NEW HAMPSHIRE JOINT ENGINEERING SOCIETIES
ANNUAL JOINT SOCIETY CONFERENCE

FORENSIC ENGINEERING
SCOTT GRAINGER, PE
FIRE PROTECTION ENGINEER
CIVIL ENGINEER
SCOTT GRAINGER, PE

• CONTACT INFORMATION
• GRAINGER CONSULTING, INC
• 4135 E FAIRVIEW CIR.
• MESA, AZ 85206
• 480.833.2100
• WWW.graingerconsulting.com
• scott@graingerconsulting.com
OVERVIEW OF PRESENTATION

• CURIOUS PIPE FAILURE
• LEAKING FIRE DOOR
• ODD SPRINKLER HEAD “FAILURE”
• INVESTIGATION THOUGHTS ALONG THE WAY
CURIOUS PIPE FAILURE
WHAT I FOUND
HISTORY

• WHEN REMOVED
  – HOLE COVERED WITH A RAG & CARDBOARD
  – HOLE FACED UP

• WHERE WAS THIS PIPE?
  – IMMEDIATELY DOWN STREAM OF BANK OF 20 URINALS
  – UPSTREAM OF CHINESE KITCHEN
WHERE?
BASEMENT PLAN

SEWAGE ENTERED BASEMENT THROUGH WALL

APPROXIMATE AREA OF SEWAGE POND/FILL SUBSIDENCE

BASEMENT

PARTIAL SH. 2/13
SH. 09.00
FIRST CLUES
EXCAVATION OF UNDERSLAB / CESSPOOL

• CONCRETE BOULDERS
• WIRE ROPE
• LUMBER
• MISCELLANEOUS DEBRIS
• 25’ DEEP
ENGINEERED FILL?
A LITTLE MORE

• SS LINE PASSED BELOW NEW KITCHEN
• KITCHEN GREASE SEWER FROM 12 WOK STATION FED INTO SS LINE
• HEAT TAPE ON SS LINE NOT CONNECTED TO POWER
FINDINGS

• COST TO REPAIR > $1 MILL
• SUBROGATION LIST INCLUDED
  – RESTAURANT TI A&E FIRMS
  – CASINO ELEC CONTRACTOR
  – PLUMBERS 1 & 2
  – CASINO PROJECT MANAGER
  – CASINO 3RD PARTY MATERIALS TESTING FIRM
  – CASINO CONSTRUCTION MANAGER
LEAKING FIRE DOOR
THE DOOR
THE CASE

• 3\textsuperscript{RD} TIME IS A CHARMS
• CLIENT - DEFENDANT PROPERTY OWNER
• RENTER’S LINSEED OIL RAGS SOURCE OF IGNITION
• FIRE PROGRESSION
  – CANOPY
  – MOTOR CYCLE STORAGE
A LITTLE MORE OF THE CASE

• BUILDING CODE ANALYSIS
  – DOES DOOR NEED TO BE RATED?
  – 1958 BUILDING CODE
  – MISCELANEOUS CONSTRUCTION ADDITIONS SINCE 1958
  – WHO ADDED THE DOOR?
    • WHO IS RESPONSIBLE FOR IT?

• DOOR POSITION
  – 4” ABOVE EXTERIOR “FLOOR”
  – UL TESTS FOR DOOR RATINGS
SUMMARY OF INVESTIGATION

• DOOR DID NOT REQUIRE RATING

• PLAINTIFF ARGUMENT ON CODES WAS NOT ON POINT, INACCURATE, FALSE

• EVEN IF IT HAD BEEN A RATED DOOR, INTERIOR OF KART SHOP WAS DOOMED
  – CONSIDER EXACTLY WHERE FIRE STARTED
RETRIBUTION

- UNHAPPY LAWYERS CAN BE NASTY
- REFUSED TO PAY FOR DEPOSITION
  – JUDGE SUPPORTED POSITION
US CONSTITUTION TO THE RESCUE

• 13\textsuperscript{TH} AMENDMENT
  – BETTER KNOWN AS THE ANTI-SLAVERY AMENDMENT

• CASE SETTLED, DEFENDANT WAS PLEASED
HEAD FAILURE?
OR?
BACKGROUND

- VERNON, CA (LA, CALIF DOWNTOWN
- FREEZER -10F FROZEN SEAFOOD
- LOSS $250 MILL +
- DATE OF LOSS 12/28/03
- CONSTRUCTION STARTED 1951
- RECENT SPRINKLER INSPECTION
- NO EVIDENCE OF FIRE
- INITIAL REPORT – SPRINKLER HEAD FAILED
LEAKING HEAD?

GLASS BULB HEAD

REPLACED 2 TIMES
PHASE 1 CONSTRUCTION
PHASE 2 CONSTRUCTION
PHASE 3 CONSTRUCTION
PHASE 4 CONSTRUCTION
BUILDING COMPLETION

[Image: A photo of a building on a rooftop with construction materials scattered around, dated January 7, 2004.]
INTERIOR OF ROOF

2 DECKS

ICE

LOGGED

BATT

JAN 7, 2004
2\textsuperscript{ND} HEAD PIPING
CONCLUSION

• HEAD NEVER LEAKED
• NO VAPOR BARRIER IN FREEZER
• MOISTURE COLLECTED, FROZE IN BATT
• GRADUALLY, OVER YEARS, ICE INCHED UP TO PIPE
• FROZE PIPE IN WINTER
• WARM DAYS ICE SOFTENED, LEAKED
RESOLUTION

• No subrogation attempted
• Some parties at fault identified but protected or gone
• Extended and compounding nature of the failures to follow good engineering & construction practices by various previous owners, contractors, engineers and City plans reviewers & inspectors
FORENSIC ENGINEER RESPONSIBLE

Reveal true nature of a failure
  – Regardless of implications for client
  – Not an advocate for anyone but the truth

• Thorough review of site conditions & background
• Extent of investigation determined by Engineer’s
  – Background
  – Experience
HANG IN THERE