Notes

Bridge Failures in the United States Potential Remedies for Injured Parties Case Study: I-35W Minneapolis Bridge Collapse

Paul J. Rupprecht*

I. INTRODUCTION

This review provides an analysis of the current conditions of bridges in the United States, examples of bridge failures and maintenance deficiencies, and a synopsis of personal injury remedies and defenses available to injured parties as a result of bridge failures. Specifically, the I-35W Minneapolis, Minnesota Bridge collapse that occurred on August 1, 2007, will be examined. As of December 2007, the Federal Highway Administration (FHWA) determined that of the approximately 599,766 private and public vehicular and railroad bridges built and maintained in the United States, nearly 72,524 bridges are structurally deficient, representing 12.1% of the total number of bridges in the United States.[1] The scope of this review is further narrowed to design errors; corrosion and struc-

* J.D. Candidate, University of Denver, Sturm School of Law, 2010; B.S.M.E. Illinois Institute of Technology, 1985. The author would like to thank Professor Robert Hardaway, University of Denver, Sturm College of Law, and Mr. Richard Westley, Westley Law Offices, S.C., for their support in this article. This article was originally submitted on May 6, 2008 in the Transportation Business Law course. The author is grateful for his family's unconditional support.

1. *See* FED. HIGHWAY ADMIN., U.S. DEP'T TRANSP., DEFICIENT BRIDGES BY STATE AND

tural fatigue; and construction, repair and maintenance failures; similar to those identified in the I-35W Bridge collapse. The personal injury remedies available to victims of the I-35 W Bridge collapse include litigation, settlement negotiations, and compensation fund options. The injured parties from the I-35W Minneapolis Bridge collapse have potential claims of action against the State of Minnesota for negligence and the contractor and subcontractor performing bridge renovation at the time of collapse.

In lieu of legal action, the injured parties may opt to accept compensation from proposed funds currently approved by the Minnesota State Legislature and under review by the Governor.[2]

II. Bridge Conditions

In the United States, safety issues continue to emerge as a result of bridge construction, maintenance, and repair. As recent as March 2008, the Pennsylvania Department of Transportation (PennDOT) closed a section of the I-95 highway leading to the Philadelphia Bridge due to discovery of a 6-foot crack in a 40-year-old pillar as depicted in Figure 1 below. The bridge was not scheduled for inspection for another year based on the two year federal bridge inspection cycle.[3] In 2007, many witnessed the aftermath of the I-35W Bridge collapse in Minneapolis, Minnesota; 13 people died and another 145 suffered injuries.[4] As identified in Table 1, as of December 2007, the US Department of Transportation (US DOT), Federal Highway Administration (FWHA) assessed 72,524 bridges and deemed them structurally deficient.[5] Of the 599,766 bridges across the United States, that number represents 12.1% of the total.[6] Tables 2 and 3 illustrate FHWA bridge statistics by year built, age and condition (1948-2007).[7]

Both the I-95 Philadelphia and I-35W Minneapolis Bridges were classified as "structurally deficient" in the National Bridge Inventory (NBI) Database prior to their respective failures.[8] An NBI "sufficiency

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Highway System (2007), http://www.fhwa.dot.gov/bridge/defbr07.xls, (last visited Aug. 14, 2008).

2. Martiga Lohn, *Bridge Victim Fund Clears Legislature, Heads to Pawlenty*, Associated Press, StarTribune, May 5, 2008, *available at* http://startribune.com/template/Print_This_Story?sid=18603974.

3. Greg Kelly, *74,000 Bridges at Risk, Rarely Inspected*, Fox News, Mar. 21, 2008, *available at* http://www.foxnews.com/story/0,2933,340488,00.html.

4. Mark V. Rosenker, Nat'l Transp. Safety Bd., Safety Recommendation 1 (2008).

5. Fed. Highway Admin., U.S. Dep't Transp. Deficient Bridges by State and Highway System, *supra* note 1.

6. *See id.*

7. Fed. Highway Admin., U.S. Dep't Transp., Structure Type by Year Built (2007), *available at* http://www.fhwa.dot.gov/bridge/nbi/yrblt07.cfm (last modified Jan. 15, 2009).

8. FHWA Structure Inventory and Appraisal, Structure: 9340 (2007), *available at*

rating" of less than 50 percent "qualifies a bridge for federal replacement funding."[9] The I-95 Philadelphia Bridge was last inspected on October 2, 2007, five months before its need for repair was discovered. At that time, it received a "sufficiency rating" of 51 percent.[10] The I-35W Minneapolis Bridge was last inspected on June 22, 2007, two months in advance of its collapse, with a "sufficiency rating" of 50 percent.[11] As a result of these actual failures, there is great cause for concern regarding the 72,524 bridges currently categorized as structurally deficient. Kevin Womack, Professor of Civil Engineering at Utah State University, surmised "chances are we will have something occur in the future, [in] the next year or two, that will probably take lives again."[12]

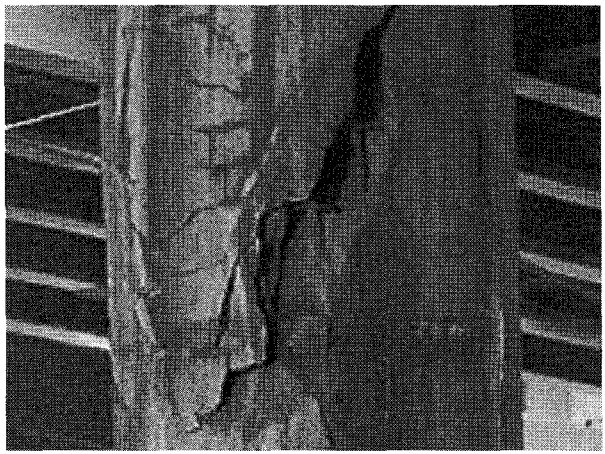

Figure 1: 6 foot crack in the pillar of the I-95 Philadelphia Bridge.[13]

www.fhwa.dot.gov/bridge/ta514027sia.pdf.; Paul Nussbaum, *I-95 Support Column was 'Poor' in Inspection*, PHILA. INQUIRER, Mar. 19, 2008, at A01, *available at* http://www.philly.com/inquirer/local/philadelphia/16808446.html.

