

# STRUCTURING DATA FOR ANALYSIS OF LAW ENFORCEMENT SURVEILLANCE IMPACT ON CONSTRUCTION ZONES

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## **Abstract –**

Some of the most important functions of state DOTs are maintenance and construction programs. However, during the construction period, there are temporary traffic disruptions, which increase the number of accidents with associated deaths and injuries. Therefore, several states have taken a proactive role in implementing special measures in construction zones to reduce the number of accidents. An example of such measures is the increase of law enforcement surveillance in construction zones. Although, the increase of law enforcement surveillance has been used by several state DOTs, there are a limited number of studies documenting its impact. There are many reasons for this limited numbers of studies. One of these reasons is the added analysis complexity is due to the fact that several agencies are involved in collecting and storing the data. Furthermore, each agency uses a different data structure to store and retrieve collected information and in many cases some of the necessary data is not collected at all. This paper focuses on the process implemented to restructure and consolidate the data obtained from multiple agencies to be able to measure the impact of law enforcement surveillance in construction zones. The content of this report was later used as the foundation for statistical analysis. Furthermore, the experience obtained from this data restructuring and consolidation could be used as a set of case studies in the classroom to build bridges and make connections that facilitate engineering education. The results presented in this paper reveal the importance of inter-agency collaboration, the need to establish a common data structure to facilitate the exchange of information among agencies, and the importance of using real life applied research experiences for making the connections that facilitate engineering education.

*Keywords:* Law Enforcement Surveillance, Construction Zone, Impact, State-of-the-Art

## INTRODUCTION TO CONSTRUCTION ZONES

The first step in consolidating the data was to identify the agencies with needed data, the offices within the agencies and their responsibility/roles in collecting data. Then, the MDOT leader of this project contacted the agencies and provided a brief description of the project and the research team. The research team followed-up this initial contact by requesting a meeting with the representatives of the agencies to provide an overview of the project and initiate the turn-over of the data that had been collected by the agencies. During, this initial meeting an informal interview was conducted with the agency representative to explicitly identify the data that the

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agency had already collected, the structure, and the media in which the data was stored as well as the retrieval means of the agency. Upon agreeing with the agency concerning the data to be retrieved, a mechanism to transfer the data was established. As expected and evidenced below, each agency used a different structure to archive the data. Furthermore, some agencies were able to retrieve the data in electronic form while other agencies were only able to retrieve the data in hard copies. The following is a brief description of the data collected by different agencies involved in a road construction zone:

District 5 Office - Mississippi Department of Transportation (MDOT)

The MDOT District Office had all the construction documents developed by engineering prior to the construction as well as all the construction documents generated during the construction process. All the data provided by the District Office to the research team was hard copy. Given the diversity of the information handled by this office, there was no common structure in the data archived. This office handled descriptive, pictorial and numerical information. Information ranged from specific in nature (either by location or day) to very broad. One of the most valuable pieces of information provided by the District 5 office to the research team was the actual construction timeline shown in Table 1.

Table 1. Construction Timeline Received from District 5

<u>Dates</u>	<u>Activities</u>
02-16-01 - 02-22-01	Placed median barriers southbound
02-23-01 - 03-13-01	Placed median barriers northbound
03-20-01	Closed Natchez Trace Parkway (NTP) Bridge & West ramps of NTP
10-03-01 - 10-12-01	Placed median barriers southbound to put traffic on newly constructed inside lane (becomes shoulder when complete)
11-01-01 - 11-09-01	Placed median barriers northbound to put traffic to the newly constructed inside lane (becomes shoulder when complete)
12-18-01	Opened new SE ramp @ OAR
12-19-01	Opened new SW ramp @ OAR
06-03-02	Opened new NE and NW ramps @ OAR
07-08-02	Closed NTP East ramps
02-19-03	Moved northbound traffic to outside 2 lanes to finish leveling Sta 108+00 - E.O.P.
04-01-03	Opened NTP east ramps
04-01-03	Changeable Speed Sign with Radar Slow down
06-04-03 - 06-15-03	Removed median barriers northbound
06-15-03	So far there were only two lanes open
06-15-03 - 08-31-04	Paving, Opening Lane, Landscaping
07-14-03	Switched Northbound traffic back to inside lanes (like described previously 11-1-01 - 11-9-01).
11-12-03	Switched Southbound traffic to outside lanes
11-20-03	Opened NE and NW loops plus Natchez Trace Bridge and West ramps of NTP
12-19-03	Opened a new lane Northbound from I-220 - Northeast Ramp
12-19-03	Opened a new lane Southbound from NW Ramp to I-220
03-09-04	Opened all lanes Southbound in final locations
03-30-04	Opened all lanes Northbound in final locations.
05-04-04	Began permanent stripe and completed 5-17-04

