Special Study Debris and Contributing Materials in Roadway (CMR)

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Introduction

Debris and Contributing Materials in the Roadway will be covered collectively in this document using the acronym Contributing Materials in the Roadway (CMR). Over the past five years (2018-2022) in Alabama there were 3,836 CMR crashes of which 19 were fatal crashes causing 21 deaths. In addition, the total number of injured (including fatalities) was 863 persons.

The purpose of this report is to reduce the number of CMR (which includes roadway debris) crashes as much as possible, and thereby reduce the resulting fatalities and injuries. The following cross-tabulation shows how the number of CMR crashes (henceforth CMRs) have remained fairly constant over the five years of this study. Year 2020 was an exception.

CMR-Involved Crash Severity (C025) by Year (C003) 2018-2022 Cross-tabulation

CARE 10.2.1.3	- [Crosstab Result	s - 2018-2022 Alabar	na Integrated eCra	sh Crash Data - Filt	er = Debris Contrib	uti — 🗆	I X
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2018-2022	Nabama Integrated e	eCrash Crash Data	\sim	Debris Contributing	Materials in Roadway	(C405, CMR) ~	1 🗊 📲
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	2018	2019	2020	2021	2022	TOTAL	
Fatal Injury	3 0.42%	5 0.69%	4 0.45%	4 0.52%	2 0.27%	18 0.47%	
Suspected Serious Injury	37 5.18%	16 2.21%	31 3.48%	25 3.23%	23 3.15%	132 3.44%	
Suspected Minor Injury	74 10.36%	56 7.73%	86 9.64%	63 8.13%	60 8.21%	339 8.84%	-
Possible Injury	39 5.46%	44 6.08%	40 4.48%	47 6.06%	33 4.51%	203 5.29%	-
Property Damage Only	546 76.47%	581 80.25%	709 79.48%	630 81.29%	604 82.63%	3070 80.03%	
Unknown	15 2.10%	22 3.04%	22 2.47%	6 0.77%	9 1.23%	74 1.93%	
TOTAL	714 18.61%	724 18.87%	892 23.25%	775 20.20%	731 19.06%	3836 100.00%	

Generally, the year 2020 could be discounted in many such presentations in that it was the year that COVID caused irregular changes in the crash data. For general studies of the effects of COVID on crashes in 2020 and 2021, please see <u>http://www.safehomealabama.gov/caps-special-studies/</u> under the topic of COVID-19/Coronavirus. Generally, because of reduced traffic, the number and proportion of crashes in 2020 is lower for most crash causes. However, the above shows it to be the high year. Further analysis showed that this increase was due to Trees/Limbs; there were 561 as compared with the other four year average of 325. This would indicate that the weather was the cause of this spike (see C032 Weather in the IMPACT analyses below).

This report will begin with a filter definition section intended to demonstrate the exact nature of HMRs as given by the CARE variables for this subset. This is followed by an Executive Summary that will give a very short summary of the findings of each of the IMPACT analyses that are given in detail in Section 2. This is followed by recommendations, to drivers. The IMPACT studies in Section 2 compare the CMRs against the non-CMRs for all relevant attributes.

Variable number nomenclature: for the attribute comparisons in Section 2, the numbering of the variables (aka attributes) will be indicated by C followed by the variable number in CARE (e.g., C015 for Primary Contributing Circumstances).

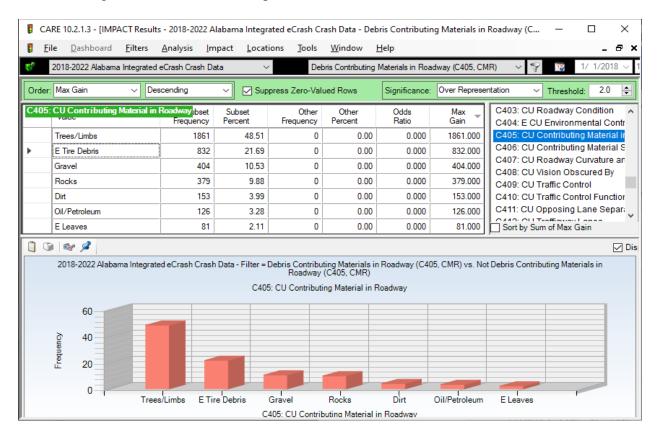
1.0 Filter Definition, Executive Summary, Recommendations to Drivers

1.1 Filter Definition: CMR Involved Crashes (CMRs)

The following is an image of the filter for all CMRs over the years 2018-2022 five-year period.

Filter Logic: Debris Contributing Materials in	n Roadway (C405, CMR)	_		\times
Logic Tree Logic Text				
⊡. One or more of the following are true (OR)				
2018-2022 Alabama Integrated eCrash Cras	h Data: CU Contributing Material in	Roadway is equal to	o Rocks	
	h Data: CU Contributing Material in	Roadway is equal to	o Trees/Lin	nbs
2018-2022 Alabama Integrated eCrash Cras	h Data: CU Contributing Material in	Roadway is equal to	o E Leaves	
	h Data: CU Contributing Material in	Roadway is equal to	o Dirt	
	h Data: CU Contributing Material in	Roadway is equal to	o Gravel	
	h Data: CU Contributing Material in	Roadway is equal to	o E Tire De	bris
2018-2022 Alabama Integrated eCrash Cras	h Data: CU Contributing Material in	Roadway is equal to	o Oil/Petrol	eum
Jr				
3836 records selected by this filter.				:

The following shows their relative frequencies to each other.



1.2 Executive Summary and Abstract of Findings

The following is a brief abstract of findings of each of the CARE IMPACT analyses according to the attribute numbering indicated above, along with the report Section 2 numbers that appear below. For the complete IMPACT report on any of them, see the corresponding Section 2 references.

2.1 C001 County. Over-represented counties typically have the largest proportions of County and Interstate crashes.

2.2 C002 City. As with the over-represented counties, those cities that have heavy Interstate traffic rose to the top (see C011). County roads did not play as large a role since there are relatively few county roads in most cities.

2.3 C004 Month. Months correlate heavily with the number or rural crashes in that time period. April through August and October are generally those that have the highest rural travel (see C010 and C011).

2.4 Cross-tabulation C010 Rural or Urban by C011 Highway Classification. The highway classifications that have the highest over-representations in rural areas are County and Interstate followed by State and Federal).

2.5 C006 Day of the Week. Saturday, Sunday and Thursday are significantly over-represented. Tuesday and Friday are significantly under-represented.

2.6 C008 Time of Day. The night-time (after dark) hours were consistently over-represented from 7:00 PM through 6:59 AM indicating that there is a problem of drivers not being able to see the CMR materials after dark.

2.7 C010 Rural/Urban. Nearly 65% (64.39) of CMRs occur in Rural areas, which is a proportion of 2.728 times more than expected compared the control subset of non-CMR crashes. This has reflected itself in several of that attributes discussed above.

2.8 C011 Highway Classification. County and Interstate both have over twice their expected CMR crashes as compared to their non-CMR controls. This is expected from the results presented in several of the attributes above.

2.9 C015 Primary Contributing Circumstances (PCCs). The following PCCs (with frequencies) are very significantly over-represented: Unseen Object/Person/Vehicle (1,927, over 50%), Swerved to Avoid Object (218), and the combined, Driving Too Fast for Conditions and Over Speed Limit (235+78=313).

2.10 First Harmful Event. Direct hits of CMR materials are rarely of high severity. The only First Harmful Event item that may involve CMR direct hits is "Collision with Other Non-Fixed

Object", which had 1,159 occurrences (31.84% and 3 fatal crashes). But it was second to Collision with Tree, which had 1,213 occurrences (33.32% and 8 fatal crashes). Most of the harmful events occur mainly in avoiding CMR items. This output lists the wide variety of crash types that commonly result from CMR secondary collisions.

2.11 C023 Manner of Crash. Close to 80% (79.64%) of CMR crashes involve only a single vehicle. Most of the other items in this list show the results when a second vehicle is involved. Seventeen out of the 18 fatal crashes involved only a single vehicle.

2.12 C031 Lighting Conditions. Highly correlated with time of day, all dark conditions were over-represented except E Dark - Spot Illumination One Side of Roadway (117), Dark - Continuous Lighting One Side of Roadway (4), Dark - Continuous Lighting Both Sides of Roadway (28). and Dark - Spot Illumination Both Sides of Roadway (107). This demonstrates that there are some roadway lighting conditions that can reduce CMR crashes.

2.13 C025 Crash [Injury] Severity. The only over-represented crash injury severity category was Suspected Serious Injury, which had 132 occurrences. Property Damage Only was also over-represented with 80.03% of the CMR crashes.

2.14 C032 Weather. Weather contributes to CMR crashes in two ways: (1) it is often the creation of the foreign materials that end up on the roadway, and (2) it limits the visibility to be able to effectively react to these materials. Rain is the highest frequency characteristic because of the frequency of its occurrence. Severe winds have less than one tenth of the frequency of rain, but their over-representation (Odds Ratio = 112.710) is enormous, indicating that severe winds either bring down tree limbs or blow foreign materials into the roadway. Fog is also significantly over-represented indicating problems with the further limitation in visibility. No doubt fog at night would be the worst visibility situation, and driving in these conditions should be avoided if at all possible.

2.15 C033 Locale. Corresponding to the Rural/Urban findings given above, almost three quarters (73.15%) of CMR crashes occur in open country. While this is generally classified as rural, there are some Open Country areas in many urban areas as well. The speed problem in rural and open country situations is compounded with that of the presence of trees, many of which are at an age where they have dead wood or weak limbs that can break off onto the roadway.

