

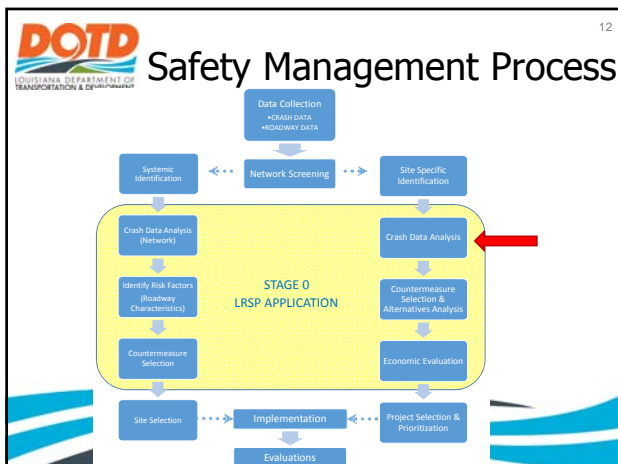


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Agenda

Duration

- 30 • Safety Program Overview, Safety Management Process, & 23 USC 409
- 30 • General Crash Data Information
- 15 • Crash Querying
- 30 • Crash Data Analysis
- 15 • General CAT Scan Information
- 45 • CAT Scan Process
- 15 (minute) • Interpreting the Data, Selecting Mitigation Strategies, BCA, and Other Considerations



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Key Points

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- Perform these task honestly without fear of litigation
- Interest of the public to protect safety information
- Not the function of the judge or jury to second guess decisions

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Agenda

23

- ✓ Safety Program Overview, Safety Management Process, & 23 USC 409
- General Crash Data Information
- Crash Querying
- Crash Data Analysis
- General CAT Scan Information
- CAT Scan Process
- Interpreting the Data, Selecting Mitigation Strategies, BCA, and Other Considerations

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Crash Report Etiquette

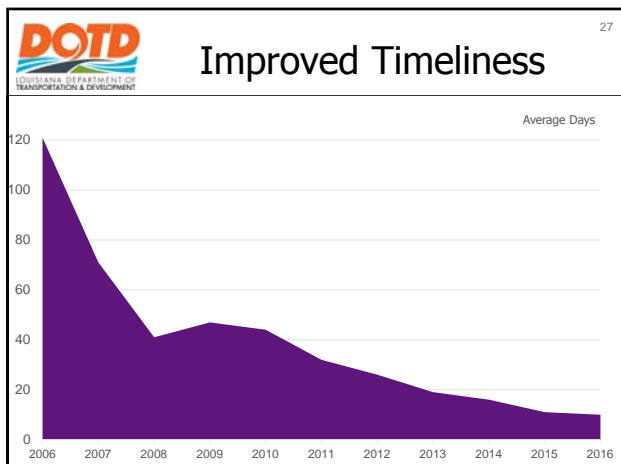
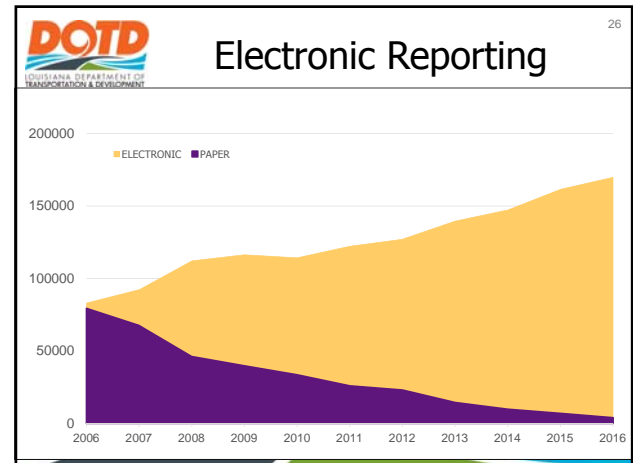
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- Personal information should be ignored
- Do not print crash reports
- Do not include copies of crash reports in studies or Stage 0

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Report vs. Data

- **Crash Report: form**
 - Completed by Law Enforcement Officer (LEO)
 - Owned by LEO's Agency
 - Entry Options
 - Open notes – free form
 - Certain formats (number, letters, time)
 - List Selection
- **Crash Data: warehouse of elements**
 - Subset of report
 - List – Codes



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Crash Report

- Current Version: 2005
- Minimum: 4 pages
- Maximum: no limit
- Format: Paper; Electronic
- Applications:
 - paper
 - LACrash
 - vendors

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Crash Report

- Crash Event – 2 pages
- Each Vehicle – 2 pages
- Additional Occupants (8, optional)
- Narrative Supplement (optional)
- Alternative Grid (optional)
- Driver/Witness Voluntary Statement
 - (optional; at least 1 page)
- Railroad Grade Crossing Supplement
 - (1 page)

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Crash Event

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Vehicle

Vehicle

Commercial

Driver

Occupant(s)

Factors & Conditions

Citation

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Crash Report Elements

- Administration – 8
- Crash – 72
- Vehicle – 72
- Commercial – 17
- People – 43
- Passengers – 15
- Pedestrians – 6
- Train – 106

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Crash Data @ DOTD

- HSRG -> DOTD
- Apply current year Road Profile
 - May be different than the year before or after
 - User must research location to ensure no changes

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Crash Data Elements

- Crash Number – unique identifier
- Intersection flag – 1 is True; 0 is False
- Collision Manner
- (Human) Severity
- Most Harmful Event
- Event Sequence
- Prior Movement

Vehicle Factors

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Crash Data Elements

- Pedestrian flag – 1 is True; 0 is False
- Train flag – 1 is True; 0 is False
- Vehicle Configuration
- Coordinates
 - LEO
 - DOTD

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Collision Manner

- Top of Diagram
- Primary pattern 2-vehicle

A: Noncollision	B: Rear end	C: Head on ^{1,2}
D: Right angle ^{1,2,3}	E: Left turn	F: Left turn ^{1,2}
G: Left turn ²	H: Right turn	I: Right turn ^{1,3}
J: Same direction swipe	K: Opposite direction swipe ²	Z: Other two or more vehicles and not described otherwise

¹ roundabout multi-vehicle (A) ² traffic signal multi-vehicle (C) ³ median multi-vehicle (A)

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(Human) Severity

LA Codes	National Safety Council
A	K – Killed
B	A – Incapacitating Injury
C	B – Evident Injury
D	C – Possible Injury
E	O – No Injury

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Derived Elements

- Road Departure
- Intersection ID – geography based
- Location Type
- Crash Type – replaced Accident Type
- Contributing Factor
- Vehicle Severity – uses Human Severity scale

New!

