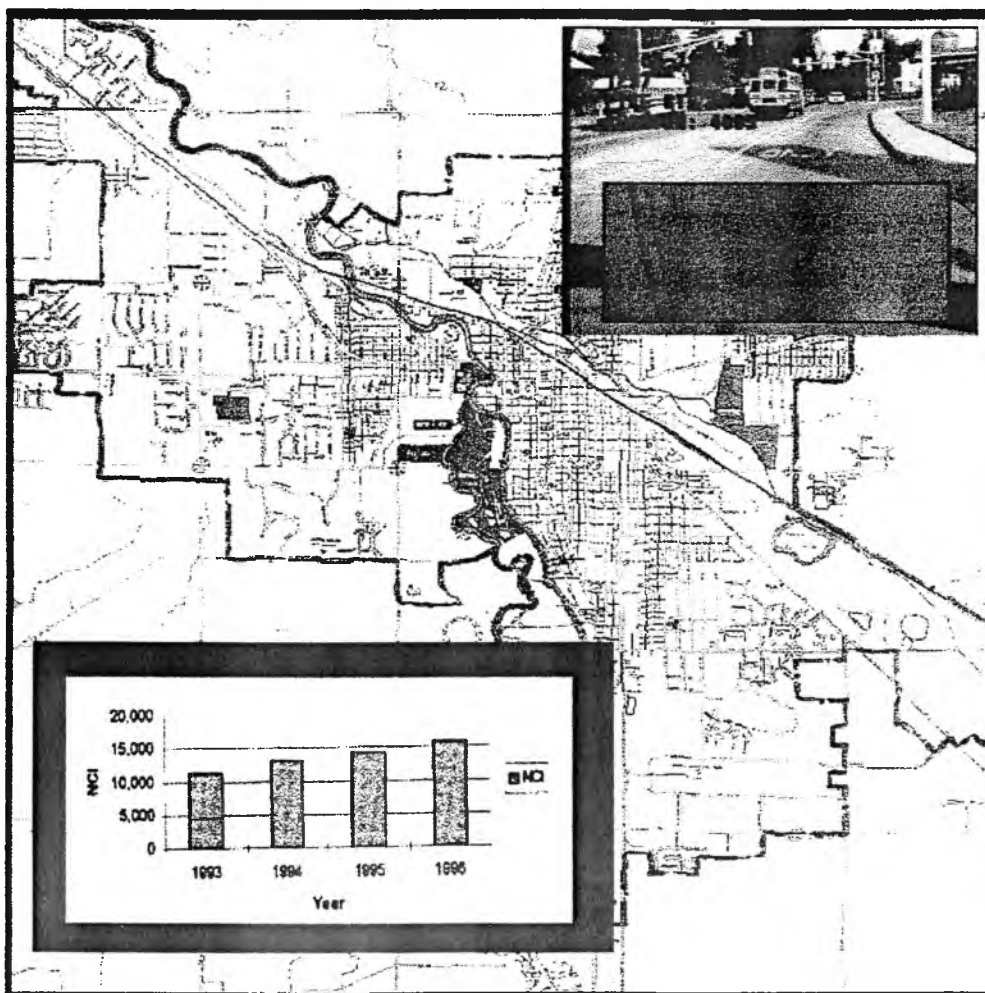


CITY OF GOSHEN

PAVEMENT MANAGEMENT PROGRAM NEEDS STUDY UPDATE January 31, 1997



"THE MAPLE CITY"



By: **MHM ASSOCIATES INC.**
1920 Ridgedale Road
South Bend , IN 46614

City of Goshen, Indiana
302 South 5th Street
Goshen, Indiana

Dear Sirs,

Enclosed is a copy of the pavement management report for 1997.

Pavement condition surveys are an important component of any effective pavement management system. These are directed at assessing the measures required to prevent accelerated deterioration of the pavements, and at predicting the future maintenance and rehabilitation needs of the network.

This report is based on the annual condition surveys carried out in the city of Goshen from 1993 to 1996. Each one of these surveys was performed in the winter season.

Table 1 lists the Network Cumulative Condition Indices (NCI's) for each year from 1993 to 1996. The NCI for a year is simply the sum of the Pavement Condition Indices (PCI's) for that year. The overall network condition improved significantly from a NCI of 11,307 in 1993 to 15,655 in 1996. This amounts to a condition improvement of 38.5%, which in our opinion is a major achievement. The City of Goshen spends hundreds of thousands of dollars every year on the maintenance and rehabilitation of its road network. Continuous implementation of a pavement management program, both at the network and project levels, would ensure further improvements in the future, the ultimate objective being to achieve the maximum customer satisfaction possible within the given budget restraints, or in other words, to provide the best quality at the least cost.