9. Nussbaum, *supra* note 8, at A01.
10. *Id.*
11. FHWA Structure Inventory and Appraisal, *supra* note 8.
12. Kelly, *supra* note 3.
13. *Id.*

TABLE 1: FHWA DEFECTIVE BRIDGE STATISTICS[14]

	Number of Bridges	Number of Structurally Deficient Bridges	Number of Functionally Obsolete Bridges	Number of Deficient Bridges
NHS Bridges	116,145	6,160	17,149	23,309
Non-NHS Bridges	483,621	66,364	62,643	129,007
Totals	599,766	72,524	79,792	152,316

Table includes 50 U.S. States, District of Columbia and Puerto Rico as of December 2007.
NHS - National Highway System

TABLE 2: FHWA BRIDGE STATISTICS BY YEAR BUILT, AGE AND CONDITION (1948-2007)[15]

Year Built	1998-2007	1988-1997	1978-1987	1968-1977	1958-1967	1948-1957
Condition↓ Age in Years→	0-9	10-19	20-29	30-39	40-49	50-59
Structurally Deficient Bridges	0	1,852	3,327	8,039	13,338	11,448
Functionally Obsolete Bridges	0	7,455	6,587	10,331	19,406	12,821
Deficient Bridges	0	9,307	9,914	18,370	32,744	24,269
Total Bridges	62,881	82,748	77,489	91,162	107,433	62,797

Table includes 50 U.S. States, District of Columbia and Puerto Rico as of December 2007.

TABLE 3: FHWA BRIDGE STATISTICS BY YEAR BUILT, AGE AND CONDITION (PRIOR 1904-1947)[16]

Year Built	1938-1947	1928-1937	1918-1927	1907-1917	Prior 1904	No Value
Condition↓ Age in Years→	60-69	70-79	80-89	90-100	>100	Coded
Structurally Deficient Bridges	8,272	12,616	5,908	3,771	3,514	93
Functionally Obsolete Bridges	5,875	9,168	4,157	1,758	1,947	130
Deficient Bridges	14,147	21,784	10,065	5,529	5,461	223
Total Bridges	32,794	46,948	17,491	7,797	9,033	604

Table includes 50 U.S. States, District of Columbia and Puerto Rico as of December 2007.

Of additional concern is the fact that privately owned bridges in the United States are not subject to inspection requirements incorporating the National Bridge Inspection Standards (NBIS).[17] The FHWA confirmed that "the FHWA does not know if privately owned highway bridges are inspected using the NBIS or other standard," and to what extent privately owned highway bridges are maintained.[18] The NBIS

14. DEFICIENT BRIDGES BY STATE AND HIGHWAY SYSTEM, *supra* note 1.
15. *See* STRUCTURE TYPE BY YEAR BUILT (2007), *supra* note 7.
16. *See id.*
17. National Bridge Inspection Standards, 69 Fed. Reg. 74419, 74420 (Dec. 14, 2004) (to be codified at 23 C.F.R. pt. 650).
18. *Id.*

identify three cycles of inspection for bridges: inspections at (1) regular intervals within twenty-four months; (2) less than twenty-four months with level and frequency based on age, traffic considerations, and known deficiencies; and (3) greater than twenty-four month intervals and less than forty-eight month intervals with FWHA written approval.[19]

Various agencies in the United States have been diligently addressing these concerns with government officials from the respective States where these structurally deficient and functionally obsolete bridges have been identified in the NBI Database. Ms. Mary E. Peters, Secretary of Transportation, has been working with Congress to expedite the making of new laws and the funding to address the deficiencies identified in the required inspections.[20] On October 30, 2007, legislation was introduced in the House of Representatives identified as the Bridge Reconstruction and Inspection Act of 2007, H.R. 3999 IH, at the 100th Congress, 1st Session. This Act was to amend Title 23 USC for improving the safety record of the federal-aid highway bridges, to strengthen the inspection standards and processes, and to provide funds for reconstructing structurally deficient bridges.[21] In addition, the Safety Board issued an NTSB Safety Recommendation, H-08-1, on January 15, 2008, which specifically requires bridge owners to determine load capacity using calculations including structural elements of non-load-path-redundant steel truss bridges within the NBI Database, for bridges designed and constructed similar to the I-35W Bridge in Minneapolis.[22]

The FHWA NBI Database further classifies deficient bridge conditions as structurally deficient, functionally obsolete and deficient.[23] Structurally deficient bridges are bridges with reduced load carrying capacity due to deterioration in significant load-carrying bridge elements.[24] Functionally obsolete bridges are of the result of the bridges' geometrics not meeting current design standards.[25] Deficient bridges are bridges that require significant maintenance and repair to remain in service.[26] Even though a bridge is identified as being deficient, the bridge is not likely to collapse or be identified as unsafe. Inspectors perform inspections to determine whether unsafe conditions exist causing the structure

19. *Id.* at 74438.

20. *See* Mary E. Peters, Sec'y of Transp., Statement before the Committee on Environment and Public Works United States Senate (September 20, 2007).

21. Bridge Reconstruction and Inspection Act of 2007, H.R. 3999, 110th Cong. (2007).

22. Rosenker, *supra* note 4, at 5.

23. DEFICIENT BRIDGES BY STATE AND HIGHWAY SYSTEM, *supra* note 1.

24. FED. HIGHWAY ADMIN., FED. TRANSIT ADMIN., U.S. DEP'T TRANSP., 2006 STATUS OF THE NATION'S HIGHWAYS, BRIDGES, AND TRANSIT: CONDITIONS & PERFORMANCE 3-14, ES-4 (2007), http://www.fhwa.dot.gov/policy/2006cpr/, (last modified Mar. 14, 2007).

