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RESEARCH

National Transit Database
Transit Safety Data: 2008 - 2011

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Federal Transit Administration

Center for Urban Transportation Research | University of South Florida

Presentation Outline

- Transit Safety Data Analyses by Mode
- Critical Areas of Concern
- Top 10 Transit Safety Research Areas

TRANSIT SAFETY DATA ANALYSIS – DATA DRIVEN PRIORITIES



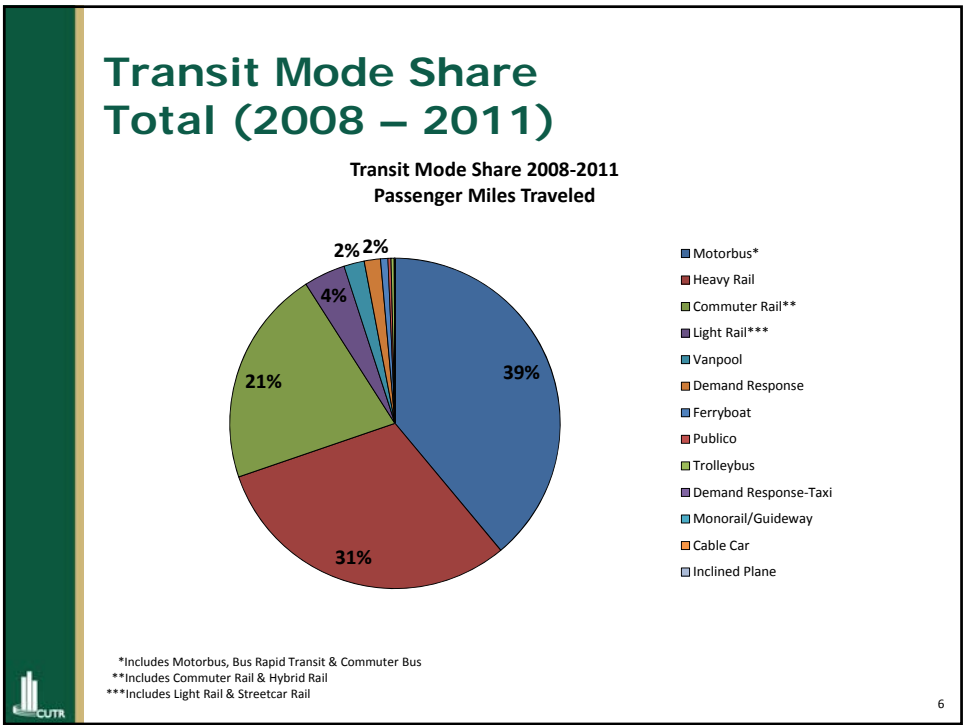
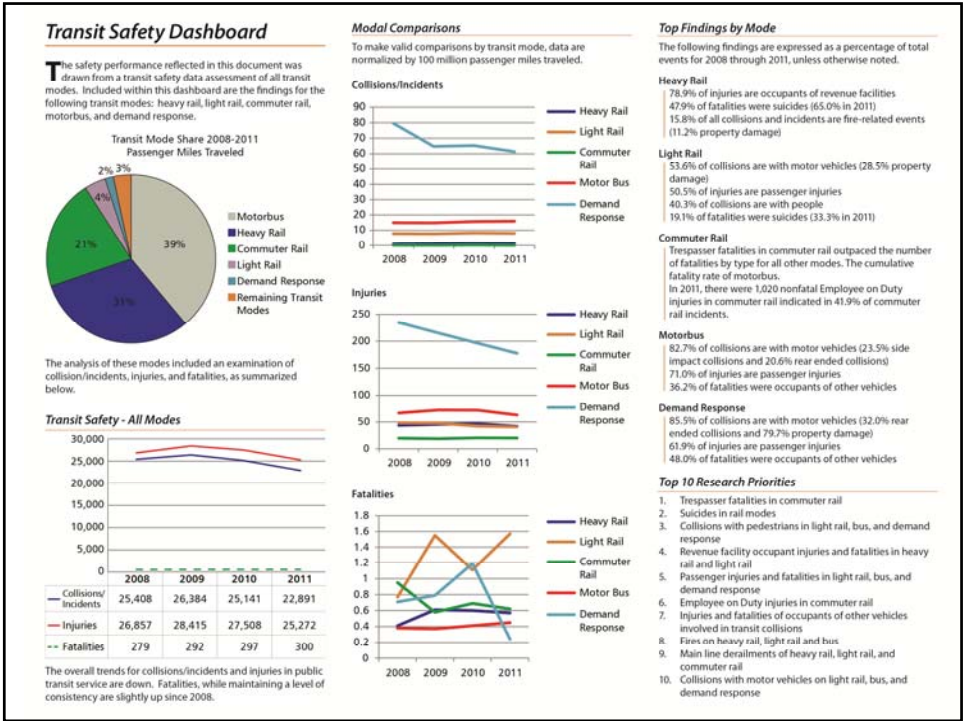
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Data Collection and Analysis Method