Figure 1 illustrates the improvement in the overall network condition from 1993 to 1996.

Table 1: Network Cumulative Indices (NCI's) for Successive Years

Year	NCI	Increase Over Previous Year	% Increase
1993	11,307		
1994	12,982	1,675	14.81
1995	14,116	1,134	8.74
1996	15,655	1,539	10.90

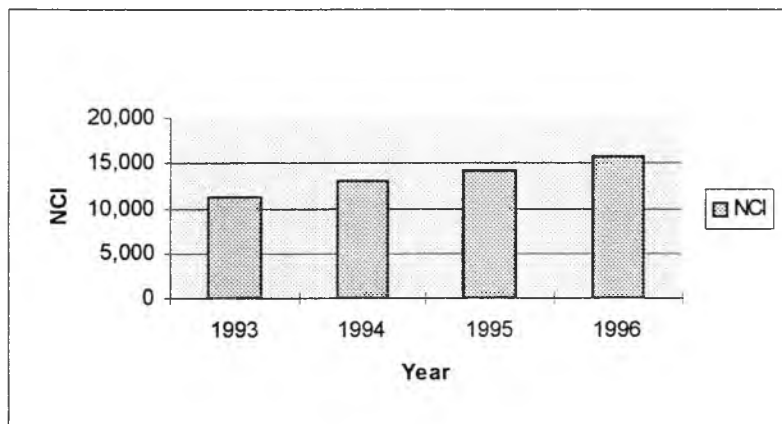


Figure 1

This report presents a summary of the needs analysis for the network, including separate sections for arterial, collector and local streets, respectively. In addition, the streets have been categorized based on their PCI's. The streets which were assigned PCI's ranging from 7 to 9.5 are considered to be in a good condition, and generally require minimal treatment in the coming year. The streets falling in the category of PCI's ranging from 5 to 7 require routine preventive maintenance. PCI's below 5 correspond to conditions ranging from fair to poor, indicating the need for corrective maintenance, and in some cases major rehabilitation of these streets.

Based on the needs analysis, financial projections have been developed. Again, the network is divided into three categories; (1) arterial streets, (2) collector

streets, and (3) local streets. Remaining life models, based on present condition, and Annual Daily Traffic (ADT) have been used to predict short range (for the year 1997), intermediate range (for the years 1997-1999), and long range (for the years 1997-2001) financial needs of the network. Given the projected funding levels for the intermediate range, it is estimated that an additional 509,000 dollars would be required to maintain the network in a satisfactory condition over the next 3 years.

The remaining life models would be improved as more annual data is collected and analyzed. However, to develop models which are reliable to a statistically acceptable degree, we suggest that deflection data be collected in addition to distress data for a sample of the network. The models developed as a result would hopefully result in better performance prediction, and thus more effective *proactive* management as opposed to *reactive* management.

Sincerely,

Jerry Mohajeri
MHM Associates, Inc.
1920 Ridgedale Road,
South Bend, IN 46614
Phone: (219) 291-4793

FINANCIAL PROJECTION (1997)

(SHORT RANGE)

Cost of improvement needs per pavement management study

Arterial and collector roads	\$217,886
Local roads	\$1,010,001
The amount of money needed for maintenance	\$33,106
Available revenue (1997)	\$521,000
Number of years required by present revenue	2.4
Additional revenues needed to meet year 1997 program	\$739,993
Deficit	\$739,993

Source: MHM Associates, Inc.

01/31/97

FINANCIAL PROJECTION (1997) (INTERMEDIATE RANGE)

Cost of improvement needs per pavement management study	
Arterial and collector roads	\$436,570
Local roads	\$2,348,988
The amount of money needed for maintenance	\$44,065
Available revenue (1997)	\$521,000
Available revenue (1998)	\$900,000
Available revenue (1999)	\$900,000
Average annual funds available	\$773,667
The number of years required for network rehabilitation	3.7
Additional revenues needed to meet year 1999 program	\$508,623
Deficit	\$508,623

Source: MHM Associates, Inc.

