20:30-20:45]	60	26 MPH	72 F	Dry		1
[20:45-21:00]	36	28 MPH	72 F	Dry		0
[21:00-21:15]	41	28 MPH	70 F	Dry		0
[21:15-21:30]	44	25 MPH	70 F	Dry		0
[21:30-21:45]	29	29 MPH	70 F	Dry		0
[21:45-22:00]	27	30 MPH	69 F	Dry		0
[22:00-22:15]	20	28 MPH	68 F	Dry		0
[22:15-22:30]	26	29 MPH	68 F	Dry		0
[22:30-22:45]	22	30 MPH	66 F	Dry		0
[22:45-23:00]	14	26 MPH	66 F	Dry		0
[23:00-23:15]	17	31 MPH	65 F	Dry		0
[23:15-23:30]	10	33 MPH	64 F	Dry		0
[23:30-23:45]	19	27 MPH	64 F	Dry		0
[23:45-00:00]	10	30 MPH	64 F	Dry		0
	5614	27 MPH	77 F			

J

Nu-Metrics Traffic Analyzer Study
Computer Generated Summary Report
City: CEDAR RAPIDS
Street: JOHNSON AVE EAST OF WILEY BLVD
Location: Added: 11, 13

A study of vehicle traffic was conducted with HI-STAR unit number 3424. The study was done in the EB BOTH lane at JOHNSON AVE EAST OF WILEY BLVD in CEDAR RAPIDS, IA in LINN county. The study began on May/08/08 at 00:00 and concluded on May/09/08 at 00:00, lasting a total of 24.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 5614 vehicles passed through the location with a peak volume of 152 on May/08/08 at [07:30-07:45] and a minimum volume of 1 on May/08/08 at [01:45-02:00]. The AADT count for this study was 4,996.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 25 - 30 MPH range or lower. The average speed for all classifed vehicles was 27 MPH with 8.53% vehicles exceeding the posted speed of 30 MPH. The HI-STAR found 0.23 percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 25MPH and the 85th percentile was 33.22 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >					
0	32	410	1578	1862	962	337	77	18	6	2	4	3	1	4					

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin.

Most of the vehicles classified during the study were Vans & Pickups. The number of Passenger Vehicles in the study was 0 which represents 0 percent of the total classified vehicles. The number of Vans & Pickups in the study was 5164 which represents 98 percent of the total classified vehicles. The number of Busses & Trucks in the study was 85 which represents 2 percent of the total classified vehicles. The number of Tractor Tailers in the study was 47 which represents 0 percent of the total classified vehicles.

< to 20	21 to 27	28 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80 to >												
5164	85	38	8	1	0	0	0												

CHART 2

HEADWAY

During the peak traffic period, on May/08/08 at [07:30-07:45] the average headway between vehicles was 5.882 seconds. During the slowest traffic period, on May/08/08 at [01:45-02:00] the average headway between vehicles was 450 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 53.00 and 109.00 degrees F. The HI-STAR determined that the roadway surface was Dry 100.00% of the time.

J

[Raw] Volume Report

Added: 3, 4

HI-Star ID: 3612	Begin: Oct/30/08 00:00	End: Oct/31/08 00:00
Street: JOHNSON AVE EAST OF JACOLYN	Lane: WB BOTH	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 35	Raw Count: 4414
County: LINN	AADT Factor: 0.9	AADT Count: 3,973

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Thu,Oct/30/08						
[00:00-00:15]	10	35 MPH	44 F	Dry		0
[00:15-00:30]	11	34 MPH	44 F	Dry		0
[00:30-00:45]	4	38 MPH	44 F	Dry		0
[00:45-01:00]	13	34 MPH	44 F	Dry		0
[01:00-01:15]	8	29 MPH	44 F	Dry		0
[01:15-01:30]	6	35 MPH	44 F	Dry		0
[01:30-01:45]	3	33 MPH	43 F	Dry		0
[01:45-02:00]	3	33 MPH	43 F	Dry		0
[02:00-02:15]	6	35 MPH	42 F	Dry		0
[02:15-02:30]	2	23 MPH	42 F	Dry		0
[02:30-02:45]	4	37 MPH	42 F	Dry		0
[02:45-03:00]	2	40 MPH	42 F	Dry		0
[03:00-03:15]	3	41 MPH	42 F	Dry		0
[03:15-03:30]	1	22 MPH	42 F	Dry		0
[03:30-03:45]	3	26 MPH	42 F	Dry		0
[03:45-04:00]	2	35 MPH	42 F	Dry		0
[04:00-04:15]	2	30 MPH	42 F	Dry		0
[04:15-04:30]	3	26 MPH	42 F	Dry		0
[04:30-04:45]	1	22 MPH	42 F	Dry		0
[04:45-05:00]	5	36 MPH	42 F	Dry		0
[05:00-05:15]	3	26 MPH	42 F	Dry		0
[05:15-05:30]	5	36 MPH	42 F	Dry		0
[05:30-05:45]	9	35 MPH	42 F	Dry		0
[05:45-06:00]	7	34 MPH	42 F	Dry		0
[06:00-06:15]	4	35 MPH	42 F	Dry		0
[06:15-06:30]	14	34 MPH	42 F	Dry		0
[06:30-06:45]	20	33 MPH	42 F	Dry		0
[06:45-07:00]	33	31 MPH	42 F	Dry		0
[07:00-07:15]	53	35 MPH	42 F	Dry		0
[07:15-07:30]	43	33 MPH	42 F	Dry		0
[07:30-07:45]	49	35 MPH	42 F	Dry		0
[07:45-08:00]	58	33 MPH	42 F	Dry		0
[08:00-08:15]	57	35 MPH	42 F	Dry		0
[08:15-08:30]	41	33 MPH	42 F	Dry		0
[08:30-08:45]	54	35 MPH	44 F	Dry		0
[08:45-09:00]	61	34 MPH	46 F	Dry		0
[09:00-09:15]	61	34 MPH	48 F	Dry		0
[09:15-09:30]	50	32 MPH	50 F	Dry		0
[09:30-09:45]	49	31 MPH	52 F	Dry		0
[09:45-10:00]	36	34 MPH	52 F	Dry		0

J

[Raw] Volume Report

Added: 3, 4

HI-Star ID: 3612
Street: JOHNSON AVE EAST OF JACOLYN
State: IA
City: CEDAR RAPIDS
County: LINN

Begin: Oct/30/08 00:00
Lane: WB BOTH
Oper: CAL
Posted: 35
AADT Factor: 0.9

End: Oct/31/08 00:00
Hours: 24.00
Period: 15
Raw Count: 4414
AADT Count: 3,973

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Thu,Oct/30/08						
[10:00-10:15]	46	33 MPH	54 F	Dry		0
[10:15-10:30]	47	35 MPH	56 F	Dry		0
[10:30-10:45]	59	32 MPH	58 F	Dry		0
[10:45-11:00]	52	34 MPH	60 F	Dry		0
[11:00-11:15]	47	35 MPH	62 F	Dry		0
[11:15-11:30]	51	33 MPH	64 F	Dry		0
[11:30-11:45]	58	34 MPH	66 F	Dry		0
[11:45-12:00]	63	33 MPH	67 F	Dry		0
[12:00-12:15]	59	33 MPH	68 F	Dry		0
[12:15-12:30]	68	32 MPH	70 F	Dry		0
[12:30-12:45]	51	33 MPH	71 F	Dry		0
[12:45-13:00]	48	35 MPH	72 F	Dry		0
[13:00-13:15]	72	34 MPH	74 F	Dry		0
[13:15-13:30]	69	32 MPH	74 F	Dry		1
[13:30-13:45]	65	33 MPH	74 F	Dry		0
[13:45-14:00]	67	33 MPH	75 F	Dry		0
[14:00-14:15]	65	34 MPH	75 F	Dry		0
[14:15-14:30]	62	31 MPH	75 F	Dry		0
[14:30-14:45]	74	33 MPH	75 F	Dry		1
[14:45-15:00]	76	34 MPH	75 F	Dry		0
[15:00-15:15]	82	35 MPH	75 F	Dry		1
[15:15-15:30]	90	31 MPH	75 F	Dry		1
[15:30-15:45]	90	34 MPH	75 F	Dry		1
[15:45-16:00]	136	32 MPH	74 F	Dry		3
[16:00-16:15]	94	34 MPH	73 F	Dry		1
[16:15-16:30]	108	31 MPH	73 F	Dry		1
[16:30-16:45]	104	32 MPH	71 F	Dry		2
[16:45-17:00]	136	32 MPH	70 F	Dry		2
[17:00-17:15]	128	33 MPH	69 F	Dry		2
[17:15-17:30]	122	34 MPH	68 F	Dry		1
[17:30-17:45]	94	33 MPH	66 F	Dry		1
[17:45-18:00]	94	33 MPH	66 F	Dry		1
[18:00-18:15]	100	33 MPH	64 F	Dry		1
[18:15-18:30]	79	34 MPH	62 F	Dry		1
[18:30-18:45]	100	32 MPH	62 F	Dry		1
[18:45-19:00]	79	32 MPH	61 F	Dry		1
[19:00-19:15]	68	32 MPH	60 F	Dry		1
[19:15-19:30]	55	33 MPH	59 F	Dry		0
[19:30-19:45]	68	31 MPH	58 F	Dry		1
[19:45-20:00]	60	34 MPH	58 F	Dry		0

J

[Raw] Volume Report

Added: 3, 4

HI-Star ID: 3612	Begin: Oct/30/08 00:00	End: Oct/31/08 00:00
Street: JOHNSON AVE EAST OF JACOLYN	Lane: WB BOTH	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 35	Raw Count: 4414
County: LINN	AADT Factor: 0.9	AADT Count: 3,973

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Thu,Oct/30/08						
[20:00-20:15]	55	35 MPH	58 F	Dry		0
[20:15-20:30]	73	33 MPH	57 F	Dry		1
[20:30-20:45]	45	34 MPH	56 F	Dry		0
[20:45-21:00]	42	33 MPH	56 F	Dry		0
[21:00-21:15]	43	33 MPH	56 F	Dry		0
[21:15-21:30]	46	37 MPH	56 F	Dry		0
[21:30-21:45]	35	34 MPH	55 F	Dry		0
[21:45-22:00]	36	34 MPH	55 F	Dry		0
[22:00-22:15]	36	34 MPH	54 F	Dry		0
[22:15-22:30]	27	35 MPH	54 F	Dry		0
[22:30-22:45]	17	35 MPH	54 F	Dry		0
[22:45-23:00]	25	31 MPH	54 F	Dry		0
[23:00-23:15]	16	29 MPH	53 F	Dry		0
[23:15-23:30]	11	36 MPH	52 F	Dry		0
[23:30-23:45]	10	34 MPH	52 F	Dry		0
[23:45-00:00]	12	33 MPH	52 F	Dry		0
	4414	33 MPH	55 F			

J

Nu-Metrics Traffic Analyzer Study
Computer Generated Summary Report
City: CEDAR RAPIDS
Street: JOHNSON AVE EAST OF JACOLYN DR
Location: Added: 3, 4

A study of vehicle traffic was conducted with HI-STAR unit number 3612. The study was done in the WB BOTH lane at JOHNSON AVE EAST OF JACOLYN DR in CEDAR RAPIDS, IA in LINN county. The study began on Oct/30/08 at 00:00 and concluded on Oct/31/08 at 00:00, lasting a total of 24.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 4414 vehicles passed through the location with a peak volume of 136 on Oct/30/08 at [15:45-16:00] and a minimum volume of 1 on Oct/30/08 at [03:15-03:30]. The AADT count for this study was 3,973.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 35 - 40 MPH range or lower. The average speed for all classifed vehicles was 33 MPH with 13.99% vehicles exceeding the posted speed of 35 MPH. The HI-STAR found 0.16 percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 35MPH and the 85th percentile was 39.85 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >					
0	41	293	489	348	1105	1516	494	91	18	7	3	1	3	0					

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin.

Most of the vehicles classified during the study were Vans & Pickups. The number of Passenger Vehicles in the study was 0 which represents 0 percent of the total classified vehicles. The number of Vans & Pickups in the study was 4281 which represents 97 percent of the total classified vehicles. The number of Busses & Trucks in the study was 86 which represents 2 percent of the total classified vehicles. The number of Tractor Tailers in the study was 42 which represents 0 percent of the total classified vehicles.

< to 20	21 to 27	28 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80 to >												
4281	86	30	8	2	2	0	0												

CHART 2

HEADWAY

During the peak traffic period, on Oct/30/08 at [15:45-16:00] the average headway between vehicles was 6.569 seconds. During the slowest traffic period, on Oct/30/08 at [03:15-03:30] the average headway between vehicles was 450 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 42.00 and 75.00 degrees F. The HI-STAR determined that the roadway surface was Dry 100.00% of the time.

J

[Raw] Volume Report

Added: 1, 2

HI-Star ID: 3417
Street: JOHNSON AVE EAST OF JACOLYN
State: IA
City: CEDAR RAPIDS
County: LINN

Begin: Oct/30/08 00:00
Lane: EB BOTH
Oper: CAL
Posted: 35
AADT Factor: 0.9

End: Oct/31/08 00:00
Hours: 24.00
Period: 15
Raw Count: 4223
AADT Count: 3,801

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Thu,Oct/30/08						
[00:00-00:15]	3	29 MPH	44 F	Dry		0
[00:15-00:30]	4	32 MPH	44 F	Dry		0
[00:30-00:45]	11	33 MPH	44 F	Dry		0
[00:45-01:00]	6	37 MPH	44 F	Dry		0
[01:00-01:15]	6	33 MPH	44 F	Dry		0
[01:15-01:30]	2	18 MPH	44 F	Dry		0
[01:30-01:45]	1	32 MPH	44 F	Dry		0
[01:45-02:00]	6	37 MPH	44 F	Dry		0
[02:00-02:15]	5	32 MPH	43 F	Dry		0
[02:15-02:30]	1	32 MPH	43 F	Dry		0
[02:30-02:45]	1	18 MPH	43 F	Dry		0
[02:45-03:00]	1	38 MPH	42 F	Dry		0
[03:00-03:15]	1	12 MPH	42 F	Dry		0
[03:15-03:30]	1	38 MPH	42 F	Dry		0
[03:30-03:45]	2	35 MPH	42 F	Dry		0
[03:45-04:00]	3	27 MPH	42 F	Dry		0
[04:00-04:15]	1	18 MPH	42 F	Dry		0
[04:15-04:30]	0	0 MPH	42 F	Dry		0
[04:30-04:45]	6	35 MPH	42 F	Dry		0
[04:45-05:00]	6	38 MPH	42 F	Dry		0
[05:00-05:15]	9	34 MPH	42 F	Dry		0
[05:15-05:30]	16	33 MPH	42 F	Dry		0
[05:30-05:45]	14	30 MPH	42 F	Dry		0
[05:45-06:00]	17	35 MPH	42 F	Dry		0
[06:00-06:15]	25	33 MPH	42 F	Dry		0
[06:15-06:30]	44	34 MPH	42 F	Dry		0
[06:30-06:45]	47	35 MPH	42 F	Dry		0
[06:45-07:00]	62	34 MPH	42 F	Dry		1
[07:00-07:15]	81	35 MPH	42 F	Dry		1
[07:15-07:30]	87	35 MPH	42 F	Dry		1
[07:30-07:45]	137	36 MPH	42 F	Dry		1
[07:45-08:00]	91	36 MPH	42 F	Dry		1
[08:00-08:15]	61	35 MPH	42 F	Dry		1
[08:15-08:30]	73	32 MPH	43 F	Dry		3
[08:30-08:45]	80	34 MPH	44 F	Dry		1
[08:45-09:00]	95	34 MPH	48 F	Dry		1
[09:00-09:15]	66	32 MPH	50 F	Dry		2
[09:15-09:30]	50	32 MPH	52 F	Dry		0
[09:30-09:45]	55	32 MPH	52 F	Dry		0
[09:45-10:00]	55	34 MPH	54 F	Dry		0

J

[Raw] Volume Report

Added: 1, 2

HI-Star ID: 3417
Street: JOHNSON AVE EAST OF JACOLYN
State: IA
City: CEDAR RAPIDS
County: LINN

Begin: Oct/30/08 00:00
Lane: EB BOTH
Oper: CAL
Posted: 35
AADT Factor: 0.9

End: Oct/31/08 00:00
Hours: 24.00
Period: 15
Raw Count: 4223
AADT Count: 3,801

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Thu,Oct/30/08						
[10:00-10:15]	50	31 MPH	56 F	Dry		4
[10:15-10:30]	66	30 MPH	59 F	Dry		1
[10:30-10:45]	53	34 MPH	62 F	Dry		0
[10:45-11:00]	57	33 MPH	64 F	Dry		1
[11:00-11:15]	59	32 MPH	66 F	Dry		1
[11:15-11:30]	67	33 MPH	68 F	Dry		1
[11:30-11:45]	60	33 MPH	70 F	Dry		1
[11:45-12:00]	67	34 MPH	72 F	Dry		1
[12:00-12:15]	66	33 MPH	74 F	Dry		0
[12:15-12:30]	51	32 MPH	76 F	Dry		1
[12:30-12:45]	55	32 MPH	76 F	Dry		1
[12:45-13:00]	58	33 MPH	76 F	Dry		0
[13:00-13:15]	56	32 MPH	77 F	Dry		0
[13:15-13:30]	65	34 MPH	78 F	Dry		1
[13:30-13:45]	60	33 MPH	79 F	Dry		0
[13:45-14:00]	66	35 MPH	79 F	Dry		0
[14:00-14:15]	54	33 MPH	80 F	Dry		0
[14:15-14:30]	61	33 MPH	80 F	Dry		0
[14:30-14:45]	68	33 MPH	79 F	Dry		1
[14:45-15:00]	56	32 MPH	79 F	Dry		0
[15:00-15:15]	65	34 MPH	79 F	Dry		1
[15:15-15:30]	86	34 MPH	78 F	Dry		1
[15:30-15:45]	85	33 MPH	78 F	Dry		1
[15:45-16:00]	91	33 MPH	76 F	Dry		1
[16:00-16:15]	68	32 MPH	76 F	Dry		1
[16:15-16:30]	92	32 MPH	76 F	Dry		1
[16:30-16:45]	87	32 MPH	74 F	Dry		1
[16:45-17:00]	90	33 MPH	72 F	Dry		3
[17:00-17:15]	99	33 MPH	71 F	Dry		1
[17:15-17:30]	81	34 MPH	70 F	Dry		1
[17:30-17:45]	81	34 MPH	68 F	Dry		1
[17:45-18:00]	77	32 MPH	66 F	Dry		1
[18:00-18:15]	95	32 MPH	64 F	Dry		1
[18:15-18:30]	76	32 MPH	63 F	Dry		1
[18:30-18:45]	52	32 MPH	62 F	Dry		0
[18:45-19:00]	50	31 MPH	61 F	Dry		0
[19:00-19:15]	49	33 MPH	60 F	Dry		0
[19:15-19:30]	39	31 MPH	59 F	Dry		0
[19:30-19:45]	53	32 MPH	58 F	Dry		0
[19:45-20:00]	46	31 MPH	58 F	Dry		0

J

[Raw] Volume Report

Added: 1, 2

HI-Star ID: 3417	Begin: Oct/30/08 00:00	End: Oct/31/08 00:00
Street: JOHNSON AVE EAST OF JACOLYN	Lane: EB BOTH	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 35	Raw Count: 4223
County: LINN	AADT Factor: 0.9	AADT Count: 3,801

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Thu,Oct/30/08						
[20:00-20:15]	40	31 MPH	58 F	Dry		0
[20:15-20:30]	33	30 MPH	56 F	Dry		0
[20:30-20:45]	32	32 MPH	56 F	Dry		0
[20:45-21:00]	28	31 MPH	56 F	Dry		0
[21:00-21:15]	33	31 MPH	56 F	Dry		0
[21:15-21:30]	24	31 MPH	56 F	Dry		0
[21:30-21:45]	29	31 MPH	55 F	Dry		0
[21:45-22:00]	16	31 MPH	54 F	Dry		0
[22:00-22:15]	17	33 MPH	54 F	Dry		0
[22:15-22:30]	22	32 MPH	54 F	Dry		0
[22:30-22:45]	14	33 MPH	54 F	Dry		0
[22:45-23:00]	10	34 MPH	53 F	Dry		0
[23:00-23:15]	7	29 MPH	52 F	Dry		0
[23:15-23:30]	9	33 MPH	52 F	Dry		0
[23:30-23:45]	14	30 MPH	52 F	Dry		0
[23:45-00:00]	6	33 MPH	52 F	Dry		0
	4223	33 MPH	57 F			

J

Nu-Metrics Traffic Analyzer Study
Computer Generated Summary Report
City: CEDAR RAPIDS
Street: JOHNSON AVE EAST OF JACOLYN DR
Location: Added: 1, 2

A study of vehicle traffic was conducted with HI-STAR unit number 3417. The study was done in the EB BOTH lane at JOHNSON AVE EAST OF JACOLYN DR in CEDAR RAPIDS, IA in LINN county. The study began on Oct/30/08 at 00:00 and concluded on Oct/31/08 at 00:00, lasting a total of 24.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 4223 vehicles passed through the location with a peak volume of 137 on Oct/30/08 at [07:30-07:45] and a minimum volume of 0 on Oct/30/08 at [04:15-04:30]. The AADT count for this study was 3,801.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 30 - 35 MPH range or lower. The average speed for all classifed vehicles was 33 MPH with 10.18% vehicles exceeding the posted speed of 35 MPH. The HI-STAR found 0.12 percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 30MPH and the 85th percentile was 39.26 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >					
0	34	214	374	382	1413	1367	351	58	11	4	4	0	1	0					

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin.

Most of the vehicles classified during the study were Vans & Pickups. The number of Passenger Vehicles in the study was 0 which represents 0 percent of the total classified vehicles. The number of Vans & Pickups in the study was 4109 which represents 98 percent of the total classified vehicles. The number of Busses & Trucks in the study was 59 which represents 1 percent of the total classified vehicles. The number of Tractor Tailers in the study was 45 which represents 0 percent of the total classified vehicles.

< to 20	21 to 27	28 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80 to >												
4109	59	39	6	0	0	0	0												

CHART 2

HEADWAY

During the peak traffic period, on Oct/30/08 at [07:30-07:45] the average headway between vehicles was 6.522 seconds. During the slowest traffic period, on Oct/30/08 at [04:15-04:30] the average headway between vehicles was 900 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 42.00 and 80.00 degrees F. The HI-STAR determined that the roadway surface was Dry 100.00% of the time.

J

Nu-Metrics Traffic Analyzer Study
Computer Generated Summary Report
City: CEDAR RAPIDS
Street: JOHNSON AVE EAST OF JACOLYN DR
Location: Added: 1, 2, 3, 4

A study of vehicle traffic was conducted with HI-STAR unit number 3417. The study was done in the ALL lane at JOHNSON AVE EAST OF JACOLYN DR in CEDAR RAPIDS, IA in LINN county. The study began on Oct/30/08 at 00:00 and concluded on Oct/31/08 at 00:00, lasting a total of 24.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 8637 vehicles passed through the location with a peak volume of 227 on Oct/30/08 at [15:45-16:00] and a minimum volume of 2 on Oct/30/08 at [03:15-03:30]. The AADT count for this study was 7,773.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 35 - 40 MPH range or lower. The average speed for all classifed vehicles was 33 MPH with 12.13% vehicles exceeding the posted speed of 35 MPH. The HI-STAR found 0.14 percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 35MPH and the 85th percentile was 39.57 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >					
0	75	507	863	730	2518	2883	845	149	29	11	7	1	4	0					

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin.

Most of the vehicles classified during the study were Vans & Pickups. The number of Passenger Vehicles in the study was 0 which represents 0 percent of the total classified vehicles. The number of Vans & Pickups in the study was 8390 which represents 97 percent of the total classified vehicles. The number of Busses & Trucks in the study was 145 which represents 2 percent of the total classified vehicles. The number of Tractor Tailers in the study was 87 which represents 0 percent of the total classified vehicles.

< to 20	21 to 27	28 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80 to >												
8390	145	69	14	2	2	0	0												

CHART 2

HEADWAY

During the peak traffic period, on Oct/30/08 at [15:45-16:00] the average headway between vehicles was 3.947 seconds. During the slowest traffic period, on Oct/30/08 at [03:15-03:30] the average headway between vehicles was 300 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 42.00 and 77.00 degrees F. The HI-STAR determined that the roadway surface was Dry 100.00% of the time.

J

Nu-Metrics Traffic Analyzer Study
Computer Generated Summary Report
City: CEDAR RAPIDS
Street: JOHNSON AVE WEST OF JACOLYN DR
Location: Added: 5, 6, 7, 8

A study of vehicle traffic was conducted with HI-STAR unit number 3614. The study was done in the ALL lane at JOHNSON AVE WEST OF JACOLYN DR in CEDAR RAPIDS, IA in LINN county. The study began on Oct/30/08 at 00:00 and concluded on Oct/31/08 at 00:00, lasting a total of 24.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 8974 vehicles passed through the location with a peak volume of 241 on Oct/30/08 at [17:00-17:15] and a minimum volume of 2 on Oct/30/08 at [04:00-04:15]. The AADT count for this study was 8,077.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 30 - 35 MPH range or lower. The average speed for all classifed vehicles was 31 MPH with 6.57% vehicles exceeding the posted speed of 35 MPH. The HI-STAR found 0.11 percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 30MPH and the 85th percentile was 38.20 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >					
0	128	809	920	1406	3008	2107	471	83	19	6	3	4	0	3					

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin.

Most of the vehicles classified during the study were Vans & Pickups. The number of Passenger Vehicles in the study was 0 which represents 0 percent of the total classified vehicles. The number of Vans & Pickups in the study was 8743 which represents 98 percent of the total classified vehicles. The number of Busses & Trucks in the study was 147 which represents 2 percent of the total classified vehicles. The number of Tractor Tailers in the study was 77 which represents 0 percent of the total classified vehicles.

< to 20	21 to 27	28 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80 to >												
8743	147	63	9	5	0	0	0												

CHART 2

HEADWAY

During the peak traffic period, on Oct/30/08 at [17:00-17:15] the average headway between vehicles was 3.719 seconds. During the slowest traffic period, on Oct/30/08 at [04:00-04:15] the average headway between vehicles was 300 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 42.00 and 79.00 degrees F. The HI-STAR determined that the roadway surface was Dry 100.00% of the time.

J

Nu-Metrics Traffic Analyzer Study
Computer Generated Summary Report
City: CEDAR RAPIDS
Street: JOHNSON AVE EAST OF WILEY BLVD
Location: Added: 11, 13

A study of vehicle traffic was conducted with HI-STAR unit number 3424. The study was done in the ALL lane at JOHNSON AVE EAST OF WILEY BLVD in CEDAR RAPIDS, IA in LINN county. The study began on May/08/08 at 00:00 and concluded on May/09/08 at 00:00, lasting a total of 24.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 11058 vehicles passed through the location with a peak volume of 274 on May/08/08 at [17:00-17:15] and a minimum volume of 1 on May/08/08 at [03:00-03:15]. The AADT count for this study was 9,842.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 25 - 30 MPH range or lower. The average speed for all classifed vehicles was 26 MPH with 11.13% vehicles exceeding the posted speed of 30 MPH. The HI-STAR found 0.32 percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 25MPH and the 85th percentile was 33.73 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >					
0	563	1656	2338	2353	1438	724	219	50	13	10	10	4	8	8					

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin.

Most of the vehicles classified during the study were Vans & Pickups. The number of Passenger Vehicles in the study was 0 which represents 0 percent of the total classified vehicles. The number of Vans & Pickups in the study was 9035 which represents 96 percent of the total classified vehicles. The number of Busses & Trucks in the study was 229 which represents 2 percent of the total classified vehicles. The number of Tractor Tailers in the study was 130 which represents 0 percent of the total classified vehicles.

< to 20	21 to 27	28 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80 to >												
9035	229	96	19	6	3	4	2												

CHART 2

HEADWAY

During the peak traffic period, on May/08/08 at [17:00-17:15] the average headway between vehicles was 3.273 seconds. During the slowest traffic period, on May/08/08 at [03:00-03:15] the average headway between vehicles was 450 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 54.00 and 109.00 degrees F. The HI-STAR determined that the roadway surface was Dry 100.00% of the time.

J

[Raw] Volume Report

Added: 3, 7

HI-Star ID: 3392
Street: JOHNSON AVE WEST OF WILEY B
State: IA
City: CEDAR RAPIDS
County: LINN

Begin: May/08/08 00:00
Lane: EB BOTH
Oper: CAL
Posted: 30
AADT Factor: 0.89

End: May/09/08 00:00
Hours: 24.00
Period: 15
Raw Count: 4810
AADT Count: 4,281

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Thu,May/08/08						
[00:00-00:15]	6	31 MPH	61 F	Dry		0
[00:15-00:30]	6	37 MPH	60 F	Dry		0
[00:30-00:45]	8	34 MPH	60 F	Dry		0
[00:45-01:00]	5	33 MPH	60 F	Dry		0
[01:00-01:15]	6	38 MPH	59 F	Dry		0
[01:15-01:30]	1	32 MPH	58 F	Dry		0
[01:30-01:45]	9	33 MPH	58 F	Dry		0
[01:45-02:00]	3	29 MPH	58 F	Dry		0
[02:00-02:15]	3	34 MPH	58 F	Dry		0
[02:15-02:30]	5	36 MPH	57 F	Dry		0
[02:30-02:45]	6	32 MPH	56 F	Dry		0
[02:45-03:00]	3	33 MPH	56 F	Dry		0
[03:00-03:15]	1	38 MPH	56 F	Dry		0
[03:15-03:30]	2	30 MPH	55 F	Dry		0
[03:30-03:45]	2	37 MPH	55 F	Dry		0
[03:45-04:00]	1	48 MPH	54 F	Dry		0
[04:00-04:15]	1	38 MPH	54 F	Dry		0
[04:15-04:30]	2	35 MPH	54 F	Dry		0
[04:30-04:45]	8	39 MPH	54 F	Dry		0
[04:45-05:00]	8	35 MPH	54 F	Dry		0
[05:00-05:15]	7	35 MPH	54 F	Dry		0
[05:15-05:30]	12	31 MPH	54 F	Dry		0
[05:30-05:45]	23	36 MPH	53 F	Dry		0
[05:45-06:00]	20	36 MPH	52 F	Dry		0
[06:00-06:15]	34	34 MPH	52 F	Dry		0
[06:15-06:30]	38	27 MPH	52 F	Dry		1
[06:30-06:45]	78	27 MPH	54 F	Dry		1
[06:45-07:00]	52	29 MPH	54 F	Dry		1
[07:00-07:15]	83	26 MPH	55 F	Dry		1
[07:15-07:30]	106	25 MPH	57 F	Dry		3
[07:30-07:45]	140	26 MPH	57 F	Dry		2
[07:45-08:00]	101	28 MPH	57 F	Dry		2
[08:00-08:15]	81	25 MPH	57 F	Dry		1
[08:15-08:30]	82	27 MPH	57 F	Dry		1
[08:30-08:45]	85	25 MPH	57 F	Dry		1
[08:45-09:00]	86	25 MPH	61 F	Dry		2
[09:00-09:15]	81	25 MPH	66 F	Dry		1
[09:15-09:30]	63	27 MPH	69 F	Dry		1
[09:30-09:45]	66	25 MPH	76 F	Dry		1
[09:45-10:00]	51	26 MPH	78 F	Dry		0

J

[Raw] Volume Report

Added: 3, 7

HI-Star ID: 3392
Street: JOHNSON AVE WEST OF WILEY B
State: IA
City: CEDAR RAPIDS
County: LINN

Begin: May/08/08 00:00
Lane: EB BOTH
Oper: CAL
Posted: 30
AADT Factor: 0.89

End: May/09/08 00:00
Hours: 24.00
Period: 15
Raw Count: 4810
AADT Count: 4,281

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Thu,May/08/08						
[10:00-10:15]	58	28 MPH	79 F	Dry		1
[10:15-10:30]	69	26 MPH	84 F	Dry		1
[10:30-10:45]	72	28 MPH	86 F	Dry		1
[10:45-11:00]	74	25 MPH	90 F	Dry		1
[11:00-11:15]	78	26 MPH	92 F	Dry		1
[11:15-11:30]	73	26 MPH	95 F	Dry		1
[11:30-11:45]	79	26 MPH	97 F	Dry		1
[11:45-12:00]	71	26 MPH	97 F	Dry		1
[12:00-12:15]	71	27 MPH	98 F	Dry		1
[12:15-12:30]	70	26 MPH	100 F	Dry		1
[12:30-12:45]	72	27 MPH	102 F	Dry		1
[12:45-13:00]	67	26 MPH	102 F	Dry		1
[13:00-13:15]	80	26 MPH	104 F	Dry		3
[13:15-13:30]	70	26 MPH	105 F	Dry		1
[13:30-13:45]	60	26 MPH	106 F	Dry		1
[13:45-14:00]	77	25 MPH	107 F	Dry		1
[14:00-14:15]	79	26 MPH	107 F	Dry		1
[14:15-14:30]	74	25 MPH	108 F	Dry		1
[14:30-14:45]	65	26 MPH	108 F	Dry		1
[14:45-15:00]	71	26 MPH	107 F	Dry		1
[15:00-15:15]	77	24 MPH	108 F	Dry		1
[15:15-15:30]	75	25 MPH	107 F	Dry		3
[15:30-15:45]	88	22 MPH	107 F	Dry		4
[15:45-16:00]	91	25 MPH	107 F	Dry		1
[16:00-16:15]	86	25 MPH	106 F	Dry		1
[16:15-16:30]	76	26 MPH	104 F	Dry		1
[16:30-16:45]	93	24 MPH	102 F	Dry		3
[16:45-17:00]	104	25 MPH	100 F	Dry		6
[17:00-17:15]	114	25 MPH	99 F	Dry		25
[17:15-17:30]	87	24 MPH	98 F	Dry		2
[17:30-17:45]	91	24 MPH	97 F	Dry		2
[17:45-18:00]	86	25 MPH	95 F	Dry		1
[18:00-18:15]	69	27 MPH	92 F	Dry		2
[18:15-18:30]	81	25 MPH	88 F	Dry		1
[18:30-18:45]	85	26 MPH	85 F	Dry		1
[18:45-19:00]	62	25 MPH	83 F	Dry		1
[19:00-19:15]	64	26 MPH	80 F	Dry		1
[19:15-19:30]	81	27 MPH	79 F	Dry		1
[19:30-19:45]	55	27 MPH	78 F	Dry		1
[19:45-20:00]	36	26 MPH	76 F	Dry		0