- Examined National Transit Database (NTD) S&S 40 Major Incident Reporting and Rail Accident/Incident Reporting System (RAIRS) database
- Reviewed NTSB reports
- Analysis for 12 transit modes
- Expanded analysis for heavy rail, light rail, commuter rail, motorbus, demand response
- Rates include 100m passenger miles traveled (PMT) and 100m vehicle miles traveled (VMT)
- Also examined property damage estimates



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Transit Safety All Modes (2008 – 2011)

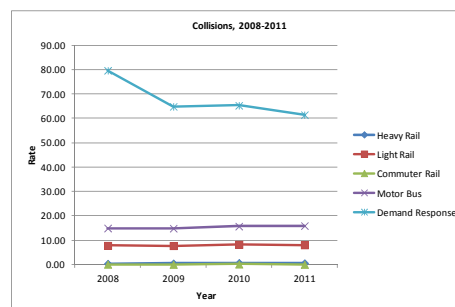
- Total collisions, accidents, incidents are down
 - Majority of collisions on Motorbus (78.0%)
- Total injuries have gradually declined since 2008
 - Majority of transit injuries on Motorbus (52.9%)
- Total fatalities have gradually increased since 2008
 - Majority of transit fatalities on Heavy Rail (30.7%), followed by Motorbus (28.6%) and Commuter Rail (27.6%)



Collision Rate - All Modes per 100 million/Passenger Miles Traveled

Highest collision rate in DR

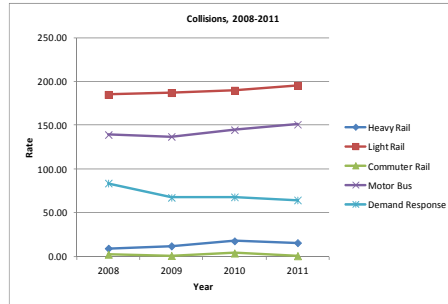
	2008	2009	2010	2011
Heavy Rail	0.38	0.49	0.72	0.60
Light Rail	7.78	7.70	8.20	8.02
Commuter Rail	0.08	0.04	0.13	0.03
Motorbus	14.91	14.84	15.67	15.89
Demand Response	79.63	64.82	65.27	61.38



Collision Rate - All Modes per 100 million/Vehicle Miles Traveled

Highest collision rates in LR and MB and trending upward

	2008	2009	2010	2011
Heavy Rail	9.37	12.06	17.76	15.73
Light Rail	184.96	187.15	189.80	195.47
Commuter Rail	2.60	1.16	3.99	0.86
Motor Bus	139.15	137.06	144.67	150.99
Demand Response	83.73	67.42	68.02	64.52

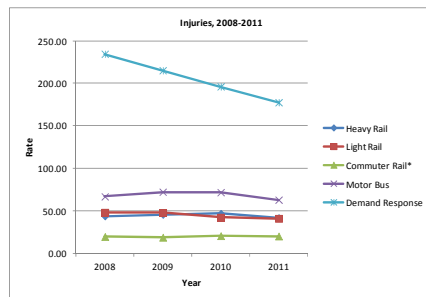


Injury Rate – All Modes per 100 million/Passenger Miles Traveled

Highest rate in DR, but trending down

	2008	2009	2010	2011
Heavy Rail	43.95	45.77	46.83	41.89
Light Rail	48.34	47.99	42.37	41.11
Commuter Rail*	19.79	18.91	20.68	20.29
Motorbus	66.89	72.27	71.96	62.97
Demand Response	234.50	215.24	196.27	177.65