## Planning Division - Mississippi Department of Transportation (MDOT)

The MDOT Planning Division had placed a number of traffic recording devices around the state. The data/information collected from these devices was mainly handled/presented in pictorial and numerical form. The Planning Division archived the information both in hard copies and electronic media. Some of the information received by the research team was in hardcopy and some was received in electronic files. In the cases where the information was made available to the research team in hard copy, further processing was required. The research team entered the information either in a spreadsheet or another program that allowed the processing of the data. One of the most valuable pieces of information provided by the Planning Division to the research team was traffic volume in the studied area. Figure 1 shows a sample of traffic volume obtained from the Planning Division.

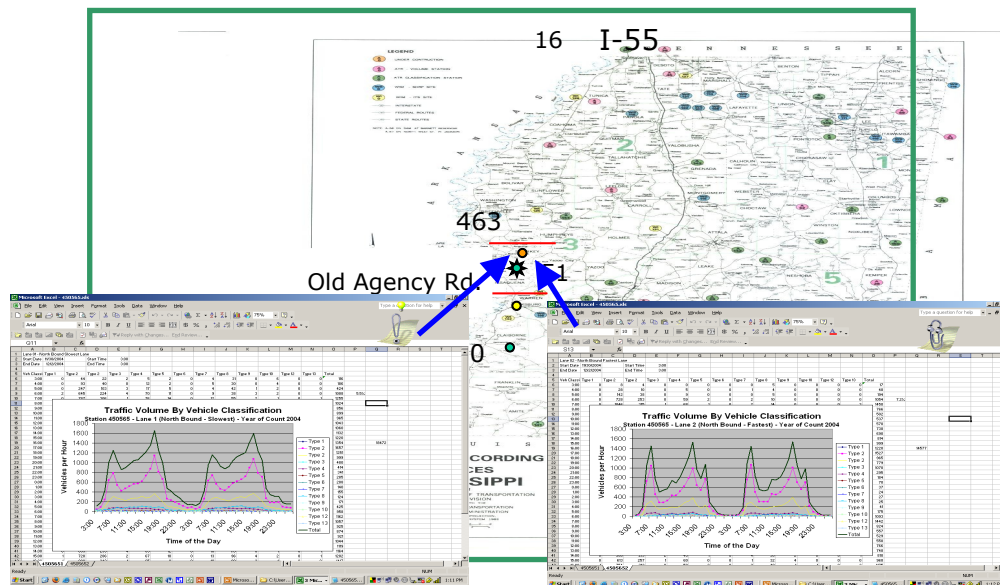


Figure 1 – A Sample of the Traffic Volume Data Received from Planning Division

## Mississippi Safety Highway Patrol

The Mississippi Safety Highway Patrol as part of a contract with MDOT established through a Memorandum of Understanding, prepared monthly reports of law enforcement efforts in the studied area. All information provided by this agency to the research team was in hard copy. Additionally, the information was only a summary of activities, where each record represented a number of citations. The detailed information related to each event was not accessible to the research team because the retrieval would require a hand search of the individual documents. Figure 2 shows an example of the citation provided by this agency.