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Location Type

Code	Name
A	related to an <u>intersection</u> (signal, roundabout, stop, etc.)
B	related to a median <u>crossover</u>
C	related to a <u>driveway</u>
D	related to an on- <u>ramp</u> or off- <u>ramp</u>
E	related to a non-road path (sidewalk, bike, rail, golf-cart, etc.)
F	related to a <u>merging</u> area
G	related to a <u>bus-stop</u>
H	related to a <u>shoulder</u>
J	related to a <u>turn-lane</u>
Z	not related to any feature

- Derived from:
 - Traffic Control
 - Roadway Relation
 - Prior Movement

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Crash Type

- Addressed issues
 - Accident Type: **Greater detail on single vehicle**
 - Difficult to assess non-motorized users, vulnerable users
- Non-motorized User codes: A, B
- Vulnerable User codes: C, D

Vehicle Count	Percentage
1	17%
2	76%
3+	6%

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Crash Type

Code	Name
A	pedestrian
B	pedalcycle
C	ATV
D	motorcycle
E	parked vehicle
F	not fixed
G	vertical fixed structures
H	Train
J	responder
L	farm / construction

Code	Name
M	bus
N	animal
P	other fixed
Q	transport
R	3+ vehicles
S	2 vehicles
T	miscellaneous

- Derived from:
 - Most Harmful Event
 - Vehicle Configuration
 - Movement Reason
 - Roadway Conditions

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Vehicle Severity

- Answer to overcome poor human severity data

	Combined Severity	
	Before	After
A Severe	0.4%	0.4%
B Moderate	0.7%	6.2%
C Minor	5.9%	17%
D Superficial	22%	25%
E Superficial	71%	51%

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Exercise 1

- Go to <crashdata.lsu.edu>
- Select: Interactive Crash Manual
bottom left
- Select the website
- Go to Vehicle 2nd page
- Select Sequence of Events
- Select Railway Vehicle
- Explore crash report manual

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Crash Query Tools

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Crash Data Query

- One data file
 - 1 entry per crash
 - Consolidates
 - Vehicles
 - People
 - Years
- Crash1 – query by state
- Crash3 – query by local
- Crash2 – query by individual

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Crash1

→ Not secure | engrapps/crash1/

3. Select the geographic area to include (either route, control-section, parish, district, or statewide)

Route: Type LA Num 39 Byp Milepoint From 47.43 To 53.71

Control-Section: 022-05 Logmile From 1.56 To 3.51

Parish: 01-Acadia City: All

District: 02-New Orleans

Troop: A-Baton Rouge

Statewide

Within 150 feet of intersection. Parish: 00-None ID:

Within 150 feet miles of lat, long 30.063509,-90.484536 Find in: 48-St John

Include "Mainline" crashes?
Include "Ramp" crashes?
Include "Frontage Road" crashes?
Include "Local Road" crashes?

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Crash3

→ Not secure | engrapps/crash3/

3. Select the geographic area to include (parish/city, troop, or statewide)

Parish: 17-East Baton Rouge City: All

Troop: A-Baton Rouge

Statewide

Within feet miles of lat, long 30.00000,-90.00000 Find in: 01-Acadia

Include State as well as Local roads

4. Enter a road name to look for

Road Name (contains):

Intersecting Street (contains):

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Crash2

engrapps/crash2/

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INTRANET

Intranet

LADOTD Highway Crash Reports

Beginning Year: 2017 Ending Year: 2018

Run 1. Count of Crashes by City ☐ Fatal Crashes Only

Run 2. Search for a crash Number:

Options:
Return output as: ☒ Regular HTML ☐ Excel Spreadsheet
Use Gridlines: ☒

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Crash2 - LSP

engrapps/crash2/search_for_crash_num.aspx

[show crash on map](#)

Item	Value	Item
CRASH_YEAR	2016	CRASH_NUM
CRASH_HOUR	13	ACCESS_CNTL_CD
ALIGNMENT_CD	A-Straight-Level	BYPASS
CONST_MAINT_ZN	0-No	DAY_OF_WK
HIT_AND_RUN	0-No	HWY_TYPE_CD
INVEST_AGENCY_CD	A-State	LIGHTING_CD
MAN_COLL_CD	A-Non Coll w M/V	MILE_POST
NUM_TOT_KIL	0	NUM_VEH
POP_CD	0	PRI_HWY_NUM
ROAD_REL_CD	E-Beyond Shoulder-Right	ROAD_TYPE_CD

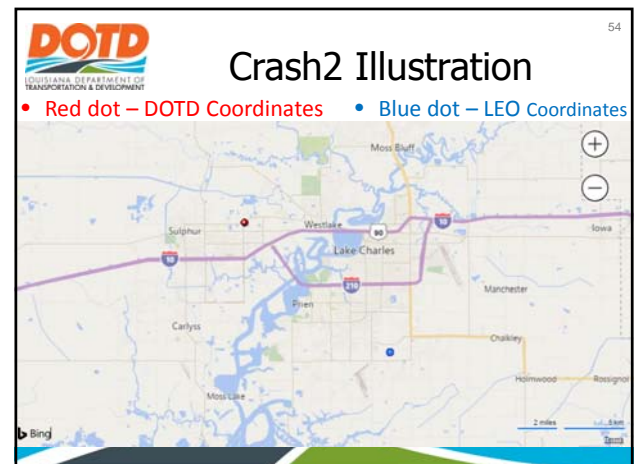
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Crash2 Not LSP

engrapps/crash2/search_for_crash_num.aspx

[Content Manager](#) [show crash on map](#)

Item	Value	Item
CRASH_YEAR	2014	CRASH_NUM
CRASH_HOUR	19	ACCESS_CNTL_CD
ALIGNMENT_CD	A-Straight-Level	BYPASS
CONST_MAINT_ZN	0-No	DAY_OF_WK
HIT_AND_RUN	0-No	HWY_TYPE_CD
INVEST_AGENCY_CD	C-Parish	LIGHTING_CD
MAN_COLL_CD	Z	MILE_POST
NUM_TOT_KIL	0	NUM_VEH
POP_CD	0	PRI_HWY_NUM
ROAD_REL_CD	A-On Roadway	ROAD_TYPE_CD



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- ## Limits - All
- Insufficient Crashes
 - Intersections: <5 crashes / year
 - Segments: <5 crashes / year / mile
 - Remedy
 - Increase geographic span
 - Increase time span

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- ## Limits - Time
- Most recent
 - Minimum: 3 years
 - Sometimes: 4 or 5 years
 - If LOSS 3 or 4 and
 - Insufficient crashes
 - Consistency
 - Similar operations
 - No major construction

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Limits - Segments

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- Considerations
 - Too small may be too close to randomness
 - Too large may be too close to average
- Suggested extremes

