



U.S. Department
of Transportation
**Federal Transit
Administration**

State Safety Oversight (SSO) Program Annual Report for 2005

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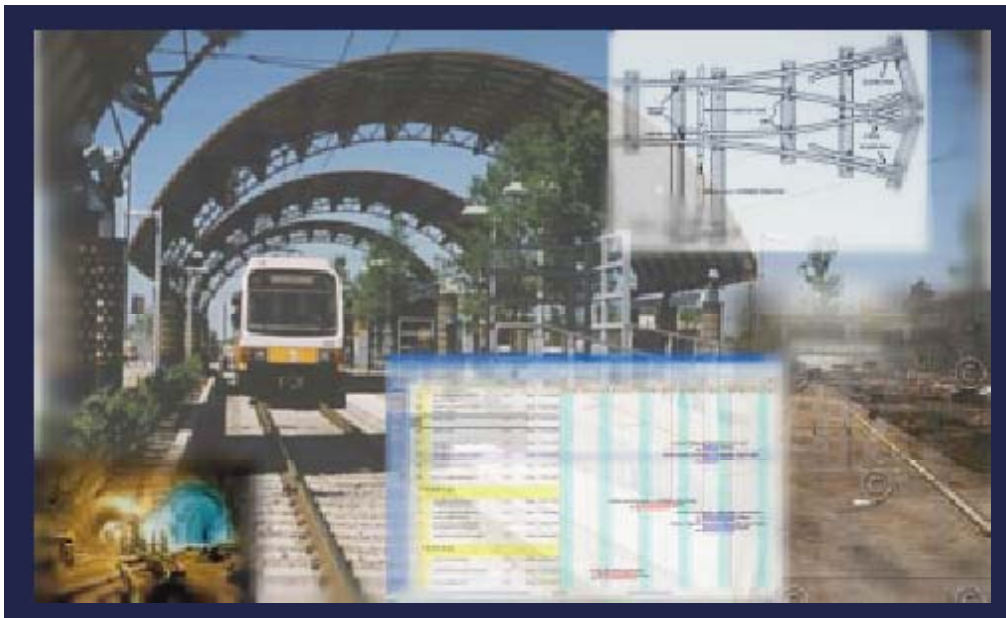


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Background

In 1991, the National Transportation Safety Board (NTSB) released a series of recommendations to the Federal Transit Administration (FTA) regarding the need for safety oversight of rail transit agencies by state government. In response to these recommendations, Congress added section 28 to the Federal Transit Act (codified at 49 U.S.C. section 5330). Based on this new authority, FTA developed a rule creating the first-ever, state-managed safety and security oversight program for rail transit agencies not regulated by the Federal Railroad Administration (FRA). This regulation was published as "Rail Fixed Guideway Systems; State Safety Oversight" on December 27, 1995 (codified at 49 CFR Part 659), subsequently referred to as the SSO Rule or Part 659. The safety requirements for Part 659 went into effect on January 1, 1997, and the security requirements went into effect one year later. FTA recently revised Part 659 in a Final Rule published on April 29, 2005.

FTA's SSO rule stipulates that, among other activities, agencies designated by states to oversee rail transit safety and security must make annual reports to FTA. To facilitate this reporting, each January, FTA distributes an Annual Reporting Template to all SSO agencies. This template captures data pertaining to all reportable accidents, determined probable causes, corrective action plans, changes to program documentation, and agency resource allocation. SSO agencies submit their completed annual reports to FTA by March 15th of each year for the preceding calendar year.

Purpose of Report

The 2005 SSO Annual Report presents safety data provided by the individual SSO agencies and offers industry-wide analysis regarding the types of accidents occurring, their probable causes, and the corresponding impacts of these accidents on passengers, employees, and property. This report documents the safety performance of the rail transit industry for the calendar year 2005 and includes comparison data from the previous two years. Results from this analysis may assist SSO and rail transit agencies in addressing 49 CFR Part 659 requirements and in developing management structures and work programs to effectively plan, implement, and evaluate safety and security-related programs for passenger service.

SSO and rail transit agencies can also use information provided in this report to identify accident trends, emerging issues, and to benchmark their performance against the industry average. Using this information, all involved parties can work more effectively toward the goal of eliminating transit-related deaths, injuries, and property damage.

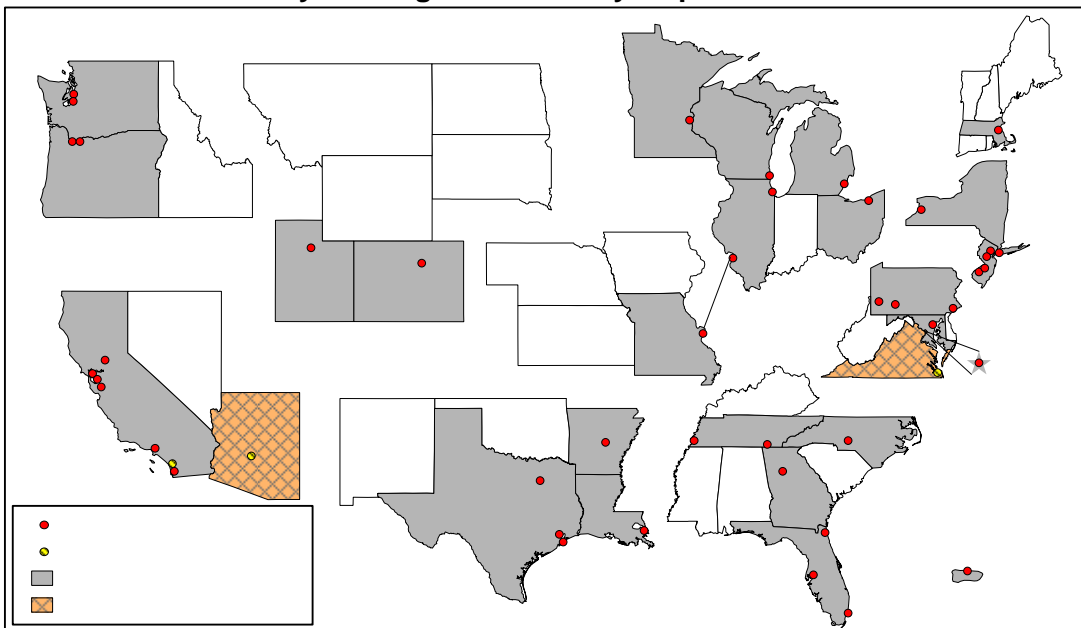
FTA relies on the analysis of SSO annual report data to direct its safety oversight and technical assistance efforts toward those areas involving the highest risks for rail transit agencies. FTA also uses the evaluation of annual report data to determine the effectiveness of its own programs and to identify where improvements can be made.

SSO Community

The community of states and rail transit agencies affected by 49 CFR Part 659 has grown considerably over the last decade. Prior to 1997, there were six (6) designated SSO agencies overseeing the operations of 12 rail transit agencies. In 1997, when Part 659 went into effect, 19 SSO agencies were established to oversee 36 rail transit agencies. In 2005, 26 SSO agencies provided oversight to 44 rail transit agencies. By 2009, as many as six (6) new rail transit agencies and two (2) new oversight agencies may join the program.

Exhibit 1 below shows all States and rail transit agencies affected by Part 659 in 2005 and those states and rail transit agencies that will be affected within the next three years.

Exhibit 1: State Safety Oversight Community Map



Rail transit agencies in the SSO program provide three modes of service:

- *Heavy Rail:* includes metros, subways, and rapid rail; usually has multiple-car trains on fixed, exclusive rights-of-way; and often uses sophisticated signaling systems. Region 8
Denver, CO
- *Light Rail:* includes lightweight passenger rail cars traveling singly or in short two-car trains on a fixed right-of-way, usually not separated from on-street traffic for much of the way. Trains are usually electrically powered. WSDOT
- *Other Rail:* includes automated guideway/monorail systems, inclined planes or funicular systems, and cable car systems. ORDOT

Exhibit 2 on the next page identifies the SSO agencies and rail transit agencies affected by 49 CFR Part 659 in 2005. Region 10
Seattle, WA

Exhibit 2: 2005 State Safety Oversight Community, 2005

FTA Region	State	Oversight Agency	Rail Fixed Guideway System	Modal Systems
1	MA	Massachusetts Department of Telecommunication & Energy (MDTE)	Massachusetts Bay Transportation Authority (MBTA)	HR, LR
2	NJ	New Jersey Department of Transportation (NJDOT)	New Jersey Transit Newark City Subway (NCS)	LR
			New Jersey Transit Hudson-Bergen (HBLR)	LR
			New Jersey Transit River Line (RL)	LR
			Port Authority Transit Corporation (PATCO)	HR
	NY	Public Transportation Safety Board (PTSB)	New York City Transit (NYCT)	HR
			Niagara Frontier Transit Authority (NFTA)	LR
3	DC/VA/MD	Tri-State Oversight Committee (TOC)	Washington Metropolitan Area Transit Authority (WMATA)	HR
	MD	Maryland Department of Transportation (MdDOT)	Maryland Transit Administration (MTA-MD)	HR, LR
	PA	Pennsylvania Department of Transportation (PennDOT)	Southeastern Pennsylvania Transit Authority (SEPTA)	HR, LR
			Port Authority of Allegheny County (PAAC)	LR, IP, IP
			Cambria County Transit Authority (CCTA)	IP
4	FL	Florida Department of Transportation (FDOT)	Metro-Dade Transit Authority (MDTA)	HR, AG
			Jacksonville Transportation Authority (JTA)	AG
			Hillsborough Area Regional Transit (HART)	LR
			Metropolitan Atlanta Rapid Transit Authority (MARTA)	HR
	GA	Georgia Department of Transportation (GDOT)	Chattanooga Area Rapid Transit Authority (CARTA)	IP
	TN	Tennessee Department of Transportation (TDOT)	Memphis Area Transit Authority (MATA)	LR
	PR	Puerto Rico State Emergency and Disaster Management Agency (PREMA)	Puerto Rico Highway and Transportation Authority (PRHTA)	HR
	NC	North Carolina Department of Transportation (NCDOT)	Charlotte Area Transit System (CATS)	LR
5	IL	Regional Transit Authority (RTA)	Chicago Transit Authority (CTA)	HR
	MI	Michigan Department of Transportation (MDOT)	Detroit People Mover (DPM)	AG
	OH	Ohio Department of Transportation (ODOT)	Greater Cleveland Regional Transit Authority (GCRTA)	HR, LR
	WI	Wisconsin Department of Transportation (WisDOT)	Kenosha Transit (KT)	LR
	MN	Minnesota Department of Public Safety (MnDPS)	Metro Transit (MT)	LR
6	LA	Louisiana Department of Transportation and Development (DOTD)	New Orleans Regional Transit Authority (NORTA)	LR
	TX	Texas Department of Transportation (TxDOT)	Galveston Island Transit (GIT)	LR
			Metropolitan Transit Authority of Harris County (MTA-HC)	LR
			Dallas Area Rapid Transit (DART)	LR
	AR	Arkansas Highway and Transportation Department (AHTD)	Central Arkansas Transit Authority (CATA)	LR
7	IL	St. Clair County Transit District (SCCTD)	Bi-State Development Agency (BSDA)	LR
	MO	Missouri Department of Transportation (MoDOT)		
8	CO	Colorado Public Utilities Commission (CoPUC)	Denver Regional Transit District (RTD)	LR
	UT	Utah Department of Transportation (UDOT)	Utah Transit Authority (UTA)	LR
9	CA	California Public Utilities Commission (CPUC)	Bay Area Rapid Transit (BART)	HR
			Los Angeles County Metropolitan Transportation Authority (LACMTA)	HR, LR
			San Francisco Municipal Railway (Muni)	LR, CC
			San Diego Trolley, Inc. (SDTI)	LR
			Sacramento Regional Transit District (SRTD)	LR
			Santa Clara Valley Transit Authority (SCVTA)	LR
			North County Transit District (NCTD)*	LR
	AZ	Arizona Department of Transportation (ADOT)	Regional Public Transportation Authority (RPTA)*	LR
10	OR	Oregon Department of Transportation (ODOT)	Portland Tri-Met (Tri-Met)	LR
			Portland Streetcar (PSC)	LR
	WA	Washington State Department of Transportation (WSDOT)	King County Metro (WFSC)	LR
			Sound Transit (Link)	LR
			Seattle Center Monorail (S Mon)	AG

HR: Heavy Rail, LR: Light Rail, IP: Inclined Plane, AG: Automated Guideway, CC: Cable Car

* New Start Rail Transit Agency

Reporting Thresholds

For Calendar Year 2005, SSO agencies used the accident thresholds established in the original 49 CFR Part 659:

Any event involving the revenue service operation of a rail fixed guideway system if as a result:

1. an individual dies
2. an individual suffers bodily injury and immediately receives medical treatment away from the scene of the accident
3. a collision, derailment, or fire causes property damage in excess of \$100,000

For each event meeting the above-listed thresholds in 2005, the rail transit agency notified the SSO agency. The SSO agency then either conducted an independent accident investigation, or authorized the rail transit agency to conduct the investigation on its behalf.

