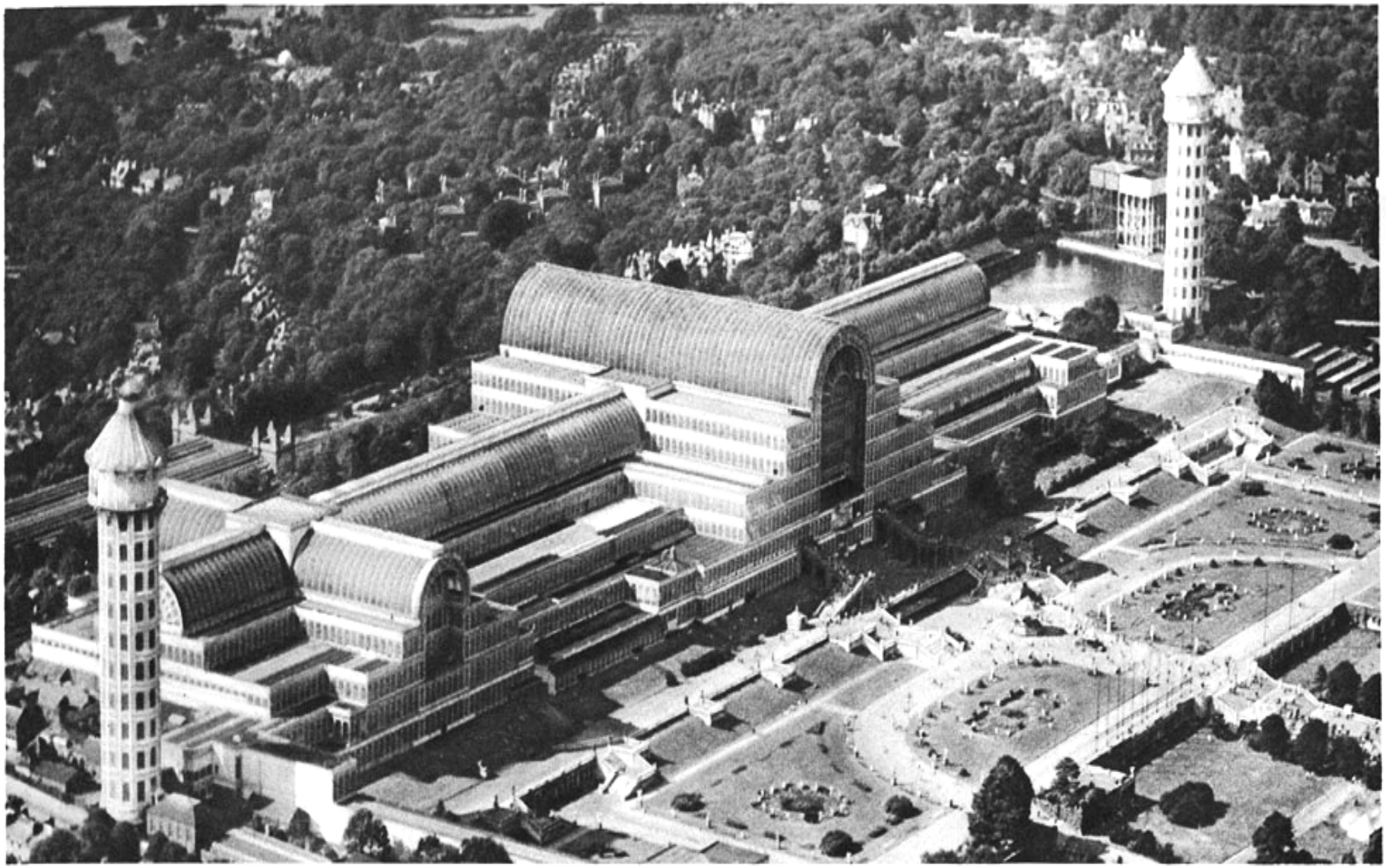
DOE Fire Safety Workshop

Ronald L. Lynn, Building Official
Clark County, Nevada

1936 Crystal Palace

South London, England

1936 Crystal Palace, South London, England



BEFORE THE FIRE: A PANORAMIC AIR VIEW OF THE CRYSTAL PALACE—A HUGE STRUCTURE OF IRON AND GLASS COVERING 25 ACRES: SHOWING THE SOUTH TOWER (PARTLY OCCUPIED BY THE BAIRD TELEVISION COMPANY) ON THE LEFT, THE NORTH TOWER ON THE RIGHT, AND THE GARDENS ON THE EASTERN SIDE.

1936 Crystal Palace, South London, England

1936 Crystal Palace, South London, England

1936 Crystal Palace, South London, England

THE ILLUSTRATED LONDON NEWS

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SATURDAY, DECEMBER 5, 1936.

THE DESTRUCTION OF ONE OF THE WORLD'S LANDMARKS: THE DRAMA OF THE CRYSTAL PALACE FIRE AT ITS HEIGHT—WATER JETS PLAYING NEAR THE SOUTH TOWER, WHICH THREATENED TO COLLAPSE.

The Crystal Palace on Sydenham Hill, a landmark famous not only to Londoners but throughout the world, was destroyed by fire on the night of November 30. Only the two great towers, 282 ft. high, one at each end, were eventually left standing above the ruins of the huge structure, which covered 25 acres.

The fire broke out about 8 p.m. and spread with astonishing rapidity. Some 500 firemen were engaged, with over ninety fire-fighting appliances—a record for a London fire. At one time it was feared the South Tower might collapse into streets crowded with spectators. Further photographs appear on later pages.

1936 Crystal Palace, South London, England

1936 Crystal Palace, South London, England

AFTER THE FIRE: AN AIR PHOTOGRAPH, FROM THE SAME POINT OF VIEW, SHOWING THE VAST MASS OF WRECKAGE AFTER THE BULK OF THE CRYSTAL PALACE HAD CRASHED, AND ONLY THE TWO TOWERS (THE SOUTH ONE HERE SEEN ON THE LEFT) REMAINED STANDING.

1936 Crystal Palace, South London, England

1982 K-Mart Distribution Center Pennsylvania

1982 K-Mart Distribution Center Pennsylvania

- **1.2 million square feet**

1982 K-Mart Distribution Center
Pennsylvania

1982 K-Mart Distribution Center Pennsylvania

1982 K-Mart Distribution Center
Pennsylvania

1982 K-Mart Distribution Center
Pennsylvania

US Hotels & Resorts

	Hotel	Rooms		Hotel	Rooms
1	MGM Grand	5,034	6	Flamingo Hilton	3,565
2	Luxor	4,407	7	Mandalay Bay	3,215
3	Venetian	4,049	8	Las Vegas Hilton	3,174
4	Excalibur	3,991	9	Mirage	3,044
5	Circus Circus	3,770	10	Bellagio	3,005

Source: Las Vegas Convention & Visitors Authority

U.S. Hotels & Resorts

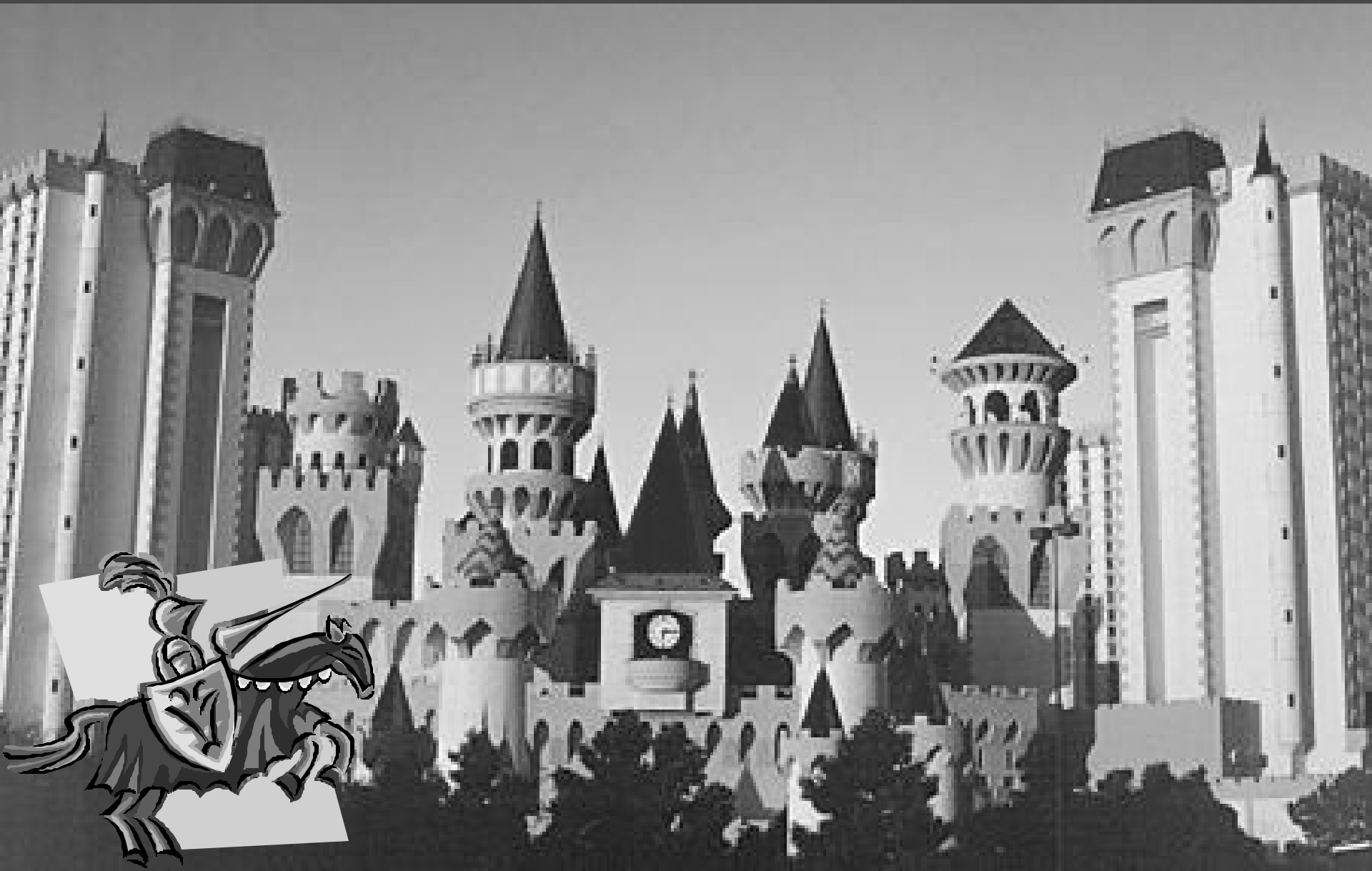
Hotel		Rooms	Hotel		Rooms
11	Monte Carlo	3,002	16	Treasure Island	2,665
12	Paris Las Vegas	2,916	17	Harrah's Las Vegas	2,579
13	Opryland USA, Tennessee	2,884	18	Aladdin Casino	2,567
14	Bally's Las Vegas	2,814	19	Rio Suite Hotel	2,563
15	Imperial Palace	2,700	20	Hilton Hawaiian Village	2,555

