



# 9th International Conference on **MANAGING PAVEMENT ASSETS (ICMPA9)**

## **Challenges of a Construction Defect Claim Involving a Highway Concessions Project: A Private Sector Forensic Perspective**

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# OUTLINE

## 1. Intro:

- Private Sector Forensic Engineering
- Highway Concessions

## 2. Case Study

- Americo Vespuccio Norte
- Anatomy of Defect Claim
- Conclusions

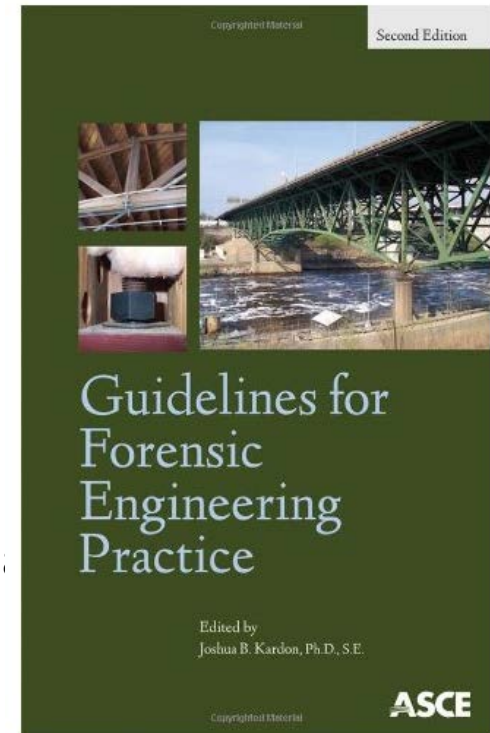
# FORENSIC ENGINEERING

**Failure:** “An unacceptable difference between an expected and observed performance.”

A Failure need not be a complete collapse of a structure.

ASCE: Applying engineering principles, education, and knowledge to problems where legal liability may be decided in a legal forum.

**Forensic Engineer:** Third party assessment with no stake in the outcome.



# CONSTRUCTION DEFECT

- Risk typically borne by the private sector.
- Insurable risk.
- Must determine: Construction Defect vs. Design Defect
- *Typically, the contractor is responsible to the owner for defective construction caused by faulty construction practices, unless the defective construction is caused by faulty design.*
- Construction defect: carries long-term implications with maintenance costs, and thus operation and pavement management costs.

# CONCESSIONS

- Agreement between government and private entity.
- Government transfers construction and/or operation/maintenance of asset to private entity for a period of time.
- The private entity charges a user fee.
- Asset is built or maintained outside the public budget with private capital.
- Also takes advantage of private-sector efficiency.

# CONCESSIONS



- Risk allocation is main concern
- Risks: predicting traffic volume and operation costs
- Minimum Income Guarantee (MIG) mechanism created to offset risk

# Minimum Income Guarantee (MIG)

- Optional to bidders
- Concessionaire shares extra revenue over a set threshold with government.
- If revenues fall below established threshold, government will subsidize concessionaire.
- Threshold established in bid documents.
- Result: Less risk and increased competitiveness in concessionaire bidding process.
- Government guarantees *revenue flow* but not *cash flow*.
- 2006 TRR publication by Vassallo, et al.: "Minimum Income Guarantee in Transportation Infrastructure Concessions in Chile. TRR No. 1960, pp. 15-22.