2.16 C052 Number of Vehicles. About 85% (84.36) of CMR crashes are single vehicle. We would suspect that multiple-vehicle crashes would cause more severe injuries. However, the cross-tabulation of Crash Severity by Number of Vehicles indicates that 17 out of 18 of the fatal crashes involved only a single vehicle.

2.16a Cross-tabulation of C025 Crash Severity by C052 Number of Vehicles

2.17 C110 Distance from Residence. Greater than 25 Miles is over-represented by about 55.1% more than expected (Odds Ratio = 1.551). This is probably caused by the unfamiliarity with distant roadways, and the fact that they are often traveled at night.

2.18 C121 CU Driver Condition. The major finding here is that alcohol/drugs were significantly under-represented and thus did not contribute to the frequency or severity of CMR crashes.

2.19 C224 CU Estimated Speed at Impact. Impact speeds are generally higher for CMRs than for other crashes. This is largely because of their rural nature, and quite often drivers (especially at night) are taken by surprise by the materials in the roadway.

2.20 C403 Roadway Condition. Wet conditions are present in 41.21% of CMR crashes, but only in 17.05% of the non-CMRs. The two reasons for this is that wet weather is highly correlated with tree limbs and the limited visibility that goes with bad weather.

2.21 C406 Contributing Materials Source. The source of the CMR materials are primarily (69.94%) the natural environment. A smaller, but significant number (28.10%) fall from other vehicles, and even fewer are from those things expected in some neighborhoods and business environments. All three of these are very-highly significantly over-represented because the comparison subset was defined as non-CMR crashes.

2.22 C407 Roadway Curvature and Grade. Generally, it seems from this attribute that grades play a larger part in contributing to CMR crashes than do curves. This could be in requiring greater braking on down-slopes when a CMR situation is encountered. Also, many drivers increase their speeds to adapt to upgrades, which could also create similar problems.

2.23 C412 Trafficway Lanes. Two-lane roads have a significantly higher proportion of CMR crashes than any other lane conditions, probably because of the limited ability to avoid CMR materials without causing greater potential danger. It is possible that some CMRs do not get reported as such because other conditions are considered to be more significant to the reporting officers.

1.3 Recommendations to Drivers

Based upon the findings of this study the following recommendations are offered to all driver to help reduce that frequency and severity of CMR crashes:

- The failure to see CMR materials arises when drivers are not expecting to see these obstacles in the roadway.
 - Recommendation: expect these possibilities all the time while driving.
 - This problem is compounded at night when visibility depends almost completed on the vehicle's headlights. Use high beams in all cases when they will not create a problem for approaching vehicles. Recognize that your bright lights could prevent the oncoming driver from seeing a CMR obstacle in the roadway.

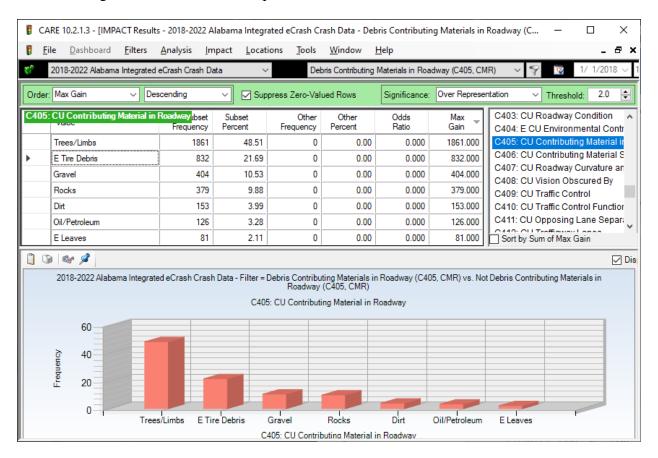
- Weather is a second compounding factor in restricting visibility. Rain, mist or fog can make seeing a CMR object impossible. Exercise your option to pull over and wait-out the bad weather if at all possible. Some of the most severe weather is relatively short-lived, so not much is lost in such a delay.
- Be aware of additional wind problems that accompany bad weather. It is relatively common for tree limbs to come down on the roadway especially in situations where windy weather had not been experienced for some time.
- Anticipate CMR before actually seeing it. High winds and rain in rural areas should put drivers on special alert that CMR obstacles may be in the offing.
- The hazard of all of the factors above can be mitigated by taking the foot off the gas and turning the cruise control off. A few additional seconds to react to danger can save lives.
- Think through exactly how you will respond to various CMR hazards. Consider the pros and cons of the reaction responses that follow:
 - Brake sharply. Sometimes there are no other alternatives, but recognize and condition your response recognizing that often sharp braking only complicates the situation, especially if you lose control of the vehicle. Do not think that you are the exception that can handle it. If at all possible, take advantage of a local driver performance course that has exercises in wet asphalt conditions.
 - Pump your brakes to get down to a more survivable speed without losing control of your vehicle. Not only can this increase your chances of survival in a crash, but the slower speed vehicle will be easier to control. DO NOT DO THIS if the vehicle manual warns against it. Some newer models have non-skid brake features. In these cases sharp braking is recommended as opposed to pumping the brakes.
 - If braking is out of the question, then choose the safest way out of the situation, recognizing:
 - The worst case is generally to swerve left into the lane of oncoming traffic.
 - Look to the right and compare the obstacles on the shoulder of roadside against those in the roadway.
 - If there is no good alternative, then hit the obstacle in the best way to reduce the harm. If there is no safe alternative to avoiding the obstacle, hard braking may be an alternative since retaining control at this point may be of little value.
- Follow speed limits, but do not allow the speed limit to govern your speed in the possible presence of CMRs. Slow down at their first indication, and be ready to stop if necessary.

1.4 Filter Definition: CMR Involved Crashes (CMRs)

The following is an image of the filter for all CMRs involved in crashes over 2018-2022.

Filter Logic: Debris Contributing Materials in Roadway (C405, CMR)	_		×
Logic Tree Logic Text			
One or more of the following are true (OR)			
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2018-2022 Alabama Integrated eCrash Crash Data: CU Contributing Material in Roadway is eq	jual to G	aravel	
2018-2022 Alabama Integrated eCrash Crash Data: CU Contributing Material in Roadway is eq	ual to E	Tire Deb	ris
2018-2022 Alabama Integrated eCrash Crash Data: CU Contributing Material in Roadway is eq	ual to C)il/Petroleu	um
3836 records selected by this filter.			:

The following shows their relative frequencies to each other.



2.0 CMR-Involved Crash (CMR) IMPACT Analyses

This section contains several IMPACT comparisons of CMR crashes compared to non-CMR crashes of all types.

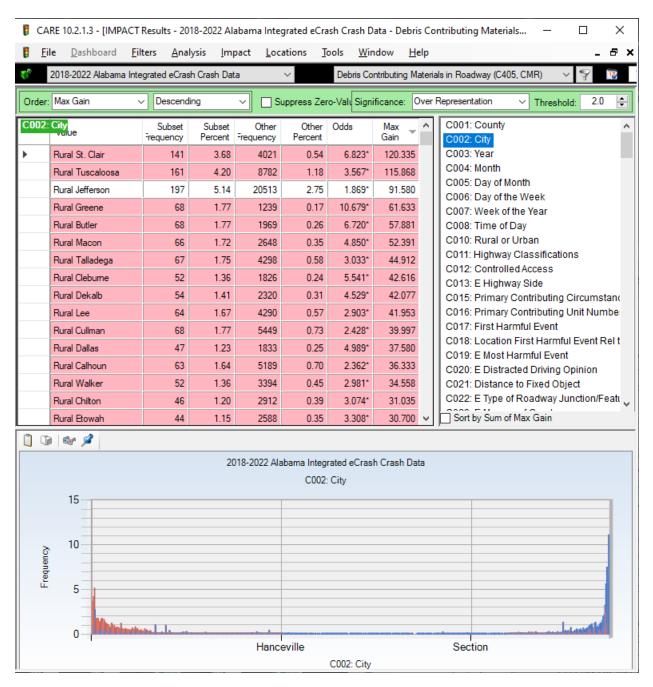
For an explanation of the IMPACT output displays, please see the discussion entitled "General Discussion of IMPACT Output Terms ..." at the end of the introduction of the following Special Study:

http://www.safehomealabama.gov/wp-content/uploads/2023/03/Rural-Urban-IMPACT-Study-v07.pdf

File Dashboard Filters Analysis Impact Locations Tools Window Help - File 2018-2022 Alabama Integrated eCrash Crash Data Debris Contributing Materials in Roadway (C405, CMR) Image: Control of the	R (4		Posulta 201	10 2022 41-	hama Into	wated offer	wh Crach D	ata Dobri	- 6-	ntributing Materials — 🔲 X
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2018-2022 Alabama Integrated eCrash Data			83	2.16	11494	1.54	1.405*	23.933	Υ.	Sort by Sum of Max Gain
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C001: County				20	18-2022 Ala	-		h Crash Da	ta	
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C001: County						C	001: County			2

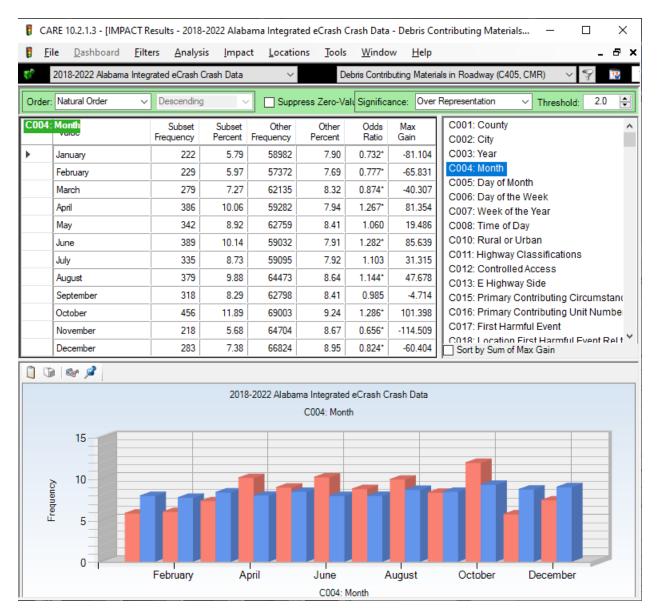
2.1 C001 County; CMR vs Non-CMR All Counties with Max Gains > 25.000

The above are all counties that had a Max Gains greater than 25. Counties with a high mileage of County and Intestate roadways are the ones that rise to the top of this list. See C011.