Each investigation resulted in report, which was adopted by the SSO agency. This report, at a minimum, provided a description of investigation activities, identified causal and contributing factors for the accident, and included a corrective action plan, to be implemented by the rail transit agency to prevent accident recurrence. Each corrective action plan was reviewed and approved by the SSO agency, and its implementation monitored by the SSO agency.

Beginning in Calendar Year 2006, FTA's annual reporting thresholds will change to reflect the revised SSO rule (Part 659.33). These new thresholds include any event that results in the following:

- A fatality at the scene; or where an individual is confirmed dead within thirty (30) days of a rail transit-related incident;
- Injuries requiring immediate medical attention away from the scene for two or more individuals;
- Property damage to rail transit vehicles, non-rail transit vehicles, other rail transit property or facilities and non-transit property that equals or exceeds \$25,000;
- An evacuation due to life safety reasons;
- A collision at a grade crossing;
- A main-line derailment;
- A collision with an individual on a rail right of way; or
- A collision between a rail transit vehicle and a second rail transit vehicle, or a rail transit non-revenue vehicle.

These new thresholds are more closely aligned with information reported by rail transit agencies to the National Transit Database (NTD), *Safety and Security Incident Reporting Module*. In its revised final rule for 49 CFR Part 659, FTA adopted the new thresholds with the intention of conforming the two reporting systems to: reduce reporting burdens; provide SSO agencies with access to NTD reports to supplement their oversight activity; and provide for independent SSO agency verification of NTD data.

Standardization

To interpret data reported for 2005 and to establish trends and rates, FTA uses traditional measures of transportation service, including unlinked passenger trips, vehicle revenue miles, vehicle revenue hours, and passenger miles.

- *Unlinked Passenger Trips*: The number of passengers who board public transportation vehicles. Passengers are counted each time they board vehicles no matter how many vehicles they use to travel from their origin to their destination.
- *Vehicle Revenue Miles*: The miles that vehicles are scheduled to or actually travel while in revenue service. Vehicle revenue miles include layover and recovery time, but exclude deadhead, operator training, vehicle maintenance testing, and charter services.
- *Vehicle Revenue Hours*: The hours that vehicles are scheduled to or actually travel while in revenue service. Vehicle revenue hours include layover and recovery time, but exclude deadhead, operator training, vehicle maintenance testing, and charter services.
- *Passenger Miles*: The cumulative sum of the distances ridden by each passenger.

For 2005, as depicted in **Exhibit 3**, the 26 SSO agencies reported the following service information for the 44 rail transit agencies in the SSO program. In each category of service, rail transit agencies have experienced considerable growth over the last decade.

Exhibit 3: Rail Transit Industry Service Information, 2005

Mode	Unlinked Passenger Trips	Vehicle Revenue Miles	Vehicle Revenue Hours	Passenger Miles
Heavy Rail	2,733,224,881	613,314,552	30,537,691	14,072,194,057
Light Rail	385,936,736	69,122,037	4,628,750	1,703,925,387
Other Rail	21,540,746	2,290,519	316,036	21,684,236
Total	3,140,702,363	684,727,108	35,482,477	15,797,803,680

In 2005, rail transit agencies under the State Safety Oversight Program reported over **3.1 billion unlinked passenger trips**. This level of ridership marks an increase of over 300 million annual passenger trips since 1999. Also, since 1999, there has also been a steady increase in the number of:

- **Annual Vehicle Revenue Miles** provided by the industry – from just over 625 million to almost 685 million;
- **Annual Vehicle Revenue Hours** provided by industry – from 32 million to over 35 million; and
- **Annual Passenger Miles** provided by industry -- from just over 14 billion to just under 16 billion.

SSO Reportable Accidents

For FTA's annual report, accidents are grouped into four categories:

- Collisions,
- Derailments,
- Fires, and
- Other (including suicides, slips and falls, passenger actions, and trespassing-related and other security incidents.)

Exhibit 4 presents the impacts of FTA-reportable accidents between 2003 and 2005 in terms of fatalities and injuries.

Exhibit 4: FTA-Reportable Accidents and Impacts, 2003 - 2005

Category	2003		2004		2005		Total	
	Fatalities	Injuries	Fatalities	Injuries	Fatalities	Injuries	Fatalities	Injuries
Derailments	0	7	0	5	0	11	0	23
Fires	0	188	0	15	0	41	0	244
Collisions	13	219	12	260	13	272	38	751
Non-Grade Crossing	4	116	1	166	9	134	14	416
Grade Crossing	9	103	11	94	4	138	24	335
Other	86	2,659	99	3,680	58	3,192	243	9,531
Totals	99	3,073	111	3,960	71	3,516	281	10,549

Between 2003 and 2005, SSO agencies reported that the rail transit agencies in their jurisdictions experienced:

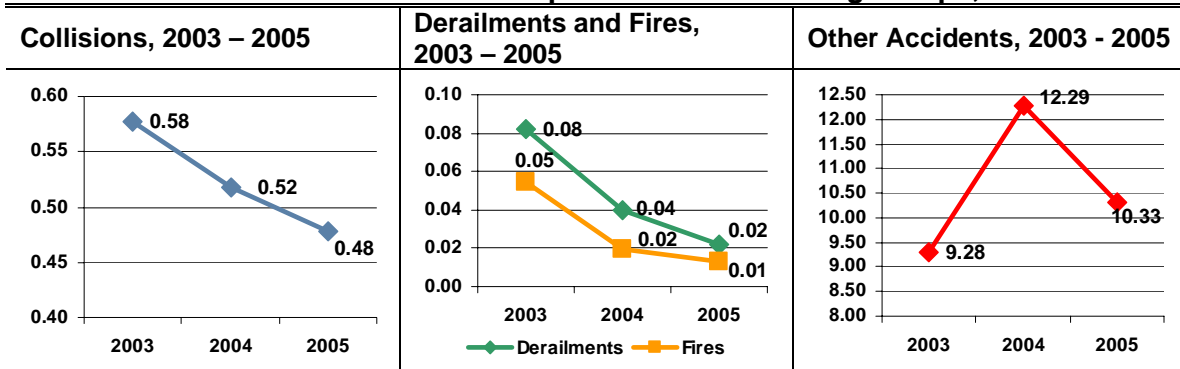
- **476 collisions**, resulting in **38 fatalities** and **751 injuries**;
- **69 derailments and fires**, resulting in **267 injuries** and **0 fatalities**; and
- **9,687 "other" accidents**, resulting in **9,531 injuries** and **243 fatalities**.

"Other" accidents include a range of events such as accidents on escalators, elevators and stairs; slips, trips and falls in stations; injuries boarding and deboarding rail cars; car door injuries; and injuries resulting from sudden train starts and stops. Certain types of employee accidents and accidents involving non-passengers also fall into the "other" category.

Three-Year Accident Trends

When standardized by unlinked passenger trips, the rates of occurrence for collisions, derailments and fires, and other accidents between 2003 and 2005 are depicted in **Exhibit 5**. In spite of the growing number of rail transit agencies in the SSO program between 2003 and 2005, this exhibit shows decreasing trend rates for collisions, derailment and fires. Rates for "other" accidents varied considerably over the three-year period, reaching an all-time high of 12.29 accidents per 10 million passenger trips in 2004.

Exhibit 5: Rail Transit Accident Rates per 10 Million Passenger Trips, 2003 - 2005



- In spite of a growing number of rail transit systems, the total number of reported collisions decreased each year between 2003 and 2005.
- Derailments and fires also trended down over the three-year period.
- The rate of “other” accidents saw-toothed between 2003 and 2005.

Modal Considerations

Exhibits 6 through 8 depict categories of reportable accidents and impacts by mode.

Exhibit 6: Heavy Rail – FTA-Reportable Accident Impacts, 2003 – 2005

Year	Collisions			Derailments			Fires			Other			Total		
	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities
2003	14	10	4	11	0	0	14	188	0	2,479	2,418	79	2,518	2,616	83
2004	9	26	1	9	3	0	5	7	0	3,314	3,286	85	3,337	3,322	86
2005	15	13	2	2	3	0	3	38	0	2,780	2,740	46	2,800	2,794	48
Total	38	49	7	22	6	0	22	233	0	8,573	8,444	210	8,655	8,732	217

Exhibit 7: Light Rail – FTA-Reportable Accident Impacts, 2003 - 2005

Year	Collisions			Derailments			Fires			Other			Total		
	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities
2003	155	209	9	13	7	0	2	0	0	239	231	7	409	447	16
2004	148	234	11	3	2	0	0	0	0	394	381	13	545	617	24
2005	133	258	11	5	8	0	1	3	0	456	447	9	595	716	20
Total	436	701	31	21	17	0	3	3	0	1,089	1,059	29	1,549	1,780	60

Exhibit 8: Other Rail – FTA-Reportable Accident Impacts, 2003 - 2005

Year	Collisions			Derailments			Fires			Other			Total		
	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities
2003	0	0	0	0	0	0	0	0	0	1	10	0	1	10	0
2004	0	0	0	0	0	0	1	8	0	16	13	1	17	21	1
2005	2	1	0	0	0	0	0	0	0	8	5	3	10	6	3
Total	2	1	0	0	0	0	1	8	0	25	28	4	28	37	4

When broken down over the three year period between 2003 and 2005:

- The 13 heavy rail service providers affected by 49 CFR Part 659 accounted for **88 percent** of passenger trips taken on rail transit and experienced **8,655 total accidents**, which resulted in **217 fatalities** and **8,732 injuries**.
- The 33 light rail service providers affected by 49 CFR Part 659 accounted for **11 percent** of passenger trips and experienced **1,549 total accidents**, which resulted in **60 fatalities** and **1,780 injuries**.
- The nine (9) other rail service providers accounted for **one (1) percent** of passenger trips taken on rail transit and experienced **28 total accidents**, which resulted in **four (4) fatalities** and **37 injuries**.

