



# PROJECT MANAGEMENT CENTER FOR EXCELLENCE

A.J. CLARK SCHOOL OF ENGINEERING  
Civil & Environmental Engineering Department



## HYATT REGENCY HOTEL IN KANSAS CITY COLLAPSE – A CASE STUDY

*Shulman*

*2017 Project Management Symposium*

# HYATT REGENCY HOTEL IN KANSAS CITY

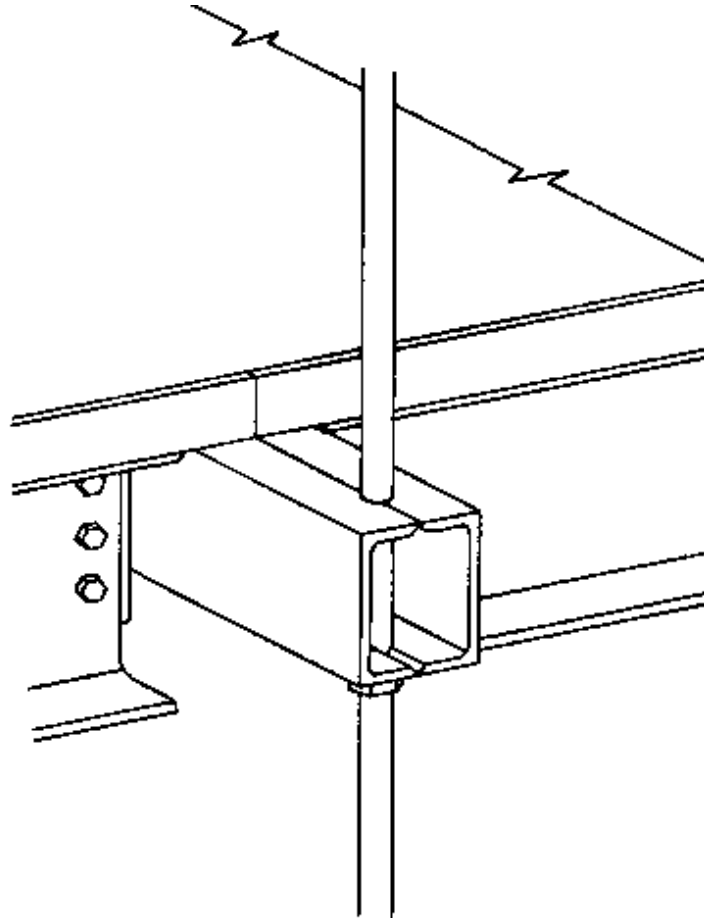
## COLLAPSE – A CASE STUDY

- On July 17, 1981, two suspended walkways collapsed in the atrium of the Hyatt Regency Hotel in Kansas City.
- It was the deadliest structural collapse at the time in the history of the United States.
- Approximately 2,000 people had gathered in the atrium to participate in and watch a dance contest. Dozens stood on the walkways. One hundred fourteen people were killed.
- It was an accident that could have been prevented if a better coordinated engineering review had taken place in the design shop drawing process.

- The hotel's design called for walkways to span the atrium at the second and fourth floors.
- The original design specified continuous hanger rods run from the ceiling through the fourth-floor beams and on through to the second-floor beams.

## Walkway as Designed

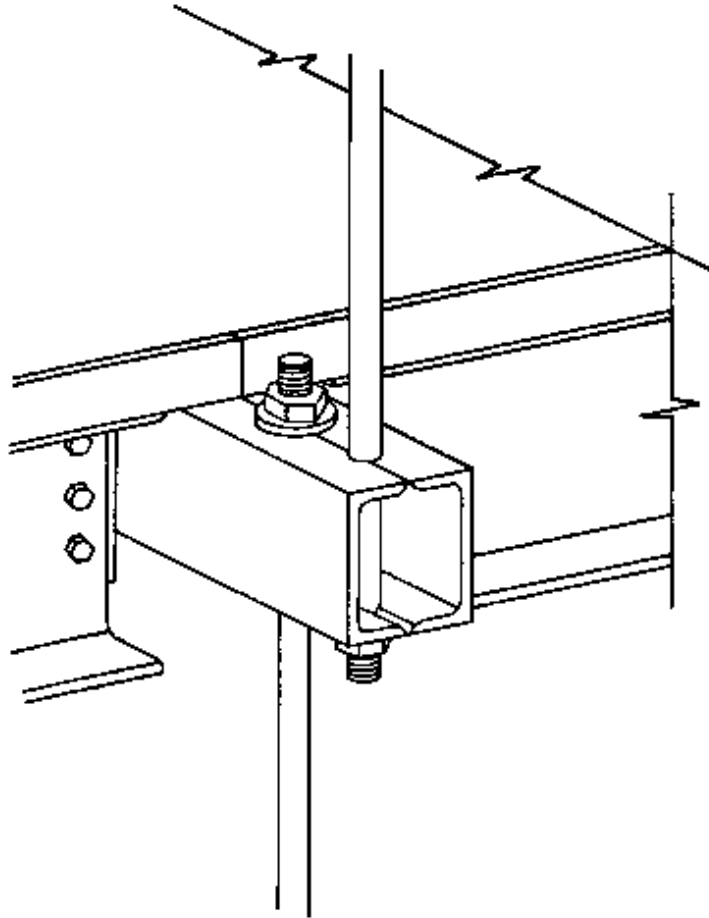
Box beams of 4<sup>th</sup> floor walkway was designed to carry only the 4<sup>th</sup> floor load