2.2 C002 City; CMR vs Non-CMR All Cities with Max Gains > 30.000

The above are all cities that had a Max Gain of 30 or more. As with the over-represented counties, those cities that have heavy Interstate traffic rose to the top (see C011).

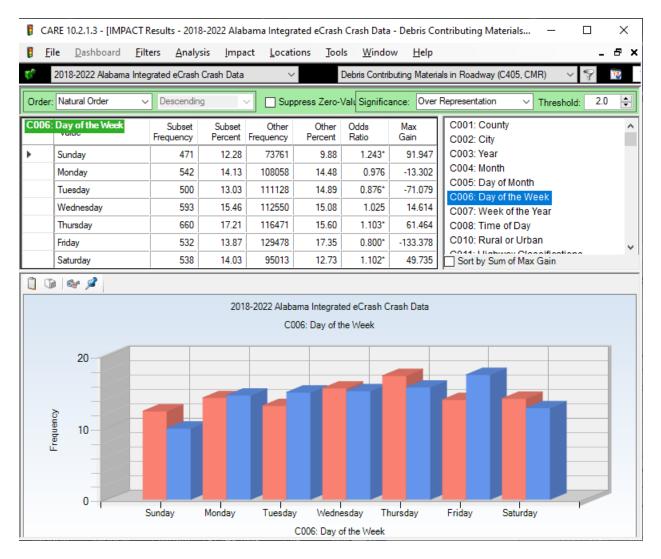


2.3 C004 Month; CMR vs Non-CMR

The over-represented months, April through August and October are generally those that have the highest rural travel (see C010). The cross-tabulation on the next page indicates those Highway Classifications that are over-represented in Rural crashes (See C010 and C011).

CARE 10.2.1.3	- [Crosstab Results	- 2018-2022 Alabar	ma Integrated eCra	sh Crash Data - Filter = Debris Contributing 🗕 🛛 🗙
🚦 <u>F</u> ile <u>D</u> ashb	ooard <u>F</u> ilters <u>/</u>	<u>A</u> nalysis <u>C</u> rosstal	b <u>L</u> ocations <u>T</u>	[ools <u>W</u> indow <u>H</u> elp _ ₽ ×
2018-2022 /	Alabama Integrated e	Crash Crash Data	~	Debris Contributing Materials in Roadway (C405, CMR) 🛛 🗸 🏆
Suppress Zero Va	lues: Rows and Col	umns 🗸 Select	Cells: 🔳 🔻 🛞	Second Se
	Rural	Urban	TOTAL	
Interstate	777	176	953	
Federal	217	90	307	
State	428	210	638	
County	1034	230	1264	
Municipal	14	657	671	
Private Property	0	3	3	
TOTAL	2470	1366	3836	
				1

2.4 Cross-tabulation C010 Rural or Urban by C011 Highway Classification



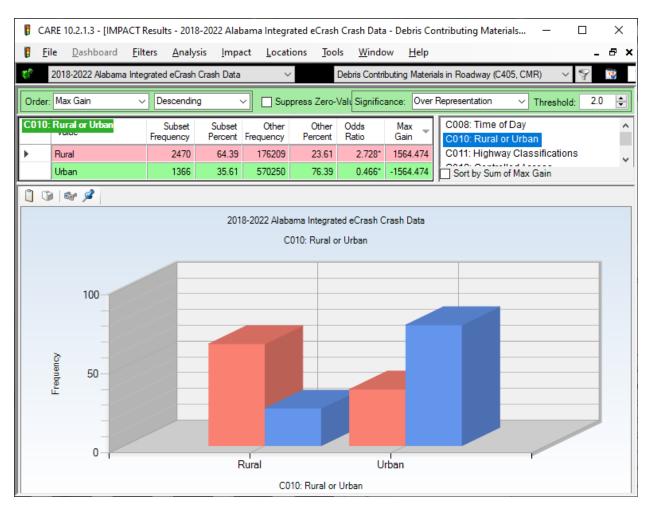
2.5 C006 Day of the Week; CMR vs Non-CMR

Saturday, Sunday and Thursday are significantly over-represented. Tuesday and Friday are significantly under-represented.

6	2018-2022 Alabama Inte	grated eCras	h Crash Dat	a	\sim	Debris Co	ntributing N	Materi	ials	s in Roadway (C405, CMR) 🛛 🗸 💡
Order:	Natural Order 🗸 🗸	Descend	ng	∼ ⊡s	uppress Zer	o-Valı Sign	ificance:	Over	r R	lepresentation V Threshold: 2.0
C008:	Time of Day	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds	Max Gain	^		C001: County A C002: City
•	12:00 Midnight to 12	130	3.39	9455	1.27	2.676*	81.411	1		C003: Year
	1:00 AM to 1:59 AM	127	3.31	7785	1.04	3.174*	86.993	3		C004: Month
	2:00 AM to 2:59 AM	87	2.27	7039	0.94	2.405*	50.827	7		C005: Day of Month C006: Day of the Week
	3:00 AM to 3:59 AM	160	4.17	6108	0.82	5.097*	128.611	1		C007: Week of the Year
	4:00 AM to 4:59 AM	165	4.30	6977	0.93	4.602*	129.146	6		C008: Time of Day
	5:00 AM to 5:59 AM	217	5.66	12648	1.69	3.339*	152.003	3		C010: Rural or Urban
	6:00 AM to 6:59 AM	135	3.52	20572	2.76	1.277*	29.282	2		C011: Highway Classifications
	7:00 AM to 7:59 AM	126	3.28	42712	5.72	0.574*	-93.494	4		C012: Controlled Access C013: E Highway Side
	8:00 AM to 8:59 AM	97	2.53	31533	4.22	0.599*	-65.046	6		C013: E Highway Side C015: Primary Contributing Circumstanc
	9:00 AM to 9:59 AM	101	2.63	28394	3.80	0.692*	-44.915	5		C016: Primary Contributing Unit Numbe
	10:00 AM to 10:59 AM	86	2.24	32607	4.37	0.513*	-81.565	5		C017: First Harmful Event
	11:00 AM to 11:59 AM	121	3.15	40415	5.41	0.583*	-86.690)		C018: Location First Harmful Event Rel t
	12:00 Noon to 12:59	125	3.26	49168	6.59	0.495*	-127.671	1		C019: E Most Harmful Event C020: E Distracted Driving Opinion
	1:00 PM to 1:59 PM	180	4.69	48635	6.52	0.720*	-69.932	2		C020: E Distracted Driving Opinion C021: Distance to Fixed Object
	2:00 PM to 2:59 PM	152	3.96	53244	7.13	0.556*	-121.617	7		C022: E Type of Roadway Junction/Featu
	3:00 PM to 3:59 PM	178	4.64	65372	8,76	0.530*	-157,942	2		C023: E Manner of Crash
	4:00 PM to 4:59 PM	191	4.98	63615	8.52	0.584*	-135.913	3		C024: School Bus Related
	5:00 PM to 5:59 PM	216	5.63	67170	9.00	0.626*	-129,182	2		C025: Crash Severity C026: Intersection Related
	6:00 PM to 6:59 PM	207	5.40	44561	5.97	0.904	-21.996	5		C027: At Intersection
	7:00 PM to 7:59 PM	233	6.07	31256	4.19	1.451*	72.378	3		C028: Mileposted Route
	8:00 PM to 8:59 PM	225	5.87	25914	3.47	1.690*	91.830	2		C029: National Highway System
	9:00 PM to 9:59 PM	250	6.52	20994	2.81	2.317*	142.113			C030: Functional Class
	10:00 PM to 10:59 PM	199	5.19	16442	2.20	2.355*	114.500			C031: Lighting Conditions C032: Weather
	11:00 PM to 11:59 PM	124	3.23	12360	1.66	1.952*	60.483	-		Sort by Sum of Max Gain
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			20)18-2022 Ala	abama Integ	rated eCras	h Crash D	ata		
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		4:00 AM t	o 4:59 AM	9:00 AM	to 9:59 AM		M to 2:59 F	РМ		7:00 PM to 7:59 PM Unknown
					C005	R: Time of D	av			

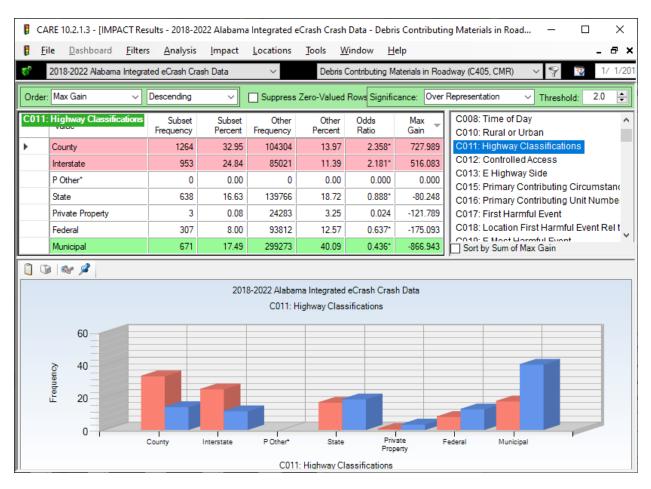
2.6 C008 Time of Day; CMR vs Non-CMR

The night-time (after dark) hours were consistently over-represented from 7:00 PM through 6:59 AM. This is probably a problem of not being able to see the CMR materials in the dark. See the over-representation of Unseen Object/Person in C015.