When the data provided by the SSO agencies regarding the total number of accidents, fatalities and injuries are standardized, by mode, using unlinked passenger trips, the following rates result, depicted in **Exhibit 9**:

Exhibit 9: Rates per 10 Million Passenger Trips, 2003 – 2005

Year	Accident Rate			Fatality Rate			Injury Rate		
	Heavy Rail	Light Rail	Other Rail	Heavy Rail	Light Rail	Other Rail	Heavy Rail	Light Rail	Other Rail
2003	9.69	13.13	0.53	0.32	0.51	0.00	10.07	14.35	5.28
2004	12.51	15.84	9.04	0.32	0.70	0.53	12.45	17.94	11.17
2005	10.24	15.42	4.64	0.18	0.52	1.39	10.22	18.55	2.79

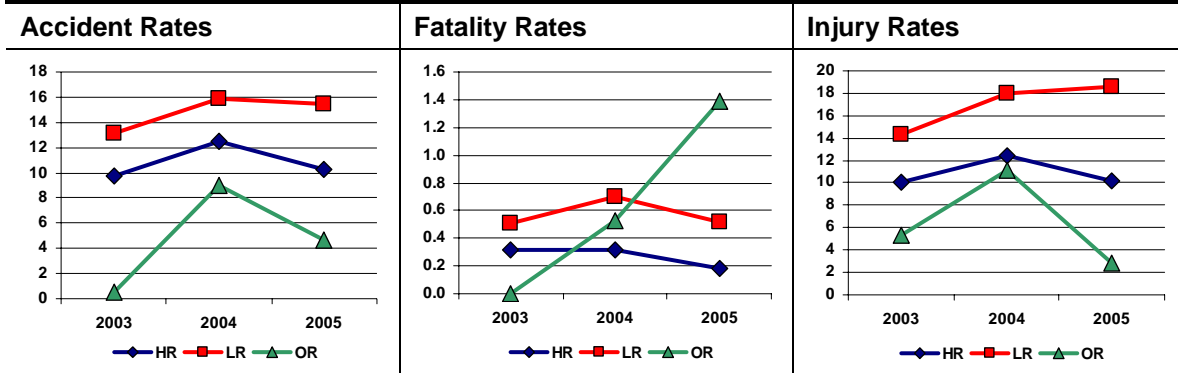
Exhibit 9 demonstrates that heavy rail agencies, in spite of the large number of passengers carried, maintain accident, fatality and injury rates significantly below the rates experienced by light rail agencies. “Other” rail transit agencies experience the lowest accident and injury rates of all modes reporting to FTA’s SSO program, with fatality rates in this mode varying from lowest to highest in comparison to light rail and heavy rail agencies over the three year period.

Collectively, these rates for rail transit compare quite favorably to other modes of transportation, and show not only that rail transit provides a convenient and attractive alternative to traveling by automobile, but also that it is far safer. For example, when compared to accident, fatality and injury rates established by the National Safety Council, in their *2005-2006 Injury Facts*, passengers on rail transit systems, on average,

are 40 times less likely to be involved in a fatality accident, and 20 times less likely to be involved in an accident resulting in injury. Likewise, the NTSB in its *Annual Safety Report for 2005*, shows that of the 45,650 fatalities attributed to transportation in 2005, rail transit, with less than 75 fatalities, is responsible for only .15 percent of the total.

However, as indicated in **Exhibit 10**, there is great variability in rail transit accident, fatality and injury rates. Significant accidents continue to occur, and, when they do, the corresponding rates for accidents, injuries and fatalities fluctuate considerably by mode.

Exhibit 10: Trended Rates per 10 Million Passenger Trips by Mode, 2003 – 2005



As indicated in Exhibit 10, between 2003 and 2005, the accident rate increased by 5 percent for heavy rail transit agencies and 17 percent for light rail agencies. The accident rate ranged dramatically for the other rail transit agencies, from .53 at its lowest to 9.04 at its highest. Between 2003 and 2005, the fatality rate decreased by 43 percent for the heavy rail agencies affected by Part 659; remained relatively stable for the light rail agencies affected by Part 659; and increased sharply for the other rail transit agencies affected by Part 659. Finally, between 2003 and 2005, the injury rate remained stable for the heavy rail agencies; increased by 30 percent for the light rail agencies, and decreased by 89 percent for the other rail transit agencies affected by Part 659.

The challenge for rail transit is to stabilize these low rates and to work to further reduce fatalities and injuries even as the total number of people using transit increases.

Probable Cause

For the past three years, FTA has required SSO agencies to submit probable cause data for each reportable accident. FTA has established a list of standard probable causes for collisions, derailments, and fires, as well as a separate set of categories for “other” accidents. SSO agencies use these pre-defined causes to assign a probable cause to reported accidents.

Established probable causes are listed below.

Probable causes for collisions, derailments and fires:

- **Car Equipment Failure**
 - Car Body
 - Propulsion Unit
 - Trucks
- **Human Failure**
 - Operating Rule Violation
 - Operating Procedures
 - Violations
 - Drug/Alcohol Violation
 - Fatigue
 - Inattentiveness
 - Employee Action
- **Operations**
 - Crowd Control
 - Improper Procedures
- **Track**
 - Track Component Deficiency
 - Track Component Failure
- **Signal**
 - Signal Component Deficiency
 - Signal Component Failure
- **Cable**
 - Cable Component Deficiency
 - Cable Component Failure
- **Actions of Other Vehicle**
- **Actions of Passengers/Station Occupants**
- **Actions of Pedestrians**

Probable causes for “other” accidents:

- **Suicides**
- **Suicide Attempts**
- **Slips, Trips and Falls in Station**
- **Boarding/Deboarding**
- **Car Door**
- **Escalators**
- **Elevator**
- **Homicides**
- **Assaults**
- **Trespassing**
- **Health-related**
- **Material Falling from Structure or Train**
- **Non-Passenger Incidents**
- **Equipment/Maintenance**
- **Sudden Train Movement**
- **Unknown**

Results

Between 2003 and 2005, **10,232 accidents** were reported meeting Part 659 thresholds. **Exhibit 11** provides a detailed break-down of reported probable cause for the 10,232 reported accidents by year. Over the three year period, these accidents resulted in **281 fatalities and 10,549 injuries**. **Exhibit 12** shows the probable causes identified for reportable accidents, fatalities and injuries between 2003 and 2005.

Appendix A provides additional detail on probable causes for fatalities and injuries for all reporting agencies, broken down by heavy rail and light rail modes. **Appendix B** provides analysis on probable causes by the types of accident reported, by year, and by rail transit mode.

Exhibit 11: Probable Causes of Accidents, 2003 – 2005

Probable Cause	2003	2004	2005	Total
Car Equipment Failure				
Car Body	0	0	0	0
Propulsion Unit	3	1	1	5
Trucks	6	6	1	13
Human Failure				
Operating Rule Violation	10	19	14	43
Operating Procedures Violations	6	2	10	18
Drug/Alcohol Violation	0	0	0	0
Fatigue	0	1	0	1
Inattentiveness	30	11	9	50
Employee Action	4	1	4	9
Operations				
Crowd Control	0	1	0	1
Improper Procedures	3	2	0	5
Track Component Deficiencies and/or Failures	4	5	1	10
Signal Component Deficiencies and/or Failures	1	2	1	4
Cable Component Deficiencies and/or Failures	3	2	0	5
Actions of Passenger/Station Occupants	449	597	528	1,574
Actions of Other Vehicles	98	77	63	238
Actions of Pedestrians	36	37	49	122
Other				
Suicides	43	48	19	110
Suicide Attempts	22	29	49	100
Slips, Trips and Falls	1,696	1,951	2,014	5,661
Boarding/Deboarding	46	59	73	178
Car Door	46	96	69	211
Escalators	201	181	101	483
Homicides	1	2	2	5
Assaults	8	432	298	738
Trespassing	31	220	26	277
Health-related	95	4	6	105
Material from Structure or Train Striking a Passenger	3	6	5	14
Non-Passenger Incidents	50	60	8	118
Train Movement	7	13	18	38
Elevator	9	5	16	30
Equipment/Maintenance	4	8	0	12
Unknown	13	21	20	54
Total	2,928	3,899	3,405	10,232

Exhibit 12: Probable Causes of Accidents, Fatalities and Injuries, 2003 – 2005

Probable Cause	Accidents		Fatalities		Injuries	
	Number	Percentage	Number	Percentage	Number	Percentage
Slips, Trips and Falls	5,661	55.33%	13	4.63%	5,702	54.05%
Actions of Passengers/Station Occupants	1,574	15.38%	58	20.64%	1,555	14.74%
Assaults	738	7.21%	0	0.00%	739	7.01%
Escalators/Elevators	513	5.01%	2	0.71%	511	4.84%
Boarding/Alighting (including car door incidents)	389	3.80%	2	0.71%	393	3.73%
Trespassing	277	2.71%	37	13.17%	237	2.25%
Actions of Other Vehicle	238	2.33%	12	4.27%	376	3.56%
Actions of Pedestrian	122	1.19%	18	6.41%	103	0.98%
Non-Passenger Incidents	118	1.15%	8	2.85%	108	1.02%
Human Factors/Human Failure	127	1.24%	6	2.14%	272	2.58%
Suicides	110	1.08%	110	39.15%	0	0.00%
Health-related	105	1.03%	9	3.20%	96	0.91%
Suicide Attempts	100	0.98%	0	0.00%	75	0.71%
Sudden Train Movement	38	0.37%	0	0.00%	47	0.45%
Debris Hitting Passengers from Structure or Train	14	0.14%	1	0.36%	16	0.15%
Equipment Failure (including equipment/maintenance issues and component deficiencies and/or failures in track, cable, signals and car equipment)	49	0.48%	0	0.00%	218	2.07%
Homicides	5	0.05%	5	1.78%	0	0.00%
Unknown	54	0.53%	0	0.00%	101	0.96%
TOTALS	10,232	100%	281	100%	10,549	100%

The data presented in Exhibits 11 and 12 reflect the reality that the majority of accidents reported by rail transit agencies in the SSO program occur at heavy rail transit agencies (84.6 percent). As such, suicides and suicide attempts; the actions of careless or intoxicated passengers and station occupants; slips, trips and falls in passenger stations; escalator/elevator misuse, malfunction or over-crowding; crowding/carelessness and door malfunctions while boarding/alighting rail vehicles, and employee safety issues caused the majority of fatalities and injuries reported in the SSO program between 2003 and 2005.

Light rail agencies account for 15.1 percent of all accidents reported in the SSO program. These agencies experience significant issues with the actions of other vehicles, the actions of pedestrians and trespassers, and human factors/human failures, including rule violations and inattentiveness. Light rail agencies are also experiencing an increasing number of slips, trips and falls.

Other rail transit agencies account for 0.3 percent of all accidents reported in the SSO program between 2003 and 2005. Other rail transit agencies experience their biggest safety concerns from the actions of other vehicles, equipment failures, and human factors/human failures in system operation.

Safety Priorities for SSO Community

Based on the information presented in Exhibits 11 and 12, the probable causes of accidents with the most serious consequences in terms of the number of fatalities and injuries include:

- **Passenger Safety in and near Rail Transit Stations**
 - Actions of Passenger/Station Occupants – 58 fatalities and 1,555 injuries
 - Slips, Trips and Falls – 13 fatalities and 5,702 injuries
 - Escalators/Elevators – 2 fatalities and 511 injuries
- **Collisions**
 - Trespassing – 37 fatalities and 237 injuries
 - Actions of Other Vehicles – 12 fatalities and 376 injuries
 - Actions of Pedestrians – 18 fatalities and 103 injuries
- **Rules/Procedures Compliance and Managing Fatigue**
 - Human Factors/Human Failures – 6 fatalities and 272 injuries
 - Equipment Failure – 218 injuries
- **Passenger Safety on Rail Transit Vehicles**
 - Boarding/Alighting – 2 fatalities and 393 injuries
 - Sudden Train Movement – 47 injuries
- **Transit Worker Safety**
 - Non-Passenger Incidents – 8 fatalities and 108 injuries

This listing excludes suicides (110 fatalities), suicide attempts (100 injuries), homicides (5 fatalities), assaults (739 injuries), and health-related events (9 fatalities and 96 injuries). These events are typically managed through rail transit security programs and public wellness campaigns.