J

[Raw] Volume Report

Added: 3, 7

HI-Star ID: 3392
Street: JOHNSON AVE WEST OF WILEY B
State: IA
City: CEDAR RAPIDS
County: LINN

Begin: May/08/08 00:00
Lane: EB BOTH
Oper: CAL
Posted: 30
AADT Factor: 0.89

End: May/09/08 00:00
Hours: 24.00
Period: 15
Raw Count: 4810
AADT Count: 4,281

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Thu,May/08/08						
[20:00-20:15]	53	28 MPH	76 F	Dry		0
[20:15-20:30]	50	29 MPH	75 F	Dry		0
[20:30-20:45]	42	26 MPH	74 F	Dry		0
[20:45-21:00]	30	31 MPH	72 F	Dry		0
[21:00-21:15]	35	28 MPH	72 F	Dry		0
[21:15-21:30]	33	28 MPH	70 F	Dry		0
[21:30-21:45]	24	32 MPH	70 F	Dry		0
[21:45-22:00]	22	28 MPH	70 F	Dry		0
[22:00-22:15]	16	32 MPH	68 F	Dry		0
[22:15-22:30]	23	31 MPH	68 F	Dry		0
[22:30-22:45]	21	33 MPH	67 F	Dry		0
[22:45-23:00]	11	30 MPH	66 F	Dry		0
[23:00-23:15]	11	35 MPH	66 F	Dry		0
[23:15-23:30]	11	34 MPH	64 F	Dry		0
[23:30-23:45]	12	33 MPH	64 F	Dry		0
[23:45-00:00]	10	32 MPH	64 F	Dry		0
	4810	27 MPH	76 F			

L

Rev. 8/09

Road Segment Benefit / Cost Safety Analysis

Iowa DOT Office of Traffic & Safety

County: Linn | Prepared by: City of Cedar Rapids | Date Prepared: June 14, 2010

Location: Johnson Avenue NW from 1st Ave to Midway Drive

Improvement

Proposed Improvement(s): Convert from 4-lane undivided roadway to 3-lane roadway with center left-turn lane and shared-use through lanes

$1,695,000	Estimated Improvement Cost, **EC**	15	Est. Improvement Life, years, **Y**
$ 1,000	Other Annual Cost (after initial year), **AC**	37	Crash Reduction Factor (integer), **CRF**
$ 11,118	Present Value Other Annual Costs, **OC**	4.0%	Discount Rate, **INT**
		$ 1,706,118	Present Value All Costs, **COST** = EC + OC

$$OC = \frac{AC}{INT}\left(1 - \frac{1}{(1+INT)^Y}\right)$$

Traffic Volume Data

Source: City of Cedar Rapids | 2008 Date of traffic count

Length (mi.)	Two-way veh/day	Description
0.50	7,965	near Jacolyn Drive SW
0.60	9,130	near Wiley Blvd SW
1.10	miles total	

9,461	Current Vehicle Miles / Day, **VM**
12,733	End of Life Veh. Miles / Day
3,453,083	Current Veh. Miles / Year, **AM**
59,715,595	Total Projected Veh. Miles Over Life of Project, **TVMT**

$$TVMT = \frac{AM}{-G}\left(1 - \left(\frac{1+G}{1}\right)^Y\right)$$

2.0% Projected Traffic Growth (0%-10%), **G**

Crash Data

2005 First full year --> 2009 Last full year — 5.0 years, Time Period, **T**

Additional months — values as of Dec. 2007

1	Fatal Crashes		Fatalities @	$3,500,000	$	-
		1	Major Injuries @	$240,000	$	240,000
31	Injury Crashes	17	Minor Injuries @	$48,000	$	816,000
		28	Possible Injuries @	$25,000	$	700,000
51	Property Damage Only		(assumed cost per crash)	$2,700	$	-
		-OR-	enter all Property Costs of all crashes:		$	446,858
83	Total Crashes, **TA**			Total $ Loss, **LOSS**	$	2,202,858

16.60	Current Crashes / Year, **AA** = TA / T	**480.7**	Crashes / HMVM, Crash Rate, **CR** CR = TA x 10^8 / (AM x T)
$ 26,540	Cost per Crash, **AVCR** = LOSS / TA		
287.1	Total Expected Crashes, **TCR** = CR x TVMT/10^8	**$ 2,059,545**	Present Value of Avoided Crashes, **BENEFIT**
6.14	Crashes Avoided First Year **AAR** = AA x CRF / 100		
$ 163,011	Crash Costs Avoided in First Year, AAR x AVCR		
106.2	Total Avoided Crashes, TCR x CRF/ 100		

$$BEN. = \frac{AVCR \times AAR}{(INT - G)}\left(1 - \left(\frac{1+G}{1+INT}\right)^Y\right)$$

Benefit / Cost Ratio

Benefit : Cost = $2,059,545 : $1,706,118 = **1.21** : 1

Iowa Department of Transportation

Rev. 3/08 A

Application for TRAFFIC SAFETY FUNDS

GENERAL INFORMATION

Location / Title of Project: 29th Street and Prairie Drive NE Intersection Improvement Project

Applicant: City of Cedar Rapids

Contact Person: Leslie Hart, P.E. PTOE Title: Associate Traffic Engineer

Complete Mailing Address: 1201 6th St SW
Cedar Rapids, IA 52404

Phone: 319-286-5802 (Area Code) E-Mail: l.hart@cedar-rapids.org

If more than one highway authority is involved in this project, please indicate and fill in the information below (use additional sheets if necessary).

Co-Applicant(s) _____

Contact Person _____ Title _____

Complete Mailing Address _____

_____

Phone _____ (Area Code) E-Mail _____

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Application Type

- Site Specific ☒
- Traffic Control Device ☐
- Safety Study ☐

Funding Amount

Total Project Cost $ 133,000

Safety Funds Requested $ 133,000

EXHIBIT "B"

PROJECT NARRATIVE

29th Street and Prairie Drive NE Intersection Improvement Project

EXISTING CONDITIONS

29th Street NE is a minor arterial roadway in the northeast quadrant of Cedar Rapids, Iowa. This thru street roadway is an east/west artery that connects the residential and commercial areas on the northeast side to those on the southeast side of town. 29th Street also acts as a connecting link between Interstate 380, US Business 151/ 1st Avenue and the City of Marion.

29th Street is oriented east / west, with a posted speed limit of 30 miles per hour. In the vicinity of the project site, land uses are primarily residential. 29th Street is currently a 36' wide two-lane roadway with no left- or right-turn lanes and with on-street parking allowed on both sides of the street beyond the intersection. The nearest signalized intersection is at Oakland Road NE, approximately 2,000 feet west.

Prairie Drive NE is a collector street on the northeast side of Cedar Rapids connecting commercial, office, and residential areas between Iowa Highway 922 (1st Avenue) and Iowa Hwy. 100 (Collins Road). Prairie Drive is a 34' wide two-lane street, with on-street parking allowed on both sides of the street beyond the intersection and a posted speed limit of 30 mph on the south leg and 25 mph on the north leg.

The project intersection is currently stop sign controlled with Prairie Drive stopping for 29th Street. The traffic volume at this intersection is approximately 12,300 entering vehicles per day (2010 City count data). Traffic counts indicate an Average Annual Daily Traffic (AADT) of about 9,800 vehicles per day on 29th Street and an AADT of about 4,300 vpd on Prairie Drive.

There are currently no sidewalks on any approaches to the intersection along 29th Street or Prairie Drive. There is a signed and marked School Crosswalk across the west leg of 29th Street to support adjacent schools. This intersection is about 6 blocks away from Garfield Elementary School, about 6 blocks away from Regis Middle School and about 2 blocks away from Mount Mercy College. Due to the residential character of the neighborhood, there are numerous driveways along both 29th Street and Prairie Drive. There are also many wood utility poles, mostly along the north side of 29th Street and the west side of Prairie Drive. The existing right-of-ways are quite narrow, 80 feet on 29th Street and 60 feet on Prairie Drive.

Traffic accident numbers at this location average about 4 crashes per year over the last 15 years with 4 reported in 2004, 3 in 2005, 2 in 2006, 5 in 2007 and 8 in 2008. Reported crashes reached a recent high of 8 in 2008 including 2 personal injury crashes. Collision diagrams of the 22 reported crashes from 2004 through 2008 (5 years) are attached. Typical crash types include:

- Right-angle crashes: 18 of the 22 crashes were right angle type.
- Rear-end crashes: Four crashes of this type were reported.

Signal warrant analysis was completed per 2009 *Manual on Uniform Traffic Control Devices* (*MUTCD)* criteria, and applying the adjustment factor for crash experience, the intersection satisfied Warrant 1, Eight-Hour Vehicular Volume, for 9 hours.[1]

Consideration was given to modifying the standard four-leg intersection to a modern roundabout, but the narrow public right-of-way and existing single family homes do not allow the needed space.

The current and future potential for additional commercial development in areas near Oakland Road, Center Point Road and I-380 to the west of this intersection and expansion of Mount Mercy College two blocks south of this intersection are indicators of a growing neighborhood commercial area that will generate additional traffic at this intersection which will increase the potential for more crashes. Our concern and desire for improved safety at this location is addressed in this safety grant application.

PROPOSED PROJECT

The proposed project includes the installation of new traffic signals and all associated equipment. The new signal poles with mast arms will provide the all-important signal visibility to improve the safety and functionality of this intersection. These improvements should translate into improved intersection safety through the reduction of right-angle type traffic accidents.[2]

Features of the proposed project include:

- New combination signal/ lighting poles for each intersection approach, including 12" LED signal indications with backplates.
- Pole locations that will provide clear zones in compliance with current standards.
- Countdown pedestrian signal indications and accessible pushbuttons on each intersection approach.
- "Dilemma zone" protection will be provided for each approach.
- Radio interconnect to traffic signal at 29th Street & Oakland Road NE intersection.

Due to the relatively low approach volumes, the distance to the next signalized intersection, and possible weather condition issues, the City proposes to operate the intersection as "rest in red" initially. Advance detection on 29th Street will call the 'green phase' with minimal delay for vehicles traveling within the posted speed limit. Vehicles approaching at higher speeds will be required to slow or stop. Stopline detection will provide the 'call' for Prairie Drive traffic, and responsive operation will be a benefit. As traffic volumes increase on 29th Street, operation will be re-evaluated for typical operation with recall to, and rest in, the major street phase.

New sidewalk installations are not a part of this safety improvement project. A "Safe Route to School" grant application for sidewalk on the west side of Prairie Drive is planned.

The proposed project will provide the needed traffic safety protection to reduce right-angle accidents, provide the necessary signal equipment to improve pedestrian safety, and will also reduce the potential for fixed object crashes along both 29th Street & Prairie Drive.

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[1] Warrant criteria were satisfied for 8 hours under "Interruption of Traffic" analysis, and 9 hours under the Combination analysis.

[2] 67% CRF per Davis, G.A. and Aul, N., "Safety Effects of Left-Turn Phasing Schemes at High-Speed Intersections", Minnesota Department of Transportation, Report No. MN/RC-2007-03, (2007) or 74% CRF per Gan, A., Shen, J., and Rodriguez, A., "Update of Florida Crash Reduction Factors and Countermeasures to Improve the Development of District Safety Improvement Projects." Florida Department of Transportation, (2005)

C

29th Street and Prairie Drive NE Intersection Improvement Project

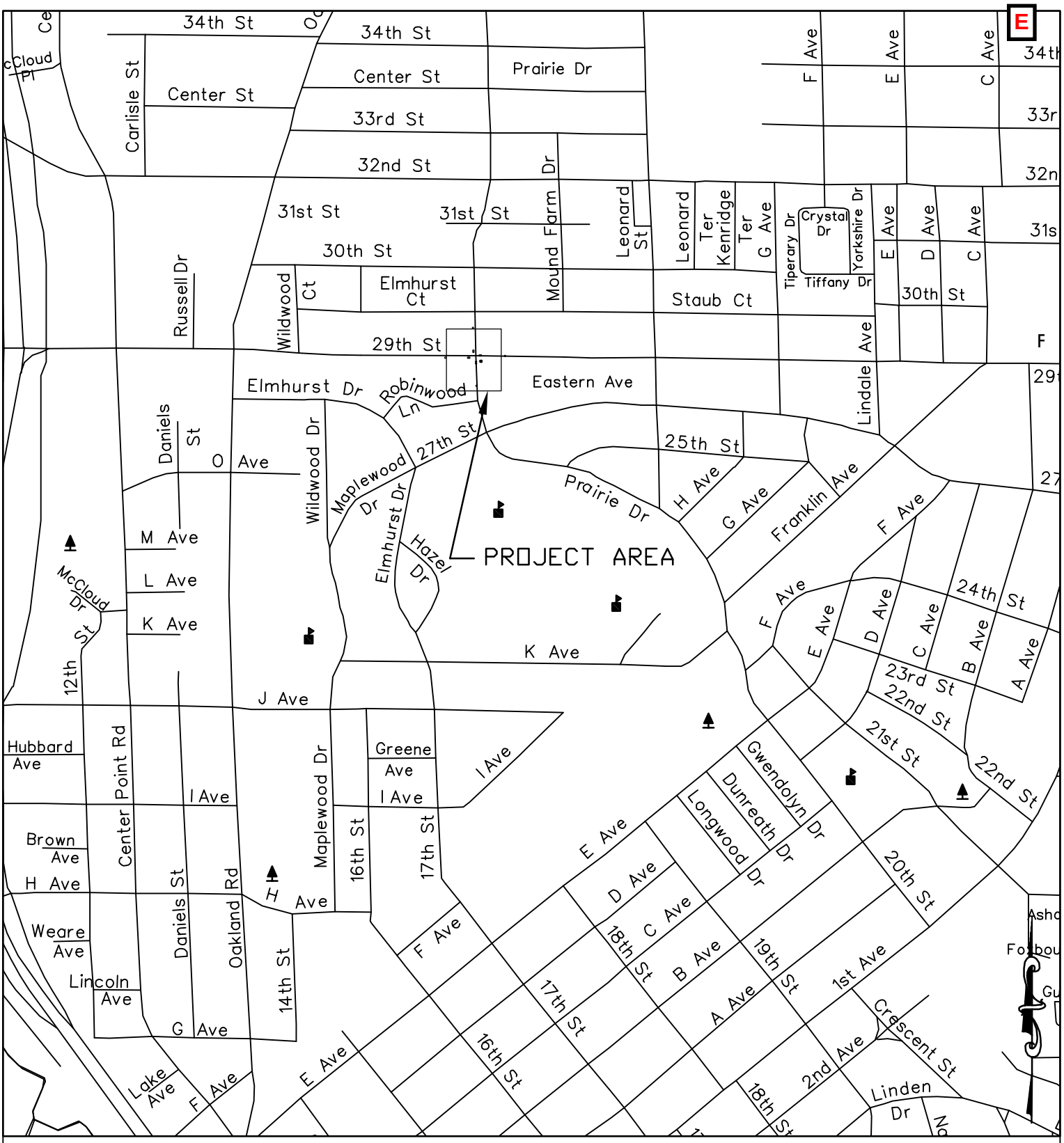
Engineer's Opinion of Probable Construction Cost All items are furnished and installed by the Contractor unless otherwise indicated.				
ITEM	Unit	Quantity	Est Unit Price	Extension
Signal Cabinet w controller & acc's	EA	1	$13,000	$ 13,000
Combination Signal/ Lighting Assembly	EA	4	$6,000	$ 24,000
Pole footing	EA	4	$2,200	$ 8,800
Signal Cabinet Base w/ riser	EA	1	$950	$ 950
Handhole - concrete	EA	3	$600	$ 1,800
Handhole - Quazite	EA	1	$1,100	$ 1,100
Conduit - bored				
3" PVC	LF	300	$18	$ 5,400
3-section Heads, mounted w/ backplates	EA	8	$720	$ 5,760
Pedestrian Heads, countdown	EA	8	$700	$ 5,600
Pushbuttons w/ signs	EA	8	$200	$ 1,600
Wireless Detection system	LS	1	$15,000	$ 15,000
Radio Interconnect system	LS	1	$5,000	$ 5,000
Signal Cable				
7C	LF	500	$1.60	$ 800
5C	LF	2,000	$1.50	$ 3,000
2C	LF	2,000	$0.80	$ 1,600
Power Cable	LF	100	$1.10	$ 110
Power Service	EA	1	$960	$ 960
Mobilization	LS			$ 2,500
Traffic Control	LS			$ 2,500
Construction Total				**$ 100,000**
Engineering				**$ 20,000**
Contingency				**$ 13,000**
TOTAL				**$ 133,000**

EXHIBIT "D"

TIME SCHEDULE FOR PROPOSED PROJECT

29TH STREET AND PRAIRIE DRIVE NE INTERSECTION IMPROVEMENTS

June 15, 2010	**--**	**T.S.I.P. Project submittal deadline**
December 15, 2010	**--**	**Traffic Safety Improvements Program approval**
July 15, 2011	**--**	**Project agreement approval**
December 15, 2011	**--**	**Project letting**
April 15, 2012	**--**	**Project construction start**
October 15, 2012	**--**	**Project construction completion**



LOCATION MAP

LEGEND

F FIRE STATION
SCHOOL
PARK

FILE NO.: 60-10-004	
DRAWN BY: JLR	
APPROVED BY: LH	
DATE: 6/14/10	
SCALE: 1" = 1000'	

29TH ST & PRAIRIE DR NE

CEDAR RAPIDS
City Of Five Seasons

EXHIBIT "F"

COLOR PICTURES OF THE PROJECT SITE

29th Street and Prairie Drive NE Intersection Improvement Project

Photo 1. Eastbound view on 29th Street NE toward Prairie Drive intersection (at streetname sign).

Photo 2. Nearer eastbound view on 29th Street NE toward Prairie Drive intersection & crosswalk.

Photo 3. Westbound view on 29th Street NE toward Prairie Drive intersection (queued vehicles).

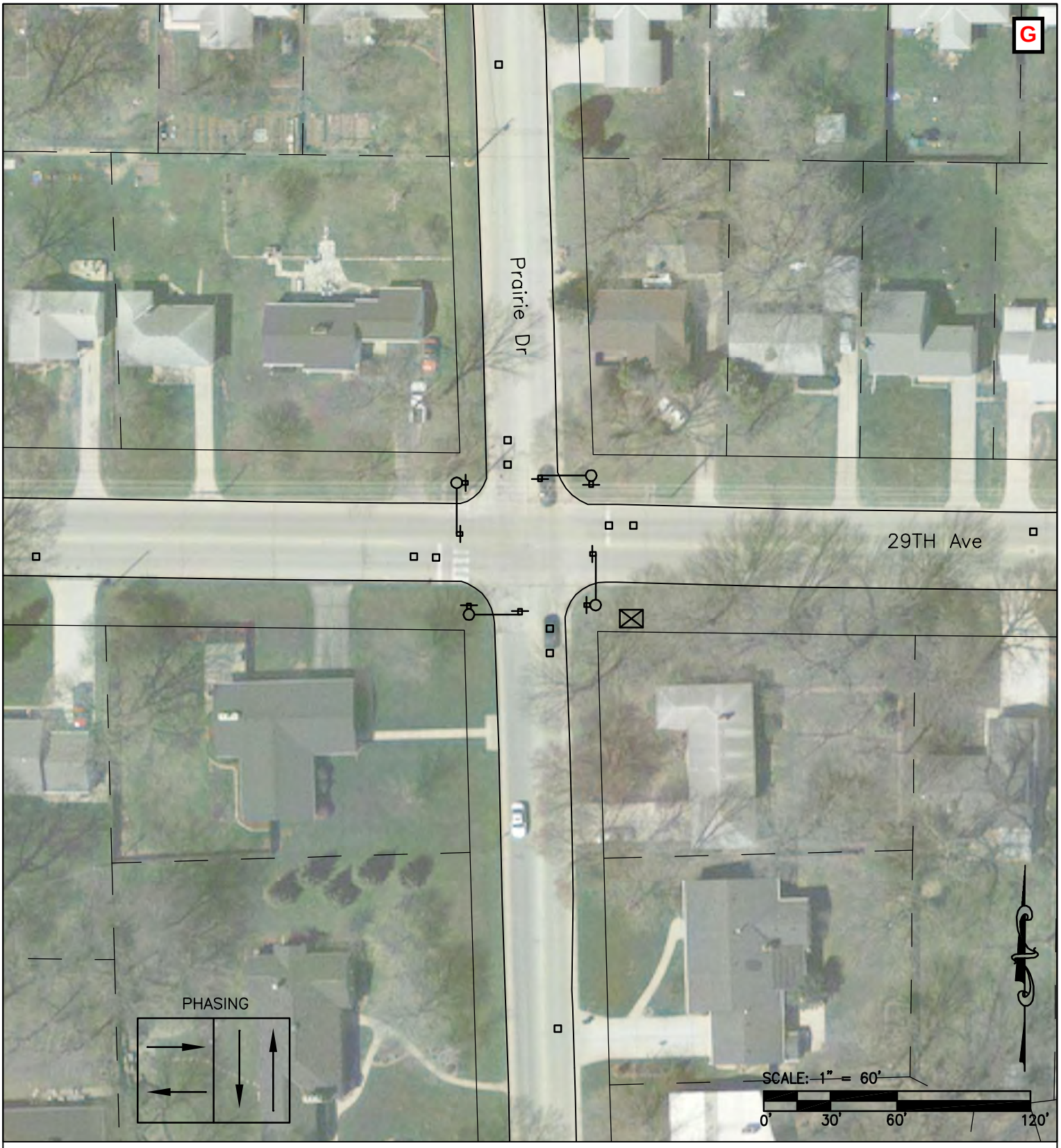
Photo 4. Nearer westbound view on 29th Street NE toward Prairie Drive intersection.

Photo 5. Northbound view on Prairie Drive toward 29th Street NE intersection.

Photo 6. Northbound driver's view from Prairie Drive toward 29th Street NE east leg.

Photo 7. Southbound view on Prairie Drive toward 29th Street NE intersection.

Photo 8. Southbound driver's view from Prairie Drive toward 29th Street NE west leg.



3-SECTION VEHICLE HEAD

VEHICLE DETECTION

SIGNAL CABINET

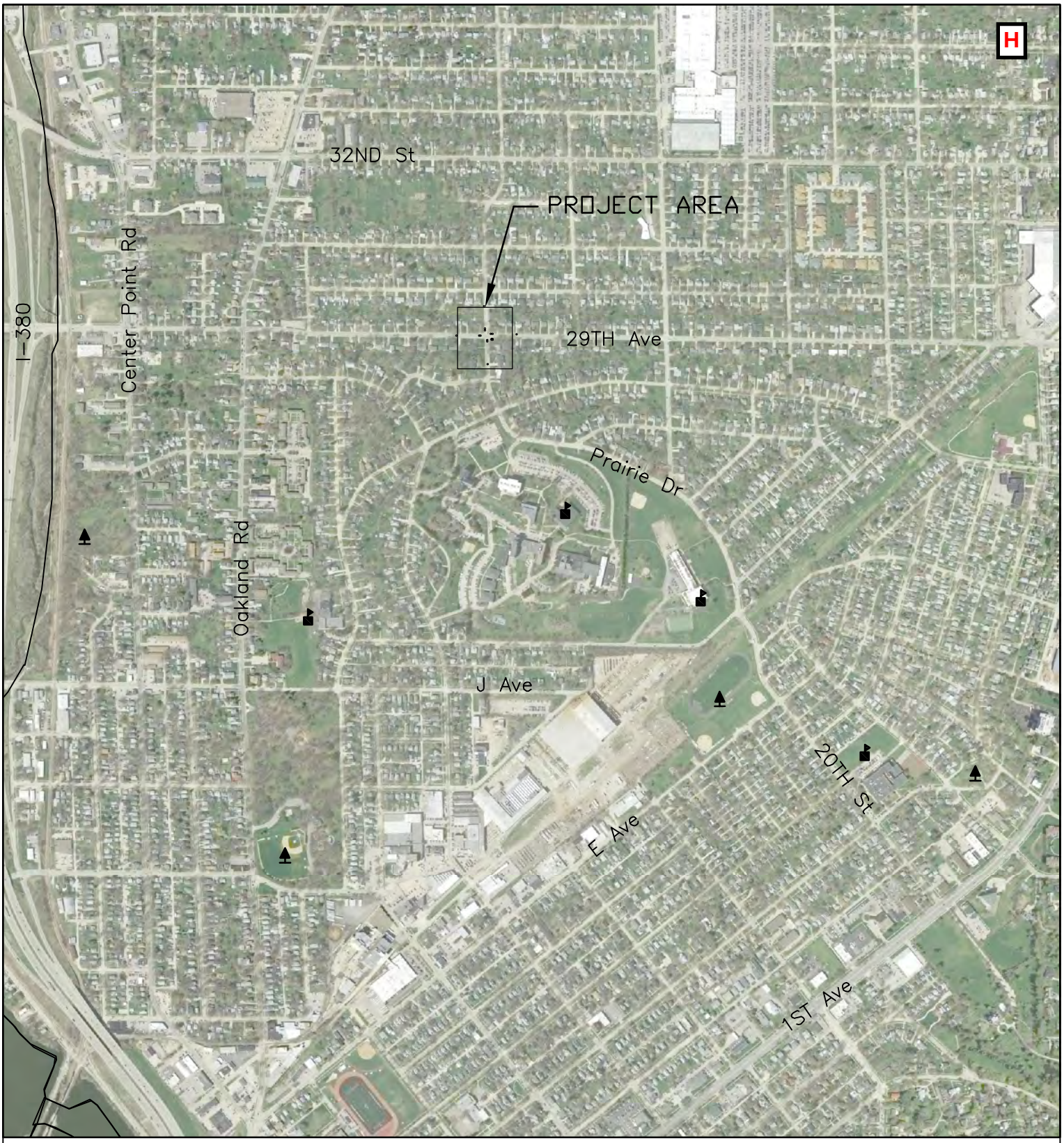
NOTE: COUNTDOWN PEDESTRIAN HEADS AND PUSH-BUTTONS FOR EACH CROSSING.

PLAN SHEET

FILE NO.: 60-10-004	
DRAWN BY: JLR	
APPROVED BY: LH	
DATE: 6/14/10	
SCALE: 1" = 60'	

29TH ST & PRAIRIE DR NE

CEDAR RAPIDS
City Of Five Seasons



AERIAL PHOTOGRAPH

LEGEND

F FIRE STATION
SCHOOL
PARK

FILE NO.: 60-10-004	
DRAWN BY: JLR	
APPROVED BY: LH	
DATE: 6/14/10	
SCALE: 1" = 1000'	

29TH ST & PRAIRIE DR NE

CEDAR RAPIDS
City Of Five Seasons

WARRANT ANALYSIS
MUTCD 2003

Counts taken: May 2010
Major Street Speed Limit (mph): 35

	Traffic Volumes											Warrant 1A		Warrant 1B		Wrnt 1 Combination			
	Major Street		29th Street NE				Minor Street		Prairie Drive NE			Criteria		Criteria		Comb A Criteria		Comb B Criteria	
	Major Street no. of lanes:		1						1			400	120	600	60	320	96	480	48
Interval beginning …	major street traffic volumes	Hourly Total	major street traffic volumes		Hourly Total	Both Major Approaches Hourly Total	minor traffic	Hourly Total	minor traffic	Hourly Total	Higher Volume	Warrant Met?	NO	Warrant Met?	YES	Combination Warrant Met?		YES	
0:00	18	83	10		29	112	3	13	1	8	13	no	no	no	no	no	no	no	no
0:15	15	84	7		30	114	3	15	0	4	15								
0:30	18	73	3		26	99	7	20	1	3	20								
0:45	13	64	1		21	85	2	15	3	5	15								
1:00	5	51	8		19	70	0	12	2	6	12	no	no	no	no	no	no	no	no
1:15	4	40	3		15	55	2	11	0	6	11								
1:30	6	28	3		15	43	1	5	1	6	6								
1:45	7	22	3		17	39	0	3	5	8	8								
2:00	5	22	3		12	34	1	4	0	6	6	no	no	no	no	no	no	no	no
2:15	3	21	3		12	33	0	2	2	8	8								
2:30	8	23	4		13	36	1	2	1	8	8								
2:45	5	21	2		12	33	1	3	2	5	5								
3:00	6	22	1		10	32	0	2	0	5	5	no	no	no	no	no	no	no	no
3:15	2	21	0		7	28	0	2	1	4	4								
3:30	2	15	6		9	24	1	2	0	3	3								
3:45	3	13	3		10	23	0	1	0	1	1								
4:00	3	10	1		10	20	0	1	1	2	2	no	no	no	no	no	no	no	no
4:15	6	14	6		16	30	1	2	2	3	3								
4:30	5	17	7		17	34	0	1	2	5	5								
4:45	9	23	8		22	45	3	4	2	7	7								
5:00	5	25	8		29	54	0	4	1	7	7	no	no	no	no	no	no	no	no
5:15	8	27	12		35	62	2	5	2	7	7								
5:30	24	46	19		47	93	1	6	5	10	10								
5:45	15	52	17		56	108	3	6	2	10	10								
6:00	19	66	33		81	147	3	9	8	17	17	no	no	no	no	no	no	no	no
6:15	30	88	37		106	194	13	20	12	27	27								
6:30	46	110	67		154	264	9	28	18	40	40								
6:45	77	172	62		199	371	16	41	14	52	52								
7:00	81	234	57		223	457	6	44	12	56	56	yes	no	yes	yes	yes	no	no	yes
7:15	113	317	84		270	587	17	48	23	67	67								
7:30	131	402	122		325	727	24	63	26	75	75								
7:45	171	496	137		400	896	44	91	20	81	91								
8:00	112	527	103		446	973	18	103	11	80	103	yes	no	yes	yes	yes	yes	yes	yes
8:15	82	496	62		424	920	22	108	14	71	108								
8:30	94	459	56		358	817	23	107	25	70	107								
8:45	73	361	70		291	652	19	82	23	73	82								
9:00	51	300	47		235	535	20	84	18	80	84	yes	no	no	yes	yes	no	yes	yes
9:15	63	281	48		221	502	21	83	10	76	83								
9:30	61	248	53		218	466	14	74	18	69	74								
9:45	67	242	37		185	427	12	67	14	60	67								
10:00	56	247	32		170	417	19	66	25	67	67	yes	no	no	yes	yes	no	no	yes
10:15	79	263	44		166	429	13	58	10	67	67								
10:30	47	249	41		154	403	12	56	17	66	66								
10:45	91	273	58		175	448	24	68	18	70	70								
11:00	83	300	62		205	505	15	64	19	64	64	yes	no	no	yes	yes	no	yes	yes
11:15	105	326	59		220	546	18	69	18	72	72								
11:30	62	341	55		234	575	9	66	26	81	81								
11:45	91	341	40		216	557	13	55	17	80	80								
12:00	96	354	49		203	557	25	65	32	93	93	yes	yes	no	yes	yes	yes	yes	yes
12:15	75	324	53		197	521	21	68	33	108	108								
12:30	84	346	47		189	535	21	80	23	105	105								
12:45	85	340	66		215	555	16	83	34	122	122								
13:00	79	323	61		227	550	18	76	34	124	124	yes	no	yes	yes	yes	yes	yes	yes
13:15	97	345	68		242	587	26	81	31	122	122								
13:30	91	352	62		257	609	20	80	20	119	119								
13:45	78	345	63		254	599	16	80	28	113	113								
14:00	51	317	57		250	567	13	75	15	94	94	yes	no	yes	yes	yes	yes	yes	yes
14:15	101	321	63		245	566	19	68	17	80	80								
14:30	103	333	64		247	580	25	73	23	83	83								
14:45	127	382	69		253	635	14	71	26	81	81								
15:00	152	483	73		269	752	18	76	36	102	102	yes	no	yes	yes	yes	yes	yes	yes
15:15	128	510	78		284	794	26	83	24	109	109								
15:30	129	536	76		296	832	27	85	29	115	115								
15:45	121	530	91		318	848	35	106	23	112	112								
16:00	138	516	86		331	847	23	111	23	99	111	yes	yes	yes	yes	yes	yes	yes	yes
16:15	156	544	86		339	883	16	101	33	108	108								
16:30	161	576	99		362	938	26	100	37	116	116								
16:45	170	625	103		374	999	31	96	25	118	118								
17:00	177	664	97		385	1049	28	101	34	129	129	yes	yes	yes	yes	yes	yes	yes	yes
17:15	165	673	106		405	1078	22	107	31	127	127								
17:30	150	662	80		386	1048	18	99	37	127	127								
17:45	132	624	54		337	961	23	91	35	137	137								
18:00	99	546	74		314	860	23	86	22	125	125	yes	no	yes	yes	yes	yes	yes	yes
18:15	88	469	68		276	745	30	94	24	118	118								
18:30	80	399	58		254	653	16	92	21	102	102								
18:45	90	357	40		240	597	15	84	28	95	95								
19:00	74	332	52		218	550	17	78	24	97	97	yes	no	no	yes	yes	yes	yes	yes
19:15	77	321	40		190	511	19	67	15	88	88								
19:30	60	301	52		184	485	12	63	27	94	94								
19:45	57	268	42		186	454	14	62	20	86	86								
20:00	62	256	57		191	447	24	69	14	76	76	yes	no	no	yes	yes	no	no	yes
20:15	73	252	36		187	439	15	65	13	74	74								
20:30	53	245	36		171	416	15	68	25	72	72								
20:45	57	245	53		182	427	9	63	16	68	68								
21:00	41	224	24		149	373	15	54	18	72	72	no	no	no	yes	yes	no	no	yes
21:15	45	196	45		158	354	8	47	16	75	75								
21:30	46	189	27		149	338	17	49	24	74	74								
21:45	38	170	22		118	288	10	50	15	73	73								
22:00	35	164	12		106	270	8	43	4	59	59	no	no	no	no	no	no	no	yes
22:15	26	145	18		79	224	4	39	7	50	50								
22:30	32	131	15		67	198	6	28	6	32	32								
22:45	35	128	18		63	191	8	26	11	28	28								
23:00	20	113	10		61	174	11	29	5	29	29	no	no	no	no	no	no	no	no
23:15	14	101	6		49	150	1	26	4	26	26								
23:30	29	98	7		41	139	2	22	2	22	22								
23:45	22	85	6		29	114	7	21	1	12	21								

Factor 0.8 crash warrant

Warrant 1A

Major Street	Minor Street	Major Street
1	1	500
1	2	500
2	1	600
2	2	600

Warrant 2: Four-Hour Vehicular Volume

Warrant 1B

Major Street	Minor Street	Major Street
1	1	750
1	2	750
2	1	900
2	2	900

Warrant 1 Comb A

Major Street	Minor Street	Major Street
1	1	400
1	2	400
2	1	480
2	2	480

Warrant 1 Comb B

Major Street	Minor Street	Major Street
1	1	600
1	2	600
2	1	720
2	2	720

J

Nu-Metrics Traffic Analyzer Study
Computer Generated Summary Report
City: CEDAR RAPIDS
Street: PRAIRIE DR NORTH OF 29TH ST NE

A study of vehicle traffic was conducted with HI-STAR unit number 3417. The study was done in the SB lane at PRAIRIE DR NORTH OF 29TH ST NE in CEDAR RAPIDS, IA in LINN county. The study began on May/19/10 at 00:00 and concluded on May/20/10 at 00:00, lasting a total of 24.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 1269 vehicles passed through the location with a peak volume of 44 on May/19/10 at [07:45-08:00] and a minimum volume of 0 on May/19/10 at [01:00-01:15]. The AADT count for this study was 1,154.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 10 - 15 MPH range or lower. The average speed for all classifed vehicles was 16 MPH with 2.62% vehicles exceeding the posted speed of 25 MPH. The HI-STAR found 0.52 percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 10MPH and the 85th percentile was 19.12 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >					
0	317	205	20	15	5	4	2	0	1	0	0	1	2	0					

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin.

