

for the jurisdiction in question. For example, losses may be greater in an event that results in the complete destruction of a high-rise building; in that scenario, losses will stem from loss of life, the actual destruction of the building, and business interruptions. For comparison's sake, the total losses incurred by New York City in the September 11, 2001 attacks are estimated at \$83-95 billion. This loss estimate includes lost tax revenue for the city, the cost of response and recovery, business interruptions, deaths, building damage, and infrastructure damage. The cost of evacuation could be significant; the City of Pittsburgh estimates that should a large-scale terrorist event occur in the central business district, they would have to evacuate approximately 65,000 workers and approximately 7,000 university students. Likewise, many visitors to the central business district, while intending to remain for the day or staying overnight, are anticipated to require evacuation assistance. While Pennsylvania's cities are certainly smaller than New York, losses could still be severe.

4.3.23.9. State Facility Loss Estimation

All state facilities are vulnerable to terrorism in some way, whether or not the facility itself is the target of an attack. While highly unlikely that all critical facilities would be destroyed in a single event, the total replacement cost of all state critical facilities with known replacement values is \$47,154,997,513.00.

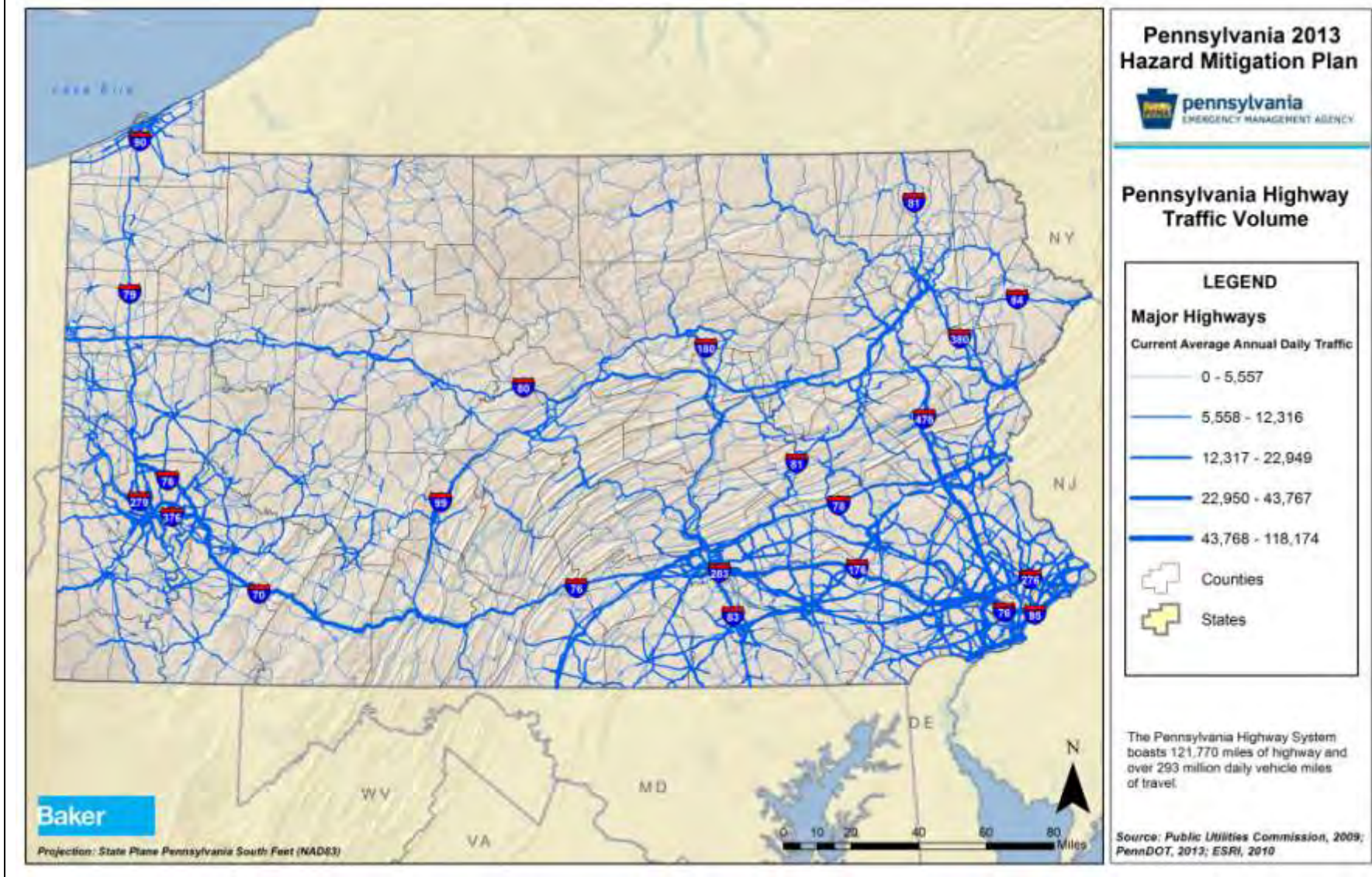
4.3.24. Transportation Accident

4.3.24.1. Location and Extent

Transportation accidents are defined as accidents involving highway, air, and rail travel. These incidents are collectively the most costly of all hazards in the Commonwealth in terms of lives lost, injuries, and economic losses. Pennsylvania has the fifth largest state highway system in the United States – larger than New York, New Jersey, and New England combined (Federal Highway Administration, 2011). Pennsylvania's highway transportation network consists of 119,686 linear miles of roadway, of which Pennsylvania Department of Transportation (PennDOT) is responsible for 41,166 miles, and 31,400 bridges, of which 25,000 are owned by PennDOT. Daily vehicle miles traveled (DVMT) on the Pennsylvania highway system is 277,293,041; 66% of this total occurs in urban areas while 33% occurs in rural areas (PennDOT, 2012). The sheer amount of roadway coupled with the high volume of traffic creates the potential for serious accidents along the Commonwealth's roads and bridges.