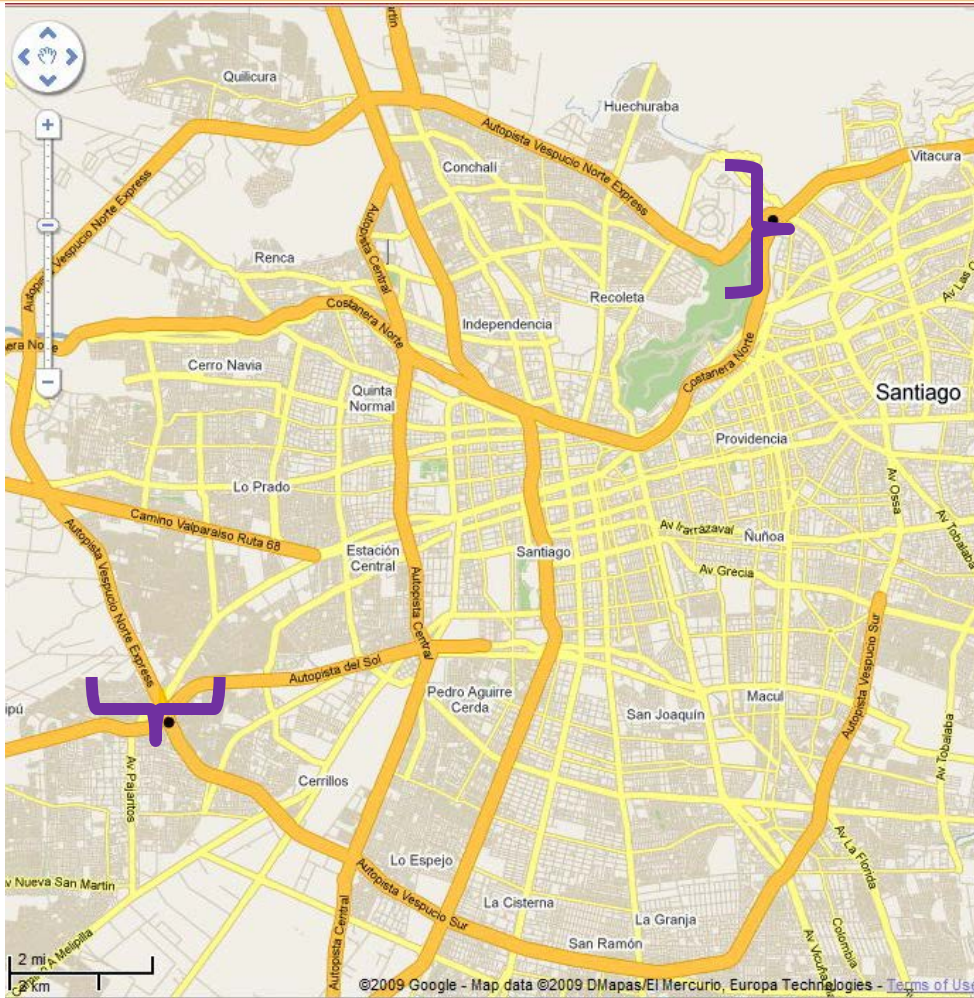
# PROJECT SUMMARY

- ABS contacted to investigate claims of premature distress
- Americo Vespucio Norte Highway
- Santiago, Chile
- The Mission: Determine Cause & Origin
- Claim and investigation before the earthquake





# PROJECT SUMMARY



- Urban highway loop (northern section)
- 29 km, Constructed in segments between 2002-2005
- Asphalt surfaced
- Three lanes each direction
- HMA surface course
- HMA Binder Course
- Granular Base
- Granular Subgrade
- Tolled Highway