Most of the vehicles classified during the study were Vans & Pickups. The number of Passenger Vehicles in the study was 0 which represents 0 percent of the total classified vehicles. The number of Vans & Pickups in the study was 547 which represents 96 percent of the total classified vehicles. The number of Busses & Trucks in the study was 0 which represents 0 percent of the total classified vehicles. The number of Tractor Tailers in the study was 25 which represents 0 percent of the total classified vehicles.

< to 21	22 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80 to 139	140 to >												
547	21	2	1	1	0	0	0												

CHART 2

HEADWAY

During the peak traffic period, on May/19/10 at [07:45-08:00] the average headway between vehicles was 20 seconds. During the slowest traffic period, on May/19/10 at [01:00-01:15] the average headway between vehicles was 900 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 58.00 and 121.00 degrees F. The HI-STAR determined that the roadway surface was Dry 100.00% of the time.

J

[Raw] Volume Report

HI-Star ID: 3417	Begin: May/19/10 00:00	End: May/20/10 00:00
Street: PRAIRIE DR NORTH OF 29TH ST N	Lane: SB	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 25	Raw Count: 1269
County: LINN	AADT Factor: 0.909	AADT Count: 1,154

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Wed,May/19/10						
[00:00-00:15]	3	0MPH	68 F	Dry		8
[00:15-00:30]	3	14MPH	66 F	Dry		0
[00:30-00:45]	7	15MPH	66 F	Dry		0
[00:45-01:00]	2	15MPH	66 F	Dry		0
[01:00-01:15]	0	0MPH	64 F	Dry		0
[01:15-01:30]	2	15MPH	64 F	Dry		0
[01:30-01:45]	1	0MPH	64 F	Dry		0
[01:45-02:00]	0	0MPH	64 F	Dry		0
[02:00-02:15]	1	18MPH	62 F	Dry		0
[02:15-02:30]	0	0MPH	62 F	Dry		0
[02:30-02:45]	1	0MPH	62 F	Dry		0
[02:45-03:00]	1	12MPH	62 F	Dry		0
[03:00-03:15]	0	0MPH	62 F	Dry		0
[03:15-03:30]	0	0MPH	60 F	Dry		0
[03:30-03:45]	1	12MPH	60 F	Dry		0
[03:45-04:00]	0	0MPH	60 F	Dry		0
[04:00-04:15]	0	0MPH	60 F	Dry		0
[04:15-04:30]	1	18MPH	58 F	Dry		0
[04:30-04:45]	0	0MPH	58 F	Dry		0
[04:45-05:00]	3	12MPH	58 F	Dry		0
[05:00-05:15]	0	0MPH	58 F	Dry		0
[05:15-05:30]	2	15MPH	58 F	Dry		0
[05:30-05:45]	1	18MPH	58 F	Dry		0
[05:45-06:00]	3	22MPH	58 F	Dry		0
[06:00-06:15]	3	14MPH	58 F	Dry		0
[06:15-06:30]	13	14MPH	58 F	Dry		8
[06:30-06:45]	9	17MPH	58 F	Dry		0
[06:45-07:00]	16	15MPH	58 F	Dry		9
[07:00-07:15]	6	15MPH	60 F	Dry		0
[07:15-07:30]	17	18MPH	60 F	Dry		2
[07:30-07:45]	24	18MPH	62 F	Dry		17
[07:45-08:00]	44	16MPH	64 F	Dry		5
[08:00-08:15]	18	16MPH	66 F	Dry		0
[08:15-08:30]	22	17MPH	66 F	Dry		2
[08:30-08:45]	23	19MPH	70 F	Dry		19
[08:45-09:00]	19	15MPH	68 F	Dry		1
[09:00-09:15]	20	18MPH	68 F	Dry		0
[09:15-09:30]	21	15MPH	68 F	Dry		1
[09:30-09:45]	14	20MPH	68 F	Dry		13
[09:45-10:00]	12	15MPH	70 F	Dry		18

J

[Raw] Volume Report

HI-Star ID: 3417	Begin: May/19/10 00:00	End: May/20/10 00:00
Street: PRAIRIE DR NORTH OF 29TH ST N	Lane: SB	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 25	Raw Count: 1269
County: LINN	AADT Factor: 0.909	AADT Count: 1,154

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Wed,May/19/10						
[10:00-10:15]	19	16MPH	76 F	Dry		7
[10:15-10:30]	13	14MPH	74 F	Dry		4
[10:30-10:45]	12	25MPH	72 F	Dry		7
[10:45-11:00]	24	14MPH	74 F	Dry		10
[11:00-11:15]	15	14MPH	76 F	Dry		1
[11:15-11:30]	18	16MPH	93 F	Dry		12
[11:30-11:45]	9	16MPH	101 F	Dry		7
[11:45-12:00]	13	16MPH	105 F	Dry		8
[12:00-12:15]	25	16MPH	107 F	Dry		3
[12:15-12:30]	21	16MPH	111 F	Dry		2
[12:30-12:45]	21	14MPH	115 F	Dry		1
[12:45-13:00]	16	15MPH	117 F	Dry		9
[13:00-13:15]	18	15MPH	119 F	Dry		1
[13:15-13:30]	26	19MPH	119 F	Dry		22
[13:30-13:45]	20	16MPH	121 F	Dry		13
[13:45-14:00]	16	14MPH	121 F	Dry		0
[14:00-14:15]	13	17MPH	115 F	Dry		0
[14:15-14:30]	19	14MPH	111 F	Dry		1
[14:30-14:45]	25	14MPH	107 F	Dry		11
[14:45-15:00]	14	14MPH	101 F	Dry		4
[15:00-15:15]	18	17MPH	97 F	Dry		1
[15:15-15:30]	26	14MPH	95 F	Dry		14
[15:30-15:45]	27	20MPH	95 F	Dry		4
[15:45-16:00]	35	19MPH	93 F	Dry		9
[16:00-16:15]	23	17MPH	95 F	Dry		13
[16:15-16:30]	16	14MPH	95 F	Dry		1
[16:30-16:45]	26	16MPH	93 F	Dry		2
[16:45-17:00]	31	14MPH	97 F	Dry		33
[17:00-17:15]	28	16MPH	97 F	Dry		8
[17:15-17:30]	22	18MPH	95 F	Dry		5
[17:30-17:45]	18	15MPH	93 F	Dry		7
[17:45-18:00]	23	20MPH	91 F	Dry		9
[18:00-18:15]	23	15MPH	93 F	Dry		7
[18:15-18:30]	30	16MPH	93 F	Dry		7
[18:30-18:45]	16	14MPH	91 F	Dry		1
[18:45-19:00]	15	15MPH	89 F	Dry		0
[19:00-19:15]	17	15MPH	85 F	Dry		8
[19:15-19:30]	19	16MPH	83 F	Dry		8
[19:30-19:45]	12	14MPH	82 F	Dry		0

J

[Raw] Volume Report

HI-Star ID: 3417	Begin: May/19/10 00:00	End: May/20/10 00:00
Street: PRAIRIE DR NORTH OF 29TH ST N	Lane: SB	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 25	Raw Count: 1269
County: LINN	AADT Factor: 0.909	AADT Count: 1,154

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Wed,May/19/10						
[19:45-20:00]	14	15 MPH	80 F	Dry		6
[20:00-20:15]	24	14 MPH	78 F	Dry		3
[20:15-20:30]	15	16 MPH	78 F	Dry		1
[20:30-20:45]	15	14 MPH	76 F	Dry		0
[20:45-21:00]	9	15 MPH	76 F	Dry		0
[21:00-21:15]	15	16 MPH	76 F	Dry		0
[21:15-21:30]	8	14 MPH	76 F	Dry		0
[21:30-21:45]	17	14 MPH	74 F	Dry		0
[21:45-22:00]	10	15 MPH	72 F	Dry		0
[22:00-22:15]	8	16 MPH	72 F	Dry		0
[22:15-22:30]	4	13 MPH	72 F	Dry		0
[22:30-22:45]	6	14 MPH	72 F	Dry		0
[22:45-23:00]	8	17 MPH	70 F	Dry		9
[23:00-23:15]	11	24 MPH	70 F	Dry		0
[23:15-23:30]	1	0 MPH	70 F	Dry		0
[23:30-23:45]	2	13 MPH	70 F	Dry		0
[23:45-00:00]	7	15 MPH	70 F	Dry		0
	1269	15 MPH	79 F			

J

Nu-Metrics Traffic Analyzer Study
Computer Generated Summary Report
City: CEDAR RAPIDS
Street: 29TH ST WEST OF PRAIRIE DR NE

A study of vehicle traffic was conducted with HI-STAR unit number 3386. The study was done in the EB lane at 29TH ST WEST OF PRAIRIE DR NE in CEDAR RAPIDS, IA in LINN county. The study began on May/19/10 at 00:00 and concluded on May/20/10 at 00:00, lasting a total of 24.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 6149 vehicles passed through the location with a peak volume of 177 on May/19/10 at [17:00-17:15] and a minimum volume of 2 on May/19/10 at [03:15-03:30]. The AADT count for this study was 5,589.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 30 - 35 MPH range or lower. The average speed for all classifed vehicles was 28 MPH with 45.96% vehicles exceeding the posted speed of 25 MPH. The HI-STAR found 0.38 percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 30MPH and the 85th percentile was 36.72 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >					
0	242	1031	753	814	1355	786	181	48	17	8	9	3	7	1					

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin.

Most of the vehicles classified during the study were Vans & Pickups. The number of Passenger Vehicles in the study was 0 which represents 0 percent of the total classified vehicles. The number of Vans & Pickups in the study was 5112 which represents 97 percent of the total classified vehicles. The number of Busses & Trucks in the study was 0 which represents 0 percent of the total classified vehicles. The number of Tractor Tailers in the study was 143 which represents 0 percent of the total classified vehicles.

< to 21	22 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80 to 139	140 to >												
5112	127	13	2	1	0	0	0												

CHART 2

HEADWAY

During the peak traffic period, on May/19/10 at [17:00-17:15] the average headway between vehicles was 5.056 seconds. During the slowest traffic period, on May/19/10 at [03:15-03:30] the average headway between vehicles was 300 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 58.00 and 123.00 degrees F. The HI-STAR determined that the roadway surface was Dry 100.00% of the time.

J

[Raw] Volume Report

HI-Star ID: 3386	Begin: May/19/10 00:00	End: May/20/10 00:00
Street: 29TH ST WEST OF PRAIRIE DR NE	Lane: EB	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 25	Raw Count: 6149
County: LINN	AADT Factor: 0.909	AADT Count: 5,589

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Wed,May/19/10						
[00:00-00:15]	18	28 MPH	70 F	Dry		0
[00:15-00:30]	15	28 MPH	68 F	Dry		0
[00:30-00:45]	18	28 MPH	68 F	Dry		0
[00:45-01:00]	13	36 MPH	68 F	Dry		0
[01:00-01:15]	5	28 MPH	66 F	Dry		0
[01:15-01:30]	4	29 MPH	66 F	Dry		0
[01:30-01:45]	6	21 MPH	66 F	Dry		0
[01:45-02:00]	7	37 MPH	66 F	Dry		0
[02:00-02:15]	5	32 MPH	64 F	Dry		0
[02:15-02:30]	3	22 MPH	64 F	Dry		0
[02:30-02:45]	8	27 MPH	64 F	Dry		0
[02:45-03:00]	5	26 MPH	64 F	Dry		0
[03:00-03:15]	6	30 MPH	64 F	Dry		0
[03:15-03:30]	2	33 MPH	62 F	Dry		0
[03:30-03:45]	2	18 MPH	62 F	Dry		0
[03:45-04:00]	3	34 MPH	62 F	Dry		0
[04:00-04:15]	3	29 MPH	62 F	Dry		0
[04:15-04:30]	6	26 MPH	60 F	Dry		0
[04:30-04:45]	5	30 MPH	60 F	Dry		0
[04:45-05:00]	9	39 MPH	60 F	Dry		8
[05:00-05:15]	5	29 MPH	60 F	Dry		0
[05:15-05:30]	8	32 MPH	58 F	Dry		0
[05:30-05:45]	24	30 MPH	58 F	Dry		3
[05:45-06:00]	15	29 MPH	58 F	Dry		0
[06:00-06:15]	19	33 MPH	58 F	Dry		0
[06:15-06:30]	30	31 MPH	58 F	Dry		0
[06:30-06:45]	46	31 MPH	60 F	Dry		1
[06:45-07:00]	77	29 MPH	60 F	Dry		2
[07:00-07:15]	81	29 MPH	62 F	Dry		2
[07:15-07:30]	113	27 MPH	66 F	Dry		5
[07:30-07:45]	131	25 MPH	70 F	Dry		8
[07:45-08:00]	171	26 MPH	72 F	Dry		7
[08:00-08:15]	112	32 MPH	76 F	Dry		17
[08:15-08:30]	82	32 MPH	78 F	Dry		2
[08:30-08:45]	94	27 MPH	82 F	Dry		8
[08:45-09:00]	73	30 MPH	85 F	Dry		5
[09:00-09:15]	51	28 MPH	89 F	Dry		1
[09:15-09:30]	63	28 MPH	91 F	Dry		3
[09:30-09:45]	61	28 MPH	95 F	Dry		5
[09:45-10:00]	67	28 MPH	97 F	Dry		5

J

[Raw] Volume Report

HI-Star ID: 3386	Begin: May/19/10 00:00	End: May/20/10 00:00
Street: 29TH ST WEST OF PRAIRIE DR NE	Lane: EB	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 25	Raw Count: 6149
County: LINN	AADT Factor: 0.909	AADT Count: 5,589

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Wed,May/19/10						
[10:00-10:15]	56	30 MPH	99 F	Dry		6
[10:15-10:30]	79	30 MPH	103 F	Dry		7
[10:30-10:45]	47	32 MPH	105 F	Dry		1
[10:45-11:00]	91	28 MPH	107 F	Dry		4
[11:00-11:15]	83	28 MPH	109 F	Dry		5
[11:15-11:30]	105	27 MPH	111 F	Dry		5
[11:30-11:45]	62	29 MPH	113 F	Dry		1
[11:45-12:00]	91	29 MPH	115 F	Dry		3
[12:00-12:15]	96	30 MPH	115 F	Dry		3
[12:15-12:30]	75	27 MPH	117 F	Dry		2
[12:30-12:45]	84	26 MPH	119 F	Dry		8
[12:45-13:00]	85	29 MPH	121 F	Dry		2
[13:00-13:15]	79	29 MPH	121 F	Dry		5
[13:15-13:30]	97	29 MPH	121 F	Dry		3
[13:30-13:45]	91	28 MPH	121 F	Dry		3
[13:45-14:00]	78	32 MPH	121 F	Dry		2
[14:00-14:15]	51	30 MPH	123 F	Dry		7
[14:15-14:30]	101	27 MPH	121 F	Dry		6
[14:30-14:45]	103	24 MPH	121 F	Dry		5
[14:45-15:00]	127	28 MPH	121 F	Dry		6
[15:00-15:15]	152	24 MPH	119 F	Dry		6
[15:15-15:30]	128	27 MPH	117 F	Dry		4
[15:30-15:45]	129	25 MPH	117 F	Dry		5
[15:45-16:00]	121	27 MPH	117 F	Dry		5
[16:00-16:15]	138	28 MPH	115 F	Dry		4
[16:15-16:30]	156	28 MPH	113 F	Dry		5
[16:30-16:45]	131	28 MPH	111 F	Dry		5
[16:45-17:00]	170	26 MPH	109 F	Dry		7
[17:00-17:15]	177	25 MPH	107 F	Dry		6
[17:15-17:30]	165	28 MPH	105 F	Dry		5
[17:30-17:45]	150	28 MPH	105 F	Dry		5
[17:45-18:00]	132	28 MPH	103 F	Dry		5
[18:00-18:15]	99	28 MPH	101 F	Dry		6
[18:15-18:30]	88	28 MPH	99 F	Dry		6
[18:30-18:45]	80	30 MPH	97 F	Dry		2
[18:45-19:00]	90	27 MPH	95 F	Dry		3
[19:00-19:15]	74	29 MPH	91 F	Dry		7
[19:15-19:30]	77	29 MPH	89 F	Dry		3
[19:30-19:45]	60	27 MPH	87 F	Dry		5

J

[Raw] Volume Report

HI-Star ID: 3386	Begin: May/19/10 00:00	End: May/20/10 00:00
Street: 29TH ST WEST OF PRAIRIE DR NE	Lane: EB	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 25	Raw Count: 6149
County: LINN	AADT Factor: 0.909	AADT Count: 5,589

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Wed,May/19/10						
[19:45-20:00]	57	27 MPH	85 F	Dry		6
[20:00-20:15]	62	27 MPH	83 F	Dry		1
[20:15-20:30]	73	29 MPH	82 F	Dry		3
[20:30-20:45]	53	27 MPH	80 F	Dry		5
[20:45-21:00]	57	28 MPH	80 F	Dry		4
[21:00-21:15]	41	26 MPH	78 F	Dry		3
[21:15-21:30]	45	27 MPH	78 F	Dry		1
[21:30-21:45]	46	28 MPH	76 F	Dry		1
[21:45-22:00]	38	26 MPH	76 F	Dry		1
[22:00-22:15]	35	28 MPH	76 F	Dry		0
[22:15-22:30]	26	28 MPH	76 F	Dry		4
[22:30-22:45]	32	30 MPH	76 F	Dry		1
[22:45-23:00]	35	30 MPH	76 F	Dry		4
[23:00-23:15]	20	28 MPH	74 F	Dry		0
[23:15-23:30]	14	25 MPH	74 F	Dry		9
[23:30-23:45]	29	28 MPH	72 F	Dry		0
[23:45-00:00]	22	31 MPH	72 F	Dry		0
	6149	28 MPH	87 F			

J

Nu-Metrics Traffic Analyzer Study
Computer Generated Summary Report
City: CEDAR RAPIDS
Street: 29TH ST EAST OF PRAIRIE DR NE

A study of vehicle traffic was conducted with HI-STAR unit number 3415. The study was done in the WB lane at 29TH ST EAST OF PRAIRIE DR NE in CEDAR RAPIDS, IA in LINN county. The study began on May/19/10 at 00:00 and concluded on May/20/10 at 00:00, lasting a total of 24.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 4173 vehicles passed through the location with a peak volume of 137 on May/19/10 at [07:45-08:00] and a minimum volume of 0 on May/19/10 at [03:15-03:30]. The AADT count for this study was 3,793.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 35 - 40 MPH range or lower. The average speed for all classifed vehicles was 34 MPH with 78.28% vehicles exceeding the posted speed of 25 MPH. The HI-STAR found 0.82 percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 35MPH and the 85th percentile was 40.38 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >					
0	81	192	212	307	1123	1154	392	91	38	27	14	7	2	7					

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin.

Most of the vehicles classified during the study were Vans & Pickups. The number of Passenger Vehicles in the study was 0 which represents 0 percent of the total classified vehicles. The number of Vans & Pickups in the study was 3533 which represents 97 percent of the total classified vehicles. The number of Busses & Trucks in the study was 0 which represents 0 percent of the total classified vehicles. The number of Tractor Tailers in the study was 114 which represents 0 percent of the total classified vehicles.

< to 21	22 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80 to 139	140 to >												
3533	102	4	5	2	1	0	0												

CHART 2

HEADWAY

During the peak traffic period, on May/19/10 at [07:45-08:00] the average headway between vehicles was 6.522 seconds. During the slowest traffic period, on May/19/10 at [03:15-03:30] the average headway between vehicles was 900 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 58.00 and 117.00 degrees F. The HI-STAR determined that the roadway surface was Dry 100.00% of the time.

J

[Raw] Volume Report

HI-Star ID: 3415	Begin: May/19/10 00:00	End: May/20/10 00:00
Street: 29TH ST EAST OF PRAIRIE DR NE	Lane: WB	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 25	Raw Count: 4173
County: LINN	AADT Factor: 0.909	AADT Count: 3,793

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Wed,May/19/10						
[00:00-00:15]	10	33 MPH	70 F	Dry		0
[00:15-00:30]	7	27 MPH	68 F	Dry		0
[00:30-00:45]	3	33 MPH	68 F	Dry		0
[00:45-01:00]	1	32 MPH	68 F	Dry		0
[01:00-01:15]	8	30 MPH	66 F	Dry		0
[01:15-01:30]	3	28 MPH	66 F	Dry		0
[01:30-01:45]	3	27 MPH	66 F	Dry		0
[01:45-02:00]	3	33 MPH	66 F	Dry		0
[02:00-02:15]	3	37 MPH	64 F	Dry		0
[02:15-02:30]	3	34 MPH	64 F	Dry		0
[02:30-02:45]	4	26 MPH	64 F	Dry		0
[02:45-03:00]	2	38 MPH	64 F	Dry		0
[03:00-03:15]	1	42 MPH	64 F	Dry		0
[03:15-03:30]	0	0 MPH	62 F	Dry		0
[03:30-03:45]	6	33 MPH	62 F	Dry		0
[03:45-04:00]	3	38 MPH	62 F	Dry		0
[04:00-04:15]	1	42 MPH	62 F	Dry		0
[04:15-04:30]	6	43 MPH	62 F	Dry		0
[04:30-04:45]	7	35 MPH	62 F	Dry		0
[04:45-05:00]	8	37 MPH	60 F	Dry		0
[05:00-05:15]	8	37 MPH	60 F	Dry		0
[05:15-05:30]	12	36 MPH	60 F	Dry		0
[05:30-05:45]	19	38 MPH	58 F	Dry		0
[05:45-06:00]	17	37 MPH	58 F	Dry		0
[06:00-06:15]	33	37 MPH	58 F	Dry		0
[06:15-06:30]	37	36 MPH	60 F	Dry		0
[06:30-06:45]	67	37 MPH	62 F	Dry		1
[06:45-07:00]	62	35 MPH	64 F	Dry		3
[07:00-07:15]	57	35 MPH	66 F	Dry		1
[07:15-07:30]	84	36 MPH	68 F	Dry		2
[07:30-07:45]	122	35 MPH	70 F	Dry		5
[07:45-08:00]	137	32 MPH	72 F	Dry		8
[08:00-08:15]	103	34 MPH	74 F	Dry		6
[08:15-08:30]	62	33 MPH	76 F	Dry		2
[08:30-08:45]	56	34 MPH	80 F	Dry		2
[08:45-09:00]	70	33 MPH	83 F	Dry		6
[09:00-09:15]	47	36 MPH	85 F	Dry		1
[09:15-09:30]	48	34 MPH	89 F	Dry		1
[09:30-09:45]	53	34 MPH	89 F	Dry		1
[09:45-10:00]	37	33 MPH	82 F	Dry		1

J

[Raw] Volume Report

HI-Star ID: 3415	Begin: May/19/10 00:00	End: May/20/10 00:00
Street: 29TH ST EAST OF PRAIRIE DR NE	Lane: WB	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 25	Raw Count: 4173
County: LINN	AADT Factor: 0.909	AADT Count: 3,793

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Wed,May/19/10						
[10:00-10:15]	32	35 MPH	82 F	Dry		1
[10:15-10:30]	44	29 MPH	83 F	Dry		9
[10:30-10:45]	41	36 MPH	80 F	Dry		1
[10:45-11:00]	58	37 MPH	78 F	Dry		6
[11:00-11:15]	62	35 MPH	78 F	Dry		1
[11:15-11:30]	59	34 MPH	78 F	Dry		1
[11:30-11:45]	55	31 MPH	78 F	Dry		2
[11:45-12:00]	40	34 MPH	80 F	Dry		7
[12:00-12:15]	49	34 MPH	93 F	Dry		1
[12:15-12:30]	53	36 MPH	99 F	Dry		1
[12:30-12:45]	47	34 MPH	103 F	Dry		1
[12:45-13:00]	66	35 MPH	107 F	Dry		1
[13:00-13:15]	61	34 MPH	109 F	Dry		1
[13:15-13:30]	68	35 MPH	111 F	Dry		1
[13:30-13:45]	62	33 MPH	113 F	Dry		8
[13:45-14:00]	63	35 MPH	115 F	Dry		3
[14:00-14:15]	57	33 MPH	115 F	Dry		1
[14:15-14:30]	63	36 MPH	115 F	Dry		3
[14:30-14:45]	64	32 MPH	117 F	Dry		1
[14:45-15:00]	69	32 MPH	117 F	Dry		9
[15:00-15:15]	73	35 MPH	113 F	Dry		5
[15:15-15:30]	78	34 MPH	111 F	Dry		5
[15:30-15:45]	76	33 MPH	113 F	Dry		7
[15:45-16:00]	91	32 MPH	111 F	Dry		4
[16:00-16:15]	86	34 MPH	111 F	Dry		3
[16:15-16:30]	86	35 MPH	107 F	Dry		2
[16:30-16:45]	99	35 MPH	107 F	Dry		2
[16:45-17:00]	103	34 MPH	107 F	Dry		4
[17:00-17:15]	97	34 MPH	105 F	Dry		5
[17:15-17:30]	106	33 MPH	101 F	Dry		9
[17:30-17:45]	80	35 MPH	101 F	Dry		1
[17:45-18:00]	54	33 MPH	101 F	Dry		5
[18:00-18:15]	74	37 MPH	99 F	Dry		1
[18:15-18:30]	68	35 MPH	97 F	Dry		10
[18:30-18:45]	58	37 MPH	97 F	Dry		1
[18:45-19:00]	40	36 MPH	91 F	Dry		1
[19:00-19:15]	52	32 MPH	89 F	Dry		5
[19:15-19:30]	40	34 MPH	87 F	Dry		4
[19:30-19:45]	52	33 MPH	85 F	Dry		2

J

[Raw] Volume Report

HI-Star ID: 3415	Begin: May/19/10 00:00	End: May/20/10 00:00
Street: 29TH ST EAST OF PRAIRIE DR NE	Lane: WB	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 25	Raw Count: 4173
County: LINN	AADT Factor: 0.909	AADT Count: 3,793

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Wed,May/19/10						
[19:45-20:00]	42	32 MPH	83 F	Dry		5
[20:00-20:15]	57	30 MPH	83 F	Dry		3
[20:15-20:30]	36	31 MPH	82 F	Dry		3
[20:30-20:45]	36	32 MPH	80 F	Dry		6
[20:45-21:00]	53	30 MPH	78 F	Dry		2
[21:00-21:15]	24	33 MPH	78 F	Dry		0
[21:15-21:30]	45	32 MPH	76 F	Dry		1
[21:30-21:45]	27	33 MPH	76 F	Dry		0
[21:45-22:00]	22	29 MPH	76 F	Dry		0
[22:00-22:15]	12	33 MPH	76 F	Dry		0
[22:15-22:30]	18	32 MPH	76 F	Dry		0
[22:30-22:45]	15	33 MPH	76 F	Dry		0
[22:45-23:00]	18	30 MPH	74 F	Dry		0
[23:00-23:15]	10	35 MPH	74 F	Dry		0
[23:15-23:30]	6	36 MPH	72 F	Dry		0
[23:30-23:45]	7	29 MPH	72 F	Dry		0
[23:45-00:00]	6	33 MPH	72 F	Dry		0
	4173	34 MPH	82 F			

J

Nu-Metrics Traffic Analyzer Study
Computer Generated Summary Report
City: CEDAR RAPIDS
Street: PRAIRIE DR SOUTH OF 29TH ST NE

A study of vehicle traffic was conducted with HI-STAR unit number 3385. The study was done in the NB lane at PRAIRIE DR SOUTH OF 29TH ST NE in CEDAR RAPIDS, IA in LINN county. The study began on May/19/10 at 00:00 and concluded on May/20/10 at 00:00, lasting a total of 24.00 hours. Traffic statistics were recorded in 15 minute time periods. The total recorded volume showed 1507 vehicles passed through the location with a peak volume of 37 on May/19/10 at [16:30-16:45] and a minimum volume of 0 on May/19/10 at [00:15-00:30]. The AADT count for this study was 1,370.

SPEED

Chart 1 lists the values of the speed bins and the total traffic volume for each bin. At least half the vehicles were traveling in the 10 - 15 MPH range or lower. The average speed for all classifed vehicles was 15 MPH with 2.57% vehicles exceeding the posted speed of 25 MPH. The HI-STAR found 0.54 percent of the total vehicles were traveling in excess of 55 MPH. The mode speed for this traffic study was 10MPH and the 85th percentile was 18.45 MPH.

< to 9	10 to 14	15 to 19	20 to 24	25 to 29	30 to 34	35 to 39	40 to 44	45 to 49	50 to 54	55 to 59	60 to 64	65 to 69	70 to 74	75 to >					
0	497	190	20	14	3	7	3	1	1	0	1	1	1	1					

CHART 1

CLASSIFICATION

Chart 2 lists the values of the classification bins and the total traffic volume accumulated for each bin.

Most of the vehicles classified during the study were Vans & Pickups. The number of Passenger Vehicles in the study was 0 which represents 0 percent of the total classified vehicles. The number of Vans & Pickups in the study was 711 which represents 96 percent of the total classified vehicles. The number of Busses & Trucks in the study was 0 which represents 0 percent of the total classified vehicles. The number of Tractor Tailers in the study was 29 which represents 0 percent of the total classified vehicles.

< to 21	22 to 39	40 to 49	50 to 59	60 to 69	70 to 79	80 to 139	140 to >												
711	26	1	1	0	0	1	0												

CHART 2

HEADWAY

During the peak traffic period, on May/19/10 at [16:30-16:45] the average headway between vehicles was 23.684 seconds. During the slowest traffic period, on May/19/10 at [00:15-00:30] the average headway between vehicles was 900 seconds.

WEATHER

The roadway surface temperature over the period of the study varied between 56.00 and 107.00 degrees F. The HI-STAR determined that the roadway surface was Dry 100.00% of the time.