Addressing the Priorities

To support SSO agencies and rail transit agencies in managing and preventing, where possible, these accidents and their consequences, FTA has initiatives underway in the following areas:

- Passenger Safety in Stations and on Vehicles
- Collision Reduction
- Rules/Procedures Compliance and Fatigue Management
- Transit Worker Safety

Each of these initiatives is discussed in greater detail in FTA's *Rail Transit Safety Action Plan*.

Top 10 Safety Action Items

In FTA's *Rail Transit Safety Action Plan*, the results of analysis from the 2005 SSO Annual Report have been combined with the results of analysis from data reported by rail transit agencies to the National Transit Database (NTD) since 2002. Based on this analysis, FTA identified its Top 10 priorities for improving rail transit safety:

- Priority Number 1: Reducing Collisions with Other Vehicles
- Priority Number 2: Reducing Collisions with Pedestrians and Trespassers
- Priority Number 3: Improving Compliance with Operating Rules
- Priority Number 4: Reducing the Impacts of Fatigue on Transit Workers
- Priority Number 5: Reducing Unsafe Acts by Passengers in Transit Stations
- Priority Number 6: Improving Safety of Transit Workers
- Priority Number 7: Improving Safety for Passengers with Disabilities
- Priority Number 8: Removing Debris from Tracks and Stations
- Priority Number 9: Improving Emergency Response Procedures
- Priority Number 10: Improving Safety Data Acquisition and Analysis

The Top 10 priorities identified by FTA in the *Rail Transit Safety Action Plan* coincide with the results of the analysis presented in this 2005 Annual SSO Report. However, the ranking is somewhat different. Results from the 2005 Annual SSO Report indicate that "Reducing Unsafe Acts by Passengers in Transit Stations" is the most significant priority in terms of consequences to passengers, employees, and others who come into contact with the system. However, as explained in FTA's *Rail Transit Safety Action Plan*, priorities and the rankings assigned by FTA are not based only on the numbers of fatalities and injuries, but also on the standardized rates per 10 million passenger trips.

From this perspective, modal distinctions are important. As demonstrated in Exhibit 10, collisions with vehicles, pedestrians and trespassers at rail grade crossings and intersections drive up accident, fatality and injury rates per 10 million passenger trips for light rail agencies. The rates for light rail agencies remain well above the corresponding rates for heavy rail agencies per 10 million passenger trips. In response to the disparity in rates between light rail and heavy rail, FTA made the reduction of these collisions its top priority. In this way, safety resources are focused on ensuring that rail transit passengers receive the same baseline of safety, whether traveling by subway, light rail, or automated guideway.

Improving compliance with operating rules and procedures and reducing the impact of fatigue on transit workers, activities exclusively under the control of the rail transit agency, are the next priorities, and are equally important for both heavy and light rail agencies. FTA then identified reducing unsafe acts by passengers in transit stations as the next priority, which primarily affects heavy rail agencies with stations, mezzanines and parking garages. FTA rounded out the Top 10 by focusing on transit worker safety, safety for passengers with disabilities, good housekeeping practices, improving emergency response, and enhancing safety data acquisition and analysis.

As demonstrated in **Exhibit 13**, FTA's *Rail Transit Safety Action Plan* specifies certain FTA initiatives underway to address each of the Top 10 priorities. More information on each of these initiatives can be found in the *Rail Transit Safety Action Plan*.

Further, based on information obtained from the NTD, FTA's *Rail Transit Safety Action Plan* established performance measures for rail transit agencies. These measures, which appear in **Exhibit 14**, encourage a 10 percent reduction in significant accident categories by 2008.

Finally, based on information provided in the 2005 Annual SSO Report, in the *Rail Transit Safety Action Plan*, FTA also identifies target goals for improvement in the SSO Program. **Exhibit 15** identifies these goals.

Conclusion

For Calendar Year 2006, SSO agencies will be reporting to FTA using the new thresholds specified in the revised 49 CFR Part 659. These thresholds are more closely aligned with the NTD Major Safety and Security Incident Reporting thresholds and should ensure greater consistency in the data used by FTA to monitor how well the rail transit industry and SSO agencies are meeting FTA's performance measures and target safety goals. FTA intends to fold all future reporting on the results from SSO Annual Reports into Annual Updates on the *Rail Transit Safety Action Plan*.

Exhibit 13: FTA's Safety Initiatives

Safety Initiative	Action Item	Status
Passenger Safety in and near Rail Transit Stations	• Training session on addressing passenger safety in and near rail transit stations as part of the hazard management process	To be included at the 2007 SSO Program Manager's Meeting
	• TransitWatch initiative revised to address risky behavior	2007
	• TransitWatch initiative to address housekeeping	2007
	• Guidelines on addressing passenger safety through the hazard management process	To be released in 2008; Working Group to be established in 2007
Collision Reduction	• TCRP Project D-10 Audible Signals for Pedestrian Safety in Light Rail Transit Environments	Final Report Released
	• TCRP Project A-30: Improving Safety Where Light Rail, Pedestrians, and Vehicles Intersect.	Contract awarded in July 2006; work underway
	• Okalahoma State University Best Practices Manual and Training Program	SOW approved in March 2006; work underway
	• Operation Lifesaver (OLI) Light Rail Public Outreach and Driver Education Materials	On-going FTA committee participation
	• FRA, (FRA), Highway-Rail Grade Crossing and Trespasser Prevention Division, research, action plans, and safety data analysis	On-going FTA participation; Secretary's Action Plan to be released soon
	• Update to MUTCD, 2003, Part 10 - Traffic Controls for Highway-Light Rail Transit Grade Crossings	On-going FTA participation
	• APTA rail grade crossing standards and recommended practices	On-going FTA participation
	• Institute of Electrical and Electronics Engineers (IEEE), Rail Transit Vehicle Interface Standards Committee	On-going FTA participation
	• American Society of Mechanical Engineers (ASME), Standards Committee for Rail Transit Vehicles (RT)	Crashworthiness standard due in Fall 2006
	• FTA <i>Accident Notification and Investigation Working Group</i>	On-going
Rules/Procedures Compliance	• Training session on rules/procedures compliance assessment methods and techniques	To be included at the 2007 SSO Program Manager's Meeting
	• Working Group established with industry to develop recommended practice	To be established in 2006
	• Rules/Procedures Compliance Assessment Guidelines developed	To be released by the end of 2007
	• TSI/NTI training	2007
Fatigue Management	• TSI/NTI training	On-going
	• Response to NTSB recommendation R-06-3	Fall 2006
Transit Worker Safety	• Training session on addressing transit worker safety in the SSO Program	To be included at the 2007 SSO Program Manager's Meeting
	• New FTA Circular and guidance addressing construction safety and security for major capital projects	2006
	• Revised FTA Project Management Oversight (PMO) guidelines on construction safety and security oversight	2007
Debris Management	• FTA security initiative and standard on the use and design of trashcans in the rail transit environment	2007
Emergency Response	• TSI/NTI training	On-going
	• Reinstitution of the well-received FTA drill grant program	2007
NTD Training and Enhancements	• Training session on NTD safety and security reporting for State Oversight Agency and rail transit agency safety personnel	2007
	• NTD logons and passwords for State Oversight Agency personnel	2007
	• Integration of NTD into SSO three-year safety review process	On-going
	• FTA reporting on rail transit agency and State Oversight Agency performance measures and target goals	2007
	• FTA "top ten" safety initiatives website	2007

Exhibit 14: Rail Transit Industry Safety Performance Target Goals for Improvement

Performance Measures	3-Year Industry Average Rate		Target Goals for Improvement by 2008	
	Heavy Rail	Light Rail	Heavy Rail	Light Rail
Total Safety Incidents per 10 Million Passenger Trips ¹	23.27	29.86	20.94	26.87
Total Safety Incidents per 1 Million Vehicle Miles ¹	9.96	16.15	8.96	14.54
Major Safety Incidents per 10 Million Passenger Trips ²	.63	8.58	0.57	7.72
Major Safety Incidents per 10 Million Vehicle Miles ²	2.74	45.44	2.47	40.90
Total Fatalities per 100 Million Passenger Trips (including suicides and trespasser-related deaths) ¹	2.79	5.51	2.51	4.96
Total Injuries per 10 Million Passenger Trips ¹	16.9	17.1	15.2	15.4
Total Collisions per 100 Million Passenger Trips ¹	5.33	149.08	4.80	134.17
Major Collisions per 100 Million Passenger Trips ²	1.48	69.44	1.33	62.50
Major Rail Grade Crossing Collisions per 10 Million Passenger Trips ²	0.01	46.30	0.01	41.67
Major Pedestrian and Trespasser Collisions per 10 Million Vehicle Miles ²	.56	4.48	0.50	4.03
Fatalities from Major Collisions per 100 Million Passenger Miles ²	.83	3.8	0.75	3.42
Injuries from Major Collisions per 100 Million Passenger Trips ²	.77	28.93	0.69	26.04
Total Derailments per 100 Million Passenger Miles ¹	3.92	51.76	3.53	46.58
Total Personal Injury Events per 10 Million Passenger Trips ¹	16.43	12.85	14.78	11.57
Total Fires per 10 Million Vehicle Miles ¹	25.81	4.41	23.23	3.97
Major Fires per 10 Million Vehicle Miles ²	4.45	.56	4.01	0.50
Average Number of Injuries per Incident	.72	.61	0.65	0.55
¹ As reported on both NTD S&S-40 Form "Major Safety and Security Incidents" and NTD S&S-50 Form "Non-Major Summary Report"				
² As reported only on the NTD S&S-40 Form "Major Safety and Security Incidents"				

Exhibit 15: SSO Agency Target Goals for Improvement

Performance Measure	Target Goal for Improvement by 2009
Dedicated Personnel	<ul style="list-style-type: none"> • Each State with a single rail transit agency in its jurisdiction that provides more than 15 million unlinked annual passenger trips has a minimum of 1 full-time equivalent devoted to the SSO Program. • Each State with a single rail transit agency in its jurisdiction that provides less than 15 million unlinked annual passenger trips has a minimum of .5 full-time equivalent devoted to the SSO Program. • Each State with more than one rail transit agency its jurisdiction has a minimum of 2 full-time equivalents devoted to the SSO Program.
Training and Certification	<ul style="list-style-type: none"> • Each State Safety Oversight Program Manager has attended all three invitational workshops to be provided by FTA between 2007 and 2009, and has satisfactorily completed the oversight management training sessions, including completion of written tests. • 70 percent of State Safety Oversight Program Managers have obtained a certificate from the Transportation Safety Institute (TSI), Transit Safety and Security Division, attesting to their completion of five (5) specified rail transit safety and security courses within a consecutive three (3) year time-frame. These courses include: <ul style="list-style-type: none"> ○ Transit System Safety FT00464/Transit Rail System Safety FT00439 ○ Transit Industrial Safety Management FT00457 ○ Transit System Security FT00432 ○ Effectively Managing Transit Emergencies FT00456 ○ Transit Rail Incident Investigation FT00430 • 50 percent of State Safety Oversight Program Managers have also completed National Transit Institute (NTI) training courses devoted to System Security Awareness for Transit Employees, Terrorist Activity Recognition and Reaction, and Toolbox for Transit Operator Fatigue: Putting the Report into Action. • 40 percent of State Safety Oversight Program Managers have obtained a certificate from the World Safety Organization (WSO), at a minimum classifying them as a Certified Safety Specialist.
Hazard Management Process	<ul style="list-style-type: none"> • Each State Safety Oversight Agency, as demonstrated through FTA's SSO Audit Program, oversees a hazard management process that effectively addresses passenger slips, trips, and falls and other single-person injury events at the rail transit agencies within their jurisdiction.
NTD Training and Participation	<ul style="list-style-type: none"> • Each State Safety Oversight Program Manager has received a NTD logon and password; has received training in how to review NTD reports; and has integrated the use of NTD into their oversight of accident investigations.
Three-year Safety Reviews	<ul style="list-style-type: none"> • Each State Oversight Agency has performed a three-year review for each of the rail transit agencies in its jurisdiction that meets all FTA requirements; including the review of programs for compliance with operating rules and procedures, transit worker safety, and safety data and acquisition, and has received, reviewed and approved corrective action plans from the rail transit agency to address any findings.