01/12/2002 09:38 6019871513 MHP FLEET OPERATIONS PAGE 86

**DPS/MHP ENFORCEMENT PROGRAM**  
**CONSTRUCTION TRAFFIC ENFORCEMENT**  
MHP/MDOT  
Project # I-55 NORTH  
MARCH 1, 2003 THROUGH MARCH 31, 2003

PREPARED BY: LT. DONALD McCAIN

DATE	SSN	BADGE	NAME	HOURS	HAZ	NONHAZ	MILEAGE
03/01/03	427156916	R31	STEWART, RONNIE L.	8	20	4	200
03/01/03	426060448	C1	BERRY, DONNELL	8	12	0	150
03/02/03	427040237	A18	BROWN, DONALD P.	8	22	1	200
03/02/03	426060448	C1	BERRY, DONNELL	8	8	1	100
03/03/03	426027238	Q2	STEWART, RAYS O.	8	15	3	200
03/03/03	425042595	C36	HOPKINS, THOMAS J.	8	15	7	200
03/04/03	587485874	C69	MCCRUDEN, KENNETH L.	8	20	1	250
03/04/03	427433669	C36	BROWN, KENNETH K.	8	14	1	275
03/05/03	587802243	C	RAWLS, JOHNNY D.	8	5	0	150
03/05/03	428565822	D17	STEED, MARK D.	8	9	12	240
03/06/03	425477874	C6	STEED, RAY	8	3	4	200
03/06/03	427197682	C18	GEORGE, TRAYON M.	8	10	5	240
03/07/03	428172568	C9	SMITH, JAMES C.	8	13	14	200
03/07/03	427371226	C40	WARREN, JOHN R.	8	12	3	130
03/08/03	428114886	A15	MCMULLIN, GAYLE M.	8	10	2	200
03/08/03	425110815	A8	THORNTON, TONY R.	8	12	1	250
03/03/03				8	23	2	181
03/03/03				8	6	1	200
03/03/03				8	14	1	181
03/03/03				8	8	8	120
03/03/03				8	9	5	300
03/03/03				8	8	1	100
03/03/03				8	13	7	300
03/03/03				8	5	0	100
03/03/03				8	2	3	100
03/03/03				8	6	0	200
03/03/03				8	3	3	200
03/03/03				8	10	0	150
03/03/03				8	10	7	200
03/03/03				8	17	0	200
03/03/03				8	12	0	200
03/03/03				8	12	0	250
03/03/03				8	17	3	150
03/03/03				8	12	0	200
03/03/03				8	13	0	200
03/03/03				8	13	0	200
03/03/03				8	18	1	220
03/03/03				8	9	100	200
03/03/03				8	4	0	200

Figure 2. A Sample of the Citation Information Received from the Mississippi Highway Patrol

Ridgeland Police Department

The Ridgeland Police Department also prepared monthly reports of the law enforcement efforts in the studied area. All information provided by this department was in electronic format and contained all the information generated at the moment of the incident. The data provided by the Ridgeland Police Department to the research team was citation data in the studied area. Each citation was represented as one record as shown in Figure 4-3.

	A	B	C	D	E	F
1	CITATION_DATE	CITATION_NO	LOCATION	OFFICER_NAME	DESCRIPTION	VIOLATION
2	8/15/2003	084817	1-55 S/B		SPEEDING - 16 - 20 MILES OVER LIMIT	SPD2
3	8/15/2003	084814	1-55 S/B		SPEEDING - 10 - 15 MILES OVER LIMIT	SPD1
4	8/15/2003	083900	I-55N/B		SPEEDING - 10 - 15 MILES OVER LIMIT	SPD1
5	8/15/2003	081226	I 55		WINDOWS, TINTED OR DARKENED, 1ST OFFE	TINT1
6	8/15/2003	080625	I55		SPEEDING - 10 - 15 MILES OVER LIMIT	SPD1
7	8/15/2003	080624	I55 N/B		SPEEDING - 10 - 15 MILES OVER LIMIT	SPD1
8	8/15/2003	084816	I-55 N/B		SPEEDING - 16 - 20 MILES OVER LIMIT	SPD2

Figure 3. A Sample of the Citation Information Received from The Ridgeland Police Department

Traffic Engineering Division – Mississippi Department of Transportation (MDOT)

The MDOT Traffic Engineering Division continuously collects safety related information. All information provided by this office to the research team was in electronic files. Several files were provided to the research team to analyze the safety conditions of the studied area. Although, all the data was electronically stored, given the diversity of the data, few (if any) of the fields were common to all the data stored. Two of the most valuable pieces of information provided by the Traffic Engineering Division to the research team were the crash data in the studied area and the Memorandum of Understanding between the MDOT and the law enforcement agencies. Figure 4 and 5 show a sample of crash data obtained from the Traffic Engineering Division and a portion of sample Memorandum of Understanding respectively.

