Chapter 7
Safety Management in Transportation Planning

Overview - the Safety Management System

Introduction

Transportation planning activities involve numerous components of traffic data and analyses. Incorporating safety as a component of planning requires detailed information to be effective in the process. The primary element in safety management is the identification of problem areas or types. To be successful in this objective accurate data is required. With this information it is possible to identify problem areas and work toward finding solutions to mitigate or eliminate crashes. The Northeastern Indiana Regional Coordinating Council (NIRCC) has established a safety management system structured around accurate data. The system has been designed to provide a variety of informational data sets to various users from planners, engineers, law enforcement agencies and even social advocacy groups.

Source of Data

NIRCC obtains all crashes that occur in Allen County on an annual basis from the Automatic Record Information Exchange System (ARIES). This database contains all crashes that occur in the state of Indiana. Crash reports from all law enforcement agencies are required to be provided and included to the Indiana State Police through this system. In February of each year NIRCC retrieves all the data reported in Allen County and saves the data in a database for analysis.

Quality of Data

The first step performed by planners with the data is to perform a quality check. This step is the most time consuming part of the safety management process. Planners review all crash locations to ensure that once mapped, the locations are accurate and unique in their description. Locations are often misspelled or have multiple names. It is critical that all crashes occurring at a specific geographical location are named identically for future analyses. A significant amount of time is devoted to inputting these unique crash locations descriptions and verifying the accuracy of the data.

Crashes that do not occur at intersections (within 33 feet) require planners to assign mid-block address locations. This task requires geographic information systems and relies on accurate information from the reporting officers. Each crash that occurs 34 or more feet from an intersection is assigned an address if not already provided in the report.

Private property crashes have also created quality concerns with where crashes are reported. Planners work to identify crashes reported on a public roadway that occur on private property such as in parking lots. Crash reports require officers to provide the address of a crash on private property. This address

is then reflected as a "private property" crash by another input item. This step is often omitted by the reporting officer. An inverse problem also is checked where a vehicle leaves a public roadway and collides with a fixed object or parked car located on private property. Since the crash involved a vehicle that left a public roadway it should be included as a "non-private property crash". However the collision itself occurred on private property and occasionally is reported in that manner.

NIRCC works directly with the law enforcement agencies in Allen County to address these issues and provide suggestions on how to improve the reporting process. Information is shared with patrol officers and special investigation units such as the Fatal Alcohol Crash Team to improve the data before it is submitted in final form.

Analysis of Data

A complete data set for one calendar year is saved into a database and information related to the "unique" location for each crash is geo-coded into a geographic information system (GIS) for analysis. The GIS software gives planners the ability to evaluate crash data in an infinite number of ways. NIRCC provides each jurisdiction within Allen County an annual "Crash Summary Report" which is provided to the respective law enforcement agencies, engineering departments, elected officials and used for statistical purposes by planners. The report summarizes crashes by location, types, contributing circumstances, individual information, environmental impacts and a variety of other data items.

High crash locations are often defined as locations that are "hazardous". NIRCC worked with law enforcement agencies and engineers to define "hazardous" locations. Safety in transportation planning often defines high crash locations by frequency of crashes because of the impacts on the transportation network resulting in congestion and excessive delay. For other users high crash locations are those where more crashes occur per million vehicles. NIRCC developed a process to identify high crash locations or, hazardous locations, which considers and balances both of these definitions. NIRCC's process was developed through a cooperative effort with FHWA, INDOT and the Transportation Technical Committee (TTC).

The process incorporates both frequency and crash rates to identify and rank hazardous locations in a fair and responsive manner. A listing of crash locations is review that includes the crash frequency of the locations. Locations from this listing that meet or exceed seven crashes in a single year are then given a crash rate. A second listing is then created that includes only the locations identified from the frequency standards. This procedure is the most cost efficient and accurate method at this time. The principle of using a minimum frequency threshold and a RMV is a simple method to determine the safety of a location.

