



**Consulting Engineers & Scientists, Inc.**

# **The Expert Approach to Bridge Related Liability Matters**

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## BRIDGE RELATED LIABILITY MATTERS

### INTRODUCTION

This document was developed to aid the attorney in assessing and preparing bridge liability cases. Each case will be unique and require an individualized approach. The information contained herein is of a general nature and will require adaptation for each case. Early review of the case by an expert will provide the attorney with a technical view of the merits and pitfalls of the individual case and allow the attorney to make a more informed assessment of the case.

### THE ACCIDENT

Bridges can be dangerous places. These structures span rivers, roadways, railroads, and other items that may not be desirable to walk or drive across. Bridges generally restrict the lateral movement of traffic and confine pedestrians to a relatively narrow space. When vehicles are introduced to the space, there is very little room for the errant driver to correct his actions. Consequently, vehicular accidents occur frequently on bridges.

Construction of these structures also poses issues. The construction of the Brooklyn Bridge in New York City claimed 30 lives including the designer/contractor, John A. Roebling. Calamities on this bridge included caisson fires and explosions.

Maintenance of bridges raises other issues. Simply painting a bridge poses risks as evidenced when a painter died in 2002 while painting the San Francisco Bay Bridge when his scaffolding buckled. This was the second death on this painting project.

Bridges themselves may have weakened members that cause problems. In 1993, an Amtrak train jumped the tracks and plunged into the Big Bayou Canot near Mobile, Alabama, killing 47 people.

Just the simple act of inspecting a bridge's condition can be dangerous. Access to examine the condition of bridge components at certain locations, on the underside and top of a bridge, can be dangerous when boat, truck, and/or train traffic is present. These areas warrant special care.

Bridge accidents generally include:

- Bridge inspection accidents
- Construction accidents
- Maintenance accidents
- Collapses
- Local component failures
- Traffic accidents

In most cases, collapses and local component failures will require analysis. These cases can be very complex because the failure or collapse is generally a result of inadequacies in design, maintenance, construction and/or bridge inspection. Other instances have occurred when the bridge has been overloaded. This most often occurs when a bridge is load posted.

A licensed engineer experienced in bridge design and bridge inspection is essential for these cases so that analysis and review of inspection procedures, documents, etc. is performed correctly and thoroughly. Inspection documents may be difficult to obtain since they are privileged by federal statute. A licensed engineer experienced in both bridge inspection and design will be needed to determine whether inspections had been performed properly, the bridge had been maintained properly and the bridge design was appropriate and in compliance with both general and specific criteria. The American Association of State Highway and

## BRIDGE RELATED LIABILITY MATTERS

Transportation Officials (AASHTO), an organization comprised of the top Bridge and Highway Officials from the Federal Highway Administration and each state's Department of Transportation, publishes nationally recognized bridge design criteria. States generally use these criteria as a base standard and then adopt minor modifications to this AASHTO document.

It is essential that a licensed engineer with experience in both bridge design and inspection be present to inspect the local failure and/or collapsed bridge. Certain evidence regarding the cause/means of the collapse can be lost if pieces of the bridge are removed. Also, natural forces, i.e. rain, wind, snow, etc., may alter or destroy evidence

Bridge inspection accidents generally involve one or more inspectors being injured or worse. Many times the injury occurs as the result of a fall or collision with a vehicle, train, or boat/barge.

In these instances, the following will assist in the investigation:

- Experience of the inspectors
- Safety devices used
- Traffic control during the inspection
- Permits that were acquired for the work
- Temporary signing employed
- Waterway safety controls

Federal statute dictates the interval at which bridges are to be inspected. It also identifies the inspection criteria and publications that must be followed. These criteria are published by the Federal Highway Administration.

