Rogue Valley Metropolitan Planning Organization

Transportation Safety Planning Project

Final Report

April 23, 2004

RVMPO is staffed by Rogue Valley Council of Governments • 155 N. First St. • P O Box 3275 • Central Point OR 97502 • (541) 664-6674

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I. Introduction

This document serves as the final report on the Safety Prioritization Project, Project No. J9.04.54.02C. For this project, the Rogue Valley Metropolitan Planning Organization (RVMPO) utilized grants funds from the ODOT Transportation Safety Division to:

- Generate a GIS accident database coupling ODOT accident data with the RVMPO's GIS system to pinpoint accident locations on specific transportation corridors.

The contract identified five (5) activities for the period. The first part of this report is organized around those activities, providing background and analysis as appropriate. The second part of the report focuses on the usefulness of this approach for identifying safety issues.

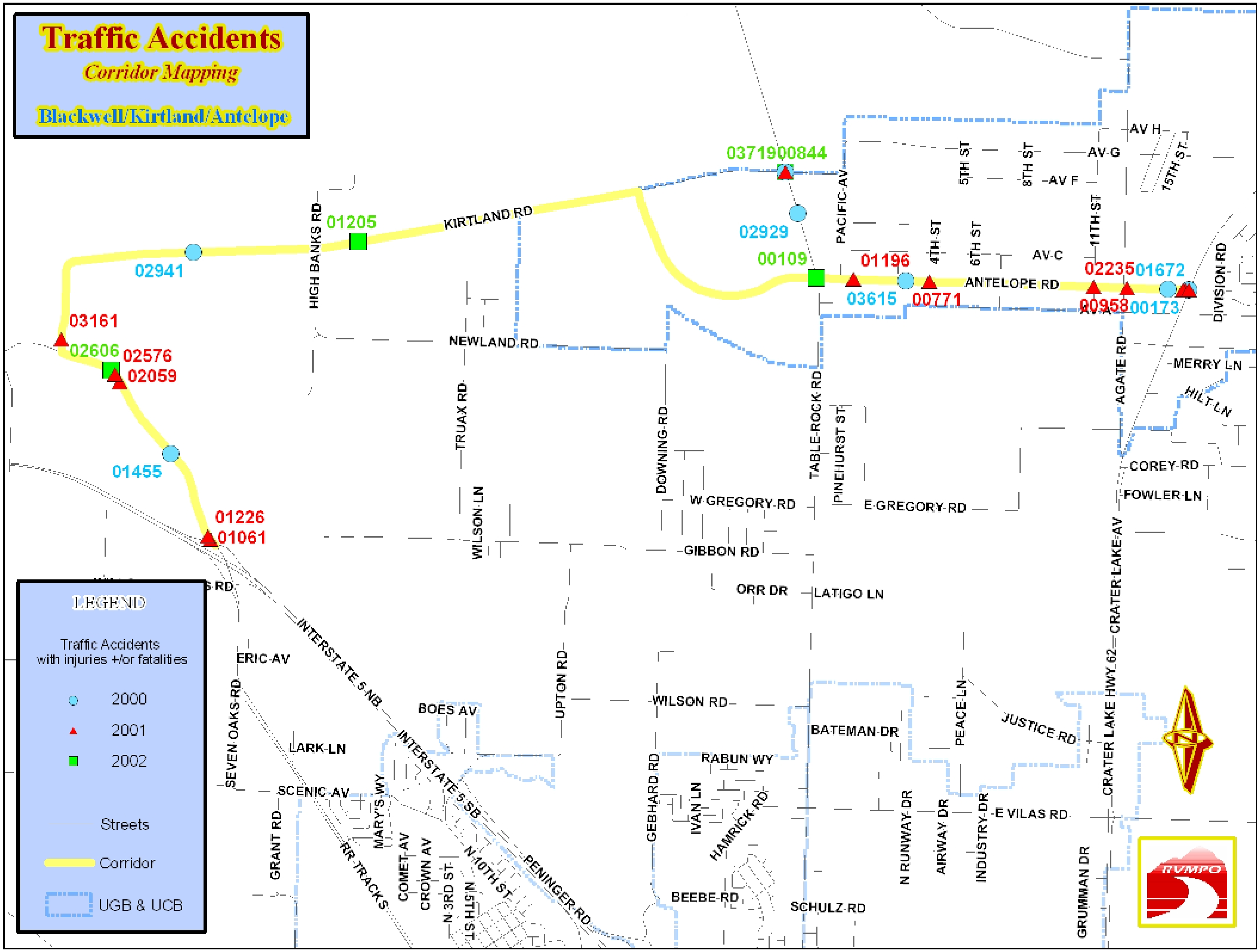
II. Scope of Work Activities

Activity #1: Create a GIS accident database for two (2) major transportation corridors in the RVMPO, using State accident data.

In this instance, the RVMPO went beyond the requirements of the scope, creating a database for three (3), rather than two (2), major transportation corridors. The corridors were selected for their regional and economic significance. The corridors are:

- The Pine St. corridor (from Highway 99 to a point before its intersection with Table Rock Road);
- The Table Rock Road corridor (from Highway 99 to a point before Mosquito Lane);
- The Blackwell/Kirtland/Antelope corridor (from Interstate Exit 33 to Highway 62).

All three corridors serve freight and regional traffic en route to or from an I-5 interchange. Pine Street is unusual in that it functions both as part of the local transportation network for downtown Central Point and as part of the regional transportation network connecting traffic moving between Highway 99 and the I-5 interchange in Central Point. The Blackwell/Kirtland/Antelope route serves the White City industrial area and freight from other areas choosing to connect with the Interstate at the Seven Oaks Interchange.