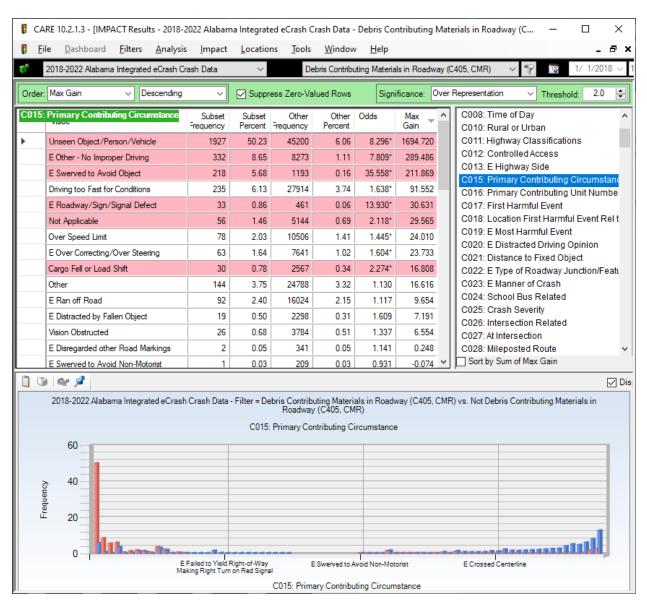
2.7 C010 Rural/Urban; CMR vs Non-CMR Crashes

Nearly 65% (64.39) of CMRs occur in Rural areas, which is a proportion of 2.728 times more than expected from the control subset of non-CMR crashes.



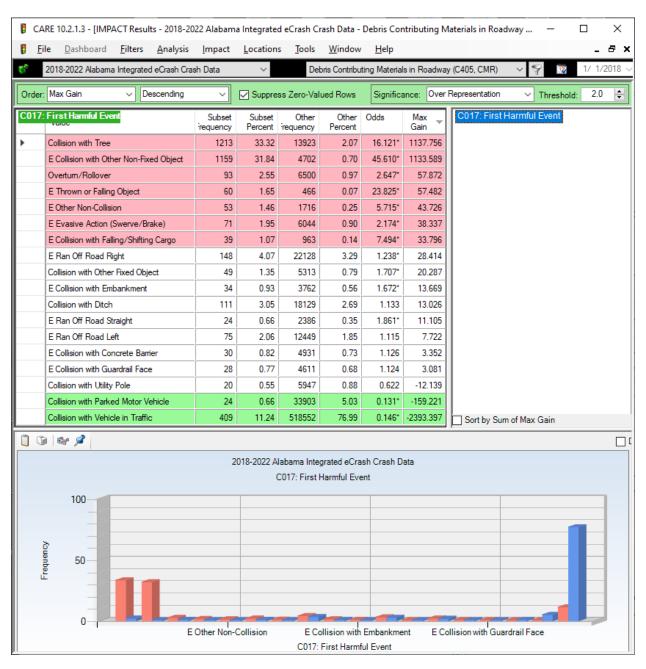
2.8 C011 Highway Classification; CMR vs Non-CMR Crashes

County and Interstate both have over twice their expected CMR crashes as compared to the non-CMR control.



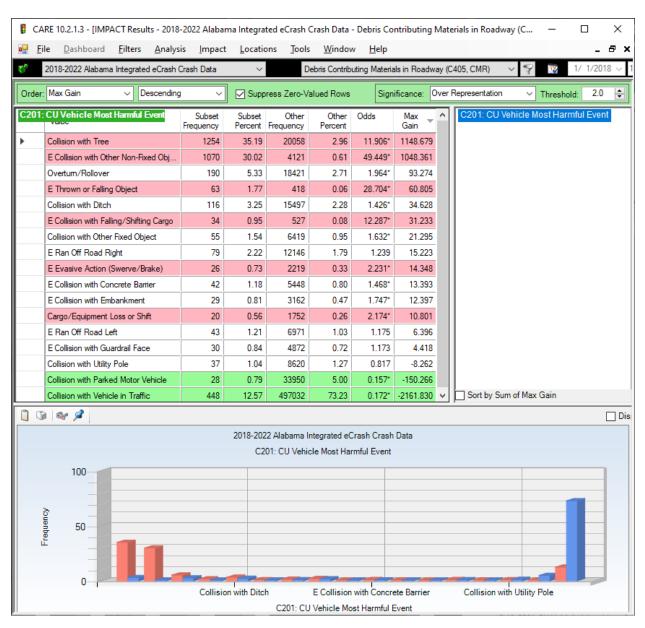
2.9 C015 Primary Contributing Circumstances (PCCs); Odds Ratio > 1.000

Over 50% (1927) of the CMR cases were Unseen Object/Person/Vehicle, which in this case are most likely to be CMR objects. This accounts for the large over-representations in the night-time hours. Other items with high frequencies are Swerved to Avoid Object (218) and Driving Too Fast for Conditions (235).



2.10 C017 First Harmful Event (Items with At Least 20 occurrences)

This display illustrates that collisions with the debris or other contributing materials are rarely harmful. The only item that may involve a CMR direct hit is "Collision with Other Non-Fixed Object", which had 1,159 occurrences (31.84% and 3 fatal crashes). But it was second to Collision with Tree, which had 1,213 occurrences (33.32% and 8 fatal crashes). Many of the most harmful events occur mainly in avoiding CMR items. There are a wide variety of crash types that result from these secondary collisions.



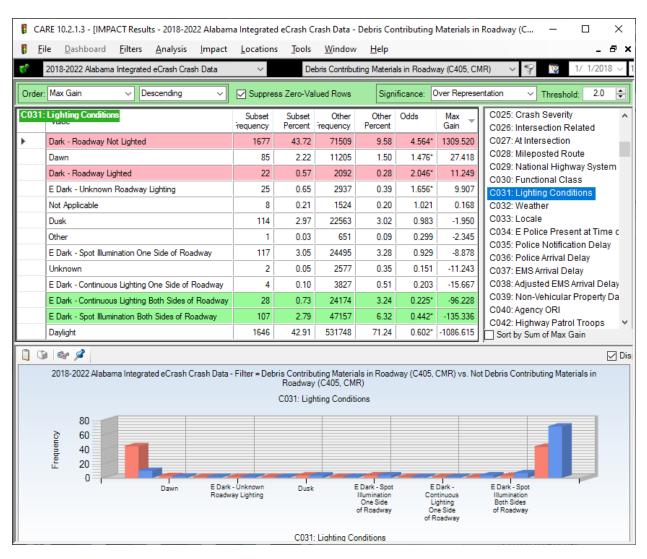
2.11 C201 CU Vehicle Most Harmful Event (Items >= 20)

This correlates very highly with the First Harmful Event.

