



TECHNICAL MEMORANDUM

TO: Jon Halter, PE
 FROM: Mike Kotila, PE
 DATE: May 11, 2016
 RE: 4th Avenue North at Dewey Street – Intersection Evaluation
 SEH No. FOLEY 127233

This technical memorandum provides findings related to an intersection control review performed to evaluate the intersection of 4th Avenue North at Dewey Street in Foley, Minnesota.

Data Collection

Existing traffic turning movement counts were collected during the weekday from 4:00 AM to 8:00 PM on Thursday December 17, 2015 at the intersection of 4th Avenue North at Dewey Street. The peak hours for the intersection were found to be from 7:00 – 8:00 AM, 11:00 AM – 12:00 PM and from 2:30 – 3:30 PM. The existing peak hour traffic turning movements are shown below in Table 1.

Table 1 – Existing Peak Hour Count

Intersection	Peak	NBL	NBT	NBR	SBL	SBT	SBR	EBL	EBT	EBR	WBL	WBT	WBR	TOTAL
4 th Avenue at Dewey Street	AM	2	11	1	9	9	14	18	35	4	3	20	5	131
	Mid-day	4	14	3	12	11	19	17	27	3	2	49	14	175
	PM	9	21	9	26	33	19	22	51	4	5	50	16	265

Existing Conditions

The existing intersection geometry and traffic control for the study intersection is as follows:

- Stop sign control is provided on northbound and southbound 4th Avenue at Dewey Street. Dewey Street traffic is uncontrolled.
- Cross walks are in place across all four legs of the intersection.
- Each approach to the intersection is a single lane.
- On-street 45 degree angled parking is provided on both sides of 4th Avenue and both sides of Dewey Street. The parking stalls are painted on the street in very close proximity to the intersection crosswalks on all four approaches to the intersection.
- The curb to centerline width for 4th Avenue and for Dewey Street is 31 feet, comprised of 18 feet for the angled parking, 2 feet for a clear zone and 11 feet for the traveled lane; this results in an overall curb to curb street width of 62 feet.

Operational Issues

The existing configuration results in several operational issues all related to limited sight lines for drivers and for pedestrians.

- When the angled parking stalls are occupied, drivers stopped at the stop sign and crosswalk on northbound or southbound 4th Avenue have a very restricted view of cars approaching on Dewey Street. To safely progress through the intersection, they must creep forward into the intersection until they can see around parked vehicles.
- The Dewey Street approaches to 4th Avenue are uncontrolled (i.e. no stop sign). Drivers approach the intersection without knowledge of vehicles or pedestrians about to enter the intersection.
- Pedestrians using the crosswalks have 62 feet of potential exposure to moving vehicles.
- Pedestrians crossing Dewey Street cannot see vehicles approaching on Dewey Street without leaving the curb. Similarly, drivers on Dewey Street are unaware that pedestrians may desire to cross.

Intersection Control

The intersection of 4th Avenue North at Dewey Street is currently controlled by a two-way stop for the northbound and southbound 4th Avenue approach.

The Minnesota Manual on Uniform Traffic Control Devices (MMUTCD) advises that the decision to install a multi-way stop control should be based on an engineering study. The MMUTCD provides traffic volume and crash history criteria to be considered as part of the engineering study. The following are minimum thresholds are defined for all-way stop control:

- The minimum volume entering the intersection from the major street approaches (total of both approaches) averages at least 300 vehicles per hour for any 8 hours of an average day.
- The combined vehicular, pedestrian and bicycle volume entering the intersection from the minor street approaches (total of both approaches) averages 200 units per hour for the same 8 hours, with an average delay to minor-street traffic of at least 30 seconds per vehicle during the highest hour.
- Five or more crashes in a 12 month period that are susceptible to correction by an all-way stop installation. Such crashes include right-turn and left turn collisions as well as right-angle collisions.

Based on the volume thresholds, all-way stop control is not warranted at this intersection. The traffic volumes do not meet the 300 total vehicles and 200 combined vehicular traffic for any hour of the day that was counted. A detailed volume warrant analysis is summarized in the Appendix of this report.

The MMUTCD also defines “other criteria” that may be considered in the engineering study. Two of the other criteria apply to the 4th Avenue and Dewey Street intersection:

- The need to control vehicular/pedestrian conflicts near locations that generate high pedestrian volumes.
- Locations where a road user, after stopping, cannot see conflicting traffic and is not able to negotiate the intersection unless conflicting traffic is also required to stop.

Based on the “other criteria” defined by the MMUTCD, an all-way stop control could be considered.

Traffic Safety

Vehicle crashes from 2005-2014 were reviewed for the study intersection. In the last five years, 2010 – 2014, the intersection had 2 reported crashes. Over ten years, 2005 – 2014, the intersection had 6 reported crashes. Both the five and ten year crash analysis indicate that the study intersection has a crash rate that is higher than the statewide average crash rate for an Urban Thru/Stop intersection. However, both time periods have crash and severity rates below the calculated critical crash and severity rate, therefore indicating that crash experience does not demonstrate that a safety problem exists. Additionally there was not five or more reported crashes in any 12 month period that would be susceptible to correction through implementation of all-way stop control at the intersection. A detailed crash analysis is summarized in attached Tables A1-A4.