25. *Id.* at ES-4.

26. *Id.* at 3-14.

to be closed to the public.[27] After the inspector completes the Structure Inventory and Appraisal (SI&A) Sheet, the sufficiency rating is computed using a formula collected on the data entered on the SI&A Sheet. The computed numeric value is referenced against the scale whereby 100 percent represents a sufficient bridge and a zero percent represents a deficient bridge.[28]

III. Bridge Failures

Bridge failures can be attributed to a variety of factors, including but not limited to improper design, unsafe construction and repair practices, lack of proper maintenance, corrosion and metal fatigue, collisions and natural forces such as wind, rains, floods and earthquakes.[29]

A. Design Errors

On August 1, 2007, the Interstate 35 West (I-35W) Bridge collapsed over the Mississippi River in Minneapolis, Minnesota. The I-35W Bridge collapsed due to structural failure during rush hour: 13 people died and an additional 145 sustained injuries.[30] The I-35W Bridge was maintained and owned by the state highway agency.[31] The National Transportation and Safety Board (NTSB) determined the probable cause was found in the design of the undersized gusset plates. The FHWA published a report that identified that the "gusset plates at U10 and L11 consistently failed the D/C ratio checks conducted and the U10 gussets also violated the unsupported edge limitations."[32] The demand to capacity ratio (D/C) is a calculation used in the measurement of design efficiency. The FHWA determined that "the capacity inadequacies were considerable for all conditions investigated with the plate providing approximately one-half of the resistance required by the design loadings."[33] The NTSB Safety Recommendation identified that the design process was seriously flawed whereby 112 of the gusset plates located on the main trusses of the

27. *Id.*

28. Fed. Highway Admin., U.S. Dep't Transp., Report No. FHWA-PD-96-001, Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges app. B (1995) http://www.fhwa.dot.gov/bridge/mtguide.pdf. (last modified Mar. 14, 2007).

29. *See* Kenneth L. Carper & Jacob Feld, *Construction Failure* 52 (John Wiley & Sons, Inc. 2d ed. 1997) (1976).

30. NTSB Safety Recommendation, *supra* note 4.

31. Structure Inventory and Appraisal, *supra* note 8.

32. Reggie Holt & Joseph Hartmann, *Adequacy of the U10 & L11 Gusset Plate Designs for the Minnesota Bridge No. 9340 (I-35W over the Mississippi River)*, FHWA Turner-Fairbank Highway Research Center Report, at 16 (Jan. 11, 2008).

33. *Id.*

bridge, after its failure, were only half as thick as required.[34] In addition to the inadequacy of the design, renovations to the bridge since its build in 1967, added significant weight to the overall structure.[35] Moreover, during the times renovations were performed and at the time of its collapse, the I-35W Bridge was subjected to additional weight based on heavy machinery and paving materials "being parked and stockpiled on the center span."[36] The NTSB estimated 300 tons of equipment and material was on the bridge at the time of collapse.[37] Further, the Structure Inventory and Appraisal (SI&A) Sheet for the I-35W Bridge, Structure 9340, last updated on June 22, 2007, reflected that the bridge held a "sufficiency rating" of 50% rendering its status as "structurally deficient."[38] In addition to these Interim Report findings, a recent Associated Press article brought attention to photographs of bent gussets on the I-35 Bridge taken during contractor inspections, four years in advance of the collapse.[39]

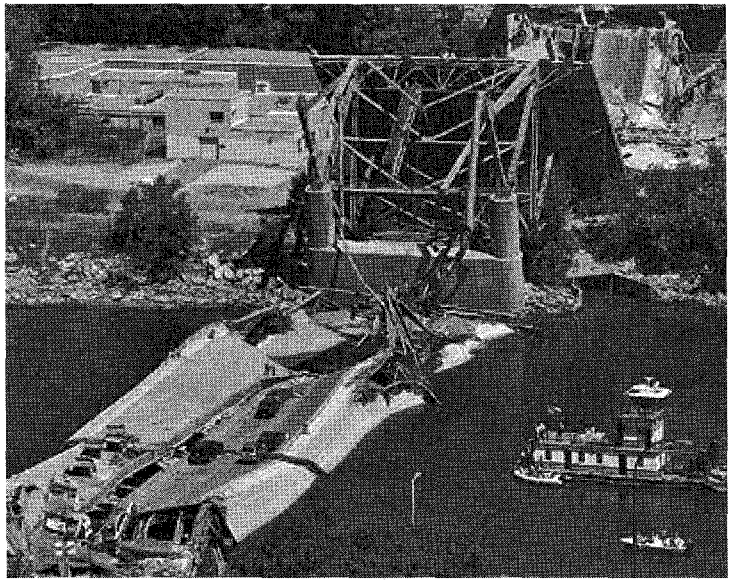

Figure 2: I-35W Bridge collapse in Minneapolis, Minnesota on August 2, 2007.[40]

34. Rosenker, *supra* note 4.

35. *Id.*

36. *Id.*

37. Frederic J. Frommer, *Design Flaw Cited in Bridge Collapse*, Associated Press, Jan. 15, 2008, *available at* http://www.foxnews.com/wires/2008Jan15/0,4670,BridgeCollapseNTSB,00.html.

38. Structure Inventory and Appraisal, *supra* note 8.

39. *NTSB Pics Reveal Early Warping on 35W Bridge*, Associated Press, Mar. 23, 2008, *available at* http://www.usatoday.com/news/nation/2008-03-23-bridge-photos_N.htm.