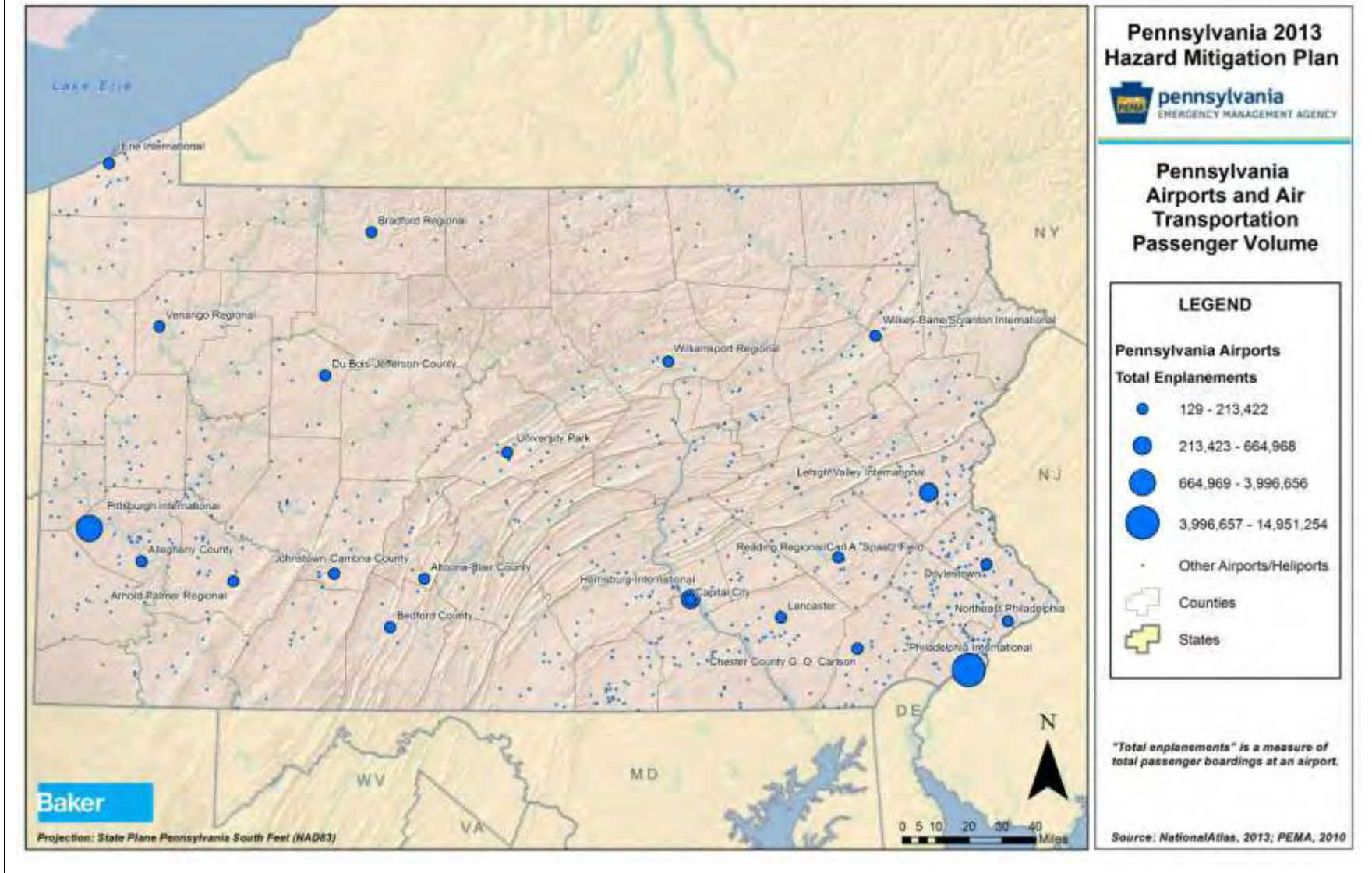
Pennsylvania's highway transportation network encompasses a number of key routes for the movement of goods and people, including Interstates 76 (PA Turnpike), 78, 80, 81, 95, and 476 (PA Turnpike Northeast Extension) and US Routes 15, 22, 30, and 202. Figure 4.3.24-1 illustrates the average annual daily traffic for Pennsylvania roads; this map highlights the volume of traffic on these and other key routes.

Figure 4.3.24-1 Average annual daily traffic on the Pennsylvania highway system (PennDOT 2013).



With 134 public access airports (including 22 commercial airports), 313 private-use airports and 290 private-use heliports across the Commonwealth. Considering the number of commercial air traffic flyovers that occur every day, there exists a potential extent for air transportation accidents statewide. However, a five-mile radius around each airport can be considered a high-risk area since most aviation incidents occur near take-off and landing sites (Aircraft Owners and Pilots Association Air Safety Foundation, 2009). Figure 4.3.24-2 illustrates Pennsylvania's major airports and their associated yearly commercial passenger enplanements.

Figure 4.3.24-2 Pennsylvania major airports and their associated passenger volumes (National Atlas, 2013).



Rail transportation accidents are generally classified as one of three types:

- Derailment – an accident on a railway in which a train leaves the rails;
- Collision – an accident in which a train strikes something such as another train or highway motor vehicle; and
- Other – accidents caused by other circumstances like obstructions on rails, fire, or explosion (Federal Railway Administration, 2010).

Rail accidents can occur anywhere along the more than 6,000 linear miles of track in the Commonwealth. Rail transportation is divided into two major categories: freight and passenger. Each category can be subdivided according to carrier type: major carrier (SFX, Norfolk Southern, Amtrak, etc) and local or regional carriers (company/business owned and operated, regional transit agencies, etc). A total of 67 railroad companies operate in Pennsylvania.

River traffic is now a planning consideration for the Commonwealth. Barges breaking away from moorings or their pilot boats can be a hazard. These barges can carry a wide variety of loads, including hazardous materials. Runaway barges can pose a threat to other river traffic, physical structures over and next to the waterway, and even the properties that line a waterway. Much of the potential threat depends on the load being carried. Recent events in 2011 included a barge carrying benzene which resulted in a bridge being shut down and triggered local, state and federal salvage efforts.

4.3.24.2. Range of Magnitude

Significant passenger vehicle, air, and rail transportation accidents can result in a wide range of outcomes from damage solely to property to serious injury or death. Most air incidents are non-fatal and cause minor injuries or property damage. The majority of motor vehicle crashes are non-fatal in Pennsylvania, but PennDOT estimates that every hour ten people are injured in a car crash, and every seven hours someone dies as a result of a car crash (PennDOT, 2012). Most fatal crashes occur in the summer months of July, and August, and September.

Railway and roadway accidents in particular have the potential to result in hazardous materials release (See Section 4.3.19). Transportation accidents can also result in broader infrastructure damage.

The worst transportation accident on record occurred in May 1998 when a tanker carrying gasoline exploded on Interstate 95 in Delaware County, causing two deaths and significant damage. The fire was so hot that it buckled the bridge girders and forced months of repairs that affected the nation's major east coast roadway (New York Times 1998). The governor declared this event a disaster; because of its wider impact and declaration status, it can be considered the worst-case event.

4.3.24.3. Past Occurrence

Vehicular transportation accidents are a daily occurrence in the Commonwealth. According to PennDOT, in 2009, there was an average of 332 reportable crashes daily, and in 2012, there

was an average of 340 reportable traffic crashes daily. Reportable crashes are crashes resulting in a death within 30 days of the crash; crashes resulting in injury in any degree to any person involved; or crashes resulting in damage to any vehicle serious enough to require towing. In 2009, there were 121,242 reportable crashes resulting in 1,256 deaths and 87,126 injuries. Of the injuries, just over 2.8% were classified as major. This was the lowest number of crashes since 1951. In 2012, there were 124,092 reportable crashes (a 1.0% decrease from 2011) resulting in 1,310 deaths (a 1.9% increase over 2011) and 86,846 injuries (a decrease of 1.1% from 2011). Of the injuries, just over 3.9% were classified as major. Table 4.3.23-1 illustrates trends in crashes, deaths, and injuries from 2004-2012.

