## Using Complementary Intersection and Segment Analyses to Identify Crash Hot Spots

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## Outline



- Introduction
- Methodology
- Results
- Conclusions



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- The primary objectives of the effort include:
  - Create a methodology that identifies crash hot spots on Utah highways
  - Separate intersection crashes from non-intersection (segment) crashes in the analyses
  - Identify and rank the hotspots
  - Analyze the top-ranking hotspots



### TOTAL FATALITIES AND SERIOUS INJURIES

TOTAL FATALITIES AND TOTAL SERIOUS INJURIES



### Introduction

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### Methodology: Crash Analysis Methodology for Segments (CAMS)

- The Roadway Safety Analysis Methodology (RSAM) is used to evaluate segments of Utah state routes:
  - Forms the foundation of the Crash Analysis Methodology for Segments (CAMS)
- Two statistical models applied:
  - Utah Crash Prediction Model (UCPM)
  - Utah Crash Severity Model (UCSM)
- Homogenous segmentation based on:
  - AADT
  - Functional Class
  - Number of Lanes
  - Speed Limit
  - Urban Code





### Methodology: Intersection Safety Analysis Methodology (ISAM)



- The ISAM identifies intersection crash hot spots:
  - Intersections with two or more state routes
  - Intersection crashes defined based on functional area and intersection-related criteria
- Two statistical models applied:
  - Utah Intersection Crash Prediction Model (UICPM)
  - Utah Intersection Crash Severity Model (UICSM)



# Methodology: Distinction between CAMS/ISAM





## Methodology: CAMS Data Integration

#### Choose a segmentation method: Choose a segmentation method:

### • Functional Class

- Number of Through Lanes
- Speed Limit
- Urban Code

### **Combining the Crash Data**

- Includes removing intersection-related crashes at selected intersection types:
  - Functional Area Distance
  - Physical Area Distance = 60'

#### Crash Data:

Roadway Data:

AADT Data

Functional Class

Lanes

Speed Limit

Urban Code

Browse to the files for the following data:

Intersections	
Define intersection functional (Choose one from each colur	distance: nn)
<ul> <li>by approach speed</li> </ul>	from the intersection's approximate stopbar location
⊂ as 250 feet	from the center of the intersection
Speed Limit	
	Intersections Define intersection functional (Choose one from each colur

Combine Roadwav Data





### **Combining Roadway and Crash Data Together**

• Assigns crashes to segments

Input to CAMS		×
Select Road Segme	nt and Cra <mark>s</mark> h Data Fil	es:
	Create Input Dataset	ts
Road Segment Data Crash Data	; rn0903/CAMSRoadSegn Jn0903/CAMSCrash_bySp	nents_9-3-2019_7-55-15_AM.csv peedfromCenter_9-3_8-29AM.csv
Select Crash Severit	ties to Summarize:	
Severity 5 (fatal injury	y crash) ting injury crash)	Select All
<ul> <li>Severity 3 (injury craining of a severity 2 (possible in Severity 1 (property )</li> </ul>	ijury) damage only)	Select None
Select the Desired Y	(ear Range:	
Minimun 2014	n Year: Maxir	num Year: 2018
Create 1	Input Data for Statis	tical Analysis

### Methodology: CAMS Statistical Analysis



### **CAMS Prediction Model**

What segments have more crashes than expected?

### **CAMS Severity Model**

• What segments have a higher proportion of injury crashes than expected?