40. Jim Gehrz, *Minneapolis Bridge Collapse* (photograph), WASH. POST, August 2, 2007,

B. Corrosion and Structural Fatigue

On June 28, 1983, the Interstate 95 (I-95) Bridge collapsed over Mianus River in Greenwich, Connecticut. During the collapse, two tractor semi-trailers and two automobiles drove off the edge of the bridge. Three people died and another 3 people sustained serious injuries. The NTSB concluded that the probable cause of the collapse of the Mianus River Bridge was due to a series of mechanical failures in securing the suspension system over the bridge span. Structural failures of these mechanical components, responsible for the suspension of the bridge, such as an upper pin and hanger assembly, were due to corrosion followed by fatigue. In addition, the NTSB identified deficiencies in the Connecticut Department of Transportation bridge safety inspection and bridge maintenance program, and the NTSB report highlighted the importance of an adequate surface drainage system for bridge roadways.[41]

On December 15, 1967, the US 35 Highway Bridge collapsed over the Ohio River near Point Pleasant, West Virginia. After the US 35 Highway Bridge collapsed, thirty-one vehicles fell into the Ohio River or landed on the shore resulting in 46 fatalities and 9 injuries. The NTSB determined that contributing causes of the bridge collapse were stress corrosion and corrosion fatigue. Inspectors had difficulty accessing many of the forty year old metal bridge components for visual inspections due to accessibility.[42]

C. Construction/Repair/Maintenance

On May 15, 2004, while under construction, a 40-ton steel support girder failed on the Colorado State Route 470 (C-470) Bridge over Interstate 70 East (I-70E) Highway. Figure 3 shows the aftermath of the failed girder impacting the severed van. The metal braces that secured the girder failed and the girder fell onto a van crushing a family of three.[43] Temporary metal braces, secured by eight 10 inch bolts, held the 6 foot tall girder to the existing bridge already in place. The Colorado Department of Transportation (CDOT) initially identified the probable cause as a shift in the girder causing the braces to give way and allowing the girder

available at http://www.washingtonpost.com/wp-dyn/content/linkset/2007/08/03/LI2007080300854.html.

41. NTSB Highway Accident Report, Collapse of a Suspended Span of Route 95 Highway Bridge over the Mianus River, Greenwich, Connecticut, NTSB Number: HAR-84/03 (1983), *available at* www.ntsb.gov/publictn/1984/HAR8403.htm.

42. NTSB Highway Accident Report, Collapse of U.S. 35 Highway Bridge, Point Pleasant, West Virginia, NTSB Number: HAR-71/01 (1970).

43. Wayne Harrison & Kim Ngan Nguyen, *Caller Reports Unstable Girder Hour Before Fatal Accident, Investigations Under Way Into Cause of Girder Collapse*, Seven News, May 17, 2004, *available at* http://www.thedenverchannel.com/news/3313576/detail.html.

to fall.[44] The NTSB also determined the probable cause to be the failure of the temporary bracing system as a result of insufficient planning by the prime contractor, subcontractor and CDOT. The NTSB identified a contributing factor as the CDOT's failure "to effectively oversee safety-critical contract work for the project."[45]

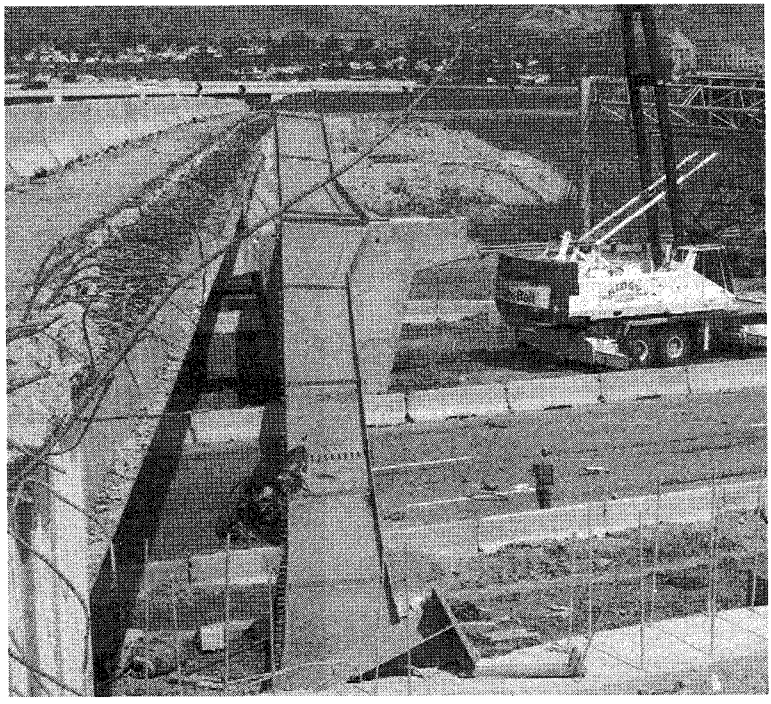

Figure 3: C-470 Bridge steel girder under construction collapsed on eastbound vehicle on I-70 near Golden, Colorado.[46]

The C-470 Bridge steel girder support failure is typical of bridge construction failure. Most bridge failures occur during the construction stage.[47] Moreover, the most common bridge construction failure is "the result of insufficient temporary support or bracing . . . or inadequate consideration of construction loads."[48]

44. *Id.*

45. NTSB Highway Accident Brief, Passenger Vehicle Collision with a Fallen Overhead Bridge Girder, Golden, Colorado Accident No.: HWY-04-MH-023 at 21-22 (2004), *available at* www.ntsb.gov/publictn/2006/HAB0601.pdf.

46. *Id.* at 22.