J

[Raw] Volume Report

HI-Star ID: 3385	Begin: May/19/10 00:00	End: May/20/10 00:00
Street: PRAIRIE DR SOUTH OF 29TH ST N	Lane: NB	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 25	Raw Count: 1507
County: LINN	AADT Factor: 0.909	AADT Count: 1,370

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Wed,May/19/10						
[00:00-00:15]	1	12MPH	64 F	Dry		0
[00:15-00:30]	0	0MPH	64 F	Dry		0
[00:30-00:45]	1	0MPH	64 F	Dry		0
[00:45-01:00]	3	18MPH	64 F	Dry		0
[01:00-01:15]	2	12MPH	62 F	Dry		0
[01:15-01:30]	0	0MPH	62 F	Dry		0
[01:30-01:45]	1	18MPH	62 F	Dry		0
[01:45-02:00]	5	13MPH	62 F	Dry		0
[02:00-02:15]	0	0MPH	60 F	Dry		0
[02:15-02:30]	2	22MPH	60 F	Dry		0
[02:30-02:45]	1	18MPH	60 F	Dry		0
[02:45-03:00]	2	20MPH	60 F	Dry		0
[03:00-03:15]	0	0MPH	58 F	Dry		0
[03:15-03:30]	1	0MPH	58 F	Dry		0
[03:30-03:45]	0	0MPH	58 F	Dry		0
[03:45-04:00]	0	0MPH	58 F	Dry		0
[04:00-04:15]	1	12MPH	58 F	Dry		0
[04:15-04:30]	2	18MPH	58 F	Dry		0
[04:30-04:45]	2	12MPH	58 F	Dry		0
[04:45-05:00]	2	15MPH	56 F	Dry		0
[05:00-05:15]	1	12MPH	56 F	Dry		0
[05:15-05:30]	2	15MPH	56 F	Dry		0
[05:30-05:45]	5	13MPH	56 F	Dry		0
[05:45-06:00]	2	13MPH	56 F	Dry		0
[06:00-06:15]	8	13MPH	56 F	Dry		0
[06:15-06:30]	12	13MPH	56 F	Dry		0
[06:30-06:45]	18	15MPH	56 F	Dry		1
[06:45-07:00]	14	15MPH	56 F	Dry		0
[07:00-07:15]	12	14MPH	58 F	Dry		1
[07:15-07:30]	23	14MPH	58 F	Dry		6
[07:30-07:45]	26	16MPH	60 F	Dry		4
[07:45-08:00]	20	15MPH	60 F	Dry		6
[08:00-08:15]	11	16MPH	62 F	Dry		26
[08:15-08:30]	14	14MPH	62 F	Dry		1
[08:30-08:45]	25	18MPH	62 F	Dry		16
[08:45-09:00]	23	14MPH	64 F	Dry		2
[09:00-09:15]	18	14MPH	64 F	Dry		22
[09:15-09:30]	10	13MPH	66 F	Dry		0
[09:30-09:45]	18	14MPH	66 F	Dry		0
[09:45-10:00]	14	15MPH	70 F	Dry		3

J

[Raw] Volume Report

HI-Star ID: 3385	Begin: May/19/10 00:00	End: May/20/10 00:00
Street: PRAIRIE DR SOUTH OF 29TH ST N	Lane: NB	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 25	Raw Count: 1507
County: LINN	AADT Factor: 0.909	AADT Count: 1,370

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Wed,May/19/10						
[10:00-10:15]	25	17 MPH	74 F	Dry		10
[10:15-10:30]	20	14 MPH	72 F	Dry		1
[10:30-10:45]	17	14 MPH	70 F	Dry		1
[10:45-11:00]	18	14 MPH	70 F	Dry		16
[11:00-11:15]	19	14 MPH	70 F	Dry		3
[11:15-11:30]	18	15 MPH	70 F	Dry		3
[11:30-11:45]	26	14 MPH	72 F	Dry		2
[11:45-12:00]	17	18 MPH	72 F	Dry		13
[12:00-12:15]	32	14 MPH	72 F	Dry		25
[12:15-12:30]	33	17 MPH	72 F	Dry		8
[12:30-12:45]	23	17 MPH	74 F	Dry		1
[12:45-13:00]	34	13 MPH	76 F	Dry		4
[13:00-13:15]	34	15 MPH	76 F	Dry		28
[13:15-13:30]	31	14 MPH	76 F	Dry		9
[13:30-13:45]	20	14 MPH	76 F	Dry		3
[13:45-14:00]	28	16 MPH	76 F	Dry		15
[14:00-14:15]	15	14 MPH	83 F	Dry		2
[14:15-14:30]	17	14 MPH	97 F	Dry		17
[14:30-14:45]	23	15 MPH	103 F	Dry		13
[14:45-15:00]	26	14 MPH	107 F	Dry		19
[15:00-15:15]	36	14 MPH	105 F	Dry		54
[15:15-15:30]	24	19 MPH	103 F	Dry		9
[15:30-15:45]	29	13 MPH	105 F	Dry		10
[15:45-16:00]	23	14 MPH	107 F	Dry		47
[16:00-16:15]	23	13 MPH	105 F	Dry		18
[16:15-16:30]	33	14 MPH	103 F	Dry		25
[16:30-16:45]	37	16 MPH	101 F	Dry		9
[16:45-17:00]	25	15 MPH	101 F	Dry		19
[17:00-17:15]	34	20 MPH	101 F	Dry		56
[17:15-17:30]	31	21 MPH	97 F	Dry		21
[17:30-17:45]	37	17 MPH	95 F	Dry		25
[17:45-18:00]	35	16 MPH	91 F	Dry		25
[18:00-18:15]	22	14 MPH	89 F	Dry		2
[18:15-18:30]	24	14 MPH	87 F	Dry		2
[18:30-18:45]	21	15 MPH	85 F	Dry		1
[18:45-19:00]	28	15 MPH	83 F	Dry		11
[19:00-19:15]	24	14 MPH	82 F	Dry		7
[19:15-19:30]	15	14 MPH	80 F	Dry		1
[19:30-19:45]	27	14 MPH	80 F	Dry		7

J

[Raw] Volume Report

HI-Star ID: 3385	Begin: May/19/10 00:00	End: May/20/10 00:00
Street: PRAIRIE DR SOUTH OF 29TH ST N	Lane: NB	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 25	Raw Count: 1507
County: LINN	AADT Factor: 0.909	AADT Count: 1,370

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Wed,May/19/10						
[19:45-20:00]	20	17 MPH	78 F	Dry		5
[20:00-20:15]	14	15 MPH	76 F	Dry		0
[20:15-20:30]	13	14 MPH	76 F	Dry		0
[20:30-20:45]	25	17 MPH	76 F	Dry		2
[20:45-21:00]	16	14 MPH	76 F	Dry		0
[21:00-21:15]	18	14 MPH	74 F	Dry		1
[21:15-21:30]	16	19 MPH	72 F	Dry		3
[21:30-21:45]	24	18 MPH	72 F	Dry		2
[21:45-22:00]	15	17 MPH	72 F	Dry		7
[22:00-22:15]	4	14 MPH	70 F	Dry		0
[22:15-22:30]	7	14 MPH	70 F	Dry		0
[22:30-22:45]	6	14 MPH	70 F	Dry		0
[22:45-23:00]	11	18 MPH	70 F	Dry		0
[23:00-23:15]	5	25 MPH	68 F	Dry		0
[23:15-23:30]	4	15 MPH	68 F	Dry		0
[23:30-23:45]	2	13 MPH	68 F	Dry		0
[23:45-00:00]	1	18 MPH	68 F	Dry		0
	1507	14 MPH	73 F			

Rev. 5/08

Intersection or Spot Benefit / Cost Safety Analysis

Iowa DOT Office of Traffic & Safety

County: Linn | Prepared by: CR PW-TED | Date Prepared: May 7, 2010

Intersection: 29th Street & Prairie Drive NE

Improvement

Proposed Improvement(s): Install traffic signal

*****RIGHT ANGLE CRASHES ONLY (Davis et al, 2007)*****

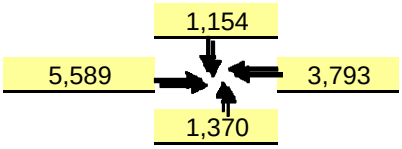
$ 133,000	Estimated Improvement Cost, **EC**	15	Est. Improvement Life, years, **Y**
$ 1,000	Other Annual Cost (after initial year), **AC**	67	Crash Reduction Factor (integer), **CRF**
$ 11,118	Present Value Other Annual Costs, **OC**	4.0%	Discount Rate (time value of $), **INT**
		$ 144,118	Present Value Cost, **COST** = EC + OC

$$OC = \frac{AC}{INT}\left(1 - \frac{1}{(1+INT)^Y}\right)$$

Traffic Volume Data

Source: City of Cedar Rapids | 5/19/2010 Date of traffic count

Daily Entering Vehicles by Approach (or AADT / 2)



4,345,690	Current Annual Entering Veh., **AEV** = DEV * 365
18,549	veh / day, Final Year DEV, **FDEV**
80.83	MEV, Total Million Entering Veh. Over life of Project, **TMEV**
3.0%	Projected Traffic Growth (0%-10%), **G**
11,906	Current Daily Entering Vehicles, **DEV**

$$TMEV = \frac{AEV}{-G}\left(1 - \left(\frac{1+G}{1}\right)^Y\right) \Big/ 10^6$$

Crash Data

2004 First full year --> 2008 Last full year — 5.0 years, Time Period, **T**

Additional months — values as of Dec. 2007

0	Fatal Crashes		Fatalities @	$3,500,000	$	-
			Major Injuries @	$240,000	$	-
2	Injury Crashes	1	Minor Injuries @	$48,000	$	48,000
		1	Possible Injuries @	$25,000	$	25,000
14	Property Damage Only		(assumed cost per crash)	$2,700	$	-
		-OR-	enter Actual Cost of all property damage:		$	56,266
16	Total Crashes, **TA**			Total $ Loss, **LOSS**	$	129,266

3.20	Current Crashes / Year, **AA** = TA / T	**0.74**	Crashes / MEV, Crash Rate, **CR**
$ 8,079	Cost per Crash, **AVC** = LOSS / TA		CR = TA x 10^6 / (DEV x 365 x T)
59.5	Total Expected Crashes, **TECR** = CR x TMEV	**$ 233,697**	Present Value of Avoided Crashes, **BENEFIT**
2.14	Crashes Avoided First Year **AAR** = AA x CRF / 100		
$ 17,322	Crash Costs Avoided in First Year, AAR x AVC		
39.9	Total Avoided Crashes, TECR x CRF/ 100		

$$BEN. = \frac{AVC \times AAR}{(INT - G)}\left(1 - \left(\frac{1+G}{1+INT}\right)^Y\right)$$

Benefit / Cost Ratio

Benefit : Cost = $233,697 : $144,118 = **1.62** : 1

L

Rev. 5/08

Intersection or Spot Benefit / Cost Safety Analysis

Iowa DOT Office of Traffic & Safety

County: Linn | Prepared by: CR PW-TED | Date Prepared: May 7, 2010

Intersection: 29th Street & Prairie Drive NE

Improvement

Proposed Improvement(s): Install traffic signal

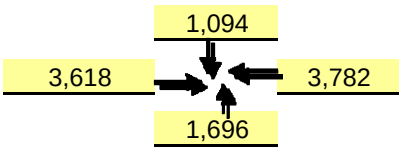
$ 200,000	Estimated Improvement Cost, **EC**	15	Est. Improvement Life, years, **Y**
$ 1,000	Other Annual Cost (after initial year), **AC**	30	Crash Reduction Factor (integer), **CRF**
$ 11,118	Present Value Other Annual Costs, **OC**	4.0%	Discount Rate (time value of $), **INT**
		$ 211,118	Present Value Cost, **COST** = EC + OC

$$OC = \frac{AC}{INT}\left(1 - \frac{1}{(1+INT)^Y}\right)$$

Traffic Volume Data

Source: City of Cedar Rapids | 9/14/2006 Date of traffic count

Daily Entering Vehicles by Approach (or AADT / 2)



3,719,350	Current Annual Entering Veh., **AEV** = DEV * 365
13,714	veh / day, Final Year DEV, **FDEV**
64.32	MEV, Total Million Entering Veh. Over life of Project, **TMEV**
2.0%	Projected Traffic Growth (0%-10%), **G**
10,190	Current Daily Entering Vehicles, **DEV**

$$TMEV = \frac{AEV}{-G}\left(1 - \left(\frac{1+G}{1}\right)^Y\right) \Big/ 10^6$$

Crash Data

2004	First full year -->	2008	Last full year	5.4 years, Time Period, **T**		
5	Additional months			values as of Dec. 2007		
0	Fatal Crashes		Fatalities @	$3,500,000	$	-
		1	Major Injuries @	$240,000	$	240,000
7	Injury Crashes	3	Minor Injuries @	$48,000	$	144,000
		3	Possible Injuries @	$25,000	$	75,000
17	Property Damage Only		(assumed cost per crash)	$2,700	$	-
			-OR- enter Actual Cost of all property damage:		$	91,026
24	Total Crashes, **TA**			Total $ Loss, **LOSS**	$	550,026

4.43	Current Crashes / Year, **AA** = TA / T	**1.19**	Crashes / MEV, Crash Rate, **CR**
$ 22,918	Cost per Crash, **AVC** = LOSS / TA		CR = TA x 10^6 / (DEV x 365 x T)
76.6	Total Expected Crashes, **TECR** = CR x TMEV	**$ 384,880**	Present Value of Avoided Crashes, **BENEFIT**
1.33	Crashes Avoided First Year **AAR** = AA x CRF / 100		
$ 30,463	Crash Costs Avoided in First Year, AAR x AVC		
23.0	Total Avoided Crashes, TECR x CRF/ 100		

$$BEN. = \frac{AVC \times AAR}{(INT - G)}\left(1 - \left(\frac{1+G}{1+INT}\right)^Y\right)$$

Benefit / Cost Ratio

Benefit : Cost = $384,880 : $211,118 = **1.82** : 1

Iowa Department of Transportation

Rev. 3/08 A

Application for TRAFFIC SAFETY FUNDS

GENERAL INFORMATION

Location / Title of Project: Williams Blvd/ US 151 & Dean Road SW Intersection Improvement Project

Applicant: City of Cedar Rapids

Contact Person: Leslie Hart, P.E. PTOE Title: Associate Traffic Engineer

Complete Mailing Address: 1201 6th St SW
Cedar Rapids, IA 52404

Phone: 319-286-5802 (Area Code) E-Mail: l.hart@cedar-rapids.org

If more than one highway authority is involved in this project, please indicate and fill in the information below (use additional sheets if necessary).

Co-Applicant(s): Iowa DOT (Project concurrence under consideration)

Contact Person: _____ Title: _____

Complete Mailing Address: _____

Phone: _____ (Area Code) E-Mail: _____

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Application Type

- Site Specific ☒
- Traffic Control Device ☐
- Safety Study ☐

Funding Amount

Total Project Cost $ 176,000

Safety Funds Requested $ 176,000

EXHIBIT "B"

PROJECT NARRATIVE

Williams Boulevard and Dean Road SW Intersection Improvement Project

EXISTING CONDITIONS

Williams Boulevard SW is US Highway 151 entering the southwest quadrant of Cedar Rapids. Within Iowa, the highway runs north and east from I-80 near the Amana Colonies to where it enters Wisconsin at Dubuque. Approaching the City, the 55 mile-per-hour 2-lane rural roadway widens to provide left-turn lanes at the Dean Road intersection. A westbound right-turn lane is also provided.

Dean Road SW is a collector street serving an expanding medium-to-high density residential area on the west side of Williams Blvd/ US 151, and a small established neighborhood on the east side. On the west leg, Dean Road is a 41' wide two-lane street, with left-turn lane at Williams Boulevard and a posted speed limit of 30 mph. The east leg connects to a frontage road that provides shared access to eight homes and one business site.

The area has potential for further single-family and multi-family development. Undeveloped land in the northeast quadrant of the intersection is zoned for commercial use.

Traffic data collected in March 2010 found the following AADT's:

- Williams Boulevard/ US 151 – south of Dean Road: 13,340 vehicles per day (vpd)
- Williams Boulevard/ US 151 – north of Dean Road: 15,500 vpd
- Dean Road – west of Williams Boulevard: 2,270 vpd
- Dean Road – east of Williams Boulevard: 150 vpd

Signal warrant analysis was completed per 2009 *Manual on Uniform Traffic Control Devices* (*MUTCD)* criteria, and applying the adjustment factor for high-speed major street, the intersection satisfied Warrant 1, Eight-Hour Vehicular Volume, for 11 hours. Due to the very high percentage of southbound vehicles on Dean Road that complete a left-turn onto Williams Boulevard and continue toward the City; 1,020 of 1,095 total southbound vehicles; Dean Road was analyzed as a 1-lane minor street.

Traffic accident numbers at this location average about 2 reported crashes per year over the last 5 years. Reported crashes reached a recent high of 5 in 2007 including 1 personal injury crash. There were also 3 crashes in 2006 including 2 personal injury crashes. A crash diagram of the 11 reported crashes (including 3 personal injury crashes) from 2004 through 2008 (5 years) is attached. Typical crash types include:

- Right-angle/ Entering Highway crashes: 4 of the 11 crashes were right angle type resulting in 1 injury accident.

- Rear-end crashes: 6 of the 11 crashes were rear-end type resulting in 2 injury accidents. Three crashes occurred between vehicles southbound on Dean Road, and three eastbound on Williams Boulevard.

PROPOSED PROJECT

The proposed project is the installation of a fully-actuated and interconnected traffic signal. These improvements should translate into improved intersection safety through the reduction of right angle crashes. Converting the rural intersection control from two-way *STOP* to signal control is expected to reduce the potential for all types and severities of crashes by 44%.[1]

Features of the proposed project include:

- Combination signal/ lighting poles for each intersection approach
- 12" LED signal indications with backplates.
- Pole locations that will provide clear zones in compliance with current standards.
- Countdown pedestrian signal indications and accessible pushbuttons on each intersection approach.
- "Dilemma zone" protection for Williams Boulevard/ US 151 approaches.
- Coordinated operation via radio interconnect communication with the existing traffic signal at Williams Boulevard and Stoney Point Road/ Beverly Road SW, approximately one-half mile west of the site.

[1] Harkey, D., et al., Accident Modification Factors for Traffic Engineering and ITS Improvements, NCHRP Report 617, TRB, 2008

C

Williams Blvd and Dean Rd SW Intersection Improvement Project

Engineer's Opinion of Probable Construction Cost All items are furnished and installed by the Contractor unless otherwise indicated.				
ITEM	Unit	Quantity	Est Unit Price	Extension
Signal Cabinet w controller & acc's	EA	1	$13,000	$ 13,000
Combination Signal/ Lighting Assembly	EA	4	$8,500	$ 34,000
Pole footing	EA	4	$2,800	$ 11,200
Signal Cabinet Base w/ riser	EA	1	$920	$ 920
Handhole - concrete	EA	3	$590	$ 1,770
Handhole - Quazite	EA	2	$1,110	$ 2,220
Conduit - trenched				
3" PVC	LF	150	$15	$ 2,250
Conduit - pushed				
3" PVC	LF	300	$20	$ 6,000
5-section Heads, mounted w/ backplates	EA	2	$1,010	$ 2,020
3-section Heads, mounted w/ backplates	EA	8	$720	$ 5,760
Pedestrian Heads, countdown	EA	8	$700	$ 5,600
Pushbuttons w/ signs	EA	8	$150	$ 1,200
Luminaires - high efficiency	EA	4	$800	$ 3,200
Wireless Detection system	LS	1	$25,000	$ 25,000
Radio Interconnect system	LS	1	$8,000	$ 8,000
Signal Cable				
7C	LF	700	$1.60	$ 1,120
5C	LF	2,100	$1.50	$ 3,150
2C	LF	2,100	$0.80	$ 1,680
Luminaire cable	LF	1,000	$1.00	$ 1,000
Power Cable	LF	150	$1.10	$ 165
Power Service	EA	1	$960	$ 960
Mobilization	LS			$ 2,500
Traffic Control	LS			$ 2,500
Construction Total				**$ 136,000**
Engineering				**$ 20,000**
Contingency				**$ 20,000**
TOTAL				**$ 176,000**

EXHIBIT "D"

TIME SCHEDULE FOR PROPOSED PROJECT

TRAFFIC SAFETY IMPROVEMENTS @ WILLIAMS BLVD./HWY 151 & DEAN ROAD SW

June 15, 2010	**--**	**T.S.I.P. Project submittal deadline**
December 15, 2010	**--**	**Traffic Safety Improvements Program approval**
July 15, 2011	**--**	**Project agreement approval**
December 15, 2012	**--**	**Project letting**
April 15, 2013	**--**	**Project construction start**
October 15, 2013	**--**	**Project construction completion**

E

US 30

West Post Rd

Pheasant Hollow Rd

Dean Rd

Falcon View Rd

Field Stone Pl

Water Point Rd

Stoneview Cr

Fox Run Dr

Point Ct

Palmetto Cr

Highway 151

Waterview Dr

Water

Lakeview Dr

Julie Ln

Tarpy Dr

PROJECT AREA

Beverly Rd

Selzer Rd

Williams Blvd

West Post Rd

Hillcrest Rd

Dr

View Dr

LOCATION MAP

FILE NO.: 60-10-004	
DRAWN BY: JLR	
APPROVED BY: LH	
DATE: 6/14/10	
SCALE: 1" = 1000'	

WILLIAMS BLVD AND DEAN RD SW

CEDAR RAPIDS
City Of Five Seasons

EXHIBIT "F"

COLOR PICTURES OF THE PROJECT SITE

Williams Boulevard/ US 151 and Dean Road SW

Photo 1. Westbound view of Williams Blvd/ US 151 to Dean Road SW

Photo 2. Nearer westbound view of Williams Blvd/ US 151 approach to Dean Road SW

Photo 3. Eastbound view of Williams Blvd/ US 151 approach to Dean Road SW

Photo 4. Southbound Dean Road approach to Williams Blvd/ US 151

F

NOTE:

For a southbound passenger car driver to enter Williams Blvd/ US 151 with left-turn from stop, the design time gap to cross three travel lanes (right-turn, through & left-turn) is 8.5 seconds.[1]

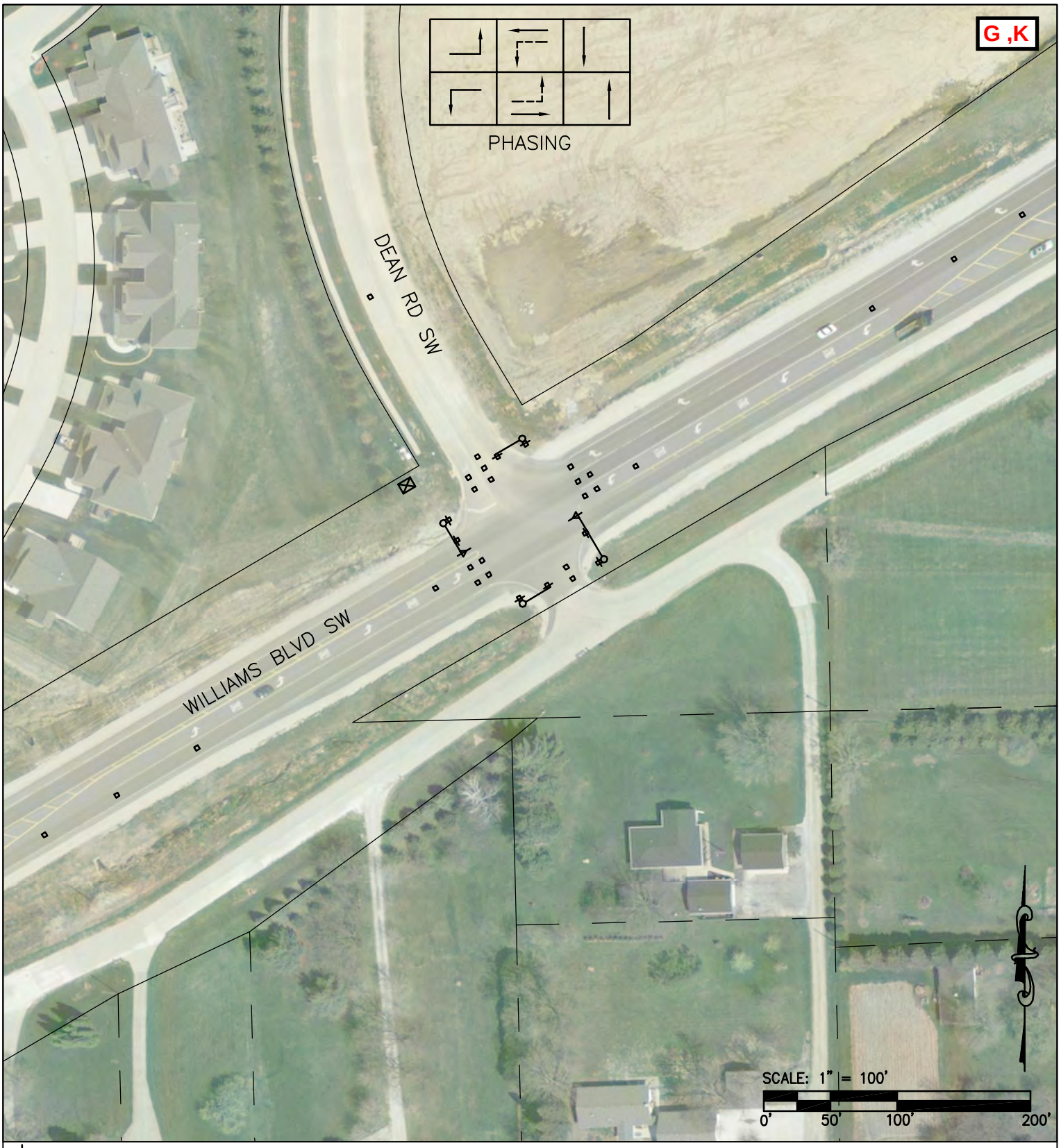
Photo 5. Southbound driver's view to westbound US 151 traffic.

Photo 6. Southbound driver's view to eastbound US 151 traffic.

[1] "Geometric Design of Highways and Street", AASHTO, 2004..

Photo 7. View to eastbound Williams Blvd/ US 151 from frontage road on east leg of intersection.

Photo 8. View from frontage road on east leg of intersection to southbound Dean Road approach.



5-SECTION VEHICLE HEAD (2)

3-SECTION VEHICLE HEAD (8)

VEHICLE DETECTION

SIGNAL CABINET

SIGNAL LAYOUT

NOTE: COUNTDOWN PEDESTRIAN HEADS AND PUSH-BUTTONS FOR EACH CROSSING.

FILE NO.: 60-10-004	
DRAWN BY: JLR	
APPROVED BY: LH	
DATE: 6/14/10	
SCALE: 1" = 100'	

WILLIAMS BLVD AND DEAN RD SW

CEDAR RAPIDS
City Of Five Seasons

AERIAL PHOTOGRAPH

FILE NO.: 60-10-004	
DRAWN BY: JLR	
APPROVED BY: LH	
DATE: 6/14/10	
SCALE: 1" = 1000'	

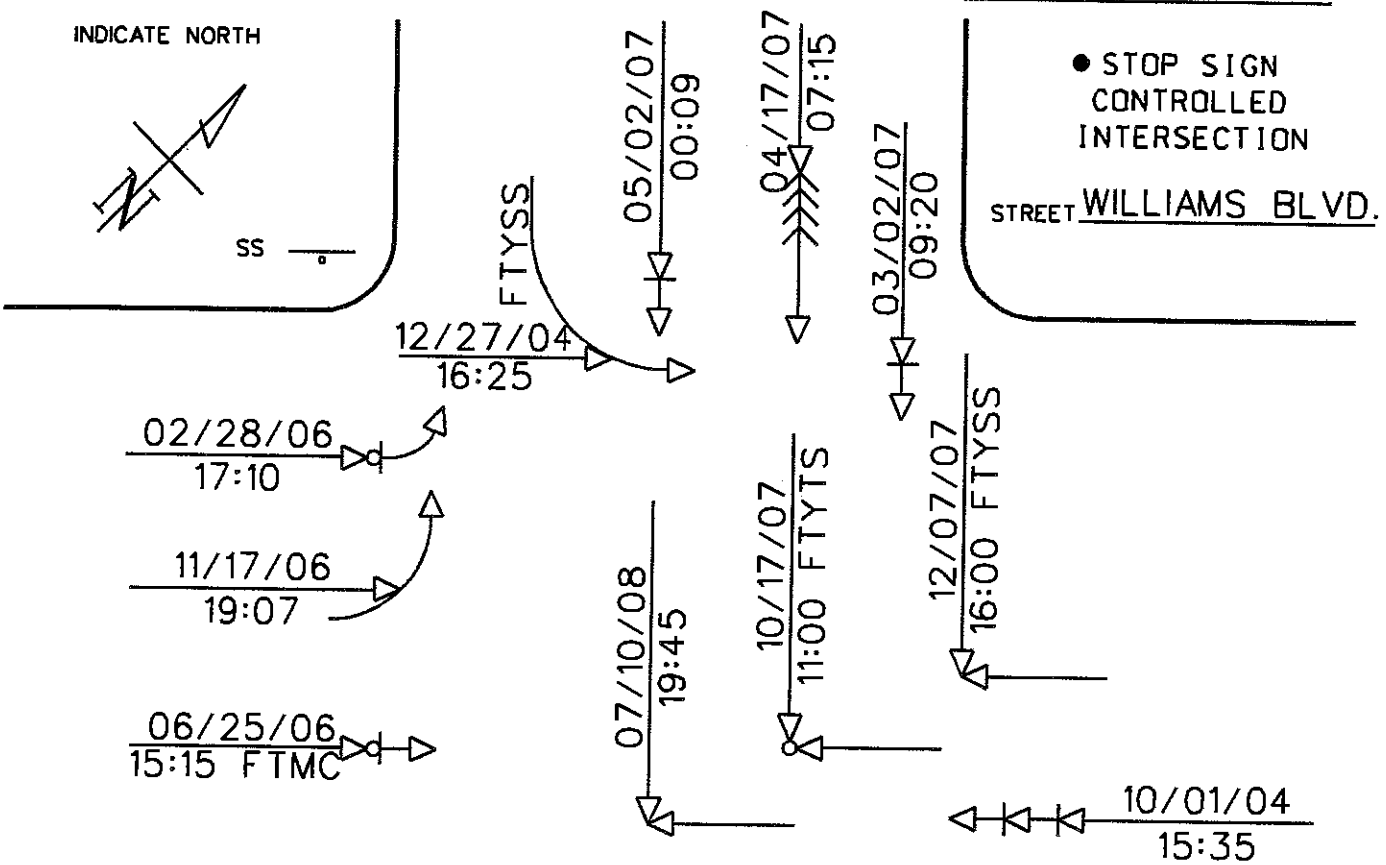
WILLIAMS BLVD AND
DEAN RD SW

CEDAR RAPIDS
City Of Five Seasons

CITY OF CEDAR RAPIDS, IOWA
TRAFFIC ENGINEERING DEPARTMENT

COLLISION DIAGRAM

LOCATION WILLIAMS BLVD. & DEAN RD. SW PERIOD 2004-2008



LEGEND

- M.V. BACKING
- M.V. MOVING AHEAD
- PEDESTRIAN
- PARKED(ING) VEHICLE
- FIXED OBJECT
- REAR END COLLISION
- SIDE SWIPE
- OUT OF CONTROL VEHICLE
- FATAL ACCIDENT
- PERSONAL INJURY
- PROPERTY DAMAGE ONLY

STREET DEAN RD.

TIME: A=A.M. P=P.M.
PAVEMENT: D=DRY I=ICY W=WET
WEATHER: C=CLEAR F=FOG R=RAIN
S=SNOW SL=SLEET
CL=CLOUDY

Accident Diagrams_2010.dgn 6/15/2010 1:57:14 PM

Iowa Department of Transportation

Major Cause Summary

Williams Blvd. & Dean Road SW

Report Version 1.1 Jan 2005

Analysis Years: 2004 [2], 2006 [3], 2007 [5], 2008 [1]

Crash Summary:

Fatal	-
Major Injury	-
Minor Injury	1
Possible/Unknown	2
PDO	8
Total Crashes	11

Injury Summary:

Fatal	-
Major Injury	-
Minor Injury	2
Possible	5
Unknown	-
Total Injuries	7

TOT Property Damage: $100,226

AVG Property Damage: $9,111

Surface Condition Summary:

Dry	7
Wet	3
Ice	1
Snow	-
Slush	-
Sand/Dirt/Oil/Gravel	-
Water	-
Other	-
Unknown	-
Not Reported	-
Total Crashes	11

Major Cause Summary:

	Animal
	Ran Traffic Signal
	Ran Stop Sign
	Crossed Centerline
	FTYROW: At Uncontrolled Intersection
	FTYROW: Making Right Turn on Red Signal
2	FTYROW: From Stop Sign
	FTYROW: From Yield Sign
1	FTYROW: Making Left Turn
	FTYROW: From Driveway
	FTYROW: From Parked Position
	FTYROW: To Pedestrian
	FTYROW: Other (explain in narrative)
	Traveling Wrong Way or on Wrong Side of Rd
2	Driving Too Fast for Conditions
	Exceeded Authorized Speed
1	Made Improper Turn
	Improper Lane Change
	Followed Too Close
	Disregarded Railroad Signal
	Disregarded Warning Sign
	Operating Vehicle in Reckless/Aggressive Manner
	Improper Backing
	Illegally Parked/Unattended
	Swerving/Evasive Action
	Over-Correcting/Over-Steering
	Downhill Runaway
	Equipment Failure
	Separation of Units
	Ran Off Road - Right
	Ran Off Road - Straight
	Ran Off Road - Left
	Lost Control
1	Inattentive/Distracted By: Passenger
	Inattentive/Distracted By: Use of Phone or Other
	Inattentive/Distracted By: Fallen Object
	Inattentive/Distracted By: Fatigued/Asleep
	Other: Vision Obstructed
	Oversized Load/ Oversized Vehicle
	Cargo/Equipment Loss or Shift
	Other: Other Improper Action
3	Unknown
1	Other: No Improper Action
	None Indicated

Selection Filter:

((YEAR <> 2001 and YEAR <> 2002 and YEAR <> 2003 and YEAR <> 2009))

Analyst: B Meeks

Notes:

Iowa Department of Transportation

Abbreviated Crash Report

Williams Blvd. & Dean Road SW

Report Version 1.2 Mar 2005

Date	DOT Case #	Agency Case #	City	Crash Sev.	Literal Description
10/01/2004	2004247533		Cedar Rapids	PDO	US 0151 / WILLIAMS BLVD measuring 0.25 Miles Southwest from US 0030
12/27/2004	2004264223	200424921	Cedar Rapids	PDO	US 0151 / WILLIAMS BLVD AND DEAN RD
02/28/2006	2006208583	9688ISP	Cedar Rapids	Minor	DEAN RD SW AND US 0151 / WILLIAMS BLVD
06/25/2006	2006226061	200611589	Cedar Rapids	Poss/Unk	DEAN RD SW AND US 0151 / WILLIAMS BLVD
11/17/2006	2006253448		Cedar Rapids	PDO	DEAN RD SW and US 0151 / WILLIAMS BLVD
03/02/2007	2007212854			PDO	DEAN RD SW and US 0151 / WILLIAMS BLVD
04/17/2007	2007367461			PDO	DEAN RD SW and US 0151 / WILLIAMS BLVD
05/02/2007	2007369938		Cedar Rapids	PDO	DEAN RD SW and US 0151 / WILLIAMS BLVD
10/17/2007	2007399135	200718675	Cedar Rapids	Poss/Unk	DEAN RD SW and US 0151 / WILLIAMS BLVD
12/07/2007	2007410003	200721829	Cedar Rapids	PDO	DEAN RD SW AND US 0151 / WILLIAMS BLVD
07/10/2008	2008451668		Cedar Rapids	PDO	US 0151 / WILLIAMS BLVD and DEAN RD SW

Selection Filter:

((YEAR <> 2001 and YEAR <> 2002 and YEAR <> 2003 and YEAR <> 2009))

Analyst: B Meeks

Notes:

WARRANT ANALYSIS
MUTCD 2003

Counts taken: March 24, 2010
Major Street Speed Limit (mph): 55

	Traffic Volumes															Warrant 1A		Warrant 1B		Wrnt 1 Combination			
		Major Street			Williams Blvd				Minor Street			Dean Road				Criteria		Criteria		Comb A Criteria		Comb B Criteria	
				Major Street no. of lanes:		2								Minor Street no. of lanes:	1	420	105	630	53	336	84	504	42
Interval beginning …	EBL	major street traffic volumes	Hourly Total	WBL	WBT	WBR	Hourly Total	Both Major Approaches Hourly Total	minor traffic	NB all	Hourly Total	SB left-turn	SB T/R	Hourly Total	Higher Volume	Warrant Met?	NO	Warrant Met?	YES	Combination Warrant Met?		NO	
0:00	2	5	29	0	8	6	87	116		0	0	1	0	11	11	no	no	no	no	no	no	no	no
0:15	4	142	164	0	10	5	76	240		0	0	2	0	10	10								
0:30	0	36	195	0	11	3	62	257		0	0	4	0	11	11								
0:45	0	11	200	1	6	3	53	253		0	0	6	0	13	13								
1:00	0	3	196	0	7	7	53	249		0	0	1	0	13	13	no	no	no	no	no	no	no	no
1:15	0	6	56	0	5	4	47	103		0	0	0	0	11	11								
1:30	0	3	23	0	8	2	43	66		0	0	2	0	9	9								
1:45	0	3	15	0	2	3	38	53		0	0	3	0	6	6								
2:00	0	5	17	0	2	2	28	45		0	0	1	0	6	6	no	no	no	no	no	no	no	no
2:15	0	4	15	0	2	0	21	36		0	0	0	0	6	6								
2:30	0	2	14	0	4	0	15	29		0	0	3	0	7	7								
2:45	0	2	13	0	3	1	14	27		0	0	0	0	4	4								
3:00	0	2	10	0	2	0	12	22		0	0	3	0	6	6	no	no	no	no	no	no	no	no
3:15	0	4	10	0	0	2	12	22		0	0	4	0	10	10								
3:30	0	7	15	0	1	1	10	25		0	0	3	0	10	10								
3:45	0	10	23	0	3	3	12	35		0	0	1	0	11	11								
4:00	0	4	25	0	7	0	17	42		0	0	1	0	9	9	no	no	no	no	no	no	no	no
4:15	0	12	33	0	3	1	19	52		0	0	0	0	5	5								
4:30	0	11	37	0	6	0	23	60		0	0	2	0	4	4								
4:45	0	23	50	0	5	1	23	73		2	2	1	0	4	4								
5:00	0	26	72	0	11	0	27	99		0	2	3	1	7	7	no	no	no	no	no	no	no	no
5:15	0	31	91	0	11	1	35	126		0	2	8	1	16	16								
5:30	0	58	138	0	16	2	47	185		0	2	16	1	31	31								
5:45	0	50	165	0	44	6	91	256		1	1	13	1	44	44								
6:00	1	72	212	0	74	3	157	369		0	1	5	0	45	45	yes	no	yes	yes	yes	no	no	yes
6:15	0	93	274	0	98	3	246	520		0	1	20	3	59	59								
6:30	0	184	400	1	63	3	295	695		0	1	21	3	66	66								
6:45	1	145	496	2	54	5	306	802		5	5	27	2	81	81								
7:00	0	208	631	1	45	6	281	912		2	7	18	2	96	96	yes	yes	yes	yes	yes	yes	yes	yes
7:15	1	277	816	0	43	5	228	1044		2	9	22	1	96	96								
7:30	0	254	886	0	42	6	209	1095		1	10	33	4	109	109								
7:45	1	192	933	0	57	7	212	1145		1	6	25	1	106	106								
8:00	0	173	898	0	65	7	232	1130		0	4	17	0	103	103	yes	no	yes	yes	yes	yes	yes	yes
8:15	0	134	754	1	42	6	233	987		0	2	16	2	98	98								
8:30	1	134	635	2	52	5	244	879		1	2	23	1	85	85								
8:45	1	110	553	1	67	12	260	813		4	5	17	1	77	77								
9:00	0	91	471	0	59	5	252	723		0	5	10	0	70	70	yes	no	yes	no	yes	no	yes	yes
9:15	1	90	428	0	65	7	275	703		0	5	10	1	63	63								
9:30	0	109	402	2	57	4	279	681		1	5	7	1	47	47								
9:45	0	94	385	1	55	7	262	647		2	3	13	0	42	42								
10:00	0	94	388	0	47	8	253	641		3	6	11	0	43	43	yes	no	yes	yes	yes	no	yes	yes
10:15	1	92	390	0	68	14	263	653		2	8	12	0	44	44								
10:30	0	98	379	0	63	12	275	654		0	7	18	0	54	54								
10:45	0	82	367	2	58	8	280	647		1	6	13	0	54	54								
11:00	0	90	363	0	64	12	301	664		1	4	7	2	52	52	yes	no	yes	yes	yes	no	yes	yes
11:15	1	79	350	0	66	12	297	647		0	2	14	1	55	55								
11:30	0	87	339	1	85	9	317	656		0	2	13	2	52	52								
11:45	3	69	329	1	77	11	338	667		0	1	15	0	54	54								
12:00	2	73	314	0	79	9	350	664		0	0	19	1	65	65	yes	no	yes	yes	yes	no	yes	yes
12:15	2	98	334	1	93	9	375	709		1	1	14	1	65	65								
12:30	0	90	337	1	83	13	377	714		2	3	15	0	65	65								
12:45	0	86	351	1	90	13	392	743		1	4	10	0	60	60								
13:00	1	90	367	1	93	12	410	777		3	7	15	1	56	56	yes	no	yes	yes	yes	no	yes	yes
13:15	0	74	341	0	94	13	414	755		2	8	17	0	58	58								
13:30	3	91	345	0	89	13	419	764		0	6	17	1	61	61								
13:45	0	80	339	1	68	13	397	736		3	8	15	1	67	67								
14:00	2	78	328	0	84	15	390	718		0	5	13	0	64	64	yes	no	yes	yes	yes	no	yes	yes
14:15	1	72	327	0	106	18	407	734		0	3	13	3	63	63								
14:30	0	103	336	0	122	21	448	784		0	3	18	2	65	65								
14:45	1	83	340	1	188	17	572	912		0	0	11	2	62	62								
15:00	0	70	330	2	119	26	620	950		0	0	13	1	63	63	yes	no	yes	no	yes	no	yes	yes
15:15	2	96	355	1	106	16	619	974		3	3	9	0	56	56								
15:30	1	78	331	1	119	15	611	942		1	4	12	0	48	48								
15:45	6	176	429	0	156	24	585	1014		1	5	12	2	49	49								
16:00	2	137	498	2	181	29	650	1148		2	7	15	1	51	51	yes	no	yes	yes	yes	no	yes	yes
16:15	2	125	527	0	159	31	717	1244		0	4	11	2	55	55								
16:30	1	136	585	3	185	20	790	1375		7	10	9	0	52	52								
16:45	1	140	544	2	190	27	829	1373		2	11	21	1	60	60								
17:00	1	137	543	1	186	30	834	1377		0	9	19	1	64	64	yes	no	yes	yes	yes	no	yes	yes
17:15	4	129	549	3	204	46	897	1446		4	13	15	4	70	70								
17:30	0	139	551	0	192	24	905	1456		0	6	17	1	79	79								
17:45	3	93	506	0	178	30	894	1400		0	4	18	1	76	76								
18:00	3	109	480	0	138	30	845	1325		0	4	18	0	74	74	yes	no	yes	yes	yes	no	yes	yes
18:15	3	82	432	2	158	19	771	1203		0	0	9	0	64	64								
18:30	2	92	387	0	136	19	710	1097		0	0	14	0	60	60								
18:45	4	73	368	0	121	24	647	1015		1	1	12	0	53	53								
19:00	3	56	315	1	101	22	603	918		0	1	16	3	54	54	yes	no	yes	no	yes	no	yes	yes
19:15	2	52	284	2	82	18	526	810		2	3	6	3	54	54								
19:30	2	56	248	0	94	21	486	734		1	4	13	0	53	53								
19:45	0	54	225	1	99	26	467	692		0	3	8	1	50	50								
20:00	1	47	214	0	78	20	441	655		0	3	12	2	45	45	yes	no	no	yes	yes	no	yes	yes
20:15	1	36	197	0	89	16	444	641		0	1	14	0	50	50								
20:30	1	42	182	0	53	15	397	579		6	6	9	2	48	48								
20:45	1	43	172	1	71	20	363	535		1	7	16	2	57	57								
21:00	0	30	154	0	54	9	328	482		0	7	11	1	55	55	no	no	no	no	yes	no	no	yes
21:15	3	19	139	1	49	15	288	427		1	8	8	0	49	49								
21:30	0	15	111	0	39	14	273	384		0	2	3	0	41	41								
21:45	1	20	88	0	38	12	231	319		0	1	4	1	28	28								
22:00	0	15	73	0	32	15	215	288		3	4	4	0	20	20	no	no	no	no	no	no	no	no
22:15	0	23	74	0	28	5	183	257		0	3	11	2	25	25								
22:30	1	17	77	0	16	11	157	234		0	3	4	0	26	26								
22:45	0	16	72	0	18	8	133	205		0	3	4	0	25	25								
23:00	1	13	71	0	41	10	137	208		0	0	1	0	22	22	no	no	no	no	no	no	no	no
23:15	0	11	59	0	16	10	130	189		0	0	3	0	12	12								
23:30	0	5	46	0	17	11	131	177		0	0	3	0	11	11								
23:45	1	5	36	0	12	7	124	160		0	0	3	1	11	11								

Factor 0.7

Warrant 1A

Major Street	Minor Street	Major Street	Minor Street
1	1	500	150
1	2	500	200
2	1	600	150
2	2	600	200

Warrant 2: Four-Hour Vehicular Volume

Warrant 1B

Major Street	Minor Street	Major Street	Minor Street
1	1	750	75
1	2	750	100
2	1	900	75
2	2	900	100

Warrant 1 Comb A

Major Street	Minor Street	Major Street	Minor Street
1	1	400	120
1	2	400	160
2	1	480	120
2	2	480	160

Warrant 1 Comb B

Major Street	Minor Street	Major Street	Minor Street
1	1	600	60
1	2	600	80
2	1	720	60
2	2	720	80

J

[Raw] Volume Report

HI-Star ID: 3409
Street: DEAN RD SOUTH OF WILLIAM
State: IA
City: CEDAR RAPIDS
County: LINN

Begin: Mar/23/10 00:00
Lane: NB
Oper: CAL
Posted: 25
AADT Factor: 1

End: Mar/24/10 00:00
Hours: 24.00
Period: 15
Raw Count: 76
AADT Count: 76

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Tue,Mar/23/10						
[00:00-00:15]	0	0MPH	44 F	Dry		0
[00:15-00:30]	0	0MPH	44 F	Dry		0
[00:30-00:45]	0	0MPH	44 F	Dry		0
[00:45-01:00]	0	0MPH	44 F	Dry		0
[01:00-01:15]	0	0MPH	44 F	Dry		0
[01:15-01:30]	0	0MPH	42 F	Dry		0
[01:30-01:45]	0	0MPH	42 F	Dry		0
[01:45-02:00]	0	0MPH	42 F	Dry		0
[02:00-02:15]	0	0MPH	42 F	Dry		0
[02:15-02:30]	0	0MPH	42 F	Dry		0
[02:30-02:45]	0	0MPH	42 F	Dry		0
[02:45-03:00]	0	0MPH	42 F	Dry		0
[03:00-03:15]	0	0MPH	42 F	Dry		0
[03:15-03:30]	0	0MPH	42 F	Dry		0
[03:30-03:45]	0	0MPH	42 F	Dry		0
[03:45-04:00]	0	0MPH	42 F	Dry		0
[04:00-04:15]	0	0MPH	42 F	Dry		0
[04:15-04:30]	0	0MPH	41 F	Dry		0
[04:30-04:45]	0	0MPH	41 F	Dry		0
[04:45-05:00]	2	18MPH	41 F	Dry		0
[05:00-05:15]	0	0MPH	41 F	Dry		0
[05:15-05:30]	0	0MPH	41 F	Dry		0
[05:30-05:45]	0	0MPH	41 F	Dry		0
[05:45-06:00]	1	0MPH	41 F	Dry		2
[06:00-06:15]	0	0MPH	41 F	Dry		0
[06:15-06:30]	0	0MPH	39 F	Dry		0
[06:30-06:45]	0	0MPH	39 F	Dry		0
[06:45-07:00]	5	21MPH	39 F	Dry		0
[07:00-07:15]	2	20MPH	39 F	Dry		0
[07:15-07:30]	2	22MPH	39 F	Dry		0
[07:30-07:45]	1	22MPH	39 F	Dry		0
[07:45-08:00]	1	22MPH	42 F	Dry		0
[08:00-08:15]	0	0MPH	42 F	Dry		0
[08:15-08:30]	0	0MPH	44 F	Dry		0
[08:30-08:45]	1	18MPH	44 F	Dry		0
[08:45-09:00]	4	22MPH	48 F	Dry		0
[09:00-09:15]	0	0MPH	50 F	Dry		0
[09:15-09:30]	0	0MPH	52 F	Dry		0
[09:30-09:45]	1	18MPH	52 F	Dry		0
[09:45-10:00]	2	13MPH	54 F	Dry		0

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[Raw] Volume Report

HI-Star ID: 3409	Begin: Mar/23/10 00:00	End: Mar/24/10 00:00
Street: DEAN RD SOUTH OF WILLIAM	Lane: NB	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 25	Raw Count: 76
County: LINN	AADT Factor: 1	AADT Count: 76

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Tue,Mar/23/10						
[10:00-10:15]	3	22MPH	56 F	Dry		0
[10:15-10:30]	2	20MPH	58 F	Dry		0
[10:30-10:45]	0	0MPH	62 F	Dry		0
[10:45-11:00]	1	22MPH	64 F	Dry		0
[11:00-11:15]	1	75MPH	66 F	Dry		0
[11:15-11:30]	0	0MPH	62 F	Dry		0
[11:30-11:45]	0	0MPH	58 F	Dry		0
[11:45-12:00]	0	0MPH	66 F	Dry		0
[12:00-12:15]	0	0MPH	70 F	Dry		0
[12:15-12:30]	1	22MPH	74 F	Dry		0
[12:30-12:45]	2	22MPH	76 F	Dry		0
[12:45-13:00]	1	0MPH	78 F	Dry		0
[13:00-13:15]	3	18MPH	80 F	Dry		0
[13:15-13:30]	2	23MPH	80 F	Dry		0
[13:30-13:45]	0	0MPH	82 F	Dry		0
[13:45-14:00]	3	15MPH	83 F	Dry		0
[14:00-14:15]	0	0MPH	83 F	Dry		0
[14:15-14:30]	0	0MPH	83 F	Dry		0
[14:30-14:45]	0	0MPH	83 F	Dry		0
[14:45-15:00]	0	0MPH	83 F	Dry		0
[15:00-15:15]	0	0MPH	82 F	Dry		0
[15:15-15:30]	3	16MPH	82 F	Dry		0
[15:30-15:45]	1	18MPH	80 F	Dry		0
[15:45-16:00]	1	22MPH	82 F	Dry		0
[16:00-16:15]	2	22MPH	82 F	Dry		0
[16:15-16:30]	0	0MPH	80 F	Dry		0
[16:30-16:45]	7	19MPH	78 F	Dry		0
[16:45-17:00]	2	15MPH	78 F	Dry		0
[17:00-17:15]	0	0MPH	76 F	Dry		0
[17:15-17:30]	4	16MPH	76 F	Dry		0
[17:30-17:45]	0	0MPH	74 F	Dry		0
[17:45-18:00]	0	0MPH	72 F	Dry		0
[18:00-18:15]	0	0MPH	70 F	Dry		0
[18:15-18:30]	0	0MPH	70 F	Dry		0
[18:30-18:45]	0	0MPH	68 F	Dry		0
[18:45-19:00]	1	18MPH	66 F	Dry		0
[19:00-19:15]	0	0MPH	64 F	Dry		0
[19:15-19:30]	2	20MPH	62 F	Dry		0
[19:30-19:45]	1	12MPH	62 F	Dry		0
[19:45-20:00]	0	0MPH	60 F	Dry		0

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[Raw] Volume Report

HI-Star ID: 3409	Begin: Mar/23/10 00:00	End: Mar/24/10 00:00
Street: DEAN RD SOUTH OF WILLIAM	Lane: NB	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 25	Raw Count: 76
County: LINN	AADT Factor: 1	AADT Count: 76

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Tue,Mar/23/10						
[20:00-20:15]	0	0MPH	60 F	Dry		0
[20:15-20:30]	0	0MPH	58 F	Dry		0
[20:30-20:45]	6	0MPH	58 F	Dry		0
[20:45-21:00]	1	0MPH	56 F	Dry		0
[21:00-21:15]	0	0MPH	56 F	Dry		0
[21:15-21:30]	1	0MPH	56 F	Dry		0
[21:30-21:45]	0	0MPH	56 F	Dry		0
[21:45-22:00]	0	0MPH	56 F	Dry		0
[22:00-22:15]	3	18MPH	54 F	Dry		0
[22:15-22:30]	0	0MPH	56 F	Dry		0
[22:30-22:45]	0	0MPH	56 F	Dry		0
[22:45-23:00]	0	0MPH	56 F	Dry		0
[23:00-23:15]	0	0MPH	54 F	Dry		0
[23:15-23:30]	0	0MPH	54 F	Dry		0
[23:30-23:45]	0	0MPH	54 F	Dry		0
[23:45-00:00]	0	0MPH	54 F	Dry		0
	76	0 MPH	57 F			

J

[Raw] Volume Report

HI-Star ID: 3385
Street: WILLIAMS BLVD EAST OF DEA
State: IA
City: CEDAR RAPIDS
County: LINN

Begin: Mar/23/10 00:00
Lane: WB LT
Oper: CAL
Posted: 55
AADT Factor: 1

End: Mar/24/10 00:00
Hours: 24.00
Period: 15
Raw Count: 45
AADT Count: 45

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Tue,Mar/23/10						
[00:00-00:15]	0	0MPH	46 F	Dry		0
[00:15-00:30]	0	0MPH	44 F	Dry		0
[00:30-00:45]	0	0MPH	44 F	Dry		0
[00:45-01:00]	1	18MPH	44 F	Dry		0
[01:00-01:15]	0	0MPH	44 F	Dry		0
[01:15-01:30]	0	0MPH	44 F	Dry		0
[01:30-01:45]	0	0MPH	44 F	Dry		0
[01:45-02:00]	0	0MPH	42 F	Dry		0
[02:00-02:15]	0	0MPH	42 F	Dry		0
[02:15-02:30]	0	0MPH	42 F	Dry		0
[02:30-02:45]	0	0MPH	42 F	Dry		0
[02:45-03:00]	0	0MPH	42 F	Dry		0
[03:00-03:15]	0	0MPH	42 F	Dry		0
[03:15-03:30]	0	0MPH	42 F	Dry		0
[03:30-03:45]	0	0MPH	42 F	Dry		0
[03:45-04:00]	0	0MPH	42 F	Dry		0
[04:00-04:15]	0	0MPH	42 F	Dry		0
[04:15-04:30]	0	0MPH	42 F	Dry		0
[04:30-04:45]	0	0MPH	41 F	Dry		0
[04:45-05:00]	0	0MPH	41 F	Dry		0
[05:00-05:15]	0	0MPH	41 F	Dry		0
[05:15-05:30]	0	0MPH	41 F	Dry		0
[05:30-05:45]	0	0MPH	41 F	Dry		0
[05:45-06:00]	0	0MPH	41 F	Dry		0
[06:00-06:15]	0	0MPH	39 F	Dry		0
[06:15-06:30]	0	0MPH	39 F	Dry		0
[06:30-06:45]	1	32MPH	39 F	Dry		0
[06:45-07:00]	2	33MPH	39 F	Dry		0
[07:00-07:15]	1	72MPH	39 F	Dry		0
[07:15-07:30]	0	0MPH	39 F	Dry		0
[07:30-07:45]	0	0MPH	39 F	Dry		0
[07:45-08:00]	0	0MPH	41 F	Dry		0
[08:00-08:15]	0	0MPH	42 F	Dry		0
[08:15-08:30]	1	28MPH	42 F	Dry		0
[08:30-08:45]	2	38MPH	44 F	Dry		0
[08:45-09:00]	1	32MPH	44 F	Dry		0
[09:00-09:15]	0	0MPH	48 F	Dry		0
[09:15-09:30]	0	0MPH	50 F	Dry		0
[09:30-09:45]	2	30MPH	52 F	Dry		0
[09:45-10:00]	1	28MPH	52 F	Dry		0

J

[Raw] Volume Report

HI-Star ID: 3385	Begin: Mar/23/10 00:00	End: Mar/24/10 00:00
Street: WILLIAMS BLVD EAST OF DEA	Lane: WB LT	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 55	Raw Count: 45
County: LINN	AADT Factor: 1	AADT Count: 45

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Tue,Mar/23/10						
[10:00-10:15]	0	0MPH	54 F	Dry		0
[10:15-10:30]	0	0MPH	56 F	Dry		0
[10:30-10:45]	0	0MPH	60 F	Dry		0
[10:45-11:00]	2	30MPH	62 F	Dry		0
[11:00-11:15]	0	0MPH	64 F	Dry		0
[11:15-11:30]	0	0MPH	68 F	Dry		0
[11:30-11:45]	1	28MPH	70 F	Dry		0
[11:45-12:00]	1	18MPH	72 F	Dry		0
[12:00-12:15]	0	0MPH	74 F	Dry		0
[12:15-12:30]	1	28MPH	76 F	Dry		0
[12:30-12:45]	1	38MPH	76 F	Dry		0
[12:45-13:00]	1	28MPH	78 F	Dry		0
[13:00-13:15]	1	22MPH	80 F	Dry		0
[13:15-13:30]	0	0MPH	80 F	Dry		0
[13:30-13:45]	0	0MPH	82 F	Dry		0
[13:45-14:00]	1	32MPH	83 F	Dry		0
[14:00-14:15]	0	0MPH	85 F	Dry		0
[14:15-14:30]	0	0MPH	85 F	Dry		0
[14:30-14:45]	0	0MPH	83 F	Dry		0
[14:45-15:00]	1	38MPH	83 F	Dry		0
[15:00-15:15]	2	30MPH	83 F	Dry		0
[15:15-15:30]	1	28MPH	83 F	Dry		0
[15:30-15:45]	1	28MPH	83 F	Dry		0
[15:45-16:00]	0	0MPH	83 F	Dry		0
[16:00-16:15]	2	33MPH	83 F	Dry		0
[16:15-16:30]	0	0MPH	82 F	Dry		0
[16:30-16:45]	3	31MPH	80 F	Dry		0
[16:45-17:00]	2	33MPH	78 F	Dry		0
[17:00-17:15]	1	32MPH	76 F	Dry		0
[17:15-17:30]	3	27MPH	76 F	Dry		0
[17:30-17:45]	0	0MPH	74 F	Dry		0
[17:45-18:00]	0	0MPH	72 F	Dry		0
[18:00-18:15]	0	0MPH	72 F	Dry		0
[18:15-18:30]	2	25MPH	70 F	Dry		0
[18:30-18:45]	0	0MPH	68 F	Dry		0
[18:45-19:00]	0	0MPH	68 F	Dry		0
[19:00-19:15]	1	28MPH	66 F	Dry		0
[19:15-19:30]	2	28MPH	64 F	Dry		0
[19:30-19:45]	0	0MPH	62 F	Dry		0
[19:45-20:00]	1	28MPH	62 F	Dry		0

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[Raw] Volume Report

HI-Star ID: 3385	Begin: Mar/23/10 00:00	End: Mar/24/10 00:00
Street: WILLIAMS BLVD EAST OF DEA	Lane: WB LT	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 55	Raw Count: 45
County: LINN	AADT Factor: 1	AADT Count: 45

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Tue,Mar/23/10						
[20:00-20:15]	0	0MPH	60 F	Dry		0
[20:15-20:30]	0	0MPH	60 F	Dry		0
[20:30-20:45]	0	0MPH	58 F	Dry		0
[20:45-21:00]	1	0MPH	58 F	Dry		0
[21:00-21:15]	0	0MPH	58 F	Dry		0
[21:15-21:30]	1	32MPH	56 F	Dry		0
[21:30-21:45]	0	0MPH	56 F	Dry		0
[21:45-22:00]	0	0MPH	56 F	Dry		0
[22:00-22:15]	0	0MPH	56 F	Dry		0
[22:15-22:30]	0	0MPH	56 F	Dry		0
[22:30-22:45]	0	0MPH	56 F	Dry		0
[22:45-23:00]	0	0MPH	56 F	Dry		0
[23:00-23:15]	0	0MPH	56 F	Dry		0
[23:15-23:30]	0	0MPH	54 F	Dry		0
[23:30-23:45]	0	0MPH	54 F	Dry		0
[23:45-00:00]	0	0MPH	54 F	Dry		0
	45	0 MPH	58 F			

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[Raw] Volume Report

HI-Star ID: 8990	Begin: Mar/23/10 00:00	End: Mar/24/10 00:00
Street: WILLIAMS BLVD @ DEAN RD S	Lane: WB	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 55	Raw Count: 6387
County: LINN	AADT Factor: 1	AADT Count: 6,387

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Tue,Mar/23/10						
[00:00-00:15]	8	57MPH	44 F	---		0
[00:15-00:30]	10	63MPH	42 F	---		0
[00:30-00:45]	11	53MPH	42 F	---		0
[00:45-01:00]	6	57MPH	42 F	---		0
[01:00-01:15]	7	54MPH	42 F	---		0
[01:15-01:30]	5	54MPH	42 F	---		0
[01:30-01:45]	8	58MPH	42 F	---		0
[01:45-02:00]	2	55MPH	42 F	---		0
[02:00-02:15]	2	53MPH	41 F	---		0
[02:15-02:30]	2	55MPH	41 F	---		0
[02:30-02:45]	4	56MPH	41 F	---		0
[02:45-03:00]	3	47MPH	41 F	---		0
[03:00-03:15]	2	67MPH	41 F	---		0
[03:15-03:30]	0	0MPH	41 F	---		0
[03:30-03:45]	1	52MPH	41 F	---		0
[03:45-04:00]	3	51MPH	39 F	---		0
[04:00-04:15]	7	56MPH	39 F	---		0
[04:15-04:30]	3	59MPH	39 F	---		0
[04:30-04:45]	6	60MPH	39 F	---		0
[04:45-05:00]	5	56MPH	39 F	---		0
[05:00-05:15]	11	58MPH	39 F	---		0
[05:15-05:30]	11	54MPH	39 F	---		0
[05:30-05:45]	16	61MPH	39 F	---		0
[05:45-06:00]	44	56MPH	39 F	---		1
[06:00-06:15]	74	57MPH	39 F	---		2
[06:15-06:30]	98	59MPH	39 F	---		2
[06:30-06:45]	63	57MPH	39 F	---		1
[06:45-07:00]	54	55MPH	39 F	---		1
[07:00-07:15]	45	56MPH	39 F	---		1
[07:15-07:30]	43	58MPH	39 F	---		1
[07:30-07:45]	42	58MPH	39 F	---		1
[07:45-08:00]	57	59MPH	39 F	---		2
[08:00-08:15]	65	60MPH	41 F	---		2
[08:15-08:30]	42	56MPH	42 F	---		1
[08:30-08:45]	52	57MPH	44 F	---		1
[08:45-09:00]	67	58MPH	46 F	---		2
[09:00-09:15]	59	57MPH	48 F	---		2
[09:15-09:30]	65	56MPH	50 F	---		2
[09:30-09:45]	57	57MPH	52 F	---		1
[09:45-10:00]	55	58MPH	52 F	---		1

J

[Raw] Volume Report

HI-Star ID: 8990
Street: WILLIAMS BLVD @ DEAN RD S
State: IA
City: CEDAR RAPIDS
County: LINN

Begin: Mar/23/10 00:00
Lane: WB
Oper: CAL
Posted: 55
AADT Factor: 1

End: Mar/24/10 00:00
Hours: 24.00
Period: 15
Raw Count: 6387
AADT Count: 6,387

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Tue,Mar/23/10						
[10:00-10:15]	47	56MPH	56 F	---		1
[10:15-10:30]	68	57MPH	58 F	---		2
[10:30-10:45]	63	58MPH	60 F	---		2
[10:45-11:00]	58	58MPH	64 F	---		1
[11:00-11:15]	64	57MPH	66 F	---		2
[11:15-11:30]	66	59MPH	68 F	---		2
[11:30-11:45]	85	58MPH	70 F	---		2
[11:45-12:00]	77	59MPH	72 F	---		2
[12:00-12:15]	79	57MPH	74 F	---		2
[12:15-12:30]	93	58MPH	76 F	---		2
[12:30-12:45]	83	58MPH	76 F	---		2
[12:45-13:00]	90	58MPH	78 F	---		2
[13:00-13:15]	93	58MPH	80 F	---		2
[13:15-13:30]	94	57MPH	80 F	---		3
[13:30-13:45]	89	57MPH	80 F	---		3
[13:45-14:00]	68	59MPH	82 F	---		2
[14:00-14:15]	84	58MPH	83 F	---		2
[14:15-14:30]	106	57MPH	83 F	---		3
[14:30-14:45]	122	57MPH	82 F	---		3
[14:45-15:00]	188	58MPH	82 F	---		5
[15:00-15:15]	119	58MPH	82 F	---		5
[15:15-15:30]	106	59MPH	82 F	---		3
[15:30-15:45]	119	58MPH	80 F	---		3
[15:45-16:00]	156	58MPH	82 F	---		4
[16:00-16:15]	181	58MPH	80 F	---		5
[16:15-16:30]	159	58MPH	80 F	---		4
[16:30-16:45]	185	58MPH	78 F	---		5
[16:45-17:00]	190	58MPH	76 F	---		5
[17:00-17:15]	186	59MPH	76 F	---		5
[17:15-17:30]	204	58MPH	74 F	---		6
[17:30-17:45]	192	58MPH	72 F	---		5
[17:45-18:00]	178	58MPH	72 F	---		5
[18:00-18:15]	138	57MPH	70 F	---		4
[18:15-18:30]	158	59MPH	68 F	---		4
[18:30-18:45]	136	59MPH	68 F	---		3
[18:45-19:00]	121	57MPH	66 F	---		3
[19:00-19:15]	101	58MPH	64 F	---		2
[19:15-19:30]	82	58MPH	62 F	---		2
[19:30-19:45]	94	56MPH	60 F	---		2
[19:45-20:00]	99	57MPH	60 F	---		2

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[Raw] Volume Report

HI-Star ID: 8990	Begin: Mar/23/10 00:00	End: Mar/24/10 00:00
Street: WILLIAMS BLVD @ DEAN RD S	Lane: WB	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 55	Raw Count: 6387
County: LINN	AADT Factor: 1	AADT Count: 6,387

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Tue,Mar/23/10						
[20:00-20:15]	78	56MPH	58 F	---		2
[20:15-20:30]	89	55MPH	58 F	---		2
[20:30-20:45]	53	55MPH	58 F	---		1
[20:45-21:00]	71	56MPH	56 F	---		2
[21:00-21:15]	54	57MPH	56 F	---		1
[21:15-21:30]	49	59MPH	54 F	---		1
[21:30-21:45]	39	56MPH	54 F	---		1
[21:45-22:00]	38	56MPH	54 F	---		1
[22:00-22:15]	32	56MPH	54 F	---		1
[22:15-22:30]	28	59MPH	54 F	---		0
[22:30-22:45]	16	59MPH	54 F	---		0
[22:45-23:00]	18	57MPH	54 F	---		0
[23:00-23:15]	41	57MPH	54 F	---		1
[23:15-23:30]	16	58MPH	54 F	---		0
[23:30-23:45]	17	55MPH	52 F	---		0
[23:45-00:00]	12	53MPH	52 F	---		0
	6387	57 MPH	57 F			

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[Raw] Volume Report

HI-Star ID: 8991	Begin: Mar/23/10 00:00	End: Mar/24/10 00:00
Street: WILLIAMS BLVD @ DEAN RD S	Lane: WB RT	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 55	Raw Count: 1091
County: LINN	AADT Factor: 1	AADT Count: 1,091

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Tue,Mar/23/10						
[00:00-00:15]	6	28MPH	44 F	---		0
[00:15-00:30]	5	36MPH	44 F	---		0
[00:30-00:45]	3	37MPH	42 F	---		0
[00:45-01:00]	3	34MPH	42 F	---		0
[01:00-01:15]	7	32MPH	42 F	---		0
[01:15-01:30]	4	30MPH	42 F	---		0
[01:30-01:45]	2	35MPH	42 F	---		0
[01:45-02:00]	3	37MPH	42 F	---		0
[02:00-02:15]	2	33MPH	42 F	---		0
[02:15-02:30]	0	0MPH	41 F	---		0
[02:30-02:45]	0	0MPH	41 F	---		0
[02:45-03:00]	1	28MPH	41 F	---		0
[03:00-03:15]	0	0MPH	41 F	---		0
[03:15-03:30]	2	38MPH	41 F	---		0
[03:30-03:45]	1	32MPH	41 F	---		0
[03:45-04:00]	3	36MPH	41 F	---		0
[04:00-04:15]	0	0MPH	41 F	---		0
[04:15-04:30]	1	28MPH	39 F	---		0
[04:30-04:45]	0	0MPH	39 F	---		0
[04:45-05:00]	1	28MPH	39 F	---		0
[05:00-05:15]	0	0MPH	39 F	---		0
[05:15-05:30]	1	38MPH	39 F	---		0
[05:30-05:45]	2	42MPH	39 F	---		0
[05:45-06:00]	6	36MPH	39 F	---		0
[06:00-06:15]	3	28MPH	39 F	---		0
[06:15-06:30]	3	36MPH	39 F	---		0
[06:30-06:45]	3	31MPH	39 F	---		0
[06:45-07:00]	5	36MPH	39 F	---		0
[07:00-07:15]	6	32MPH	39 F	---		0
[07:15-07:30]	5	34MPH	39 F	---		0
[07:30-07:45]	6	33MPH	39 F	---		0
[07:45-08:00]	7	35MPH	39 F	---		0
[08:00-08:15]	7	36MPH	41 F	---		0
[08:15-08:30]	6	36MPH	42 F	---		0
[08:30-08:45]	5	38MPH	44 F	---		0
[08:45-09:00]	12	35MPH	46 F	---		0
[09:00-09:15]	5	34MPH	48 F	---		0
[09:15-09:30]	7	36MPH	52 F	---		0
[09:30-09:45]	4	34MPH	52 F	---		0
[09:45-10:00]	7	35MPH	54 F	---		0

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[Raw] Volume Report

HI-Star ID: 8991
Street: WILLIAMS BLVD @ DEAN RD S
State: IA
City: CEDAR RAPIDS
County: LINN