	2004	2005	2006	2007	2008	2009	2010	2011	2012
Reported Crashes	137,410	132,829	128,342	130,675	125,327	121,242	121,312	125,395	124,092
Total Deaths	1,490	1,616	1,525	1,491	1,468	1,256	1,324	1,286	1,310
Total Injuries	105,222	100,381	96,597	94,633	88,709	87,126	87,949	87,839	86,846
<i>Major Injury</i>	4,365	4,324	4,200	4,087	3,831	3,483	3,555	3,409	3,458
<i>Moderate Injury</i>	19,580	17,740	16,514	16,004	14,306	13,783	14,036	13,815	13,519
<i>Minor Injury</i>	63,888	56,975	52,740	50,535	46,704	45,306	44,564	43,980	43,441
<i>Unknown Severity</i>	17,389	21,612	23,143	24,007	23,868	24,554	25,794	26,635	26,428
Deaths per 100 Million Vehicle-Miles	1.40	1.51	1.41	1.38	1.35	1.17	1.28	1.27	1.31

Aviation accidents are the least frequent type of transportation accident. The National Transportation Safety Board, the federal agency responsible for aviation accident information, indicates that from 2001-2012, there were 356 air transportation accidents in Pennsylvania. Most of these accidents involved small aircraft and many resulted in only minimal injuries. Of the total accidents, 74 were fatal, resulting in 161 deaths including the victims of United Flight 93 on September 11, 2001.

Aviation accidents are the least frequent type of transportation accident. The National Transportation Safety Board, the federal agency responsible for aviation accident information, indicates that from 2001-2012, there were 356 air transportation accidents in Pennsylvania. Most of these accidents involved small aircraft and many resulted in only minimal injuries. Of the total accidents, 74 were fatal, resulting in 161 deaths including the victims of United Flight 93 on September 11, 2001.

According to the Federal Railroad Administration, there has been an average of approximately 89 rail accidents per year from 2001-2012 in the Commonwealth. In 2012, there were reported a total of 53 incidents; there were 7 injuries but no deaths in these accidents. Table 4.3.24-2 provides an accounting of recent rail accidents and their associated damages.

Pennsylvania 2013 Standard State All-Hazard Mitigation Plan

Table 4.3.24-2 Rail incidents by county from 2010-2013 (Federal Railway Administration, 2013).										
COUNTY	2010 INCIDENTS	2010 DAMAGES	2011 INCIDENTS	2011 DAMAGES	2012 INCIDENTS	2012 DAMAGES	2013 INCIDENTS	2013 DAMAGES	TOTAL INCIDENTS	TOTAL DAMAGE
Allegheny	7	\$360,907.00	4	\$ 56,208.00	6	\$179,994.00	2	\$ 63,971.00	19	\$ 661,080.00
Armstrong	1	\$32,000.00	0	\$0	0	\$0	0	\$0	1	\$ 32,000.00
Beaver	9	\$849,811.00	8	\$180,939.00	11	\$479,342.00	7	\$ 79,476.00	35	\$1,589,568.00
Berks	1	\$24,000.00	1	\$ 30,100.00	0	\$ -	0	\$0	2	\$ 54,100.00
Blair	2	\$48,316.00	0	\$0	0	\$0	1	\$157,194.00	3	\$ 205,510.00
Bucks	10	\$483,446.00	5	\$ 44,168.00	6	\$186,024.00	1	\$ 52,644.00	22	\$ 766,282.00
Butler	1	20,000.00	0	\$0	0	\$0	0	\$0	1	\$ 20,000.00
Cambria	3	27,366.00	1	\$ 71,812.00	1	\$ 12,100.00	0	\$0	5	\$ 111,278.00
Carbon	0	\$0	2	\$145,963.00	0	\$0	2	\$ 21,531.00	4	\$ 167,494.00
Chester	8	\$84,417.00	0	\$0	1	\$ 21,000.00	0	\$0	9	\$ 105,417.00
Columbia	0	\$0	2	\$550,385.00	0	\$0	0	\$0	2	\$ 550,385.00
Crawford	0	\$0	0	\$0	0	\$0	3	\$156,100.00	3	\$ 156,100.00
Cumberland	4	\$109,500.00	6	\$130,635.00	7	\$113,535.00	2	\$ 55,300.00	19	\$ 408,970.00
Dauphin	3	\$ 98,249.00	4	\$191,700.00	2	\$ 32,050.00	0	\$0	9	\$ 321,999.00
Delaware	5	\$ 57,668.00	5	\$232,652.00	1	\$ 11,519.00	2	\$ 15,747.00	13	\$ 317,586.00
Erie	0	\$0	1	\$255,181.00	0	\$0	0	\$0	1	\$ 255,181.00
Fayette	1	\$ 13,926.00	0	\$0	1	\$ 15,000.00	0	\$0	2	\$ 28,926.00
Greene	0	\$0	0	\$0	1	\$ 10,000.00	1	\$ 23,111.00	2	\$ 33,111.00
Indiana	0	\$0	1	\$ 24,428.00	0	\$0	0	\$0	1	\$ 24,428.00
Jefferson	0	\$0	0	\$0	1	\$ 22,000.00	0	\$0	1	\$ 22,000.00
Lackawanna	0	\$0	0	\$0	1	\$ 35,105.00	1	\$ 31,770.00	2	\$ 66,875.00
Lancaster	1	\$ 15,000.00	2	\$115,906.00	2	\$286,000.00	1	\$ 35,550.00	6	\$ 452,456.00
Lawrence	1	\$ 69,400.00	1	\$ 10,503.00	0	\$0	1	\$ 14,439.00	3	\$ 94,342.00
Lehigh	5	\$ 53,950.00	3	\$ 64,510.00	2	\$ 68,500.00	0	\$0	10	\$ 186,960.00
Luzerne	0	\$0	0	\$0	2	\$ 35,578.00	0	\$0	2	\$ 35,578.00
Lycoming	0	\$0	0	\$0	1	\$ 10,958.00	0	\$0	1	\$ 10,958.00

Pennsylvania 2013 Standard State All-Hazard Mitigation Plan

Table 4.3.24-2 Rail incidents by county from 2010-2013 (Federal Railway Administration, 2013).										
COUNTY	2010 INCIDENTS	2010 DAMAGES	2011 INCIDENTS	2011 DAMAGES	2012 INCIDENTS	2012 DAMAGES	2013 INCIDENTS	2013 DAMAGES	TOTAL INCIDENTS	TOTAL DAMAGE
Mercer	0	\$0	0	\$0	1	\$ 41,050.00	0	\$0	1	\$ 41,050.00
Mifflin	3	\$ 62,421.00	0	\$0	0	\$0	0	\$0	3	\$ 62,421.00
Monroe	0	\$0	0	\$0	1	\$ 22,551.00	0	\$0	1	\$ 22,551.00
Montgomery	6	\$ 65,760.00	5	\$102,985.00	2	\$ 35,802.00	0	\$0	13	\$ 204,547.00
Northampton	3	\$ 34,900.00	1	\$ 30,600.00	0	\$0	1	\$ 34,000.00	5	\$ 99,500.00
Northumberland	0	\$0	1	\$ 29,700.00	3	\$ 60,100.00	0	\$0	4	\$ 89,800.00
Philadelphia	16	\$201,395.00	15	\$452,908.00	9	\$556,851.00	5	\$172,761.00	45	\$1,383,915.00
Somerset	1	\$ 2,576,191.00	2	\$ 21,297.00	2	\$178,863.00	0	\$0	5	\$2,776,351.00
Union	1	\$ 13,500.00	0	\$0	0	\$0	0	\$0	1	\$ 13,500.00
Washington	1	\$204,270.00	1	\$ 20,850.00	0	\$0	1	\$ 23,500.00	3	\$ 248,620.00
Westmoreland	1	\$169,487.00	1	\$ 25,440.00	0	\$0	1	\$ 93,992.00	3	\$ 288,919.00
Wyoming	0	\$0	0	\$0	1	\$ 25,825.00	0	\$0	1	\$ 25,825.00
York	1	\$ 19,000.00	0	\$0	1	\$180,000.00	0	\$0	2	\$ 199,000.00
TOTAL	95	\$5,694,880.00	72	\$2,788,870.00	66	\$ 2,619,747.00	32	\$ 1,031,086.00	265	\$ 12,134,583.00