47. Feld & Carper, *supra* note 29, at 150.

48. Feld & Carper, *supra* note 29, at 150.

IV. Remedies and Defenses

The remedies and defenses for bridge accidents which result in personal injury and property damage vary based on several factors. These factors include the types of parties involved, such as individuals, employees, corporations, and government entities, private or public authorities, private contractors (prime, general and subcontractors), construction contractors (prime, general and subcontractors), design engineers, vendors and material suppliers. Corporations include motorcoach, motor carrier, taxi, bus, railroad, maritime and insurance companies, in addition to some private toll authorities. Private authorities with bridge ownership responsibilities include toll authorities, railroad companies, and non-public owners. Public authorities with bridge ownership responsibilities include federal and state entities identified in Table 4 Bridge Statistics by Bridge Owner and Condition, in the Agency Abbreviation section. Other government entities that may be involved in the litigation or remedy of these actions include the US Department of Transportation (US DOT), Federal Highway Administration (FHWA), Federal Railroad Administration (FRA), National Highway Traffic Safety Administration (NHTSA), Department of Interior (DOI), Department of Defense (DOD), US Coast Guard (USCG) and the National Transportation Safety Board (NTSB). State entities include state legislatures, DOTs, counties, and municipalities. Design engineers or professionals are suppliers of services, not products.[49] Vendors and material suppliers may be liable for defective materials or materials that did not meet contractual or engineering specifications.[50]

49. Feld & Carper, *supra* note 29, at 455.
50. Feld & Carper, *supra* note 29, at 460.

TABLE 4: FHWA BRIDGE STATISTICS BY BRIDGE OWNER AND CONDITION[51]

Condition↓ Agency→	SHA	CHA	THA	C/MHA	SPFRA	LPFRA	OSA	OLA	PrA	RR	STA	LTA	OFA	Unk
Structurally Deficient Bridges by Owner Totals	23,141	40,366	3,940	4,268	166	11	195	107	51	450	306	37	689	77
Functionally Obsolte Bridges by Owner Totals	40,889	23,693	2,447	8,090	197	20	334	192	119	229	2,358	194	1,363	139
Deficient Bridges by Owner Totals	64,030	64,059	6,387	12,358	363	31	529	299	170	679	2,664	231	2,052	216
Bridge by Owner Totals	276,056	230,542	28,995	50,479	989	67	1,128	1,251	542	948	6,495	578	8,355	375

Table includes 50 U.S. States, District of Columbia and Puerto Rico as of December 2006.

Abbreviation	Agency
SHA	State Highway Agency
CHA	County Highway Agency
THA	Town or Township Highway Agency
C/MHA	City or Municipal Highway Agency
SPFRA	State Park, Forest, or Reservation Agency
LPFRA	Local Park, Forest, or Reservation Agency
OSA	Other State Agencies
OLA	Other Local Agencies
PrA	Private (other than railroad)
RR	Railroad
STA	State Toll Authority
LTA	Local Toll Authority

Abbreviation	Agency
OFA	Other Federal Agencies (not listed below)
	Indian Tribal Government
	Bureau of Indian Affairs
	Bureau of Fish and Wild Life
	U.S. Forest Service
	National Park Service
	Tennessee Valley Authority
	Bureau of Land Management
	Bureau of Reclamation
	Corps of Engineers (Civil)
	Corps of Engineers (Military)
	Air Force
	Navy/Marines
	Army
	NASA
	Metropolitan Washington Airports Service
Unk	Unknown

51. FHWA Bridge Programs National Bridge Information Data, Highway Bridge by Owner (2005), *available at* http://www.fhwa.dot.gov/bridge/owner06.xls.

The personal injury remedies available as a result, include litigation, settlement negotiations, and compensation fund options. Formulae 1-5 identify variables that may be considered in the remedies available to injured parties and defenses accessible to defending parities.

FORMULA 1: INJURED PARTY (IP_{II}) TYPES FOR BRIDGE FAILURE LITIGATION, SETTLEMENT OR COMPENSATION.

$$\mathbf{IP_{II}} = PVO \vee FM \vee C_T(Pax) \vee Emp[BO(PA \vee PO) \vee BM(PA \vee PO \vee PC) \vee BB(PA \vee PO \vee PC) \vee C_T(MCo \vee MCa \vee TC \vee BC \vee RR \vee MV)] \vee InsC$$

FORMULA 2: INJURED PARTY (IP_{II}) REMEDIES.

$$\mathbf{Remedy\ (IP_{II})} = Li \vee Se \vee CF$$
$$= Li\{Ne[Du(LD \vee VA \vee FR(In \vee NoD \vee S_f) \wedge Br \wedge Ca(Co \vee De \vee E_f) \wedge Da] \vee K \vee SI(SW) \vee VL\} \vee Se \vee CF$$

FORMULA 3: DEFENDING PARTY ($DP_{Ä}$) TYPES SUBJECT TO SUIT BY AN INJURED PARTY (IP_{II}).

$$\mathbf{DP_{Ä}} = BO(PA \vee PO) \vee BM(PA \vee PO \vee PC) \vee BB(PA \vee PO \vee PC) \vee BD(PA \vee PO \vee DE) \vee Ve \vee MS \vee C_T(MCo \vee MCa \vee TC \vee BC \vee RR \vee MV) \vee InsC$$

FORMULA 4: DEFENDING PARTY ($DP_{Ä}$) DEFENSES FOR THE PUBLIC AUTHORITY (PA).

$$\mathbf{Defense\ (DP_{Ä}(PA))} = Li \vee Se \vee CF$$
$$= Li\{SI(G_f) \vee K(IC \vee RST) \vee CN \vee SOL \vee N_f\} \vee Se \vee CF$$

FORMULA 5: DEFENDING PARTY ($DP_{Ä}$) DEFENSES FOR THE PRIVATE OWNER (PO), PRIVATE CONTRACTOR (PC), TRANSPORTATION COMPANY (C_T), VENDOR (VE), MATERIAL SUPPLIER (MS) AND INSURANCE COMPANY (INSC).

$$\mathbf{Defense\ (DP_{Ä}(PO, PC, C_T, Ve, MS \vee InsC))} = Li \vee Se$$
$$= Li\{SI(G_f) \vee K(IC \vee RST) \vee SOL \vee CN \vee N_f\} \vee Se$$