Traffic Accidents
Corridor Mapping
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Traffic Accidents with injuries +/or fatalities
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2002
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ANTELOPE RD
NEWLAND RD
HIGH BANKS RD
TRUAX RD
WILSON LN
DOWNING RD
TABLE ROCK RD
PINEHURST ST
PACIFIC AV
W GREGORY RD
E GREGORY RD
GIBBON RD
ORR DR
LATIGO LN
AGATE RD
CRATER LAKE AV
CRATER LAKE HWY 62
DIVISION RD
MERRY LN
HILT LN
COREY RD
FOWLER LN
AV H
AV G
AV F
AV C
5TH ST
8TH ST
11TH ST
15TH ST
4TH ST
6TH ST
INTERSTATE 5 NB
INTERSTATE 5 SB
ERIC AV
SEVEN OAKS RD
LARK LN
SCENIC AV
GRANT RD
RR TRACKS
MARY'S WY
COMET AV
CROWN AV
N 3RD ST
N 5TH ST
N 10TH ST
PENINGER RD
BOES AV
UPTON RD
WILSON RD
RABUN WY
GEBHARD RD
IVAN LN
HAMRICK RD
BEEBE RD
SCHULZ RD
BATEMAN DR
PEACE LN
JUSTICE RD
N RUNWAY DR
AIRWAY DR
INDUSTRY DR
E VILAS RD
GRUMMAN DR
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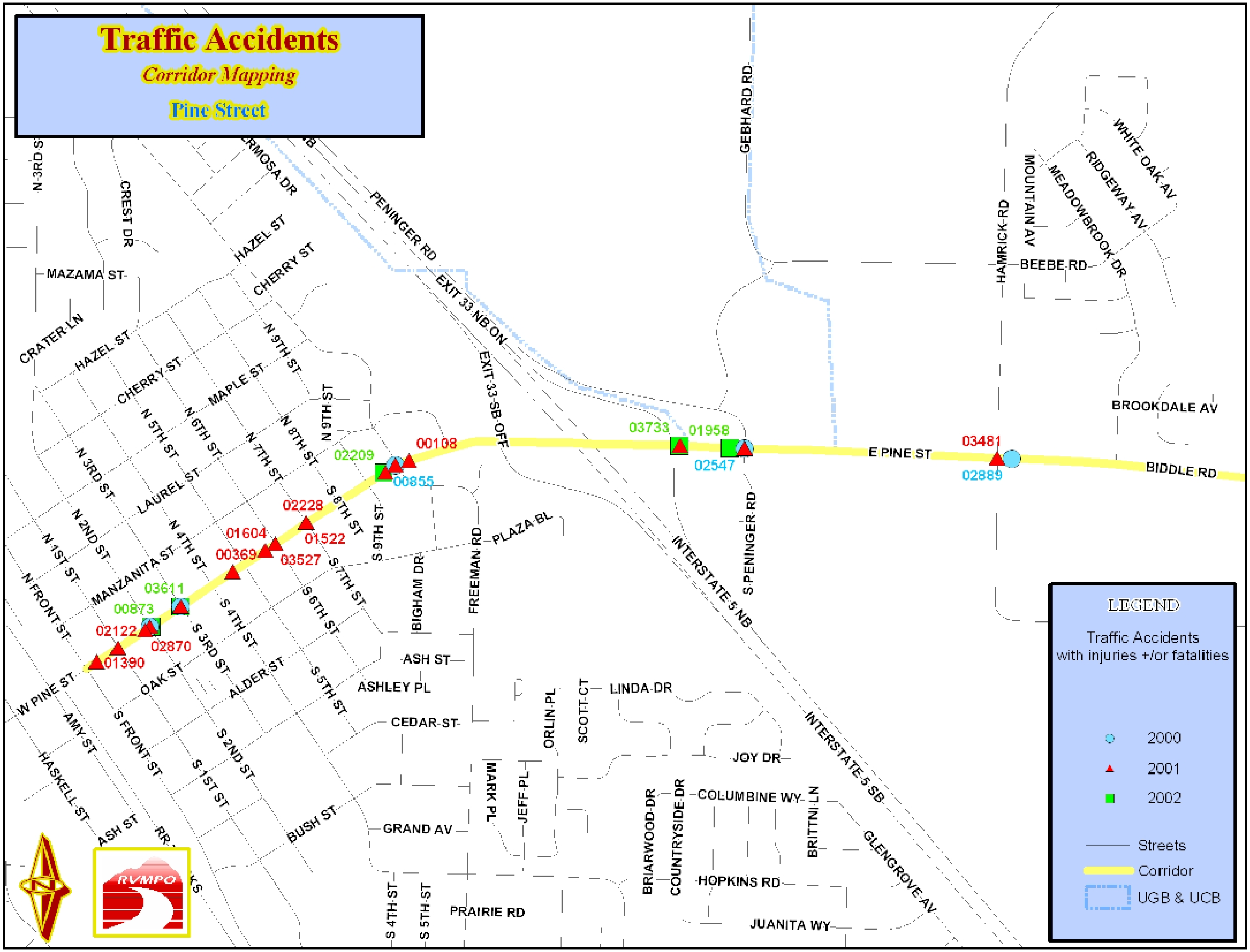
RVMPO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03733
01958
02547
03481
02889
E PINE ST
BIDDLE RD
W PINE ST
GEBHARD RD
PENINGER RD
EXIT 33 NB ON
EXIT 33 SB OFF
S PENINGER RD
INTERSTATE 5 NB
INTERSTATE 5 SB
HAMRICK RD
MOUNTAIN AV
MEADOWBROOK DR
RIDGEWAY AV
WHITE OAK AV
BEEBE RD
BROOKDALE AV
HAZEL ST
CHERRY ST
MAPLE ST
LAUREL ST
MANZANITA ST
OAK ST
ALDER ST
ASH ST
CEDAR ST
BUSH ST
GRAND AV
PRAIRIE RD
PLAZA BL
FREEMAN RD
BIGHAM DR
ASHLEY PL
LINDA DR
JOY DR
COLUMBINE WY
HOPKINS RD
JUANITA WY
GLENGROVE AV
BRITTNI LN
COUNTRYSIDE DR
BRIARWOOD DR
ORLIN PL
SCOTT CT
MARK PL
JEFF PL
MAZAMA ST
CRATER LN
CREST DR
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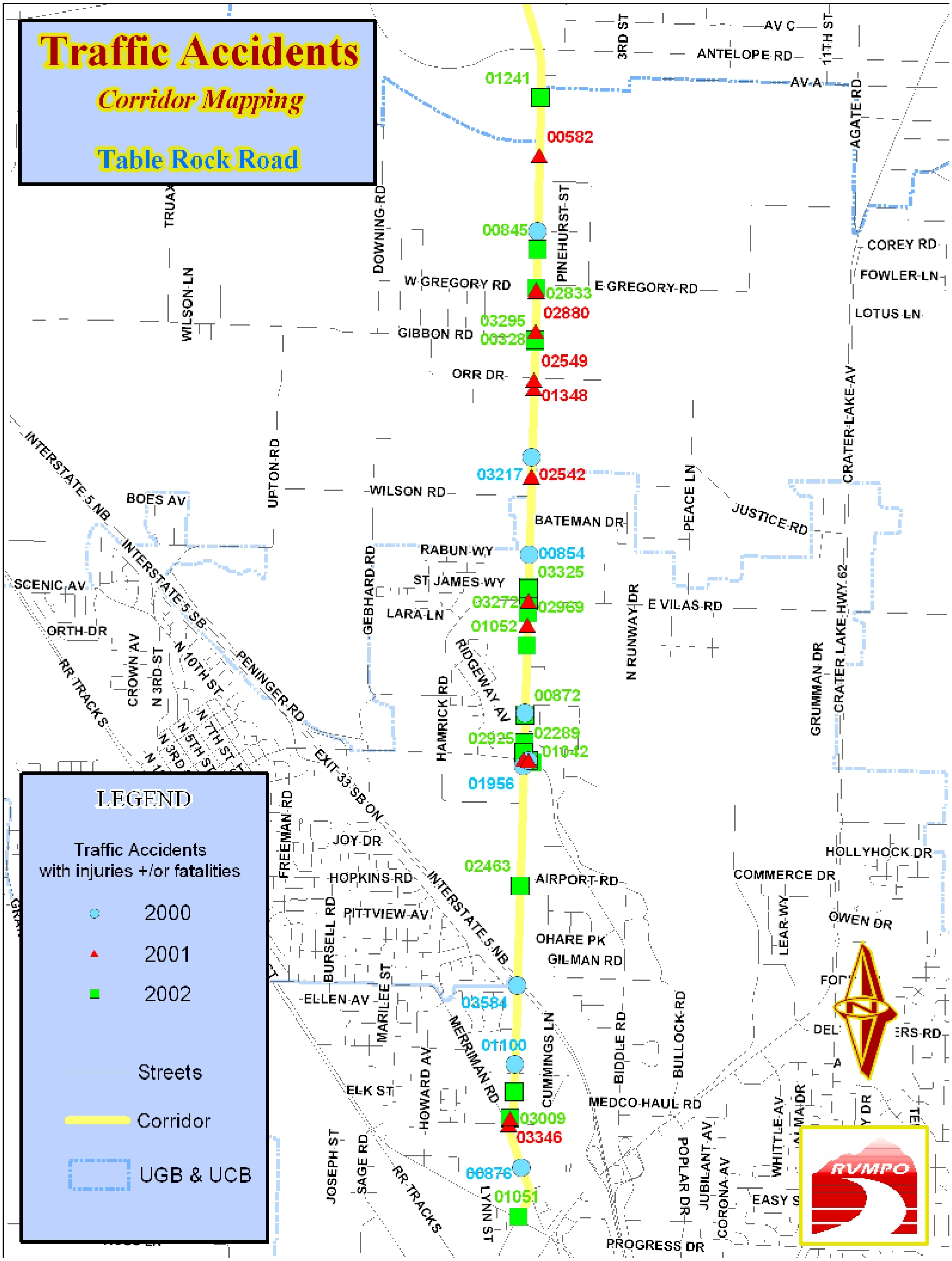