Both models create distributions of predicted crashes for each segment



### Methodology: CAMS Statistical Analysis

### **Predicted Distributions**

- Current model uses 4 years to build the model and 1 year to compare against the distribution
- Percentiles are used to rank the segments

$$P(Y_{ij} = y_{ij} | \pi, \lambda_{ij}) = \begin{cases} \pi + (1 - \pi)e^{\lambda_{ij}} & y_{ij} = 0 \\ \frac{e^{\lambda_{ij}}\lambda_{ij}^{y_{ij}}}{y_{ij}!} & y_{ij} = 1, 2, \dots \end{cases} P(Y_{ij} = y_{ij} | \pi_{ij}) = {n_{ij} \choose y_{ij}} \pi_{ij}^{y_{ij}} (1 - \pi_{ij})^{n_{ij} - y_{ij}} & y_{ij} = 0, 1, \dots, n_{ij} \\ \ln(\lambda_{ij}) = \beta_0 + x'_{ij} \beta_k + \eta_{ij} & \log\left(\frac{\pi_{ij}}{1 - \pi_{ij}}\right) = \beta_{0k} + x'_{ij} \beta \end{cases}$$





### Results: CAMS Prediction Model



State Rank	Segment Length (miles/km)	2018 Injury Crashes	Predicted 2018 Injury Crashes	Percentile
1	1.5/2.4	4	0.07	1.0000
2	0.4/0.6	7	0.91	0.9998
3	13.2/21.2	5	0.42	0.9996
4	0.5/0.8	7	0.87	0.9994
5	10.5/16.9	8	1.44	0.9992
6	1.4/2.3	5	0.58	0.9990
7	5.7/9.2	6	0.99	0.9986
8	1.3/2.1	4	0.38	0.9985
9	1.1/1.8	13	3.87	0.9984
10	3.2/5.1	8	1.79	0.9983
11	0.1/0.2	5	0.69	0.9976
12	5.6/9.0	11	3.64	0.9972
13	0.4/0.6	6	0.94	0.9972
14	1.2/1.9	9	2.37	0.9971
15	1.5/2.4	10	3.03	0.9971
16	0.6/1.0	5	0.79	0.9959
17	0.5/0.8	7	1.70	0.9953
18	0.1/0.2	2	0.09	0.9946
19	15.3/24.6	7	1.81	0.9943
20	1.8/2.9	2	0.10	0.9943

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Introduction

The purpose of this report is to summarize and present preliminary results from a safety-specific micro analysis on an identified segment of interest. This report includes identification of the roadway segment and sub-segments, micro-analysis of the crash data, site visit notes, and a list of possible countermeasures.