Legend:

Abbreviations:

BB	Bridge Builder	DE	Design Engineer (Professionals)	Li	Litigation	PVO	Personal Vehicle Occupant
BC	Bus Company	DP	Defending Party	LD	Lewgal Duty	RR	Railroad
BD	Bridge Designer	Du	Duty	MCo	Motorcoach	RST	Restatement of Torts
BM	Bridge Maintainer	E_f	External Force (car, carrier, train or maritime vessel impact)	MCa	Motor Carrier	Se	Settlement
BO	Bridge Owner	Emp	Employee	MS	Material Suppliers	S_f	Structural Failure
Br	Breach	FM	Family Member	MV	Maritime Vessel	SI	Sovereign Immunity
Ca	Causation	FR	Failure to Repair	Ne	Negligent Act	SOL	Statute of Limitations
CF	Compensation Fund	G_f	Governmental function	N_f	Natural Forces (Earthquake, Flood, Tornado, Hurricane, Wind)	SW	Statute Waiver
CN	Contributory Negligence	IC	Indemnification Clause	NoD	Notice of Disrepair	TC	Taxi Company
Co	Construction	In	Inspections	PA	Public Authority	VA	Voluntary Assumption
C_T	Transportation Company	InsC	Insurance Company	PO	Private Owner	Ve	Vendor
Da	Damages	IP	Injured Party	PC	Private Contractor	VL	Vicarious Liability
De	Design	K	Contract	P_f	Proprietary function		

Boolean Logic Symbols: ^ = AND v = OR

V. Litigation Remedies

In general, personal injury remedies from a bridge accident may include causes of action such as negligence, vicarious liability and breach of contract from contributing factors including bridge design, construction, repair, maintenance and inspection activities.

From the I-35W Minneapolis Bridge collapse, the most likely causes of action will be for negligence founded:

1. in maintenance of the bridge against the State;
2. in inspection of the bridge against the contractor;
3. in the renovation of the bridge at the time of collapse against the general contractor; and
4. in the design of the bridge against the engineering firm.

In general, injured parties' claims of action based on negligence in bridge design, construction, repair, maintenance or inspection activities will be available against public authorities, private authorities, and prime contractors.

A. Defective Design or Plan for Construction

A cause of action against engineers, general contractors or public or private authorities originate with the defective design or plan in construction of the bridge. The injured party may be precluded from bringing suit against the parties responsible for the defective design or plan of bridge construction based on the statute of limitations associated with construction accident claims. In addition, the injured party may be precluded from bringing suit against any public authority on the basis of governmental immunity granted such entities.

Depending on each state's statute of limitations associated with con-

struction accident claims, injured parties may not have a cause of action for the defective design or plan of construction of a bridge, specifically against the engineer or the approving public authority.[52] Minnesota state statute limits individuals from filing claims for 10 years after substantial completion of construction.[53] Hypothetically, if the statute of limitations in each state regarding such claims required filing bridge collapse claims within 10 years of the occurrence, 536,885 of the 599,766 bridges (89.5%) in the United States would not be eligible for such claims (refer to Tables 1 and 2). Further, Table 2 does not identify any bridges which are between the ages of 0 and 9 years as being structurally deficient. Therefore, the probability of an injured party recovering from such a bridge failure on the basis of defective design or construction is very low. On this basis, the victims of the I-95 Mianus Bridge collapse in Greenwich, Connecticut in 1983 unsuccessfully pursued the architect due to the expiration of the statute for construction claims.[54] Unfortunately, the Connecticut Supreme Court upheld the superior court's decision to exonerate the designer of the twenty-six year old bridge and held that the Connecticut Department of Transportation was responsible for the collapse based on deficient inspection.[55]

Other state statutes may preclude liability of the public authority and other state departments involved, if the injuries occurred as a result of defective design or plan in construction of a bridge. Many states have statutes which provide immunity to governmental entities which are parties in a suit, if the design and construction of the bridge was executed according to generally accepted standards at the time the bridge was built.[56] Likewise, many states possess state tort claims acts which provide absolute government immunity from liability based on the design or plan of construction of highways and bridges.[57] In *White*, the Wyoming Supreme Court upheld the lower court's finding that the Wyoming Highway Department was immune from liability for defective design, construction and maintenance of highways based on the basis of the state's Government Claims Act.[58]

Since the I-35W Minnesota Bridge was built in 1967, forty-one years ago, the argument for a defective design or plan of construction would most likely hold little merit. The Minnesota statute stating that such

52. Feld & Carper, *supra* note 29, at 147.

53. MINN. STAT. ANN. § 541.051 (West 2008).

54. Elizabeth Stawicki, *Who Will Pay When the Lawsuits Begin?*, MINN. PUB. RADIO, Aug. 13, 2007, http://minnesota.publicradio.org/display/web/2007/08/10/liability.

55. Feld & Carper, *supra* note 29, at 147.

56. 39 AM. JUR. 2D *Highways, Streets, and Bridges* § 382 (2008).

57. *Id.*

58. White v. Wyoming, 784 P.2d 1313, 1322 (Wyo. 1989).

claims must be filed within ten years precludes an injured party from filing a claim against those responsible for flaws in bridge design, for defective designs and plans for construction, or for filing claims against the state highway agency responsible for bridge ownership and maintenance. On the other hand, the injured parties may have a cause of action due to the defective plan for construction based on the excessive weight on the I-35W Bridge during the public improvement bridge projects in 1998 and 2007.

B. Duty to Repair or Maintain

The duty to repair or maintain the bridge is the responsibility of the general contractor who performs the inspections or who is responsible for repair and maintenance of the bridge. Engineers are rarely tasked with the duty to repair or maintain the bridge, unless their company is asked to fulfill a role in the inspection after build. Likewise, public and private authorities also do not have the duty to repair or maintain the bridge, unless notice is provided directly to them regarding a deficiency.