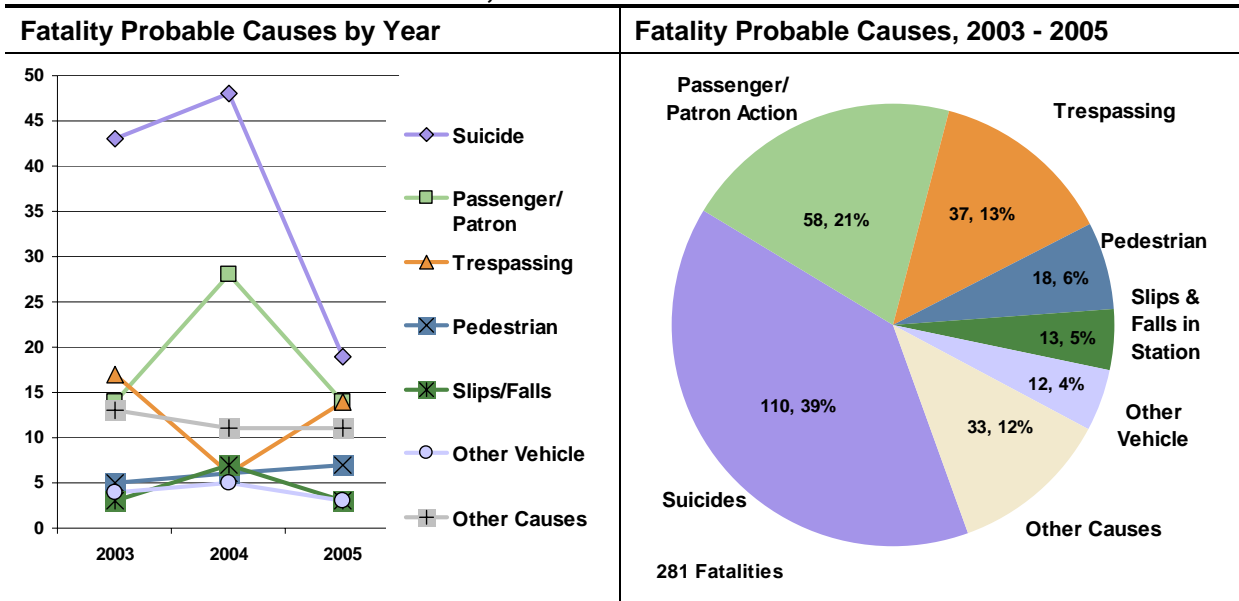
Appendix A

This appendix provides detailed analysis on the probable causes of fatalities and injuries occurring between 2003 and 2005.

Fatalities

The figure below provides an overview of the most common probable causes of fatalities in the rail transit industry.

Exhibit A-1: Rail Transit Fatalities, 2003 – 2005

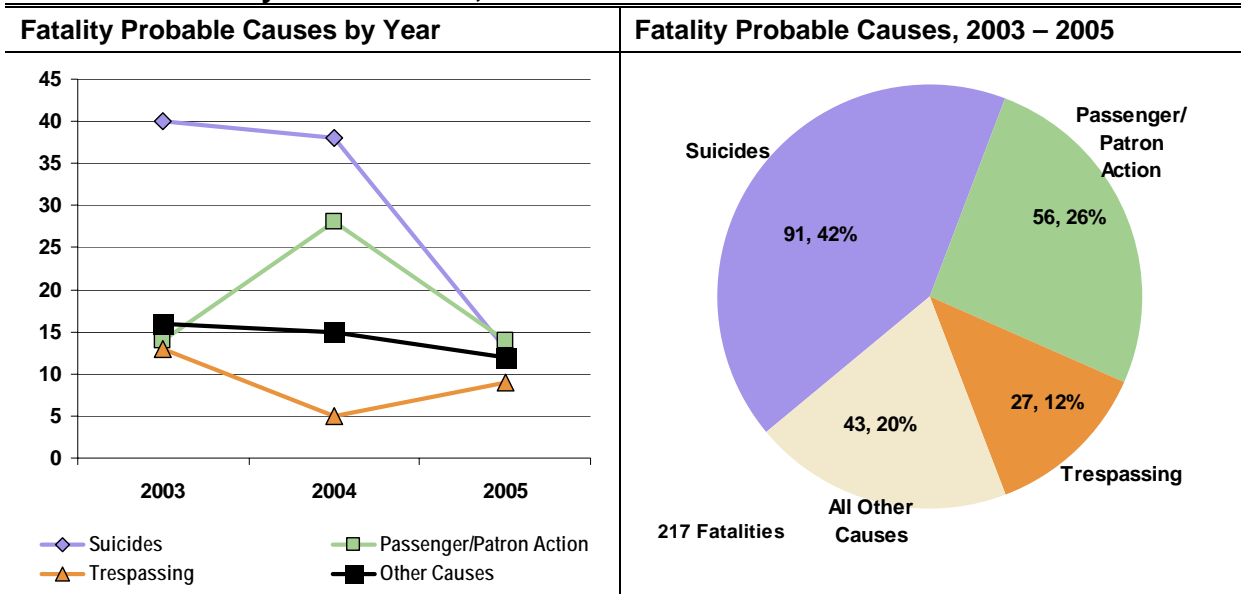


- Suicides account for 40 percent of rail transit fatalities.
- Passenger/Patron Action, which includes accidents resulting from risky or careless behavior by passengers on rail transit vehicles or patrons in rail transit stations and at rail transit stops, accounts for 21 percent of rail transit fatalities.
- Trespasser-related incidents account for 13 percent of rail transit fatalities.
- The “Other Causes” category, which accounts for 12 percent of rail transit fatalities, includes:
 - Health-related (9 fatalities),
 - Miscellaneous Non-Passenger Incidents (8 fatalities),
 - Inattentiveness (5 fatalities),
 - Homicides (5 fatalities),
 - Boarding/Deboarding (2 fatalities),
 - Escalators (2 fatalities),
 - Operating Procedures Violation (1 fatality), and
 - Material Falling from Structure or Train (1 fatality).
- Pedestrian-related incidents account for 6 percent of fatalities.
- Slips, trips and falls in stations accounted for 5 percent of rail transit fatalities.
- Incidents involving drivers and passengers in other vehicles account for 4 percent of rail transit fatalities.

Heavy Rail

Heavy rail systems reported **217 fatalities** between 2003 and 2005. The 60 fatalities reported in 2005 represent a decrease of 39% since 2003. Suicides and trespassing events accounted for 91 fatalities during the three-year period. An additional 56 fatalities were found to have occurred due to the actions of passengers or patrons, such as slips and falls onboard a train, leaning into an oncoming train at the station, exiting from the train prematurely, and leaping to the track bed.

Exhibit A-2: Heavy Rail Fatalities, 2003 – 2005

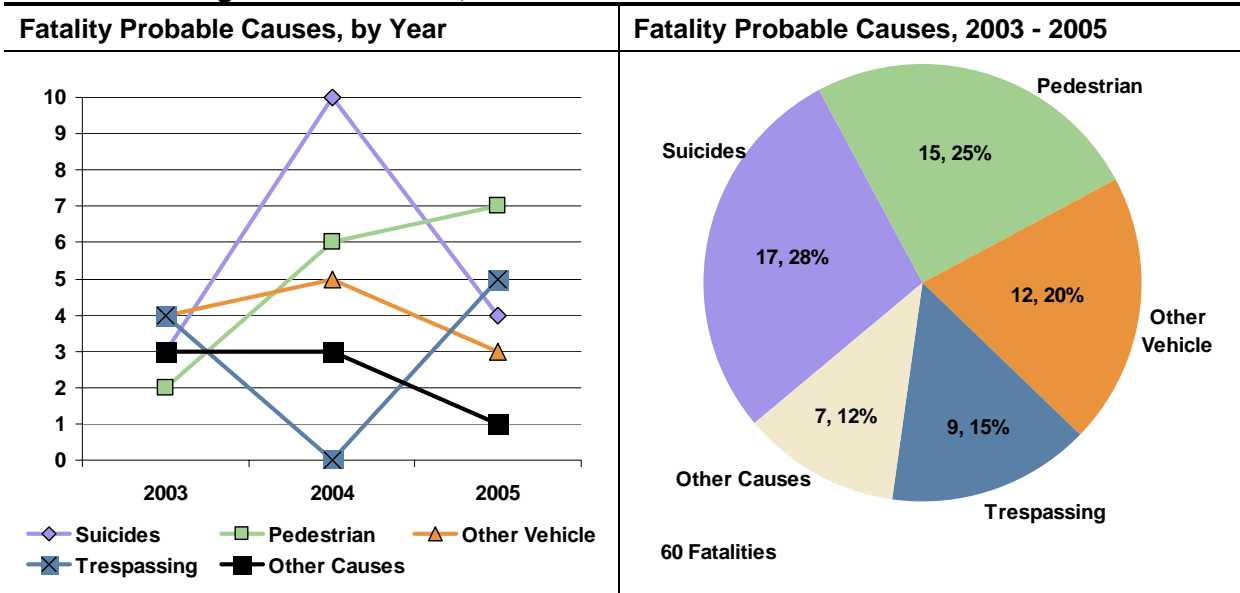


- Heavy Rail fatalities have declined over the three-year period by 39%.
- Over the period 2003 through 2005, Suicides, Trespassing, and Passenger/Patron Actions have accounted for 80% of all heavy rail fatalities.
- Since 2003 Suicides, Trespassing, and Other Cause fatalities have decreased 51.

Light Rail

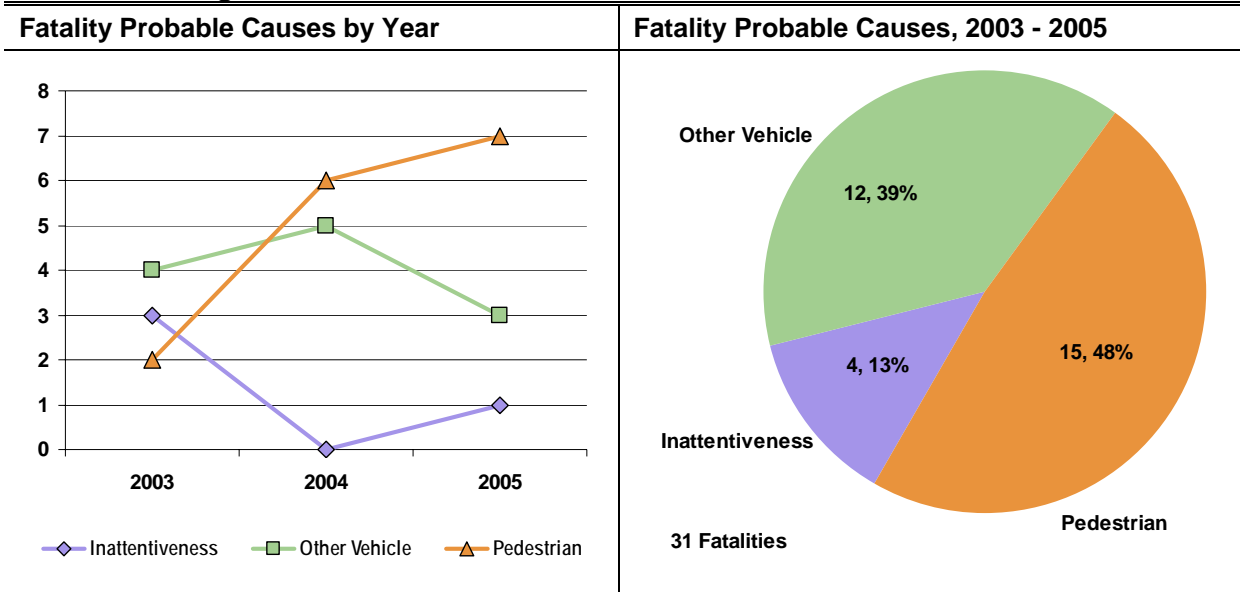
Light rail systems reported **60 fatalities** between 2003 and 2005. **Collisions** resulted in **31 fatalities** (52%) and “**other**” accidents resulted in **29 fatalities** (48%). The following graphs present the reported light rail fatalities by probable cause.