Segment Identification and Roadway Characteristics							Date:	7/17/2020	
Street Name: 0	aden River Si	cenic Byway							
Table 1: Segment	Metadata								
Route Number:		39			UC Model Use	d:	CAMS-P		
Road Direction:		P		-	State Rank: 1		1		
Beginning, Ending MP	:	42.67-44.13			Region, Rank:		1, 1		
Length (miles):		1.46			County, Rank:		WEBER, 1		
Data Source Years:		2014-2018		-					
Table 2: Segment	Characteristic	CS							
Functional Class:		Major Collector		8	AADT:		510		
Number of Thru Lanes	S:	2			Speed Limit (N	IPH):	45		
Table 3: Roadway	Characteristi	cs	0.00	1999 DI 18	9. yz			104192 mand 60192 33	Rumble
1.10	0	Ma	dian	Shoulder	Grade	Curvo	Ianoc	Wall/ Barrier	Numble
MPS	1	IVIE	ulan	Shoulder	Glade	Curve	Lanes	wany barrier	Strips
42.67 - 4	4.13	No	one	Paved - 3ft	Steep	4 sharp curves	2	None	Strips No
42.67 - 4	4.13	No	one	Paved - 3ft	Steep	4 sharp curves	2:	None	Strips No
42.67 - 4 Micro-Analysis c	4.13 of Crash Data	No	one	Paved - 3ft	Steep	4 sharp curves	2:	None	Strips No
42.67 - 4 Micro-Analysis o Crash Data Summ	4.13 Of Crash Data Dary	No	one	Paved - 3ft	Steep	4 sharp curves	2	None	Strips No
42.67 - 4 Micro-Analysis o Crash Data Summ Table 4: Crash Co	of Crash Data Data Dary unt and Sever	No No	one	Paved - 3ft	Steep	4 sharp curves	2	None	Strips No
42.67 - 4 Micro-Analysis o Crash Data Summ Table 4: Crash Co	of Crash Data bary unt and Sever	ity	Crashes D	Paved - 3ft	Steep	4 sharp curves Total Cras	2 hes Between	None 2014-2018	Strips No
MPS 42.67 - 4 Micro-Analysis o Crash Data Summ Table 4: Crash Co Crash Severities	, 44.13 Dof Crash Data hary unt and Sever Functional A	ity Area Method	Crashes D Predicted	Paved - 3ft	Steep Steep	4 sharp curves Total Cras Sev. 4	2 hes Between Sev. 3	None 2014-2018 Sev. 2	Strips No Sev. 1
Micro-Analysis of Crash Data Summ Table 4: Crash Co Crash Severities 345	, and Crash Data and Sever Functional A by speed fr	ity Area Method om stop bar	Crashes D Predicted 0.0716	Paved - 3ft Paved - 3ft uring 2018 Actual 4	Steep Steep Sev. 5 0	4 sharp curves Total Cras Sev. 4 3	2 hes Between Sev. 3 1	None 2014-2018 Sev. 2 0	Strips No Sev. 1 2
42.67 - 4 Micro-Analysis of Crash Data Summ Table 4: Crash Co Crash Severities 345 Table 5: Top 7 Cra	, of Crash Data hary unt and Sever Functional A by speed fr ash Factors	ity om stop bar	Crashes D Predicted 0.0716	Paved - 3ft uring 2018 Actual 4	Steep Steep Sev. 5 0	A sharp curves Total Cras Sev. 4 3	2 hes Between Sev. 3 1	None 2014-2018 Sev. 2 0	Strips           No           Sev. 1           2
Alexandress Alexan	, aary unt and Sever Functional A by speed fr ash Factors Latitude	ity Area Method om stop bar	Crashes D Predicted 0.0716 SINGLE VEHICLE	Paved - 3ft Paved - 3ft uring 2018 Actual 4 ROADWAY GEOMETRY RELATED	Steep Steep Sev. 5 0 ROADWAY DEPARTURE	Collision WITH FIXED OBJECT	2 hes Between Sev. 3 1 OVERTURN ROLLOVER	None 2014-2018 Sev. 2 0 NIGHT DARK CONDITION	Strips No Sev. 1 2 IMPROPER RESTRAINT
Mirs 42.67 - 4 Micro-Analysis o Crash Data Summ Table 4: Crash Co Crash Severities 345 Table 5: Top 7 Cra Crash ID Injury Total	, aary unt and Sever Functional A by speed fr ash Factors Latitude	rity Area Method om stop bar	Crashes D Predicted 0.0716 SINGLE VEHICLE 4/4	Paved - 3ft Paved - 3ft uring 2018 Actual 4 ROADWAY GEOMETRY RELATED 4/4	Steep Steep Sev. 5 0 ROADWAY DEPARTURE 4/4	4 sharp curves Total Cras Sev. 4 3 COLLISION WITH FIXED OBJECT 3/4	2 hes Between Sev. 3 1 OVERTURN ROLLOVER 2/4	None 2014-2018 Sev. 2 0 NIGHT DARK CONDITION 1/4	Strips No Sev. 1 2 IMPROPER RESTRAINT 1/4

#### Manner 7 Manner 1 Manner 2 Manner 3 Manner 4 Manner 5 Manner 6 Manner 8 Manner 9 Sideswipe Sideswipe Parked Rear to Side Rear to Rear Name **Single Vehicle** Front to Rear Head On Angle Same Opposite Vehicle Direction Direction Injury Total 4/4 0/4 0/4 0/4 0/4 0/4 0/4 0/4 0/4 Segment Total 6/6 0/6 0/6 0/6 0/6 0/6 0/6 0/6 0/6

#### Historical Perspective, Current Conditions, Site Visit Notes

This segment has not experienced significant changes since the beginning of the analysis period (2014).