The next evaluation step is to incorporate crashes resulting in injuries or fatalities (I/F). The percentage

of I/F is used to identify locations where severity is greater than expected. There are two processes that are followed to evaluate two strata of data. Crash locations with an annual frequency equal to or greater than 7 will be reviewed in one stratum and crash locations with an annual frequency greater than two and less than 6 follow a second process.

Process for locations with frequency >2; < 6 crashes per year

1. A density analysis will be completed using a 250' radius to identify crash locations.
2. Crash locations with a frequency of 6, 5, 4 or 3 must have a minimum of one I/F crash to be included in the listing.
3. Locations then must meet one of the following two criteria;

A.

Frequency	Percentage of I/F
6	100% to 33 %
5	100% to 40%
4	100% to 50%
3	100 % to 66%

B. Locations with a RMV equal or greater than 1.00 will be included in the analysis.

Process for locations with FREQUENCY > 7 crashes per Year

1. A density analysis will be completed using a 250' radius to identify crash locations.
2. All crash locations with a RMV > 2.00 will be selected.
3. All locations with a RMV between 1.00 and 1.99 and have a percent of I/F between 100% and 66%.

The final step is to calculate a severity index for each location. Planners utilize specialized software developed by Purdue University in conjunction with the Indiana Department of Transportation called Hazard Analysis Tool, HAT. Severity index values (ICC) aid planners in determining how many standard deviations from a 'typical' or 'similar' intersections the location being evaluated is performing. A value of 1.00 standard deviation or higher indicates the location is experiencing a higher level of injury or fatal crashes that other similar locations throughout the State of Indiana.

Uses of Data

NIRCC uses the data for various planning activities in addition to providing crucial information to other agencies and users. The use of the data supports the Indiana Strategic Highway Safety Plan. The data is used in conjunction with data from previous years. Analysis of crash data for planning purposes relies on data from three or more years to support most decisions. The primary use of the data is the identification of high crash locations or hazardous crash locations. It provides planners the necessary resource to aid local officials in addressing citizen comments to education of drivers. As the program continues to grow the various uses of the data also increases.

The Indiana Strategic Highway Safety Plan identifies 13 emphasis areas listed below. This report provides

components of NIRCC's Safety Management Program that support this effort.

Driver Behaviors
- Emphasis Area 1: Develop Safer Young Drivers
- Emphasis Area 2: Increase occupant protection
- Emphasis Area 3: Reduce impaired drivers

Special Users/Vehicles
- Emphasis Area 4: Improve motorcycle safety
- Emphasis Area 5: Reduce large truck crashes
- Emphasis Area 6: Reduce bicycle and pedestrian crashes

Serious Crash Types/Locations
- Emphasis Area 7: Reduce "High Risk" rural road crashes
- Emphasis Area 8: Minimize the possibility and consequences of leaving the roadway
- Emphasis Area 9: Improve safety at intersections
- Emphasis Area 10: Reduce crashes at highway railroad crossings

Crash Management
- Emphasis Area 11: Enhance emergency services response to traffic crashes
- Emphasis Area 12: Expedite crash clearance to reduce secondary crashes and congestion
- Emphasis Area 13: Improve the quality of the data used to make safety improvement decisions

Driver Behaviors

(1) Develop Safer Young Drivers

NIRCC provides crash data to advocacy groups for education of young drivers in Allen County. The "Drive Alive" campaign works with parents and teens to promote safe driving practices through education. The campaign provides parents with tools to help them talk to their teen including a parent/teen contract. Various partners have contact NIRCC for data related to crash locations near schools, statistics of crashes involving drivers by age, crash types most common to young drivers, and contributing factors of crashes involving young drivers.

Crash data will continue to be provided to this group, other local groups and elected officials to encourage education of young drivers. The information will also be a tool to monitor the effectiveness of the programs and efforts by all those involved.