*Excludes attempted suicides

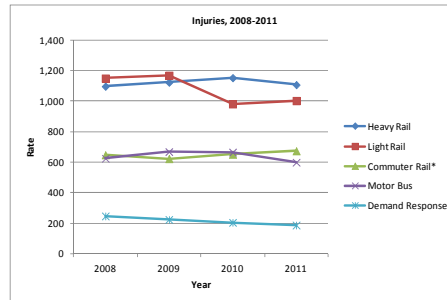


Injury Rate – All Modes per 100 million/Vehicle Miles Traveled

Highest rates in rail modes – modest upward trend HR & CR downward LR

	2008	2009	2010	2011
Heavy Rail	1,096	1,122	1,151	1,106
Light Rail	1,149	1,167	980	1,002
Commuter Rail*	647	623	651	673
Motor Bus	624	667	664	598
Demand Response	247	224	205	187

*Excludes attempted suicides.

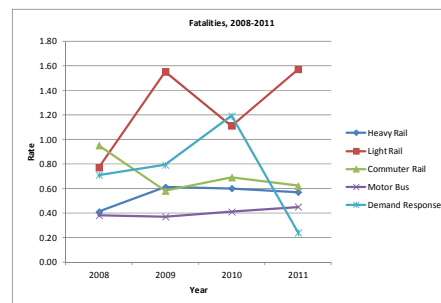


Fatality Rate – All Modes per 100 million/Passenger Miles Traveled

Highest rate in LR (36 fatalities in 2011)

	2008	2009	2010	2011
Heavy Rail	0.41	0.61	0.60	0.57
Light Rail	0.77	1.55	1.11	1.57
Commuter Rail*	0.95	0.58	0.69	0.62
Motorbus	0.38	0.37	0.41	0.45
Demand Response	0.71	0.79	1.19	0.24

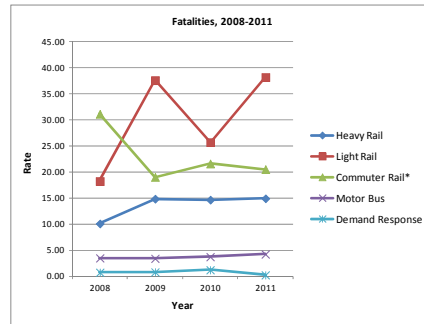
*Excludes suicides



Fatality Rate – All Modes per 100 million/Vehicle Miles Traveled

Highest rate in LR

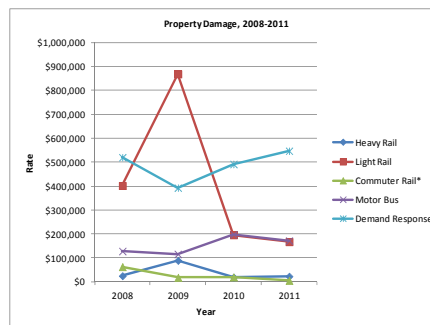
	2008	2009	2010	2011
Heavy Rail	10.13	14.89	14.70	14.96
Light Rail	18.27	37.65	25.74	38.24
Commuter Rail*	31.19	19.07	21.65	20.57
Motor Bus	3.52	3.41	3.77	4.26
Demand Response	0.75	0.83	1.24	0.25



Transit Property Damage Rate – All Modes per 100 million/Passenger Miles Traveled

Highest rate in DR

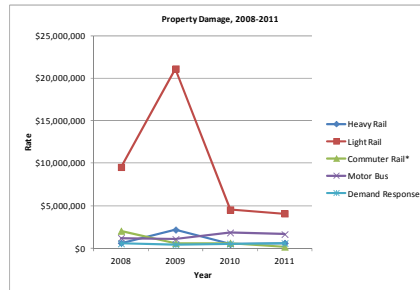
	2008	2009	2010	2011
Heavy Rail	\$24,572	\$88,551	\$18,705	\$22,688
Light Rail	\$401,255	\$867,997	\$195,563	\$166,967
Commuter Rail	\$62,286	\$17,773	\$19,592	\$5,152
Motor Bus	\$127,690	\$115,416	\$197,522	\$171,873
Demand Response	\$519,850	\$392,476	\$491,492	\$546,475