Begin: Mar/23/10 00:00
Lane: WB RT
Oper: CAL
Posted: 55
AADT Factor: 1

End: Mar/24/10 00:00
Hours: 24.00
Period: 15
Raw Count: 1091
AADT Count: 1,091

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Tue,Mar/23/10						
[10:00-10:15]	8	37MPH	58 F	---		0
[10:15-10:30]	14	38MPH	60 F	---		0
[10:30-10:45]	12	35MPH	64 F	---		0
[10:45-11:00]	8	36MPH	66 F	---		0
[11:00-11:15]	12	34MPH	70 F	---		0
[11:15-11:30]	12	39MPH	72 F	---		0
[11:30-11:45]	9	35MPH	74 F	---		0
[11:45-12:00]	11	36MPH	76 F	---		0
[12:00-12:15]	9	36MPH	78 F	---		0
[12:15-12:30]	9	34MPH	80 F	---		0
[12:30-12:45]	13	36MPH	82 F	---		0
[12:45-13:00]	13	34MPH	82 F	---		0
[13:00-13:15]	12	34MPH	83 F	---		0
[13:15-13:30]	13	38MPH	85 F	---		0
[13:30-13:45]	13	37MPH	85 F	---		0
[13:45-14:00]	13	34MPH	87 F	---		0
[14:00-14:15]	15	34MPH	89 F	---		0
[14:15-14:30]	18	36MPH	89 F	---		0
[14:30-14:45]	21	36MPH	87 F	---		0
[14:45-15:00]	17	35MPH	87 F	---		0
[15:00-15:15]	26	36MPH	87 F	---		1
[15:15-15:30]	16	35MPH	87 F	---		0
[15:30-15:45]	15	35MPH	85 F	---		0
[15:45-16:00]	24	36MPH	87 F	---		1
[16:00-16:15]	29	36MPH	85 F	---		1
[16:15-16:30]	31	36MPH	83 F	---		1
[16:30-16:45]	20	36MPH	83 F	---		0
[16:45-17:00]	27	37MPH	82 F	---		1
[17:00-17:15]	30	36MPH	78 F	---		1
[17:15-17:30]	46	38MPH	76 F	---		1
[17:30-17:45]	24	35MPH	76 F	---		1
[17:45-18:00]	30	36MPH	74 F	---		1
[18:00-18:15]	30	36MPH	72 F	---		1
[18:15-18:30]	19	36MPH	70 F	---		0
[18:30-18:45]	19	37MPH	68 F	---		0
[18:45-19:00]	24	36MPH	68 F	---		1
[19:00-19:15]	22	34MPH	66 F	---		0
[19:15-19:30]	18	36MPH	62 F	---		0
[19:30-19:45]	21	36MPH	62 F	---		0
[19:45-20:00]	26	36MPH	60 F	---		1

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[Raw] Volume Report

HI-Star ID: 8991	Begin: Mar/23/10 00:00	End: Mar/24/10 00:00
Street: WILLIAMS BLVD @ DEAN RD S	Lane: WB RT	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 55	Raw Count: 1091
County: LINN	AADT Factor: 1	AADT Count: 1,091

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Tue,Mar/23/10						
[20:00-20:15]	20	32MPH	60 F	---		0
[20:15-20:30]	16	32MPH	58 F	---		0
[20:30-20:45]	15	35MPH	58 F	---		0
[20:45-21:00]	20	34MPH	58 F	---		0
[21:00-21:15]	9	33MPH	56 F	---		0
[21:15-21:30]	15	32MPH	56 F	---		0
[21:30-21:45]	14	32MPH	56 F	---		0
[21:45-22:00]	12	35MPH	54 F	---		0
[22:00-22:15]	15	35MPH	54 F	---		0
[22:15-22:30]	5	34MPH	54 F	---		0
[22:30-22:45]	11	31MPH	54 F	---		0
[22:45-23:00]	8	35MPH	54 F	---		0
[23:00-23:15]	10	38MPH	54 F	---		0
[23:15-23:30]	10	34MPH	54 F	---		0
[23:30-23:45]	11	37MPH	54 F	---		0
[23:45-00:00]	7	36MPH	54 F	---		0
	1091	35 MPH	59 F			

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[Raw] Volume Report

HI-Star ID: 8992
Street: DEAN RD NORTH OF WILLIAM
State: IA
City: CEDAR RAPIDS
County: LINN

Begin: Mar/23/10 00:00
Lane: SB LT
Oper: CAL
Posted: 30
AADT Factor: 1

End: Mar/24/10 00:00
Hours: 24.00
Period: 15
Raw Count: 1019
AADT Count: 1,019

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Tue,Mar/23/10						
[00:00-00:15]	1	22MPH	42 F	---		0
[00:15-00:30]	2	20MPH	41 F	---		0
[00:30-00:45]	4	23MPH	41 F	---		0
[00:45-01:00]	6	23MPH	41 F	---		0
[01:00-01:15]	1	22MPH	41 F	---		0
[01:15-01:30]	0	0MPH	41 F	---		0
[01:30-01:45]	2	18MPH	41 F	---		0
[01:45-02:00]	3	21MPH	41 F	---		0
[02:00-02:15]	1	12MPH	41 F	---		0
[02:15-02:30]	0	0MPH	39 F	---		0
[02:30-02:45]	3	19MPH	39 F	---		0
[02:45-03:00]	0	0MPH	39 F	---		0
[03:00-03:15]	3	23MPH	39 F	---		0
[03:15-03:30]	4	21MPH	39 F	---		0
[03:30-03:45]	3	24MPH	39 F	---		0
[03:45-04:00]	1	22MPH	39 F	---		0
[04:00-04:15]	1	18MPH	39 F	---		0
[04:15-04:30]	0	0MPH	37 F	---		0
[04:30-04:45]	2	20MPH	37 F	---		0
[04:45-05:00]	1	28MPH	37 F	---		0
[05:00-05:15]	3	24MPH	37 F	---		0
[05:15-05:30]	8	24MPH	37 F	---		0
[05:30-05:45]	16	20MPH	37 F	---		1
[05:45-06:00]	13	22MPH	37 F	---		0
[06:00-06:15]	5	24MPH	37 F	---		0
[06:15-06:30]	20	21MPH	37 F	---		1
[06:30-06:45]	21	20MPH	37 F	---		1
[06:45-07:00]	27	20MPH	37 F	---		2
[07:00-07:15]	18	20MPH	37 F	---		1
[07:15-07:30]	22	21MPH	37 F	---		1
[07:30-07:45]	33	19MPH	37 F	---		3
[07:45-08:00]	25	20MPH	39 F	---		1
[08:00-08:15]	17	22MPH	41 F	---		1
[08:15-08:30]	16	23MPH	42 F	---		1
[08:30-08:45]	23	20MPH	44 F	---		1
[08:45-09:00]	17	21MPH	46 F	---		1
[09:00-09:15]	10	24MPH	50 F	---		0
[09:15-09:30]	10	19MPH	52 F	---		0
[09:30-09:45]	7	23MPH	54 F	---		0
[09:45-10:00]	13	20MPH	56 F	---		0

J

[Raw] Volume Report

HI-Star ID: 8992
Street: DEAN RD NORTH OF WILLIAM
State: IA
City: CEDAR RAPIDS
County: LINN

Begin: Mar/23/10 00:00
Lane: SB LT
Oper: CAL
Posted: 30
AADT Factor: 1

End: Mar/24/10 00:00
Hours: 24.00
Period: 15
Raw Count: 1019
AADT Count: 1,019

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Tue,Mar/23/10						
[10:00-10:15]	11	19MPH	60 F	---		0
[10:15-10:30]	12	22MPH	64 F	---		0
[10:30-10:45]	18	22MPH	66 F	---		1
[10:45-11:00]	13	24MPH	70 F	---		0
[11:00-11:15]	7	22MPH	74 F	---		0
[11:15-11:30]	14	20MPH	76 F	---		1
[11:30-11:45]	13	20MPH	78 F	---		0
[11:45-12:00]	15	22MPH	80 F	---		1
[12:00-12:15]	19	22MPH	82 F	---		1
[12:15-12:30]	14	21MPH	83 F	---		0
[12:30-12:45]	15	22MPH	85 F	---		1
[12:45-13:00]	10	19MPH	85 F	---		0
[13:00-13:15]	15	21MPH	87 F	---		0
[13:15-13:30]	17	22MPH	89 F	---		1
[13:30-13:45]	17	21MPH	89 F	---		1
[13:45-14:00]	15	23MPH	91 F	---		0
[14:00-14:15]	13	21MPH	91 F	---		0
[14:15-14:30]	13	21MPH	91 F	---		1
[14:30-14:45]	18	23MPH	91 F	---		1
[14:45-15:00]	11	21MPH	91 F	---		0
[15:00-15:15]	13	21MPH	89 F	---		0
[15:15-15:30]	9	21MPH	89 F	---		0
[15:30-15:45]	12	19MPH	87 F	---		0
[15:45-16:00]	12	21MPH	87 F	---		0
[16:00-16:15]	15	22MPH	87 F	---		1
[16:15-16:30]	11	22MPH	83 F	---		0
[16:30-16:45]	9	21MPH	83 F	---		0
[16:45-17:00]	21	19MPH	80 F	---		1
[17:00-17:15]	19	22MPH	78 F	---		1
[17:15-17:30]	15	20MPH	76 F	---		1
[17:30-17:45]	17	20MPH	74 F	---		1
[17:45-18:00]	18	23MPH	72 F	---		1
[18:00-18:15]	18	22MPH	72 F	---		1
[18:15-18:30]	9	21MPH	70 F	---		0
[18:30-18:45]	14	19MPH	68 F	---		1
[18:45-19:00]	12	22MPH	66 F	---		0
[19:00-19:15]	16	23MPH	64 F	---		1
[19:15-19:30]	6	23MPH	62 F	---		0
[19:30-19:45]	13	19MPH	60 F	---		1
[19:45-20:00]	8	21MPH	58 F	---		0

J

[Raw] Volume Report

HI-Star ID: 8992
Street: DEAN RD NORTH OF WILLIAM
State: IA
City: CEDAR RAPIDS
County: LINN

Begin: Mar/23/10 00:00
Lane: SB LT
Oper: CAL
Posted: 30
AADT Factor: 1

End: Mar/24/10 00:00
Hours: 24.00
Period: 15
Raw Count: 1019
AADT Count: 1,019

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Tue,Mar/23/10						
[20:00-20:15]	12	23MPH	58 F	---		0
[20:15-20:30]	14	22MPH	56 F	---		1
[20:30-20:45]	9	19MPH	56 F	---		0
[20:45-21:00]	16	20MPH	56 F	---		1
[21:00-21:15]	11	20MPH	54 F	---		0
[21:15-21:30]	8	20MPH	54 F	---		0
[21:30-21:45]	3	24MPH	54 F	---		0
[21:45-22:00]	4	19MPH	52 F	---		0
[22:00-22:15]	4	25MPH	52 F	---		0
[22:15-22:30]	11	21MPH	54 F	---		0
[22:30-22:45]	4	24MPH	54 F	---		0
[22:45-23:00]	4	24MPH	54 F	---		0
[23:00-23:15]	1	22MPH	52 F	---		0
[23:15-23:30]	3	21MPH	52 F	---		0
[23:30-23:45]	3	21MPH	52 F	---		0
[23:45-00:00]	3	17MPH	52 F	---		0
	1019	21 MPH	58 F			

J

[Raw] Volume Report

HI-Star ID: 3409	Begin: Mar/23/10 00:00	End: Mar/24/10 00:00
Street: DEAN RD SOUTH OF WILLIAM	Lane: SB	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 25	Raw Count: 20
County: LINN	AADT Factor: 1	AADT Count: 20

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Tue,Mar/23/10						
[00:00-00:15]	0	0MPH	44 F	Dry		0
[00:15-00:30]	0	0MPH	44 F	Dry		0
[00:30-00:45]	0	0MPH	44 F	Dry		0
[00:45-01:00]	0	0MPH	44 F	Dry		0
[01:00-01:15]	0	0MPH	44 F	Dry		0
[01:15-01:30]	0	0MPH	42 F	Dry		0
[01:30-01:45]	0	0MPH	42 F	Dry		0
[01:45-02:00]	0	0MPH	42 F	Dry		0
[02:00-02:15]	0	0MPH	42 F	Dry		0
[02:15-02:30]	0	0MPH	42 F	Dry		0
[02:30-02:45]	0	0MPH	42 F	Dry		0
[02:45-03:00]	0	0MPH	42 F	Dry		0
[03:00-03:15]	0	0MPH	42 F	Dry		0
[03:15-03:30]	0	0MPH	42 F	Dry		0
[03:30-03:45]	0	0MPH	42 F	Dry		0
[03:45-04:00]	0	0MPH	42 F	Dry		0
[04:00-04:15]	0	0MPH	42 F	Dry		0
[04:15-04:30]	0	0MPH	41 F	Dry		0
[04:30-04:45]	0	0MPH	41 F	Dry		0
[04:45-05:00]	1	0MPH	41 F	Dry		0
[05:00-05:15]	0	0MPH	41 F	Dry		0
[05:15-05:30]	0	0MPH	41 F	Dry		0
[05:30-05:45]	0	0MPH	41 F	Dry		0
[05:45-06:00]	0	0MPH	41 F	Dry		0
[06:00-06:15]	0	0MPH	41 F	Dry		0
[06:15-06:30]	0	0MPH	39 F	Dry		0
[06:30-06:45]	0	0MPH	39 F	Dry		0
[06:45-07:00]	0	0MPH	39 F	Dry		0
[07:00-07:15]	0	0MPH	39 F	Dry		0
[07:15-07:30]	0	0MPH	39 F	Dry		0
[07:30-07:45]	0	0MPH	39 F	Dry		0
[07:45-08:00]	0	0MPH	42 F	Dry		0
[08:00-08:15]	0	0MPH	42 F	Dry		0
[08:15-08:30]	0	0MPH	44 F	Dry		0
[08:30-08:45]	0	0MPH	44 F	Dry		0
[08:45-09:00]	2	23MPH	48 F	Dry		0
[09:00-09:15]	0	0MPH	50 F	Dry		0
[09:15-09:30]	0	0MPH	52 F	Dry		0
[09:30-09:45]	0	0MPH	52 F	Dry		0
[09:45-10:00]	0	0MPH	54 F	Dry		0

J

[Raw] Volume Report

HI-Star ID: 3409
Street: DEAN RD SOUTH OF WILLIAM
State: IA
City: CEDAR RAPIDS
County: LINN

Begin: Mar/23/10 00:00
Lane: SB
Oper: CAL
Posted: 25
AADT Factor: 1

End: Mar/24/10 00:00
Hours: 24.00
Period: 15
Raw Count: 20
AADT Count: 20

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Tue,Mar/23/10						
[10:00-10:15]	1	0MPH	56 F	Dry		0
[10:15-10:30]	1	22MPH	58 F	Dry		0
[10:30-10:45]	0	0MPH	62 F	Dry		0
[10:45-11:00]	1	22MPH	64 F	Dry		0
[11:00-11:15]	1	75MPH	66 F	Dry		0
[11:15-11:30]	0	0MPH	62 F	Dry		0
[11:30-11:45]	0	0MPH	58 F	Dry		0
[11:45-12:00]	0	0MPH	66 F	Dry		0
[12:00-12:15]	0	0MPH	70 F	Dry		0
[12:15-12:30]	0	0MPH	74 F	Dry		0
[12:30-12:45]	2	22MPH	76 F	Dry		0
[12:45-13:00]	0	0MPH	78 F	Dry		0
[13:00-13:15]	1	0MPH	80 F	Dry		0
[13:15-13:30]	1	22MPH	80 F	Dry		0
[13:30-13:45]	0	0MPH	82 F	Dry		0
[13:45-14:00]	0	0MPH	83 F	Dry		0
[14:00-14:15]	0	0MPH	83 F	Dry		0
[14:15-14:30]	0	0MPH	83 F	Dry		0
[14:30-14:45]	0	0MPH	83 F	Dry		0
[14:45-15:00]	0	0MPH	83 F	Dry		0
[15:00-15:15]	0	0MPH	82 F	Dry		0
[15:15-15:30]	0	0MPH	82 F	Dry		0
[15:30-15:45]	0	0MPH	80 F	Dry		0
[15:45-16:00]	1	22MPH	82 F	Dry		0
[16:00-16:15]	0	0MPH	82 F	Dry		0
[16:15-16:30]	0	0MPH	80 F	Dry		0
[16:30-16:45]	1	0MPH	78 F	Dry		0
[16:45-17:00]	1	18MPH	78 F	Dry		0
[17:00-17:15]	0	0MPH	76 F	Dry		0
[17:15-17:30]	1	18MPH	76 F	Dry		0
[17:30-17:45]	0	0MPH	74 F	Dry		0
[17:45-18:00]	0	0MPH	72 F	Dry		0
[18:00-18:15]	0	0MPH	70 F	Dry		0
[18:15-18:30]	0	0MPH	70 F	Dry		0
[18:30-18:45]	0	0MPH	68 F	Dry		0
[18:45-19:00]	1	18MPH	66 F	Dry		0
[19:00-19:15]	0	0MPH	64 F	Dry		0
[19:15-19:30]	2	20MPH	62 F	Dry		0
[19:30-19:45]	0	0MPH	62 F	Dry		0
[19:45-20:00]	0	0MPH	60 F	Dry		0

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[Raw] Volume Report

Hi-Star ID: 3409	Begin: Mar/23/10 00:00	End: Mar/24/10 00:00
Street: DEAN RD SOUTH OF WILLIAM	Lane: SB	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 25	Raw Count: 20
County: LINN	AADT Factor: 1	AADT Count: 20

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Tue,Mar/23/10						
[20:00-20:15]	0	0MPH	60 F	Dry		0
[20:15-20:30]	0	0MPH	58 F	Dry		0
[20:30-20:45]	0	0MPH	58 F	Dry		0
[20:45-21:00]	0	0MPH	56 F	Dry		0
[21:00-21:15]	0	0MPH	56 F	Dry		0
[21:15-21:30]	0	0MPH	56 F	Dry		0
[21:30-21:45]	0	0MPH	56 F	Dry		0
[21:45-22:00]	0	0MPH	56 F	Dry		0
[22:00-22:15]	2	18MPH	54 F	Dry		0
[22:15-22:30]	0	0MPH	56 F	Dry		0
[22:30-22:45]	0	0MPH	56 F	Dry		0
[22:45-23:00]	0	0MPH	56 F	Dry		0
[23:00-23:15]	0	0MPH	54 F	Dry		0
[23:15-23:30]	0	0MPH	54 F	Dry		0
[23:30-23:45]	0	0MPH	54 F	Dry		0
[23:45-00:00]	0	0MPH	54 F	Dry		0
	20	0 MPH	57 F			

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[Raw] Volume Report

HI-Star ID: 3424	Begin: Mar/23/10 00:00	End: Mar/24/10 00:00
Street: WILLAMS BLVD WEST OF DEA	Lane: EB LT	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 55	Raw Count: 86
County: LINN	AADT Factor: 1	AADT Count: 86

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Tue,Mar/23/10						
[00:00-00:15]	2	32MPH	46 F	Dry		0
[00:15-00:30]	4	28MPH	46 F	Dry		0
[00:30-00:45]	0	0MPH	44 F	Dry		0
[00:45-01:00]	0	0MPH	44 F	Dry		0
[01:00-01:15]	0	0MPH	44 F	Dry		0
[01:15-01:30]	0	0MPH	44 F	Dry		0
[01:30-01:45]	0	0MPH	44 F	Dry		0
[01:45-02:00]	0	0MPH	44 F	Dry		0
[02:00-02:15]	0	0MPH	42 F	Dry		0
[02:15-02:30]	0	0MPH	42 F	Dry		0
[02:30-02:45]	0	0MPH	42 F	Dry		0
[02:45-03:00]	0	0MPH	42 F	Dry		0
[03:00-03:15]	0	0MPH	42 F	Dry		0
[03:15-03:30]	0	0MPH	42 F	Dry		0
[03:30-03:45]	0	0MPH	42 F	Dry		0
[03:45-04:00]	0	0MPH	42 F	Dry		0
[04:00-04:15]	0	0MPH	42 F	Dry		0
[04:15-04:30]	0	0MPH	42 F	Dry		0
[04:30-04:45]	0	0MPH	42 F	Dry		0
[04:45-05:00]	0	0MPH	41 F	Dry		0
[05:00-05:15]	0	0MPH	41 F	Dry		0
[05:15-05:30]	0	0MPH	41 F	Dry		0
[05:30-05:45]	0	0MPH	41 F	Dry		0
[05:45-06:00]	0	0MPH	41 F	Dry		0
[06:00-06:15]	1	38MPH	41 F	Dry		0
[06:15-06:30]	0	0MPH	39 F	Dry		0
[06:30-06:45]	0	0MPH	39 F	Dry		0
[06:45-07:00]	1	22MPH	39 F	Dry		0
[07:00-07:15]	0	0MPH	39 F	Dry		0
[07:15-07:30]	1	18MPH	39 F	Dry		0
[07:30-07:45]	0	0MPH	39 F	Dry		0
[07:45-08:00]	1	22MPH	41 F	Dry		0
[08:00-08:15]	0	0MPH	42 F	Dry		0
[08:15-08:30]	0	0MPH	42 F	Dry		0
[08:30-08:45]	1	28MPH	42 F	Dry		0
[08:45-09:00]	1	22MPH	44 F	Dry		0
[09:00-09:15]	0	0MPH	46 F	Dry		0
[09:15-09:30]	1	0MPH	48 F	Dry		0
[09:30-09:45]	0	0MPH	50 F	Dry		0
[09:45-10:00]	0	0MPH	52 F	Dry		0

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[Raw] Volume Report

HI-Star ID: 3424	Begin: Mar/23/10 00:00	End: Mar/24/10 00:00
Street: WILLAMS BLVD WEST OF DEA	Lane: EB LT	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 55	Raw Count: 86
County: LINN	AADT Factor: 1	AADT Count: 86

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Tue,Mar/23/10						
[10:00-10:15]	0	0MPH	54 F	Dry		0
[10:15-10:30]	1	18MPH	56 F	Dry		0
[10:30-10:45]	0	0MPH	58 F	Dry		0
[10:45-11:00]	0	0MPH	60 F	Dry		0
[11:00-11:15]	0	0MPH	64 F	Dry		0
[11:15-11:30]	1	0MPH	66 F	Dry		0
[11:30-11:45]	0	0MPH	68 F	Dry		0
[11:45-12:00]	3	24MPH	70 F	Dry		0
[12:00-12:15]	2	22MPH	72 F	Dry		0
[12:15-12:30]	2	23MPH	74 F	Dry		0
[12:30-12:45]	0	0MPH	76 F	Dry		0
[12:45-13:00]	0	0MPH	76 F	Dry		0
[13:00-13:15]	1	22MPH	78 F	Dry		0
[13:15-13:30]	0	0MPH	78 F	Dry		0
[13:30-13:45]	6	24MPH	80 F	Dry		0
[13:45-14:00]	0	0MPH	82 F	Dry		0
[14:00-14:15]	2	20MPH	82 F	Dry		0
[14:15-14:30]	1	18MPH	83 F	Dry		0
[14:30-14:45]	0	0MPH	82 F	Dry		0
[14:45-15:00]	1	22MPH	82 F	Dry		0
[15:00-15:15]	0	0MPH	82 F	Dry		0
[15:15-15:30]	2	23MPH	80 F	Dry		0
[15:30-15:45]	1	28MPH	80 F	Dry		0
[15:45-16:00]	6	23MPH	82 F	Dry		0
[16:00-16:15]	2	23MPH	82 F	Dry		0
[16:15-16:30]	2	23MPH	80 F	Dry		0
[16:30-16:45]	1	22MPH	80 F	Dry		0
[16:45-17:00]	1	18MPH	78 F	Dry		0
[17:00-17:15]	1	18MPH	76 F	Dry		0
[17:15-17:30]	4	18MPH	76 F	Dry		0
[17:30-17:45]	0	0MPH	74 F	Dry		0
[17:45-18:00]	3	26MPH	72 F	Dry		0
[18:00-18:15]	3	23MPH	72 F	Dry		0
[18:15-18:30]	3	24MPH	70 F	Dry		0
[18:30-18:45]	2	20MPH	68 F	Dry		0
[18:45-19:00]	4	22MPH	68 F	Dry		0
[19:00-19:15]	3	21MPH	66 F	Dry		0
[19:15-19:30]	2	25MPH	64 F	Dry		0
[19:30-19:45]	2	20MPH	64 F	Dry		0
[19:45-20:00]	0	0MPH	62 F	Dry		0

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[Raw] Volume Report

HI-Star ID: 3424	Begin: Mar/23/10 00:00	End: Mar/24/10 00:00
Street: WILLAMS BLVD WEST OF DEA	Lane: EB LT	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 55	Raw Count: 86
County: LINN	AADT Factor: 1	AADT Count: 86

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Tue,Mar/23/10						
[20:00-20:15]	1	18MPH	62 F	Dry		0
[20:15-20:30]	1	28MPH	60 F	Dry		0
[20:30-20:45]	1	18MPH	60 F	Dry		0
[20:45-21:00]	1	18MPH	58 F	Dry		0
[21:00-21:15]	0	0MPH	58 F	Dry		0
[21:15-21:30]	3	16MPH	56 F	Dry		0
[21:30-21:45]	0	0MPH	56 F	Dry		0
[21:45-22:00]	1	28MPH	56 F	Dry		0
[22:00-22:15]	0	0MPH	56 F	Dry		0
[22:15-22:30]	0	0MPH	56 F	Dry		0
[22:30-22:45]	1	22MPH	56 F	Dry		0
[22:45-23:00]	0	0MPH	56 F	Dry		0
[23:00-23:15]	1	18MPH	56 F	Dry		0
[23:15-23:30]	0	0MPH	54 F	Dry		0
[23:30-23:45]	0	0MPH	54 F	Dry		0
[23:45-00:00]	1	23MPH	54 F	Dry		0
	86	0 MPH	58 F			

J

[Raw] Volume Report

HI-Star ID: 8876	Begin: Mar/23/10 00:00	End: Mar/24/10 00:00
Street: WILLIAMS BLVD WEST OF DE/	Lane: EB	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 55	Raw Count: 6916
County: LINN	AADT Factor: 1	AADT Count: 6,916

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Tue,Mar/23/10						
[00:00-00:15]	5	63MPH	44 F	---		0
[00:15-00:30]	142	64MPH	44 F	---		3
[00:30-00:45]	36	60MPH	42 F	---		1
[00:45-01:00]	11	61MPH	42 F	---		0
[01:00-01:15]	3	59MPH	42 F	---		0
[01:15-01:30]	6	59MPH	42 F	---		0
[01:30-01:45]	3	57MPH	41 F	---		0
[01:45-02:00]	3	59MPH	41 F	---		0
[02:00-02:15]	5	58MPH	41 F	---		0
[02:15-02:30]	4	56MPH	41 F	---		0
[02:30-02:45]	2	63MPH	41 F	---		0
[02:45-03:00]	2	62MPH	41 F	---		0
[03:00-03:15]	2	63MPH	41 F	---		0
[03:15-03:30]	4	65MPH	41 F	---		0
[03:30-03:45]	7	61MPH	39 F	---		0
[03:45-04:00]	10	63MPH	39 F	---		0
[04:00-04:15]	4	63MPH	39 F	---		0
[04:15-04:30]	12	60MPH	39 F	---		0
[04:30-04:45]	11	63MPH	39 F	---		0
[04:45-05:00]	23	63MPH	39 F	---		0
[05:00-05:15]	26	61MPH	39 F	---		1
[05:15-05:30]	31	61MPH	39 F	---		1
[05:30-05:45]	58	61MPH	39 F	---		1
[05:45-06:00]	50	60MPH	39 F	---		1
[06:00-06:15]	72	59MPH	39 F	---		2
[06:15-06:30]	93	61MPH	39 F	---		2
[06:30-06:45]	184	59MPH	39 F	---		5
[06:45-07:00]	145	60MPH	39 F	---		4
[07:00-07:15]	208	59MPH	39 F	---		6
[07:15-07:30]	277	58MPH	41 F	---		8
[07:30-07:45]	254	59MPH	41 F	---		8
[07:45-08:00]	192	60MPH	41 F	---		5
[08:00-08:15]	173	61MPH	42 F	---		5
[08:15-08:30]	134	62MPH	42 F	---		4
[08:30-08:45]	134	59MPH	44 F	---		4
[08:45-09:00]	110	61MPH	46 F	---		3
[09:00-09:15]	91	61MPH	48 F	---		3
[09:15-09:30]	90	61MPH	52 F	---		2
[09:30-09:45]	109	60MPH	52 F	---		2
[09:45-10:00]	94	59MPH	54 F	---		3

J

[Raw] Volume Report

HI-Star ID: 8876	Begin: Mar/23/10 00:00	End: Mar/24/10 00:00
Street: WILLIAMS BLVD WEST OF DE/	Lane: EB	Hours: 24.00
State: IA	Oper: CAL	Period: 15
City: CEDAR RAPIDS	Posted: 55	Raw Count: 6916
County: LINN	AADT Factor: 1	AADT Count: 6,916

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Tue,Mar/23/10						
[10:00-10:15]	94	59MPH	56 F	---		3
[10:15-10:30]	92	57MPH	58 F	---		3
[10:30-10:45]	98	59MPH	60 F	---		3
[10:45-11:00]	82	61MPH	64 F	---		2
[11:00-11:15]	90	58MPH	66 F	---		3
[11:15-11:30]	79	60MPH	68 F	---		2
[11:30-11:45]	87	59MPH	72 F	---		2
[11:45-12:00]	69	59MPH	74 F	---		2
[12:00-12:15]	73	60MPH	76 F	---		2
[12:15-12:30]	98	58MPH	76 F	---		3
[12:30-12:45]	90	59MPH	76 F	---		2
[12:45-13:00]	86	61MPH	80 F	---		2
[13:00-13:15]	90	61MPH	80 F	---		2
[13:15-13:30]	74	59MPH	82 F	---		2
[13:30-13:45]	91	58MPH	82 F	---		2
[13:45-14:00]	80	61MPH	83 F	---		2
[14:00-14:15]	78	59MPH	83 F	---		2
[14:15-14:30]	72	60MPH	83 F	---		2
[14:30-14:45]	103	60MPH	83 F	---		3
[14:45-15:00]	83	61MPH	83 F	---		2
[15:00-15:15]	70	60MPH	83 F	---		2
[15:15-15:30]	96	59MPH	83 F	---		3
[15:30-15:45]	78	61MPH	82 F	---		3
[15:45-16:00]	176	62MPH	83 F	---		5
[16:00-16:15]	137	59MPH	82 F	---		4
[16:15-16:30]	125	59MPH	80 F	---		4
[16:30-16:45]	136	57MPH	80 F	---		4
[16:45-17:00]	140	60MPH	78 F	---		4
[17:00-17:15]	137	58MPH	76 F	---		4
[17:15-17:30]	129	60MPH	76 F	---		3
[17:30-17:45]	139	59MPH	74 F	---		4
[17:45-18:00]	93	59MPH	72 F	---		2
[18:00-18:15]	109	60MPH	72 F	---		3
[18:15-18:30]	82	61MPH	70 F	---		2
[18:30-18:45]	92	61MPH	68 F	---		2
[18:45-19:00]	73	59MPH	66 F	---		2
[19:00-19:15]	56	60MPH	64 F	---		1
[19:15-19:30]	52	61MPH	62 F	---		1
[19:30-19:45]	56	57MPH	62 F	---		1
[19:45-20:00]	54	59MPH	60 F	---		1

J

[Raw] Volume Report

HI-Star ID: 8876
Street: WILLIAMS BLVD WEST OF DE
State: IA
City: CEDAR RAPIDS
County: LINN

Begin: Mar/23/10 00:00
Lane: EB
Oper: CAL
Posted: 55
AADT Factor: 1

End: Mar/24/10 00:00
Hours: 24.00
Period: 15
Raw Count: 6916
AADT Count: 6,916

Date And Time Range	Period Volume	Average Speed	Roadway Temperature	Roadway Surface Wet/Dry		Period Occupancy
Tue,Mar/23/10						
[20:00-20:15]	47	59MPH	60 F	---		1
[20:15-20:30]	36	58MPH	58 F	---		1
[20:30-20:45]	42	60MPH	58 F	---		1
[20:45-21:00]	43	60MPH	56 F	---		1
[21:00-21:15]	30	61MPH	56 F	---		0
[21:15-21:30]	19	58MPH	56 F	---		0
[21:30-21:45]	15	57MPH	54 F	---		0
[21:45-22:00]	20	61MPH	54 F	---		0
[22:00-22:15]	15	57MPH	54 F	---		0
[22:15-22:30]	23	57MPH	54 F	---		0
[22:30-22:45]	17	59MPH	54 F	---		0
[22:45-23:00]	16	59MPH	54 F	---		0
[23:00-23:15]	13	60MPH	54 F	---		0
[23:15-23:30]	11	57MPH	54 F	---		0
[23:30-23:45]	5	64MPH	52 F	---		0
[23:45-00:00]	5	63MPH	52 F	---		0
	6916	60 MPH	57 F			

L

Rev. 8/09

Intersection or Spot Benefit / Cost Safety Analysis

Iowa DOT Office of Traffic & Safety

County: Linn Prepared by: City of Cedar Rapids Date Prepared: Apr 27, 2010

Intersection: Williams Blvd/ US 151 & Dean Road SW

Improvement

Proposed Improvement(s): Replace two-way STOP control with signalized control

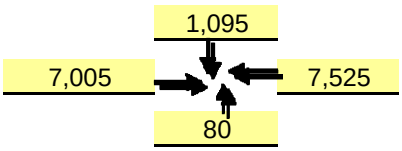
$ 175,000	Estimated Improvement Cost, **EC**	15	Est. Improvement Life, years, **Y**
$ 1,000	Other Annual Cost (after initial year), **AC**	44	Crash Reduction Factor (integer), **CRF**
$ 11,118	Present Value Other Annual Costs, **OC**	4.0%	Discount Rate (time value of $), **INT**
		$ 186,118	Present Value Cost, **COST** = EC + OC

$$OC = \frac{AC}{INT}\left(1 - \frac{1}{(1+INT)^Y}\right)$$

Traffic Volume Data

Source: City of Cedar Rapids March 2010 Date of traffic count

Daily Entering Vehicles by Approach (or AADT / 2)



5,732,325	Current Annual Entering Veh., **AEV** = DEV * 365
24,468	veh / day, Final Year DEV, **FDEV**
106.62	MEV, Total Million Entering Veh. Over life of Project, **TMEV**
3.0%	Projected Traffic Growth (0%-10%), **G**
15,705	Current Daily Entering Vehicles, **DEV**

$$TMEV = \frac{AEV}{-G}\left(1 - \left(\frac{1+G}{1}\right)^Y\right) \Big/ 10^6$$

Crash Data

2004 First full year --> 2008 Last full year 5.0 years, Time Period, **T**

Additional months values as of Dec. 2007

	Fatal Crashes		Fatalities @	$3,500,000	$	-
			Major Injuries @	$240,000	$	-
3	Injury Crashes	2	Minor Injuries @	$48,000	$	96,000
		5	Possible Injuries @	$25,000	$	125,000
8	Property Damage Only		(assumed cost per crash)	$2,700	$	-
		-OR-	enter all Property Costs of all crashes:		$	100,226
11	Total Crashes, **TA**		Total $ Loss, **LOSS**		$	321,226

2.20	Current Crashes / Year, **AA** = TA / T	0.38	Crashes / MEV, Crash Rate, **CR** CR = TA x 10^6 / (DEV x 365 x T)
$ 29,202	Cost per Crash, **AVC** = LOSS / TA		
40.9	Total Expected Crashes, **TECR** = CR x TMEV	$ 381,379	Present Value of Avoided Crashes, **BENEFIT**
0.97	Crashes Avoided First Year **AAR** = AA x CRF / 100		
$ 28,268	Crash Costs Avoided in First Year, AAR x AVC		
18.0	Total Avoided Crashes, TECR x CRF/ 100		

$$BEN. = \frac{AVC \times AAR}{(INT - G)}\left(1 - \left(\frac{1+G}{1+INT}\right)^Y\right)$$

Benefit / Cost Ratio

Benefit : Cost = $381,379 : $186,118 = **2.05** : 1

Iowa Department of Transportation

Rev. 3/08

Application for TRAFFIC SAFETY FUNDS

GENERAL INFORMATION

Location / Title of Project: University Avenue and US 63 Traffic Safety Improvements

Applicant: City of Waterloo

Contact Person: Mohammad Elahi Title: Traffic Engineer

Complete Mailing Address: 408 E. 6th Street
Waterloo, Iowa 50703

Phone: (319) 291-4440 (Area Code) E-Mail: mohammad.elahi@waterloo-ia.org

If more than one highway authority is involved in this project, please indicate and fill in the information below (use additional sheets if necessary).