The American Association of State Highway and Transportation Officials (AASHTO) publishes “A Policy on Geometric Design of Highways and Streets” which is the basis for design guidelines practiced by road authorities in Minnesota. AASHTO guidelines for 30 mile per hour roadways suggest that a driver at the 4th Avenue stop sign should have a clear view of oncoming traffic on Dewey Street for 335 feet to allow adequate time to make a left hand turn onto Dewey Street or 290 feet to make a right hand turn in front of oncoming vehicles. Achieving this guideline would require banning parking along Dewey Street for 200 – 240 feet from the crosswalks.

Minnesota Statute 169.34 states that parking is not allowed within 30 feet of a stop sign or within 20 feet of a crosswalk. These requirements are not currently being met.

Minnesota Statute 169.21 states that drivers must yield to pedestrians crossing the roadway within a marked crosswalk. The current configuration restricts visibility to portions of the crosswalk when parking spaces near the intersection are occupied. Pedestrians need to move into the street well beyond the curb to be seen by drivers – at which point the drivers are obligated to yield. For this to be effective, pedestrians need to pause as they become visible to drivers.

Potential Solutions

1. Ban parking within 200-240 feet of the crosswalks to satisfy AASHTO intersection sight distance guidelines.
2. Ban parking for 30 feet to comply with Minnesota Statutes (does not satisfy AASHTO).
3. Construct curb line bump-outs to narrow Dewey Street. The 4th Avenue stop signs and crosswalks would be moved about 15-17 feet forward. The bump-out design could be configured to consume the 30 feet not allowed for parking based on statute.
4. Consider all-way stop control. MMUTCD “other criteria” are satisfied which should be considered if no other alternative is feasible. Benton County would need to approve of this approach.

Conclusions and Recommendations

The existing traffic volume demands and safety analysis do not warrant an all-way stop traffic control at the intersection of 4th Avenue/Dewey Street. Sight lines are not adequate for motor vehicles or pedestrians to confidently proceed through the intersection. Banning parking for 30 feet in each direction from the intersection helps, but does not solve the problem. Banning parking for 200-240 feet would intersection sight distance guidelines but is not feasible for the business owners along Dewey Street.

The bump-out alternative provides the potential to solve the operational issues that have been identified while retaining the two-way stop control. City staff has considered this option and do not find it acceptable due to maintenance concerns.

It is recommended that an all-way stop control be installed in combination with removal of parking within 30 feet of the stops signs and 20 feet from the crosswalks, subject to approval of the all-way stop control by Benton County.

Attachments: Warrant Analysis Worksheet
Crash History Tables A1-A4

c: Bob Barbian, City of Foley



SHORT ELLIOTT HENDRICKSON INC.

10901 Red Circle Drive, Suite 200
 Minnetonka, MN 55343

**Existing 2015 - Dewey Street & 4th Avenue
 ALL WAY STOP
 WARRANT ANALYSIS**

LOCATION: Dewey Street & 4th Avenue
 COUNTY: Benton County, Minnesota
 REF. POINT:
 DATE: 12/17/2015

OPERATOR: CMJ

85 th % Speed	Approach Description	Lanes	Approach Total
30	Major App1: Dewey Street EB	1	637
30	Major App3: Dewey Street WB	1	717
30	Minor App2: 4th Avenue NB	1	279
30	Minor App4: 4th Avenue SB	1	585

0.70 SPEED FACTOR USED? **No**

Minimum Volume Requirement
300 200

HOUR	MAJOR	MAJOR	MINOR	MINOR	MAJOR APPROACH TOTAL	MINOR APPROACH TOTAL	WARRANT MET
	APP. 1	APP. 3	APP. 2	APP. 4	Σ (APP.1 + APP. 3)	Σ (APP.2 + APP. 4)	MAJOR / MINOR
0:00 - 1:00	0	0	0	0	0	0	NO / NO
1:00 - 2:00	0	0	0	0	0	0	NO / NO
2:00 - 3:00	0	0	0	0	0	0	NO / NO
3:00 - 4:00	0	0	0	0	0	0	NO / NO
4:00 - 5:00	3	2	1	3	5	4	NO / NO
5:00 - 6:00	14	5	2	8	19	10	NO / NO
6:00 - 7:00	18	16	4	15	34	19	NO / NO
7:00 - 8:00	57	28	14	32	85	46	NO / NO
8:00 - 9:00	39	59	5	33	98	38	NO / NO
9:00 - 10:00	40	58	9	32	98	41	NO / NO
10:00 - 11:00	43	54	24	50	97	74	NO / NO
11:00 - 12:00	47	65	21	42	112	63	NO / NO
12:00 - 13:00	48	55	34	50	103	84	NO / NO
13:00 - 14:00	44	61	24	30	105	54	NO / NO
14:00 - 15:00	50	65	33	67	115	100	NO / NO
15:00 - 16:00	79	76	30	74	155	104	NO / NO
16:00 - 17:00	62	69	17	42	131	59	NO / NO
17:00 - 18:00	41	54	27	58	95	85	NO / NO
18:00 - 19:00	28	34	22	31	62	53	NO / NO
19:00 - 20:00	24	16	12	18	40	30	NO / NO
20:00 - 21:00	0	0	0	0	0	0	NO / NO
21:00 - 22:00	0	0	0	0	0	0	NO / NO
22:00 - 23:00	0	0	0	0	0	0	NO / NO
23:00 - 24:00	0	0	0	0	0	0	NO / NO
Daily	637	717	279	585			