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01348
03217
02542
00854
03325
03272
02969
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02463
03584
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03346
00876
01051
INTERSTATE 5 NB
INTERSTATE 5 SB
PENINGER RD
EXIT 33 SB ON
W GREGORY RD
E GREGORY RD
GIBBON RD
ORR DR
WILSON RD
BATEMAN DR
RABUN WY
ST JAMES WY
LARA LN
E VILAS RD
AIRPORT RD
JOY DR
HOPKINS RD
PITTVIEW AV
OHARE PK
GILMAN RD
ELLEN AV
ELK ST
MEDCO HAUL RD
PROGRESS DR
COREY RD
FOWLER LN
LOTUS LN
ANTELOPE RD
AV A
AV C
CRATER LAKE AV
CRATER LAKE HWY 62
JUSTICE RD
HOLLYHOCK DR
COMMERCE DR
OWEN DR
DOWNING RD
PINEHURST ST
UPTON RD
GEBHARD RD
HAMRICK RD
RIDGEWAY AV
FREEMAN RD
BURSELL RD
MARILEE ST
HOWARD AV
MERRIMAN RD
CUMMINGS LN
BIDDLE RD
BULLOCK RD
POPLAR DR
JUBILANT AV
CORONA AV
WHITTLE AV
LEAR WY
N RUNWAY DR
GRUMMAN DR
PEACE LN
WILSON LN
TRUAX
BOES AV
SCENIC AV
ORTH DR
CROWN AV
N 3RD ST
N 10TH ST
N 7TH ST
N 5TH ST
N 3RD
RR TRACKS
JOSEPH ST
SAGE RD
LYNN ST
EASY S
AGATE RD
3RD ST
11TH ST

Activity #2: ***Test Ashland and Medford's accident data for compatibility with the new RVMPO GIS database.***

The City of Medford's accident data is not in a GIS format and is therefore incompatible at this point in time. The City of Ashland's data is in a GIS format. Ashland sends its information to ODOT and ODOT puts it into its own format. Ashland data can be obtained as any other data in the ODOT database.

Activity #3: ***Produce an RVMPO accident location map for the years 2000, 2001, and 2002 with accident information (i.e., type, time, conditions, etc.) in table format.***

Four maps were produced, one for each of the three corridors, as well as one displaying all three corridors on the same map.

Each map displays accidents in 2000 through 2002 which involved either injury(ies) or fatality(ies). Accidents resulting in property damage alone are not displayed. This decision to limit the types of accidents included was based on the assumption that accidents involving injuries and/or fatalities to people were more serious and costly than accidents involving damage to property. An additional reason for limiting the type of accident displayed was to allow this pilot project to proceed more expeditiously. ODOT representative Larry Christianson suggested this limitation.

In table format, each accident is associated with fifteen (15) different fields of information:

- Crash Number
- Date of Accident
- Time of Day
- Day of the Week
- Location of Accident
- Event
- Cause
- Error
- Surface
- Vehicle (number involved)
- Fatality (number of)
- Injury (number of)
- Alcohol
- Speed
- Name of Corridor

An example of the information table is provided below.