4.3.24.4. *Future Occurrence*

With the volume of goods and people moving through Pennsylvania, transportation accidents will continue to occur routinely, especially passenger vehicle accidents. At the same time, though, five year trends indicate that rail and motor vehicle transportation accidents have been decreasing across the board. In the case of highway accidents, PennDOT has taken great strides to reduce the number of highway transportation accidents through programs such as the Pennsylvania Highway Safety Corridor. In this program, PennDOT designates sections of highway where traffic citation fines are doubled in the hope that higher fines will deter unsafe driving and reduce accidents. Likewise, the number of rail accidents nationally has been falling for the last five years; in 2012, the nationwide rail accident rate was 2.34 accidents per million rail miles. Additionally, the probability of aviation accidents nationwide is 7.20 accidents per 100,000 flight hours, meaning that the likelihood of air transportation accidents in the Commonwealth remains low. Overall, the probability of future transportation accidents is *highly likely* as defined by the Risk Factor Methodology (see Section 4.1).

4.3.24.5. *Environmental Impacts*

Like the range of magnitude, the environmental impacts of transportation accidents can vary greatly. In the case of a simple motor vehicle crash, train derailment, or aviation accident, the environmental impact is minimal. However, if the accident involves any type of vehicle moving chemicals or other hazardous materials, the impact will be considerably larger and may include an explosion or the release of potentially hazardous material. For a complete discussion of the environmental impacts of hazardous materials releases, see Section 4.3.19.5.

4.3.24.6. *Jurisdictional Vulnerability Assessment*

As stated in Section 4.2.2, jurisdictional and state critical facility vulnerability assessments were completed by spatially overlaying hazards with census tracts and state critical facility layers in GIS. When spatial analysis determined that the hazard would impact a census tracts within a county or the location of state critical facilities these locations were deemed vulnerable to the hazard. Loss estimates were prepared based on the value of the facilities impacted by census tract and by state critical facility. Each hazard uses a methodology that is specific to the type of risk it may cause; Table 4.2.2-2 includes a complete methodology description for vulnerability assessments and loss estimates for each hazard.

Jurisdictional vulnerability for transportation accidents is different for each of the three major modes of transportation in the Commonwealth. For this analysis, vulnerability for highway accidents was defined as jurisdictions falling within a ¼ mile of Interstate and US highways, the high-speed roads likely to yield deadly crashes. Vulnerability for air traffic accidents is defined as jurisdictions falling within five miles of both public and private airports and heliports with at least one runway. Similar to highway accidents, jurisdictions that are vulnerable to rail accidents are those located within ¼ mile of rail lines. Using these definitions, all 67 counties are vulnerable to at least one type of transportation accident.

In addition to this geographic analysis, Table 4.3.24-3 lists which counties did and did not profile transportation accidents, along with any ranking provided. 46 counties profile this hazard. As stated in Section 4.1, the decision by a county to profile a hazard is one indicator of the presence of risk from that hazard. This indicator should be viewed complementary to other

analysis in this section. Together this analysis from reputable sources addresses different aspects of risk for a full risk profile.

Of the 33 counties which currently have calculated risk factor values for transportation accidents, the average value is 2.3; this average does not include Lebanon, Montour, Perry, and Philadelphia, who use an alternate Risk Factor/Ranking system. The State Risk Factor for transportation accidents is 2.4, while the Pennsylvania THIRA scored transportation accidents as a 6 out of 10. For more details on the State Risk Factor and THIRA rankings, please see Section 4.1.

Table 4.3.24-3 Counties profiling transportation hazards with hazard ranking and risk factor (if available).

COUNTY	PROFILED HAZARD	DID NOT PROFILE HAZARD	RANKING (IF AVAILABLE)	RISK FACTOR (IF AVAILABLE)
Adams		X		
Allegheny	X		Medium	2.2
Armstrong		X		
Beaver	X		Medium	2.0
Bedford	X		Medium	2.2
Berks		X		
Blair		X		
Bradford	X		Not Ranked	No RF
Bucks	X		Medium	2.3
Butler	X		Medium	2.0
Cambria	X		Medium	2.2
Cameron		X		
Carbon	X		Medium	2.2
Centre	X		Low	1.9
Chester		X		
Clarion		X		
Clearfield	X		Medium	2.1
Clinton	X		Medium	2.2
Columbia		X		
Crawford		X		
Cumberland	X		Medium	2.2
Dauphin		X		
Delaware	X		Medium	2.2
Elk	X		Medium	2.2
Erie	X		Medium	2.2

Table 4.3.24-3 Counties profiling transportation hazards with hazard ranking and risk factor (if available).				
COUNTY	PROFILED HAZARD	DID NOT PROFILE HAZARD	RANKING (IF AVAILABLE)	RISK FACTOR (IF AVAILABLE)
Fayette	X		High	2.5
Forest		X		
Franklin		X		
Fulton	X		High	2.8
Greene	X		Medium	2.2
Huntingdon	X		Not Ranked	No RF
Indiana	X		Medium	2.2
Jefferson	X		Medium	2.4
Juniata	X		Medium	2.2
Lackawanna		X		
Lancaster	X		Medium	2.4
Lawrence		X		
Lebanon*	X		Not Ranked	8.0
Lehigh	X		Medium	2.2
Luzerne		X		
Lycoming	X		High	2.8
McKean	X		Medium	2.2
Mercer	X		Low	1.8
Mifflin	X		Not Ranked	No RF
Monroe	X		High	2.8
Montgomery	X		High	2.5
Montour*	X		Not Ranked	2.9
Northampton	X		Medium	2.2
Northumberland	X		Medium	2.2
Perry*	X		Not Ranked	3.0
Philadelphia**		X		
Pike	X		High	2.5
Potter		X		
Schuylkill	X		Not Ranked	No RF
Snyder	X		Medium	2.2
Somerset		X		
Sullivan		X		
Susquehanna	X		Medium	2.2

Table 4.3.24-3 Counties profiling transportation hazards with hazard ranking and risk factor (if available).

