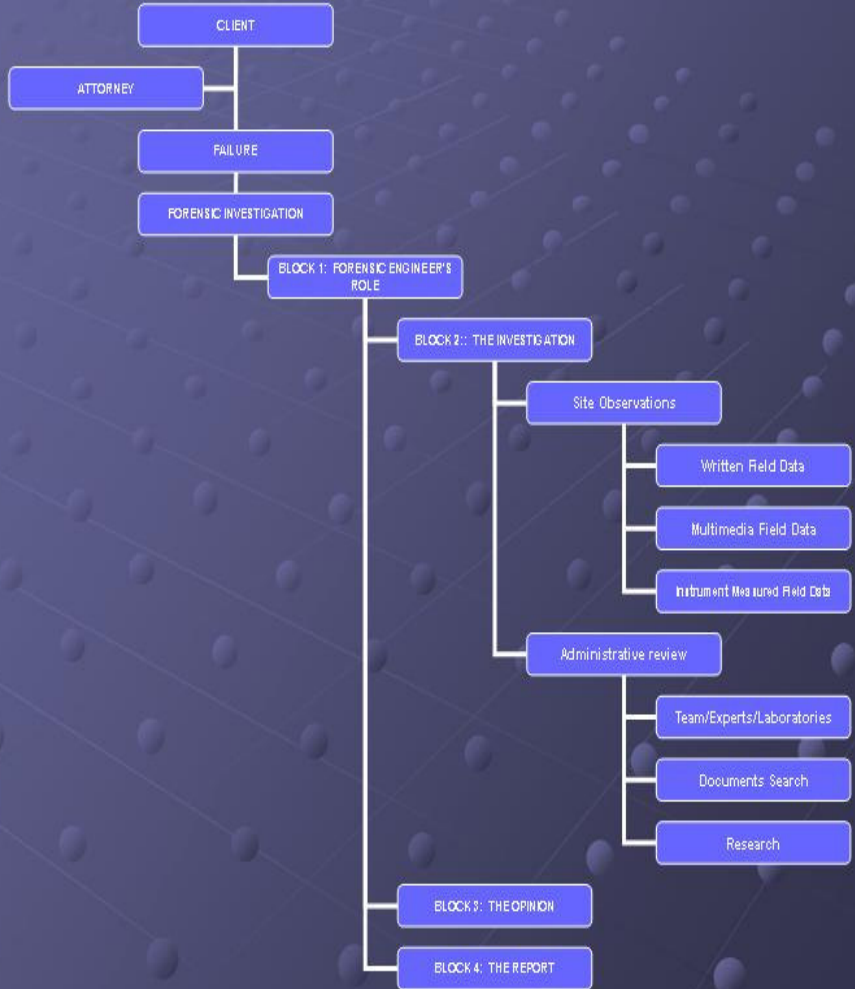


## Anatomy of a Construction Defect: The Investigation Protocol



INTRODUCTION

**ABSTRACT**

This Guide outlines the aspects of the forensic investigative process starting with investigation planning, through the failure hypothesis and ending with the report. The investigating engineer's role as an expert witness is not within the scope of this guide.