2.12 C023 Manner of Crash

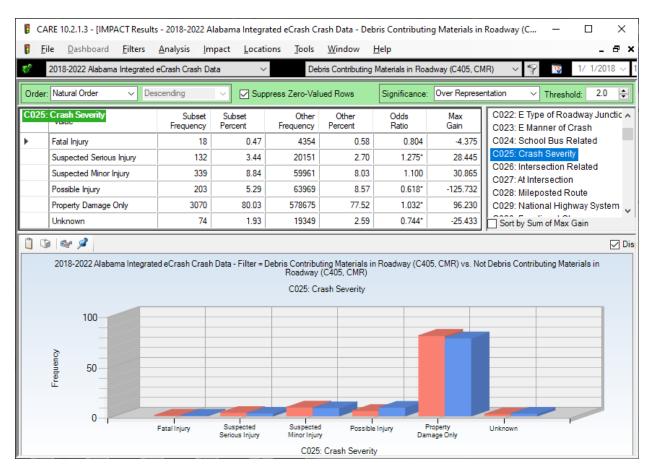
Control Control <t< th=""><th>🖡 CA</th><th>RE 10.2.1.3 - [IMP/</th><th>ACT Resu</th><th>lts - 2018-2</th><th>022 Alabam</th><th>na Integrate</th><th>ed eCrash C</th><th>rash Data -</th><th>Debris Cor</th><th>ntributing N</th><th>1aterials in Roadway — 🗆 🗙</th></t<>	🖡 CA	RE 10.2.1.3 - [IMP/	ACT Resu	lts - 2018-2	022 Alabam	na Integrate	ed eCrash C	rash Data -	Debris Cor	ntributing N	1aterials in Roadway — 🗆 🗙
Order: Max Gain ✓ Descending ✓ Suppress Zero-Valued Rows Significance: Over Pepresentation ✓ Threshold: 2.0 C0233 E Manner of Cresh Subset Frequency Subset Frequency Subset Percent Other Frequency Other	Ei	le <u>D</u> ashboard	<u>F</u> ilters	<u>A</u> nalysis	<u>I</u> mpact	Location	ns <u>T</u> ools	<u>W</u> indow	<u>H</u> elp		_ <i>8</i> ×
CU23: E Manner of Crash Subset Other requency Other Percent Other requency Other Percent Other requency Other Percent Odds Gain C011: Highway Classifications C012: Controlled Access Single Vehicle Crash (altypes) 3055 79.64 144210 19.32 4.122 213.915 Non-Collsion 82 2.14 5269 0.71 3.028 54.923 Other 139 3.62 18832 2.53 1.432' 41.967 Unknown 6 0.16 4738 0.63 0.246 -18.348 Causal Veh Backing: Rear to Rear 2 0.05 14164 0.56 0.033 -19.399 Gausal Veh Backing: Rear to Side 5 0.13 1.202 1.72 0.076 6077 Sideswipe - Opposite Direction 25 0.65 14184 19.0 0.343''' 47.891 Cu23: E Manner of Crash Angle front to side) Opposite Direction 35 0.91 2.3616 3.16 0.288'''''''''''''''''''''''''''''''''''	ŧ?	2018-2022 Alabama	a Integrate	d eCrash Cra	ash Data	~	De	bris Contribu	ting Material	ls in Roadwa	y (C405, CMR) 🗸 💡 🋐 1/ 1/2018 🗸
Value Trequency Percent Trequency Percent Gain COL Coll Controlled Access Single Vehicle Crash (all types) 3055 79.64 144210 19.32 4.122 2313.915 CO12: Controlled Access CO13: E Highway Side Other 133 3.62 18882 2.53 1.432 41.967 Unknown 6 0.16 4738 0.63 0.246 -18.348 CO15: Primary Contributing Unit Numbe C018: Location First Harmful Event Co18: Coatson First Harmful Event CO18: Coatson First Harmful Event CO19: E Distracted Driving Opinion C022: E Uppe of Roadway Junction/Feat Co20: E Distracted Driving Opinion Co22: E Type of Roadway Junction/Feat Co22: Guard Veh Backing: Rear to Side 5 0.13 12802 1.72 0.076 60.799 Angle front to side) Same Direction 17 0.44 21485 2.88 0.154 93.410 Side Impact (angled) 57 1.49 65716 8.80 0.159' - 280.710 Co28: Intersection Co28: Maleposted Route Side I	Order	Max Gain	~ D	escending	~	Suppre	ess Zero-Va	lued Rows	Significa	ance: Over	Representation V Threshold: 2.0
Single Vehicle Crash (all types) 3055 79.64 144210 19.32 4.122 2313.915 Non-Collision 82 2.14 5269 0.71 3.028' 54.923 Other 139 3.62 18882 2.53 1.432' 41.967 Unknown 6 0.16 4738 0.63 0.246 -18.348 Causal Veh Backing: Rear to Rear 2 0.05 4164 0.56 0.093 -19.399 Head-On front to front only 56 1.46 15283 2.18 0.6667 -27.677 Sideswipe - Opposite Direction 25 0.55 14184 1.90 0.343' 47.891 Causal Veh Backing: Rear to Side 5 0.13 12802 1.72 0.076 60.783 Angle front to side) Opposte Direction 35 0.91 23616 3.16 0.288' 48.361 Co22: E Type of Roadway Junction/Feath Co22: Gash Severity Co24: School Bus Related Co25: Crash Severity Co24: School Bus Related 0.913''''''''''''''''''''''''''''''''''''	C023:	E Manner of Cras	h						Odds		
Non-Constant dz 2.14 3.823 0.71 3.322 3.4.323 CO16: Primary Contributing Unit Numbe CO17: First Harmful Event Other 139 3.62 18882 2.53 1.432* 41.967 Unknown 6 0.16 4738 0.63 0.246 -18.348 Causal Veh Backing: Rear to Rear 2 0.05 4164 0.56 0.093 -19.399 Head On front to fort only) 56 1.46 16283 2.18 0.669* -27.677 Sideswipe - Opposte Direction 25 0.65 14184 1.90 0.343* 47.891 C023: E Manner of Crash Angle front to side) Opposte Direction 35 0.91 23616 3.16 0.288* 496.301 Side Impact (angled) 57 1.49 65716 8.80 0.169* -280.710 Side Impact (angled) 57 1.49 65716 8.80 0.169* -280.710 Side Impact (angled) 57 1.49 65716 8.80 0.169* -280.710 Side Impact (angled) 57 1.49 65716 8.80 <td>•</td> <td>Single Vehicle Cras</td> <td>sh (all type</td> <td>s)</td> <td>3055</td> <td>79.64</td> <td>144210</td> <td>19.32</td> <td>4.122*</td> <td>2313.915</td> <td></td>	•	Single Vehicle Cras	sh (all type	s)	3055	79.64	144210	19.32	4.122*	2313.915	
Other 139 3.62 18882 2.53 1.432' 41.967 Unknown 6 0.16 4738 0.63 0.246 -18.348 Causal Veh Backing: Rear to Rear 2 0.05 4164 0.56 0.093 -19.399 Head-On front to front only) 56 1.46 16283 2.18 0.665' 27.677 Sideswipe - Opposite Direction 25 0.65 14184 1.90 0.343' 47.891 Causal Veh Backing: Rear to Side 5 0.13 12802 1.72 0.076 60.799 Angle front to side) Opposite Direction 35 0.91 23616 3.16 0.288' 485.311 Angle front to side) Opposite Direction 17 0.44 21495 2.88 0.154' 93.410 Side Impact (angled) 57 1.49 65716' 8.80 0.169' -280.710 Side Impact (30 degrees) 49 1.28 68667' 9.20 0.139' -303.875 Sideswipe - Same Direction 53 1.38 74028 9.92 0.139' -327.425		Non-Collision			82	2.14	5269	0.71	3.028*	54.923	
Unknown 6 0.16 4738 0.63 0.246 -18.348 C018: Location First Harmful Event Rel t Causal Veh Backing: Rear to Rear 2 0.05 4164 0.56 0.093 -19.399 Head-On front to front only) 56 1.46 16283 2.18 0.669* -27.677 Sideswipe - Opposite Direction 25 0.65 14184 1.90 0.343* -47.891 Causal Veh Backing: Rear to Side 5 0.13 12802 1.72 0.076 -60.789 Angle Oncoming frontal) 14 0.36 18374 2.46 0.148 -80.423 Angle front to side) Opposite Direction 35 0.91 23616 3.16 0.288* -86.361 Side impact (angled) 57 1.49 65716 8.80 0.169* -280.710 Side impact (90 degrees) 49 1.28 68667 9.20 0.139* -303.875 Sideswipe - Same Direction 53 1.38 74028 9.92 0.139* -303.875 Sideswipe - Same Direction 53 1.38 74028 9.92		Other			139	3.62	18882	2.53	1.432*	41.967	· ·
Head-On front to front only) 56 1.46 16283 2.18 0.669* -27.677 Sideswipe - Opposite Direction 25 0.65 14184 1.90 0.343* 47.891 Causal Veh Backing: Rear to Side 5 0.13 12802 1.72 0.076 60.789 Angle front to side) Opposite Direction 35 0.91 23616 3.16 0.288* 486.361 Angle front to side) Same Direction 17 0.44 21485 2.88 0.154 93.410 Side impact (angled) 57 1.49 65716 8.80 0.169* -280.710 Side impact (90 degrees) 49 1.28 68667 9.20 0.139* -303.875 Sideswipe - Same Direction 53 1.38 74028 9.92 0.139* -327.425 Rear End (front to rear) 241 6.28 254041 34.03 0.185* -1064.499 2018-2022 Alabama Integrated eCrash Crash Data - Filter = Debris Contributing Materials in Roadway (C405, CMR) vs. Not Debris Contributing Materials in Roadway (C405, CMR) vs. Not Debris Contributing Materials in Roadway (C405, CMR) vs. Not Debris Contributing Materials in Roadway (C405, CMR)		Unknown			6	0.16	4738	0.63	0.246	-18.348	
Index of front only in the index of the only index of		Causal Veh Backin	ng:Rearto	Rear	2	0.05	4164	0.56	0.093	-19.399	
Sideswipe - Opposite Direction 25 0.65 14184 1.90 0.343 447.81 Causal Veh Backing: Rear to Side 5 0.13 12802 1.72 0.076 -60.783 Angle Oncoming frontal) 14 0.36 18374 2.46 0.148 -80.423 Angle front to side) Opposite Direction 35 0.91 23616 3.16 0.288* -86.361 Angle front to side) Same Direction 17 0.44 21485 2.88 0.154 -93.410 Side Impact (angled) 57 1.49 65716 8.80 0.169* -280.710 Side Impact (90 degrees) 49 1.28 68667 9.20 0.139* -303.875 Sideswipe - Same Direction 53 1.38 74028 9.92 0.139* -302.454 Side swipe - Same Direction 53 1.38 74028 9.92 0.139* -302.454 Sideswipe - Same Direction 53 1.38 74028 9.92 0.139* -302.454 O18-2022 Alabama Integrated eCrash Crash Data - Filter = Debris Contributing Materials in Roadway (C405, CMR) Sort by Sum of Max		Head-On (front to f	ront only)		56	1.46	16283	2.18	0.669*	-27.677	
Causal Veh Backing: Rear to Side 5 0.13 12802 1.72 0.076 -60.789 Angle Oncoming (frontal) 14 0.36 18374 2.46 0.148 -80.423 Angle (front to side) Opposite Direction 35 0.91 23616 3.16 0.288* -86.361 Angle (front to side) Same Direction 17 0.44 21485 2.88 0.154 -93.410 Side Impact (angled) 57 1.49 65716 8.80 0.169* -280.710 Side Impact (angled) 57 1.49 65716 8.80 0.139* -303.875 Sideswipe - Same Direction 53 1.38 74028 9.92 0.139* -327.425 Rear End (front to rear) 241 6.28 254041 34.03 0.185* -1064.499 2018-2022 Alabama Integrated eCrash Crash Data - Filter = Debris Contributing Materials in Roadway (C405, CMR) vs. Not Debris Contributing Materials in Roadway (C405, CMR) vs. Not Debris Contributing Materials in Roadway (C405, CMR) vs. Not Debris Contributing Materials in Roadway (C405, CMR) vs. Not Debris Contributing Materials in Roadway (C405, CMR) vs. Not Debris Contributing Materials in Roadway (C405, CMR) vs. Not Debris Contributing Materials in Roadway (C405, CMR) vs. Not Debris Contributing Materials in		Sideswipe - Oppos	ite Directio	n	25	0.65	14184	1.90	0.343*	-47.891	-
Angle Oncoming (frontal) 14 0.36 18374 2.46 0.148 -80.423 Angle (front to side) Opposite Direction 35 0.91 23616 3.16 0.288* -86.361 Angle (front to side) Same Direction 17 0.44 21485 2.88 0.154 -93.410 Side Impact (angled) 57 1.49 65716 8.80 0.169* -280.710 Side Impact (90 degrees) 49 1.28 68667 9.20 0.139* -303.875 Sideswipe - Same Direction 53 1.38 74028 9.92 0.139* -327.425 Rear End (front to rear) 241 6.28 254041 34.03 0.185* -1064.499 2018-2022 Alabama Integrated eCrash Crash Data - Filter = Debris Contributing Materials in Roadway (C405, CMR) vs. Not Debris Contributing Materials in Roadway (C405, CMR) vs. Not Debris Contributing Materials in Roadway (C405, CMR) vs. Not Debris Contributing Materials in Roadway (C405, CMR) vs. Not Debris Contributing Materials in Roadway (C405, CMR)		Causal Veh Backin	ng:Rearto	Side	5	0.13	12802	1.72	0.076	-60.789	
Angle (front to side) Same Direction 17 0.44 21485 2.88 0.154 -93.410 Side Impact (angled) 57 1.49 65716 8.80 0.169* -280.710 Side Impact (90 degrees) 49 1.28 68667 9.20 0.139* -303.875 Sideswipe - Same Direction 53 1.38 74028 9.92 0.139* -327.425 Rear End (front to rear) 241 6.28 254041 34.03 0.185* -1064.499 2018-2022 Alabama Integrated eCrash Crash Data - Filter = Debris Contributing Materials in Roadway (C405, CMR) vs. Not Debris Contributing Materials in Roadway (C405, CMR) vs. Not Debris Contributing Materials in Roadway (C405, CMR) C023: E Manner of Crash 100 100 100 100 100 100		Angle Oncoming (fr	rontal)		14	0.36	18374	2.46	0.148	-80.423	
Angle (non it of side) Same Direction 17 0.44 21433 2.85 0.154 -93.410 Side Impact (angled) 57 1.49 65716 8.80 0.169* -280.710 Side Impact (90 degrees) 49 1.28 68667 9.20 0.139* -303.875 Sideswipe - Same Direction 53 1.38 74028 9.92 0.139* -327.425 Rear End (front to rear) 241 6.28 254041 34.03 0.185* -1064.499 2018-2022 Alabama Integrated eCrash Crash Data - Filter = Debris Contributing Materials in Roadway (C405, CMR) Soft by Sum of Max Gain C023: E Manner of Crash 100 100 100 100 100 100 100		Angle (front to side) Opposite	Direction	35	0.91	23616	3.16	0.288*	-86.361	-
Side Impact (angled) 57 1.49 65716 8.80 0.169* -280.710 Side Impact (90 degrees) 49 1.28 68667 9.20 0.139* -303.875 Sideswipe - Same Direction 53 1.38 74028 9.92 0.139* -327.425 Rear End (front to rear) 241 6.28 254041 34.03 0.185* -1064.499 C030: Functional Class		Angle (front to side) Same Dir	rection	17	0.44	21485	2.88	0.154	-93.410	
Side Impact (90 degrees) 49 1.28 68667 9.20 0.139* -303.875 Sideswipe - Same Direction 53 1.38 74028 9.92 0.139* -327.425 Rear End (front to rear) 241 6.28 254041 34.03 0.185* -1064.499 030: Functional Highway System C030: Functional Class Image: Comparison of the system of the syste		Side Impact (angle	d)		57	1.49	65716	8.80	0.169*	-280.710	
Rear End (front to rear) 241 6.28 254041 34.03 0.185* -1064.499 Sort by Sum of Max Gain Image: Construction of Const		Side Impact (90 de	grees)		49	1.28	68667	9.20	0.139*	-303.875	
2018-2022 Alabama Integrated eCrash Crash Data - Filter = Debris Contributing Materials in Roadway (C405, CMR) vs. Not Debris Contributing Materials in Roadway (C405, CMR) vs. Not Debris Contributing Materials in Roadway (C405, CMR) 000000000000000000000000000000000000		Sideswipe - Same	Direction		53	1.38	74028	9.92	0.139*	-327.425	C030: Functional Class
2018-2022 Alabama Integrated eCrash Crash Data - Filter = Debris Contributing Materials in Roadway (C405, CMR) vs. Not Debris Contributing Materials in Roadway (C405, CMR) C023: E Manner of Crash		Rear End (front to i	rear)		241	6.28	254041	34.03	0.185*	-1064.499	Sort by Sum of Max Gain
Roadway (C405, CMR) C023: E Manner of Crash	00) 🗞 🖉									
		2018-2022 Alabam	a Integrate	ed eCrash C	Crash Data - I	Filter = Deb	ris Contribut Roadway (ing Materials C405, CMR	s in Roadwa)	ay (C405, CM	IR) vs. Not Debris Contributing Materials in
							C023: E Ma	nner of Cras	sh		
Causal Veh Backing: Rear to Rear Angle (front to side) Opposite Direction Rear End (front to rear)			1		Caugal Veh I	Packing, Po	ar to Peor	Angle (fr	ant to side)		rection Base End (front to rand)
Causal Ven backing: Rear to Rear Angle (front to side) Opposite Direction Rear End (front to rear) C023: E Manner of Crash				(Jausai ven i	backing: Ke				Opposite DI	rection rear End (front to rear)