Co-Applicant(s) _____

Contact Person _____ Title _____

Complete Mailing Address _____

_____

Phone _____ (Area Code) E-Mail _____

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Application Type

- Site Specific ☒
- Traffic Control Device ☐
- Safety Study ☐

Funding Amount

Total Project Cost $ 63,000

Safety Funds Requested $ 63,000

B. NARRATIVE

Existing Condition

Both University Avenue (45 mph) and Sergeant Road / US 63 (50 mph) are multilane divided arterials. The approach on south leg of the intersection has two problems. There is a dual lane right turn ramp onto University Avenue. This ramp is confusing. The taper for a new through lane starts just before the divergence point of the right turn lane's island. The pavement line guides the driver to turn right where it could go through. The signal location for through and left traffic, particularly left turning traffic do not have a traffic signal directly above each lane on the far side. This creates confusion.

Figure 1: Dual lane right turn lane and start of a new through lane.

Figure 2: Left turning drivers have a hard time locating their signal head.

Proposed Concept.

The following proposed measures have been investigated jointly by the City and DOT district 2 (Mr. Bob Clerk).

1-Reduce the two lane right turn lane to a one-lane lane. Enlarge and extend the island to more clearly define and separate the trough and right turn movement.

2- Install far side overhead signal so that each driver at a stop bar has a signal ' B ' directly in front of him/her.

Figure 3: Fundamental design and operational elements of the proposed roundabout

C

C. ITEMIZED BREAKDOWN OF ALL COSTS:

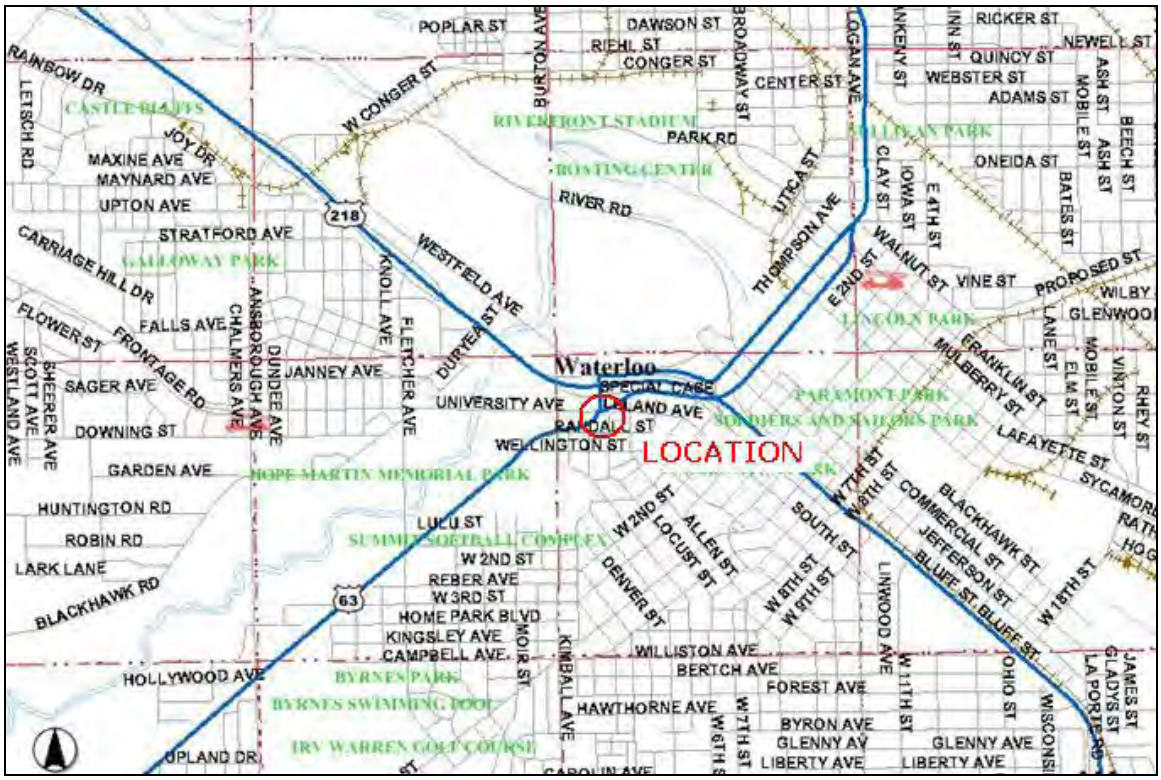
1	PAVEMENT / CURB / ETC REMOVAL	5,000
1	EXTEND ISLAND / RELATED WORKS	17,000
2	INSTALL MAST ARM AND SIGNAL HEAD FOR LEFT TURN TRAFFIC	14,000
3	INSTALL MAST ARM AND SIGNAL HEAD FOR LEFT TURN TRAFFIC	16,000
4	INCIDENTALS	11000
	TOTAL	**$63,000**

D. TIME SCHEDULE

D

	2011											2012											
	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPT	OCT	NOV	DEC	JAN	FEB	MARCH	APRIL	MAY	JUNE	JULY	AUGUST	SEPT.	OCT	NOV	DEC
START	♦																						
DOT Agreement Exchange	▬	▬	▬	▬																			
Preliminary Design					▬	▬	▬	▬															
Final Design / Acquisitions									▬	▬	▬												
Bidding / Award Process												▬	▬	▬	▬								
Construction																▬	▬	▬	▬	▬			
END																					♦		

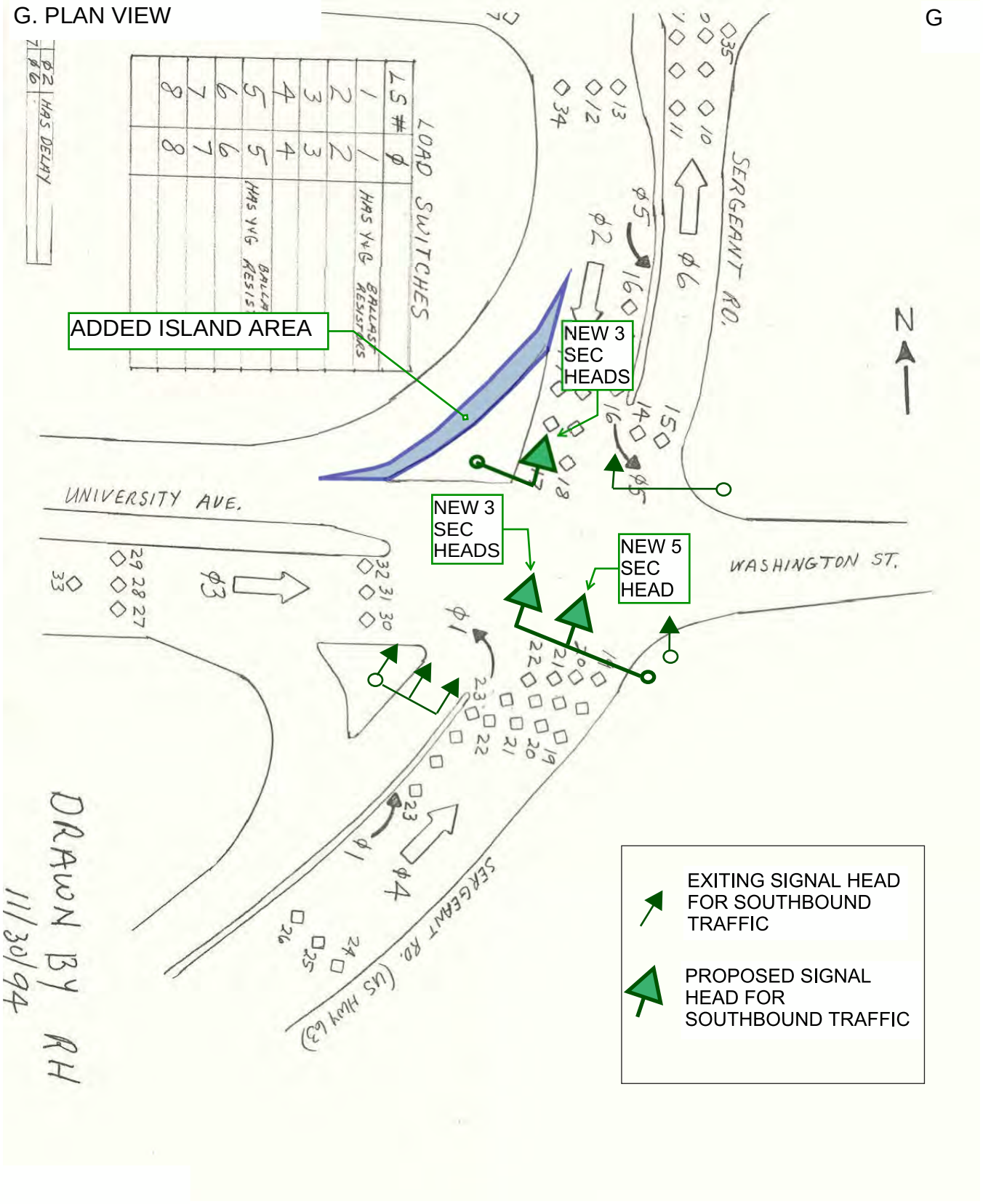
E. LOCATION MAP



F. COLOR PICTURES

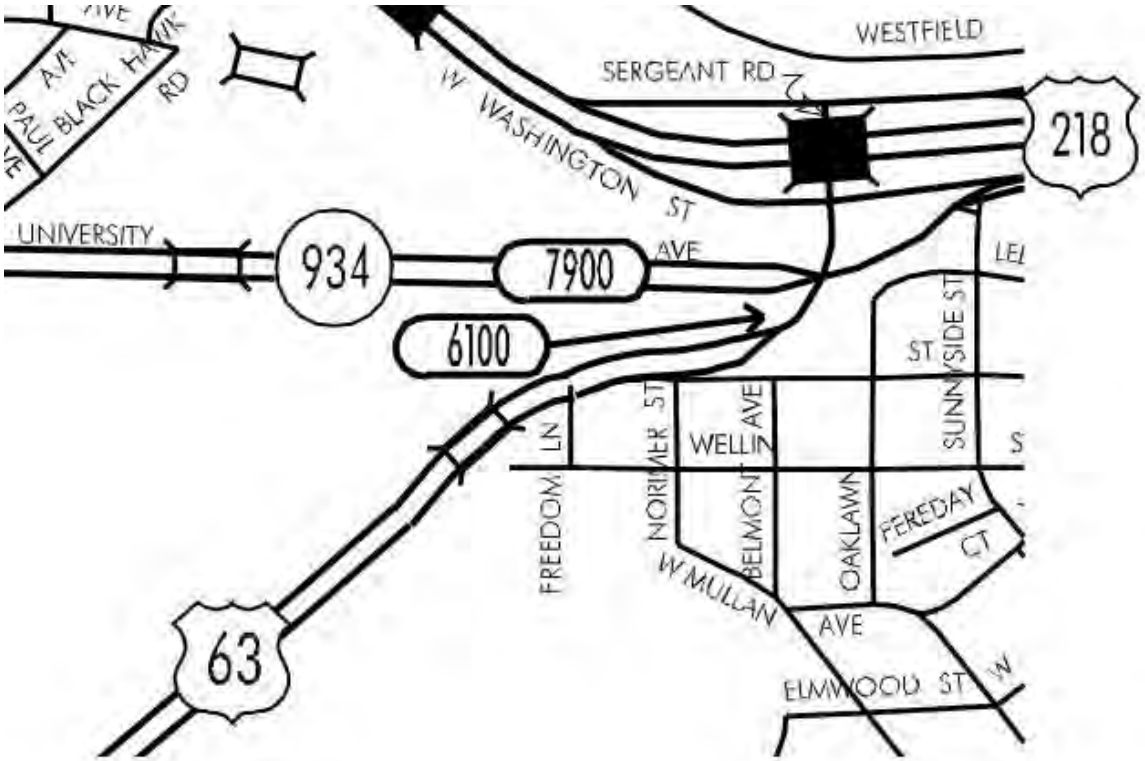
G. PLAN VIEW

G

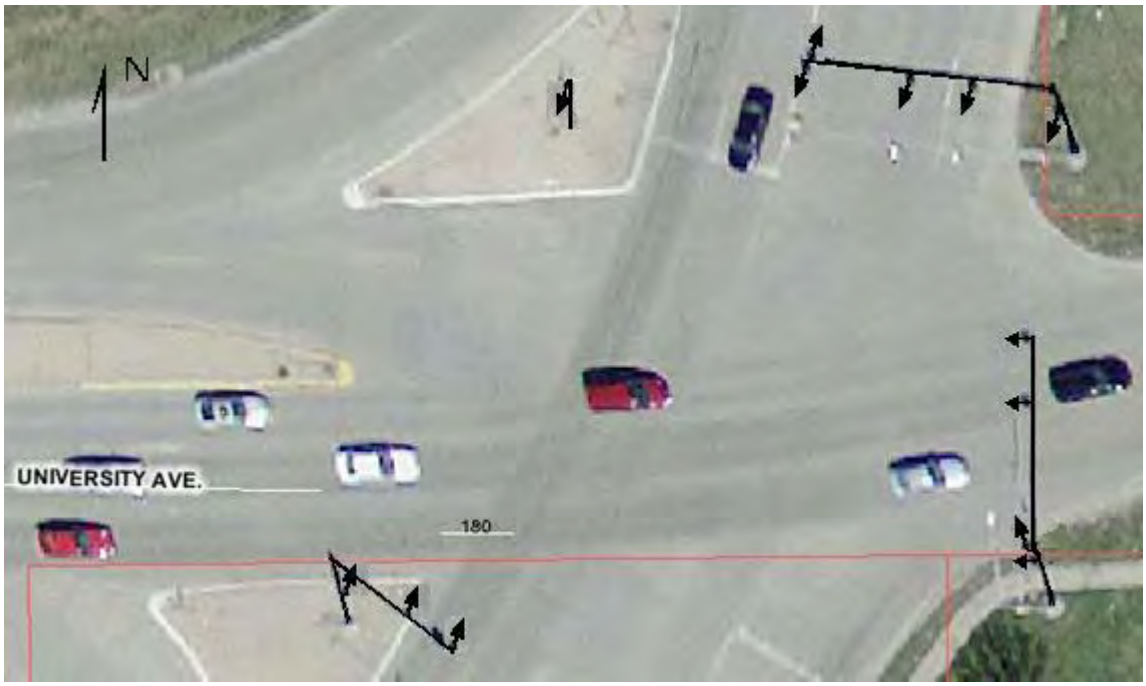

ADDED ISLAND AREA
NEW 3 SEC HEADS
NEW 3 SEC HEADS
NEW 5 SEC HEAD
SERGEANT RD.
UNIVERSITY AVE.
WASHINGTON ST.
SERGEANT RD. (US HWY 63)
LOAD SWITCHES
LS # Ø
1 1 HAS YWB BALLAST RESISTORS
2 2
3 3
4 4
5 5 HAS YWG BALLAST RESISTORS
6 6
7 7
8 8
Ø2 Ø6 HAS DELAY
Ø1
Ø2
Ø3
Ø4
Ø5
Ø6
N
EXITING SIGNAL HEAD FOR SOUTHBOUND TRAFFIC
PROPOSED SIGNAL HEAD FOR SOUTHBOUND TRAFFIC
DRAWN BY RH
11/30/94

H. AERIAL PHOTOGRAPH

J. TRAFFIC VOLUMES



K. EXISTING SIGNALS



Existing Signals: 63 & University

L- BENEFIT / COST

We were able to obtain actual officer's report for only 8 crashes. Waterloo Police Department provided a list that included 22 reportable cases. SAVER program (DiagramMagic) showed 11 of those crashes. Crash numbers 4 & 5 were manually added to the collision diagram. These 13 crashes are listed as crash numbers 1 through 13 on the following table.

1	08-007392	1/23/2008	INJURY	SOUTHBOUND RRL *	$ 9,000
2	08-035055	4/12/2008	INJURY		10,300
3	08-080411	8/7/2008	INJURY	SOUTHBOUND RRL*	1,300
4	08-113845	11/3/2008		SOUTHBOUND RRL*	1,500
5	09-042081	4/20/2009	INJURY	SOUTHBOUND RRL*	4,000
6	09-092837	8/27/2009		SOUTHBOUND RRL	2,500
7	09-109966	10/11/2009	FATALITY	SOUTHBOUND (RRL?)*	10,000
8	09-130111	12/6/2009			7,000
9	06-014698	2/11/2006	INJURY	Collision diagram through SAVER showed these, but actual officer's reports were not found in the system.	
10	06-087583	8/31/2006	INJURY		
11	06-090492	9/8/2006			
12	06-058389	6/12/2006	INJURY		
13	06-081736	8/15/2006			
14	06-058296	6/12/2006		These were not shown on collision diagram through SAVER. Actual officer's reports were not found in the system.	
15	06-066982	7/5/2006	INJURY		
16	06-068635	7/10/2006			
17	06-083612	8/20/2006	INJURIES		
18	07-035293	4/13/2007			
19	07-058281	6/10/2007			
20	08-026703	3/19/2008			
21	08-060216	6/16/2008			
22	10-022980	3/5/2010			

* Target Crash Patterns

Collision diagram shows a predominant pattern of right angle collisions involving southbound and eastbound vehicles. Most of these crashes are injury or fatal crashes. The officer's report shows all of the accidents involved a southbound vehicle running the red light. In case of the fatal crash, the hit and run driver was also southbound. (He denied running the red light.)

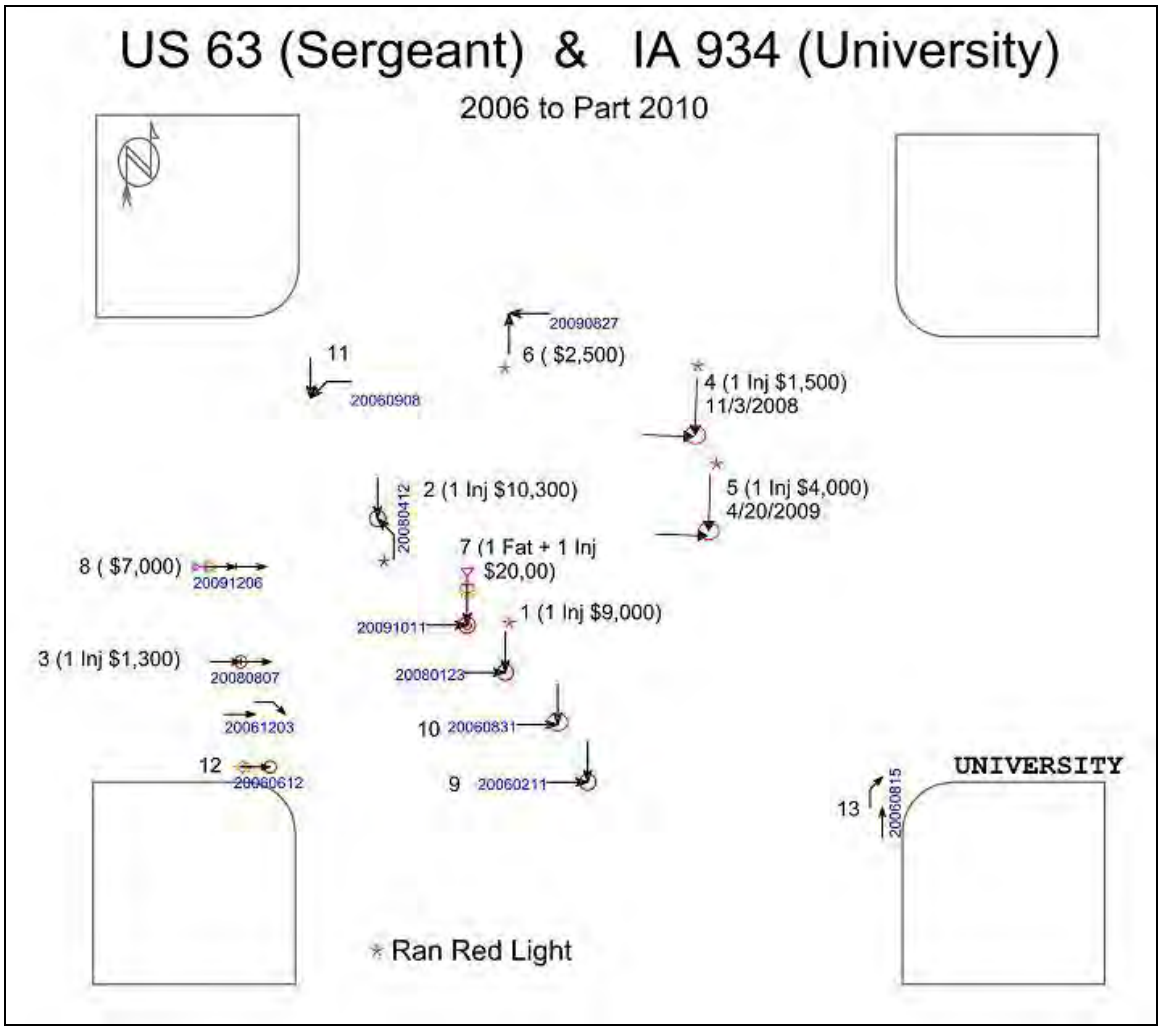
In the benefit-cost calculations the 5 of the 8 crashes were considered. The 5 are the ones involving a southbound errant vehicle and are targeted for correction.

Countermeasure: Add signal (additional primary head)							
CMF	**CRF(%)**	**Quality**	**Crash Type**	**Crash Severity**	**Roadway Type**	**Area Type**	**Reference**
0.65	35	Not Yet Rated	Angle	All	Not specified	Urban	Felipe et al., 1998

CRF of 35% is used for *angled, all, urban* crash types. The benefit for reducing confusion by improving the geometry is conservatively not considered. The B/C was computed both with and without including the fatal crash.

B/C without the fatal crash: 2.56
B/C with fatal crash: 54.71

Only 8 out of the 22 reportable crashes were considered. The potential for benefits is higher than what is shown above.



Intersection or Spot Benefit / Cost Safety Analysis

Rev. 8/09

Iowa DOT Office of Traffic & Safety

County: Balck Hawk Prepared by: M.E. Date Prepared: Jun 15, 2010

Intersection: US 63 (Sergeant Rd) and IA 934 (University Ave)

Improvement

Proposed Improvement(s): Adding and Adjusting location of signal heads for southbound traffic and Expanding the right turn separator island.

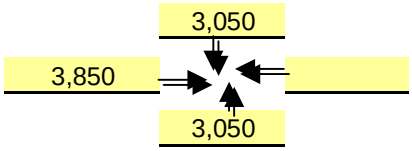
$ 63,000	Estimated Improvement Cost, **EC**	15	Est. Improvement Life, years, **Y**
	Other Annual Cost (after initial year), **AC**	35	Crash Reduction Factor (integer), **CRF**
$ -	Present Value Other Annual Costs, **OC**	4.0%	Discount Rate (time value of $), **INT**
		$ 63,000	Present Value Cost, **COST** = EC + OC

$$OC = \frac{AC}{INT}\left(1 - \frac{1}{(1+INT)^Y}\right)$$

Traffic Volume Data

Source: Iowa DOT Traffic Map 2005 Date of traffic count

Daily Entering Vehicles by Approach (or AADT / 2)



3,631,750	Current Annual Entering Veh., **AEV** = DEV * 365
11,552	veh / day, Final Year DEV, **FDEV**
58.46	MEV, Total Million Entering Veh. Over life of Project, **TMEV**
1.0%	Projected Traffic Growth (0%-10%), **G**
9,950	Current Daily Entering Vehicles, **DEV**

$$TMEV = \frac{AEV}{-G}\left(1 - \left(\frac{1+G}{1}\right)^Y\right) \Big/ 10^6$$

Crash Data

2006 First full year --> 2009 Last full year 4.4 years, Time Period, **T**

5 Additional months values as of Dec. 2007

1	Fatal Crashes	1	Fatalities @	$3,500,000	$	3,500,000
			Major Injuries @	$240,000	$	-
3	Injury Crashes	2	Minor Injuries @	$48,000	$	96,000
		2	Possible Injuries @	$25,000	$	50,000
1	Property Damage Only		(assumed cost per crash)	$2,700	$	-
		-OR-	enter all Property Costs of all crashes:		$	25,800
5	Total Crashes, **TA**			Total $ Loss, **LOSS**	$	3,671,800

1.13	Current Crashes / Year, **AA** = TA / T	0.31	Crashes / MEV, Crash Rate, **CR** CR = TA x 10^6 / (DEV x 365 x T)
$ 734,360	Cost per Crash, **AVC** = LOSS / TA		
18.2	Total Expected Crashes, **TECR** = CR x TMEV	$ 3,446,623	Present Value of Avoided Crashes, **BENEFIT**
0.40	Crashes Avoided First Year **AAR** = AA x CRF / 100		
$ 290,973	Crash Costs Avoided in First Year, AAR x AVC		
6.4	Total Avoided Crashes, TECR x CRF/ 100		

$$BEN. = \frac{AVC \times AAR}{(INT - G)}\left(1 - \left(\frac{1+G}{1+INT}\right)^Y\right)$$

Benefit / Cost Ratio

Benefit : Cost = $3,446,623 : $63,000 = **54.71** : 1

A

Iowa Department of Transportation

Rev. 3/08

Application for TRAFFIC SAFETY FUNDS

GENERAL INFORMATION

Location / Title of Project: US 61 Blue Grass ByPass Paved Shoulders

Applicant: Iowa Department of Transportation, District 6

Contact Person: Douglas L Rick Title: Area Engineer, Davenport

Complete Mailing Address: PO Box 2646
Davenport, IA 52809

Phone: 563-391-4643 (Area Code) E-Mail: douglas.rick@dot.iowa.gov

If more than one highway authority is involved in this project, please indicate and fill in the information below (use additional sheets if necessary).

Co-Applicant(s) _____

Contact Person _____ Title _____

Complete Mailing Address _____

_____

Phone _____ (Area Code) E-Mail _____

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Application Type

- Site Specific ☒
- Traffic Control Device ☐
- Safety Study ☐

Funding Amount

Total Project Cost $ $682,000

Safety Funds Requested $ $500,000

1

B & E

IOWA DEPARTMENT OF TRANSPORTATION

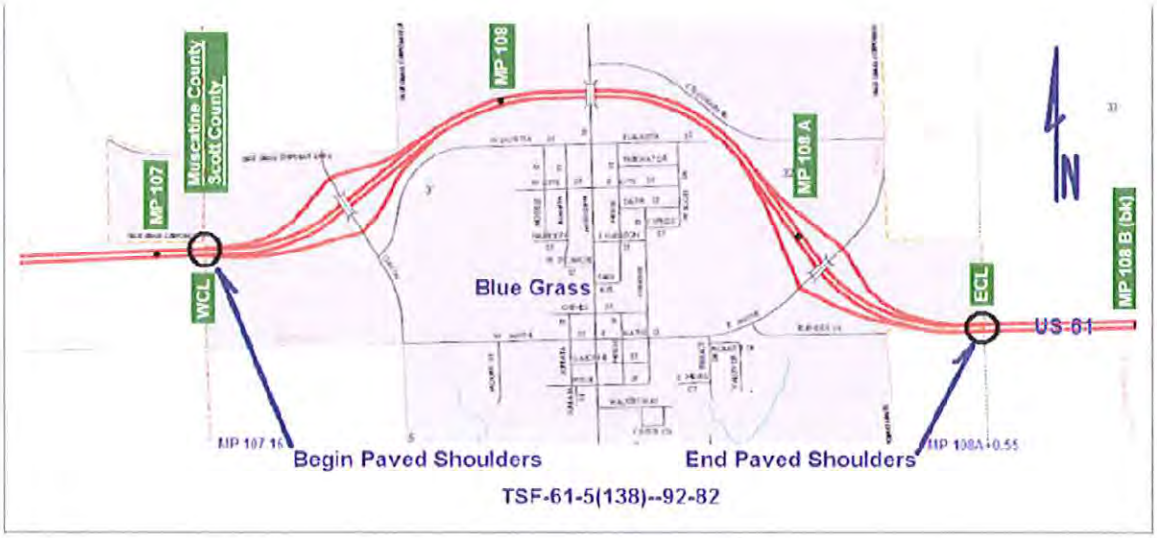
TO OFFICE: District 6 **DATE:** July 16, 2009 updated 6/11/10

ATTENTION: Jim Schnoebelen **PROJECT:** Scott County
TSF-61-5(138)--92-82
PIN 09-82-061-030

FROM: Douglas L. Rick

OFFICE: District 6, Davenport Field Office

SUBJECT: TSIP/3R Project Concept – **FINAL updated 6/11/10 -- US 61 Blue Grass By-Pass Paved Shoulder**



CONCEPT SUMMARY:

District	6
Route	US 61
Project #	TSF-61-5(138)--92-82
Location	Blue Grass By-Pass: West to East Corporate Limits
Work Type	Paved Shoulders
Proposed Letting	~~12/21/2010~~01/18/2012
Cost Estimate	~~$526,000~~$682,000
Funding Source	Traffic and Safety Improvement Program (TSIP) & 3R

Project Summary: As a safety measure, partially pave the shoulders 4' wide ~~with hot mix asphalt (HMA)~~ on the curvilinear Blue Grass By-Pass in an effort to reduce the number of single vehicle run-off-road crashes. The existing shoulders are 8' granular to the outside and 6' granular to the inside. In addition, mill in shoulder rumble strips.

Actions Needed:

-Determine TSIP funding status with the *Office of Traffic & Safety*.

~~-Coordinate/tie with *District 5* as they may also be paving some of the US 61 shoulder west of here during the same time frame.~~

~~-Coordinate with *District 6 Maintenance* to delineate the off-ramp gore area with yellow and~~

2

B&J

~~white vertical panels. Also inspect the existing subdrain outlets.~~

DATE OF REVIEW: February 3, 2009; **PARTICIPANTS**: Bruce Kuehl, Roger Boulet, Mark Brandl, Jack Patterson, Dave Lee, Tom Storey, and Doug Rick

PROJECT DATA

ROUTE: US 61 in Scott County from the Blue Grass west corporate limits (WCL), which is also the Scott/Muscatine County Line, to the Blue Grass east corporate limits (ECL)
LENGTH: 2.37 miles (Milepost 107.1 to 108A+0.55mi)
PLANNING CLASSIFICATION: 2
MAINTENANCE SERVICE LEVEL: B
TRAFFIC: ~~2007 10,600~~2008~~-----~~10,300 ADT with 16 % trucks
PRESENT PAVEMENT SURFACE: PCC
PRESENT PAVEMENT WIDTH: 26 ft. in each direction
PRESENT SHOULDER WIDTH: 8' granular outside (2' PCC integral with driving surface) and 6' granular inside

MP to MP	Dir.	Type	Avg. Str. No.	80% Str. No.	Jt. Str. No.	PCI	IRI	K Value
107.16 to 109.58	1	74	6.53	5.65	3.39	97	1.21	55
107.16 to 109.58	2	74	6.27	5.68	3.74	92	1.15	51

PAVEMENT HISTORY: 26' wide x 10.5 inches thick PCC placed in 2001 in each direction. Coarse aggregate is crushed limestone from Linwood Mine.

EXISTING CONDITIONS AND CAUSES OF DISTRESS: The existing pavement surface is good. However, granular shoulders in this curvilinear section of highway demand much maintenance. The existing subdrains should be inspected to insure that they are working properly.

SAFETY CONSIDERATION: This is a relatively new section of four lane divided highway that was built as part of the US 61 Blue Grass By-Pass. The geometrics are up to date. The concern is the number of single vehicle run-of-the-road crashes.

- This section was included with the *Road Safety Audit for US 61 from the ECL of Muscatine to the WCL of Davenport.* This audit was performed in the field on December 5-6, 2007.
- The Final Report for the audit dated June 2008 noted that: *Numerous run-off-road crashes have occurred on the Blue Grass bypass. It was suggested that installation of partially paved shoulders with milled-in rumble strips be considered as a high priority.*

3

B&C

- The audit report further notes that: *Partially paved (three- to four-foot-wide) shoulders may be beneficial along the entire corridor to address run-off-road crashes. However, funding considerations may reduce scheduling possibilities for the entire section. From the crash data, it would appear the highest priority for this improvement would be the Blue Grass bypass...*
- Also mentioned was: *At the Blue Grass bypass, it was noted that off ramp visibility may be hampered by the curvilinear alignment of the bypass. It was suggested that cross-hatch pavement markings in the gores at these locations may be helpful in differentiating the ramp from mainline lanes.*
- In reviewing the crashes involving personal injury from 2001 through 2008, 75% included comments in the narrative section indicating that the existing granular shoulders played a contributing factor. A common description was that the vehicle entered the shoulder area and then lost control or over corrected resulting in the vehicle rolling or crashing in the median.