Source: Las Vegas Convention and Visitors Authority

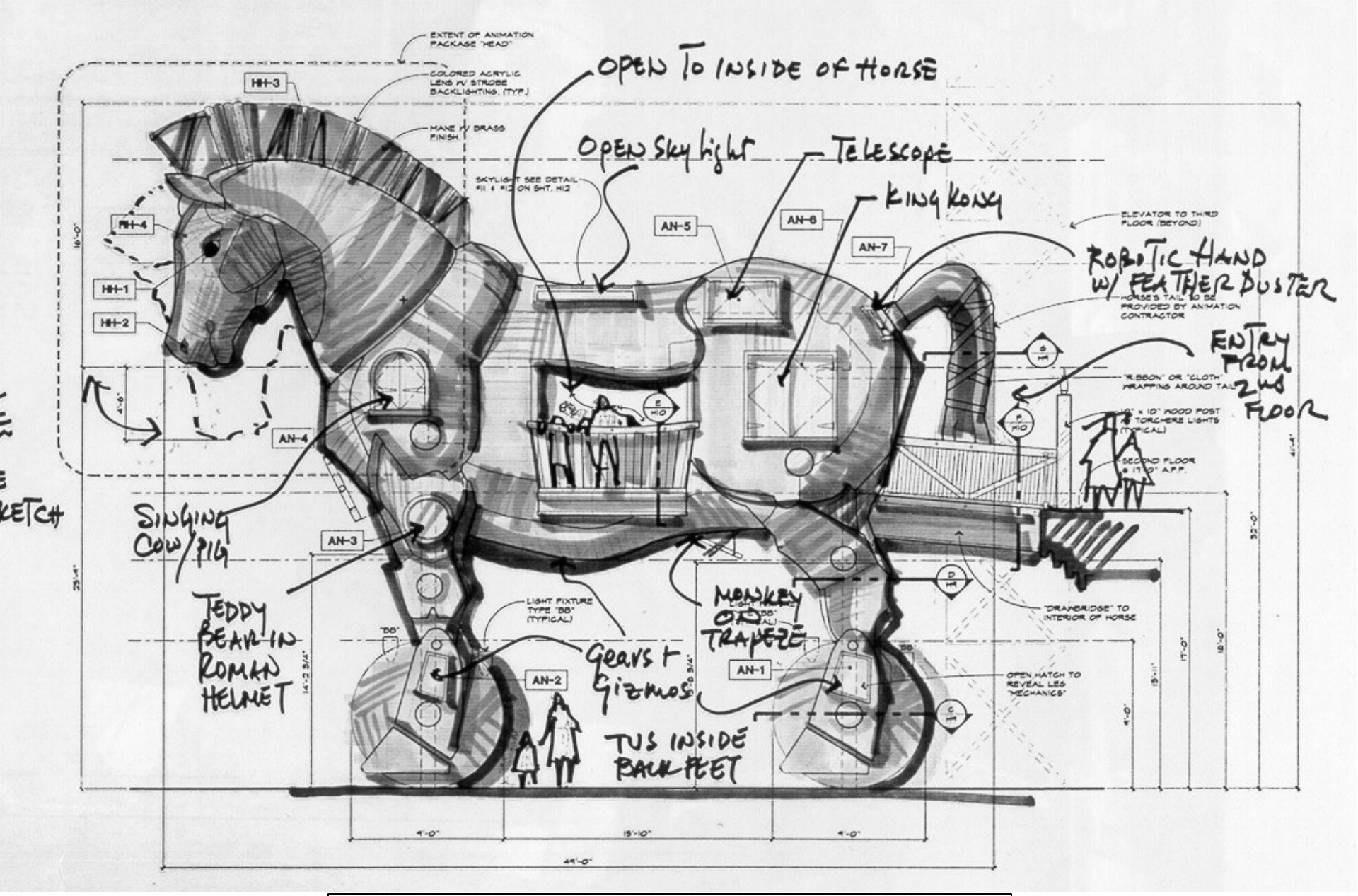
THE MIRAGE
THE MIRAGE

TREASURE ISLAND

Excalibur Hotel 280 feet tall

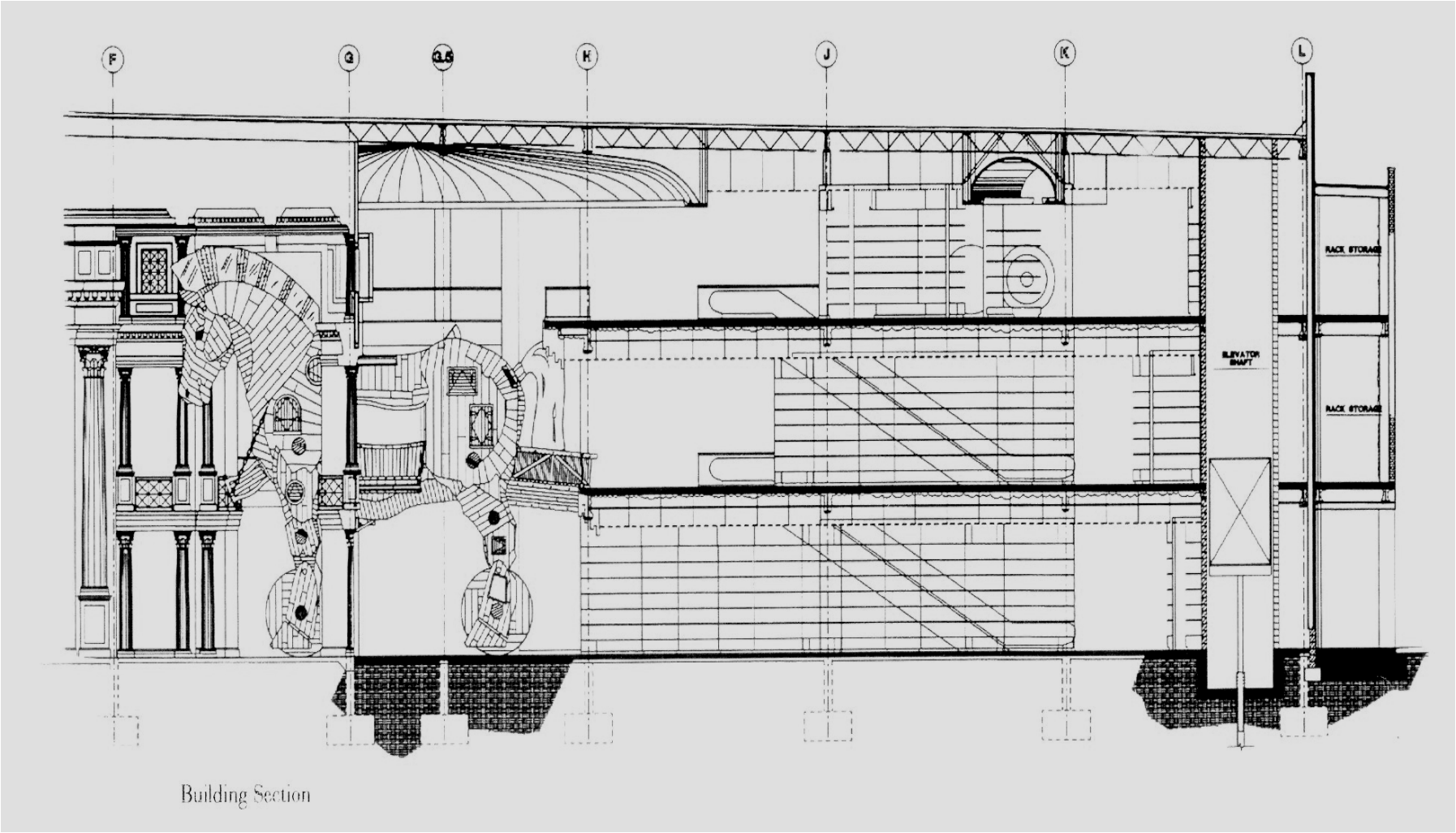


FAO SCHWARZ



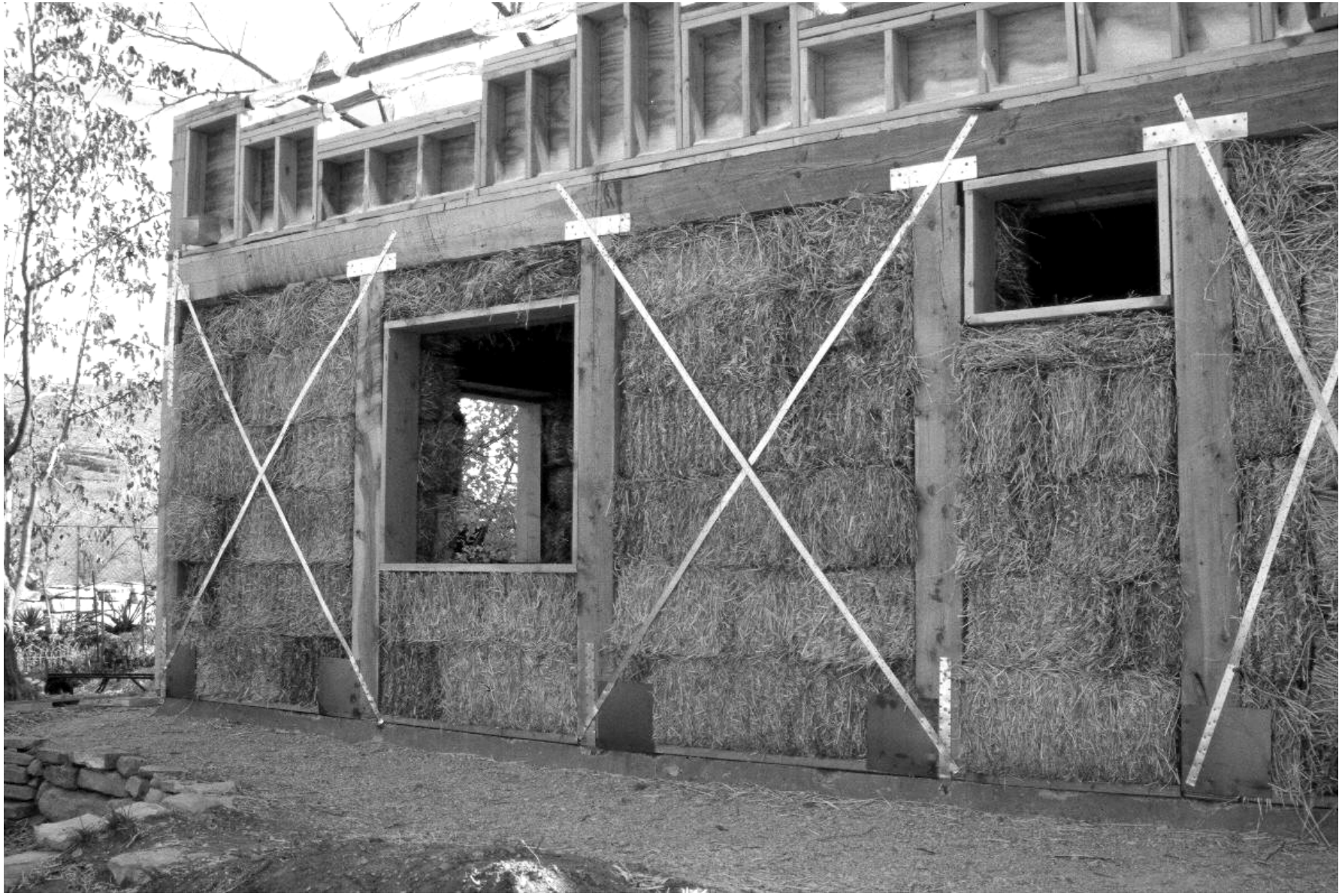
Left side view of horse

Building Section



9 8'97

STRAW BALE HOUSING



Fireplace

MGM MONORAIL

MANDALAY BAY TRAM

BONNIE SPRINGS TRAIN

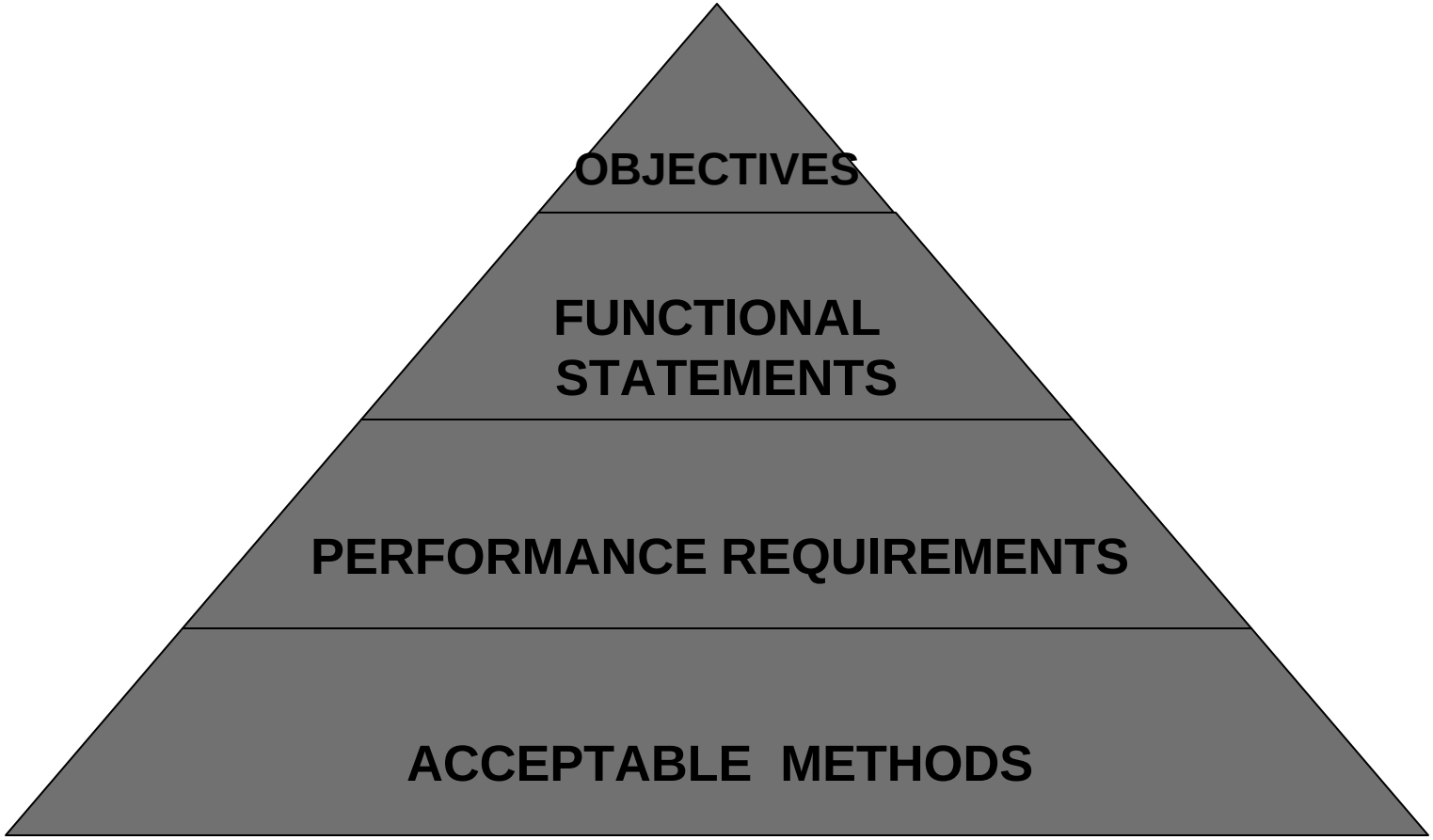
LAUGHLIN TRAIN

ICC Performance Code

for Buildings & Facilities

The Structure of Performance-based Codes

Performance based codes provide a set of objectives, functional statements and performance requirements for major topic areas that must be satisfied to meet the intent of the code.


OBJECTIVES
FUNCTIONAL STATEMENTS
PERFORMANCE REQUIREMENTS
ACCEPTABLE METHODS

1. Objectives

- Objectives state what is expected in terms of societal goals.

2. Functional Statements

- Functional statements explain what function the building must provide to meet the objective.

3. Performance Requirements