This segment is a portion of SR 39 in Weber County. It is a two lane undivided highway. There is one northbound lane and one southbound lane. There are no rumble strips. The paved shoulder on both sides of the road is 3 ft. There are horizontal and vertical curves on this segment, one of which can be seen in Figure 1. There are no barriers on the curves.



Figure 1: A curve on this segment of the Ogden River Scenic Byway (SR 39) without delineation or barriers (Google).



Figure 2: GIS map showing the location of the segment (ESRI).

#### Possible Countermeasures

The following is a list of possible countermeasures related to the top 8 crash factors listed in Table 5. The countermeasures listed were compiled from the NCHRP 500 Report volumes and Countermeasures That Work (CTW). (P) = Proven (T) = Tried (E) = Experimental (NA) = Data not available (X\*) = Star rating, as designated by CTW. (If countermeasures were listed in both the NCHRP 500 Report and CTW, it is listed with both ratings. For instance, Proven and 4-star rating = (P,4\*).)

#### Engineering Countermeasures

Change or mitigate the effects of identified elements in the environment (E) Delineate roadside objects (E) Provide adequate sight distance (T) Provide advance warning of unexpected changes in horizontal alignments (T) Remove/relocate objects in hazardous locations (P) Widen the roadway (P)

Design safer slopes and ditches to prevent rollovers (P)

#### Policy Countermeasures

Encourage trucking companies and other fleet operators to implement fatigue management programs (T)

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Report **CAMS** Results:



Manner of Collision	Total Segment Crashes	Percent of Total Segment Crashes	Crashes in the Top 20 Segments	Percent of Crashes in the Top 20 Segments	Difference in Percent
Single Vehicle	49,049	37.6%	680	37.4%	-0.2%
Front to Rear	46,301	35.5%	673	37.0%	1.5%
Sideswipe Same Direction	15,346	11.8%	191	10.5%	-1.3%
Angle	14,547	11.1%	211	11.6%	0.5%
Parked Vehicle	2,161	1.7%	15	0.8%	-0.8%
Head On	1,587	1.2%	25	1.4%	0.2%
Sideswipe Opposite Direction	1,291	1.0%	23	1.3%	0.3%
Rear to Side	148	0.1%	0	0.0%	-0.1%
Rear to Rear	64	0.0%	0	0.0%	0.0%
Total	130,494		1,818		

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Cancel

Combine Crash Data

## Methodology: ISAM Data Integration

### **Preliminary Data Preparation:**

- Import, format, and combine raw roadway and crash data
- Process transferred from Roadway and Crash Data Preparation tool to RGUI tool
- Creates the following datasets:
  - Combined intersection roadway data
  - Combined crash data

Safety Statistical Analysis: UICPM Input (R GUI)	×
Select Road Intersection and Crash Data Files:	
Create Input Datasets	
Road Intersection Data	
Crash Data	



## Methodology: ISAM Data Integration



Safety Statistical Analysis: UICPM Input (R	GUI) ×
Select Road Intersection and Cras	h Data Files:
Create Input	Datasets
Road Intersection Data	
Crash Data	
Select Crash Severities to Summar	ize:
Severity 5 (fatal injury crash)	1
Severity 4 (incapacitating injury crash)	Select All
Severity 3 (injury crash)	
Severity 2 (possible injury)	Select None
Severity 1 (property damage only)	Selectivone
Select the Desired Intersection Fu	nctional Area:
C Recommended Functional Area Def	îne by:
	Speed Limit
User-Defined	Fixed Length
Select the Road Segment, Crash Dat	ta, and Severities before continuing