COUNTY	PROFILED HAZARD	DID NOT PROFILE HAZARD	RANKING (IF AVAILABLE)	RISK FACTOR (IF AVAILABLE)
Tioga	X		Medium	2.2
Union	X		Not Ranked	No RF
Venango		X		
Warren	X		Medium	2.2
Washington		X		
Wayne	X		Not Ranked	No RF
Westmoreland	X		Not Ranked	No RF
Wyoming	X		Not Ranked	No RF
York		X		

* Lebanon, Montour, and Perry use an alternate weighted ranking where Risk Factor = Frequency x [(0.25 x Critical facilities) + (0.40 x Social) + (0.25 x Economic) + (0.10 x Environmental)]. While this risk factor was used to comparatively rank hazards, the number does not correspond to a high-medium-low rating.

**Philadelphia uses an A, B, C rating system where A is high, B is medium, and C is low.

For highway accidents, PennDOT statistics show that 53% of all reportable crashes occur in only 10 counties: Allegheny, Berks, Bucks, Chester, Delaware, Lancaster, Lehigh, Montgomery, Philadelphia, and York. Additionally, almost 42% of the total traffic deaths in 2012 occurred in only 10 counties: Allegheny, Berks, Bucks, Lancaster, Lehigh, Luzerne, Montgomery, Philadelphia, Schuylkill, and Westmoreland. Pennsylvania’s metropolitan areas like Greater Philadelphia and the Pittsburgh region maintain the largest risk of both highway transportation and rail transportation accidents due to the high number of railway tracks, roadway miles, and vehicle miles traveled coupled with high population and economic activity densities.

With highway accidents, there is an added vulnerability that stems from the age and upkeep of bridges throughout the Commonwealth. Pennsylvania has the largest number of deficient bridges in the nation with over 6,000 structurally deficient bridges and 3,708 functionally obsolete bridges. These bridges have a sufficiency rating of 80 or less; these bridges are in need of costly repairs. Unrepaired deficient bridges may be more likely to break, thus leading to highway transportation damages or deaths. Table 4.3.24-4 displays Pennsylvania’s bridge inventory in table form; Figure 4.3.23-4 illustrates the distribution of structurally deficient and functionally obsolete bridges. Cameron, Fayette, Indiana, McKean, Monroe, Potter and Susquehanna, all have at least 25% of their bridges rated as structurally deficient; Allegheny County has by far highest number of deficient bridges with 541. Montour, Snyder, Sullivan, Tioga and Union Counties have the lowest proportion of deficient bridges with between 12-14% total deficient bridges.

COUNTY	TOTAL BRIDGES	STRUCTURALLY DEFICIENT BRIDGES	FUNCTIONALLY OBSOLETE BRIDGES	TOTAL DEFICIENT BRIDGES
Adams	383	62	32	94
Allegheny	1,177	225	316	541
Armstrong	371	84	24	108
Beaver	337	72	45	117
Bedford	458	76	51	127
Berks	636	111	152	263
Blair	322	30	28	58
Bradford	509	46	30	76
Bucks	654	135	155	290
Butler	355	85	63	148
Cambria	332	35	30	65
Cameron	71	19	1	20
Carbon	135	31	23	54
Centre	433	66	36	102
Chester	668	95	178	273
Clarion	208	38	12	50
Clearfield	387	91	22	113
Clinton	247	42	26	68
Columbia	303	19	41	60
Crawford	498	74	52	126
Cumberland	369	40	80	120
Dauphin	438	36	94	130
Delaware	373	53	108	161
Elk	124	21	10	31
Erie	577	30	68	98
Fayette	429	118	61	179
Forest	75	10	5	15
Franklin	323	41	55	96
Fulton	181	28	23	51
Greene	399	93	47	140
Huntingdon	317	54	20	74
Indiana	428	140	46	186
Jefferson	264	43	13	56
Juniata	254	56	10	66
Lackawanna	411	61	59	120
Lancaster	723	156	142	298
Lawrence	282	69	24	93

Table 4.3.24-4 Pennsylvania Bridge Inventory (Federal Highway Administration, 2012)				
COUNTY	TOTAL BRIDGES	STRUCTURALLY DEFICIENT BRIDGES	FUNCTIONALLY OBSOLETE BRIDGES	TOTAL DEFICIENT BRIDGES
Lebanon	222	32	30	62
Lehigh	349	53	105	158
Luzerne	562	113	78	191
Lycoming	515	42	56	98
McKean	246	87	12	99
Mercer	422	43	53	96
Mifflin	184	37	28	65
Monroe	365	110	47	157
Montgomery	635	112	161	273
Montour	134	3	13	16
Northampton	311	65	88	153
Northumberland	341	24	54	78
Perry	275	62	25	87
Philadelphia	421	71	196	267
Pike	177	36	18	54
Potter	247	81	5	86
Schuylkill	342	85	41	126
Snyder	243	11	24	35
Somerset	474	94	43	137
Sullivan	139	11	9	20
Susquehanna	409	114	21	135
Tioga	522	30	34	64
Union	197	8	19	27
Venango	224	29	24	53
Warren	264	31	14	45
Washington	775	183	84	267
Wayne	309	77	19	96
Westmoreland	735	168	87	255
Wyoming	200	47	6	53
York	654	105	132	237
TOTALS	25,344	4,449	3,708	8,157

Of all vehicular crashes in Pennsylvania, PennDOT estimates that over one-third involve a vehicle striking a stationary object such as a pole, guard rail, or building. As a result, the 3,500 state critical facilities located one-quarter mile or less from a major highway are vulnerable to the effects of vehicular crashes (Table 4.3.24-5). On average, each county affected by highway accidents hosts 52 vulnerable critical facilities. Allegheny County has the most critical facilities in areas vulnerable to highway accidents. At the other end of the spectrum, Forest County is home to only five vulnerable state critical facilities.

Table 4.3.24-5 Number of State Critical Facilities impacted by highway accidents in each county			
COUNTY	NUMBER OF CRITICAL FACILITIES	COUNTY	NUMBER OF CRITICAL FACILITIES
Adams	31	Lackawanna	82
Allegheny	239	Lancaster	105
Armstrong	64	Lawrence	46
Beaver	90	Lebanon	62
Bedford	29	Lehigh	31
Berks	88	Luzerne	97
Blair	54	Lycoming	48
Bradford	40	McKean	33
Bucks	74	Mercer	65
Butler	61	Mifflin	16
Cambria	67	Monroe	19
Cameron	6	Montgomery	103
Carbon	38	Montour	8
Centre	51	Northampton	45
Chester	75	Northumberland	64
Clarion	28	Perry	19
Clearfield	58	Philadelphia	68
Clinton	34	Pike	15
Columbia	56	Potter	17
Crawford	61	Schuylkill	147
Cumberland	45	Snyder	18
Dauphin	96	Somerset	62
Delaware	73	Sullivan	10
Elk	19	Susquehanna	31
Erie	58	Tioga	40
Fayette	67	Union	13
Forest	5	Venango	28
Franklin	35	Warren	31
Fulton	14	Washington	90
Greene	20	Wayne	33
Huntingdon	34	Westmoreland	158