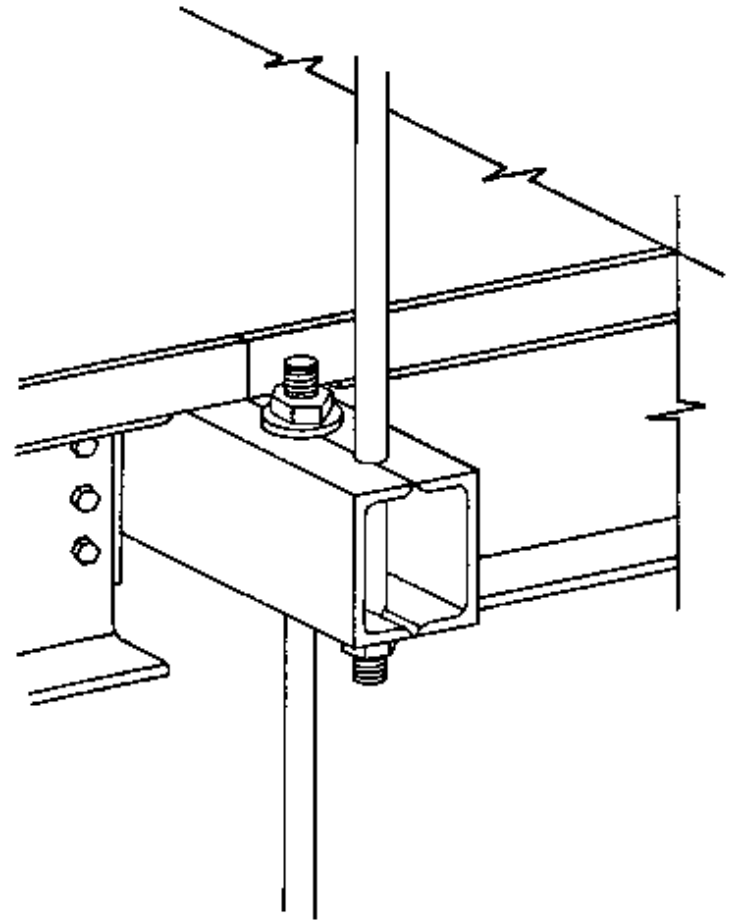
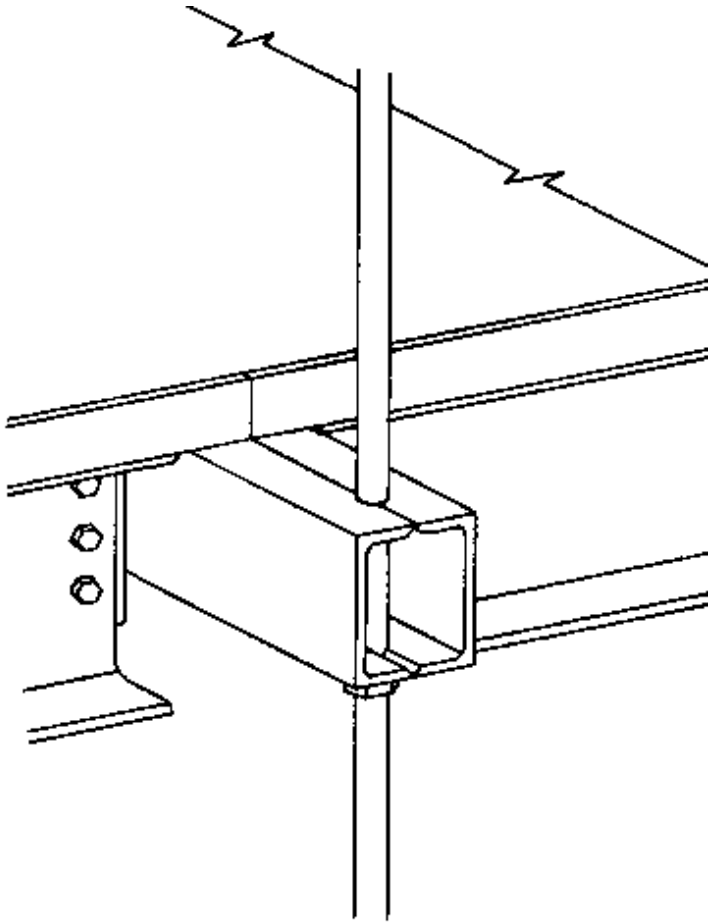
- During the course of construction, design shop drawings prepared by the steel fabricator suggested that a set of two hanger rods replace the single hanger rod between the second and fourth-floor walkways.
- This change doubled the load.
- The design shop drawings were stamped by the architect, structural engineer, and contractor indicating their review.