	A	B	C	D	E	F	G	H	I	J	K	L
1	COUNTY	DATE	TIME	WEATHE	STREET 1	DISTANCE	FEET OR	M DIRECTION	STREET 2	NUM	OF VE NUM	OF IN NUM
2												
3	Madison	1/3/2000	20:02	Rainin	I-55		0		S. TRACE RAMP	1	0	0
4	Madison	1/3/2000	20:36	Rainin	HWY 55	400	Feet	North	105 A EXIT	1	1	0
5	Hinds	1/5/2000	15:19	Clear	I-55	300	Feet		WOODROW WILSON	2	0	0
6	Madison	1/9/2000	19:08	Clear	I-55	0			MILE MARKER 11	1	1	0

	L	M	N	O	P	Q	R	S	T	U	V	W	X	Y
1	OF IN NUM	OF FA ACCIDENT	OBJ STRUC	LIGHTING	WEATHER	ROAD	SURF VEH 1 CONTR	IB	VE	H 2 CONTR	IB	VEH 1	DIR VEH 2 DIR	VEH 1 ACT
2														
3	0	Ran off r	Trees	Darkness	Raining	Wet						South		Avoiding
4	0	Fixed Obj	Abutment	Darkness	Raining	Wet						North		Straight
5	0	Sideswipe	Other	Daylight	Clear	Dry						South	South	Straight
6	0	Ran off r	Trees	Darkness	Clear	Dry	Inattention					South		Straight

Figure 4. A Sample of the Crash Data Received from Traffic Engineering Division

**MEMORANDUM OF UNDERSTANDING  
BETWEEN  
MISSISSIPPI TRANSPORTATION COMMISSION  
AND  
CITY OF RIDGELAND, MISSISSIPPI**

This agreement is executed by and between the Mississippi Transportation Commission (the "MTC") and the City of Ridgeland, Mississippi, each of which is a body corporate of the State of Mississippi, effective as of the most recent date of execution hereof.

WITNESSETH:

WHEREAS, the MTC and City of Ridgeland, through its adjunct the Ridgeland Police Department, have identified an area in the City of Ridgeland, Madison County in the State of Mississippi where an increase of motor vehicle crashes resulting in fatalities and injuries has become evident; and

WHEREAS, the area of concern is located on and along Interstate Highway 55 from County Line Road and extending north to the 105 mile-marker which is just south of the Highway 463 exit, specifically in the construction area of the Old Agency Road interchange and including the Old Agency Road and Jackson Street areas located between Highland Colony and Sunnybrook Road; and,

WHEREAS, increasing the visibility of Ridgeland Police Officers in marked patrol cars and generally strengthening the enforcement efforts on this section of Interstate 55 and within the interchange area is likely to result in a decrease in the number of serious motor vehicle accidents thereby increasing the safety of both the traveling public and the workers in the construction area; and,

WHEREAS, it is in the best interest of the traveling public and the construction workers in this area that the City of Ridgeland provide additional enforcement of traffic laws through the issuance of traffic citations and other appropriate measures, with one officer assigned per shift in the aforesaid area three days one week from 6 a.m. until 6 p.m. and one officer assigned per shift two days the next week from 6 a.m. until 6 p.m.); and,

WHEREAS, there is a substantial increase in travel over major holiday periods, therefore, it is in the best interest of highway safety that the City of Ridgeland provide 24-hour enforcement over the holiday periods of Labor Day, Thanksgiving and Christmas in 2003 and New Year's and Memorial Day in 2004 for a total of approximately 414 holiday hours; and,

WHEREAS, MTC has no funds available to expend to further these stated goals but the United States of America, through the Federal Highway