### **Model Input File Creation**

- User selects:
  - Roadway and crash files
  - Crash severities
  - Intersection functional area
- Functional area can be defined by:
  - Speed limit (default) based on Access Management Manual, 2<sup>nd</sup> Ed.
  - Fixed length (e.g., 250 ft based on the *Highway Safety Manual*)

## Methodology: ISAM Statistical Analysis

Input File	lodel/UICP	Minput_Sev	345_SL_11-16-2017_9-30-57_AM.csv
R Code for Analysis		/elopment/Ir	ntersectionModel/UICPM_5AIVd_UC.R
Iterations:	10000	(1	00,000 for full, 10,000 for test)
Burn-In Iterations:	1000	(5	% to 10% of iterations)
Manual Variable Select	ethod ion	It is r variab Enter Lanes	ecommended that the following les be used for a basic analysis: ing Vehicles and Number of s.
Manual Variable Select	ion	It is r variab Enter Lanes	ecommended that the following les be used for a basic analysis: ing Vehicles and Number of 30-MIN_SPEED_LIMIT
Manual Variable Selection     4-ELEVATION     5-SIGNALIZED     7-INT_CONTROL     18-MAX FC_CODE     19-MIN FC_CODE     20-MAX FC_TYPE	ion	It is rivariab Enter Lanes	ecommended that the following les be used for a basic analysis: ing Vehicles and Number of 3. 30-MIN_SPEED_LIMIT 29-MAX_SPEED_LIMIT 26-MIN_NUM_LANES 23-ENT_VEH 22-PERCENT_TRUCKS

## Model Execution & Variable Selection

- Select the UICPM input and R model files
- Select the number of iterations
- Select the variables to use in the model

BYU

## Methodology: ISAM Statistical Analysis

### Utah Intersection Crash Prediction Model (UICPM)

- A Bayesian generalized linear model
- Produces a distribution of the number of annual crashes that are expected at each intersection
- Distributions are based on intersection type (categorical variable) and intersection characteristics (explanatory variables)





### Two models:

- Utah Intersection Crash Prediction Model (UICPM):
  - Similar to CAMS Prediction model
- Utah Intersection Crash Severity Model (UICSM):
  - Similar to CAMS Severity model







## Methodology: ISAM Statistical Analysis RSS 2022

#### **Expected Crash Count vs. Actual Crash Count**

## Results: ISAM Prediction Model



State Dank	Interspection Type	Traffic Control	2018 Injury	Predicted 2018	Donoontilo
Siale Rank	Intersection Type	Device	Crashes	Injury Crashes	Percentile
1	State Route & Federal Aid	Stop Sign	4	0.22	0.9997
2	State Route & Local Road	Signal	8	1.34	0.9993
3	State Route & State Route	Signal	8	1.72	0.9986
4	State Route & Federal Aid	Signal	5	0.55	0.9985
5	State Route & Federal Aid	Stop Sign	9	2.08	0.9984
6	State Route & State Route	Stop Sign	2	0.07	0.9971
7	State Route & Federal Aid	Signal	5	0.74	0.9967
8	State Route & Federal Aid	Stop Sign	3	0.20	0.9965
9	State Route & State Route	Signal	9	2.58	0.9953
10	State Route & Federal Aid	Signal	6	1.26	0.9944
11	State Route & Federal Aid	Stop Sign	2	0.09	0.9938
12	State Route & Federal Aid	Signal	5	0.87	0.9935
13	State Route & Local Road	Signal	3	0.27	0.9924
14	State Route & Local Road	Signal	4	0.73	0.9869
15	State Route & Federal Aid	Signal	13	5.88	0.9861
16	State Route & Federal Aid	Signal	5	1.21	0.9851
17	State Route & Federal Aid	Signal	5	1.22	0.9845
18	State Route & Federal Aid	Stop Sign	2	0.16	0.9815
19	State Route & Federal Aid	Signal	13	6.27	0.9788
20	State Route & State Route	Signal	3	0.49	0.9785