Exhibit A-3: Light Rail Fatalities, 2003 - 2005



- Light rail fatalities decreased by 17% in 2005 from 2004 but were still 25% higher than the level reported in 2003.
- Suicides are the most common cause of light rail fatalities (17 fatalities). Combined with Trespassing-related deaths, the two probable causes account for 26 light rail fatalities (43%).
- Suicides decreased by 60% in 2005.
- Trespassing-related fatalities increased by 25% from 2003 to 2005.
- External causes such as Pedestrians and Other Vehicles resulted in 17 light rail fatalities, 28% of all light rail fatalities between 2003 and 2005.
- Pedestrian-caused fatalities have increased by 250% since 2003.
- Other Vehicle-caused fatalities have decreased by 25% since 2003.

Exhibit A-4: Light Rail Collision Fatalities, 2003 - 2005

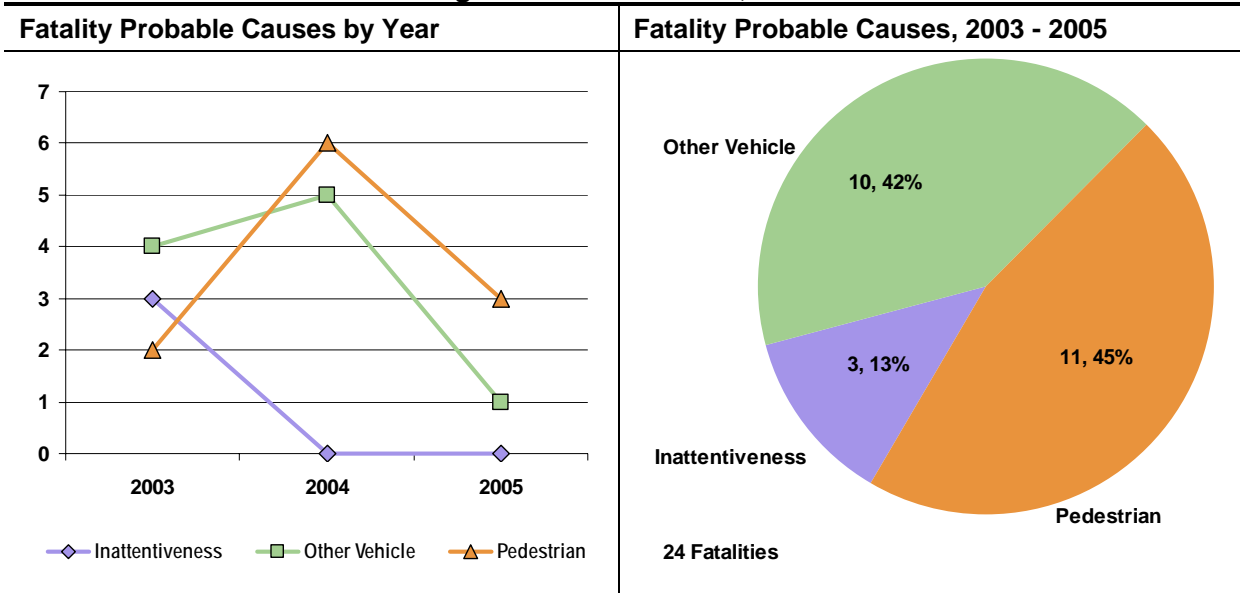


- Pedestrian-caused fatalities increased by 250% between 2003 and 2005.
- Pedestrians were the most common cause of light rail collision-related fatalities between 2003 and 2005, causing 15 fatalities (48% of light rail collision-related fatalities).
- Fatalities due to Inattentiveness and Other Vehicles have decreased by 43% since 2003.
- External causes such as Pedestrians and Other Vehicles accounted for 27 fatalities (87%) between 2003 and 2005.
- Operator Inattentiveness caused 4 fatalities during the three-year period (13% of light rail collision-related fatalities).

Rail Grade Crossing Collisions

Light Rail systems reported **254 rail grade crossing collisions** between 2003 and 2005. The 254 grade crossing collisions resulted in a total of **24 fatalities**. The following graphs present the probable causes of the 24 rail grade crossing fatalities.

Exhibit A-5: Rail Grade Crossing Collision Fatalities, 2003 - 2005

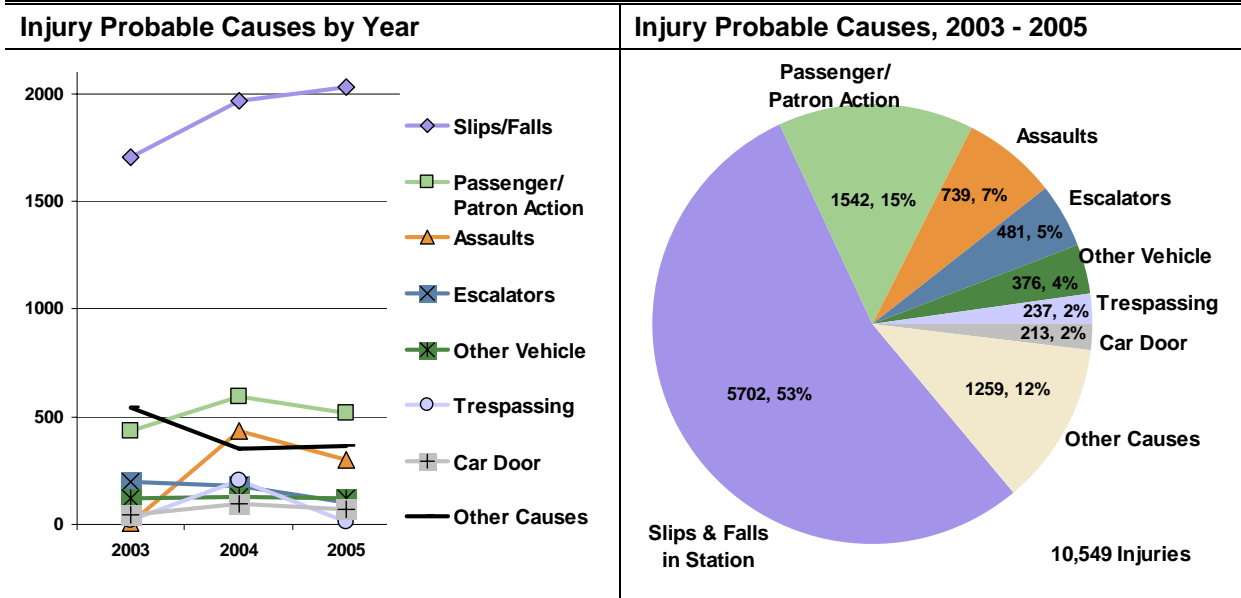


- Pedestrian and Other Vehicle-caused fatalities decreased by 64% between 2004 and 2005.
- Pedestrians were the most common cause of rail grade crossing fatalities between 2003 and 2005, causing 11 fatalities (45% of grade crossing collisions).
- Other Vehicles caused 10 grade crossing fatalities during the three-year period (42%).
- External causes such as Pedestrians and Other Vehicles combined for 21 rail grade crossing fatalities (87%) between 2003 and 2005.
- Operator Inattentiveness has not caused a grade crossing fatality since 2003.
- Inattentiveness caused 3 grade crossing fatalities during the three-year period (13%).

Injuries

The figure below provides an overview of the most common probable causes of injuries in the rail transit industry.

Exhibit A-6: Rail Transit Injuries, 2003 – 2005

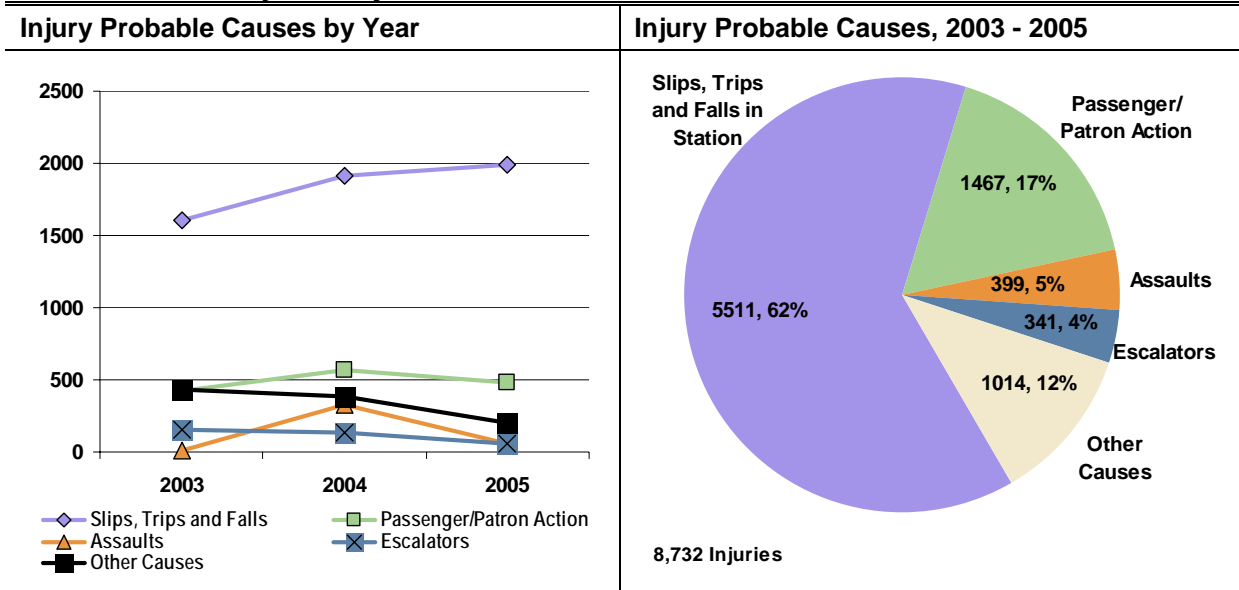


- Total rail transit injuries have increased by 14% since 2003.
- Slips Trips and Falls in the Station have increased by 19% since 2003.
- Slips trips and Falls in the Station account for 53% of injuries since 2003.
- The “Other Causes” category, which accounts for 12% of all rail transit injuries, includes Boarding/Deboarding (180 injuries), Propulsion Unit (170 injuries), Operating Rule Violation (137 injuries), Inattentiveness (108 injuries), Miscellaneous Non-Passenger Incidents (108 injuries), Pedestrian (103 injuries), Health-related (96 injuries), Suicide Attempts (75 injuries), Miscellaneous (57 injuries), Train Movement (47 injuries), Unknown (44 injuries), Elevator (30 injuries), Operating Procedures Violations (16 injuries), Cable Component Deficiency (16 injuries), Material Falling from Structure or Train (16 injuries), Track Component Deficiency (13 injuries), Passenger (13 injuries), Equipment/Maintenance (12 injuries), Employee (9 injuries), Trucks (3 injuries), Signal Component Failure (2 injuries), Crowd Control (1 injuries), Improper Procedures (1 injuries), Track Component Failure (1 injuries), and Signal Component Deficiency (1 injuries).