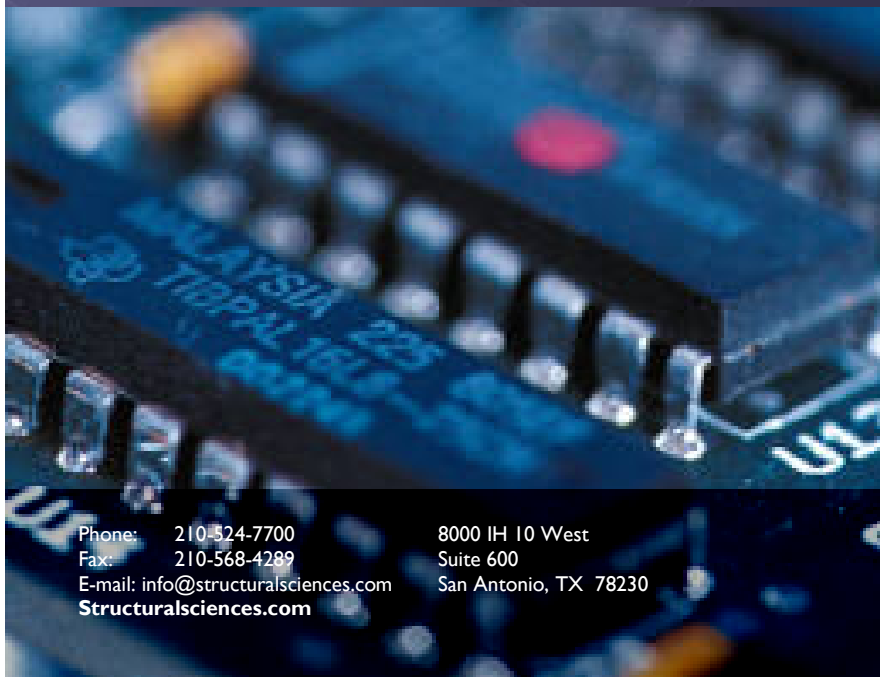
**OVERVIEW**

This guide provides a definitive method to identify the cause and origin of defective construction, including the role of the forensic engineer as investigator and finder of fact. These forensic investigation methodologies are not exclusively limited to construction defects; they can address a range of failures, including serviceability and structural performance failures.



INVESTIGATION BUILDING BLOCKS

- Block 1: Forensic Engineer's Role**
- Block 2: The Investigation**
- Block 3: The Opinion**
- Block 4: The Report**



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## BLOCK 1: FORENSIC ENGINEER'S ROLE

ROLE	DESCRIPTION	COMMENTS
<b>Engineer must be Qualified</b>	Engineer must be impartial, and possess the education, experience and training in the professed area of expertise. Engineer must be credible, have good communication skills, and avoid conflicts of interest.	Qualifications can be: field experience, formal education, published works, membership in professional societies, and continuing education, etc.
<b>Engineer must interface with the client</b>	Engineer must determine and clarify the client's requirements, assure the client-engineer agreement is clear, and provide advice as needed.	Engineer must disclose to the client any conflicts of interest, limitations of technical expertise, and commitment to testify as the claim requires.

## BLOCK 2: THE INVESTIGATION

ROLE	DESCRIPTION	COMMENTS
<b>Engineer must plan the investigation</b>	Planning the investigation involves coordinating with the client, the site personnel or owner, and the identified forensic team. A preliminary review of the available information is appropriate to determine the scope of the investigation.	On a preliminary basis, experience from prior forensic engagements can be used to model the current defect investigation. This provides the engineer with a pro-forma scope of work, and allows all parties to assess schedule and budget issues.
<b>Engineer must seek client approval</b>	Prior to consuming engineering time, all engineering activities must be client approved.	A written agreement between the client and engineer is appropriate at this stage.
<b>Engineer must identify the investigative team</b>	The scope of the investigation will define the level of skill and type of expertise required for the investigation. Client approval of the team members is required, and a conflict review must be done prior to engaging contractors or consultants.	Written agreements should be secured with the team members as required by client requirements.
<b>Engineer must collect site data</b>	Site data must be collected, and the type of data needed will be defined by the scope of the investigation. Data must be accurate with an appropriate level of precision as defined by the investigation. The means of collecting and recording data must be reliable and traceable to an appropriate standard.	Site data should be kept in a secure environment by the records custodian.
<b>Engineer must perform an administrative and technical review of documents and data</b>	Engineer must review all non-site collected data, including prior reports, testimony, or other information and documents.	

## BLOCK 3: THE OPINION

ROLE	DESCRIPTION	COMMENTS
<b>Engineer shall perform a design analysis, failure modeling, historical data review, authority review, defect classifications, and timeline review</b>	Engineer shall assure that the forensic investigation considers all reasonable potential causative factors when analyzing the investigation data.	Developing a preliminary failure model can expedite assuring that all reasonable potential causative factors are considered.
<b>Engineer shall perform Investigation Synthesis</b>	Investigation synthesis requires linking data, the historical timeline of events, the relevant authorities, and the education, experience and training of the investigation team.	The synthesis requires correlating all information & data, with the reasonably expected causative factors as indicated by the preliminary failure models.
Engineer shall develop a defect cause & origin hypothesis	The defect cause & origin hypothesis requires integrating the collective judgment of the investigation team and the investigation data synthesis.	The opinion [cause and origin of defect or failure] is resolved at this stage.

## BLOCK 4: THE REPORT

ROLE	DESCRIPTION	COMMENTS
<b>Engineer must articulate the investigation and opinion in written form</b>	The written report will indicate investigation purpose, data considered, data synthesis and engineering analysis, investigation findings, and cause and origin of defect opinions.	The report must be sealed by a licensed engineer.
<b>Engineer must articulate the investigation and opinion verbally.</b>	Whether in court or otherwise, the engineer must be able to convey complex cause and origin of defect opinions in a simple, concise manner.	Unless approved by the client or required by the courts, opinions disclosure shall be limited to the client..