01/31/97

FINANCIAL PROJECTION (1997)

(LONG RANGE)

Cost of improvement needs per pavement management study	\$4,139,116
The amount of money needed for maintenance	\$82,379
Available revenue (1997)	\$521,000
Available revenue (1998)	\$900,000
Available revenue (1999)	\$900,000
Available revenue (2000)	\$900,000
Available revenue (2001)	\$900,000
Average annual funds available	\$824,200
The number of years required for network rehabilitation	5.1
Additional revenues needed to meet year 2001 program	\$100,496
Deficit	\$100,496

Source: MHM Associates, Inc.

01/31/97

1996

CITY OF GOSHEN

INDIANA

PAVEMENT MANAGEMENT PROGRAM

NETWORK CONDITION RATING 7.1

PRESERVATIVE IMPROVEMENT RECOMMENDED (PREVENTIVE)

PAVEMENT CONDITION INDEX (PCI) TRIGGER POINT VALUES: 5 to 7

Streets rated with PCI = 5 to 7 are in sound structural condition but show signs of definite aging. Seal coating could extend their useful life.

Surface treatment/slurry seal/fog seal/crack seal recommended.

STRUCTURAL IMPROVEMENT RECOMMENDED (MAJOR)

PAVEMENT CONDITION INDEX (PCI) TRIGGER POINT VALUES : 4 to 5

Streets rated with PCI = 4 to 5 show first signs of needing strengthening by overlay or seal coating soon. Many longitudinal and transverse cracks are raveling. Alligatored areas need to be deep patched. Patches may need repairs. Block cracks need to be sealed. Rutting and slight distortions may be present.

RECONSTRUCTION OR STRUCTURAL IMPROVEMENT RECOMMENDED (OVERALL)

PAVEMENT CONDITION INDEX (PCI) TRIGGER POINT VALUES: 4 OR LESS

Streets rated with PCI = 4 or less must be strengthened soon. These sections will require thick overlay or recycling and very likely will require deep patching and repairs before long. Reconstruction of sections rated 3.5 or less is recommended.

Arterial Streets Condition Report

26-Feb-97

street	FROM	TO	1996 PCI	SURF	WIDTH	FUNC CLAS	ADT
BASHOR RD	CITY LIMITS	ELKHART RD - US 3	75	A	24	M-ARTL	5468
COLLEGE AVE	CITY LIMITS (RR TR	LINCOLNWAY EAST	90	A	26	M-ARTL	5550
COLLEGE AVE	LINCOLNWAY EAST	CANTON DR	90	A	26	M-ARTL	5550
COLLEGE AVE	CANTON DR	16TH STR	89	A	26	M-ARTL	8451
COLLEGE AVE	16TH STR	MAIN STR	89	A	26	M-ARTL	8817
GREENE RD	ELKHART RD - US 3	WILDEN AVE	68	A	24	M-ARTL	2394
GREENE RD	ELKHART RD - US 3	CLINTON STR	84	A	24	M-ARTL	7667
GREENE RD	CLINTON STR	WEST PARK	86	A	24	M-ARTL	6772
GREENE RD	WEST PARK	BERKEY AVE	78	A	24	M-ARTL	6433
GREENE RD	BERKEY AVE	CITY LIMITS	39	A	24	M-ARTL	6433
INDIANA AVE	NORTH CITY LIMITS	RIVER AVE	70	A	30	M-ARTL	2203
INDIANA AVE	CHICAGO AVE	PIKE STR - US 33	39	C	24	M-ARTL	6695
INDIANA AVE	PIKE STR - US 33	CLINTON STR	39	C	27	M-ARTL	6695
INDIANA AVE	CLINTON STR	LINCOLN AVE	86	A	37	M-ARTL	6803
INDIANA AVE	LINCOLN AVE	BERKEY AVE	90	A	24	M-ARTL	6803
INDIANA AVE	BERKEY AVE	PLYMOUTH AVE (CI	88	A	26	M-ARTL	6803
LINCOLN AVE	ELKHART RIVER BR	INDIANA AVE	80	A	48	M-ARTL	14639
LINCOLN AVE	INDIANA AVE	GREENE RD	89	A	24	M-ARTL	4010
LINCOLN AVE - EB	ELKHART RIVER BR	MAIN STR - SR 15	70	A	60	M-ARTL	7320
LINCOLN AVE - WB	MAIN STR - SR 15	ELKHART RIVER BR	70	A	60	M-ARTL	7320
MONROE STR	EAST CITY LIMITS	RR TRACKS	48	A	21	M-ARTL	
MONROE STR	9TH STR	8TH STR	85	A	22	M-ARTL	
WILDEN AVE	DEAD END (E of 7th)	MAIN STR - SR 15	87	A	24	M-ARTL	5732
WILDEN AVE	MAIN STR - SR 15	ROCK RUN CREEK	83	A	24	M-ARTL	5732
WILDEN AVE	ROCK RUN CREEK	ELKHART RIVER	88	A	24	M-ARTL	5732
WILDEN AVE	ELKHART RIVER	GREENE RD	87	A	24	M-ARTL	5732
WILDEN AVE	GREENE RD	CITY LIMITS	87	A	24	M-ARTL	5732