Close to 80% (79.64%) of CMR crashes involve only a single vehicle. Most of the other items in this list show the results when a second vehicle is involved. While most of these are underrepresented in comparison with their non-CMR counterparts, some of them tend to be quite lethal, namely Head-On (front to front, 56), Sideswipe – Opposite Direction (25), Angle Oncoming (frontal, 14), Angle (front to side) Opposite Direction (35), Angle (front to side) Same Direction (17), Side Impact (angled, 57), Side Impact (90 degrees, 49), and Sideswipe - Same Direction (53).



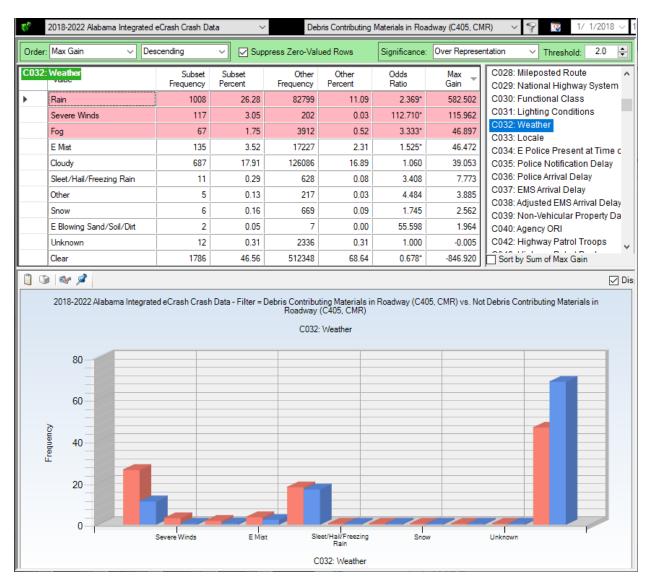
2.13 C031 Lighting Conditions; CMR vs Non-CMR Crashes

Drivers need to be particularly vigilant in the night-time hours in looking for potential debris of foreign materials in the roadway. It does not appear that having a dark roadway lighted has too much of a positive effect.