- Performance requirements state the requirements that are necessary to achieve the provision stated in the functional statements.

4. Acceptable Methods

- Acceptable methods include solutions to achieve the objectives, functional statements and performance requirements.

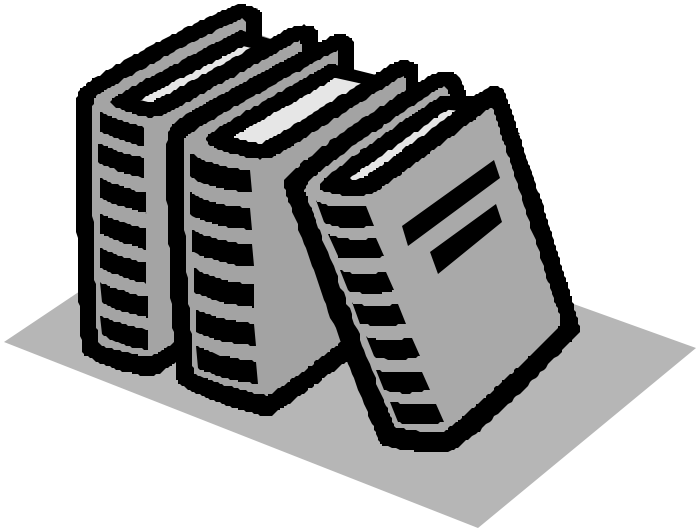
Three approaches to meet performance requirements:

- **PERFORMANCE APPROACH**
- **PRESCRIPTIVE APPROACH**
  (deemed to satisfy”)
- **COMBINATION OF PERFORMANCE & PRESCRIPTIVE APPROACHES**

Taking a performance approach allows the user to apply alternative solutions verified by one or more of the following:

- Laboratory Tests
- Computer Modeling
- Engineering design methods (performance based design)

PERFORMANCE CODE



- Concept Report
- Design Report
- Operations & Maintenance Manuals

Building

Section 101.2.1

To provide an acceptable level of health, safety and welfare, and to limit damage to property from events that are expected to impact buildings and structures. Accordingly, Part II of this code intends buildings and structures to provide for...