Collector Streets Condition Report

26-Feb-97

STREETS	FROM	TO	1996 PCI	SURF	WDTH	FUNC CLAS	ADT
BERKEY AVE	CITY LIMITS	SILVERWOOD LN	6.0	A	22	COLCTR	2795
BERKEY AVE	SILVERWOOD LN	WINTER AVE	8.6	A	22	COLCTR	2795
BERKEY AVE	WINTER AVE	DEWEY AVE	8.6	A	22	COLCTR	2896
BERKEY AVE	DEWEY AVE	INDIANA AVE	6.9	A	20	COLCTR	2360
BLACKPORT DRIVE	E. LINCOLN AVE - S	MONROE STR	8.9	A	22	COLCTR	1410
CHICAGO AVE	INDIANA AVE	PIKE ST - US 33	8.9	A	25	COLCTR	
CHICAGO AVE	LINCOLN AVE	PIKE ST - US 33	8.9	A	44	COLCTR	
CLINTON STR	NEW STR	7TH STR	4.5	A	24	COLCTR	1034
DEWEY AVE	LINCOLN AVE \ INDI	BERKEY AVE	8.6	A	24	COLCTR	1100
KERCHER RD	EAST CITY LIMITS	MAIN STR	8.8	A	24	COLCTR	8199
KERCHER RD	MAIN STR	WEST CITY LIMITS	6.7	A	24	COLCTR	7808
MAIN STR	PIKE STR	MIDDLEBURY ST	7.5	A	30	COLCTR	2671
OLIVE STR	E. LINCOLN AVE	MIDDLEBURY ST	8.6	A	24	COLCTR	1752
PLYMOUTH AVE	MAIN STR	8TH STR	8.4	A	22	COLCTR	5254
PLYMOUTH AVE	8TH STR	LINCOLNWAY EAST	8.8	A	24	COLCTR	2370
VIOLETT RD	KERCHER RD	PVMT-DMI 745	8.9	A	20	COLCTR	820
VIOLETT RD	PVMT-DMI 745	EGBERT RD	8.8	A	20	COLCTR	
ZOLLINGER RD	MIDDLEBURY STR	CITY LIMITS	7.0	A	22	COLCTR	1226
3RD STR	PIKE ST (BRIDGE)	MADISON STR	4.0	A	37	COLCTR	7194
FIFTH STR	MADISON STR	WASHINGTON ST	6.0	A	36	COLCTR	7347
FIFTH STR	WASHINGTON ST	PIKE STR	8.5	A	36	COLCTR	7347
5TH STR	MAIN STR	MADISON STR	3.9	A	36	COLCTR	3148
8TH STR	MADISON STR	LINCOLN AVE	6.8	A	30	COLCTR	6000
8TH STR	MADISON STR	COLLEGE AVE	6.0	A	30	COLCTR	5211