Figure 5. A Portion of Sample Memorandum of Understanding between MDOT and a Law Enforcement Agency

### THE RESTRUCTURING AND CONSOLIDATION OF THE AVAILABLE DATA FOR THE ANALYSIS

The restructuring and consolidation of the data was driven by the main objective of the project which was to evaluate the safety impact of increased law enforcement surveillance on construction zones. To achieve this main objective, six specific statistical analyses were established aiming to determine if there was any correlation between the studied variables. The six analyses were as follows:

- Analysis 1 - Law Enforcement Presences Vs Number of Citations:
- Analysis 2 - Law Enforcement Over Time Vs Number of Citations:
- Analysis 3- Number of Citations per Week Vs Number of Crashes Per Week

- Analysis 4- Distribution of Volume Vs Distribution of Crashes
- Analysis 5- Time of The Day Vs Number of Crashes
- Analysis 6- Law Enforcement Presences Vs Number of Crashes

Based on the six analyses, the following data was required:

- Date of the Mississippi Highway Patrol Presences over time
- Date of the Ridgeland Police Presences over time
- Number of Citations Issued by the Mississippi Highway Patrol over time
- Number of Citations Issued by the Ridgeland Police Presences over time
- Number of Crashes in the studied area over time
- Hourly Traffic Volume in the studied area over time
- Construction condition over time

Upon comparing the required statistical analysis and the data available from the different agencies, it was recognized that there were five distinctive data sets (as shown in Figure 6): 1- Construction Information, 2- Traffic Volume Information, 3-Mississippi Highway Patrol (MHP) Activities, 4- Ridgeland Police (RP) Department Activities, and 5- Crash Information.

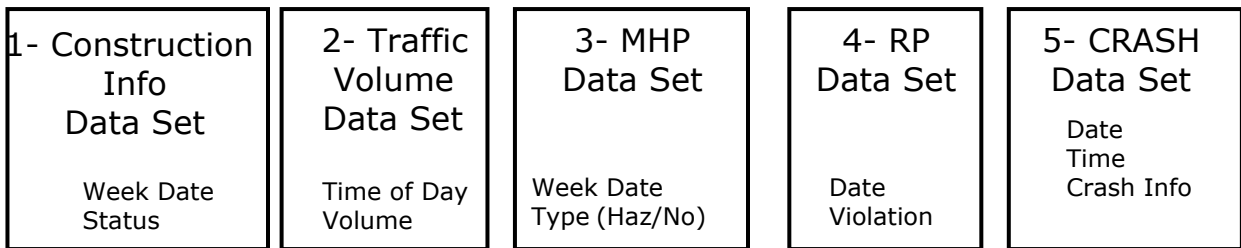


Figure 6. Data Sets for Analysis

The following is a brief description of the restructuring of the data from the different agencies involved:

Restructuring District 5 Office - Mississippi Department of Transportation (MDOT) Data

The construction timeline received from District 5 (shown in Table 1) was re-structured to two variables: Week Date and Construction Status. Since both data sets represented categories with intrinsic order, they were both defined as “Ordinal”.

The Week Date variable was assigned a number between 1 and 242. The number 1 was assigned to the week starting of January 2<sup>nd</sup> of 2000 and the successive numbers were assigned to the subsequent weeks as show in the Figure 7. The Construction Status variable received a value between 1 and 3, where 1 was assigned to the “After” construction condition, 2 was assigned to the “During” construction condition, and 3 was assigned to the “Prior” to construction condition as Show in Table 2.