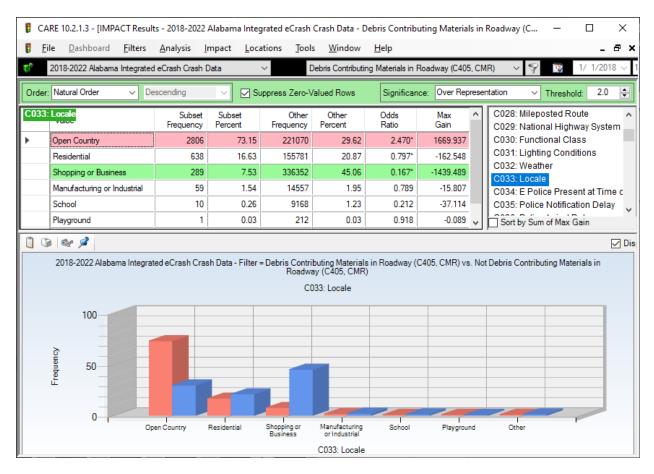
2.14 C025 Crash Severity; CMR vs Non-CMR Crashes

Generally, CMR crashes are not as serious in causing injury and death as many other crash types. However, their over-representation in the Suspected Serious Injury category indicates that CMR crashes are not to be taken lightly.



2.15 C032 Weather; CMR vs Non-CMR Crashes

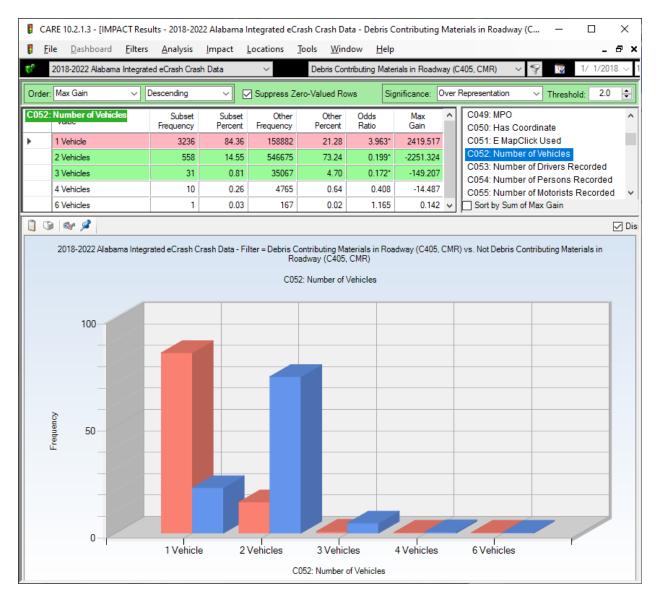
Weather contributes to CMR crashes in two ways: (1) it is often the creation of the foreign materials that end up on the roadway, and (2) it limits the visibility to be able to effectively react to these materials. Rain is the highest frequency characteristic because of the frequency of its occurrence. Severe winds have less than one tenth of the frequency of rain, but their over-representation (Odds Ratio = 112.710) is enormous, indicating that severe winds either bring down tree limbs or blow foreign materials into the roadway. Fog is also significantly over-represented indicating the further limitation in visibility. No doubt fog at night would be the worst visibility situation, and driving in these conditions should be avoided if at all possible.



2.16 C033 Locale; CMR vs Non-CMR Crashes

Almost three quarters (73.15%) of CMR crashes occur in open country. While this is generally classified as rural, there are some Open Country areas in many urban areas as well.

2.17 C052 Number of Vehicles



About 85% (84.36) of CMR crashes are single vehicle. We would suspect that multiple-vehicle crashes would cause more severe injuries. However, the cross-tabulation on the following page indicates that 17 out of 18 of the fatal crashes involved only one vehicle.

File Das	hboard <u>F</u> ilters	<u>A</u> nalysis <u>C</u> rossta	b <u>L</u> ocations <u>T</u>	ools <u>W</u> indow	<u>H</u> elp		-	8
2018-202	2 Alabama Integrated	eCrash Crash Data	\sim	Debris Contributing	Naterials in Roadway ((C405, CMR) 🛛 🗸	Sec. 1/ 1	/2018
Suppress Zero	Values: Rows and C	olumns 🗸 Select	Cells: 🔳 🛛 🛞	9	Column: C	Crash Severity ; Row	: Number of Vehicles	s 🖪
	Fatal Injury	Suspected Serious Injury	Suspected Minor Injury	Possible Injury	Property Damage Only	Unknown	TOTAL	
1 Vehicle	17	114	297	154	2592	62	3236	
2 Vehicles	1	17	38	43	449	10	558	
3 Vehicles	0	0	3	3	23	2	31	
4 Vehicles	0	1	1	3	5	0	10	
6 Vehicles	0	0	0	0	1	0	1	
TOTAL	18	132	339	203	3070	74	3836	

2.17a Cross-tabulation of C025 Crash Severity by C052 Number of Vehicles

2.18 C110 Distance from Residence

🖡 CA	ARE 10.2.1.	3 - [IMPAC	T Resu	lts - 2018-202	22 Alabama Ir	ntegrated eCr	ash Crash Da	ta - Debris Co	ontributing M	laterials in Roadway 🗕 🗌	×
E E	ile <u>D</u> ash	nboard <u>F</u>	ilters	<u>A</u> nalysis	<u>I</u> mpact <u>L</u>	ocations	<u>T</u> ools <u>W</u> ind	low <u>H</u> elp			- 8 ×
6	2018-2022	2 Alabama In	tegrate	d eCrash Cras	h Data	~	Debris Cont	ributing Materi	als in Roadway	y (C405, CMR) 🗸 🖓 🌇 1/	1/2018 ∨
Order	: Max Gain		~ D	escending	~ 2] Suppress Ze	ro-Valued Rov	vs Signific	cance: Over	Representation V Threshold: 2	2.0 🜲
C110	: CU Drive	er Residenc	æ Dista	nce Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C108: CU Driver Race C109: CU Driver Gender	^
•	Greater th Less than	an 25 Miles 25 Miles		1184 2498	31.08 65.56	148428 481104	20.03 64.94	1.551* 1.010	420.717 23.950	C110: CU Driver Residence Distar C111: CU Driver License State	
	Unknown			128	3.36	79327	10.71	0.314*	-279.935	C112: CU Driver First License Clas	ss *
00) 🗞 🖉	8									
	2018-2022	2 Alabama li	ntegrate	ed eCrash Cra	ash Data - Filte	Road	ntributing Mate dway (C405, C)river Residen	MR)	vay (C405, CM	R) vs. Not Debris Contributing Materials	n
	Frequency	100 50									
		01		Grea	ter than 25 N		ss than 25 N		Unknown		
						C110: CU	Driver Resider	ice Distance			

A significantly higher proportion of CMR (55.1% more) crashes occur at distances greater than 25 miles. These roads are often not as familiar to drivers, requiring more alert consideration.

2.19 C121 CU Driver Condition

	CARE	10.2.1.3 - [IMP/	ACT Resul	lts - 2018-20	22 Alabama	Integrated e	Crash Crash	Data - Debr	is Contributi	ng Materials	in Roadway (C — 🗆 🗙
8	<u>F</u> ile	Dashboard	<u>F</u> ilters	<u>A</u> nalysis	<u>I</u> mpact	Locations			lelp	5	_ @ ×
6 2	201	8-2022 Alabama	a Integrated	d eCrash Cras	sh Data	~	Debris (Contributing N	Naterials in Roa	adway (C405,	CMR) 🗸 🌳 🌠 1/ 1/2018 🗸 1/
Ord	der: Ma	ax Gain	~ De	escending	~	Suppress	Zero-Valued	Rows	Significance	: Over Repr	esentation V Threshold: 2.0
C12	Appa E Em E Phy Other Illnes E Asl E Un Unkn	s eep/Fainted/Fat der the Influence	ed/Angry/ t tigued		Subset Frequency 3651 9 4 1 1 2 4 30 118	0.10 0.03 0.05 0.10 0.79	Other Frequency 589498 2400 2104 1569 2763 11262 22970 77305	Other Percent 79.46 0.32 0.28 0.21 0.37 1.52 3.10 10.42	Odds Ratio 1.203* 0.729 0.369 0.124 0.141 0.069 0.254* 0.297*	Max Gain 616.524 -3.354 -6.830 -7.077 -12.223 -53.972 -88.239 -279.932	C118: CU Endorsement Violations # C119: E CU Endorsement Violations C120: E CU Driver Employment Stal C121: CU Driver Condition C122: CU Driver Officer Opinion Alcc C123: CU Driver Officer Opinion Dru C124: CU Driver Alcohol Test Type G C125: E CU Driver Drug Test Type G C126: CU Driver Alcohol Test Result C127: E CU Driver Drug Test Result C128: CU Vehicle Initial Travel Direc Sort by Sum of Max Gain
	Frequency	100	ma Integra	tted eCrash C	Crash Data - F	I	Roadway (C4 121: CU Driv	IO5, CMR) er Condition	Cline	05, CMR) vs.	Not Debris Contributing Materials in

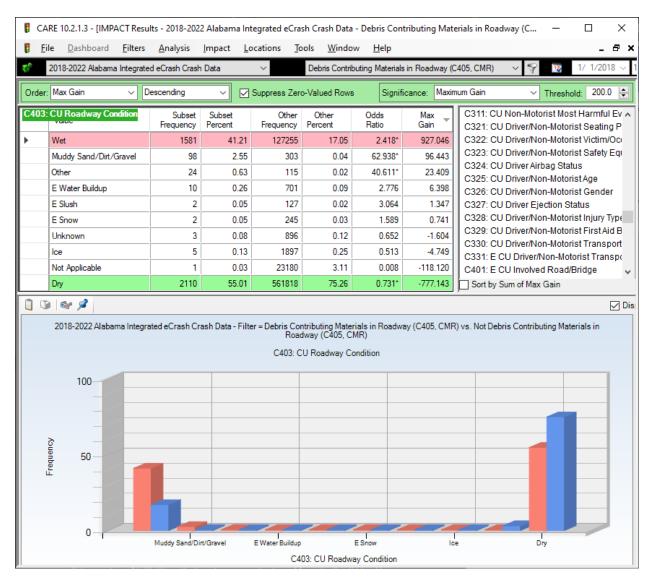
These findings show that, relatively speaking, DUI Alcohol/Drugs is not the problem with CMR that it is with many other crash types.