Repair and maintenance work is normally under the supervision of a general contractor and engineers usually contract inspection work to the same and thereby avoid liability.[59]

The bridge owner is tasked with the duty to exercise ordinary care in the construction, repair or maintenance activities.[60] In general, public and private authorities are responsible for the repair of defective components in bridges. Public authorities are not normally liable for damages to injured parties on the basis that such authorities by their nature act in a "quasi-judicial or legislative capacity."[61] Immunity was granted to the Wyoming Highway Department when suit was brought for defective design, construction and maintenance of highways on the basis of legitimate legislative objectives.[62] On the other hand, a state highway agency was denied governmental immunity when it failed to take action after receiving notice of a defect.[63]

The general contractor may have supervisory duties in addition to the construction, repair or maintenance responsibilities.[64] Therefore, the general contractor may be subject to liability for the collapse of a bridge.[65] The general contractor performing publically funded work or

59. Feld & Carper, *supra* note 29, at 457.

60. *See* 39 Am. Jur. 2d *Highways, Streets, and Bridges* § 96 (2008). *See also* 11 C.J.S. *Bridges* § 84 (2008).

61. Highways, Streets, and Bridges, *supra note 56.*

62. *White*, 784 P.2d at 1322.

63. Highways, Streets, and Bridges, *supra note 56.*

64. Feld & Carper, *supra* note 29, at 457.

65. *Id.*

improvements on behalf of a public authority does not receive the advantage of the associated governmental immunity. Contractors may then be subject to liability for the injuries or damages suffered by third parties resulting from the contractor's negligence in the performance of the contracted work.[66]

For the I-35W Minnesota Bridge collapse victims, causes of action based on the duty to repair or maintain may be viable. Engineers, those responsible for maintenance of the highway and public authorities, may be more difficult to pursue for losses sustained. Since governmental immunity does not extend to private contractors, the general contractor who performed the renovations to the I-35W Minnesota Bridge at the time of the collapse may be held liable for the associated personal injuries, deaths and property damages. The general contractor may have breached the duty to maintain the bridge. In addition, the general contractor may also be subject to claims based on negligence if there was a failure in taking proper precautionary measures in preventing a dangerous condition.[67] In either circumstance, the general contractor may be determined to be a contributor or the cause of the bridge collapse by allowing the placement of excessive weight, approximately 300 tons at the time of collapse, on the bridge deck consisting in part of machinery and paving materials.[68]

C. Notice of Defect

The strongest claim which may be available to injured parties lies with inadequate response by the bridge owner or contractor to defects identified prior to the bridge collapse of which they may have had notice.

If there was no prior notice of the defect, the bridge owner may avoid liability for the injuries or damages resulting from a bridge collapse. If a bridge collapse arises from an internal and latent defect, the injured party may not have a sustainable action against the bridge owner if the bridge owner exercised due care.[69] In *Roanoke*, the bridge owner exercised due care in contracting a reliable manufacturer for the construction of the bridge and performing frequent and proper inspections. Furthermore, the bridge owner was unable to physically visually inspect the defects due to the locations on the bridge.[70] In *Hafele*, the plaintiff sustained personal injuries and damage to his vehicle when the bridge failed. Since the public authority was not provided prior notice of any defect or "unsound support" of the bridge, the appellate court dismissed

66. 64 Am. Jur. 2d *Public Works and Contracts* § 130 (2008).

67. 60A C.J.S. *Motor Vehicles* § 480 (2008).

68. Rosenker, *supra* note 4; Frommer, *supra* note 37.

69. Roanoke Ry. & Electric Co. v. Sterrett, 62 S.E. 385, 387 (1908) (citing 2 Hutchinson on Carriers (3d. Ed.) §§ 903, 904)).

70. *Id.*

the claim.[71] In *Jackson*, the Supreme Court of Louisiana placed the burden on the defendant railroad bridge owner to show that the bridge was inspected for timely discovery and remedy of any defects during the operation of the bridge.[72]

For the I-35W Minneapolis Bridge collapse victims, there may be merit in a claim against the inspection contractor for failure to inform the authorities or give notice of the defects subsequently detected in the gusset plates. Photographs taken of the I-35W malformed gusset plates taken during a bridge inspection four years earlier evidence this failure.[73] Ironically, the Structure Inventory and Appraisal (SI&A) Sheet for the I-35W Bridge, recorded during the last inspection on June 22, 2007, did not identify any defects associated with these gusset plates.[74]

Therefore, the injured parties from the I-35W Minneapolis Bridge collapse have the following potential claims of action:

1. for negligent bridge maintenance;
2. for failure to give notice of a known defect;
3. for breach of duty in maintenance of the bridge, and
4. for not taking proper precautionary measures by limiting the weight of the equipment and construction materials on the deck of the bridge.

VI. Settlement or Administrative Solutions

Based on the facts of the case, the attorneys for the injured and defending parties may consider solutions such as settlement or binding arbitration. The families of the victims of the C-470/I-70 girder collapse opted to settle with the state of Colorado, the Colorado Department of Transportation, and the contractor and sub-contractor associated with the project. On behalf of their loved ones, they received a settlement of $1.5 million.[75] It may be advisable for attorneys involved to consider solutions such as settlement by mediation or binding arbitration so that the injured parties can benefit from more efficient resolution and avoid the time, emotional pain and financial expense associated with litigation. As of 1997, more than ninety percent of construction disputes were settled before entering court.[76]

71. Hafele v. State, 274 A.D. 1022 (1948).

72. Jackson v. Natchez & W. Ry. Co., 38 So. 701 (La. 1905).

73. NTSB Pics Reveal Early Warping on 35W Bridge, *supra,* note 39.

74. Structure Inventory and Appraisal, *supra* note 8.

75. *Minnesota Bridge Collapse a Reminder of Colorado Collapses*, SEVEN NEWS, Aug. 1, 2007 http://www.thedenverchannel.com/news/13803194/detail.html.