Table 1
Crash Data for the Pine Street Corridor
Years 2000, 2001 & 2002

CRASHNUM	DATE_	TIME	DAY	LOCATION	COLLISION	CAUSE	ERROR	SURFACE	VEH	FATALITY	INJURY	ALCOH	SPEED	Corridor
00193	01/09/00	6P	SU	E PINE AT 2ND ST	ANGL	J	17	WET	2	0	1	N	N	Pine
00855	03/28/00	1P	TU	E PINE AT 10TH ST	REAR	G	43	DRY	3	0	1	N	N	Pine
02338	08/18/00	9A	FR	E PINE AT 2ND ST	PED	H	28	DRY	2	0	1	N	N	Pine
02547	09/05/00	1P	TU	E PINE AT PENINGER RD	REAR	J	26	DRY	3	0	2	N	N	Pine
02618	09/19/00	3P	TU	E PINE AT 3RD ST	SS-O	J	26	DRY	2	0	1	N	N	Pine
02622	09/20/00	11A	WE	E PINE AT 2ND ST	ANGL	J	20	DRY	2	0	3	N	N	Pine
02889	10/09/00	10A	MO	COUNTY ROAD # 00724 AT MILEPOINT 1.40	REAR	A	47	WET	2	0	1	N	Y	Pine
01980	07/14/01	4P	SA	E PINE AT 1ST ST	TURN	C	21	DRY	2	0	1	N	N	Pine
02122	08/31/01	12P	FR	E PINE AT 1ST ST	ANGL	C	21	DRY	2	0	1	N	N	Pine
01797	07/18/01	12P	WE	E PINE AT 2ND ST	REAR	J	26	DRY	2	0	2	N	N	Pine
01260	05/02/01	7A	WE	E PINE AT 3RD ST	ANGL	D	20	DRY	2	0	1	N	N	Pine
02703	10/11/01	6A	TH	E PINE AT 3RD ST	REAR	G	26	WET	2	0	1	N	N	Pine
00016	01/11/01	11A	TH	E PINE AT 6TH ST	REAR	J	26	DRY	2	0	1	N	N	Pine
03527	12/15/01	11A	SA	E PINE AT 6TH ST	REAR	G	43	WET	3	0	2	N	N	Pine
01522	06/08/01	12P	FR	E PINE AT 7TH ST	REAR	G	26	DRY	2	0	1	N	N	Pine
02228	08/08/01	2P	WE	E PINE AT 7TH ST	REAR	G	26	DRY	2	0	1	N	N	Pine
01006	04/15/01	11A	SU	E PINE AT 10TH ST	REAR	G	26	DRY	2	0	2	N	N	Pine
01932	07/02/01	5P	MO	E PINE AT PENINGER RD	REAR	G	26	DRY	3	0	1	N	N	Pine
02877	10/31/01	7P	WE	E PINE AT PENINGER RD	REAR	J	26	DRY	2	0	3	N	N	Pine
00108	01/30/01	3P	TU	E PINE 100FT NE OF 10TH ST	REAR	J	26	DRY	2	0	2	N	N	Pine
02994	11/20/01	5P	TU	E PINE 100FT SW OF 10TH ST	REAR	G	26	WET	2	0	1	N	N	Pine
01390	05/12/01	10A	SA	E PINE 100FT NE OF FRONT ST	TURN	B	27	DRY	2	0	1	N	N	Pine
02870	10/30/01	5P	TU	E PINE 050FT SE OF 2ND ST	PED	B	29	DRY	2	0	1	N	N	Pine
00369	04/02/01	5P	MO	E PINE 100FT SW OF 5TH ST	PARK	J	18	DRY	2	0	1	N	N	Pine
01604	06/25/01	5P	MO	E PINE 050FT SW OF 6TH ST	REAR	G	26	DRY	3	0	1	N	N	Pine
00414	03/13/01	4P	TU	COUNTY ROAD # 00724 AT MILEPOINT 0.93	REAR	G	43	DRY	3	0	3	N	N	Pine
03481	12/06/01	3P	TH	COUNTY ROAD # 00724 AT MILEPOINT 1.38	REAR	G	26	DRY	2	0	2	N	N	Pine
00873	04/23/02	3P	WE	E PINE AT 2ND ST	REAR	G	43	DRY	2	0	2	N	N	Pine
01958	07/23/02	3P	TU	COUNTY ROAD # 00724 AT MILEPOINT 1.00	REAR	J	26	DRY	3	0	1	N	N	Pine
02209	08/09/02	3P	FR	E PINE 100FT W OF FREEMAN RD	TURN	B	28	DRY	2	0	2	N	N	Pine
03611	12/25/02	1P	WE	E PINE AT 3RD ST	ANGL	D	20	DRY	2	0	2	N	N	Pine
03733	12/31/02	12P	TU	COUNTY ROAD # 00724 AT MILEPOINT 0.92	REAR	G	43	WET	2	0	1	N	N	Pine

Source: ODOT Crash Analysis & Reporting Unit

Sorting Information

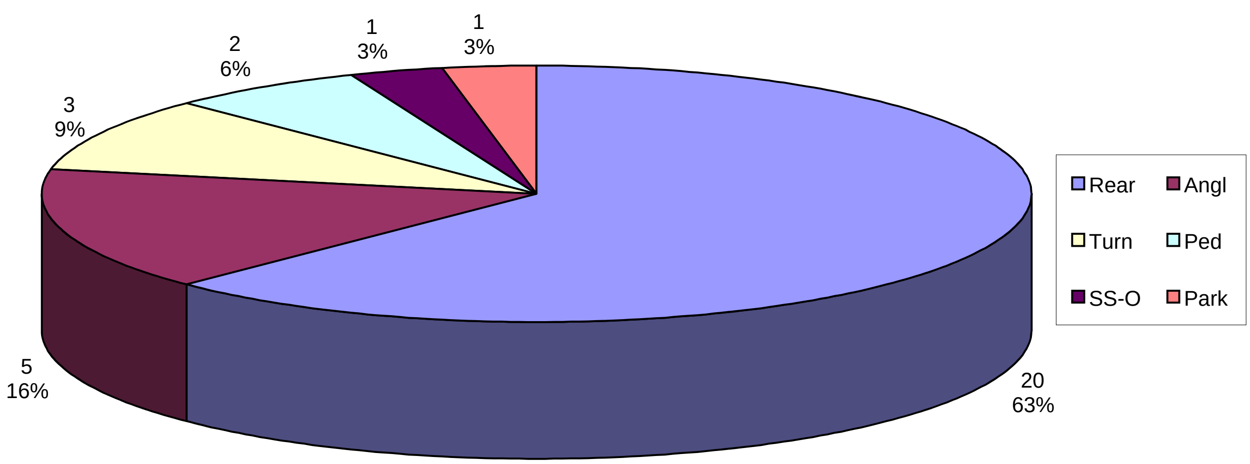
The information (data) tables can be sorted in a variety of ways, depending on the research interest. If the focus is the causes of accidents on a particular corridor, the information can be sorted first by corridor, then by “cause”. Once the information is sorted in this fashion, analysis can commence by simply glancing at the data for potential relationships. For example, looking at the “collision type” information on accidents on Pine Street over the three years, many are classified as “rear”. Queries can then be run on the corridor, resulting in a quantitative analysis that demonstrates that 20 of the 32 collisions were classified as rear. This can be represented in various ways, such as the pie chart in ***Figure 1*** below.