Heavy Rail

Heavy rail systems reported **8,732 injuries** between 2003 and 2005. **Collisions** resulted in **49 injuries** (0.56%), **derailments** resulted in **6 injuries** (0.07%), **fires** resulted in **233 injuries** (2.67%) and **“other” accidents** resulted in **8,444 injuries** (96.70%). The following graphs present the reported heavy rail injuries by probable cause.

Exhibit A-7: Heavy Rail Injuries, 2003 - 2005

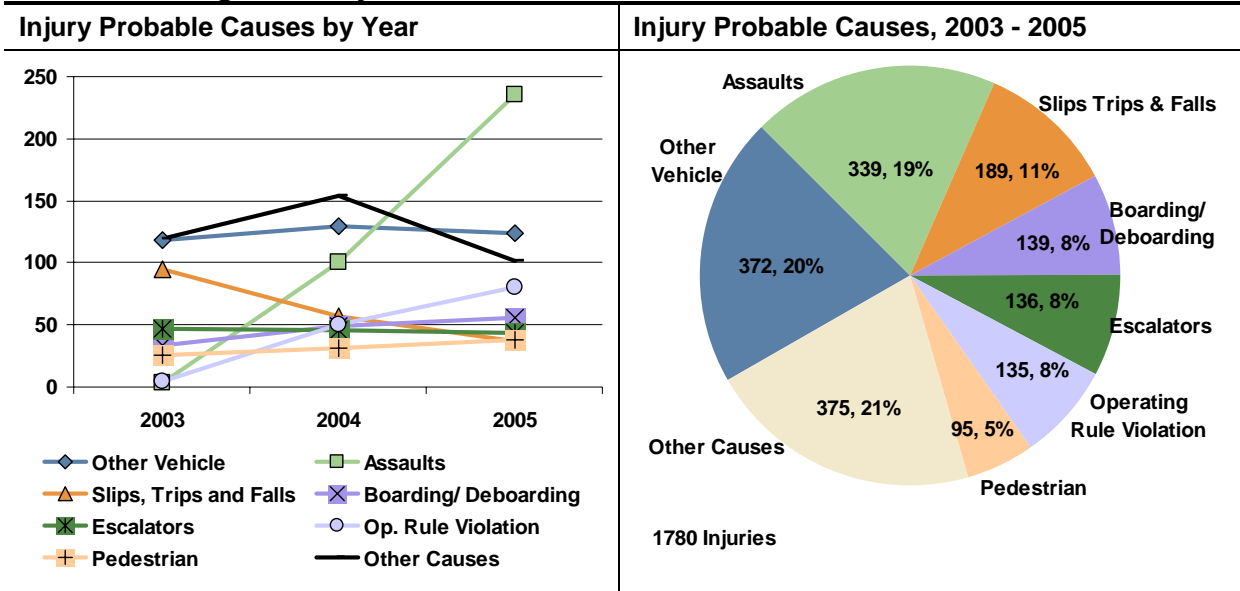


- Heavy rail injuries due to Passenger/Patron Action, Assaults, Escalators, and Other Causes decreased by 43% in 2005.
- Injuries due to Slips, Trips and Falls in the Station have increased by 24% since 2003.
- Slips, Trips and Falls in the Station and Passenger/Patron Action resulted in a combined 6,978 injuries (82% of heavy rail injuries) over the three-year period.
 - Examples of Passenger/Patron Action include slips and falls aboard rail transit vehicles, patrons leaning into trains in the station, passengers prematurely exiting trains, and other miscellaneous passenger injuries.
- The “Other Causes” category includes Trespassing (168 injuries), Propulsion Unit (159 injuries), Car Doors (134 injuries), Non-Passenger Incidents (108 injuries), Health-related events (92 injuries), Suicide Attempts (67 injuries), Miscellaneous (48 injuries), Boarding/Deboarding (41 injuries), Unknown (34 injuries), Elevators (29 injuries), Train Movement (27 injuries), Inattentiveness (24 injuries), Material Falling from Structure or Train (16 Injuries), Cable Component Deficiency (16 injuries), Track Component Deficiency (11 injuries), Passenger (7 injuries), Pedestrian (7 injuries), Equipment/Maintenance (7 injuries), Other Vehicle (4 injuries), Operating Procedures Violation (4 injuries), Trucks (3 injuries), Employee (3 injuries), Operating Rule Violation (2 injuries), Signal Component Failure (2 injuries), and Improper Procedures (1 injury).

Light Rail

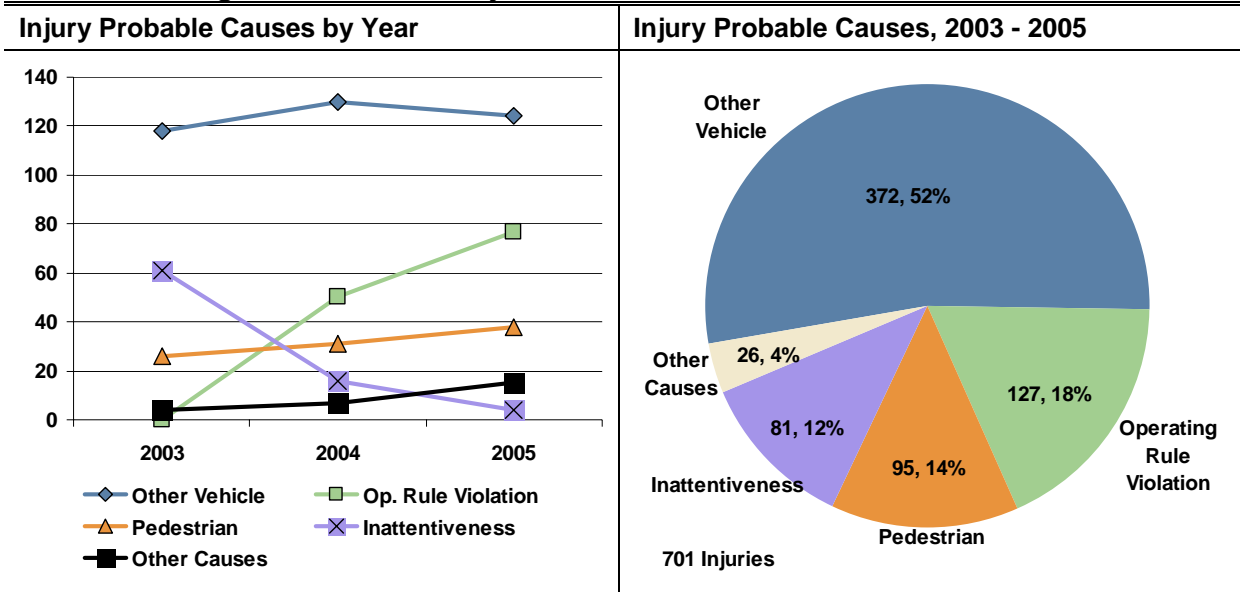
Light rail systems reported **1,780 injuries** between 2003 and 2005. **Collisions** resulted in **701 injuries** (39.38%), **derailments** resulted in **17 injuries** (0.96%), **fires** resulted in **3 injuries** (0.17%) and **“other” accidents** resulted in **1,059 injuries** (59.49%). The following graphs present the reported light rail injuries by probable cause.

Exhibit A-8: Light Rail Injuries, 2003 - 2005



- Total light rail injuries have increased by 60% between 2003 and 2005.
- Light rail assault injuries increased by 136% in 2005.
- Other Vehicles and Pedestrians have caused a combined 467 light rail injuries over the three-year period. These two causes represent 25% of reported light rail injuries.
- Light Rail assault-related injuries have increased dramatically between 2003 and 2005. Light systems reported 339 injuries due to assaults over the three-year period (19% of light rail injuries).
- The 135 injuries due to Operating Rule Violations resulted from 36 accidents. This is an average of 3.75 injuries per Operating Rule Violation accident.
- Injuries due to Slips, Trips and Falls in the Station have increased since 2003. Slips, Trips and Falls in the Station resulted in 189 injuries (11% of light rail injuries) over the three-year period.
- The “Other Causes” category includes Inattentiveness (84 injuries), Car Door (81 injuries), Passenger/Patron Action (70 injuries), Trespassing (69 injuries), Operating Procedures Violation (12 injuries), Miscellaneous (9 injuries), Unknown (9 injuries), Suicide Attempts (7 injuries), Employee (6 injuries), Passenger (6 injuries), Equipment/Maintenance (5 injuries), Health-Related (4 injuries), Train Movement (4 injuries), Propulsion Unit (3 injuries), Track Component Deficiency (2 injuries), Track Component Failure (1 injury), Signal Component Deficiency (1 injury), and Elevator (1 injury).

Exhibit A-9: Light Rail Collision Injuries, 2003 - 2005

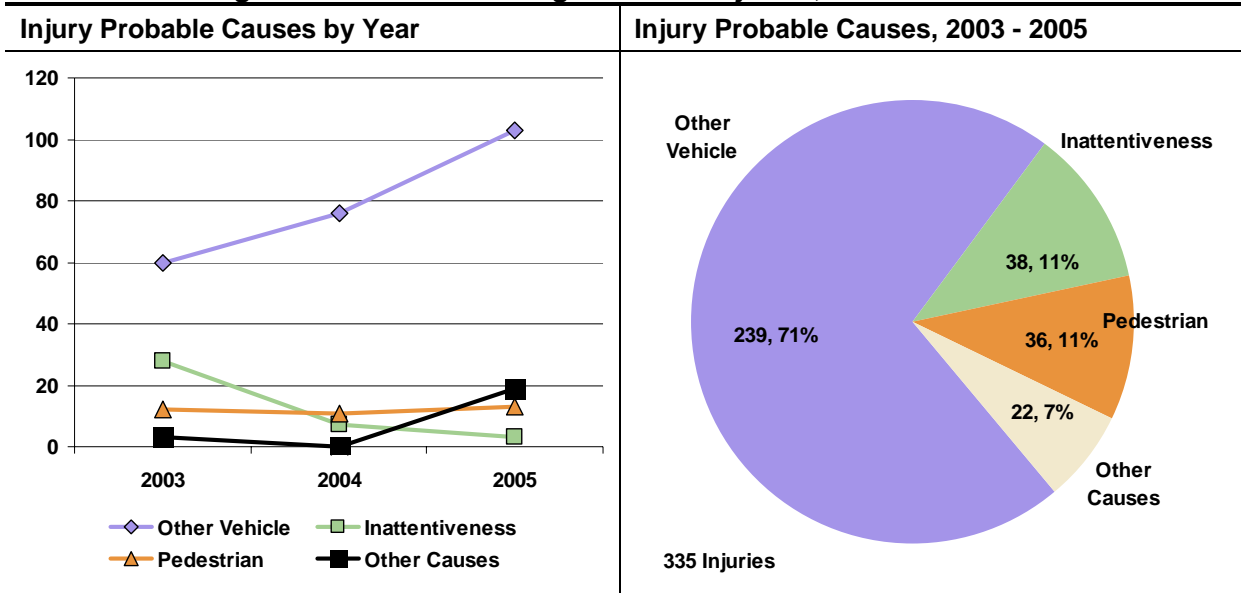


- Total light rail collision-related injuries increased by 23% between 2003 and 2005.
- Collisions due to Operator Inattentiveness have declined by 93% over the three-year period. Inattentiveness has caused 81 light rail collision-related injuries (12%) between 2003 and 2005.
- Other Vehicles and Pedestrians have caused a combined 467 light rail collision-related injuries over the three-year period. These two probable causes represent 64% of reported light rail collision-related injuries.
- An increasing number of light rail collision-related injuries have been caused by Operating Rule Violations between 2003 and 2005. Operating Rule Violations are responsible for 127 injuries (18%) over the three-year period.
- The “Other Causes” category includes Operating Procedures Violation (12 injuries), Passenger (6 injuries), Miscellaneous (5 injuries), Track Component Deficiency (2 injuries), and Crowd Control (1 injury).