76. Feld & Carper, *supra* note 29, at 451.

VII. COMPENSATION FUNDS

In the last quarter of 2007, the Minnesota Legislature proposed a Victims' Compensation Fund (VCF) for the provision of relief to injured parties and to supplement the recovery cap limitations in existing Minnesota law. At the time of the bridge collapse in August 2007, Minnesota's liability pursuant to the Tort Claims statute was limited to $1 million per incident,[77],[78] only allowing for a total of $1 million to compensate victims affected by the resulting 13 deaths and 145 injuries.[79] Thereafter, the injured parties have no claims remaining against the state.[80]

The Minnesota Senate and House continue to negotiate various VCFs, and are attempting to model them after the Federal Victims' Compensation Fund which was set up for the World Trade Center victims after September 11, 2001.[81] The Minnesota Legislature passed a bill on May 5, 2008, for $38 million toward the VCF which was sent to Minnesota Governor Tim Pawlenty.[82] Under the VCF, each of the injured parties may qualify for up to $400,000.[83] The more severely injured parties may receive additional compensation from a $12.6 million supplemental fund.[84] The VCF would provide assistance in recovering from the economic and non-economic losses sustained from that incident.[85] Injured parties receiving compensation from this fund, will be asked as a condition of receipt, to waive their rights to sue the State of Minnesota or any other governmental entities associated with the I-35W Bridge collapse.[86] The recipients of this compensation will not be asked to waive their rights to sue other entities found responsible for the bridge collapse.[87] Lastly, the injured parties will have until October 15, 2008 to apply for the VCF benefits, which process will be overseen by a compensation panel determined by the Minnesota Supreme Court.[88]

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77. Martiga Lohn, *Dozens of Bridge Victims Prepare to Sue*, ASSOCIATED PRESS, Jan. 22, 2008, http://www.foxnews.com/wires/2008Jan22/0,4670,BridgeCollapseLegal,00.html.

78. MINN. STAT. ANN. § 3.736, subdiv. 4(e), (West 2008).

79. Author's Note: If distributed equally, the result would be just less than $6,400 per injured party. Even with varying degrees of injury, few if any injured parties would receive just compensation from the government.

80. *Supra* note 78.

81. Charlie Shaw, *Public Hearing on Fund for Bridge Victims*, MINN. LAW., Oct. 29, 2007, *available at* 2007 WLNR 21464317.

82. Martiga Lohn, *Bridge Victim Fund Clears Legislature, Heads to Pawlenty*, ASSOCIATED PRESS, May 5, 2008, http://minnesota.publicradio.org/display/web/2008/05/05/bridgefund/?rsssource=1.

83. *Id.*

84. *Id.*

85. Shaw, *supra* note 81.

86. Lohn, *supra* note 82.

87. *Id.*

88. *Id.*

VIII. Conclusion

The current conditions of bridges in the United States pose a major risk to travelers as evidenced by 72,524 of the 599,766 private and public vehicular and railroad bridges assessed as structurally deficient, representing 12.1% of the total. The examples provided of bridge failures due to design errors, corrosion and structural fatigue, and construction/repair/maintenance illustrate the devastating potential for future bridge failures in the United States.

In conclusion, the injured parties of the I-35W Minneapolis Bridge collapse that occurred on August 1, 2007 have potential claims of action against the state for negligence in bridge maintenance based on failure to give notice of known defects in the gusset plates; against the contractor who performed the bridge inspection and photographed the bending gusset plates for not conveying these defects to the authorities; and against the general contractor and subcontractors that were renovating the bridge at the time of collapse based on their negligence in allowing excessive weight onto the bridge with their equipment and construction materials. In lieu of pursuing judicial relief, the injured parties retain the option to accept compensation funds that are approved by the Minnesota State Legislature and are currently under review by the Governor of Minnesota. The contractors who are not subject to governmental immunity may be pursued separately via litigation, mediation or binding arbitration for additional recovery.

APPENDIX A: DEFINITIONS

"**Bridge** = A structure including supports erected over a depression or an obstruction, such as water, highway, or railway, and having a track or passageway for carrying traffic or other moving loads, and having an opening measured along the center of the roadway of more than 20 feet between undercopings of abutments or spring lines of arches, or extreme ends of openings or multiple boxes; it may also include multiple pipes, where the clear distance between openings is less than half of the smaller contiguous opening."[89]

Bridge Accident = an accident caused by a mechanical component of the bridge, however, the bridge remains operative.

Bridge Failure = structural failure of bridge rendering bridge inoperative for use by ground vehicles.

Deficient bridges = bridges that require significant maintenance and repair to remain in service with eventual rehabilitation or replacement.[90]

Federal Bridges = bridges managed by the federal government

Functional Obsolete bridges = based on the function of the bridges' geometrics not meeting current design standards.[91]

Local Bridges = bridges managed by city and municipal governments

Private Bridges = bridges managed by toll authorities and private corporations

"**Scour** = erosion of streambed or bank material due to flowing water; often considered as being localized around piers and abutments of bridges."[92]

State Bridges = bridges managed by the state government

Structurally Deficient bridges = bridges with reduction of load carrying capacity due to deterioration in significant load-carrying bridge elements.[93],[94]

89. National Bridge Inspection Standards, 69 Fed. Reg. 239 (Dec. 14, 2004) (codified at 23 CFR § 650.305 (2007)).
90. *Status of the Nation's Highways, Bridges, and Transit*, *supra* note 24 at 3-14.
91. *Id.* at ES-4.
92. *Supra* note 90.
93. *Status of the Nation's Highways, Bridges, and Transit*, *supra* note 24 at 3-14.
94. *Id.* at ES-4.