(miles)	Urban	Rural	
Minimum	0.4	0.6	Highways
Maximum	2	8	
	Between interchanges		Freeways

- If an end-point is at an intersection, trim it down to avoid the intersection's functional area

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Limits - Intersections

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- Considerations
 - Too small, may not capture all crashes
 - Too large, may perform excessive QA
- Preferably at least 150 feet*
- Include all of the turn-lanes & taper*
 - *but do not include other intersections or their functional area(s)
- If too close to another intersection, then split distance between intersections

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Segment v Intersection

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Not secure | engrapps/crash1/

Select the geographic area to include (either route, control-section, parish, district, or statewide)

Route: Type LA Num 39 Byp Milepoint From 47.43 To 53.71

Control-Section: 022-05 Logmile From 1.56 To 3.51 **Segments**

Parish: 01-Acadia City: All

District: 02-New Orleans

Troop: A-Baton Rouge

Statewide

Within 150 feet of intersection. Parish: 00-None ID: **Intersections**

Within feet miles of lat, long 30.00000 -90.00000 Find in: 01-J

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Exercise 2

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- Open Crash1 <http://engrapps/crash1/>
- Input project information
 - Years: 2014 to 2016
 - Control Section 246-01
 - Log-mile from: 0.77
 - Log-mile to: 2.38
- How many crashes?

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Agenda

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SMP's Site Specific

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SMP = Safety Management Process

- Identify project and limits
- ✓ Query crash data
- Conduct quality assurance
- Calculate Safety Service Level
- Review crash patterns
- Determine mitigation strategies
- Develop planning level cost estimates
- Calculate crash reduction cost
- Determine benefit-cost ratio

Engineering Judgment

- Dividing Routes into Segments
 - AADT difference >50%
 - Classification change
- Determine Intersection's limits
- Determine AADT – complicated
- Interpreting Output
- Correcting Crash Data
- Decipher correctable crash pattern
- Designing Mitigation Strategy

Getting Started

The screenshot shows the DOTD Intranet homepage. The top navigation bar includes links for Customer Service, DOTD A-Z, Sharepoint, MyDOTD, and Intranet. The main content area is divided into several sections: a 'U.S. Map' section with links to create a service request, call the DOTD Service Desk, and download user guides; a 'Bulletin Board Announcements' section with a link to add carpool announcements; an 'Office of Engineering' section with links to EDMS, Environmental Section, and various project development and construction links; and a 'Resource Center' section with links to content management, daily news, and various project development and construction links. A red box highlights the 'Project Development' link in the 'Office of Engineering' section.

Find Coordinate Converter

The screenshot shows the DOTD Intranet homepage. The top navigation bar includes links for Customer Service, DOTD A-Z, Sharepoint, MyDOTD, and Intranet. The main content area is divided into several sections: a 'U.S. Map' section with links to create a service request, call the DOTD Service Desk, and download user guides; a 'Bulletin Board Announcements' section with a link to add carpool announcements; an 'Office of Engineering' section with links to EDMS, Environmental Section, and various project development and construction links; and a 'Resource Center' section with links to content management, daily news, and various project development and construction links. A red box highlights the 'Project Development' link in the 'Office of Engineering' section.

Find Location

The screenshot shows the DOTD Intranet homepage. The top navigation bar includes links for Customer Service, DOTD A-Z, Sharepoint, MyDOTD, and Intranet. The main content area is divided into several sections: a 'U.S. Map' section with links to create a service request, call the DOTD Service Desk, and download user guides; a 'Bulletin Board Announcements' section with a link to add carpool announcements; an 'Office of Engineering' section with links to EDMS, Environmental Section, and various project development and construction links; and a 'Resource Center' section with links to content management, daily news, and various project development and construction links. A red box highlights the 'Project Development' link in the 'Office of Engineering' section.

Observe Location

The screenshot shows the DOTD Intranet homepage. The top navigation bar includes links for Customer Service, DOTD A-Z, Sharepoint, MyDOTD, and Intranet. The main content area is divided into several sections: a 'U.S. Map' section with links to create a service request, call the DOTD Service Desk, and download user guides; a 'Bulletin Board Announcements' section with a link to add carpool announcements; an 'Office of Engineering' section with links to EDMS, Environmental Section, and various project development and construction links; and a 'Resource Center' section with links to content management, daily news, and various project development and construction links. A red box highlights the 'Project Development' link in the 'Office of Engineering' section.

Refine Location

The screenshot shows the DOTD Intranet homepage. The top navigation bar includes links for Customer Service, DOTD A-Z, Sharepoint, MyDOTD, and Intranet. The main content area is divided into several sections: a 'U.S. Map' section with links to create a service request, call the DOTD Service Desk, and download user guides; a 'Bulletin Board Announcements' section with a link to add carpool announcements; an 'Office of Engineering' section with links to EDMS, Environmental Section, and various project development and construction links; and a 'Resource Center' section with links to content management, daily news, and various project development and construction links. A red box highlights the 'Project Development' link in the 'Office of Engineering' section.

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Find STL

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engrapps/hwyinfo/home.aspx

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Customer Service DOTD A-Z Sharepoint MyDOTD

Can't find it? Search for: I am looking for:

Project and Highway Information

LADOTD Project and Highway Information

Project Information

- Pre-Construction
 - Highway Program Projects
 - Highway Program Projects Summary
 - Monthly Recap Sheet
 - Highway Priority Program as Submitted to the Legislature
 - Yearly Program Recap Sheet
 - Budget Partition
 - Transportation Summary Regular
 - STIP Documents
- LaGov ERP
 - Project Crosswalk Search
 - ERP PS Information
 - Check Federal Aid Against Surface Type Log File
- Construction
 - All Projects (up to date - from Time Port)
 - Construction Projects
 - Projects Under Construction (Same as on Internet)
 - Other Reports

Highway Information

- Highway Inventories
 - Apple Assets Control Section Manual
 - LADOTD Control Section Manual (obsolete?)
 - STIP On System Bridges
 - STIP Off System Bridges
 - InspectTech Bridges (new)
 - Highway Geographic Features
 - Surface-Type Log File (Highway Inventory) ←
 - Highway Needs File
 - Highway Summary Reports by Year
- Local Road Information
 - Convert latitude/longitude to route or control section
 - Traffic counts
 - Federal Funding Grandfather List
 - Show LRS_IDs on map

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Query STL

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LADOTD Surface-Type Log File (Highway Inventory)

Select Parish: 01-Acadia By Control-Section By Route

Select Single Control-Section: 000-00 Submit

Select Single Route: LA0001 Submit

Include Accident Cross-Reference Data?

Include "Map" Button? ☒

Show ADT station on Map?

Include these items?