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## Results: ISAM Report



## Intersection Safety Analysis Reports (ISAR)

- Tables 1 and 2 describe the roadway and intersection characteristics
- Tables 3 and 4 describe the crash history
- Table 5 identifies manner of collision
- User identifies:
  - The safety problem
  - Historical & current conditions
  - Site visit notes
  - Potential countermeasures (Engineering and Policy/Enforcement)

Manner 1	Manner 2	Manner 3	Manner 4	Manner 5	Manner 6	Manner 7	Manner 8	Manner
ner of Co	ollision D	ata						
aı		13/4/	10/47	10/4/	0/4/	//4/	0/4/	5/4/
Latitude	Longitude	NIGHT DARK CONDITION	TEENAGE DRIVER INVOLVED	SINGLE VEHICLE	HEADON COLLISION	ROADWAY GEOMETRY RELATED	OLDER DRIVER INVOLVED	DISTRACTED DRIVING
actors								
Spee	ed Limit	22.0	47	1	4	42	87	263
ι	Jsed	Predicted	Actual	Sev. 5	Sev. 4	Sev. 3	Sev. 2	Sev. 1
Functional	Area Method			Nu	Imber of Crash	les		
ount and Se	everity							
al Class:	Local			Max & Min	Speed Limi	it (mph):	45	-
al Class:	Other Princi	ipal Arterial		# of Lanes	on Route O	c	5	1
ontrol:	SIGNAL			Entering V	ehicles in 2	018:	86,000	
rsection	Character	istics					Pos. M	2
Hooper		Latitude &	Longitude	41.089	-112.018		Leg	'
2014-2018	_	Leg 4 Rout	te & MP:	-	-			
DAVIS, 1	-	Leg 3 Rout	te & MP:	Local	-			
1, 1	-	Leg 2 Rout	te & MP:	108	1.57	Leg	3	Leg
1	-	Leg 1 Rout	te & MP:	Local	-			
UICPM	_	Leg O Rout	te & MP:	108	1.57		Leg	·
	rsection UICPM 1 1, 1 DAVIS, 1 2014-2018 Hooper rsection ontrol: al Class: al Class: al Class: al Class: bount and Se Functional C Spece actors Latitude al	rsection Metadata UICPM 1 1 1 1 1 DAVIS, 1 2014-2018 Hooper rsection Character ontrol: SIGNAL al Class: Other Princi al Class: Local ount and Severity Functional Area Method Used Speed Limit actors Latitude Longitude al aner of Collision D Manner 1 Manner 2	rsection Metadata          UICPM       Leg 0 Rour         1       Leg 1 Rour         1, 1       Leg 2 Rour         DAVIS, 1       Leg 3 Rour         2014-2018       Leg 4 Rour         Hooper       Latitude 8         rsection Characteristics         ount and Severity         Functional Area Method         Used       Predicted         Speed Limit       22.0         actors       NIGHT DARK CONDITION         al       13/47	rsection Metadata UICPM Leg 0 Route & MP: 1 Leg 1 Route & MP: 1, 1 Leg 2 Route & MP: DAVIS, 1 Leg 3 Route & MP: 2014-2018 Leg 4 Route & MP: 2014-2018 Leg 4 Route & MP: 2014-2018 Leg 4 Route & MP: Hooper Latitude & Longitude rsection Characteristics outrol: SIGNAL al Class: Other Principal Arterial al Class: Local ount and Severity Functional Area Method Used Predicted Actual Speed Limit 22.0 47 actors Latitude Longitude NIGHT DARK CONDITION TEENAGE DRIVER INVOLVED al 13/47 10/47 Teenage Manner 1 Manner 2 Manner 3 Manner 4	rsection Metadata         UICPM       Leg 0 Route & MP:       108         1       Leg 1 Route & MP:       Local         1, 1       Leg 2 Route & MP:       108         DAVIS, 1       Leg 3 Route & MP:       Local         2014-2018       Leg 4 Route & MP:       -         Hooper       Latitude & Longitude 41.089         rsection Characteristics         potrol:       SIGNAL       Entering V         al Class:       Other Principal Arterial       # of Lanes         al Class:       