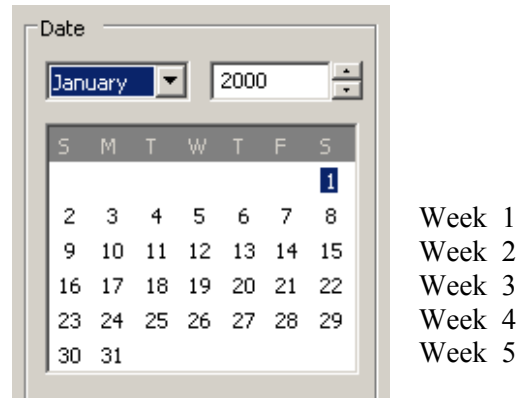


Figure 7. Week Date

Table 2. Construction Status

Start Date	End Date	Construction Status	Start Week	End Week
--	02/16/01	Prior	--	59
02/17/01	05/17/04	During	60	229
05/18/04	--	After	230	--

Restructuring Planning Division - Mississippi Department of Transportation (MDOT) Data

The traffic volume information received from District 5 (shown in Figure 1) was re-structured to two variables: Time of the Day and Volume. The variable Time of the Day was defined as “Ordinal” and since the “Volume” variable represented magnitude it was defined as “Scale”.

The Time of the Day variable was assigned a number between 0 and 23 representing a 24 hours clock which begins at midnight (which is 0000 hours). The Volume variable received the number of vehicles per hour that passed the studied area as shown in Figure 8.

Tim Day 2	Cas_Num 2	volume
0	12	290.00
1	10	198.00
2	11	160.00
3	4	155.00
4	13	204.00
5	6	547.00
6	21	1,749.00
7	59	3,552.00
8	33	2,630.00
9	31	1,931.00
10	23	1,926.00
11	45	2,135.00
12	54	2,212.00
13	60	2,236.00
14	33	2,405.00
15	57	2,846.00
16	34	3,188.00
17	59	3,506.00
18	46	2,300.00
19	24	1,685.00
20	17	1,386.00
21	19	1,057.00
22	9	724.00
23	11	453.00

Figure 8. Sample Traffic Volume Discriminated by Time of the Day

Restructuring Mississippi Safety Highway Patrol Data

The citation information received from the Mississippi Safety Highway Patrol (shown in Figure 2) was restructured to two variables: Week Date and MHP Type of Citation. The variable Week Date was defined as “Ordinal” as previously described and the variable “MHP Type of Citation” was defined as “Nominal” because the data values represented categories with no intrinsic order.

Additionally, each record in the information received from the Mississippi Safety Highway Patrol represented several Hazards and Non-Hazards citations. Therefore, each of the record was restructured to represent individual citations.

The Week Date variable as was assigned a number between 1 and 242 as previously described. The MHP Type of Citation variable received a value between 1 and 3, where 1 was assigned to the “No Applicable” condition, 2 was assigned to the “Hazard” condition, and 3 was assigned to the “Non Hazard” condition.

#### Restructuring Ridgeland Police Department Data

The citation information received from the Ridgeland Police Department (shown in Figure 3) was restructured to two variables: Week Date and RP Type of Violation. The variable Week Date was defined as “Ordinal” as previously described and the variable RP Type of Violation was defined as “Nominal” because the data values represented categories with no intrinsic order.

The Week Date variable was assigned a number between 1 and 242 as previously described. The RP Type of Violation variable received a value between 1 and 35, where each number represented a type of violation. The number 1 was assigned to “No Applicable”, 2 was assigned to “Allow Unauthorized Pers. To Oper. M/Veh.”, 3 was assigned to “Careless Driving”, 4 was assigned to “Child Restraint Law”, 5 was assigned to “Disobey Traffic Control Device”, 6 was assigned to “Driving Without Headlights”, 7 was assigned to “Expired Drivers License”, 8 was assigned to “Expired License Tag”, 9 was assigned to “Fail To Exhibit D.L. On Demand”, 10 was assigned to “Following Too Closely”, 11 was assigned to “Improper Equipment”, 12 was assigned to “Improper Lane Usage”, 13 was assigned to “Improper License Tag – Altered”, 14 was assigned to “Littering”, 15 was assigned to “No Drivers License”, 16 was assigned to “No Insurance”, 17 was assigned to “No License Tag”, 18 was assigned to “No Motorcycle Endorsement”, 19 was assigned to “No Proof Of Insurance”, 20 was assigned to “Obstructing Traffic”, 21 was assigned to “Reckless Driving”, 22 was assigned to “Running A Stop Sign”, 23 was assigned to “Seat Belt Violation”, 24 was assigned to “Speeding - 10 - 15 Miles Over Limit”, 25 was assigned to “Speeding - 16 - 20 Miles Over Limit”, 26 was assigned to “Speeding - 21 - 25 Miles Over Limit”, 27 was assigned to “Speeding - 26 - 30 Miles Over Limit”, 28 was assigned to “Speeding - 30+ Miles Over Limit”, 29 was assigned to “Suspended Drivers License”, 30 was assigned to “Suspended Drivers License, Dui”, 31 was assigned to “Tag, Switched”, 32 was assigned to “Tag, Unauthorized Dealer”, 33 was assigned to “Tag, Covered Or Defaced”, 34 was assigned to “Tag, Improperly Mounted”, and 35 was assigned to “Windows, Tinted Or Darken”