Transit Property Damage Rate – All Modes per 100 million/Vehicle Miles Traveled

Highest rate in LR – trending up

	2008	2009	2010	2011
Heavy Rail	\$612,668	\$2,170,465	\$459,905	\$599,101
Light Rail	\$9,533,874	\$21,109,639	\$4,524,083	\$4,068,589
Commuter Rail	\$2,036,074	\$584,987	\$616,590	\$170,872
Motor Bus	\$1,191,528	\$1,065,662	\$1,823,185	\$1,633,467
Demand Response	\$546,642	\$408,187	\$512,257	\$574,403



Cumulative Comparison by Mode (2008 – 2011) – Collisions per 100m PMT

	HR	LR	CR	MB	DR
Passenger Miles (millions)	659.61	87.28	453.67	833.94	34.11
	per 100 million PMT				
Collision with Motor Vehicle	0.02	4.24	n/a	12.67	57.89
Collision with Person*	0.48	3.20	n/a	2.00	5.77
Collision with Fixed Object	0.02	0.09	n/a	0.38	3.08
Collision with Rail Vehicle	0.02	0.30	n/a	0.00	0.00
Collision with Other	0.01	0.09	n/a	0.22	0.76
Total Collision Rate	0.55	7.93	0.07	15.32	67.74
Derailment	0.05	0.96	0.31	0.00	0.00
Fire	8.26	2.78	n/a	1.44	4.60
Security	1.54	3.41	n/a	1.39	0.29
Not Otherwise Classified*	42.00	27.11	n/a	35.39	108.55
Train Accident	n/a	n/a	0.95	n/a	n/a
Highway-Rail Incident	n/a	n/a	0.84	n/a	n/a
Other Accident/Incident	n/a	n/a	18.99	n/a	n/a
Total Collisions/Incident Rate	52.40	42.20	20.78	53.55	181.18

*Excludes suicides/attempted suicides



Cumulative Comparison by Mode (2008 – 2011) – Transit Injuries per 100m PMT

	HR	LR	CR*	MB	DR
Passenger Miles (100 million)	659.61	87.28	453.67	833.94	34.11
per 100 million PMT					
Passenger	7.84	22.66	5.31	48.65	127.63
Revenue Facility Occupant**	35.15	11.32	n/a	2.99	8.85
Operator	0.19	2.19	n/a	4.87	25.50
Employee	0.43	1.75	8.62	0.70	3.87
Other Worker	0.08	0.00	n/a	0.01	0.23
Bicyclist	0.00	0.30	n/a	0.48	1.67
Pedestrian in Crossing	0.00	0.55	n/a	0.58	2.55
Pedestrian not in Crossing	0.03	0.23	n/a	0.63	1.67
Pedestrian Crossing Tracks	0.00	0.53	n/a	0.01	0.00
Pedestrian Walking Along Tracks	0.01	0.27	n/a	0.00	0.00
Other Vehicle Occupant	0.02	3.29	n/a	7.62	30.72
Other	0.68	1.65	18.73	1.98	3.31
Trespasser	0.00	0.00	0.28	0.00	0.00
Suicide***	0.13	0.14	n/a	0.01	0.00
Train Accident	n/a	n/a	0.89	n/a	n/a
Highway-Rail Incident	n/a	n/a	0.50	n/a	n/a
Total Injury Rate	44.57	44.88	19.92	68.54	206.01

*Excludes attempted suicides.
 **Individuals within a location used to board or alight transit vehicles.
 ***Suicide attempts.