NHS ☐

Strahnet ☐

Truck Route ☐

Fed Aid Status ☐

Section and Subsection ☐

Shoulder Type ☐

HPMS Urban Code ☒

Select Year of Data (as of March/April): Current

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Location Familiarization

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engapps/hwyinfo/habwst/habwst2.aspx

DOTD Surface-Type Log File - by Route - As of 01/12/2018

Route LA 22

Map	Route	Beg Mile Point	End Mile Point	Len	Par	ish	Func Sys	ADT	Lanes	Pave Type	Pave Width	Shldr Width	Med Type	Med Width	Control Sect	Beg Logmi	End Logmi	Urban Code
LA 22		0.000	9.750	9.750														
LA 22		0.000	4.450	4.450	Asen	6-McCol	5,100	2	bitcon	22	4	undivd	0	266-01	0.000	4.450	Baton R	
LA 22		4.450	7.403	2.953	Asen	6-McCol	4,100	2	bitcon	22	4	undivd	12	266-01	4.450	7.403	Baton R	
LA 22		7.403	7.730	0.327	Asen	3-PaArt	24,300	2	bitcon	22	4	undivd	0	266-01	7.403	7.730	Baton R	
LA 22		7.730	7.940	0.210	Asen	3-PaArt	24,300	4	pec	48	16	open-30	22	266-01	7.730	7.940	Baton R	
LA 22		7.940	8.250	0.310	Asen	3-PaArt	24,300	4	bitcon	48	16	open-30	22	266-01	7.940	8.250	Baton R	
LA 22		8.250	9.750	1.500	Asen	3-PaArt	24,300	4	bitcon	48	16	open-30	22	266-01	8.250	9.750	Baton R	
LA 22		9.750	17.446	7.696														
LA 22		9.750	11.910	2.160	Asen	4-MiArt	9,900	2	bitcon	24	16	undivd	0	266-02	0.000	2.160	Baton R	
LA 22		11.910	15.170	3.260	Asen	4-MiArt	9,300	2	bitcon	24	4	undivd	0	266-02	2.160	5.420	Baton R	
LA 22		15.170	17.446	2.276	Asen	4-MiArt	9,300	2	bitcon	24	4	undivd	0	266-02	5.420	7.696	Rural	
LA 22		17.446	18.371	0.925	Live	4-MiArt	9,600	2	bitcon	26	3	undivd	0	266-03	0.000	0.925	Rural	
LA 22		18.371	27.771	9.400	Live	5-MiCol	4,400	2	bitcon	26	3	undivd	0	260-03	0.000	9.400	Rural	
LA 22		27.771	28.986	1.215	Live	5-MiCol	2,600	2	bitcon	26	5	undivd	0	260-03	9.400	10.615	Rural	

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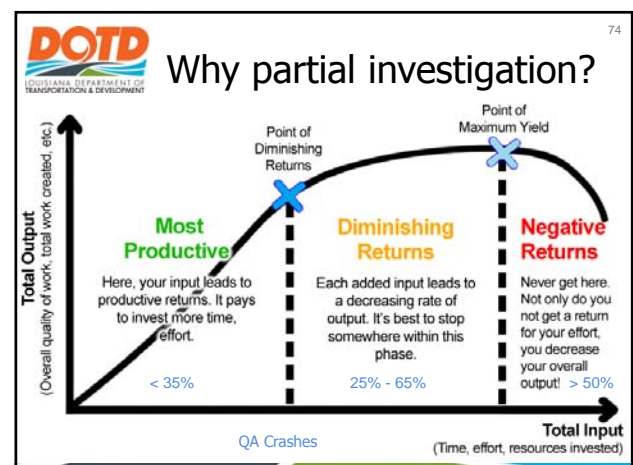
Why investigate?

- Most data elements from LEOs
~70% - 80% accurate
- Collision Manner – 76%
- Location at 0.05 mile threshold – 75%
- Without Quality Assurance
 - Answers ≈ Maybe True
- With Quality Assurance
 - Answers ≈ Likely True

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Why partial investigation?

- No need to review
 - error free crashes
 - not road's fault crashes
 - not over-represented crashes
- Determining mitigation strategies –
theory of diminishing returns



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What is CAT Scan?

- **Crash Analysis Tool**
 - Site Level
 - MS Excel based
 - Quantifies
 - Average Daily Traffic
 - Existing Crash Data

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CAT Scan Benefits

- Uses Highway Safety Manual methodology
- Use of Safety Performance Functions (SPF)
- Empirical Bayes to account for regression to the mean (RTM) bias

Substantive Safety

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Analysis Use

- Site Level Analysis
 - Traffic Studies
 - Transportation Management Plans
- File
 - Each segment
 - Each intersection
- Not
 - New alignment
 - Unique locations – no model

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Where to find?

Internal via Crash1:

CONFIDENTIAL INFORMATION
This document and the information contained herein is prepared solely for the purpose of identifying, evaluating and planning safety improvements on public roads which may be implemented utilizing federal aid highway funds, and is therefore exempt from discovery or admission into evidence pursuant to 23 U.S.C. 409.

Contact the LADOTD Traffic Safety Office at (225) 379-1871 before releasing any information.

LADOTD Highway Crash List

This application will generate a report of traffic crashes on Louisiana, U.S., and interstate highways that occurred in a certain area (route, control-section, parish, district, statewide) during a certain time frame. You may print a detail report or a summary report.

1. Enter the title for the report:
Title 1: _____
Title 2: _____

For Crash Years 1990-2007 - use Milepoint
For Crash Years 2008-2018 - use Milepoint

LADOTD List of Abnormal/High PSI Locations

Category	Section	Intersections	Spots	Supplementary	Tools
(Abnormal) Freeway Locations (Sheet)	(Unsignalized) Locations (Sheet)	Report (Sheet)	Screening Method by Hwy Class	CAT SCAN - Segments - SPFs Method (Excel)	
(Abnormal) Freeway Rates (Excel)	(Signalized) Locations (Sheet)	Rates (Excel)	All PSI Sections (Excel)	CAT SCAN - Intersection - SPFs Method (Excel)	
(High PSI) Sections (Sheet)	(Signalized) Locations (Excel)	Rates (Excel)	Combined Locations, Also + SPFs (Excel)		
(High PSI) Sections (Excel)	Rates (Sheet)	Report (Sheet)	Screening Method by Hwy Class	CAT SCAN - Segments - SPFs Method (Excel)	
	Locations (Excel)	Rates (Excel)	All PSI Sections (Excel)	CAT SCAN - Intersection - SPFs Method (Excel)	
	(Signalized) Report (Sheet)	Report (Sheet)	Combined Locations, Also + SPFs (Excel)	Safety Traps - Intersections - NumberRate Method (Excel)	
	(Signalized) Rates (Excel)	Rates (Excel)	Safety Traps - Segments - NumberRate Method (Excel)		
	(Signalized) Locations (Excel)	Rates (Excel)	Road Data Network Screening (Excel)		

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Where to find?