Concept Report

Section 103.3.4.2.1

Intended to document the preliminary details of the project

Design Report

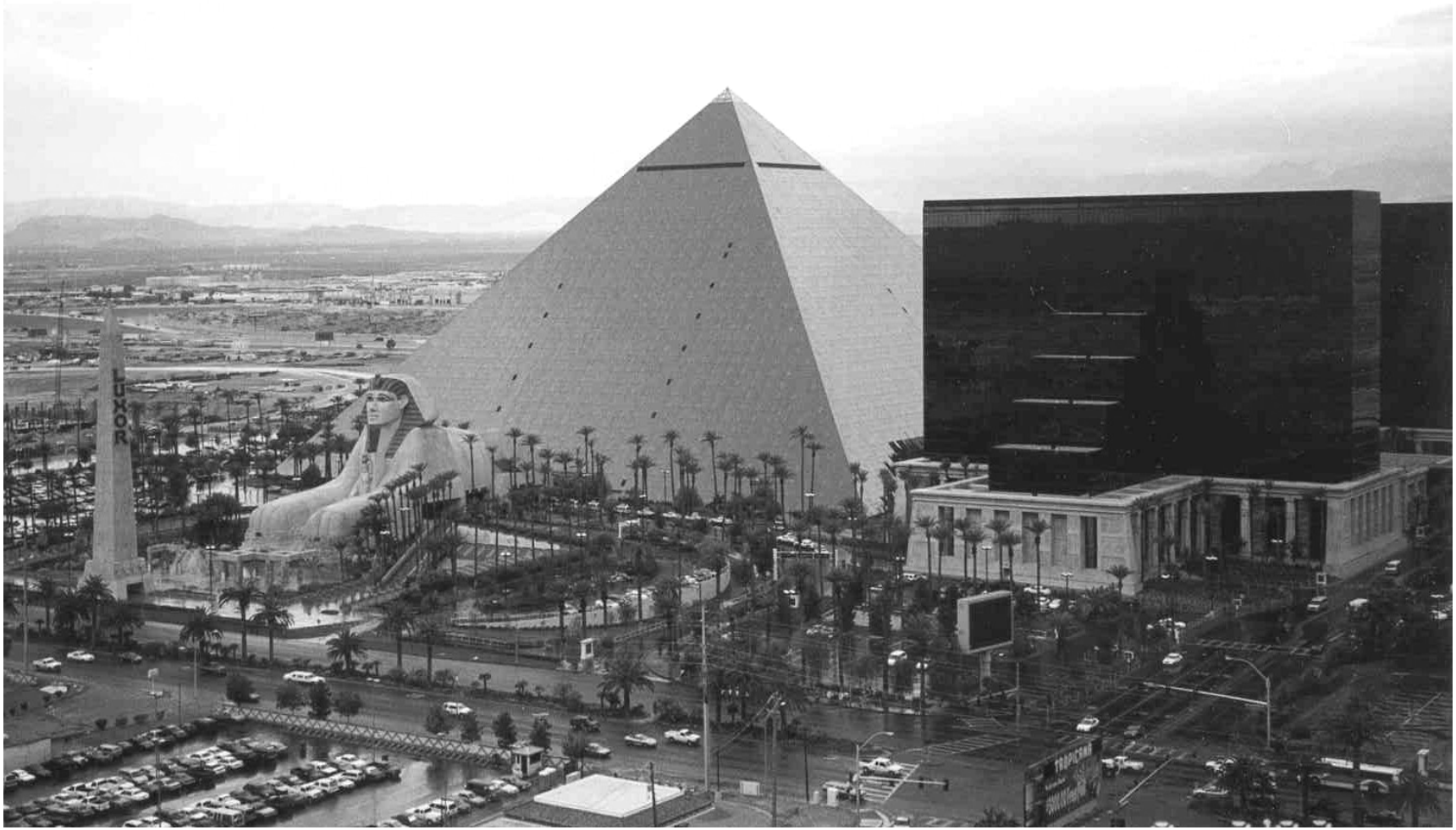
Section 103.3.4.2.2

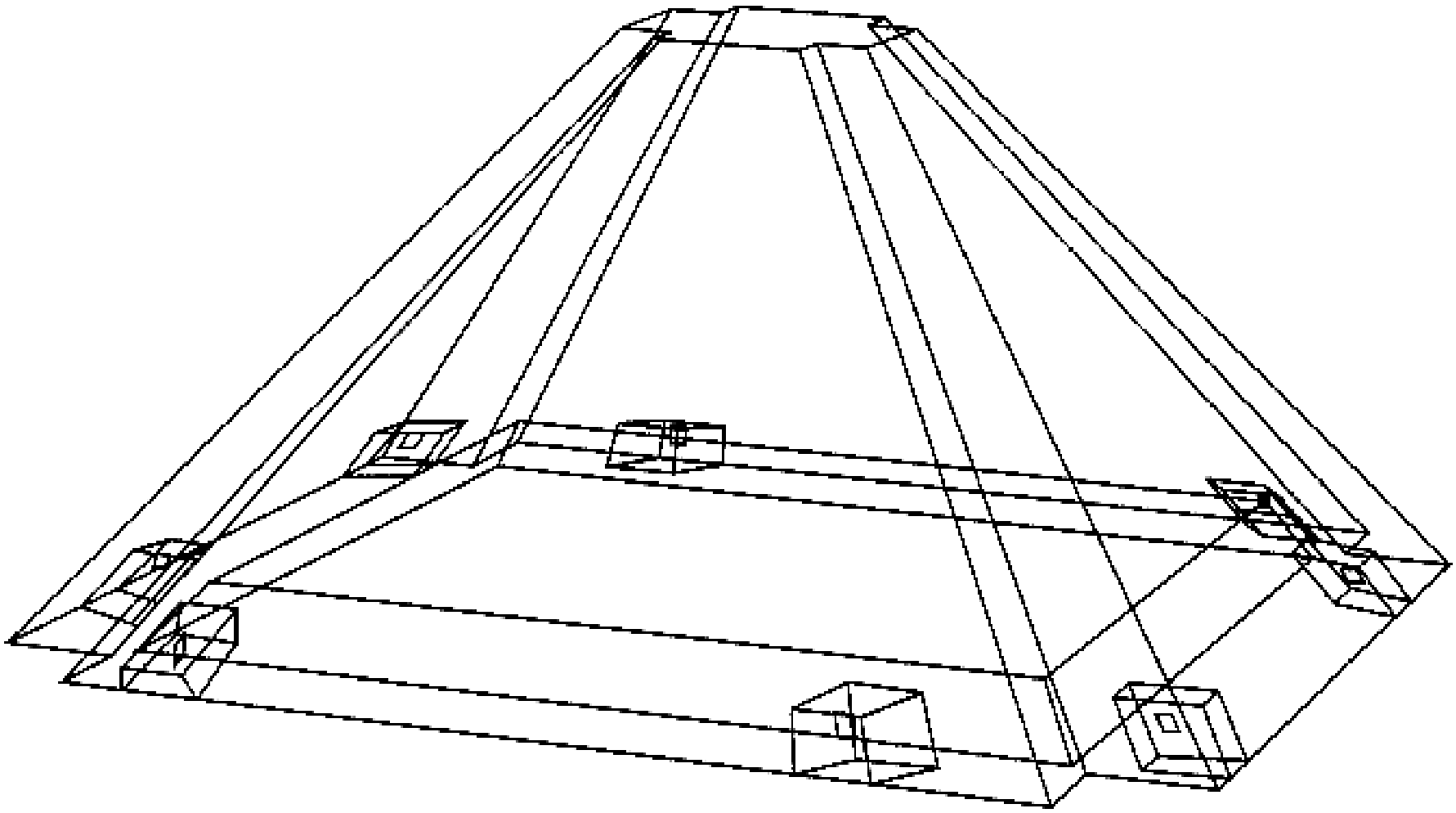
The criteria, parameters, inputs, assumptions, sensitivities and limitations involved in the analysis

Operations & Maintenance Manual

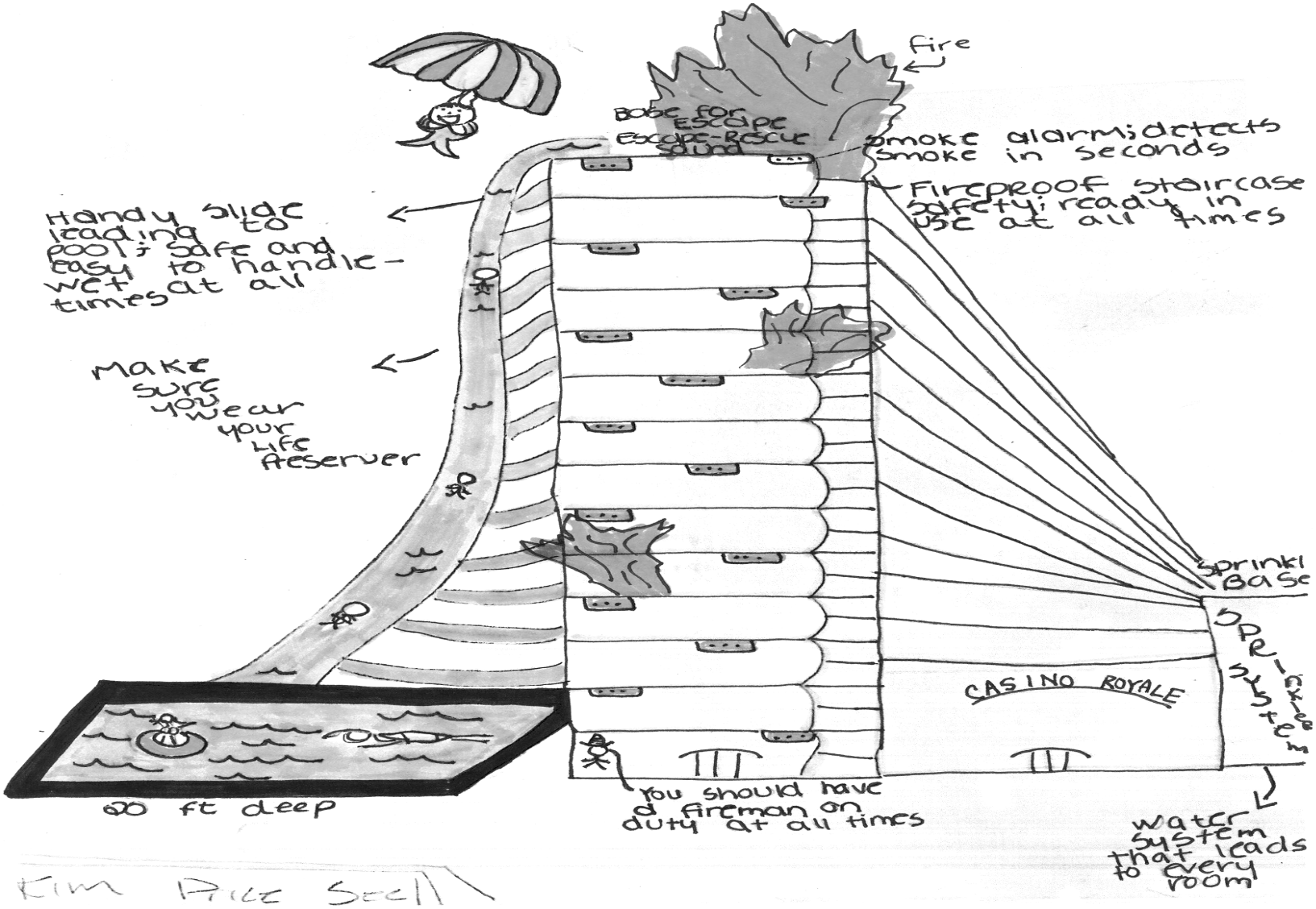
Section 103.3.4.2.3

- Identifies system and component commissioning requirements
- Identifies for facility owner and/or facility operator actions that need to be performed on a regular basis
- Identifies restrictions or limitations placed upon the use and operation of the facility