Table 4.3.24-5 Number of State Critical Facilities impacted by highway accidents in each county

COUNTY	NUMBER OF CRITICAL FACILITIES	COUNTY	NUMBER OF CRITICAL FACILITIES
Indiana	45	Wyoming	19
Jefferson	35	York	73
Juniata	14	TOTAL	3,500

As mentioned earlier, because most aviation incidents occur during take-off and landing, jurisdictions located within 5 miles of airports are more vulnerable to air transportation accidents. In order to combat the hazards of aviation incidents, the Pennsylvania Legislature enacted Act 164 of 1984. According to this law, municipalities within the Federal Aviation Administration Federal Regulation 14 CFR Part 77 areas around an airport are required to have ordinances that restrict the height of objects that could interfere with airport regulations and navigation. This restriction on development 10,000 feet around airports is designed to prevent the creation of airport hazard areas. In its Zoning Status Report dated April 28, 2010, PennDOT’s Bureau of Aviation estimated that 680 municipalities are affected by this regulation but only 30% had adopted the airport zoning ordinance. The remaining 70% of municipalities with CFR Part 77 surfaces in their community continue to be more vulnerable to air transportation accidents.

Jurisdictional vulnerability for air transportation accidents is not limited to the largest airports in the Commonwealth. With 877 public and private airports with at least one runway as well as heliports, it is unsurprising that over 5,300 critical facilities are located within the five-mile hazard zone around airports. In fact, each county has an average of 79 state critical facilities in these hazard zones. Again, Allegheny County by far has the most vulnerable critical facilities located in air transportation hazard zones with nearly three times the number of vulnerable facilities as the next-highest county, Westmoreland. Juniata County, on the other hand, is home to the least number of critical facilities – only one – as seen in Table 4.3.24-6.

Table 4.3.24-6 Number of State Critical Facilities impacted by air accidents in each county

COUNTY	NUMBER OF CRITICAL FACILITIES	COUNTY	NUMBER OF CRITICAL FACILITIES
Adams	48	Lackawanna	159
Allegheny	694	Lancaster	101
Armstrong	74	Lawrence	70
Beaver	159	Lebanon	105
Bedford	18	Lehigh	73
Berks	145	Luzerne	225
Blair	82	Lycoming	77
Bradford	48	McKean	22
Bucks	123	Mercer	86
Butler	99	Mifflin	24

Table 4.3.24-6 Number of State Critical Facilities impacted by air accidents in each county

COUNTY	NUMBER OF CRITICAL FACILITIES	COUNTY	NUMBER OF CRITICAL FACILITIES
Cambria	117	Monroe	31
Cameron	6	Montgomery	201
Carbon	62	Montour	15
Centre	63	Northampton	84
Chester	121	Northumberland	88
Clarion	31	Perry	17
Clearfield	73	Philadelphia	117
Clinton	37	Pike	14
Columbia	74	Potter	7
Crawford	56	Schuylkill	202
Cumberland	67	Snyder	18
Dauphin	184	Somerset	55
Delaware	139	Sullivan	7
Elk	7	Susquehanna	33
Erie	59	Tioga	32
Fayette	106	Union	14
Franklin	38	Venango	39
Fulton	2	Warren	40
Greene	22	Washington	126
Huntingdon	13	Wayne	38
Indiana	46	Westmoreland	235
Jefferson	31	Wyoming	26
Juniata	1	York	95

Rail incidents impact 65 of Pennsylvania’s 67 counties. Table 4.3.23-7 illustrates the number of vulnerable critical facilities in each county impacted by rail incidents. Allegheny, Westmoreland, Luzerne, Lackawanna, Washington, and Delaware Counties are the most vulnerable to rail transportation incidents. Schuylkill County also ranks among the jurisdictions most vulnerable to rail incidents with 108 potentially impacted critical facilities.

Table 4.3.24-7 Number of State Critical Facilities impacted by rail accidents in each county

COUNTY	NUMBER OF CRITICAL FACILITIES	COUNTY	NUMBER OF CRITICAL FACILITIES
Adams	11	Lackawanna	72
Allegheny	215	Lancaster	45
Armstrong	44	Lawrence	16
Beaver	59	Lebanon	31
Bedford	4	Lehigh	28
Berks	56	Luzerne	92
Blair	38	Lycoming	41
Bradford	25	McKean	20
Bucks	34	Mercer	34
Butler	26	Mifflin	11
Cambria	58	Monroe	4
Cameron	4	Montgomery	63
Carbon	19	Montour	6
Centre	16	Northampton	30
Chester	51	Northumberland	48
Clarion	15	Perry	9
Clearfield	51	Philadelphia	51
Clinton	20	Pike	4
Columbia	29	Schuylkill	208
Crawford	22	Snyder	8
Cumberland	24	Somerset	28
Dauphin	58	Sullivan	1
Delaware	83	Susquehanna	17
Elk	11	Tioga	1
Erie	19	Union	12
Fayette	49	Venango	15
Forest	3	Warren	26
Franklin	17	Washington	71
Greene	8	Wayne	15
Huntingdon	24	Westmoreland	109
Indiana	26	Wyoming	6
Jefferson	18	York	27
Juniata	4		

4.3.24.7. State Facility Vulnerability Assessment

There are 3,500 state critical facilities vulnerable to highway vehicular crashes, as shown in Table 4.3.24-8. Of these, the majority fall into three categories: fire departments, police departments, and schools. Some of the 43 transportation facilities impacted are components of

Pennsylvania’s highway and bridge network; these facilities may be disproportionately vulnerable to vehicular crashes.

Table 4.3.24-8 State Critical Facilities vulnerable to highway accidents by critical facility type	
STATE CRITICAL FACILITY TYPE	NUMBER OF IMPACTED FACILITIES
Agriculture	71
Banking	12
Chemical	5
Commercial Facilities	36
Communications	2
Dams	10
Defense Industrial Base	10
Education	74
Emergency Services	61
Energy	15
Fire Departments (Non-HSIP)	1550
Government Facilities	21
Healthcare & Public Health	20
Hospital (Non-HSIP)	111
Information Technology	2
Manufacturing	1
Nuclear Reactors, Materials & Waste	2
Police (Non-HSIP)	734
Postal & Shipping	2
School (Non-HSIP)	699
Transportation	43
Water	19
Grand Total	3500

With the large number of airports in Pennsylvania, it is unsurprising that over 85% of all critical facilities are vulnerable to air transportation accidents, seen in Table 4.3.24-9.

Table 4.3.24-9 State Critical Facilities vulnerable to air transportation accidents by critical facility type	
STATE CRITICAL FACILITY TYPE	NUMBER OF IMPACTED FACILITIES
Agriculture	97
Banking	26
Chemical	8
Commercial Facilities	58
Communications	4
Critical Manufacturing	3
Dams	24
Defense Industrial Base	20
Education	134
Emergency Services	82
Energy	31
Fire Departments (Non-HSIP)	2038
Government Facilities	39
Healthcare & Public Health	35
Hospital (Non-HSIP)	230
Information Technology	3
Manufacturing	1
National Monuments & Icons	5
Nuclear Reactors, Materials & Waste	7
Police (Non-HSIP)	1071
Postal & Shipping	8
School (Non-HSIP)	1309
Transportation	56
Water	32
Grand Total	5321

Rail accidents do not usually cause damage to buildings because of the fixed nature of this mode of transportation, but there still may be damage to state facilities located within one-quarter mile of rail lines. Table 4.3.24-10 provides a breakdown of the state facility vulnerability to rail transportation accidents.