External via Website:

WWW DOTD LA GOV TRUCKE LADOTD/Options/Multimodal/Highway Safety/Highway Safety Analysis Toolbox.aspx

Home • Inside LoDOTD • Divisions • Multimodal Commuter • Highway Safety

Highway Safety Analysis Toolbox

State Policies and Procedures on the Use of the Highway Safety Manual (HSM)
Scale and Scope of Safety Assessment Methods in the Project Development Process
AKSHIT's Highway Safety Manual

The HSM introduces a science-based technical approach that takes the guesswork out of safety analysis. The HSM provides tools to conduct quantitative safety analyses, allowing for safety to be quantitatively evaluated alongside other transportation performance measures such as traffic operations, environmental impacts, and construction costs. The HSM provides the following tools:

- Methods for developing an effective roadway safety management program and evaluating their effects.
- A predictive method to estimate crash frequency and severity.
- Guidance on the development and application of crash modification factors to estimate crash reductions.

Type	Name	Modified	File Size
2009_LA_Crash_Report_Guide01		3/3/2013 12:37 PM	2013 KB
CAT Scan - 2016 Intersection - 20180720		3/13/2018 8:37 AM	1049 KB
CAT Scan - 2016 Segments - 20180522		3/13/2018 8:37 AM	4766 KB

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CAT Scan Limitations

- Dependent upon great crash data queries
- Dependent upon high quality crash data
- Study location must match a model

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Over-coming Limitations

Conducting great crash data queries

- Time
 - At least 3 most recent years
 - Consistent operations
- Geography
 - Capture enough area
 - Segments: start with longest of similar classification
 - Intersection: include turn-lanes

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Over-coming Limitations

- Crash Data Quality
 - QA (Quality Assurance) section
 - Identifies potential errors
 - Guides partial examination
 - Provides space for correction
 - Goal: 90+% accuracy

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CAT Scan Prerequisites

- General knowledge of MS Excel
 - Using Filters
 - Entering data
 - Manipulating data
 - Conditional Formatting – remove duplicates

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CAT Scan

- Visual Optimization
 - Spreadsheets hidden
 - Columns minimized
- Open – Nothing locked
 - Careful **not to delete**
 - Careful to modify

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CAT Scan Spreadsheets


- Start: Introductory Information, References, Instructions; Guidance
- Inputs: Place to make global inputs for this workbook.
- QA: (Quality Assurance) Manage crash data review process
- Outputs: Near print ready summary
- CM: Counter-Measure guidance

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CAT Scan - Start

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- Overview of tool B3:G108
- Workbook Instructions I3:I126
- Instruction Guidance K3:L126
- QA Spreadsheet Overview N3:N130
- QA Spreadsheet Guidance P3:P71




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Segment Model Development

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	1- Oneway	2- Oneway	2- Lane	2- Divided	3- Lane	4- Lane	4- Divided	5- Lane	6- Lane	4- Freeway	6- Freeway
Rural											
Urban											

used in new CAT Scan
explore the potential to develop SPF & norms



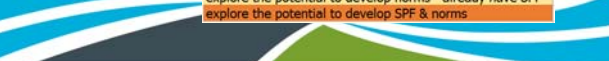
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Intersection Model Development

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		Rural					Urban				
		2- Lane	2- Divided	4- Lane	4- Divided	6- Lane	2- Lane	2- Divided	4- Lane	4- Divided	6- Lane
Not Exits	Unsignalized	4-Leg									
	Signalized	4-Leg									
Hwy Exits	Unsignalized	4-Leg									
	Signalized	4-Leg									

used in new CAT Scan
not used, no SPF; not needed (too few crashes or sites)
develop SPF
explore the potential to develop norms - already have SPF
explore the potential to develop SPF & norms



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Agenda

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- ✓ Safety Program Overview, Safety Management Process, & 23 USC 409
- ✓ General Crash Data Information
- ✓ Crash Querying
- ✓ Crash Data Analysis
- ✓ General CAT Scan Information
 - CAT Scan Process
 - Interpreting the Data, Selecting Mitigation Strategies, BCA, and Other Considerations




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Project Process (1of2)

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- Start
 - One Segment file
 - Perform QA
- Develop Project
 - Divide Segment (if necessary)
 - Initiate Intersection file(s)
 - Copy appropriate crashes from Segment file(s) to Intersection file(s)




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Project Process (2of2)

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- Intersection(s)
 - Perform QA
 - Copy appropriate updates or crashes from Intersection file(s) to Segment file(s)
- Publish Results
 - Segment(s)
 - Intersection(s)



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Instructions (1 of 2)

- ✓ 0. Location Familiarization ~1 hour
1. Download Data ~10 min
2. Import Crash Data ~2 min
3. Initial Documentation ~15 min
4. Outputs – Safety Comparison ~2 min
5. Outputs - Pattern Recognition Analysis ~5 min

Engineer

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Instructions (2 of 2)

Engineer

6. Quality Assurance: Use if
 - LOSS 3,
 - LOSS 4, or
 - Correctable Crash Pattern
6. Quality Assurance < 10 min/crash
7. Printing ~2 min
8. Reporting Errors ~2 min

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1. Ensuring good location

8. Submit the request:

Options:
Return output as: ☒ Regular HTML ☐ Excel Spreadsheet ☐ CSV ☐ CSV for CatScan
Use Gridlines: ☒
Show Map buttons: ☒

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1. Download Data

2. Enter the beginning and ending dates:
From year 2014 month 01 day 01 to year 2016 month 12 day 31

8. Submit the request:

Options:
Return output as: ☐ Regular HTML ☐ Excel Spreadsheet ☐ CSV ☒ CSV for CatScan
Use Gridlines: ☒
Show Map buttons: ☒

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2. Import Data

FILE HOME INSERT PAGE LAYOUT FORMULAS DATA REVIEW VIEW DEVELOPER

Select All ☒ 2014

	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P
	CRASHNUM	CRASHDATE	CRASH HOUR	ACCESS	ALCOHOL	ALIGNMENT	CONST	DAY	DOTD	HT	HWY	INTER	INVEST			
				CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD	CD
1	A															
2	B	2-Jan-14	5	A				0	WE		0	C	0	C		
3	B	2-Jan-14	15	A				0	TH		0	C	0	C		
4	B	4-Jan-14	19	A				0	FR		0	C	0	C		
5	B	7-Jan-14	10	A				0	MO		0	C	0	C		
6	B	8-Jan-14	19	A				0	TU		1	C	0	C		
7	B	16-Jan-14	17	A				0	FR		0	C	0	C		
8	B	16-Jan-14	11	A				0	MO		0	C	0	C		
9	B	16-Jan-14	12	A				0	TU		0	C	0	C		