Bridge construction accidents are much the same as any other construction accident with certain exceptions. Please also refer the Consulting Engineers & Scientists, Inc. "Expert Approach to Construction Liability" in addition to this discussion. Bridges impose the added hazards of vehicular/rail traffic on the bridge as well as vehicular/rail/boat traffic under the bridge. In addition, many bridges pass over rivers, bays, streams and portions of oceans. These add new dimensions to safety controls. Establishing the means and methods of providing for the safety of the construction worker, as well as others on the construction site and in the surrounding area, is essential in the investigation process.

### Bridge Components

When investigating the bridge at an accident site various components may need to be evaluated based on the particular accident. Several of these components are listed hereafter:

- Approach roadway
- Curbing
- Items adjacent to bridge
- Barriers
- Drainage
- Items under bridge
- Bridge roadway cross section
- Failed components
- Lines on pavement

Each of these components and others not listed may be checked for its location, condition, visibility, discernability, appropriateness, etc.

## BRIDGE RELATED LIABILITY MATTERS

### THE INVESTIGATION

A construction liability investigation may include a site examination, securing evidence, witness statements, production of documents, additional discovery, and case analysis.

Accident sites may remain unchanged for years; however, some sites, particularly when small localized components on bridges fail, the evidence could change in hours or even less. A site examination performed by a qualified engineering expert, as close to the time of the accident as possible, is helpful to establish and document the conditions that existed at the time of the accident and its aftermath. Critical evidence, especially with failures and collapses, can be lost when the site investigation is delayed. A prompt, thorough examination defines the accident site conditions, reduces assumptions, and minimizes speculation.

When the attorney needs to evaluate the nature and cause of an accident, limited information of the incident circumstances may exist. Witnesses are sometimes confused and provide conflicting or erroneous information; however, the engineering investigation can be helpful in the evaluation of this information. The accident scene should be documented by measuring, mapping and photographing to help assess the accident. Pertinent information should be carefully gathered and preserved for subsequent study and evaluation. When additional testing and analyses are warranted, the extent of an evaluation is often dependent upon securing evidence before the evidence is altered, lost or destroyed.

Information that can be determined from a site investigation may include the following:

- Broken components
- Clothing
- Contaminants
- Contradictory conditions
- Debris
- Footwear
- Lighting conditions
- Locations
- Measurements
- Photographs

### Environmental Conditions

- Day lighting
- Night lighting
- Weather conditions

### Site Characteristics

- Contaminants
- Drainage
- Guardrail stability & location
- Holes or openings
- Ice
- Joint in pavements
- Material types
- Means of egress
- Name plates
- Obstructions
- Signs
- Soil type
- Stormwater & drainage
- Subsidence
- Surface treatment
- Surface type
- Warnings
- Water sources

### Measurements & Locations

- Change in elevations
- Contractor laydown areas
- Curb heights
- Fixed object locations
- Guardrail height
- Handrail anchorage
- Ramp slopes
- Riser heights
- Sight distance

## BRIDGE RELATED LIABILITY MATTERS

- Debris location
- Deck coefficient of friction
- Deteriorated areas
- Dips
- Drainage locations
- Handrail geometry
- Handrail heights
- Markings
- Overhead clearances
- Signage
- Slopes & grades
- Surface texture
- Surface unevenness

### Testing and Analysis

- Air quality
- Chemical analysis
- Concrete testing
- Electric grounding
- Electrical systems
- Failure analysis of materials
- Hydraulics
- Metal detection
- Slip resistance
- Soils testing
- Stability
- Steel strength
- Structural analysis
- Timber evaluation
- X-Rays

## DISCOVERY

The discovery of materials for expert technical evaluation should include documents and materials that offer historical insight leading to the incident events and are believed to be associated with the case development. When considering deponents, the owner, engineer, contractors, construction managers, construction inspectors, maintenance supervisors and code enforcement officials may have relevant case information. Dates of design, construction and alteration should be determined to evaluate issues of building code and/or OSHA compliance. Based upon the case requirements, the following information may be requested as it is determined to be necessary for the development and support of the case