🔋 CA	RE 10.2.1.3 - [IMPAC	T Results - 2018-2	022 Alabama	Integrated eC	rash Crash Da	ata - Debris C	ontributing l	Materials in Roadwa	у (С —		Х
🖡 E	ile <u>D</u> ashboard	<u>F</u> ilters <u>A</u> nalysis	<u>I</u> mpact	<u>L</u> ocations	<u>T</u> ools <u>W</u> ine	dow <u>H</u> elp				-	₽ ×
¢?	2018-2022 Alabama Ir	ntegrated eCrash Cr	ash Data	\sim	Debris Con	ntributing Mate	rials in Roadw	ay (C405, CMR)	- 💡 🍱	1/ 1/201	8 ~
Order	Natural Order	✓ Descending	~	✓ Suppress Z	ero-Valued Ro	ws Sig	gnificance: C	Over Representation	✓ Threshol	d: 2.0	•
C224	CU Estimated Spe	ed at Impact Subse Frequency			Other Percent	Odds Ratio	Max Gain	▲ C224: CU Es	timated Speed	at Impac	:t
•	1 to 5 MPH	4	2 1.37	7 56715	14.47	0.094*	-403.022				
	6 to 10 MPH	5	3 1.72	41728	10.65	0.162*	-274.424				
	11 to 15 MPH	4	5 1.46	28618	7.30	0.200*	-179.555				
	16 to 20 MPH	7	1 2.31	20068	5.12	0.451*	-86.466				
	21 to 25 MPH	10	2 3.32	2 17605	4.49	0.738*	-36.140				
	26 to 30 MPH	15	5.07	7 18018	4.60	1.103	14.619				
	31 to 35 MPH	25	1 8.16	21573	5.50	1.483*	81.725				
	36 to 40 MPH	26	5 8.62	20382	5.20	1.657*	105.070				
	41 to 45 MPH	55	17.89	34054	8.69	2.058*	282.791				
	46 to 50 MPH	21	3 7.09	16943	4.32	1.640*	85.055				
	51 to 55 MPH	34	5 11.22	2 27243	6.95	1.614*	131.234				
	56 to 60 MPH	14	2 4.62	13267	3.39	1.364*	37.899				
	61 to 65 MPH	24	8.10	15605	3.98	2.034*	126.553				
	66 to 70 MPH	51	4 16.72	18272	4.66	3.585*	370.626				
	71 to 75 MPH	5) 1.63	4512	1.15	1.412*	14.596	-			
	76 to 80 MPH	1	9 0.62	2832	0.72	0.855	-3.222				
	81 to 85 MPH		1 0.03	903	0.23	0.141	-6.086				
	86 to 90 MPH		1 0.03	699	0.18	0.182	-4.485				
	96 to 100 MPH		1 0.03	417	0.11	0.306	-2.272	Sort by Sum	of Max Gain		
0	i 🛯 🖉										🗌 Dis
			2	2018-2022 Alab	ama Integrated	d eCrash Cras	h Data				
				C224: Cl	J Estimated Sp	eed at Impact	:				
	20									_	
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			21 to 25 MP	Ή	46 to 5	0 MPH		71 to 75 MPH			
				C.22	4 CU Estimate	ed Sneed at Ir	mpact				

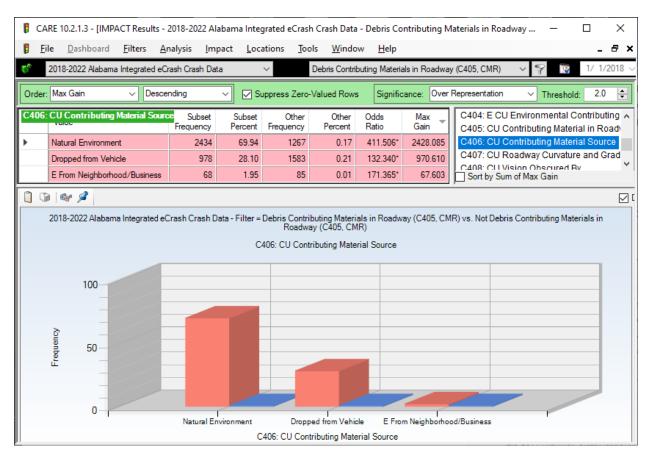
2.20 C224 CU Estimated Speed at Impact

Impact speeds are generally higher for CMRs than for other crashes. This is largely because of their rural nature, and quite often drivers (especially at night) are taken by surprise by the materials in the roadway, so they have limited time to adjust their speeds.

2.21 C403 Roadway Condition

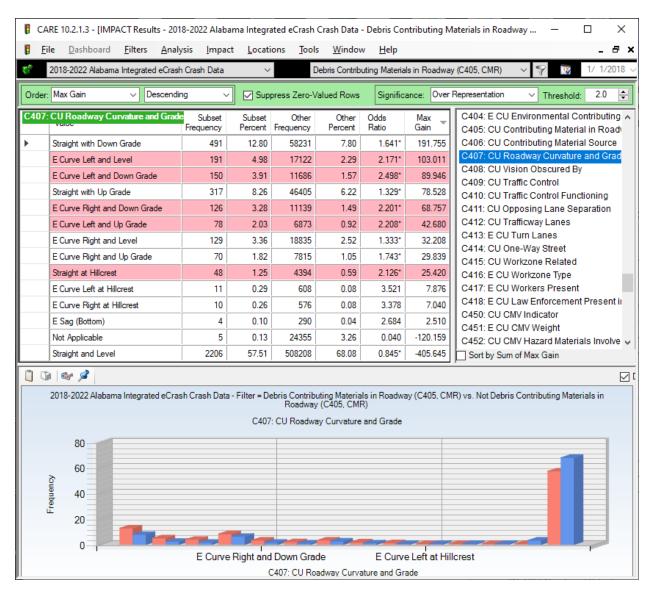


Wet conditions are present in 41.21% of CMR crashes, but only in 17.05% of the non-CMRs. The two reasons for this is that wet weather is highly correlated with tree limbs and the limited visibility that goes with bad weather.



2.22 C406 Contributing Materials Source; CMR vs Non-CMR Crashes

The source of the CMR materials are primarily (69.94%) the natural environment. A smaller, but significant number (28.10%) fall from other vehicles.



2.23 407 Roadway Curvature and Grade

Generally, it seems from this attribute that grades play a larger part in contributing to CMR crashes than do curves. This could be in requiring greater braking on down-slopes when a CMR situation is encountered. Also, many drivers increase their speeds to adapt to upgrades, which could also create a similar problem.

2.24 C412 Trafficway Lanes

CARE 10.2.1.3 - [IMPACT Results - 2018-2022 Alabama Integrated eCrash Crash Data - Debris Contributing Materials in Roadway (C File Dashboard Filters Analysis Impact Locations Tools Window Help File Dashboard Filters Analysis Impact Locations Tools Window Help File Dashboard Filters Analysis Impact Locations Tools Window Help File Dashboard File File File Dashboard File File File Dashboard File File File Dashboard File File File File File File File File								
2018-2022 Alabama Integrated eCrash Crash Data v Debris Contributing Materials in Roadway (C405, CMR) v 💡 😨 1/ 1/2018 v 1								
Order	: Max Gain 🗸 Desc	ending v	🗸 🖂 Suj	opress Zero-\	/alued Rows	Signific	ance: Maxim	num Gain 🗸 Threshold: 200.0 🖨
C412	CU Trafficway Lanes	Subset Frequency	Subset Percent	Other Frequency	Other Percent	Odds Ratio	Max Gain	C402: E CU Road Surface Type C403: CU Roadway Condition
•	Two Lanes	2326	60.64	321451	43.06	1.408*	674.086	C404: E CU Environmental Contributing
	Six Lanes or More	415	10.82	74919	10.04	1.078	29.997	C405: CU Contributing Material in Road
	One Lane	98	2.55	17087	2.29	1.116	10.191	C406: CU Contributing Material Source C407: CU Roadway Curvature and Grad
	Five Lanes	42	1.09	28213	3.78	0.290*	-102.985	C408: CU Vision Obscured By
	Three Lanes	80	2.09	37289	5.00	0.417*	-111.626	C409: CU Traffic Control
	Not Applicable (Parking Lot)	30	0.78	27902	3.74	0.209*	-113.386	C410: CU Traffic Control Functioning
	Four Lanes	845	22.03	209676	28.09	0.784*	-232.510	Sort by Sum of Max Gain
Contributing Materials in Roadway (C405, CMR) vs. Not Debris Contributing Materials in Roadway (C405, CMR) vs. Not Debris Contributing Materials in Roadway (C405, CMR)								
) vs. Not Debris Contributing Materials in
	C412: CU Trafficway Lanes							
	80							
	60							
	2							
	Action 40							
	20							
	0 I Two L	anes Six La or Mo		One Lane	Five Lanes	Three Lan	es Not App (Parkin	
C412: CU Trafficway Lanes								

Two-lane roads have a significantly higher proportion of CMR crashes than any other lane conditions, probably because of the limited ability to avoid CMR materials without causing greater potential danger.