Local       Max & Min         ount and Severity       Predicted       Actual       Sev.5         Speed Limit       22.0       47       1         actors         Latitude       Longitude       NIGHT DARK CONDITION       TEENAGE DRIVER       SINGLE VEHICLE         al       13/47       10/47       10/47	rsection Metadata          UICPM       Leg 0 Route & MP:       108       1.57         1       Leg 1 Route & MP:       Local       -         1, 1       Leg 2 Route & MP:       108       1.57         DAVIS, 1       Leg 3 Route & MP:       Local       -         2014-2018       Leg 4 Route & MP:       -       -         Hooper       Latitude & Longitude       41.089       -112.018         rsection Characteristics       Entering Vehicles in 20       -         al Class:       Other Principal Arterial       # of Lanes on Route 0         al Class:       Other Principal Arterial       # of Lanes on Route 0         ount and Severity       Functional Area Method       Number of Crash         Used       Predicted       Actual       Sev. 5       Sev. 4         Speed Limit       22.0       47       1       4         actors       Invited       SingLe       HEADON       COLUSION         al 13/47       10/47       10/47       8/47	rsection Metadata UICPM Leg 0 Route & MP: 108 1.57 Leg 1 Route & MP: Local - 1, 1 Leg 2 Route & MP: 108 1.57 DAVIS, 1 Leg 3 Route & MP: Local - 2014-2018 Leg 4 Route & MP: - Hooper Latitude & Longitude 41.089 -112.018  rsection Characteristics rsection Characteristics Cother Principal Arterial # of Lanes on Route 0: Max & Min Speed Limit (mph): Ount and Severity Functional Area Method Used Predicted Actual Sev. 5 Sev. 4 Sev. 3 Speed Limit 22.0 47 1 4 42  actors Latitude Longitude NIGHT DARK CONDITION TEENAGE DRIVER SINGLE HEADON COLLISION ROADWAY GEOMETRY al 13/47 10/47 10/47 8/47 7/47  mer of Collision Data Manner 1 Manner 2 Manner 3 Manner 4 Manner 5 Manner 6 Manner 7	rsection Metadata UICPM Leg 0 Route & MP: 108 1.57 1 Leg 1 Route & MP: 108 1.57 Leg 2 Route & MP: 108 1.57 DAVIS, 1 Leg 3 Route & MP: 108 1.57 Leg 3 Route & MP: 108 1.57 Leg 3 Route & MP: 108 1.57 Leg 3 Leg 4 Route & MP: Latitude & Longitude 41.089 -112.018 rsection Characteristics partrol: SIGNAL al Class: Other Principal Arterial # of Lanes on Route 0: 5 al Class: Local Max & Min Speed Limit (mph): 45 ount and Severity Functional Area Method Used Predicted Actual Sev. 5 Sev. 4 Sev. 3 Sev. 2 Speed Limit 22.0 47 1 4 42 87 actors Latitude Longitude NIGHT DARK CONDITION TEENAGE DRIVER Latitude Longitude NIGHT DARK CONDITION TEENAGE DRIVER NVOLVED VEHICLE COLLISION ROUTED COLLISION ROUTED ROU

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Vehicl

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Direction

0/12

Direction

0/12





- The CAMS provides UDOT with useful tools that identify segments of particular concern
- The ISAM is used to analyze the majority of State Route intersections
- The CAMS and ISAM provide a complementary analysis of the State Route crash data
- UDOT uses these findings to prioritize the use of safety funds
- The two tools used together allow for an in-depth analysis of crashes and help to identify crash hot spots and safety concerns





## Thank You!

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