Rail Grade Crossing Collisions

Light Rail systems reported **254 rail grade crossing collisions** between 2003 and 2005. The 254 grade crossing collisions resulted in a total of 335 injuries. The following graphs present the probable causes of the 335 rail grade crossing injuries.

Exhibit A-10: Light Rail Grade Crossing Collision Injuries, 2003 - 2005



- Total rail grade crossing collision-related injuries have increased by 34% between 2003 and 2005.
- Grade crossing collision injuries due to Other Vehicles and Pedestrians have increased by 61% over the three-year period. These two probable causes resulted in 275 injuries (82% of grade crossing injuries) between 2003 and 2005.
- Operator Inattentiveness has decreased by 89% since 2003. Inattentiveness resulted in 38 injuries (11%) over the three-year period.
- The “Other Causes” category includes Operating Rule Violation (14 injuries), Operating Procedures Violation (4 injuries), Signal Component Deficiency (2 injuries), and Miscellaneous (2 injuries).

Appendix B

This appendix provides probable cause data by accident types and rail transit modes by year.

Exhibit B-1: 2005 Probable Cause Distribution – Collisions, Derailments, Fires

Probable Cause	Heavy Rail									Light Rail									Other Rail									Total								
	Collisions			Derailments			Fires			Collisions			Derailments			Fires			Collisions			Derailments			Fires			Collisions			Derailments			Fires		
	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities			
Car Equipment Failure																																				
Car Body	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Propulsion Unit	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	3	0
Trucks	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0
Human Failure																																				
Operating Rule Violation	0	0	0	0	0	0	0	0	0	13	77	0	1	3	0	0	0	0	0	0	0	0	0	0	0	0	0	13	77	0	1	3	0	0	0	0
Operating Procedures Violations	4	3	1	0	0	0	0	0	0	4	12	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	9	15	1	1	0	0	0	0	0
Drug/Alcohol Violation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fatigue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Inattentiveness	3	3	0	0	0	0	0	0	0	5	4	1	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	8	7	1	1	1	0	0	0	0
Operations																																				
Crowd Control	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Improper Procedures	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Track																																				
Track Component Deficiency	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Track Component Failure	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Signal																																				
Signal Component Deficiency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Signal Component Failure	0	0	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	0	0
Cable																																				
Cable Component Deficiency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cable Component Failure	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Other Vehicle																																				
Passenger	4	3	1	0	0	0	0	0	0	2	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	5	1	0	0	0	0	0	0
Pedestrian	3	3	0	0	0	0	0	0	0	45	38	7	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	49	42	7	0	0	0	0	0	0
Miscellaneous	0	0	0	1	2	0	3	38	0	1	1	0	1	4	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	2	6	0	3	38	0
Total	15	13	2	2	3	0	3	38	0	133	258	11	5	8	0	1	3	0	2	1	0	0	0	0	0	0	0	150	272	13	7	11	0	4	41	0

Exhibit B-3: 2003 Probable Cause Distribution – Collisions, Derailments, Fires

Probable Cause	Heavy Rail									Light Rail									Other Rail									Total								
	Collisions			Derailments			Fires			Collisions			Derailments			Fires			Collisions			Derailments			Fires			Collisions			Derailments			Fires		
	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities	Accidents	Injuries	Fatalities			
Car Equipment Failure																																				
Car Body	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Propulsion Unit	0	0	0	0	0	0	2	159	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	159	0
Trucks	0	0	0	3	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0
Human Failure																																				
Operating Rule Violation	0	0	0	1	0	0	4	0	0	0	0	0	5	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	5	0	4	0	0
Operating Procedures Violations	1	0	0	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	5	0	0	0	0	0
Drug/Alcohol Violation	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Fatigue	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Inattentiveness	0	0	0	0	0	0	0	0	0	29	61	3	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	29	61	3	1	2	0	0	0	0
Operations																																				
Crowd Control	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Improper Procedures	0	0	0	0	0	0	1	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0
Track																																				
Track Component Deficiency	0	0	0	0	0	0	1	11	0	1	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	1	0	0	1	11	0
Track Component Failure	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Signal																																				
Signal Component Deficiency	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Signal Component Failure	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
Cable																																				
Cable Component Deficiency	0	0	0	0	0	0	2	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	16	0
Cable Component Failure	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0
Other Vehicle	2	3	0	0	0	0	2	1	0	94	118	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	96	121	4	0	0	0	2	1	0
Passenger	3	2	1	0	0	0	1	0	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	4	1	0	0	0	1	0	0
Pedestrian	7	4	3	0	0	0	0	0	0	29	26	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	36	30	5	0	0	0	0	0	0
Miscellaneous	1	1	0	1	0	0	1	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	1	0	0	1	1	0
Total	14	10	4	11	0	0	14	188	0	155	209	9	13	7	0	2	0	0	0	0	0	0	0	0	0	0	0	169	219	13	24	7	0	16	188	0

Exhibit B-4: 2003 - 2005 Rail Grade Crossing Collision Probable Cause Distribution

Rail Grade Crossing Collisions Probable Cause	2003			2004			2005			Total		
	Acc	Inj	Fat	Acc	Inj	Fat	Acc	Inj	Fat	Acc	Inj	Fat
Car Equipment Failure												
Car Body	0	0	0	0	0	0	0	0	0	0	0	0
Propulsion Unit	0	0	0	0	0	0	0	0	0	0	0	0
Trucks	0	0	0	0	0	0	0	0	0	0	0	0
Human Failure												
Operating Rule Violation	0	0	0	0	0	0	2	14	0	2	14	0
Operating Procedures Violation	0	0	0	0	0	0	1	4	0	1	4	0
Drug/Alcohol Violation	0	0	0	0	0	0	0	0	0	0	0	0
Fatigue	0	0	0	0	0	0	0	0	0	0	0	0
Inattentiveness	17	28	3	5	7	0	3	3	0	25	38	3
Operations												
Crowd Control	0	0	0	0	0	0	0	0	0	0	0	0
Improper Procedures	0	0	0	0	0	0	0	0	0	0	0	0
Track												
Track Component Deficiency	0	0	0	0	0	0	0	0	0	0	0	0
Track Component Failure	0	0	0	0	0	0	0	0	0	0	0	0
Signal												
Signal Component Deficiency	1	2	0	0	0	0	0	0	0	1	2	0
Signal Component Failure	0	0	0	0	0	0	0	0	0	0	0	0
Cable												
Cable Component Deficiency	0	0	0	0	0	0	0	0	0	0	0	0
Cable Component Failure	0	0	0	0	0	0	0	0	0	0	0	0
Other Vehicle	81	60	4	51	76	5	47	103	1	179	239	10
Passenger	0	0	0	0	0	0	0	0	0	0	0	0
Pedestrian	11	12	2	17	11	6	16	13	3	44	36	11
Miscellaneous	1	1	0	0	0	0	1	1	0	2	2	0
Total	111	103	9	73	94	11	70	138	4	254	335	24

Exhibit B-5: 2003 - 2005 Heavy Rail "Other" Accident Probable Cause Distribution

Probable Cause	2003			2004			2005		
	Acc	Inj	Fat	Acc	Inj	Fat	Acc	Inj	Fat
Suicides	40		40	38		38	13		13
Suicide Attempts	19	19		28	29		45	19	
Slips, Trips and Falls	1601	1607	3	1892	1911	5	1975	1993	3
Boarding/Deboarding	14	15	0	9	8	1	17	18	0
Car Door	28	29	0	58	58	0	44	45	
Escalators	154	153	1	131	131	0	58	57	1
Homicides	1		1	2		2	2		2
Assaults	5	6		331	331		62	62	
Trespassing	24	12	13	158	152	5	11	4	9
Health-related	92	90	2	4	2	2	4	0	4
Passenger/Station Occupant	429	419	14	568	563	28	490	483	14
Material Falling from Structure or Train	3	2	1	6	9	0	5	5	0
Miscellaneous Non-Passenger Incidents	50	46	4	60	54	4	8	8	0
Train Movement	5	5	0	11	11	0	15	15	0
Elevator	8	9	0	5	4	0	16	16	0
Employee	0	0	0	1	1	0	2	2	0
Equipment/Maintenance	4	4	0	3	3	0	0	0	0
Unknown	2	2	0	9	19	0	13	13	0
Total	2479	2418	79	3314	3286	85	2780	2740	46

Exhibit B-6: 2003 - 2005 Light Rail "Other" Accident Probable Cause Distribution

Probable Cause	2003			2004			2005		
	Acc	Inj	Fat	Acc	Inj	Fat	Acc	Inj	Fat
Suicides	3		3	10		10	4		4
Suicide Attempts	3	3		1	1		3	3	
Slips, Trips and Falls	95	95	0	59	57	2	37	37	0
Boarding/Deboarding	32	34	0	50	49	1	56	56	0
Car Door	18	18	0	38	38	0	25	25	0
Escalators	47	47	0	46	46	0	43	43	0
Homicides	0		0	0		0	0		0
Assaults	3	3		100	100		236	236	
Trespassing	7	4	4	55	55	0	15	10	5
Health-related	3	3	0	0	0	0	1	1	0
Passenger/Station Occupant	15	15	0	23	23	0	32	32	0
Material Falling from Structure or Train	0	0	0	0	0	0	0	0	0
Miscellaneous Non-Passenger Incidents	0	0	0	0	0	0	0	0	0
Train Movement	1	1	0	2	2	0	1	1	0
Elevator	1	1	0	0	0	0	0	0	0
Employee	4	4	0	0	0	0	2	2	0
Equipment/Maintenance	0	0	0	5	5	0	0	0	0
Unknown	7	3	0	5	5	0	1	1	0
Total	239	231	7	394	381	13	456	447	9

Exhibit B-7: 2003 - 2005 Other Rail "Other" Accident Probable Cause Distribution

Probable Cause	2003			2004			2005		
	Acc	Inj	Fat	Acc	Inj	Fat	Acc	Inj	Fat
Suicides	0		0	0		0	2		2
Suicide Attempts	0	0		0	0		1	1	
Slips, Trips and Falls	0	0	0	0	0	0	2	2	0
Boarding/Deboarding	0	0	0	0	0	0	0	0	0
Car Door	0	0	0	0	0	0	0	0	0
Escalators	0	0	0	4	4	0	0	0	0
Homicides	0		0	0		0	0		0
Assaults	0	0		1	1		0	0	
Trespassing	0	0	0	7	0	1	0	0	0
Health-related	0	0	0	0	0	0	1	0	1
Passenger/Station Occupant	0	0	0	3	7	0	0	0	0
Material Falling from Structure or Train	0	0	0	0	0	0	0	0	0
Miscellaneous Non-Passenger Incidents	0	0	0	0	0	0	0	0	0
Train Movement	1	10	0	0	0	0	2	2	0
Elevator	0	0	0	0	0	0	0	0	0
Employee	0	0	0	0	0	0	0	0	0
Equipment/Maintenance	0	0	0	0	0	0	0	0	0
Unknown	0	0	0	1	1	0	0	0	0
Total	1	10	0	16	13	1	8	5	3