Figure 1

Injury Accidents

Types of Collisions for the Years 2000, 2001 & 2002

Pine St. Corridor



The most frequent type of accident in the Pine Street traffic accident study area was rear collisions. A review of the Pine Street Corridor traffic accident map (Page 4) indicates that the majority of the accidents occurred at intersections located in the Central Point Central Business District (CBD) from Highway 99 to Freeman Road. . The 10th Street/Freeman Road/Pine Street intersection recorded the most accidents during the three year period. The cause of these rear accidents needs to be further studied, in order to address this safety issue. The USDOT National Highway Safety Administration lists “driver inattention and inattention/following too close” as the main causes of rear end collisions. Other contributing factors can be lighting, wet pavement, and signalized intersection turning time.

Activity #4: Produce a report on mapping methodology and accident trends. Make presentations to RVMPO committees.

One of the original goals of this project was to develop an automatic transfer of data from ODOT's Crash Analysis & Reporting Unit to RVMPO's GIS database. Sometime after contracting, ODOT began to overhaul and modify their Database System. Thus, RVMPO decided to create a GIS database using the location information provided in the Crash Unit's Database, instead of spending time developing a methodology for implementing an automatic transfer of data from a soon to be modified system.

A geographic data point was created where each accident occurred. Using the measuring tool, points were placed in their appropriate geographic locations. Each point was then tagged with its own unique ODOT Crash Identification (ID) Number. Joining this GIS layer with the ODOT Crash Unit's Database allowed substantial additional information to be available at each crash point.

The final GIS layer's database contains fifteen (15) fields of data. The table, extracted from the Crash Unit's Database, was joined with the RVMPO's GIS layer using the unique ID field of the ODOT Crash ID Number. A broad range of mapping and data querying can occur with this GIS database. This GIS layer can be used with other information layers to help relay information. For example, a map showing the time of accidents can be created or a map portraying street lighting can be developed.

RVMPO added one new field to the existing ODOT data fields, namely the Corridor Name. This was done to enable analyses per corridor. Otherwise, data could only be analyzed globally.

In addition to displaying the exact location of each accident, the maps exhibit the year of each accident via the use of a specific symbol for each year. Thus, for each accident, there is a year symbol and the ODOT crash number unique to that accident.

The selected corridors merge into the other selected corridors at certain points. In order to void the "double-counting" of accidents located at or near these points, staff created artificial boundaries for each of the corridors so that they were exclusive of the others. The boundaries were drawn on the assumption that accidents occurring a short distance from the intersection with the next corridor should be included in that second corridor.

III. Usefulness of the Approach

Accident mapping is typically limited to location identification along either the state system or a particular jurisdiction's network. This is useful for identifying safety "hot spots", locations where accidents cluster, or hazardous corridors, such as Riverside Drive through Medford, where numerous accidents occur along the length of the corridor. These maps are limited by the fact that they provide only two types of information: location and number of accidents. Background information on the actual accidents is not available. Interpreting the information requires a staff member well versed in the problems of particular locations.

The current approach that we are using provides a wealth of background information that may be queried and analyzed. By organizing and mapping accident information in this way, it is possible to:

- Compare corridors to each other in a quantitative fashion;
- Better understand the dimensions of safety issues along one corridor; and
- Analyze safety trends over time along one corridor.

Each of these benefits is considered below.

Comparing Corridors

Multiple corridors can be analyzed in relation to each other. This approach allows us to compare the number of serious accidents along several corridors at once. By mapping accidents in this way, we know which corridors have proven more hazardous than others. This assists in the development of safety investment priorities. ***Figure 2*** below provides one way to display this comparison.