### Agreements, Contracts & Submissions

- Agencies approvals
- Approved preliminary engineering documents
- Approved preliminary environmental documents
- Construction manager
- Developers
- Engineers
- General contractors
- Inspectors
- Joint ventures
- Maintenance
- Owners
- Permits
- Subcontractors

### Code Enforcement File

- Approved drawings
- Code enforcement officer
- Construction applications
- Construction permits
- Inspection forms
- Inspector
- Notes
- Notices
- Permits
- Violations

## BRIDGE RELATED LIABILITY MATTERS

### Construction

- Accident investigations
- Accident records
- As-built drawings
- Bid packages
- Change orders
- Codes, constructed under
- Construction manager
- Construction packages
- Correspondence
- Daily reports
- Diaries
- Drawings
- Final construction drawings
- Foreman
- Gate logs
- Inspection records
- Inspectors
- Job meeting notes
- Job notes & records
- Job schedules
- Monthly reports
- OSHA files
- OSHA violations
- Photographs
- Project manager
- Safety engineer
- Safety file
- Safety manuals
- Safety meeting minutes
- Safety officer
- Safety records
- Shop drawings
- Shop steward
- Special reports
- Specifications
- Subcontractors
- Superintendent
- Test reports
- Tool box meeting records
- Videos
- Work orders

### Engineers & Architects

- As-built drawings
- Change orders
- Codes, designed under
- Construction contract supplements
- Construction packages
- Contracts to include each scope of service
- Final construction (design) drawings
- Preliminary drawings & sketches
- Project engineer
- Project manager
- References, relied on
- Revised drawings
- Shop drawings
- Specifications
- Who sealed drawings

### Maintenance Records

- Agreements
- Alterations after construction
- Cleaning procedures
- Contractors, identification
- Load posting, including records & calculations supporting the posting
- Maintenance contractor
- Maintenance records
- Manuals
- Meeting notes
- Methods & techniques
- Personnel names, identification
- Policies
- Procedures
- Purchase orders for products
- Records of repair
- Schedules
- Signs
- Warnings

### Ordinances: Design & Construction

- Bridge requirements
- Roadway requirements
- Sidewalks requirements
- Site development requirements

## BRIDGE RELATED LIABILITY MATTERS

### Plaintiff

- Accident history
- Age
- Alcohol/drug abuse
- Attentiveness
- Climbing ability
- Clothing
- Health
- Medical history
- Prior physical conditions
- Running ability
- Statements
- Walking ability

### ENGINEERING ASSISTANCE FOR ACCIDENT INVESTIGATION

An attorney often encounters technical documents or engineering reports that provide information that is difficult to interpret. Sometimes, an attorney needs assistance interpreting technical information. The expert engineer can provide technical assistance to an attorney in performing tasks including the following:

- Anticipated opposing liability arguments
- Arrange or conduct testing
- Code enforcement, file review
- Code requirements, code changes & standards
- Complaint review
- Deposition notes
- Engineering & construction general practice criteria
- Evidence storage
- Examination of accident scene
- Exhibit preparation
- Governmental department file review
- Identify useful information
- Instruct attorney on technical issues
- Interface & coordinate to obtain information
- Interface with other consultants
- Interview witnesses
- Local & state requirements
- Photograph evidence
- Prepare a report, if warranted
- Questions & technical wording for discovery
- Research publications
- Review technical documents
- Reviewing & obtaining records
- Reviewing drawings, contracts & design documents
- Testify, if warranted
- Testing of accident conditions & evidence
- Translate engineering language into common terms
- Trail cross examination questions
- Trial monitoring
- Trial preparation

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*The information presented in this booklet is intended only to be used as a guide in assisting clients concerned with or involved in the legal process where litigation or potential litigation is an issue. The information is further intended to inform clients that Consulting Engineers & Scientists, Inc. has both the expertise and the capability to provide direction and guidance in the specific disciplines and areas presented in this booklet. It is important to note that the information also is general and is not intended to completely cover the specific nuances of a particular matter. If there are any questions concerning this information, please feel free to contact us.*