# PROJECT SUMMARY

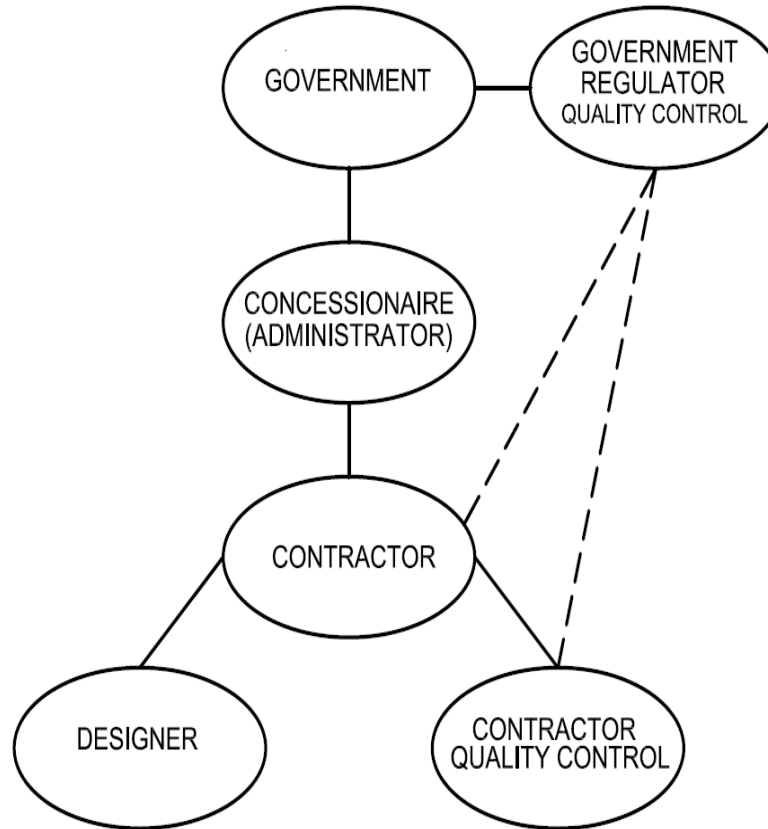
Designed for 47,000,000 ESALs  
based on 1993 AASHTO

## Typical Design Section:

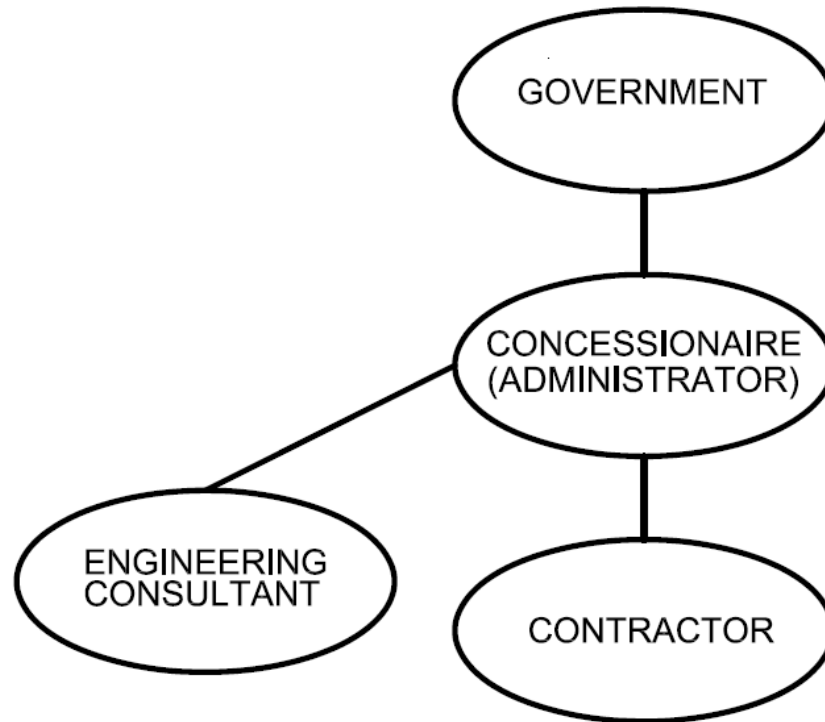
- 2 inch asphalt surface course
- 6 inch asphalt intermediate course
- 6 inch granular base
- 4.75 inch granular sub-base
- Natural Subgrade



# CONSTRUCTION



# OPERATIONS



# THE CLAIM

- Concessions contract requires yearly reports and maintenance for:

- Linear Cracking
- Fatigue Cracking
- Rutting
- IRI

- Owner's consultant monitors pavement yearly.