READY 60%

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3. Initial Documentation

Segments:

	A	B	C	D	E
		Name	Input		Suggested
10					
11		Location Method	Log-Mile		
12					
13					
14		Route	LA 9999		LA 9999
15					
16		Control-Section	123-45		123-45
17					
18		Log-mile from	3.695		3.695
19					
20		Log-mile to	6.263		6.263
21					
22		Highway Classification	Urban 5-Lane		

Helping Hint: use limits to develop project

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3. Initial Documentation

Segments:

	I	J	K	L	M	N	O	P	Q	R
1										
29	ADT Corridor Calculator									
30	Average Daily Traffic (ADT)									
31	2014	2015	2016	2017	2018	2019	2020	2021	begin	end
32	34800	34800	34800	34800	34800	34800	34800	34800	3.695	0
33	34800	34800	34800	34800	34800	34800	34800	34800	0	0
34	34800	34800	34800	34800	34800	34800	34800	34800	0	0
35	34800	34800	34800	34800	34800	34800	34800	34800	0	0
36	34800	34800	34800	34800	34800	34800	34800	34800	0	0
37	34800	34800	34800	34800	34800	34800	34800	34800	0	0
38	34800	34800	34800	34800	34800	34800	34800	34800	0	0
39	34800	34800	34800	34800	34800	34800	34800	34800	0	0
40	34800	34800	34800	34800	34800	34800	34800	34800	0	0
41	34800	34800	34800	34800	34800	34800	34800	34800	0	0
42	34800	34800	34800	34800	34800	34800	34800	34800	0	0
43	34800	34800	34800	34800	34800	34800	34800	34800	0	6.263

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3. Initial Documentation

Intersections:

	Name	Input	Suggested
1			
18	Intersection ID	28LA325@ERA	28LA325@ERA
19			
20	Intersection Classification	Urban 4-Divided Signalized 4-	
21			
22	First Year	2014	2014
23			
24	Last Year	2016	2016
25			
26	Major Legs	West	
27			
28		East	
29			
30			

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3. Initial Documentation

Intersections:

	I	J	K	L	M	N	O
1							
35	2013	ADT N			2014	ADT N	
36	ADT W	0	ADT E		ADT W	0	ADT E
37		ADT S				ADT S	
38	2015	ADT N			2016	ADT N	
39	ADT W	0	ADT E		ADT W	0	ADT E
40		ADT S				ADT S	
41	2017	ADT N			2018	ADT N	
42	ADT W	0	ADT E		ADT W	0	ADT E
43		ADT S				ADT S	
44	2019	ADT N			2020	ADT N	
45	ADT W	0	ADT E		ADT W	0	ADT E
46		ADT S				ADT S	
47							
48							
49							

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Exercise 3: Initialize

- Open Folder "Basic Crash Class files ..."
- Open Document "CAT Scan – Segments"
- Open Folder "Basic Crash Analysis Class - Exercise 3"
- Open Document "Basic Crash Analysis Class – Reference ..."
- Open Folder "Segment"
- Open Document "crash1 (84)"

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Exercise 3: Step 2

- Select All & Copy from "crash1 (84)"
- Go to "CAT Scan – Segments"
- Go to spreadsheet "Data"
- Select All & Paste
- Save "CAT Scan – Segments" as "CAT Scan - LA 57 C-S 246-01 LM 0.77 to 2.38 – 20180425"

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Exercise 3: Step 3

- Close Document "crash1 (84)"
- Update values to match reference file
 - Log-miles
 - Highway Classification
 - AADT in cell I32

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Macro Trust Issues (1 of 2)

- Click the **File** tab
- Click **Options** (bottom left). A new dialog box should open.
- Click **Trust Center** (bottom left)
- Click **Trust Center Settings** (center right). A new dialog box should open.
- Click **Trusted Locations** (second option from top left)
- Click **Add new locations...** (bottom center). A new dialog box should open.

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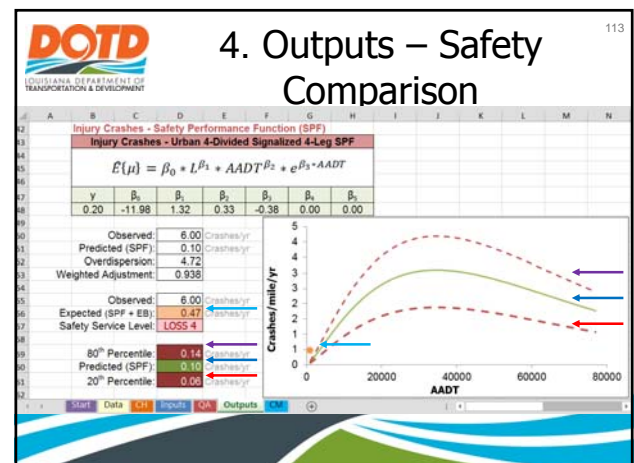
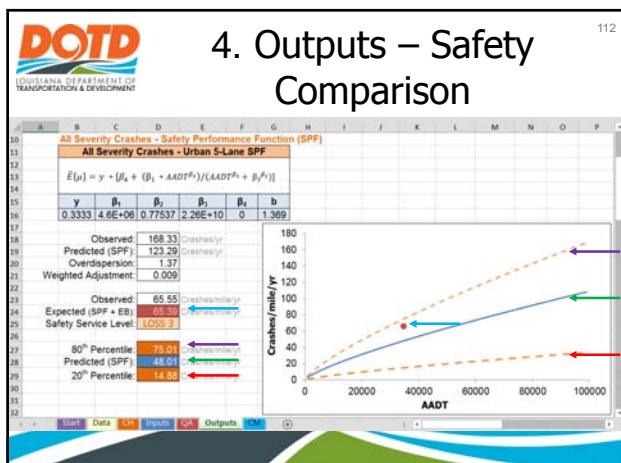
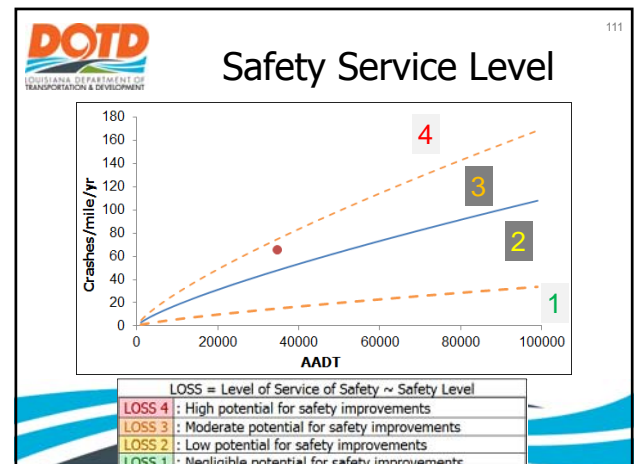
Macro Trust Issues (2 of 2)

- Click **Browse...**. A new dialog box should open. Find the a location that you will save these files. Click **Ok**. [You may have to repeat this step if you save your files in multiple locations. Note trusting a parent file will enable trust for each child file within.]
- Click **Ok**.
- Click **Ok**.
- Click **Ok**. (yes three time)
- Close your file.
- Reopen your file. It should be work properly now.