Hours met for warrant: **Met (Hr) 0 Required (Hr) 8**

All-way Stop Warrant: **Not satisfied**

REMARKS: _____

**Table A1
Dewey Street at 4th Avenue Crash Summary
2010 to 2014 Crash Data
MnDOT Crash Mapping Software Information**

Dewey Street at 4th Avenue	Crash Severity						Intersection Rates		MnDOT* Average Rates		Calculated Critical Rates	
	Fatal	A	B	C	Property	Total	Crash Rate	Severity Rate	Crash Rate	Severity Rate	Critical Crash Rate	Critical Severity Rate
5 Dewey Street at 4th Avenue	0	0	0	0	2	2	0.49	0.49	0.18	0.27	0.86	1.05
TOTAL	0	0	0	0	2	2	XX					
**Signalized Intersections	0%	0%	0%	0%	100%		Above Avg or Critical Rate		Avg Rate Exceeded		Critical Rate Exceeded	

NOTES:
Exceeding the Calculated Critical Rates indicated a sustained crash problem.

MnDOT Statewide Average Rates (2013 Data; 5-Year)*		
Intersection Type	Crash Rate	Severity Rate
1 Signal-Low Vol. & Low Speed	0.55	0.75
2 Signal-Low Vol. & High Speed	0.38	0.55
3 Signal-High Vol. & Low Speed	0.69	0.96
4 Signal-High Vol. & High Speed	0.41	0.59
5 Urban Thru/Stop	0.18	0.27
6 Rural Thru/Stop	0.26	0.42
7 All Way Stop	0.34	0.49
8 Other	0.16	0.22



Table A2
Dewey Street at 4th Avenue Crash Summary
2010 to 2014 Crash Data
MnDOT Crash Mapping Software Information

Dewey Street at 4th Avenue	Diagram - Crash Type								Intersection Rates		
	From	Rear End	Left Turn	Right Angle	Side Swipe	Head On	Ran Off Road	Other	Total	Crash Rate	Severity Rate
Dewey Street at 4th Avenue	0	0	2	0	0	0	0	0	2	0.49	0.49
TOTAL	0	0	2	0	0	0	0	0	2		

0% 0% 100% 0% 0% 0% 0%

**Signalized Intersections

Critical Rate Exceeded



Table A3
Dewey Street at 4th Avenue Crash Summary
2005 to 2014 Crash Data
MnDOT Crash Mapping Software Information

Dewey Street at 4th Avenue	Crash Severity						Intersection Rates		MnDOT* Average Rates		Calculated Critical Rates	
	Fatal	A	B	C	Property	Total	Crash Rate	Severity Rate	Crash Rate	Severity Rate	Critical Crash Rate	Critical Severity Rate
5 Dewey Street at 4th Avenue	0	0	0	0	6	6	0.73	0.73	0.20	0.30	0.90	1.11
TOTAL	0	0	0	0	6	6	XX					
**Signalized Intersections	0%	0%	0%	0%	100%		Above Avg or Critical Rate		Avg Rate Exceeded		Critical Rate Exceeded	

NOTES:
 Exceeding the Calculated Critical Rates indicated a sustained crash problem.

MnDOT Statewide Average Rates (2013 Data; 10-Year)*		
Intersection Type	Crash Rate	Severity Rate
1 Signal-Low Vol. & Low Speed	0.60	0.85
2 Signal-Low Vol. & High Speed	0.44	0.64
3 Signal-High Vol. & Low Speed	0.48	0.70
4 Signal-High Vol. & High Speed	0.44	0.64
5 Urban Thru/Stop	0.20	0.30
6 Rural Thru/Stop	0.28	0.47
7 All Way Stop	0.35	0.50
8 Other	0.13	0.19



Table A4
Dewey Street at 4th Avenue Crash Summary
2005 to 2014 Crash Data
MnDOT Crash Mapping Software Information

Dewey Street at 4th Avenue	Diagram - Crash Type								Intersection Rates	
	From	Rear End	Left Turn	Right Angle	Side Swipe	Head On	Ran Off Road	Other	Total	Crash Rate
Dewey Street at 4th Avenue	3	0	2	0	0	0	1	6	0.73	0.73
TOTAL	3	0	2	0	0	0	1	6		

50% 0% 33% 0% 0% 0% 17%

**Signalized Intersections

Critical Rate Exceeded