FEASIBLE ALTERNATE/RECOMMENDATION: Partially pave the inside and outside shoulders 4' wide from the WCL to ECL of Blue Grass in both directions on US 61. Iowa DOT District 5 is also proposing to partially pave the shoulders in FY 2011 up to the Muscatine/Scott County line. Right of way is not required.

For better visibility at the off-ramps, the suggestion is to better delineate the gore areas with lines of white and yellow object markers similar to the installations currently being tested around the state. The installation consists of three white panels along the right mainline shoulder and four yellow panels along the left ramp shoulder Completed in 2009

ESTIMATED COST:

Project limits: station 760+45.57 to 885+58.58

Item	*Unit*	*Quantity*	*Unit price*	*Estimated cost*
Class 13 excavation	CY	3708	~~$13~~$14	~~$48,000~~$52,000
~~HMA~~	~~Tons~~	~~8008~~	~~$30~~	~~$240,000~~
~~AC binder~~	~~Tons~~	~~480~~	~~$275~~	~~$132,000~~
Paved Shoulder PCC	Square Yds	22,245	$23	$512,000
Blade & shape shoulders	Stations	501	~~$50~~$34	~~$25,000~~$17,000
Milled rumble strips	Stations	501	~~$10~~$22	~~$5,000~~$11,000
~~AC for fog seal~~	~~Gallons~~	~~1446~~	~~$5~~	~~$7,000~~
Traffic Control	Lump sum	5%		~~$23,000~~$30,000

4

B & C & D

Mobilization	Lump sum	5%		~~$23,000~~$30,000
Misc. & Contingency		5%		~~$23,000~~$30,000
TOTAL				~~***$526,000***~~***$682,000***

FUNDS PROGRAMMED:
Applied for funds ($500,000) from the FY ~~2011~~ 2012 Traffic and Safety Improvement Program (TSIP). The remaining funds will come from the district's 3R program

It is proposed to perform this work in FY ~~2011~~2012, most likely starting in the spring of ~~2011~~2012.

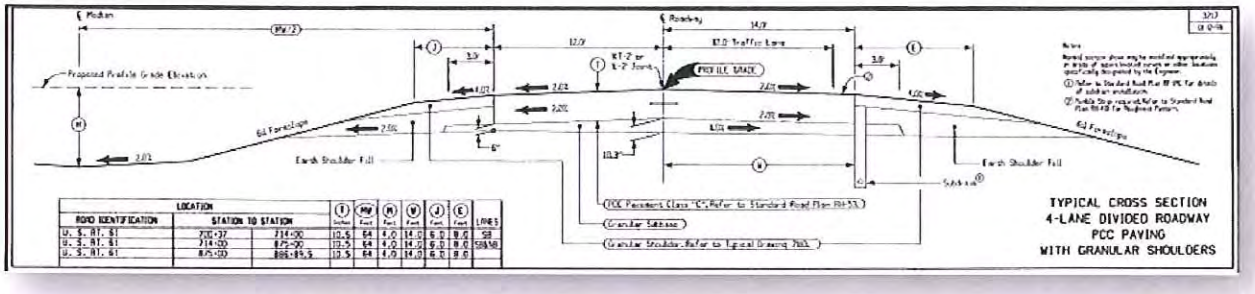
DLR:
cc:

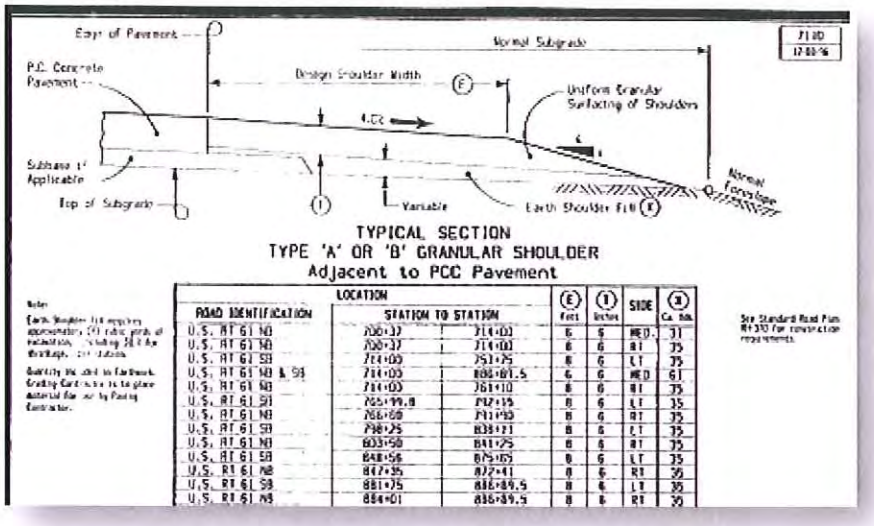
K. M. Mahoney
M. J. Kennerly
C. B. Brakke
M. D. Masteller
N. L. McDonald
R. R. Walton
T. D. Crouch
M. A. Swenson
S. J. Gent
C. C. Poole
J. P. Rost
S. G. Larson
J. R. Berger
B. A. Kuehl
D. L. Rick
T. M. Storey
T. L. Nicholson
S. Shea
J. Patterson
P. Tollenaere
J. F. Adam
K. D. Nicholson
F. W. Todey
D. L. Maifield
G. A. Novey
N. M. Miller
M. J. Donovan
J. W. Smith
D. E. Sprengeler
S. Anderson
S. C. Marler
E. J. Ranney
T. D. Hanson
G. G. Gresslin
A. F. Gourley
M. Grogg, FHWA
T. A. Jerman
R. Boulet
D. Lee
J. Phillips
M. J. Dillavou
D. E. Ohman
R. L. Stanley
A. A. Welch
J. C. Reutter
E. C. Wright
M. J. Sankey
R. A. Younie
T. M. Welch
M. A. Kerper
G. L. Hood
D. R. Tebben
K. A. Yanna
C. L. Cutler
N. M. Abuissa
S. Banks
J. F. Boyd
M. Brandl
F. Thiede
C. Belgarde

5

G&H

- Existing typical sections:





LOCATION					
ROAD IDENTIFICATION	STATION TO STATION		E Feet	I Inches	SIDE	Ca. No.
U.S. RT 61 NB	700+37	714+00	6	6	MED.	31
U.S. RT 61 NB	700+37	714+00	8	6	RT	35
U.S. RT 61 SB	714+00	751+75	8	6	LT	35
U.S. RT 61 NB & SB	714+00	886+81.5	6	6	MED	61
U.S. RT 61 NB	714+00	761+10	8	6	RT	35
U.S. RT 61 SB	755+99.8	792+35	8	6	LT	35
U.S. RT 61 NB	766+60	791+50	8	6	RT	35
U.S. RT 61 SB	798+25	838+71	8	6	LT	35
U.S. RT 61 NB	803+50	841+75	8	6	RT	35
U.S. RT 61 SB	848+56	875+65	8	6	LT	35
U.S. RT 61 NB	847+35	872+41	8	6	RT	35
U.S. RT 61 SB	881+35	886+89.5	8	6	LT	35
U.S. RT 61 NB	884+01	886+89.5	8	6	RT	35

See Standard Road Plan RT-330 for construction requirements.

#6

F

Looking east from beginning of project

7

F

Looking east from MP 108

8

F

Looking east from MP 108-A

9

F

Looking east towards the end of project

10

F

Looking west from the end of project

11

F

Looking west towards the beginning of project

12

Iowa Department of Transportation

Abbreviated Crash Report

Report Version 1.2 Mar 2005

Date	DOT Case #	Agency Case #	City	Crash Sev.	Literal Description
02/03/2003	2003005058		Blue Grass	PDO	NB/EB US 0061 / HWY 61 measuring 2638 Feet West from US 0061 / US 61
02/11/2003	2003006464			Poss/Unk	SB/WB US 0061 / US 61 measuring 300 Feet West from US 0061 / US 61
09/17/2003	2003053222	SP312498265	Blue Grass	PDO	NB/EB US 61 MILE MARKER 107
10/28/2003	2003052163		Blue Grass	PDO	NB/EB US 0061 / HWY 61
07/15/2004	2004232325			Minor	SB/WB US 0061 / HWY 61 measuring 0.1 Miles Southeast from US 0061 /
08/24/2004	2004239132		Blue Grass	Poss/Unk	US 0061 / HWY 61
11/15/2004	2004254805		Blue Grass	PDO	SB/WB US 0061 / HWY 61 measuring 1 Miles Northwest from US 0061 / US
12/21/2004	2004265493		Blue Grass	PDO	NB/EB US 0061 / HWY 61
01/04/2005	2005200169	SP512262200	Blue Grass	PDO	SB/WB US 0061 / US 61 MEASURING 0.2 MILES WEST FROM US 0061 / US 61
02/27/2005	2005213525		Blue Grass	PDO	SB/WB US 0061 / HWY 61 underpass of OAK LANE
03/25/2005	2005213439		Blue Grass	PDO	SB/WB US 0061 / HWY 61
04/24/2005	2005217671			PDO	SB/WB US 0061 / HWY 61
09/08/2005	2005240911		Blue Grass	PDO	US 0061 / NE RAMP and SB/WB US 0061 / US 61 measuring 0.3 Miles West
10/06/2005	2005246062		Blue Grass	Poss/Unk	US 0061 / SW RAMP and NB/EB US 0061 / HWY 61
10/08/2005	2005245942	7373ISP	Blue Grass	Major	HWY. #61 NB .3 EAST OF 107 M.M.
09/06/2006	2006238283		Blue Grass	PDO	US 0061 / SW RAMP and US 0061 / NW RAMP and NB/EB US 0061 / HWY 61
09/30/2006	2006242385		Blue Grass	Poss/Unk	SB/WB US 0061 / HWY 61
11/29/2006	2006253758	49777ISP		PDO	NB HGWY 61@106 MM
01/13/2007	2007201352		Blue Grass	PDO	SB/WB US 0061 / US 61
01/13/2007	2007201359		Blue Grass	PDO	NB/EB US 0061 / US 61
05/27/2007	2007375861	26257ISP	Blue Grass	PDO	HWY. 61 NB MM 109
06/12/2007	2007376430		Blue Grass	PDO	NB/EB US 0061 / HWY 61
06/18/2007	2007377567			PDO	NB/EB US 0061 / US 61 measuring 0.99 Miles Northwest from US 0061 /
10/30/2007	2007400232			PDO	SB/WB US 0061 / HWY 61 measuring 0.5 Miles West from US 0061 / US 61
11/17/2007	2007407153	53963ISP	Blue Grass	Poss/Unk	NB/EB US 0061 / HWY 61
12/27/2007	2007416163	61552ISP		PDO	NB US 0061 EXIT 107 BLUE GRASS
01/17/2008	2008426207		Blue Grass	PDO	NB/EB US 0061 / US 61 measuring 0.5 Miles Northeast from US 0061 / US
10/25/2008	2008470611		Blue Grass	Poss/Unk	US 0061 / US 61 measuring 0.5 Miles East from US 0061 / US 61
10/10/2009	2009530370	09-32837	Blue Grass	PDO	NB/EB US 0061 / US 61

7

L

Rev. 8/09

Road Segment Benefit / Cost Safety Analysis

Iowa DOT Office of Traffic & Safety

County: Scott Prepared by: Douglas L Rick Date Prepared: Jun 11, 2010

Location: US 61 in Scott County from the WCL of Blue Grass to the ECL of Blue Grass

Improvement

Proposed Improvement(s): Partially pave all shoulders on the US 61 Blue Grass Bypass and mill in rumble strips

$ 682,000	Estimated Improvement Cost, **EC**	20	Est. Improvement Life, years, **Y**
$ -	Other Annual Cost (after initial year), **AC**	92	Crash Reduction Factor (integer), **CRF**
$ -	Present Value Other Annual Costs, **OC**	4.0%	Discount Rate, **INT**
	$$OC = \frac{AC}{INT}\left(1 - \frac{1}{(1+INT)^Y}\right)$$	$ 682,000	Present Value All Costs, **COST** = EC + OC

Traffic Volume Data

Source: Iowa DOT Transportation Data 2008 Date of traffic count

Length (mi.)	Two-way veh/day	Description
0.40	9,700	Co line to Oak Lane
1.50	9,500	Oak Lane to Mayne Street
0.47	13,400	Mayne St to ECL
2.37	miles total	

24,428	Current Vehicle Miles / Day, **VM**
53,525	End of Life Veh. Miles / Day
8,916,220	Current Veh. Miles / Year, **AM**
265,507,900	Total Projected Veh. Miles Over Life of Project, **TVMT**

$$TVMT = \frac{AM}{-G}\left(1 - \left(\frac{1+G}{1}\right)^Y\right)$$

4.0% Projected Traffic Growth (0%-10%), **G**

Crash Data

2001 First full year --> 2009 Last full year 9.0 years, Time Period, **T**

Additional months values as of Dec. 2007

0	Fatal Crashes	0	Fatalities @	$3,500,000	$ -
		1	Major Injuries @	$240,000	$ 240,000
8	Injury Crashes	1	Minor Injuries @	$48,000	$ 48,000
		8	Possible Injuries @	$25,000	$ 200,000
21	Property Damage Only		(assumed cost per crash)	$2,700	$ -
			-OR- enter all Property Costs of all crashes:		$ 108,825
29	Total Crashes, **TA**			Total $ Loss, **LOSS**	$ 596,825

3.22	Current Crashes / Year, **AA** = TA / T	36.1	Crashes / HMVM, Crash Rate, **CR** CR = TA x 10^8 / (AM x T)
$ 20,580	Cost per Crash, **AVCR** = LOSS / TA	$ 1,168,144	Present Value of Avoided Crashes, **BENEFIT**
96.0	Total Expected Crashes, **TCR** = CR x TVMT/10^8		
2.95	Crashes Avoided First Year **AAR** = AA x CRF / 100		
$ 60,744	Crash Costs Avoided in First Year, AAR x AVCR		
87.9	Total Avoided Crashes, TCR x CRF/ 100		

$$BEN. = \frac{AVCR \times AAR}{(INT - G)}\left(1 - \left(\frac{1+G}{1+INT}\right)^Y\right)$$

Benefit / Cost Ratio

Benefit : Cost = $1,168,144 : $682,000 = 1.71 : 1

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Iowa Department of Transportation

Rev. 3/08

Application for TRAFFIC SAFETY FUNDS

GENERAL INFORMATION

Location / Title of Project: Lyon Co./ Route A-46 Rumble Stripes and Painting

Applicant: Lyon county

Contact Person: Jeff Williams Title: County Engineer

Complete Mailing Address: 315 1st Ave Suite 100
Rock Rapids, Iowa 51246

Phone: 712-472-8230 (Area Code) E-Mail: jwilliams@co.lyon.ia.us

If more than one highway authority is involved in this project, please indicate and fill in the information below (use additional sheets if necessary).

Co-Applicant(s) _____

Contact Person _____ Title _____

Complete Mailing Address _____

_____

Phone _____ (Area Code) E-Mail _____

PLEASE COMPLETE THE FOLLOWING PROJECT INFORMATION:

Application Type

- Site Specific ☒
- Traffic Control Device ☐
- Safety Study ☐

Funding Amount

Total Project Cost $ 19,800.00

Safety Funds Requested $ 19,800.00

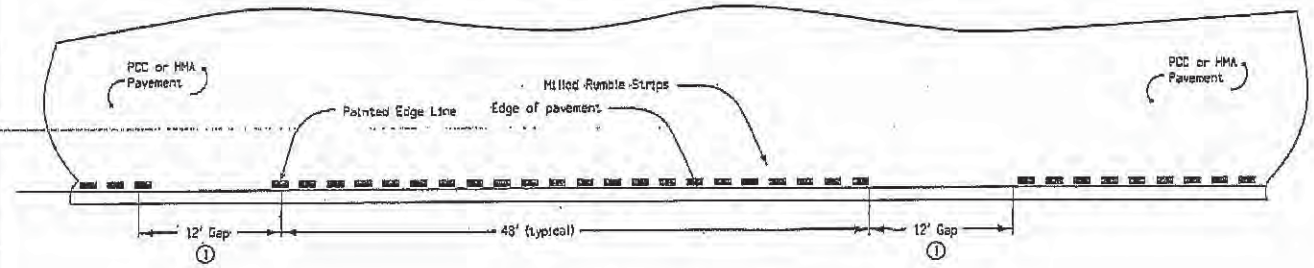
NARRATIVE

In 2008 Lyon County did a 3 ½" HMA overlay on a rural stretch of roadway that had narrow shoulders. During the overlay process, the road was leveled back to an acceptable slope which in many areas meant that the outside edge raised about 4 ½ inches. The existing side slope is 2:1. These two items all but eliminated any shoulder that was there.

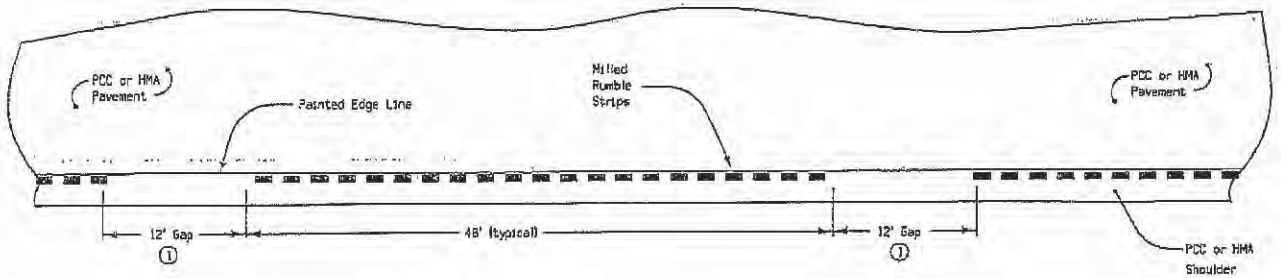
After the new surface was placed, it would appear that the travel speed of the general public has picked up. That along with inattentive driving has lead to an increase in run off the road accidents.

It is hoped that the placing of rumble stripes and painted edge line will alert the driver to the closeness of the side slope in time to correct the vehicle and thus avoid going into the ditch.

County road without paved shoulders

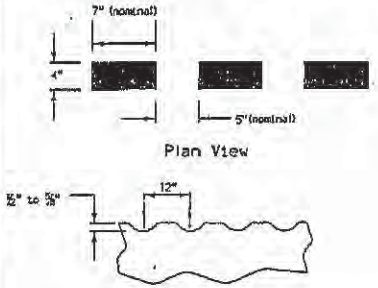


County road with paved shoulders

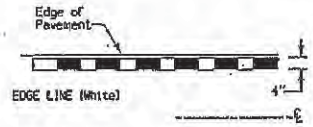


① Gap side roads and entrances

MILLED RUMBLE STRIP DETAILS



Current Painting Detail for Road with Unpaved Shoulder



Current Painting Detail for Road with Paved Shoulder

MILLED SHOULDER RUMBLE STRIPS

ENGLISH	IOWA DOT	DESIGN TEAM	STATEWIDE COUNTY	PROJECT NUMBER DE-RS07(001)--3C-00	SHEET NUMBER 8.1

COST ESTIMATE FOR RUMBLE STRIPES
AND EDGELINE PAINTING

Rumble Striping	$14.00/station
Painting	$ 7.00/station

740 stations

740 (14.00)	= $10,360.00
740 (7.00)	= $ 5,180.00
Mobilization	= $ 4,260.00
Total	= $ 19,800.00

TIME SCHEDULE

Lyon County proposes to design and bring to letting this seven mile project upon notification that it will be receiving funds from the TSIP in December. The letting date would be in June of 2011 with completion by October of the same year.

HIGHWAY AND TRANSPORTATION MAP

LYON COUNTY

IOWA

Prepared by

Iowa Department of Transportation

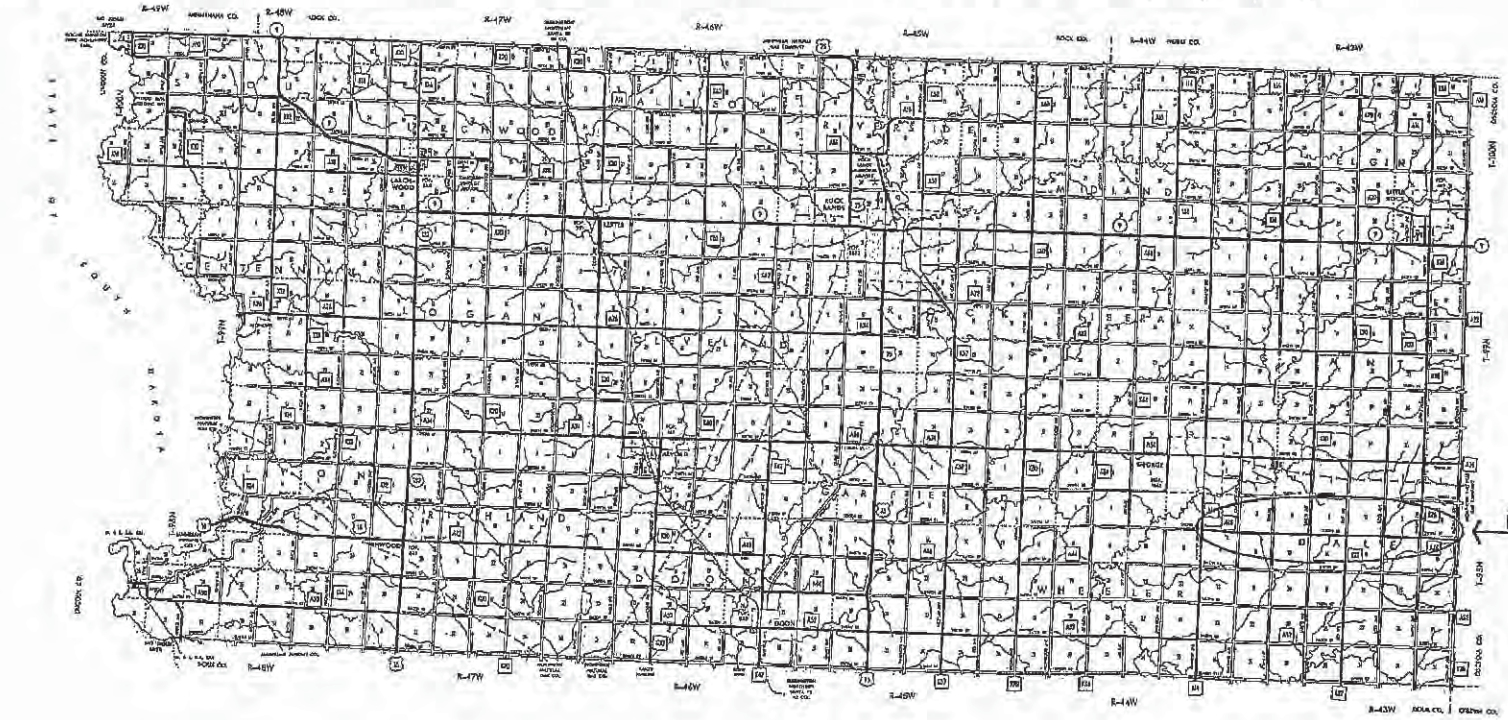
Phone (515) 239-1202

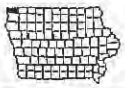
In Cooperation With

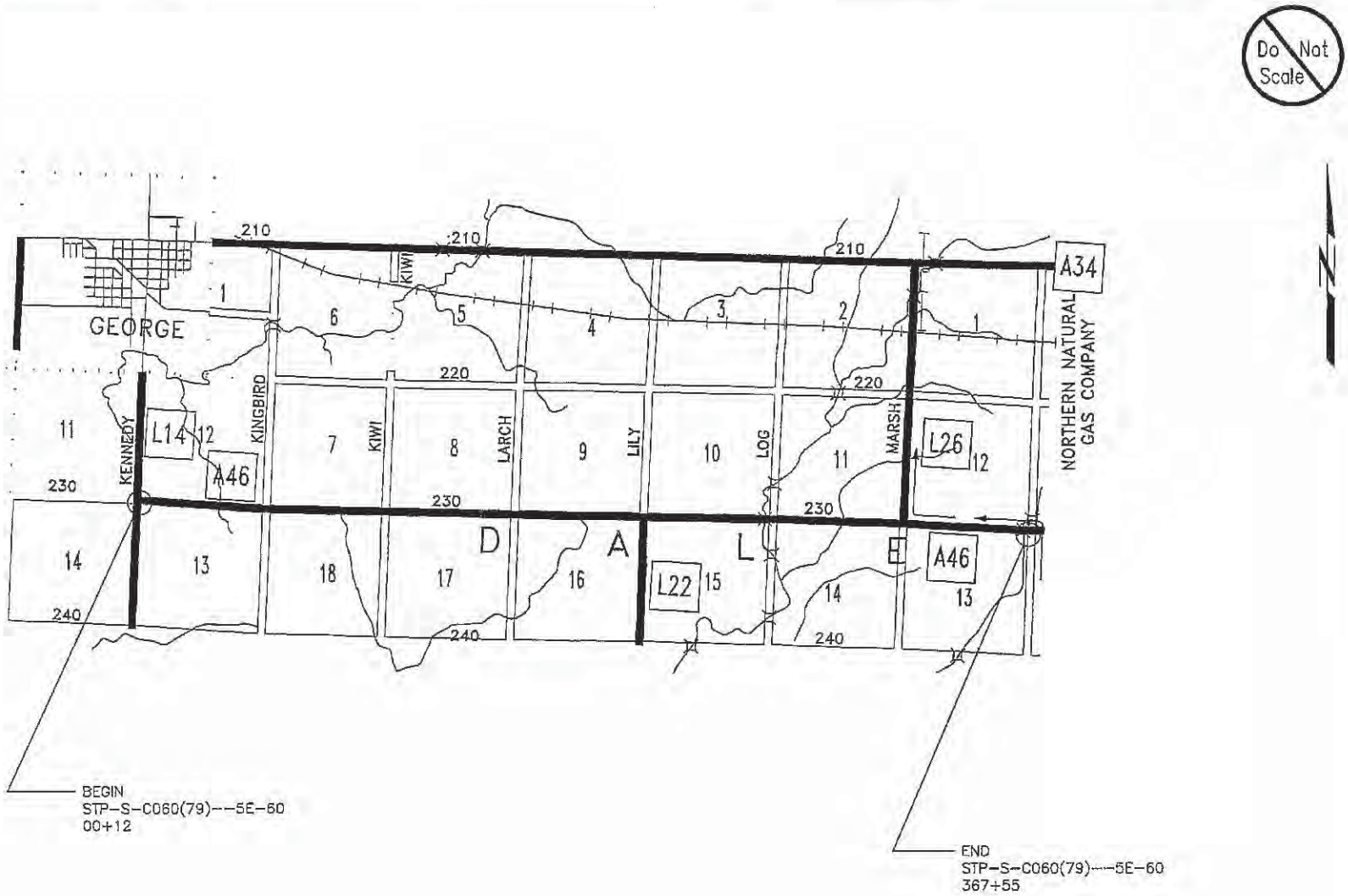
United States Department of Transportation

JANUARY 1, 2009

LEGEND







LOCATION SHEET LYON COUNTY Project Number: STP-S-C060(79)--5E-60 SHEET NO. A.02

Iowa Department of Transportation

Major Cause Summary

Lyon County A46 All Crashes 2005-2009

Analysis Years: 2005 [2], 2006 [2], 2007 [1], 2008 [3], 2009 [1]

Crash Summary:

Fatal	-
Major Injury	1
Minor Injury	5
Possible/Unknown	1
PDO	2
Total Crashes	9

Injury Summary:

Fatal	-
Major Injury	1
Minor Injury	6
Possible	2
Unknown	-
Total Injuries	9

TOT Property Damage: $162,825

AVG Property Damage: $18,092

Surface Condition Summary:

Dry	6
Wet	1
Ice	-
Snow	1
Slush	-
Sand/Dirt/Oil/Gravel	-
Water	-
Other	-
Unknown	1
Not Reported	-
Total Crashes	9

Major Cause Summary:

1 Animal
Ran Traffic Signal
Ran Stop Sign
Crossed Centerline
FTYROW: At Uncontrolled Intersection
FTYROW: Making Right Turn on Red Signal
FTYROW: From Stop Sign
FTYROW: From Yield Sign
FTYROW: Making Left Turn
FTYROW: From Driveway
FTYROW: From Parked Position
FTYROW: To Pedestrian
FTYROW: Other (explain in narrative)
Traveling Wrong Way or on Wrong Side of Rd
Driving Too Fast for Conditions
Exceeded Authorized Speed
Made Improper Turn
Improper Lane Change
Followed Too Close
Disregarded Railroad Signal
Disregarded Warning Sign
Operating Vehicle in Reckless/Aggressive Manner
Improper Backing
Illegally Parked/Unattended
2 Swerving/Evasive Action
Over-Correcting/Over-Steering
Downhill Runaway
Equipment Failure
Separation of Units
6 Ran Off Road - Right
Ran Off Road - Straight
Ran Off Road - Left
Lost Control
Inattentive/Distracted By: Passenger
Inattentive/Distracted By: Use of Phone or Other
Inattentive/Distracted By: Fallen Object
Inattentive/Distracted By: Fatigued/Asleep
Other: Vision Obstructed
Oversized Load/ Oversized Vehicle
Cargo/Equipment Loss or Shift
Other: Other Improper Action
Unknown
Other: No Improper Action
None Indicated

Selection Filter:

((YEAR <> 2001 and YEAR <> 2002 and YEAR <> 2003 and YEAR <> 2004))

Analyst: RBS

Notes: Resurfaced in 2007 or 2008? 5 Year Max for TSIP Review

Crash Reduction Factors for Rumble Strip Installation

(from Clearinghouse)

(Rumble striping would be similar, but use lower range of values)

Countermeasure: Install shoulder rumble strips

CMF	CRF(%)	Quality	Crash Type	Crash Severity	Roadway Type	Area Type	Reference
0.87	13	Not Yet Rated	Run off road	All	Not specified	Rural	Patel et al., 2007
0.73	27	Not Yet Rated	Run off road	All	Principal Arterial Interstate	Rural	Garder and Davies, 2006
CMF	**CRF(%)**	**Quality**	**Crash Type**	**Crash Severity**	**Roadway Type**	**Area Type**	**Reference**
0.66	34	Not Yet Rated	Run off road	All	Principal Arterial Other Freeways and Expressways	Rural	Smith and Ivan, 2005
0.84	16	Not Yet Rated	Run off road	All	Principal Arterial Other Freeways and Expressways	Rural	Smith and Ivan, 2005
0.66	34	Not Yet Rated	Run off road	All	Principal Arterial Other Freeways and Expressways	Rural	Smith and Ivan, 2005
0.62	38	Not Yet Rated	Run off road	All	Principal Arterial Other Freeways and Expressways	Rural	Smith and Ivan, 2005
0.64	36	Not Yet	Run off	All	Principal	Rural	Smith

		Rated	road		Arterial Other Freeways and Expressways		and Ivan, 2005
0.68	32	Not Yet Rated	Run off road	All	Principal Arterial Other Freeways and Expressways	Rural	Smith and Ivan, 2005
0.82	18	Not Yet Rated	Run off road	Fatal,Serious injury,Minor injury	Not specified	Rural	Patel et al., 2007

Use 18 for Lyon County

Rev. 8/09

Road Segment Benefit / Cost Safety Analysis

Iowa DOT Office of Traffic & Safety

County: Lyon Prepared by: RBS Date Prepared: Jun 24, 2010

Location: A46 between L14 and East County line

Improvement

Proposed Improvement(s): Rumble striping (milling and paint) at 11' lane for full length

$ 20,000	Estimated Improvement Cost, **EC**	10	Est. Improvement Life, years, **Y**
$ 2,184	Other Annual Cost (after initial year), **AC**	18	Crash Reduction Factor (integer), **CRF**
$ 17,714	Present Value Other Annual Costs, **OC**	4.0%	Discount Rate, **INT**
	$OC = \frac{AC}{INT}\left(1 - \frac{1}{(1+INT)^Y}\right)$	$ 37,714	Present Value All Costs, **COST** = EC + OC

Traffic Volume Data

Source: DOT Traffic Count map 2007 Date of traffic count

Length (mi.)	Two-way veh/day	Description
7.00	327	Wt Avg- L14-E. County line
7.00	miles total	

2,289 Current Vehicle Miles / Day, **VM**

3,388 End of Life Veh. Miles / Day

835,485 Current Veh. Miles / Year, **AM**

10,030,922 Total Projected Veh. Miles Over Life of Project, **TVMT**

$$TVMT = \frac{AM}{-G}\left(1 - \left(\frac{1+G}{1}\right)^Y\right)$$

4.0% Projected Traffic Growth (0%-10%), **G**

Crash Data

2005 First full year --> 2009 Last full year 5.0 years, Time Period, **T**

Additional months values as of Dec. 2007

	Fatal Crashes		Fatalities @	$3,500,000	$ -
		1	Major Injuries @	$240,000	$ 240,000
7	Injury Crashes	5	Minor Injuries @	$48,000	$ 240,000
		1	Possible Injuries @	$25,000	$ 25,000
2	Property Damage Only		(assumed cost per crash)	$2,700	$ 24,300
			-OR- enter all Property Costs of all crashes:		
9	Total Crashes, **TA**			Total $ Loss, **LOSS**	$ 529,300

1.80 Current Crashes / Year, **AA** = TA / T

$ 58,811 Cost per Crash, **AVCR** = LOSS / TA

21.6 Total Expected Crashes, **TCR** = CR x TVMT/10^8

0.32 Crashes Avoided First Year **AAR** = AA x CRF / 100

$ 19,055 Crash Costs Avoided in First Year, AAR x AVCR

3.9 Total Avoided Crashes, TCR x CRF/ 100

215.4 Crashes / HMVM, Crash Rate, **CR**

CR = TA x 10^8 / (AM x T)

$ 183,219 Present Value of Avoided Crashes, **BENEFIT**

$$BEN. = \frac{AVCR \times AAR}{(INT - G)}\left(1 - \left(\frac{1+G}{1+INT}\right)^Y\right)$$

Benefit / Cost Ratio

Benefit : Cost = $183,219 : $37,714 = **4.86** : 1