Figure 2
Number of Injury Accidents by Corridor
Year 2002

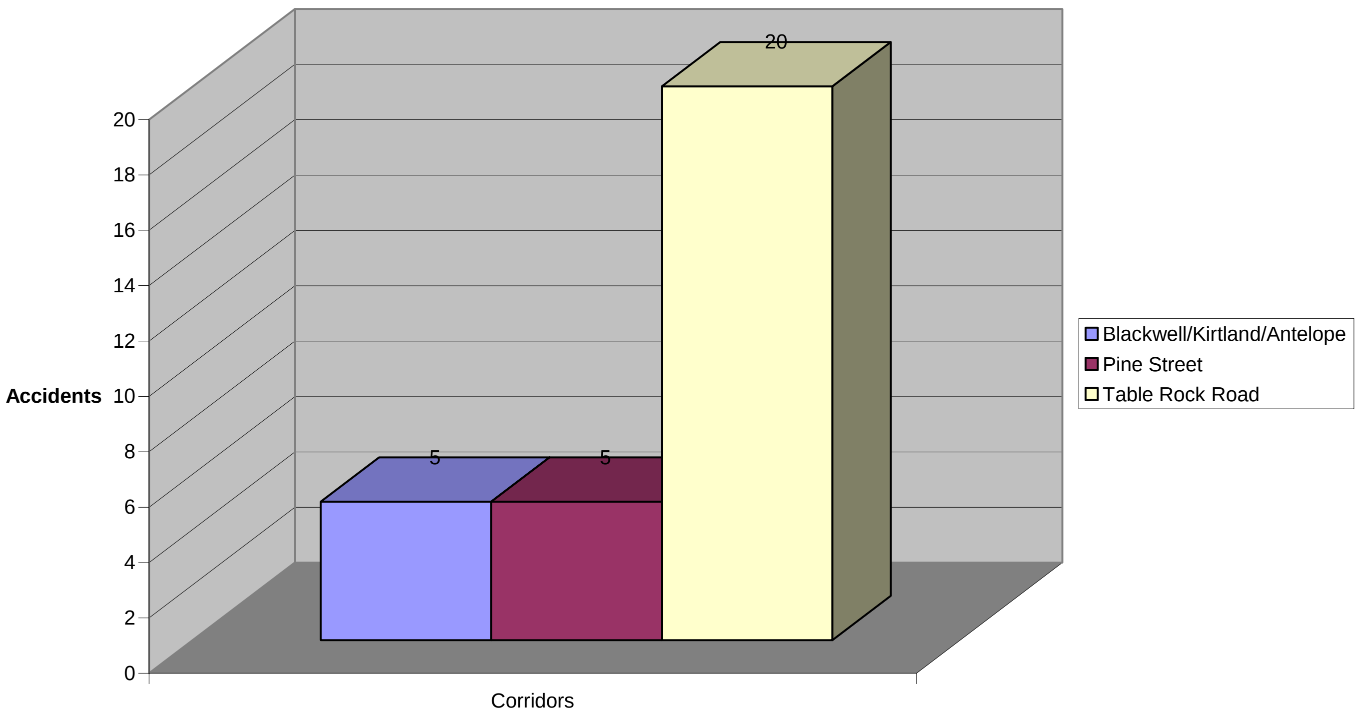


Figure 2 shows that in 2002, there were twenty (20) injury accidents within the Table Rock Road corridor study area, five (5) on the Blackwell/Kirtland/Antelope study corridor and five (5) on the Pine Street study corridor. A review of the Table Rock Road traffic accident corridor map shows that several accidents occurred at the Pine Street/Table Rock Road and Vilas Road/Table Rock Road intersections and the remainder of the accidents occurred throughout the corridor at other intersections. The majority of accidents occurred at intersections. More analysis is needed on this corridor to determine the cause of these injury accidents. Why are there more injury accidents on this corridor as opposed to the others? Could it be the volume of traffic, rural nature of the roadway and/or travel speed?

Corridor Trend Analysis

Corridor accident data can be analyzed a number of different ways. One approach provides insights into the relative safety trends among the corridors. On which corridors are the number of accidents decreasing, stable, increasing dramatically, or increasing at a steady rate? The bar graph in ***Figure 3*** below demonstrates the ability to compare the trends over three corridors. This approach assists in targeting corridors where safety issues are increasing.

Figure 3
Number of Injury Accidents per Transportation Corridor for the Years 2000, 2001 & 2002

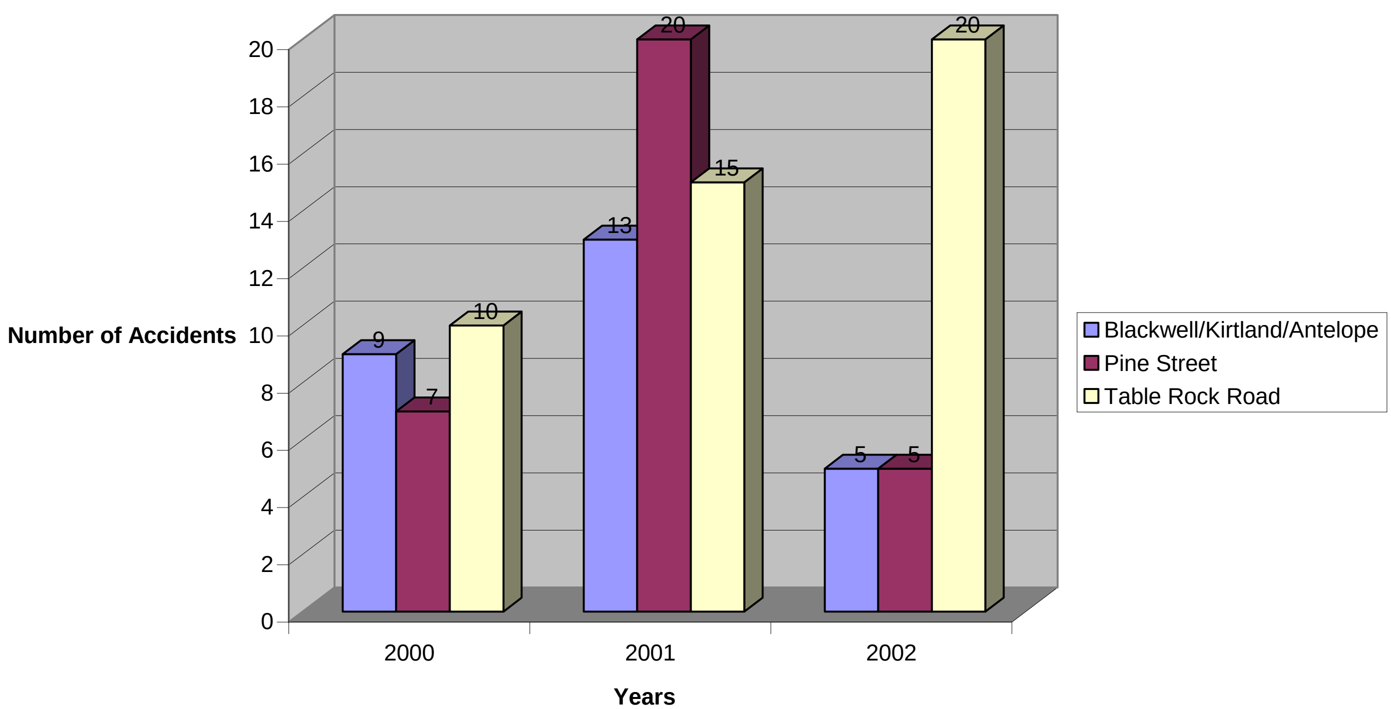
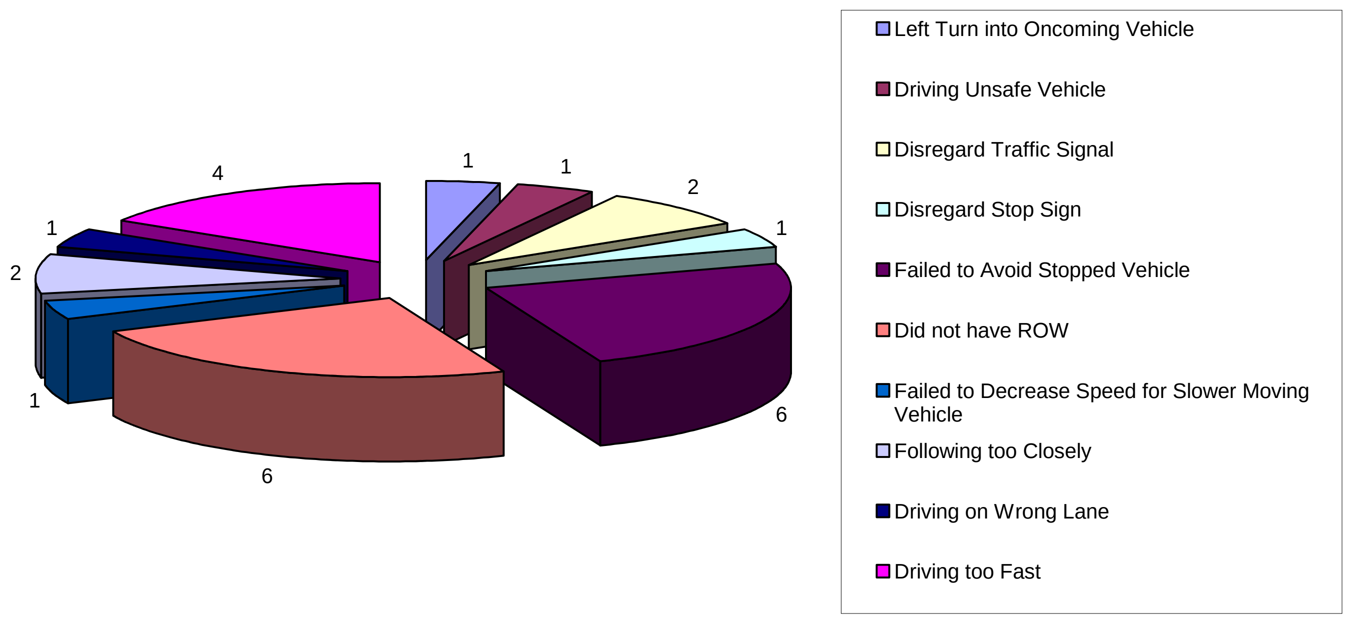