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4. Outputs – Filters

- Filters out crashes that does not meet the below criteria
- Segment**
 - Intersection = 0
- Intersection**
 - Intersection = 1
 - Intersection ID of interest



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Pattern Recognition Analysis

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- Crash attribute as Binomial Trial
- $$P(X \leq x) = B(x, n; p) = \sum_{i=0}^x \frac{n!}{(n-i)! i!} p^i (1-p)^{n-i}$$
- Each trial compares: subject % v. class %

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5. Outputs – Pattern Recognition Analysis

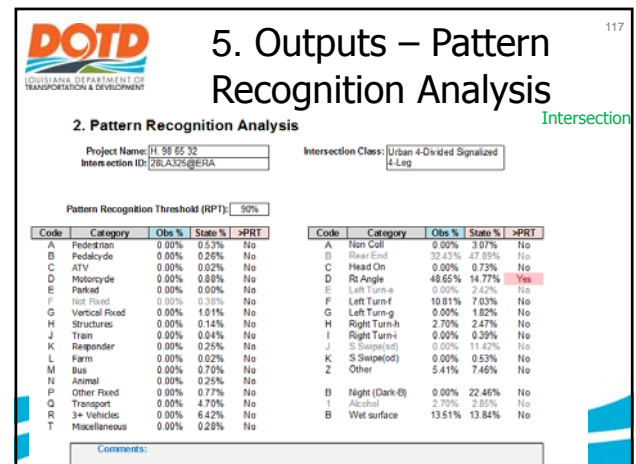
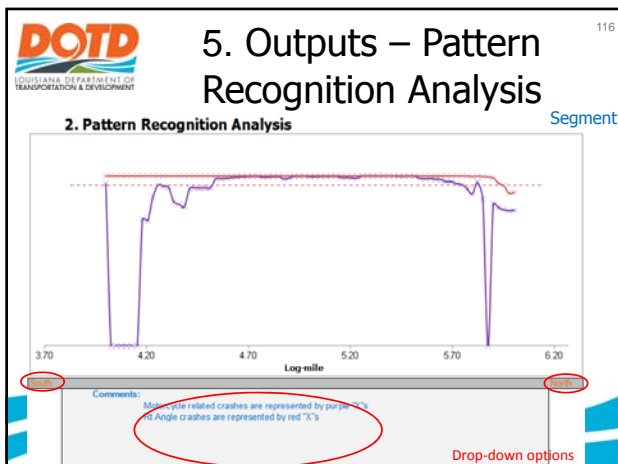
Segment

2. Pattern Recognition Analysis

Control-Section: 123.45
Log-mile from: 3.70
Log-mile to: 6.20
AADT: 3480
Highway Class: Urban 5-Lane
Period: 2014 to 2016
Δ: 0.60
E: 0.036
Percent Limit: 95%
Possible Δ: 80
AADT Group: High

Run PRA

Code	Category	Obs %	State %	Δ > Cutoff	Graph
A	Pedestrian	0.20%	0.56%	0	<input type="checkbox"/>
B	Pedalcycle	0.00%	0.29%	0	<input type="checkbox"/>
C	ATV	0.00%	0.00%	0	<input type="checkbox"/>
D	Motorcycle	2.77%	1.10%	21	<input checked="" type="checkbox"/>
E	Parked	0.00%	0.00%	0	<input type="checkbox"/>
F	Not Fixed	0.00%	0.20%	0	<input type="checkbox"/>
G	Vertical Fixed	0.00%	0.55%	17	<input checked="" type="checkbox"/>
H	Structures	0.00%	0.08%	0	<input type="checkbox"/>
J	Train	0.00%	0.02%	0	<input type="checkbox"/>
K	Responder	0.20%	0.25%	0	<input type="checkbox"/>
L	Farm	0.00%	0.02%	0	<input type="checkbox"/>
M	Bus	0.20%	0.41%	0	<input type="checkbox"/>
N	Animal	0.00%	0.16%	0	<input type="checkbox"/>
P	Other Fixed	1.39%	0.63%	44	<input checked="" type="checkbox"/>
Q	Transport	2.97%	3.15%	0	<input type="checkbox"/>
R	3+ Vehicles	6.93%	10.19%	0	<input type="checkbox"/>
T	Miscellaneous	0.73%	0.14%	32	<input checked="" type="checkbox"/>

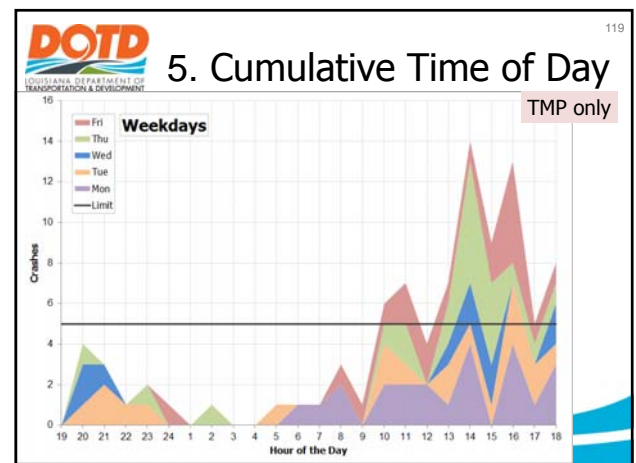


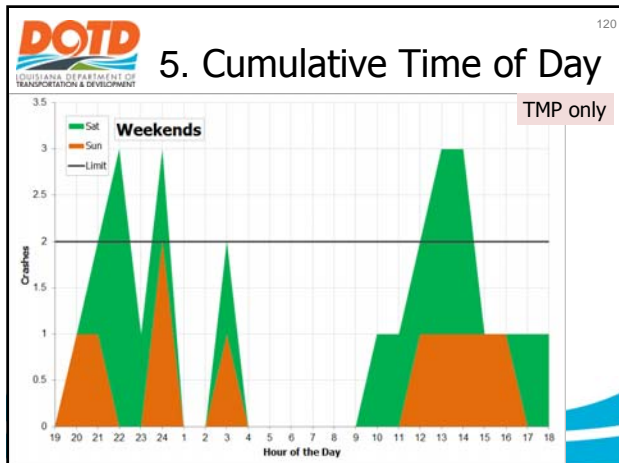
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5. Outputs – PRA

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- Gray entries: Difficult to mitigate with infrastructure or traffic operations strategies
 - Same direction movements
 - Rear-ends
 - Left-over-takes
 - Graze with flow
 - Driver behaviors: impairment, etc.
 - Non-road issues: lost cargo, etc.