City of Goshen, Indiana

PRIORITY REPORT

26-Feb-97

STREET	TO	FROM	ADT	F. C.	M AND R	96
INDIANA AVE	CHICAGO AVE	PIKE STR - US 33	6695	ARTL(M)	OVERALL	3.9
INDIANA AVE	PIKE STR - US 33	CLINTON STR	6695	ARTL(M)	OVERALL	3.9
GREENE RD	BERKEY AVE	CITY LIMITS	6433	ARTL(M)	OVERALL	3.9
MONROE STR	EAST CITY LIMITS	RR TRACKS		ARTL(M)	MAJOR	4.9
5TH STR	MAIN STR	MADISON STR	3148	COLCTR	OVERALL	3.9
3RD STR	PIKE ST (BRIDGE)	MADISON STR	7194	COLCTR	OVERALL	4.0
CLINTON STR	NEW STR	7TH STR	1034	COLCTR	MAJOR	4.5
FIFTH STR	MADISON STR	WASHINGTON ST	7347	COLCTR	MAJOR	6.0
8TH STR	MADISON STR	COLLEGE AVE	5211	COLCTR	MAJOR	6.0
BERKEY AVE	CITY LIMITS	SILVERWOOD LN	2795	COLCTR	MAJOR	6.0
OAKLAND AVE	WILKINSON STR	PIKE STR - US 33		LR	OVERALL	3.5
WEST AVE	PVMT DMI 817	RIVERSIDE BLVD		LR	OVERALL	3.5
GARDEN STR	AREHART STR	N. 6TH STR		LR	OVERALL	3.8
CENTER STR	N. 9TH STR	N. 7TH STR		LR	OVERALL	3.8
JACKSON STR	PVT PROPERTY	MAIN STR		LR	OVERALL	3.8
GLENWOOD DR	BERKEY AVE	JAMES PLACE		LR	OVERALL	3.9
CEDAR DR	WESTWOOD DR	GREENE RD		LR	OVERALL	3.9
HICKORY PL	WEST AVE	WEST AVE		LR	MAJOR	3.9
STUERY AVE	E. LINCOLN AVE - SR 4	MIDDLEBURY ST		LR	OVERALL	3.9
WOODLAWN DR	MAIN STR	DEAD END		LR	OVERALL	3.9
BURDICK ST	9TH STR	11TH STR		LR	OVERALL	4.0
CHICAGO AVE	INDIANA AVE	ELKHART RD - US 33		LR	OVERALL	4.0
LAFAYETTE STR	WILSON AVE	9TH STR		LR	OVERALL	4.0
MARTIN MANOR DR	KERCHER RD	VIOLETT RD		LR	OVERALL	4.0
NORTH DRIVE	DEAD END	DEAD END		LR	OVERALL	4.0
SHAMROCK DRIVE	DEAD END	PLANEVILLE AVE		LR	OVERALL	4.0
15TH STR	ADAMS STR	COLLEGE AVE	1480	LR	MAJOR	4.2
MADISON STR	PRIVATE PROPERTY	11TH STR		LR	MAJOR	4.2
MADISON STR	11TH STR	LINCOLNWAY EAST - US 33		LR	ROUTINE	4.2
SALEM DR	KERCHER RD	MARTIN MANOR DR		LR	MAJOR	4.2
WESTWOOD RD	GRA-ROY DR	MAIN STR - SR 15		LR	MAJOR	4.2
HARRISON STR	BAKER AVE	HICKORY STR		LR	MAJOR	4.2
WEST AVE	HICKORY PL	PVMT DMI 817		LR	MAJOR	4.2
N. 6TH STR	PRIVATE PROP	MIDDLEBURY STR		LR	MAJOR	4.2
HARRISON STR	WILKINSON STR	CLINTON STR		LR	MAJOR	4.3
MILL STR	N. 3RD STR	N. NEW 2ND STR		LR	MAJOR	4.3
OHIO STR	12TH STR	10TH STR		LR	MAJOR	4.3
15TH STR	ADAMS STR	PVMT-DMI 385 (1017 S. 15th)		LR	MAJOR	4.3
9TH STR	WASHINGTON STR	MADISON STR	1615	LR	MAJOR	4.4
CLINTON STR	GREENE RD	INDIANA AVE	1100	LR	MAJOR	4.4
N. 2ND STR	CITIZENS AVE	ALLEY (N. OF WILDEN)		LR	MAJOR	4.4
MARABOU PL	CUL-DE-SAC	CUL-DE-SAC		LR	MAJOR	4.4
MAYFIELD DR	BASHOR RD	GREENE RD		LR	MAJOR	4.4
REYNOLDS STR	COTTAGE AVE	LINCOLNWAY EAST - US 33		LR	MAJOR	4.4
BURDICK ST	DEAD END	MAIN STR		LR	MAJOR	4.4
ADAMS STR	11TH STR	15TH STR		LR	MAJOR	4.5
14TH STR	REYNOLDS STR	PLYMOUTH AVE		LR	MAJOR	4.5