(2) Increase Occupant Protection

Crash records that are summarized by NIRCC provide local agencies information from crashes that occur in each jurisdiction. This information can be used to monitor the impacts of legislation and education aimed at occupant protection. Use of seatbelts and helmets are available to the agencies. This information can be used to target enforcement or evaluate educational efforts.

(3) Reduce Impaired Drivers

The reduction of impaired drivers has been an important issue for all motorists for many years.

Crash statistics provided by NIRCC to local officials and law enforcement agencies the necessary tools to identify areas where impaired drivers are involved in crashes. This serves as a portion of the information needed. Traffic arrests are also used in determining areas for enforcement. Educational activities are also supported with crash data to inform motorists of the dangers in driving while impaired.

Special Users/Vehicles

(4) Improve Motorcycle Crashes

Motorcycle crashes have a high rate of injury and fatality per mile traveled compared to motor vehicles. NIRCC provides an annual summary of crashes by vehicle type. The data is mapped in a manner that allows planners to geographically analyze where crashes involving specific vehicle types such as motorcycles. Areas or roadways that have a concentrated number of crashes higher than that expected are identified and discussed with transportation engineers and law enforcement. Helmets are not required in Indiana which makes education of drivers more crucial. Identified crash locations involving motorcycles can provide law enforcement the ability to target enforcement efforts.

(5) Reduce Large Truck Crashes

Commercial vehicle crashes are identified by crash type. NIRCC reviews the frequency of crashes involving commercial vehicles with traffic data also collected and maintained by NIRCC. The percentage of trucks on a location or corridor can be used to evaluate the number of crashes occurring at that location. The data can aid local officials and planners with identification of needed improvements.

(6) Reduce Bicycle and Pedestrian Crashes

Planning activities for bicycle and pedestrian facilities are conducted by NIRCC and the Indiana Department of Transportation for local and regional plans. The participation in both activities by NIRCC provides a great benefit to the process. Crash statistics can be reviewed when planning efforts for specific projects are proposed. Crash statistics are also used to identify needed bicycle and pedestrian facilities. In recent years a significant amount of work has been devoted in identification of all existing sidewalks, needed greenway expansions, connectivity projects, and new construction to provide safe bicycle and pedestrian facilities.

Local advocacy groups continue educational efforts geared at sharing the roads. Crash records can the effort by providing the number of annual crashes involving bicyclists and pedestrians. This information can increase the awareness of the severity of the issue and result in safer motorists.

Serious Crash Types/Locations

(7) Reduce “High Risk” Rural Road Crashes

The metropolitan planning area for NIRCC includes areas in cities of Fort Wayne and New Haven and a portion of Allen County which are defined as urban areas. The planning efforts for the Long Range Transportation Plan focus on projects within this urban area. The Safety Management Program for NIRCC however includes data for the entire county. The intent of this information is

to provide law enforcement agencies that respond to crashes throughout the urban areas and rural areas the tools necessary to respond to crashes in a timely manner and identify enforcement areas. This information is reviewed as previously stated in a manner that considers the rural areas. The crashes outside the urbanized area are mapped and reviewed based on frequency while considering traffic volumes and roadway characteristics.

NIRCC has reviewed potential system wide improvements to mitigate crashes in rural areas. Though these type projects may not be part of a long range plan, they can serve the residents by identifying improvements that may be made by local government agencies while reducing overall crash costs to the public.

Rural crash data is also reviewed for DeKalb and Wells County. NIRCC has provided three-year crash summaries for these counties to provide local officials with necessary information in addresses safety in each jurisdiction. The data is mapped to provide an easy method to identify high crash locations in each county. The data also provides the counties with information to respond to inquiries about crash frequencies at specified locations. Periodic review of this data will aid NIRCC in assessing safety at identified locations in each county.