LUXOR
TROPICANA



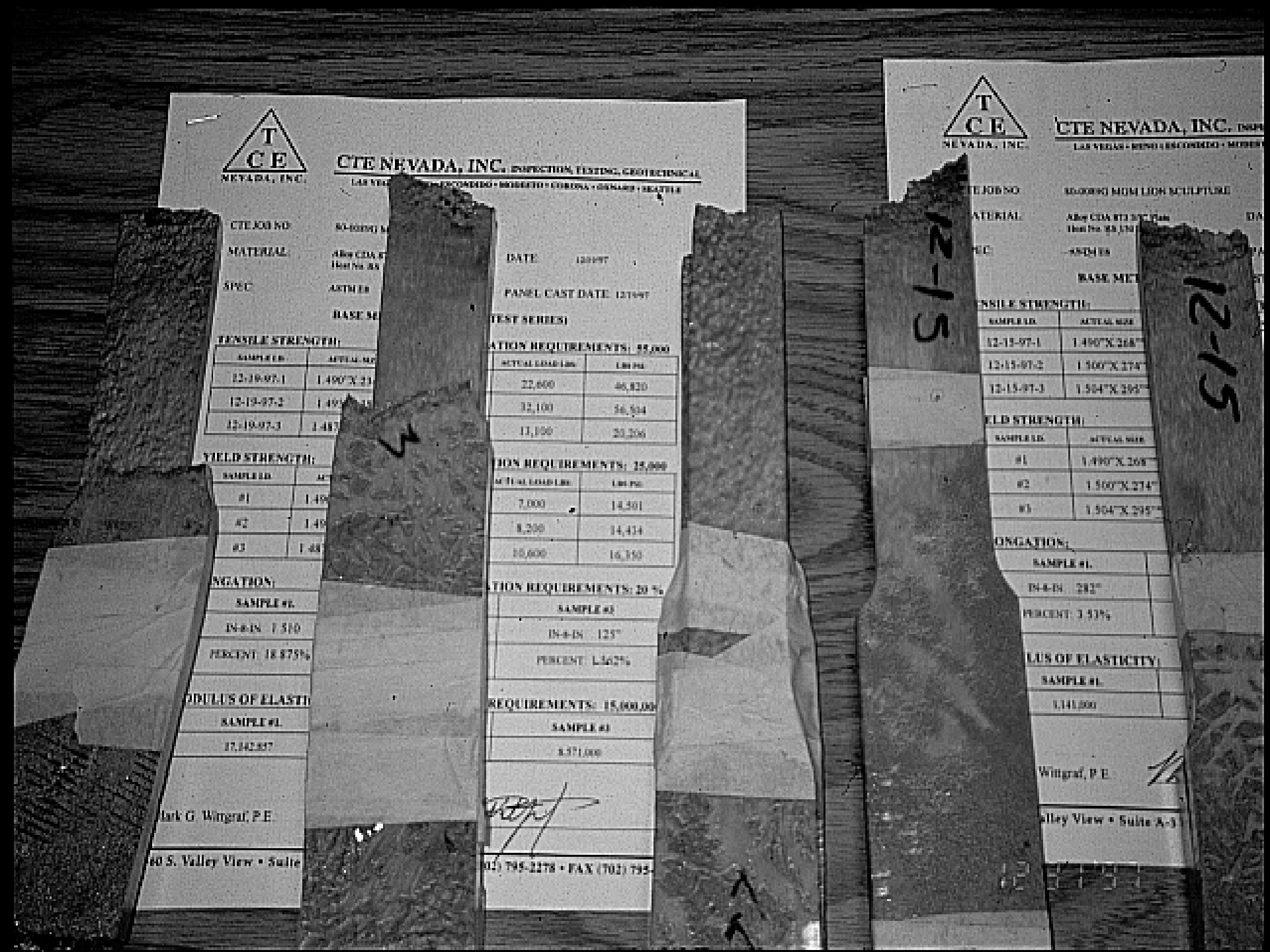
High Rise Fire Safety Proposal

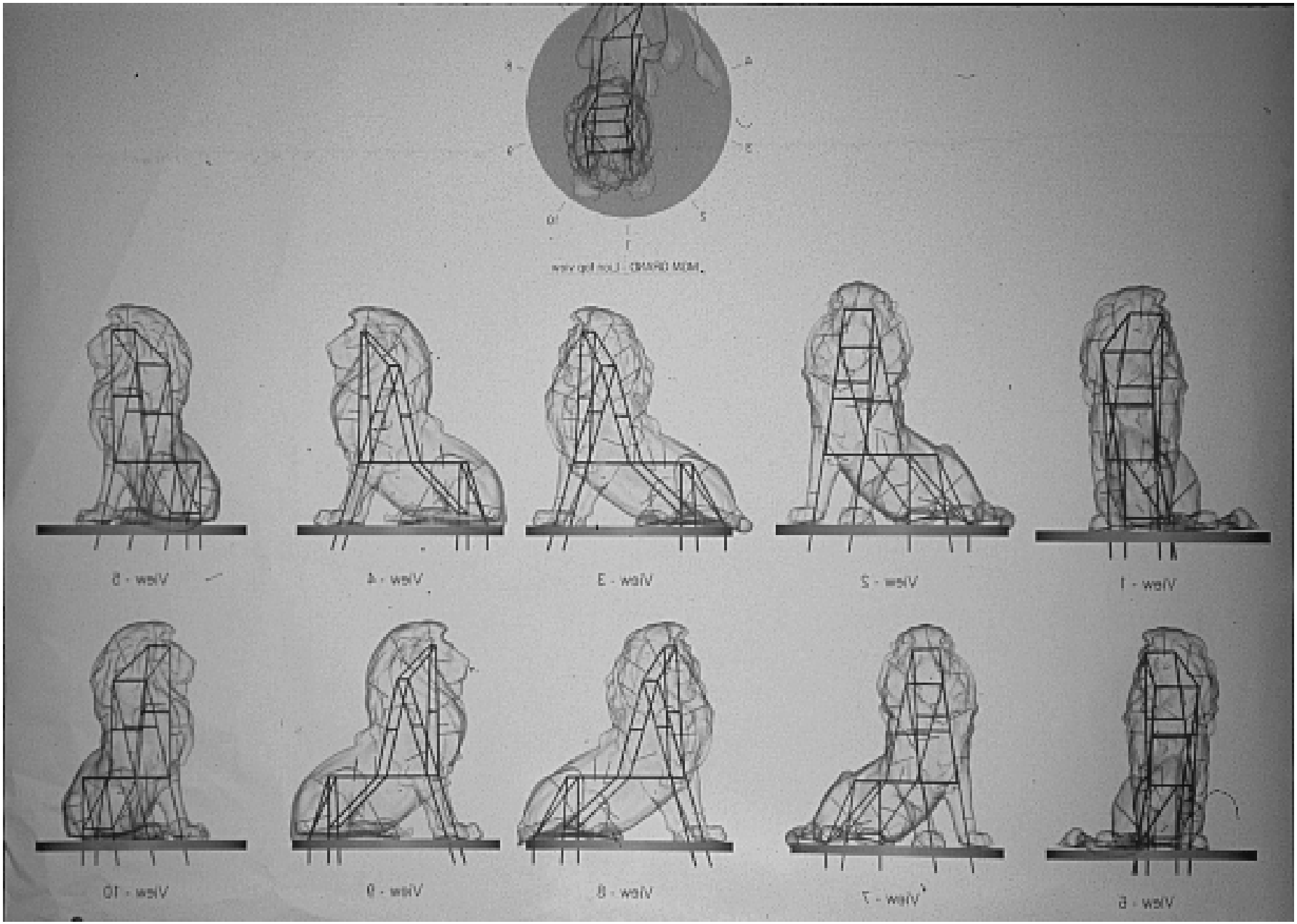


SPECIAL PROJECTS

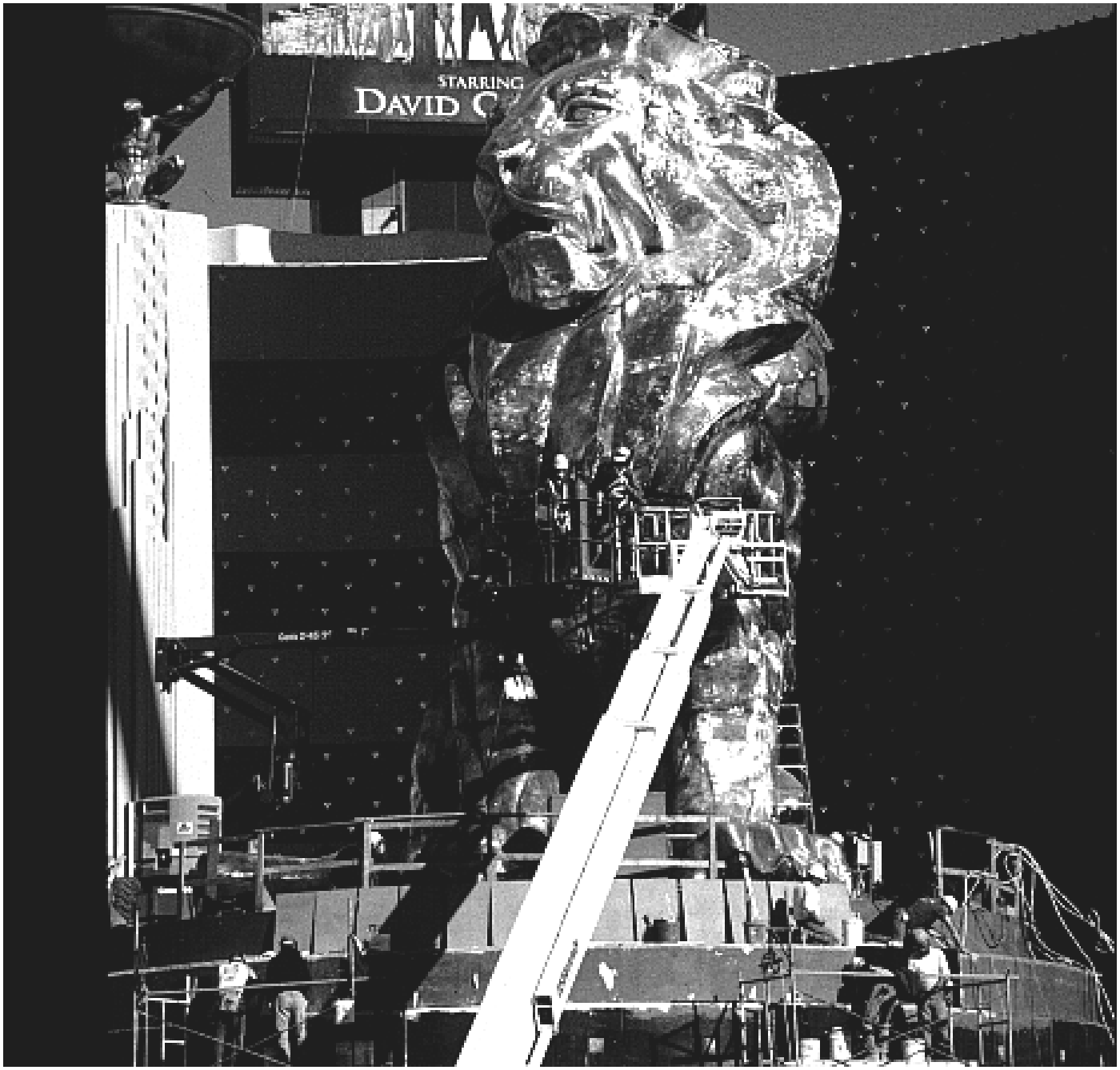
MGM LION

MGM
TYSON
EFX


CTE NEVADA, INC.
CTE JOB NO:
MATERIAL:
SPEC:
DATE:
PANEL CAST DATE:
TENSILE STRENGTH:
YIELD STRENGTH:
ELONGATION:
MODULUS OF ELASTICITY:
Mark G. Wingraf, P.E.
12-15