Figure 3 shows the comparison of injury accidents for the 3 study corridors for the years 2000, 2001 and 2002. In 2000, the Table Rock Road corridor had ten injury accidents, Pine Street corridor had seven, and Blackwell/Kirtland/Antelope had nine. In 2001, injury accidents increased on all three corridors with the Pine Street Corridor having the most injury accidents (20). In 2002, accidents went down on the Blackwell/Kirtland/Antelope corridor and the Table Rock Road corridor experienced an increase in injury accidents (20). Overall, accidents appear to be declining on the Blackwell/Kirtland/Antelope and Pine Street corridors, while increasing on the Table Rock Road corridor. Jackson County plans to improve the entire Table Rock Road corridor to urban standards (5 lanes, curbs, gutters and sidewalks) in the near future. The roadway improvements will improve safety in the corridor.

Cause of Accidents

Another approach allows the MPO to look at safety issues from a global perspective. For example, the data may be analyzed to learn the top causes of accidents across the region, e.g. driving too fast, not having the right-of-way. ***Figure 4*** below presents information on Driver Error for the year 2000 on all corridors. Failing to avoid stopped vehicles, not having the right-of-way and driving too fast are the most frequent causes of accidents in the study area corridors for the year 2000.

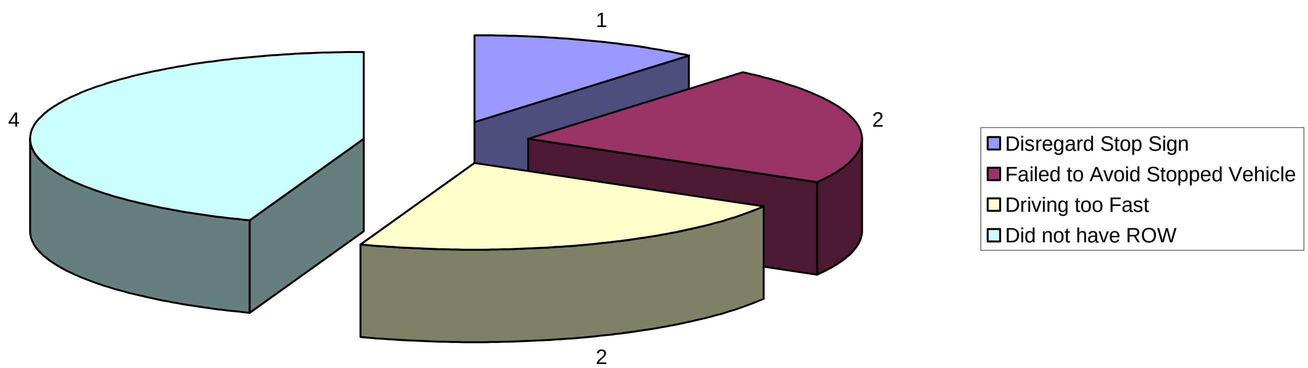
Figure 4
Cause of Injury Accident "Driver Error"
for the Year 2000
All Corridors



Analyzing Problems on Specific Corridors

By looking at the information on just one corridor, similarities in accident locations and causes can be assessed, thereby contributing to an explanation of safety issues in that corridor. ***Figure 5*** below presents Driver Error information for the year 2000 on the Blackwell/Kirtland/Antelope corridor. Thus, the approach assists in identifying specific safety problems of the corridor.

Figure 5
Driver Error Injury Accidents
Blackwell/Kirtland/Antelope Corridor
Year 2000

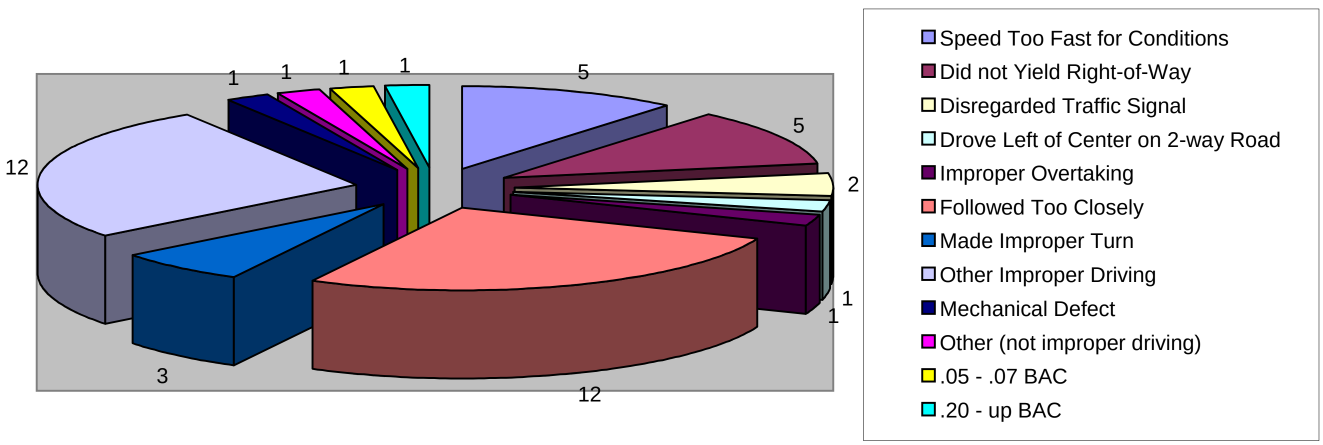


Supporting the Need for Improvements
Accident history may provide the supporting background information for safety improvements. ***Figure 6*** below depicts information on the cause of accidents on one corridor for the years 2000, 2001 & 2002.