Cumulative Comparison by Mode (2008 – 2011) – Transit Fatalities per 100m PMT

	HR	LR	CR*	MB	DR
Passenger Miles (100 million)	659.61	87.28	453.67	833.94	34.11
per 100 million PMT					
Passenger	0.02	0.01	0.05	0.02	0.26
Revenue Facility Occupant**	0.10	0.16	n/a	0.04	0.03
Operator	0.00	0.01	n/a	0.01	0.03
Employee	0.01	0.01	0.02	0.01	0.00
Bicyclist	0.00	0.08	n/a	0.03	0.00
Pedestrian in Crossing	0.00	0.17	n/a	0.05	0.03
Pedestrian not in Crossing	0.01	0.09	n/a	0.07	0.03
Pedestrian Crossing Tracks	0.01	0.15	n/a	0.00	0.00
Pedestrian Walking Along Tracks	0.02	0.11	n/a	0.00	0.00
Other Vehicle Occupant	0.00	0.11	n/a	0.15	0.35
Other	0.10	0.10	0.15	0.02	0.00
Trespasser	0.00	0.00	0.41	0.00	0.00
Suicide	0.26	0.24	n/a	0.01	0.00
Train Accident	n/a	n/a	0.06	n/a	n/a
Highway-Rail Incident	n/a	n/a	0.20	n/a	n/a
Total Fatalities	0.54	1.26	0.71	0.40	0.73

*Excludes suicides.
 **Individuals within a location used to board or alight transit vehicles.



Transit Mode Expanded Analyses

- Heavy Rail
- Light Rail
- Commuter Rail
- **Motorbus**
- **Demand Response**
- Captures 97% of Passenger Miles Traveled



Motorbus – Total Incidents and Collisions by Type

	2008	2009	2010	2011	% of Total
Incidents					
Collision with Motor Vehicle	2,582	2,604	2,684	2,697	
Collision with Person	355	431	451	432	
Collision with Fixed Object	98	69	80	71	
Collision with Other	126	29	10	15	
Total Collisions	3,161	3,132	3,224	3,261	28.61%
Fire	330	305	265	302	2.69%
Security	254	226	287	395	2.60%
Not otherwise classified (NOC)*	7,732	8,633	7,598	5,553	66.09%
Total Incidents	11,477	12,296	11,374	9,511	100.0%

Motorbus Collisions by Type 2011		
	2011	% of Total
Head-on w/ Fixed Object	12	0.37%
Head-on w/ Motor Vehicle	193	5.92%
Head-on w/ Person	64	1.96%
Other w/ Motor Vehicle	30	0.92%
Other w/ Person	14	0.43%
Front impact w/ Fixed Object	24	0.74%
Front impact w/ Motor Vehicle	564	17.30%
Other front impact w/ Person	115	3.53%
Rear-ended w/ Motor Vehicle	671	20.58%
Rear-ending w/ Motor Vehicle	279	8.56%
Rear-ending w/ Unknown	11	0.34%
Side Impact w/ Fixed Object	21	0.64%
Side Impact w/ Motor Vehicle	767	23.52%
Side Impact w/ Person	206	6.32%
Side Impact w/ Unknown	14	0.43%
Sideswipe w/ Motor Vehicle	190	5.83%
Sideswipe w/ Person	19	0.58%
Unknown	13	0.40%
Total	3,261	100.0%

*Not otherwise classified Includes a variety of incidents such as slips, trips, falls, electric shock, smoke or the odor of smoke/chemicals noticed in a transit facility, or other safety events not listed as a "reportable Incident," but which meet a reportable incident threshold.



Motorbus – Total Injuries and Fatalities by Type, 2008 - 2011

	2008	2009	2010	2011	% of Total
Fatalities					
Passenger	5	2	3	8	5.39%
Revenue Facility Occupant	4	12	10	7	9.88%
Operator	2	1	1	3	2.10%
Employee	1	4			1.50%
Bicyclist	5	4	10	4	6.89%
Pedestrian in Crossing	11	9	12	11	12.87%
Pedestrian Not in Crossing	7	16	15	18	16.77%
Other Vehicle Occupant	36	26	27	32	36.23%
Other	7	2	3	4	4.79%
Suicide	2	2	3	5	3.59%
Total	80	78	84	92	100.0%