View - 1
View - 2
View - 3
View - 4
View - 5
View - 6
View - 7
View - 8
View - 9
View - 10

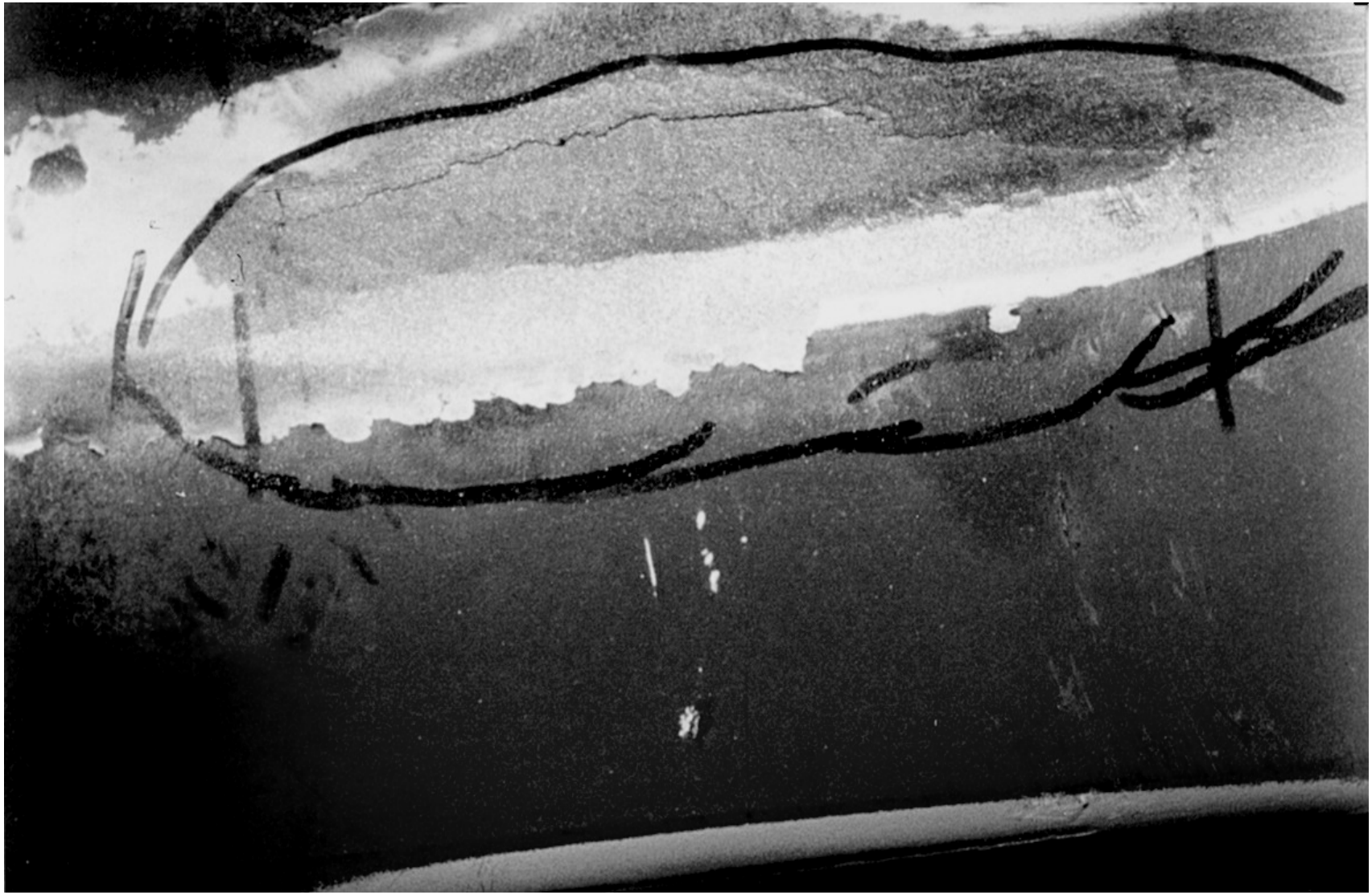
2'98


STARRING
DAVID C

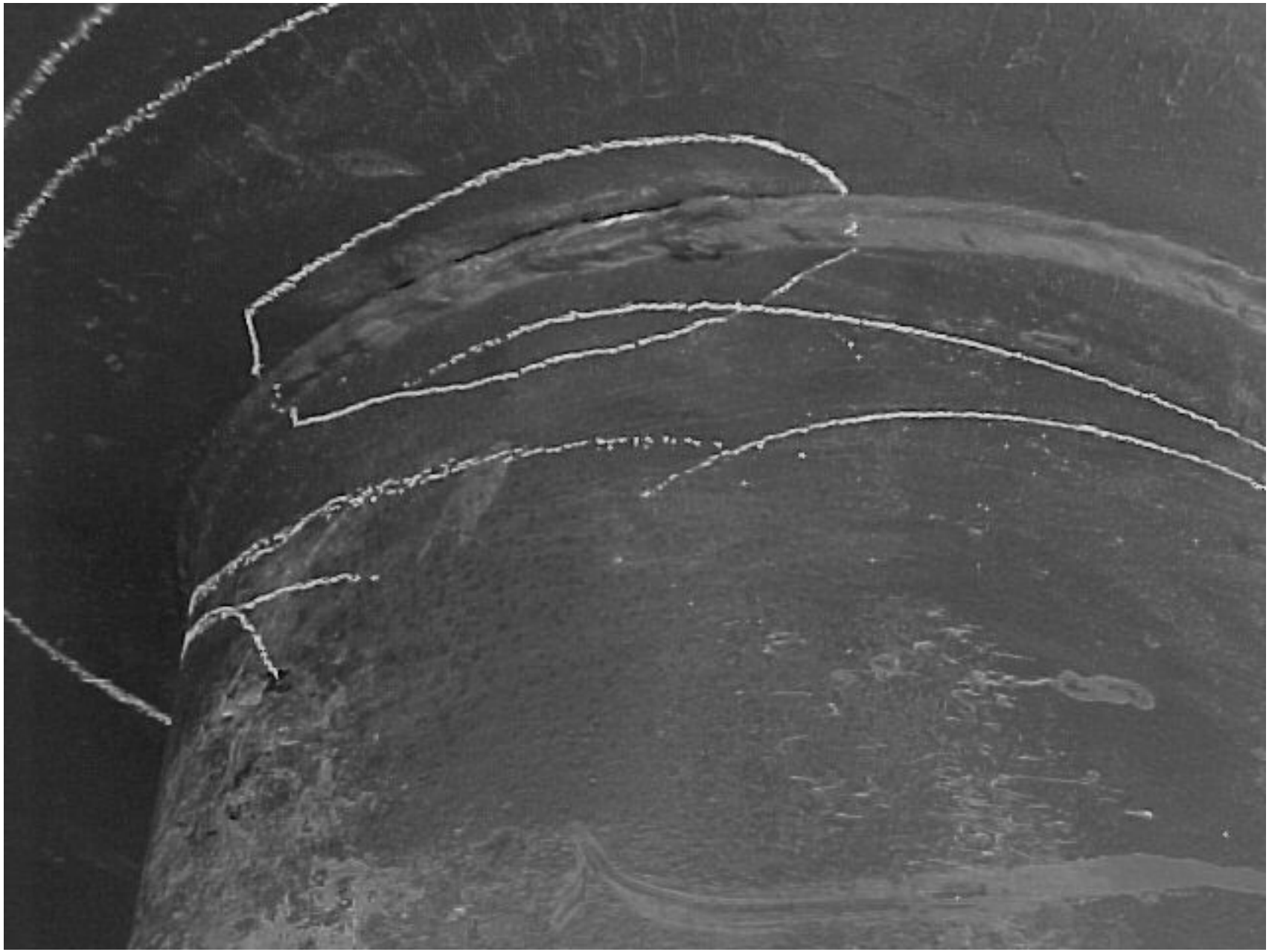
Monte Carlo
Ray & Ross Airporter