## Walkway as Built

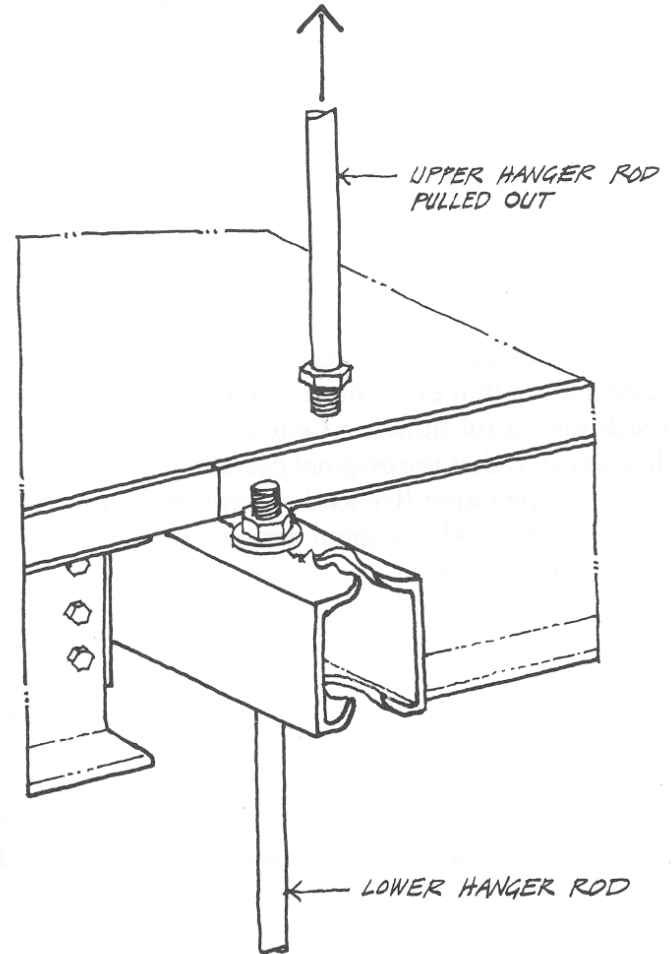
Box beam of 4<sup>th</sup> floor carried the 4th floor load and the 2<sup>nd</sup> floor load