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6. Quality Assurance

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Management: Functions that facilitate/manage the crash data review.

Errors Detection: Functions that detect possible errors.

Analysis: Functions that provide further analysis.

User Entry: Space to upgrade the data, provide notes on the crash, provide potential solutions, and provide more specific location information. Changes in this section will be reflected in the Output.

Error Notation: Space to consolidate errors for reporting

Calculations: Functions that perform the work for other parts of this spreadsheet.

Research: Space to consolidate crash data for research.

Columns

A:I

CH:CV

DA:DR

DU:EP

ES:FH

FI:GJ

GM:HP

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6. QA Management

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- Authenticity
 - A = Authentic
 - B = Beyond Limits
 - Z = Not Authentic
- Status 1: view
 - Completed crashes
 - Need Reviewing
- Status 2: review
 - Review location
 - Update coordinates
 - Evaluate location
 - Propose solution
- Status 3: quality
 - Resolve errors
 - Over-write errors (*very sparingly*)

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6. QA User Entry

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- Update Lat/Long or Location Evaluation (*not both*)
- Review Notes
- Possible Solutions
- Others depends on review and error mitigation.

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6. QA User Entry

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- Review Notes
 - Can't view: no crash report available to review
 - not within study area: removes crash from analysis
- Intersection ID
 - Use "0" when not related to intersection
 - When related to Intersection:
 - Intersection, use [specific id]
 - Segment, use "?"

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6. QA EDA

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- Error Detection Algorithms
 - Compare data and note issues
 - Collision Manner & Crash Type
 - Collision Manner & Angle
 - Intersection & Intersection ID
 - Collision Manner & Location Type & Access
 - Same as Original
 - Might be Night
 - Crossed Center & White Line
 - Road Depart & Crash Type

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QC vs. QA

- QC: Quality Control
 - Performed before and after QA
 - Before: restrict inputs
 - After Decide:
 - Need more QA
 - Use or Not
- QA: Quality Assurance
 - Network/Global level
 - Project level
 - Sample and correct

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6. QA Analysis

- Solution Count
- Evaluation Score
 - heuristic for evaluation management
- Factors
 - Segment – 18
 - Intersection – 13

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6. QA Error Notation

- Mostly Automatic
- "why"
 - Corrected value = Original value
 - Resolve: delete corrected value
- Other: for notation of errors not otherwise captured

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6. QA Process (1 of 4)

- After establishing parameters – *Input*
- After running PRA – *Output*
- Initiate QA spreadsheet
 - Filter Authenticity by Z – delete entries
 - Filter Status1 by Yes
- Start at bottom – work upward
- Run PRA – if not first time and segment

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6. QA Process (2 of 4)

- Copy crash number
- Paste into Crash2 & run query
 - Open location
 - Open report
 - If Investigating Agency <> A (LSP) – open crash report
 - If Investigating Agency = A (LSP), Then go to ThinkStream to open crash report

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6. QA Process (3 of 4)

- Review location and either:
 - Update Lat/Long or
 - Location Evaluation
- Review Notes
- Possible Solutions
- Resolve Errors

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6. QA Process (4 of 4)

L. Loop back to F – until no new crashes appear

M. Reapply filter

N. Do more crashes appear

1. Yes: Loop back to E
2. No: proceed to Step 7

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7. Printing

- Output spreadsheet
- Select Print Preview
 - Segment: 4 pages
 - Intersection: 3 pages
 - TMP: +2 pages (manual addition)

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8. Reporting Errors

E-mail CAT Scan files:
Bryan.Costello@LA.gov

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Agenda

- ✓ Safety Program Overview, Safety Management Process, & 23 USC 409
- ✓ General Crash Data Information
- ✓ Crash Querying
- ✓ Crash Data Analysis
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Interpreting Crash Patterns

- CM spreadsheet
 - Source: ITE Transportation Engineering Handbook (Unknown Edition)
 - Plus my experience
- SHSP I&O Countermeasure Resource Guide – pretty version of CM spreadsheet

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Mitigation Strategies

- Engineering Judgement
 - Decipher correctable crash pattern
 - Design mitigation strategy
- CM spreadsheet
- CMF Clearinghouse
<<http://www.cmfclearinghouse.org/>>

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Economic Appraisal

- Safety Benefit Cost
 - Benefits of reduced crashes
 - CMF * Facility Average
 - When using multiple CMF, one should not reduce the same crash more than once
 - Cost of modifications
 - Estimated construction
 - Not right-of-way acquisition

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Other Considerations

- ADA Transition Plan
- Complete Streets Policy
- Bicycle Planning Tool
 - Network Analysis
 - Recommended Facility Type
- Local Plans
- Stakeholder Input

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DOTD Maps

Geographic Information Systems (GIS)
Cloud Based DOTD GIS Platform

2 [LA DOTD ArcGIS Online Official Homepage](#)

• ArcGIS Online Homepage
• How to get your ArcGIS.com Account
• LA DOTD Organizational User Account (DOTD Intranet link)
• Personal, ESRI Global Account

1 [DOTD GIS](#)

3

LADOTD Map Gallery

The Louisiana Motorist Assistance Patrol (MAP)

ADA, Compliance, Public

Bicycle Planning Tool

Highway Priority Program Fiscal Year 2018-2019

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ADA Transition Plan

Home > ADA, Compliance, Public

Legend

ADA, Compliance, Public

Sidewalks (S&T)

- Compliant (as of last inspection)
- Designed/Under Construction
- Not Compliant

Sidewalk (one-way streets, non-standing)

- Compliant (as of last inspection)
- Designed/Under Construction
- Not Compliant

Notes

- Compliant (as of last inspection)
- Designed/Under Construction
- Not Compliant

- State routes with existing sidewalks only
- ADA Program Funds available
- Required to fix deficiencies if within project limits (even PRRR)

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Bicycle Planning Tool

Recommended Facility Type:

Legend

Marked Shoulder, Recommended Facility Type

- Shared Lane (one-way street)
- Marked Shoulder Lane
- Marked Shoulder Lane w/ Shoulder
- Marked Shoulder
- State Lane w/ Buffered Bike Lane
- Buffered or Separated Bike Lane
- Separated Bike Lane

State Highway Network

- Highway
- Interchange (Overpass Bridge)

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Questions

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