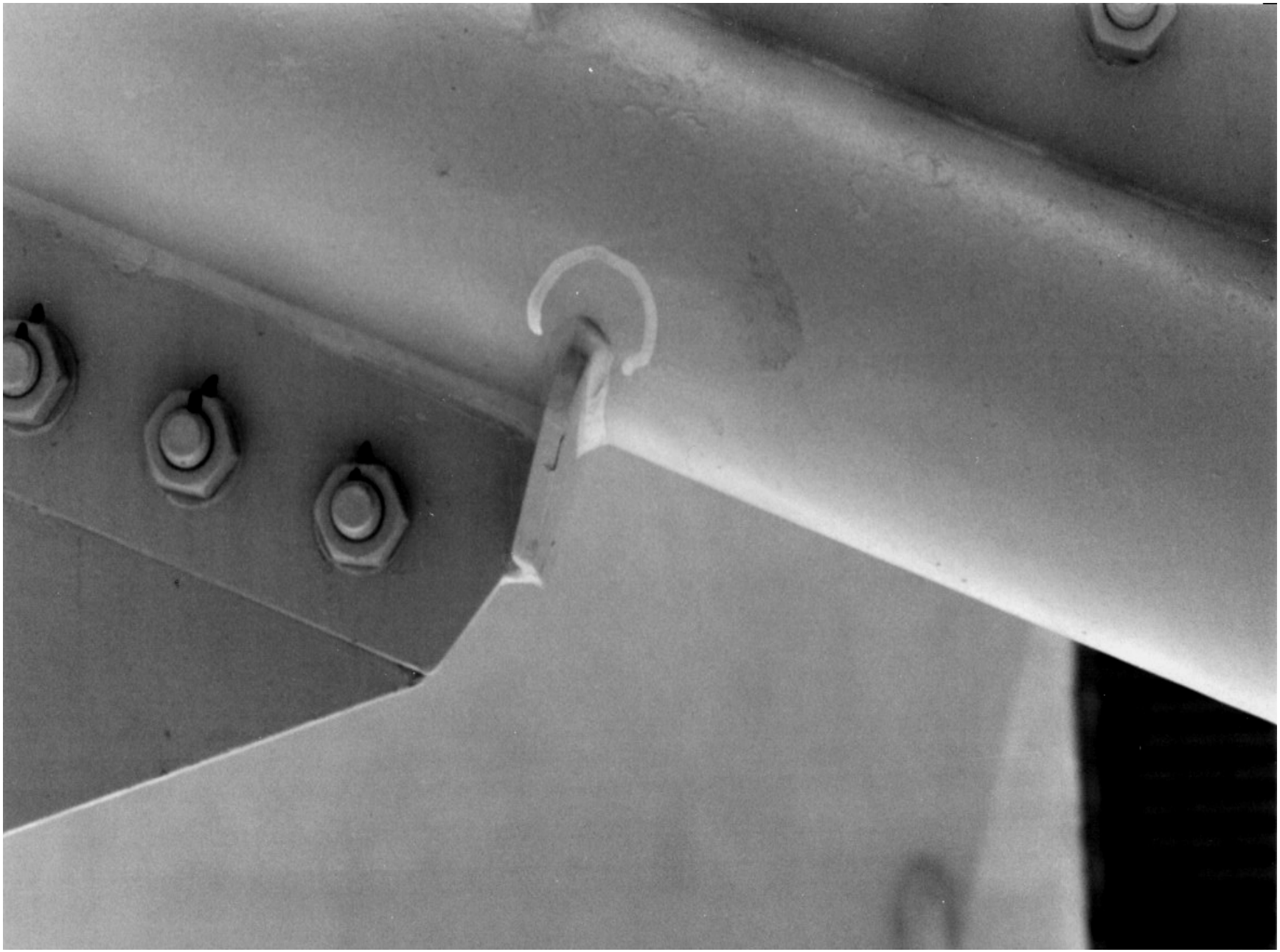
Manhattan Express

Rail Failure – Manhattan Express



3 10'99

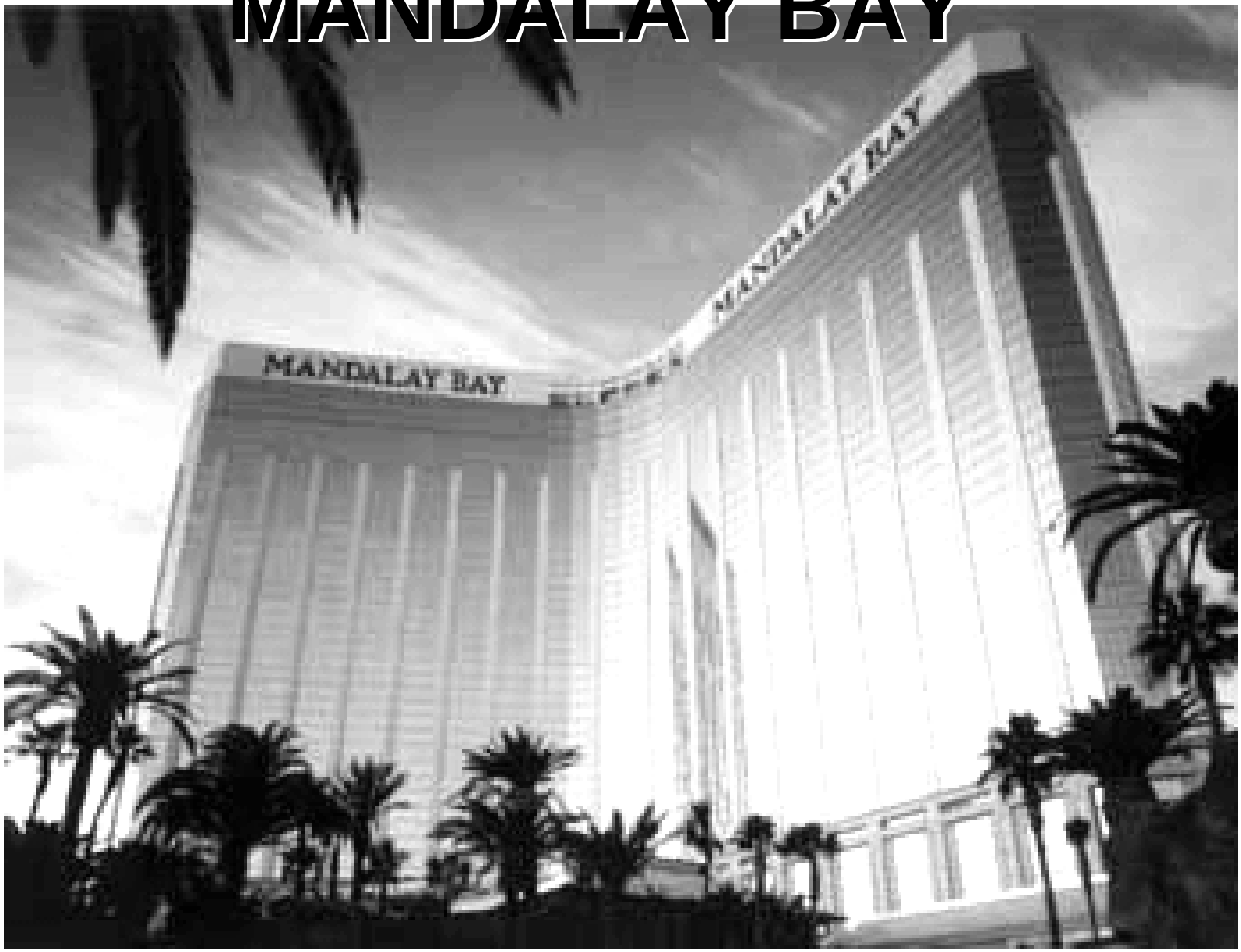




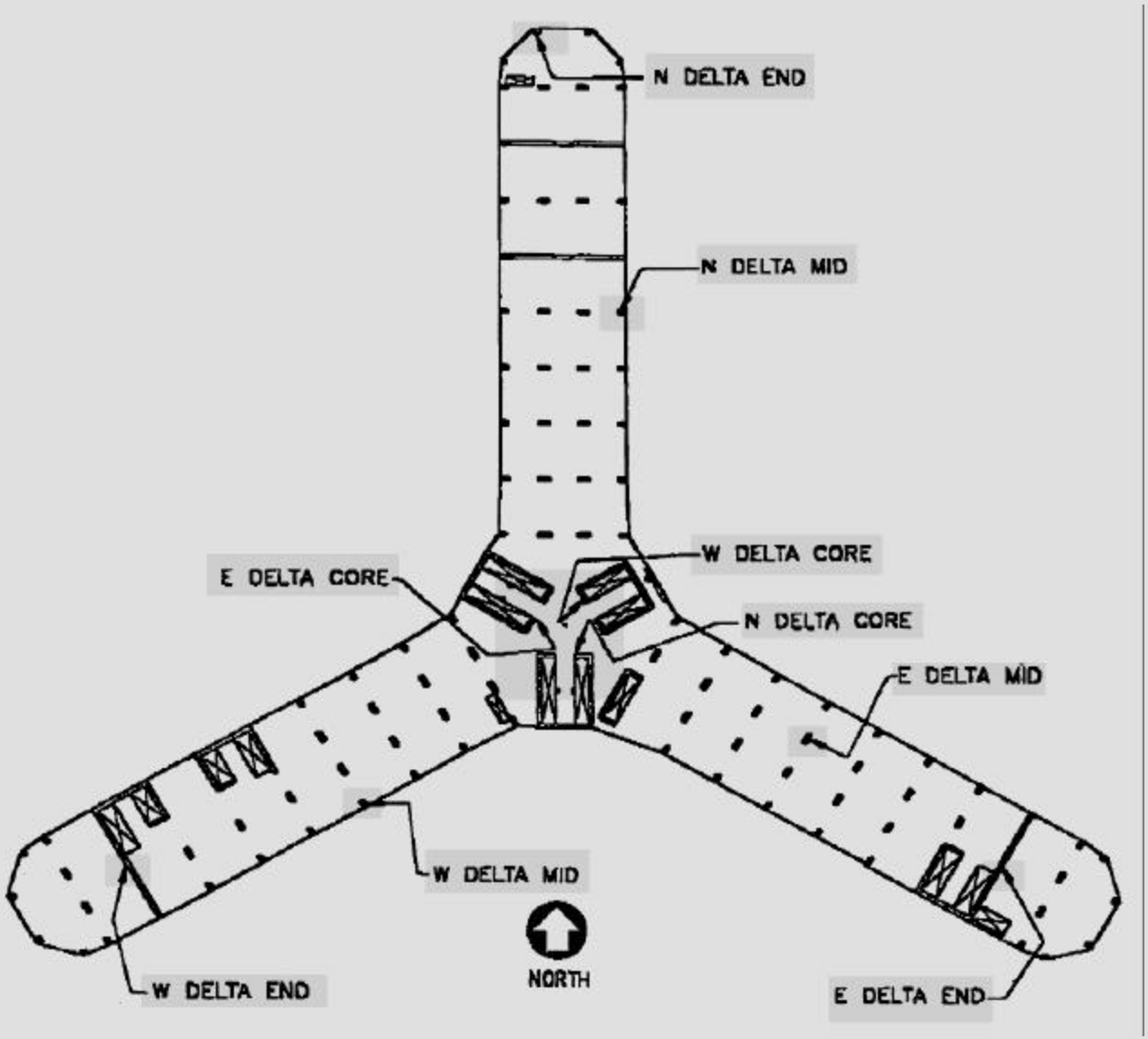
PRIMADONNA
R.V. VILLAGE
EARANCE
11' 8"