Table 4.3.24-10 State critical facilities vulnerable to rail transportation accidents by critical facility type	
STATE CRITICAL FACILITY TYPE	NUMBER OF IMPACTED FACILITIES
Agriculture	53
Banking	11
Chemical	8
Commercial Facilities	17
Communications	3
Critical Manufacturing	3
Dams	7
Defense Industrial Base	14
Education	43
Emergency Services	39
Energy	18
Fire Departments (Non-HSIP)	1006
Government Facilities	16
Healthcare & Public Health	11
Hospital (Non-HSIP)	58
Manufacturing	1
Nuclear Reactors, Materials & Waste	2
Police (Non-HSIP)	516
Postal & Shipping	4
School (Non-HSIP)	321
Transportation	22
Water	17
Grand Total	2190

4.3.24.8. Jurisdictional Loss Estimation

Jurisdictional losses due to transportation accidents will be proportional to the number of road miles in any given jurisdiction. Losses will likewise be proportional to the number and severity of vehicular transportation accidents. However, on a statewide level, PennDOT estimates annual economic loss due to reportable motor vehicle crashes. In 2012, this total economic loss exceeded \$14.8 billion. This equates to a per-person economic cost of \$1,164.

In examining potential losses jurisdiction-by-jurisdiction, counties in southeastern Pennsylvania are the most threatened by vehicular transportation accidents. This area has a high concentration of Interstate and US highways and is a major thoroughfare for not only Pennsylvania but for the entire East Coast. Allegheny County is also at risk of experiencing significant losses due to vehicular accidents with 178,562 potentially impacted buildings worth nearly \$45 billion. Counties with a smaller concentration of highways less threatened by highway accidents, as displayed in Table 4.3.24-11.

Table 4.3.24-11 Estimated jurisdictional losses due to highway accidents.

COUNTY	NUMBER OF IMPACTED BUILDINGS	DOLLAR VALUE OF EXPOSURE, BUILDING AND CONTENTS (THOUSANDS \$)
Adams	18,732	\$4,787,993.00
Allegheny	178,562	\$45,238,791.00
Armstrong	14,807	\$2,943,337.00
Beaver	44,602	\$10,785,553.00
Bedford	2,962	\$555,010.00
Berks	70,245	\$17,966,144.00
Blair	32,290	\$6,984,269.00
Bradford	6,751	\$1,228,716.00
Bucks	79,073	\$26,840,501.00
Butler	21,395	\$4,898,321.00
Cambria	41,578	\$9,116,712.00
Cameron	5,863	\$1,167,114.00
Carbon	8,128	\$1,823,890.00
Centre	19,091	\$6,199,445.00
Chester	88,638	\$30,013,285.00
Clarion	2,549	\$880,796.00
Clearfield	13,067	\$2,529,111.00
Clinton	1,092	\$217,630.00
Columbia	22,961	\$5,099,692.00
Crawford	8,927	\$1,991,123.00
Cumberland	51,301	\$13,118,234.00
Dauphin	36,428	\$8,161,718.00
Delaware	82,844	\$25,900,561.00
Elk	6,752	\$1,629,217.00
Erie	68,134	\$15,898,091.00
Fayette	30,680	\$6,157,398.00
Forest	4,967	\$799,714.00
Franklin	31,036	\$6,653,350.00
Fulton	1,272	\$201,127.00
Greene	6,197	\$1,292,216.00
Huntingdon	6,843	\$1,410,275.00
Indiana	23,007	\$5,461,626.00
Jefferson	13,600	\$2,604,740.00
Lackawanna	39,028	\$9,155,313.00
Lancaster	102,369	\$26,155,108.00
Lawrence	23,253	\$5,251,670.00
Lebanon	41,294	\$9,822,459.00

Table 4.3.24-11 Estimated jurisdictional losses due to highway accidents.		
COUNTY	NUMBER OF IMPACTED BUILDINGS	DOLLAR VALUE OF EXPOSURE, BUILDING AND CONTENTS (THOUSANDS \$)
Lehigh	38,269	\$11,459,179.00
Luzerne	43,266	\$9,156,327.00
Lycoming	23,463	\$4,987,727.00
McKean	6,211	\$1,327,663.00
Mercer	20,394	\$4,133,127.00
Mifflin	8,420	\$1,502,047.00
Monroe	11,133	\$2,865,150.00
Montgomery	152,481	\$48,899,342.00
Montour	4,955	\$989,748.00
Northampton	60,774	\$15,616,422.00
Northumberland	23,119	\$5,116,648.00
Perry	15,747	\$3,976,530.00
Philadelphia	212,795	\$59,486,215.00
Pike	16,432	\$3,826,256.00
Potter	6,160	\$1,063,212.00
Schuylkill	39,522	\$8,458,552.00
Snyder	4,007	\$901,637.00
Somerset	8,678	\$1,857,789.00
Sullivan	1,738	\$302,314.00
Susquehanna	3,174	\$711,507.00
Tioga	1,849	\$438,972.00
Union	12,471	\$2,747,309.00
Venango	16,257	\$2,919,404.00
Warren	11,888	\$2,475,890.00
Washington	43,626	\$9,518,282.00
Wayne	16,431	\$3,159,706.00
Westmoreland	93,379	\$21,087,614.00
Wyoming	10,684	\$2,119,108.00
York	79,976	\$19,348,169.00
Grand Total	2,237,617	\$571,392,096.00

While air transportation accidents are infrequent compared to highway and rail incidents, they potentially threaten a larger portion of the Commonwealth, impacting over 7 million buildings worth over \$1.8 trillion. Of these vulnerable jurisdictions, Allegheny and Philadelphia are the most threatened because of the number of airports in and around Pittsburgh and Philadelphia, respectively. Allegheny County has 701,366 potentially impacted buildings worth \$12.9 billion

while Philadelphia’s potential losses stand at 778,715 impacted buildings worth \$201.3 billion, as seen in Table 4.3.24-12.