Figure 6

Causes of Accidents on Table Rock Road Corridor

Years 2000, 2001 & 2002



The pie chart above depicts that the major causes of accidents along the Table Rock Road Study Corridor for the years 2000, 2001 and 2002 are:

- Followed too closely
- Other improper driving
- Speed too fast for conditions
- Did not yield right-of-way

What types of safety improvements on the Table Rock Road Corridor would reduce these types of accidents? Would the installation of road hazard signs that caution the driver to slow down when roadway conditions are hazardous (i.e., foggy, slippery when wet, etc.), be a possible solution? A closer analysis is needed to determine what type of safety improvements would reduce these types of accidents.

Analyzing the Impact of Improvements on a Corridor

The MPO will look at whether or not improvements on a corridor contributed to a reduction in accidents. ***Figure 7*** below presents the number of injuries on the Pine St. corridor from 2000 through 2002. Seeing information in this graphic format, it is natural to ask why the number of injuries rose so dramatically in one year and then dropped even more dramatically the next. The dollar and human cost of accidents occurring before an improvement could be compared to those after an improvement. This could provide an additional measure of cost-effectiveness. Conversely, if improvements were constructed, yet the same types of problems prevailed, questions might be raised about the appropriateness of the selected improvement.

Figure 7
Number of Injuries Resulting from Traffic Accidents
Years 2000, 2001 & 2002
Pine Street Corridor

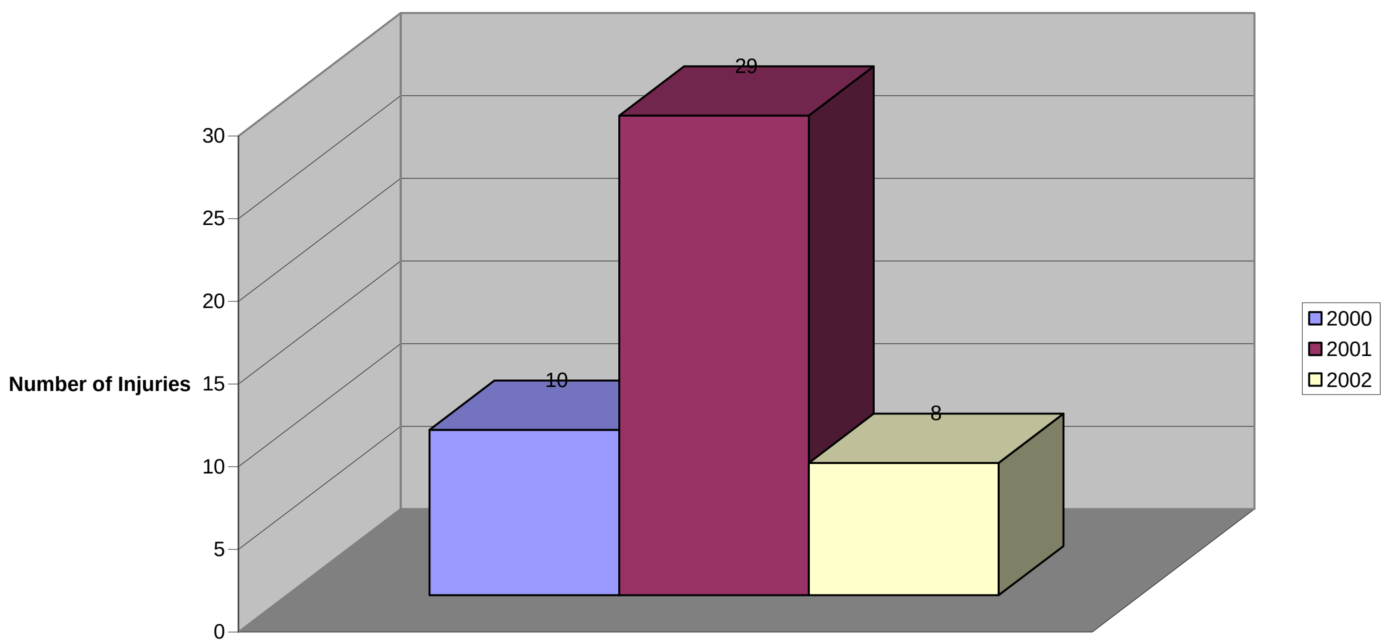


Figure 7 depicts the number of injuries resulting from accidents on the Pine Street corridor for the years 2000, 2001 and 2002. In 2000, there were 10 injury accidents reported. In 2001, the number of accidents jumped to 29, a marked increase. In 2002, the number of injury accident declined to nine. A more in-depth analysis is warranted to determine the reason for the sharp increase in accidents in 2001 and the decline in 2002.

Conclusion

Overall the project was successful. Several aspects of the project went as planned. First, much was learned about the complexity of the ODOT database versus the MPO GIS system. In particular, our system's limitations in matching to the ODOT crash database. The MPO learned how to do GIS linear referencing, a skill we did not possess in the past. Linear referencing is used to pinpoint accident locations on a map. The MPO established contacts at the ODOT Crash Analysis and Reporting Unit and Geographic Information Services. This will help the MPO access information more readily in the future.

The MPO did not have the opportunity to automate the ODOT crash data. The ODOT crash database systems will be upgraded in the near future to make it more user-friendly. The MPO had planned to automate its database system using the current ODOT crash data. It is not cost effective for MPO to automate its system until ODOT completes its system upgrade.

In terms of efficiency, the MPO is able to do more in depth analyses, in less time, using GIS and the ODOT accident data. This reduces staff time and costs. Having the accident data definitely saves time in studying corridors. The previous accident analysis methodology required extensive, time consuming review of multiple pages of spreadsheet accident data. The newly created accident location GIS information is more conducive to analyzing trends and absorbing information quickly. . It is more efficient in presenting information and easier to study and analyze.