#### Restructuring Traffic Engineering Division - Mississippi Department of Transportation (MDOT) Data

The crash information received from the Traffic Engineering Division (shown in Figure 4) was restructured to three variables: Week Date, Time of the Day and Crash Information. The variables Week Date and Time of the Day were defined as “Ordinal” as previously described and the variable Crash Information was defined as “Nominal” because the data values represented categories with no intrinsic order.

The Week Date variable was assigned a number between 1 and 242 as previously described. The Crash Information variable received a value between 2 and 17, where each number represented the crash information. The number 2 was assigned to “Angle”, 3 was assigned to “Animal”, 4 was assigned to “Fixed Object”, 5 was assigned to “Head on”, 6 was assigned to “Left turn”, 7



was assigned to “Other”, 8 was assigned to “Other Incoming”, 9 was assigned to “Other Object”, 10 was assigned to “Overturn”, 11 was assigned to “Parked Vehicle”, 12 was assigned to “Pedestrian”, 13 was assigned to “Ran off road”, 14 was assigned to “Rear end”, 15 was assigned to “Right turn”, 16 was assigned to “Sideswipe”, and 17 was assigned to “Unknown”.

The Memorandums of Understanding between the MDOT and the law enforcement agencies (shown in Figure 5) was restructured to three variables: Week Date, Permanent Presence of MHP and Permanent Presence of RP. The variables Week Date was defined as “Ordinal” as previously described and the variables Permanent Presence of MHP and Permanent Presence of RP was defined as “Nominal” because the data values represented categories with no intrinsic order.

The Week Date variable was assigned a number between 1 and 242 as previously described. The Permanent Presence of MHP and Permanent Presence of RP variable received a value between 1 and 2, where 1 was assigned to “No” presence, and 2 was assigned to “Yes” regarding presence as shown in Table 3.

Table 3. Permanent Presence of Law Enforcement per Memorandum of Understanding

Start Date	End Date	MHP	RP	Start Week	End Week
--	01/01/03	No	No		156
01/02/03	08/13/03	Yes	No	157	189
08/14/03	11/10/03	Yes	Yes	190	202
11/11/03	08/13/04	No	Yes	203	241
08/14/04	--	No	No	242	

#### CONSOLIDATION OF ALL THE DATA

After restructuring the information received from each agency, the next step was to consolidate (or integrate) all of the data sets into one master data file. The variable Week Date was identified as the common field among all the data sets with the exception of the Traffic Volume Information data set. It was also identified that the Time of the Day was a common field between the Traffic Volume Information data set and the Crash data set. The solid arrows pointing in two directions, in Figure 9 shows the common fields among all the data sets. Based on this information, both the Week Date and Time of the Day were used as key fields and the data from all the data sets was copied to each other creating a master data set with the fields shown in Table 4. The dotted arrows, in Figure 9 show the fields that were transferred from one data set to the other to create the fields in Table 4. As a result of this consolidation, a total of 7156 records were integrated into the master data set as shown in Table 5.