	2008	2009	2010	2011	% of Total
Injuries					
Passenger	10,131	10,769	10,456	9,211	70.97%
Revenue Facility Occupant	660	646	594	592	4.36%
Operator	1,052	1,065	982	965	7.11%
Employee	172	155	106	154	1.03%
Other Worker	6	1	2	3	0.02%
Bicyclist	93	85	97	123	0.70%
Pedestrian in Crossing	116	118	143	109	0.85%
Pedestrian Not in Crossing	120	147	135	124	0.92%
Pedestrian Crossing Tracks		2	5		0.01%
Pedestrian Walking Along Tracks	1				0.00%
Other Vehicle Occupant	1,517	1,566	1,674	1,595	11.11%
Other	306	690	609	48	2.89%
Suicide*	5	5		2	0.02%
Total	14,179	15,249	14,803	12,926	100.0%

*Attempted suicides.



Motorbus Property Damage 2008 - 2011

	2008	2009	2010	2011	% of Total
Property Damage					
Collision with Fixed Object	\$2,045,554	\$1,419,008	\$1,096,383	\$1,467,689	4.73%
Collision with Motor Vehicle	\$15,340,592	\$18,328,153	\$24,069,747	\$21,519,760	62.25%
Collision with Other	\$580,688	\$247,787	\$120,466	\$404,776	1.06%
Collision with Person	\$41,617	\$191,936	\$199,042	\$364,863	0.63%
Collision with Rail Vehicle	\$0	\$0	\$0	\$0	0.00%
Collision with Transit Vehicle	\$0	\$0	\$0	\$546,765	0.43%
Collision with Animal	\$0	\$8,720	\$5,000	\$1,000	0.01%
Total Collision Damage	\$18,008,451	\$20,195,604	\$25,490,638	\$24,304,853	69.11%
Fire	\$3,350	\$36,408	\$92,215	\$10,697,001	8.50%
Tornado, Food, Hurricane	\$4,153,468	\$0	\$11,439,384	\$65,000	12.30%
Other	\$4,902,600	\$4,119,948	\$3,607,529	\$212,991	10.09%
Total Property Damage	\$27,067,869	\$24,351,960	\$40,629,766	\$35,279,845	



Motorbus – Summary

Incidents

- 66.1% “not otherwise classified”
- 28.6% categorized as collisions

Collisions

- 82.7% of collisions are with a motor vehicle
- 23.5% of collisions are side impacts with motor vehicles
- 20.6% rear-ended with motor vehicle

Injuries

- 71.0% transit passengers
- 11.1% other vehicle occupants
- 7.1% bus operator

Fatalities

- 36.2% other vehicle occupants
- 5.4% transit passengers

Property Damage

- 62.2% of property damage resulted from collisions with motor vehicles
- 69.1% of property damage is due to collision
- 12.3% of property damage is weather related
- Fires accounted 8.5% of property damage



Demand Response – Total Incidents and Collisions by Type

	2008	2009	2010	2011	% of Total
Incidents					
Collision with Motor Vehicle	560	493	475	447	
Collision with Person	59	53	44	41	
Collision with Fixed Object	37	21	29	18	
Collision with Other	16	4	2	4	
Total Collisions	672	571	549	519	37.39%
Fire	57	38	21	41	2.54%
Security	1	1	4	4	0.16%
Not otherwise classified (NOC)	994	1,106	871	732	59.91%
Total Incidents	1,724	1,716	1,445	1,296	

	2011	% of Total
Collisions		
Head-on w/ Fixed Object	3	0.58%
Head-on w/ Motor Vehicle	23	4.43%
Other w/ Fixed Object	3	0.58%
Front impact w/ Person	9	1.73%
Front impact w/ Motor Vehicle	46	8.86%
Front impact w/ Fixed Object	5	0.96%
Rear-ended w/ Motor Vehicle	166	31.98%
Rear-ended w/ Unknown	3	0.58%
Rear-ending w/ Motor Vehicle	69	13.29%
Side Impact w/ Person	28	5.39%
Side Impact w/ Motor Vehicle	115	22.16%
Side Impact w/ Unknown	3	0.58%
Side Impact w/ Fixed Object	3	0.58%
Sideswipe w/ Fixed Object	3	0.58%
Sideswipe w/ Motor Vehicle	25	4.82%
Unknown	3	0.58%
Total	519	100.0%