Table 4.3.24-12 Estimated jurisdictional losses due to air transportation accidents.		
COUNTY	NUMBER OF IMPACTED BUILDINGS	DOLLAR VALUE OF EXPOSURE, BUILDING AND CONTENTS (THOUSANDS \$)
Adams	72,228	\$17,026,688.00
Allegheny	701,366	\$179,027,007.00
Armstrong	63,771	\$12,899,103.00
Beaver	121,767	\$30,434,814.00
Bedford	15,812	\$2,882,984.00
Berks	219,337	\$57,169,490.00
Blair	66,200	\$14,009,583.00
Bradford	17,032	\$3,329,257.00
Bucks	321,764	\$108,123,710.00
Butler	116,178	\$29,775,721.00
Cambria	71,531	\$15,923,104.00
Cameron	4,777	\$905,333.00
Carbon	64,595	\$14,508,369.00
Centre	63,100	\$15,531,734.00
Chester	257,886	\$88,830,732.00
Clarion	23,204	\$4,492,750.00
Clearfield	46,483	\$8,857,579.00
Clinton	14,325	\$3,031,864.00
Columbia	57,010	\$12,161,212.00
Crawford	45,215	\$9,620,807.00
Cumberland	140,062	\$35,908,025.00
Dauphin	155,473	\$38,022,863.00
Delaware	272,799	\$84,044,731.00
Elk	12,255	\$2,550,197.00
Erie	129,463	\$30,263,525.00
Fayette	75,827	\$15,257,575.00
Forest	12,347	\$2,089,286.00
Franklin	79,158	\$17,268,598.00
Fulton	6,619	\$1,126,525.00
Greene	15,644	\$3,190,704.00
Huntingdon	27,695	\$5,321,857.00
Indiana	38,580	\$8,333,525.00
Jefferson	26,297	\$5,358,398.00
Juniata	26,496	\$4,945,357.00

Table 4.3.24-12 Estimated jurisdictional losses due to air transportation accidents.		
COUNTY	NUMBER OF IMPACTED BUILDINGS	DOLLAR VALUE OF EXPOSURE, BUILDING AND CONTENTS (THOUSANDS \$)
Lackawanna	121,761	\$27,703,362.00
Lancaster	198,259	\$51,380,465.00
Lawrence	61,583	\$13,038,163.00
Lebanon	83,445	\$20,249,745.00
Lehigh	215,489	\$59,007,585.00
Luzerne	169,264	\$38,063,364.00
Lycoming	57,028	\$12,095,053.00
McKean	9,031	\$1,668,379.00
Mercer	75,370	\$16,418,459.00
Mifflin	28,437	\$5,440,172.00
Monroe	110,057	\$28,051,785.00
Montgomery	484,549	\$160,866,480.00
Montour	25,070	\$5,707,083.00
Northampton	181,973	\$50,378,288.00
Northumberland	71,222	\$15,136,546.00
Perry	56,060	\$12,823,966.00
Philadelphia	778,715	\$201,276,171.00
Pike	53,940	\$12,658,196.00
Potter	2,596	\$590,902.00
Schuylkill	105,874	\$23,128,882.00
Snyder	29,642	\$6,576,585.00
Somerset	45,417	\$9,854,528.00
Sullivan	3,391	\$552,207.00
Susquehanna	24,246	\$4,678,491.00
Tioga	15,864	\$2,906,922.00
Union	34,623	\$7,953,288.00
Venango	42,109	\$8,524,113.00
Warren	26,801	\$5,407,739.00
Washington	119,376	\$29,827,254.00
Wayne	58,553	\$12,311,065.00
Westmoreland	225,619	\$52,993,858.00
Wyoming	25,121	\$5,311,987.00
York	224,772	\$56,005,682.00
Grand Total	7,147,553	\$1,840,809,772.00

Rail accidents have the potential to cause nearly \$426.6 trillion in damages to 1.7 million buildings in 65 counties, as seen in Table 4.3.24-13. Philadelphia, Allegheny, Montgomery,

Delaware, and Westmoreland Counties, with their strong passenger and freight rail networks, are the most threatened by rail incidents with 716,657 impacted buildings worth over \$193 billion.

Table 4.3.24-13 Estimated jurisdictional losses due to rail accidents.		
COUNTY	NUMBER OF IMPACTED BUILDINGS	DOLLAR VALUE OF EXPOSURE, BUILDING AND CONTENTS (THOUSANDS \$)
Adams	3,239	\$718,821.00
Allegheny	170,972	\$41,980,937.00
Armstrong	18,933	\$3,898,538.00
Beaver	20,789	\$4,706,474.00
Berks	61,413	\$14,941,867.00
Blair	12,091	\$2,507,471.00
Bradford	4,664	\$950,024.00
Bucks	31,669	\$10,638,972.00
Butler	11,604	\$2,274,786.00
Cambria	18,253	\$4,209,417.00
Cameron	1,273	\$298,105.00
Carbon	17,913	\$3,751,897.00
Centre	3,146	\$525,784.00
Chester	58,590	\$18,109,062.00
Clarion	2,549	\$880,796.00
Clearfield	16,789	\$3,510,734.00
Clinton	1,092	\$217,630.00
Columbia	11,257	\$2,386,553.00
Crawford	7,526	\$1,662,101.00
Cumberland	50,221	\$13,275,389.00
Dauphin	28,861	\$6,622,984.00
Delaware	95,790	\$26,765,363.00
Elk	5,064	\$1,027,471.00
Erie	25,387	\$5,964,717.00
Fayette	32,461	\$6,862,710.00
Franklin	10,223	\$2,540,199.00
Greene	7,582	\$1,326,397.00
Huntingdon	4,119	\$707,901.00
Indiana	23,391	\$5,304,400.00
Jefferson	7,369	\$1,549,155.00
Lackawanna	41,210	\$9,508,120.00
Lancaster	31,621	\$8,221,856.00
Lawrence	6,795	\$1,517,583.00

Table 4.3.24-13 Estimated jurisdictional losses due to rail accidents.		
COUNTY	NUMBER OF IMPACTED BUILDINGS	DOLLAR VALUE OF EXPOSURE, BUILDING AND CONTENTS (THOUSANDS \$)
Lebanon	20,604	\$4,511,032.00
Lehigh	43,314	\$10,909,593.00
Luzerne	48,102	\$10,717,778.00
Lycoming	20,532	\$4,541,382.00
McKean	4,704	\$1,037,266.00
Mercer	17,367	\$3,634,078.00
Mifflin	2,594	\$407,072.00
Montgomery	103,963	\$31,657,897.00
Montour	4,968	\$1,034,941.00
Northampton	60,406	\$15,747,999.00
Northumberland	19,842	\$4,391,235.00
Perry	12,413	\$3,428,073.00
Philadelphia	275,976	\$77,611,726.00
Schuylkill	22,951	\$4,961,442.00
Snyder	6,773	\$1,743,067.00
Somerset	11,177	\$2,131,622.00
Susquehanna	1,170	\$230,919.00
Tioga	2,880	\$516,102.00
Union	9,213	\$1,875,441.00
Venango	5,484	\$1,110,030.00
Warren	8,224	\$1,706,632.00
Washington	37,743	\$8,439,233.00
Wayne	1,018	\$201,123.00
Westmoreland	69,956	\$15,711,959.00
Wyoming	1,631	\$294,668.00
York	34,964	\$8,699,200.00
Grand Total	1,691,825	\$426,615,724.00

4.3.24.9. State Facility Loss Estimation

The ubiquitous nature of transportation accidents translates to high estimated state facility losses for all three kinds of transportation accidents. For highway vehicular accidents, the estimated replacement cost of all state critical facilities is \$22,476,249,752. Loss estimates for state facilities impacted by air accidents is highest at \$40,551,632,447. Finally, the estimated replacement cost of all state critical facilities impacted by rail transportation accidents is \$12,776,400,116.