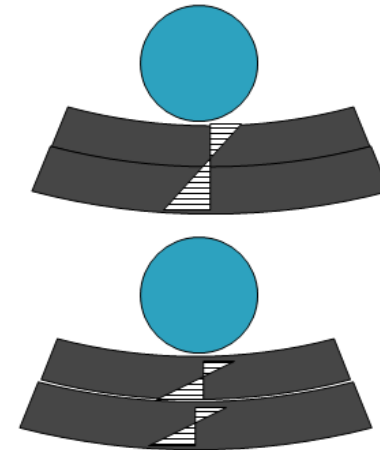
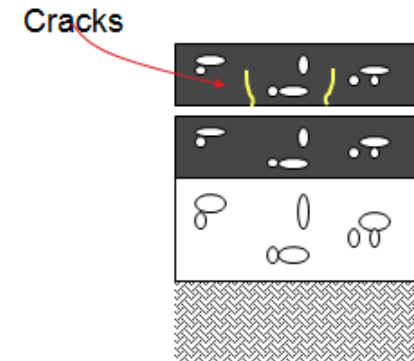
- Some sections of the highway nearing service thresholds for some parameters:

- Fatigue
- International Roughness Index (IRI)

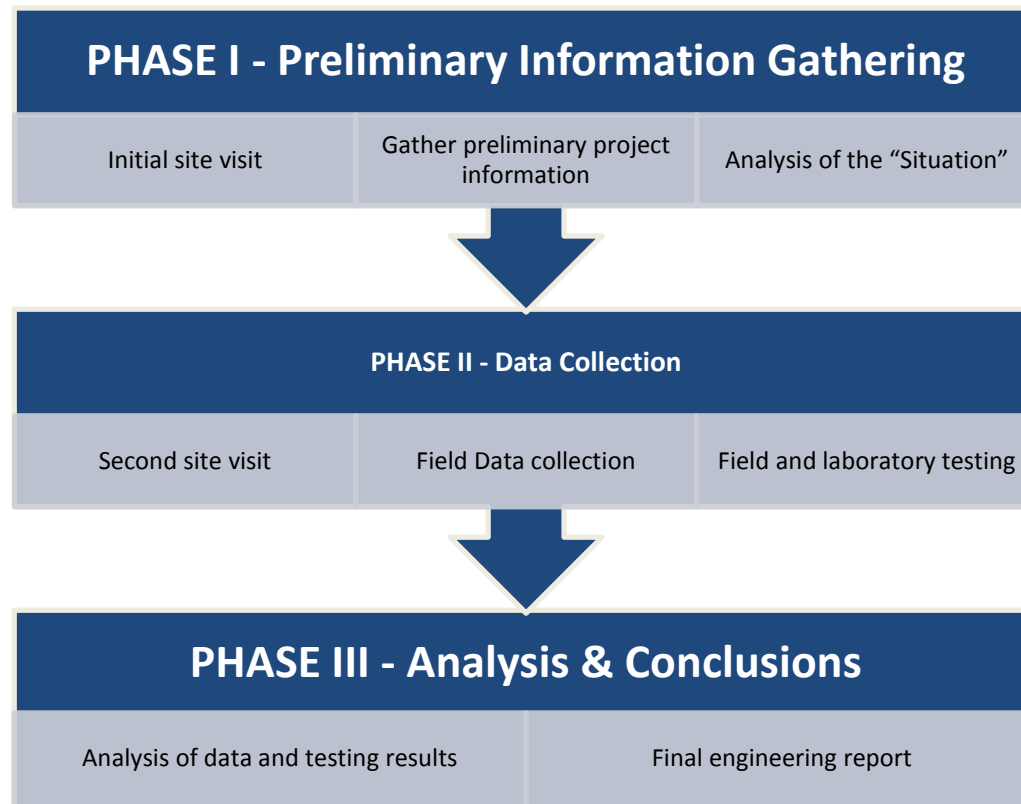


# THE CLAIM

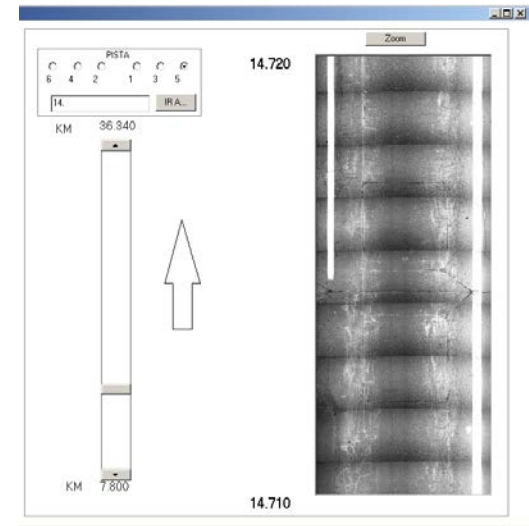
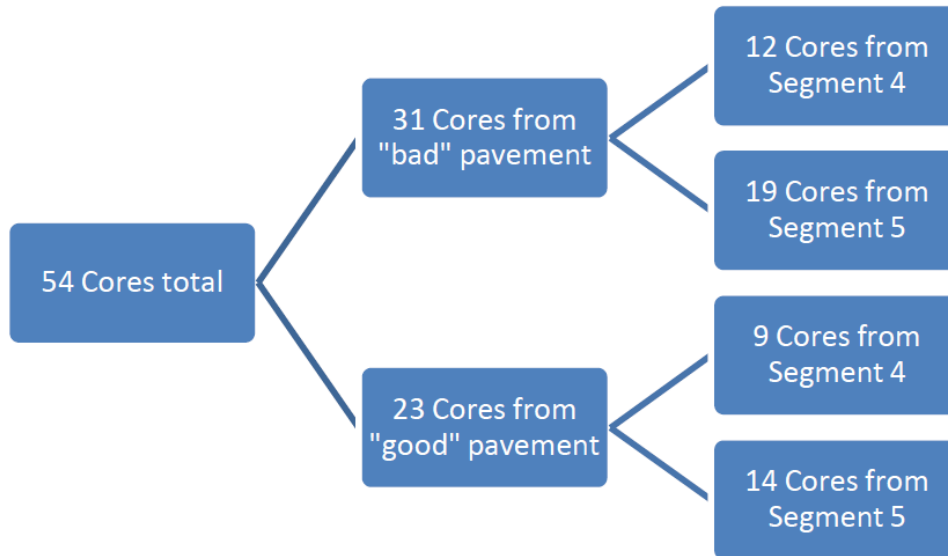
1. “Debonding” by Administrator
  - Construction Issue
2. “Top Down Cracking” by Contractor
  - Design Issue



# FORENSIC INVESTIGATION



# FORENSIC INVESTIGATION





# FIELD INVESTIGATION



# Discussion

- Concessionaire: Revenues lower than anticipated.
- Concessionaire: Operation and maintenance costs much higher than anticipated.
- Concessionaire: Higher costs were because premature distresses, due to construction deficiencies.
- Concessionaire: Sought relief against the unanticipated portions of the maintenance costs by way of the construction defect claim.

# Discussion

- Guaranteed minimum revenue.
- But no guarantee on cash flow (revenue vs expenses).
- Future maintenance costs were predicted by the government.

# CONCLUSIONS

- Equally important to the empirical evidence was understanding the intricate circumstances of the claim and the concessions arrangement.
- The concessions contract helped mitigate traffic demand risk via revenue sharing, but did not provide mitigation for unanticipated operation and maintenance costs.
- Construction defects substantially affect long-term maintenance costs, and thus are significant factors in Concessions!

# THANK YOU