(8) Minimize the Possibility and Consequences of Leaving the Roadway

Annual reports provide a summary of crashes involving vehicles that leave the roadway. The data provided by NIRCC can identify all crash types to evaluate roadways that experience a greater than expected number of off road collisions. This information is provided to local agencies for consideration of improvement projects. NIRCC continues to encourage system wide improvements such as installation of guardrails on curves, clear zone improvements, and speed evaluations where problems are identified.

(9) Improve Safety at Intersections

The strength of NIRCC's safety management process is that all crash locations are accurately identified through unique location names. Each intersection is identified by one name where various alternatives exist. This process greatly increases the level of confidence in reviewing crashes at intersections. Current requirements for law enforcement agencies reporting crashes define intersection crashes as those that occur within 33 feet of the intersection. Planners analyze all crashes reported at intersections by reviewing the crashes reported at all approaches in addition to those within the 33 feet of the crossroads. This process ensures planners that crashes related to the intersection such as rear ends are identified and examined to determine what countermeasures can be implemented to mitigate future crashes.

NIRCC dedicates a significant portion of time to examining high crash or hazardous intersections. This element of the program results in the most number of identified projects that are pursued by local public agencies. Improvements to existing intersections identified as hazardous can often provide the most effective benefit in reduction of crashes and severity of crashes. Continual review of these locations from year to year will provide planners and local public agencies with the necessary information to prioritize improvement projects.

(10) Reduce Crashes at Highway Railroad Crossings.

Railroad crossing information is maintained and updated regularly by NIRCC. Traffic volumes are

collected at all at-grade railroad crossings in Allen County as part of the traffic count program. In addition to this data planners collect other information regarding warning devices, sight distance, roadway lane widths, train speed, and trains per day. Photographs of crossings are also collected and maintained to review potential safety issues.

Crashes at railroad crossings are identified by NIRCC and also the Indiana Department of Transportation. Planners review the data reported by the state to ensure records are accurate. In recent years full protection at many of the railroad crossings in Allen County have been installed including lights and gates. Annual crash summary reports identify all crashes involving motor vehicles and trains in order to identify potential improvements.

Crash Management

(11) Enhance Emergency Services Response to Traffic Crashes

Emergency response times are critical to saving lives and clearing scenes quickly to avoid congestion and secondary crashes. NIRCC works with 911 Communication, law enforcement agencies and GIS staff on issues related to roadway names or addresses to ensure when needed, the addresses and posted signage is accurate. NIRCC has identified and mapped intersections that have the same name so that first responders do not loose valuable time going to the incorrect location.

NIRCC is also actively involved in TIM (Traffic Incident Management) which provides training to all first responders to improve their safety and aid in clearing the scene as quickly as possible. A vital part of this process is ensuring that dispatchers provide the first responders with enough information to insure appropriate agencies and equipment is sent to the scene. In addition this communication can ensure that special details about the crash and crash location are passed on to the responders.

(12) Expedite Crash Clearance

NIRCC participates in activities with local and state agencies to improve emergency services and quick clearance. These activities have motivated legislators to consider new laws to improve these issues. Crash data can assist emergency service providers in determining where crashes are occurring more than others. These decisions can help in responding to emergencies to aid victims and improve quick clearance of crash locations.

(13) Improve Quality of the Data Used to Make Safety Improvement Decisions

Reporting crash data has significantly improved in Indiana in the past years. All of the law enforcement agencies in Allen County utilize the electronic reporting software. This automatic reporting of crashes provides information to planners in a timely manner. The data provided is in a more usable format than in past years. As previously stated NIRCC extracts all the crashes from the Indiana database for annual analysis. NIRCC updates all crash locations to ensure consistency and accuracy.

Through to process of updating crash locations and mapping the data, NIRCC has identified issues that can be improved by the State of Indiana and the officers reporting the data. NIRCC works closely with the local law enforcement agencies to address these issues and improve the quality of the data reported.