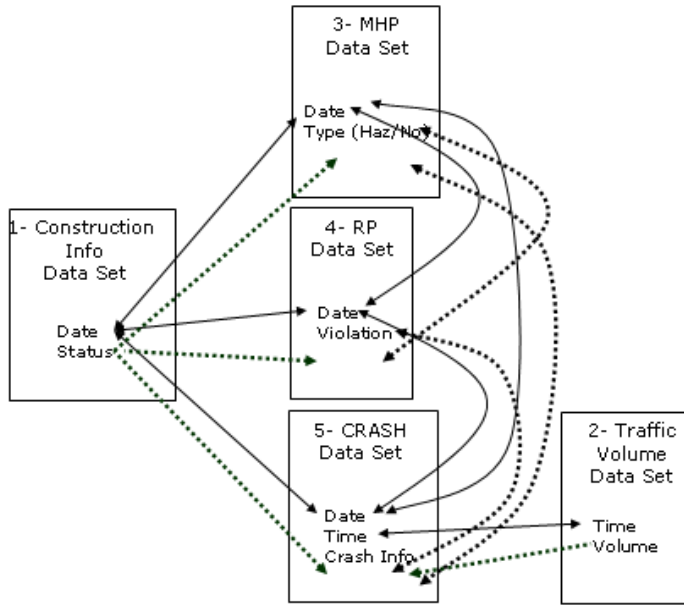


Figure 9. Data Set Consolidation

Table 4. Date Set Variables, Type of Variables and Value Codes

Variable	Type of Variable	Value Codes
Case #	Nominal	Not Applicable
Crash or Citation?	Nominal	1: Citation 2: Crash
Week Date	Ordinal	Not Applicable (01/02/00=Week1)
Construction Status	Ordinal	1: After 2: During 3: Prior
Time of the Day (Hr)	Ordinal	Not Applicable
Volume (Veh/Hr)	Scale	Not Applicable
Source of the Data	Nominal	1: MDOT 2: MHP 3: RP
MHP Type of Citation	Nominal	1: Not Applicable 2: Hazard 3: Non Hazard
RP Type of Violation	Nominal	1-35
Crash Information	Nominal	1-17
Permanent Presence of MHP	Nominal	1: No 2: Yes
Permanent Presence of RP	Nominal	1: No 2: Yes

Table 5. Number of Records Restructured From the Data Sets

<u>Source</u>	<u>Records after Restructuring</u>
Ridgeland Police Department	1944
Mississippi Highway Patrol	4521
MDOT (Crash Data)	<u>691</u>
Total Records in the Master Data Set	7156

#### LESSONS LEARNED

It is important to highlight that all agencies were very willing to collaborate in the data consolidation process. However, collecting, archiving and retrieving information was not a main priority for any of these agencies. Additionally, no general guidelines for data structuring was communicated among the agencies. Therefore, it is evident that input into the data gathering process before the data is collected rather than after the fact, could greatly improve the process of accessing the impact of law enforcement surveillance in construction zones. By defining the data to be collected, the method for collecting the data, the formatting of the data, the timeframes for collecting the data (before, during and after construction), all the participating agencies would be able to share information and to demonstrate the impact of their performance to stakeholders. It was also learned that the restructuring of the data was of paramount importance for the consolidation of the data. Identifying the variable types and the possible values for each variable, facilitated the comparison of variables to decide whether or not to use the same variable or to create a new variable for each data set. The identification of common data components among the data set was critical for the consolidation of all data sets. The use of the common data components to transfer data among data sets proved to be an effective way to complete the data sets with information from another data set (another agency)

#### SUMMARY

During the construction period, there are temporary traffic disruptions, which increase the number of accidents with associated deaths and injuring thousand of people every year. One of the special measures implemented in construction zones by several departments of transportation around the United States to reduce the number of crashes is the increase of law enforcement surveillance. This chapter focuses on the process implemented to structure the data obtained from multiple agencies to be able to measure the impact of law enforcement in construction zones. The content of this chapter was later used as the foundation for the statistical analysis.

The results presented in this chapter reveal that segmentation of the data and the structure of the data is a major barrier to assess the impact of law enforcement surveillance in construction zones. Due to the willingness of the agencies to collaborate in the data consolidation process, it was possible to restructure and consolidate the data to perform statistical analysis. It is also expected that the restructuring process presented in this chapter could be used by other research teams to perform similar analysis of law enforcement surveillance or others methods implemented around the U.S. to reduce the deaths and injuries in road construction zones.