Desperado Coaster – Primm, NV

MANDALAY BAY



SURVEY MONUMENTS



Mandalay Bay Tower
CRACK SURVEY - CASINO LEVEL

Report Date
March 26, 2001

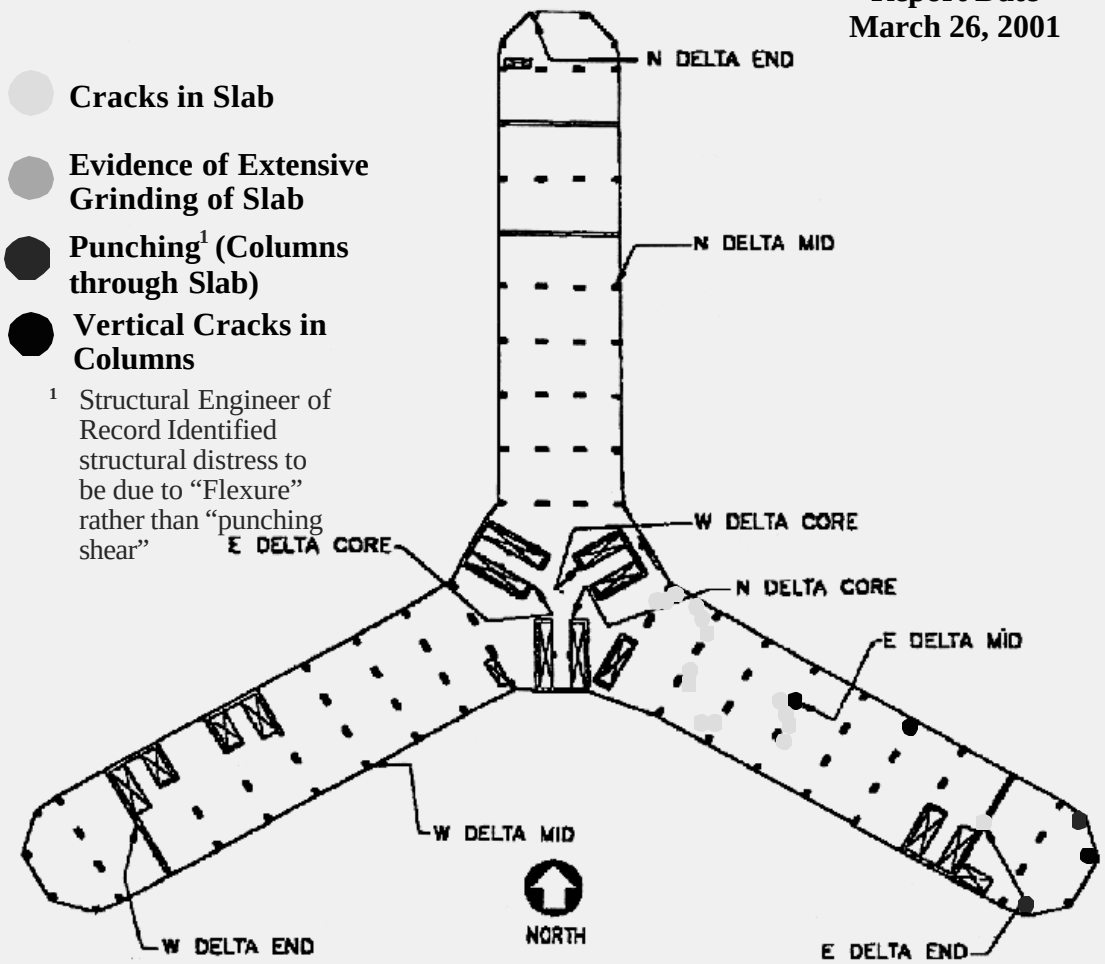
Cracks in Slab

Evidence of Extensive Grinding of Slab

Punching[1] (Columns through Slab)

Vertical Cracks in Columns

[1] Structural Engineer of Record Identified structural distress to be due to "Flexure" rather than "punching shear"



Survey Conducted on 10/5/98 thru. 10/8/98 of Casino, 2nd, & 3rd levels.
MOST OF THE STRUCTURAL ELEMENTS WERE NOT ACCESSIBLE-COVERED, OBSTRUCTIONS, etc.

Not to Scale
Wings are approx. 292.5'(L) X 73' (W)

CCBD-Inspections Services
NOT FOR DISTRIBUTION

Mandalay Bay Tower
CRACK SURVEY - LEVEL 3

Report Date
March 26, 2001

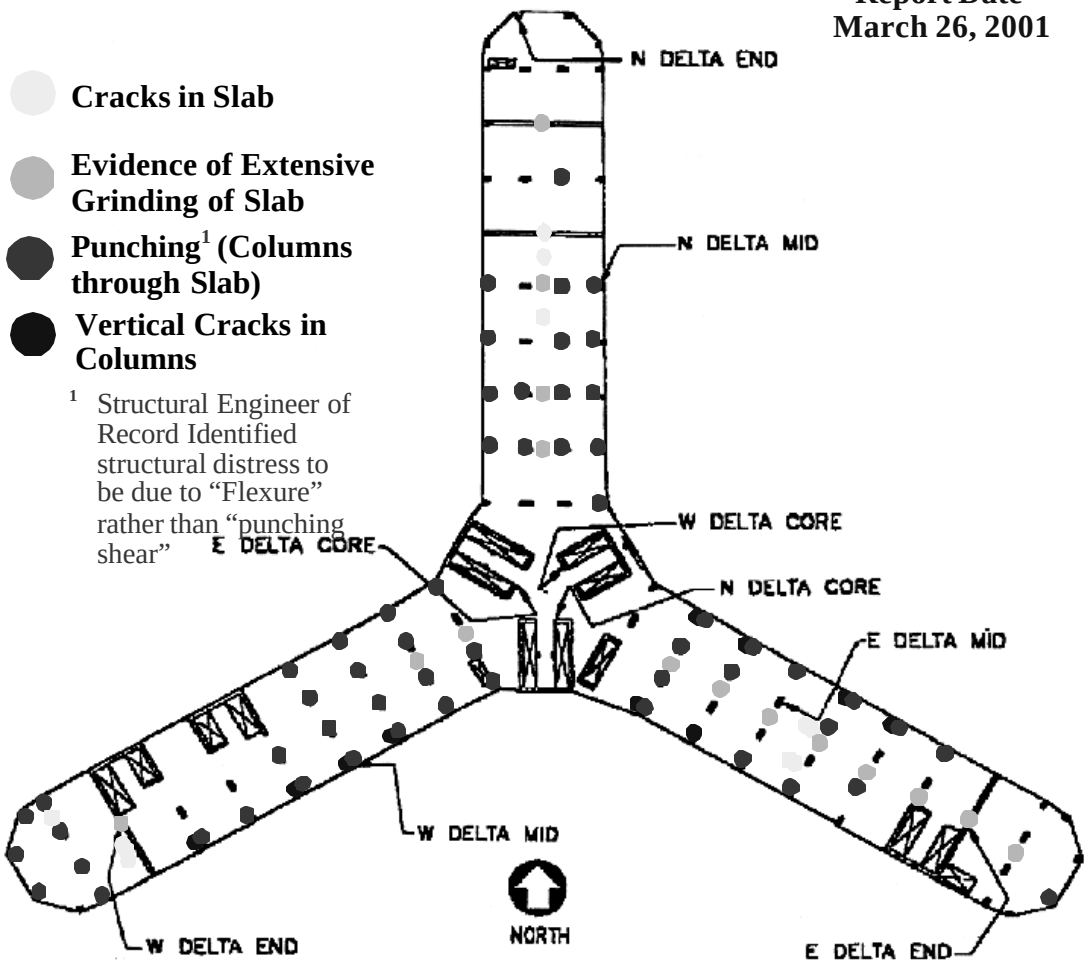
Cracks in Slab

Evidence of Extensive Grinding of Slab

Punching[1] (Columns through Slab)

Vertical Cracks in Columns

[1] Structural Engineer of Record Identified structural distress to be due to "Flexure" rather than "punching shear"



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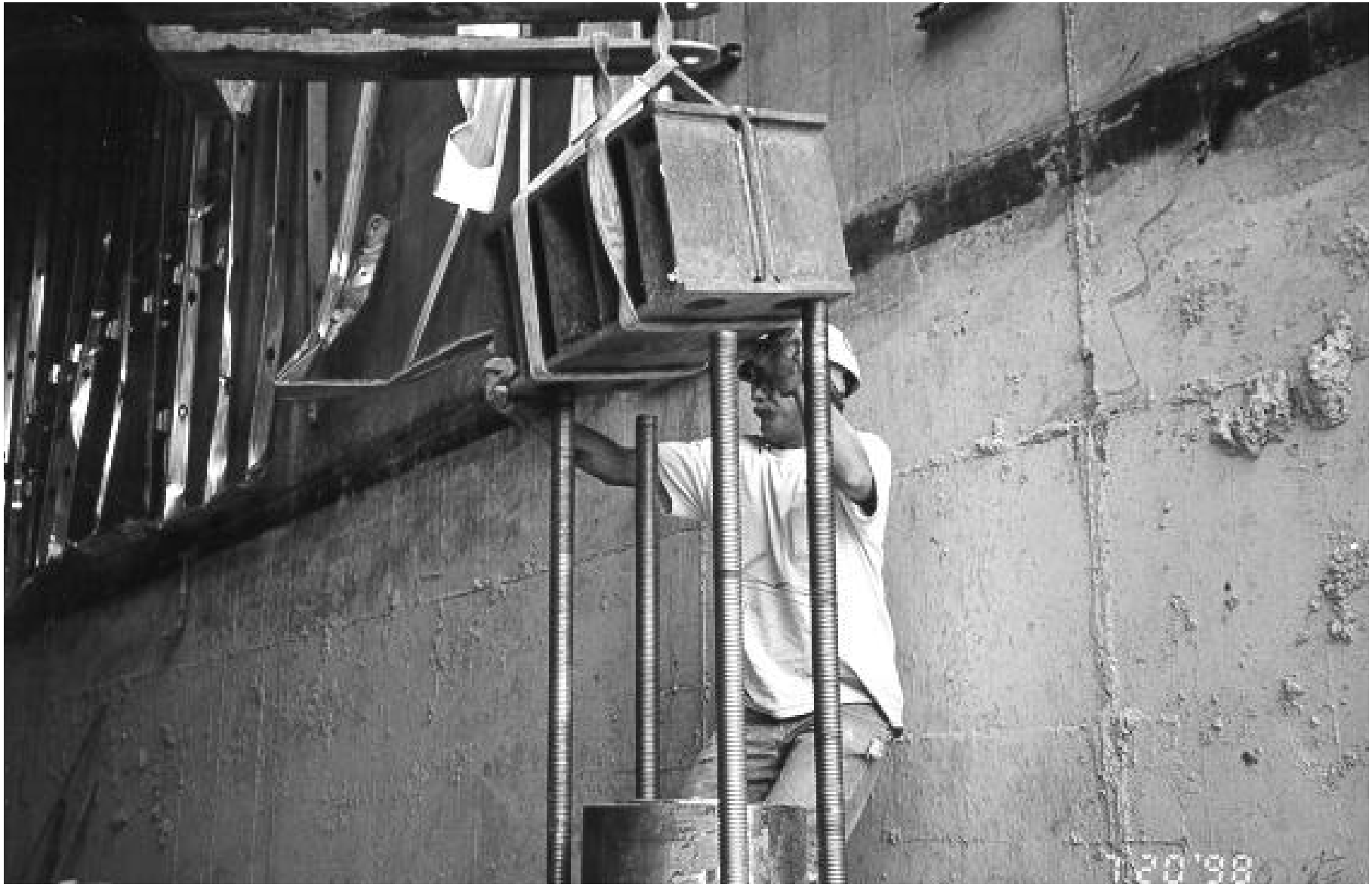
CCBD-Inspections Services
NOT FOR DISTRIBUTION

JRTI

2.10.98


7'20'98

12:08:38

January 2003

SUNRISE WEST HOSPITAL

TOP-OFF PARTY

KNIGHT
KNIGHT

SCHUFF STEEL
KITCHELL

E. MITCHELL

E. MITCHELL

KITCHELL

KITCHELL