Project Selection and Prioritization

The process of selecting projects encompasses a variety of contributing factors. Locations identified through NIRCC's evaluation process and deemed "hazardous", are carefully reviewed to determine what solution or action to implement. The annual data is reviewed by planners by using the new data in combination with the previous two years resulting in a listing of locations identified from three years of data. This listing of locations is provided to a committee of local engineers called the Transportation Technical Committee (TTC). TTC reviews the listing to inform planners of issues regarding specific locations they have already addressed or have plans to address. Potential causes for problems at the identified locations are also discussed and documented. This information is then forwarded to the local Transportation Safety Forum for further review.

The Transportation Safety Forum is comprised of representatives from each local law enforcement agency and engineering agency. Attendees include representatives from the following agencies; Indiana Department of Transportation, Indiana State Police, Allen County Highway Department, Allen County Sheriff's Department, Fort Wayne Engineering Department, Fort Wayne Police Department, New Haven Engineering Department, and New Haven Police Department. The safety forum provides a unique opportunity for law enforcement representatives and engineers to share with one another important issues regarding the locations identified. NIRCC facilitates the meetings, providing the data and documenting the issues shared by each of the representatives. Law enforcement representatives see the crashes first hand and are able to provide inviolable information that cannot always be documented in individual reports. Local engineering department representatives can share potential improvement ideas with law enforcement representative to get feedback on the potential effectiveness. The forum has benefited the safety process in Allen County by improving communication between various stakeholders and provided each of the participating agencies insight to what one another is doing to improve the safety of the roadways in Allen County.

The listing of projects identified by NIRCC is updated again with the comments from the Transportation Safety Forum. Planners review the locations where specific improvements were suggested. The projects identified from the listing are then forwarded to the local public agency responsible for the location for further consideration. Locally approved projects are then pursued by the local engineering departments for implementation of the construction process or forwarded to NIRCC for consideration of federal funding. NIRCC provides the listing of identified hazardous locations and the specific projects selected by local agencies for improvements to the Urban Transportation Advisory Board. This board approves projects for federal funding based on the benefit of each project and available funding. Larger projects may be approved for future funding if current conditions do not permit programming of the project. Smaller projects are often funded locally.

Existing Project Analysis

The ability to easily obtain crash records has allowed planners a new opportunity to review existing roadway projects being developed for construction. Projects that are in their infancy of preliminary design are reviewed to identify all safety deficiencies. This information serves to provide the designers of the project necessary information to ensure the deficiencies are addressed. Planners also provide this review to elected officials to support the needs of the project. The analysis may also warrant safety funding that can assist in the cost of the project.

Bicycle & Pedestrian Safety

A process to evaluate bicycle and pedestrian safety has been established by the Northeastern Indiana Regional Coordinating Council. The process involves an annual summary of all related crashes throughout Allen County. Each crash is evaluated to determine where the crashes are occurring and why. Planners determine what contributing circumstances are involved with each collision and search for patterns that can aid in future improvements to address identified deficiencies.

Transit Safety

Safety of residents that utilize the local transit system is very important to the success of the service. Safety improvements to the highway system have corresponding safety benefits to the transit system. The safety management system is structured in a manner that provides planners the ability to track elements of safety other than locations. Crash types involving pedestrians and buses can be identified and reviewed to address existing issues. The data can also support bus stop safety to assist the transit provider in route selections.

In addition to the efforts NIRCC provides, Citilink addresses safety issues concerning the transit system and is aware of the importance safety plays in overall passenger comfort. Several projects to improve security on buses and customer safety at the transfer facility have been made. Drivers are also provided training to address safety, terrorism, and security. The perception of a safe transit system is a great marketing tool. Citilink strives to maintain a safe transit system.

Conclusion

NIRCC has progressed in the development of a useful safety management program and continues to look for ways to improve data and expand the use of the information. The process of evaluating crash locations continues to evolve with the introduction of new unique situations and challenges. The information serves in meeting the goal of safer and more efficient roadways in our area.

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