City of Goshen, Indiana

STREET	TO	FROM	ADT	F. C.	M AND R	96
WASHINGTON STR	2ND STR	5TH STR	1416	LR	MAJOR	4.5
N. 1ST STR	ALLEY (N. OF WILDEN)	OAKRIDGE AVE	1037	LR	MAJOR	4.5
BURDICK ST	11TH STR	14TH STR		LR	MAJOR	4.5
FRANKLIN STR	MAIN STR - SR 15	9TH STR		LR	MAJOR	4.5
HURON STR	LINCOLN AVE	WILKINSON STR		LR	MAJOR	4.5
MARILYN	MAIN STR - SR 15	HOSPITAL		LR	MAJOR	4.5
MURRAY STR	WILSON AVE	DEAD END		LR	MAJOR	4.5
PRAIRIE AVE	DEWEY AVE	RIVERSIDE BLVD		LR	MAJOR	4.5
PURL STR	DEAD END	HIGH SCHOOL (PUB PROP)		LR	MAJOR	4.5
SUMMER STR	COSMO STR	ELKHART ROAD - US 33		LR	MAJOR	4.5
WESTWOOD DR	DEAD END	ELKHART RD - US 33		LR	MAJOR	4.5
CENTURY DR	COLLEGE AVE	DEAD END		LR	MAJOR	4.6
PLEASANT AVE	PIKE STR	ALLEY		LR	MAJOR	4.6
CONGRESS DR	CLINTON STR	INDEPENDANCE DR		LR	MAJOR	4.6
HIGH PARK AVE	GRA-ROY DR	MAIN STR - SR 15		LR	MAJOR	4.6
PIKE STR	ELKHART RD - US 33	PRINGLE DR		LR	MAJOR	4.6
YORKTOWN DR	INDEPENDENCE DR	MT VERNON DR		LR	MAJOR	4.6
N. 7TH STR	WILDEN AVE	DEAD END		LR	MAJOR	4.6
ISLAND VIEW DR	KERCHER RD	CUL-DE-SAC		LR	MAJOR	4.7
WESTFIELD AVE	CHICAGO AVE	PIKE ST - US 33		LR	MAJOR	4.7
11TH STR	PLYMOUTH AVE	DEAD END (N OF REYNOLD		LR	MAJOR	4.7
N. 8TH STR	MERCER AVE	BRIDGE STR		LR	MAJOR	4.7
HAWTHORN DR	SHERIDAN DR	INDEPENDENCE DR		LR	MAJOR	4.8
JAMES PL	GLENWOOD DR	JAMES PL SOUTH		LR	MAJOR	4.8
WOODMERE LN	SWEETBRIER	CUL-DE-SAC		LR	MAJOR	4.8
WILSON AVE	PLYMOUTH AVE	LAFAYETTE STR		LR	MAJOR	4.8
DOUGLAS STR	7TH STR	15TH STR		LR	MAJOR	4.9
NEW YORK STR	MAIN STR	12TH STR		LR	MAJOR	4.9
SHERIDAN DR	LEE DR	PVMT-DMI 635		LR	MAJOR	4.9
FIRST STR	RIVER AVE	PIKE STR		LR	MAJOR	4.9
9TH STR	COLLEGE AVE	MONROE STR		LR	MAJOR	4.9
14TH STR	MONROE STR	SANDERS AVE		LR	MAJOR	4.9
WAKEFIELD CIRCLE	WAKEFIELD RD	WAKEFIELD RD		LR	MAJOR	4.9
WAVERLY AVE	9TH STR	MAIN STR		LR	MAJOR	4.9
DENVER AVE	CHICAGO AVE	LINCOLN AVE		LR	MAJOR	4.9
MICHIGAN AVE	QUEEN STR	WILDEN AVE		LR	MAJOR	5.0
2ND STR	DEAD END	PIKE STR		LR	MAJOR	5.0
FIRST STR	RIVER AVE	PIKE STR		LR	MAJOR	5.0
PARK AVE	VIRGINIA STR	BASHOR RD		LR	MAJOR	5.0
6TH STR	MADISON STR	PURL STR		LR	MAJOR	5.0
7TH STR	CLINTON STR	MADISON STR		LR	MAJOR	5.0
HIGH STR	CLINTON STR	DIVISION STR		LR	MAJOR	5.0
WESTPLAINS DR	ELKHART RD - US 33	KANSAS DR		LR	MAJOR	5.0
WOODWARD PL	WESTWOOD RD	RIVER VISTA DR		LR	MAJOR	5.0