Demand Response – Total Injuries and Fatalities by Type, 2008 - 2011

	2008	2009	2010	2011	% of Total
Fatalities					
Passenger	5	1	3		36.00%
Revenue Facility Occupant		1			4.00%
Operator			1		4.00%
Pedestrian in Crossing			1		4.00%
Pedestrian Not in Crossing			1		4.00%
Other Vehicle Occupant	1	5	4	2	48.00%
Total	6	7	10	2	100.0%

	2008	2009	2010	2011	% of Total
Injuries					
Passenger	1,165	1,229	1,018	942	61.95%
Revenue Facility Occupant	90	101	62	49	4.30%
Operator	245	203	220	202	12.38%
Employee	31	35	36	30	1.88%
Other Worker	4	2		2	0.11%
Bicyclist	21	14	12	10	0.81%
Pedestrian in Crossing	25	25	22	15	1.24%
Pedestrian Not in Crossing	14	15	11	17	0.81%
Other Vehicle Occupant	338	240	245	225	14.91%
Other	46	32	25	10	1.61%
Total	1,979	1,896	1,651	1,502	100.0%



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Demand Response Property Damage 2008 - 2011

	2008	2009	2010	2011	% of Total
Property Damage					
Collision with Fixed Object	\$302,507	\$210,620	\$440,997	\$208,178	7.00%
Collision with Motor Vehicle	\$3,566,250	\$2,915,937	\$2,954,126	\$3,786,853	79.66%
Collision with Other	\$198,100	\$1,337	\$6,634	\$23,421	1.38%
Collision with Person	\$16,050	\$9,313	\$10,865	\$5,300	0.25%
Collision with Rail Vehicle	\$0	\$0	\$0	\$0	0.00%
Collision with Transit Vehicle	\$0	\$0	\$0	\$126,250	0.76%
Collision with Animal	\$0	\$500	\$0	\$0	0.00%
Total Collision Damage	\$4,082,907	\$3,137,707	\$3,412,622	\$4,150,002	89.06%
Main Line Derailment	\$0	\$0	\$0	\$0	0.00%
Fire	\$230,702	\$319,477	\$672,741	\$334,400	9.38%
Tornado, Food, Hurricane	\$72,842	\$0	\$49,000	\$0	0.73%
Other	\$700	\$0	\$0	\$136,024	0.82%
Total Property Damage	\$4,387,151	\$3,457,184	\$4,134,363	\$4,620,426	



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Demand Response - Summary

Incidents

- 59.9% “not otherwise classified”
- 37.4% collisions

Collisions

- 85.5% of collisions are with a motor vehicle
- 23.5% of collisions are side impact with motor vehicles
- 20.6% of collisions are rear-ended with motor vehicle

Injuries

- 61.9% passengers
- 12.4% bus operators

Fatalities

- 48.0% other vehicle occupants
- 36.0% passengers

Property Damage

- 79.7% of property damage resulted from collisions with motor vehicles
- 89.1% of property damage is due to collision
- Fires accounted 9.4% of property damage



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“TOP 10” AND CRITICAL AREAS OF CONCERN



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“Top 10” Research Priorities & Areas of Concern

- Based on data collection and analysis
- Prioritization factors include:
 - Significance of injuries and fatalities (% of total and actual #)
 - Level of exposure of the mode (exposure expressed as PMT and VMT)
 - Actual number of incidents, injuries and fatalities of those modes
 - Property damage



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“Top 10” Critical Areas of Concern (not in priority order)

- Trespasser fatalities in commuter rail
- Suicides in rail modes
- Collisions with pedestrians in light rail, bus, and demand response
- Revenue facility occupant injuries in heavy rail and light rail
- Passenger injuries and fatalities on bus and demand response
- Nonfatal Employee on Duty injuries in commuter rail
- Injuries and fatalities of occupants of other vehicles involved in transit collisions
- Fires on heavy rail, bus and demand response
- Main line derailments of heavy rail and light rail
- Collisions with motor vehicles on light rail, bus, and demand response



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