# Before and After



# The Upper Rod Pulled out @ the 4<sup>th</sup> floor box beam



Pulled-Out Rod at Fourth-Floor Box Beam



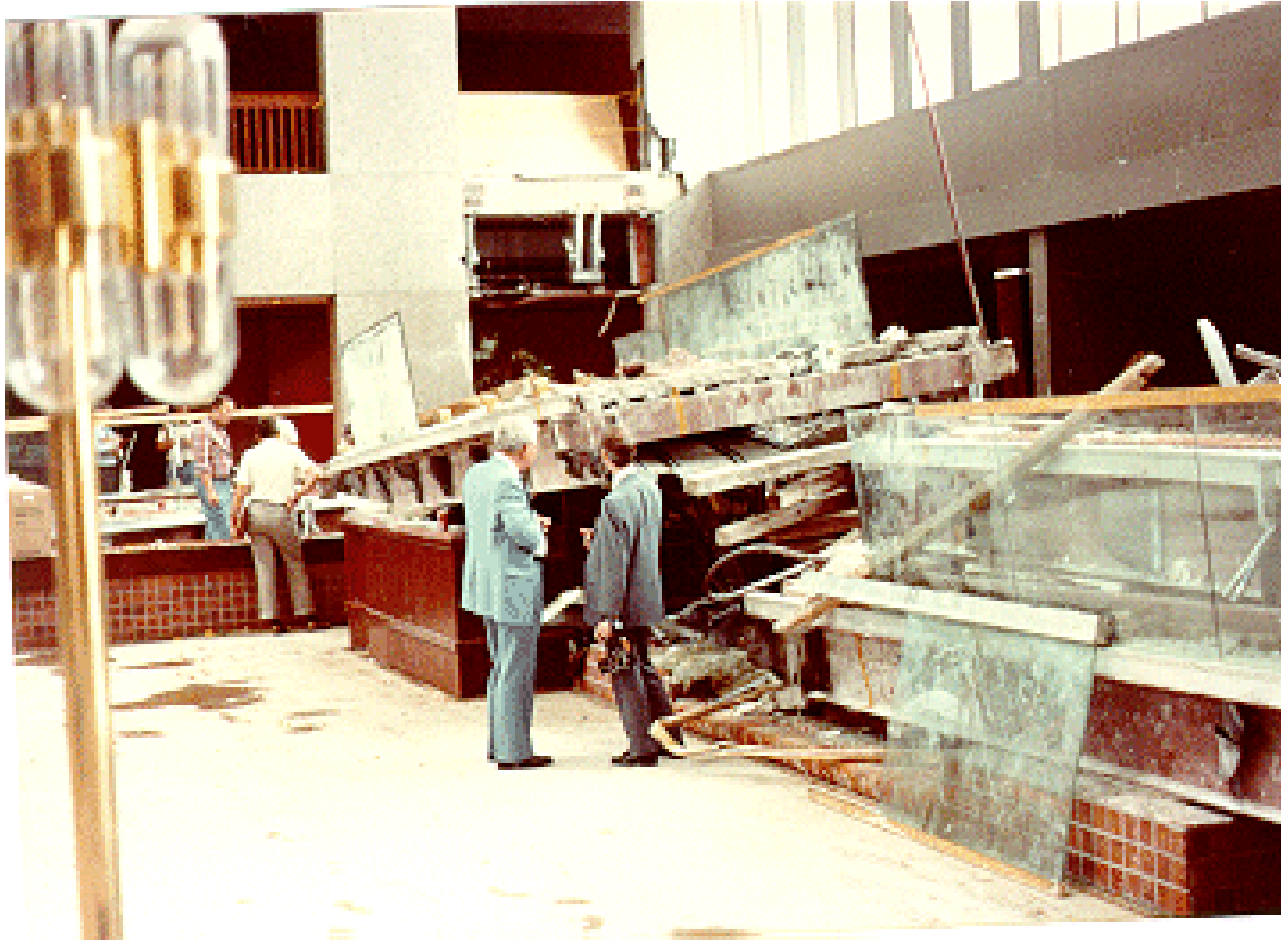
- This building's failure illustrates the importance of good communication among the project participants, since any engineer or architect who took the time to review the impact of this change could have seen the possibility of a structural problem.
- Unfortunately, it appears that each reviewer stamped the submittal but assumed that someone else would complete the review.
- According to the specifications for the project, no work could start until the design shop drawings for the work had been approved by the structural engineer.

- The judge held the structural engineering consultants liable for the accident.

# Photo After the Collapse



# Photo After the Collapse



# SEQUENCE OF EVENTS

- **Spring 1978:** Hyatt awards building contract and hotel construction begins.
- **December 1978:** The general contractor on the enters into subcontract with steel contractor to erect the atrium steel.
- **January–February 1979:** Events and communications between the structural engineers and the steel contractor determine a design change from a single to a double hanger rod box beam connection for use at the fourth floor walkways.
- Alleged telephone calls concerning this proposed change were later disputed by the structural engineers; however, because of alleged communications between engineer and fabricator, Shop Drawing 30 and Erection Drawing E3 are changed.
- **February 1979:** The structural engineers receive 42 design shop drawings (including Shop Drawing 30 and Erection Drawing E-3) and returns them to steel contractor, with engineering review stamp approval on February 26.

- **October 14, 1979:** Part of the atrium roof collapses while the hotel is under construction. Inspection team called in. Their contract dealt primarily with the investigation of the cause of the roof collapse and created no obligation to check any engineering or design work beyond the scope of that investigation and contract.
- **October 16, 1979:** Owner retains an independent engineering firm, to investigate the cause of the atrium roof collapse.
- **October 20, 1979:** The structural engineer firm writes the owner, stating they are undertaking both an atrium collapse investigation, as well as a thorough design check of all the members comprising the atrium roof.
- **October–November 1979:** Reports and meetings from structural engineer to owner/architect, assuring overall safety of the entire atrium.
- **July 1980:** Construction of hotel complete, and the Kansas City Hyatt Regency Hotel opened for business.
- **July 17, 1981:** Connections supporting rods from the ceiling that held up the second and fourth floor walkways across the atrium of the Hyatt Regency Hotel collapse, killing 114 and injuring in excess of 200 others.

- **November, 1984:** The structural engineers were found guilty of gross negligence, misconduct and unprofessional conduct in the practice of engineering.

Subsequently, the structural engineers lost their licenses to practice engineering in the State of Missouri, and had its certificate of authority as an engineering firm revoked.

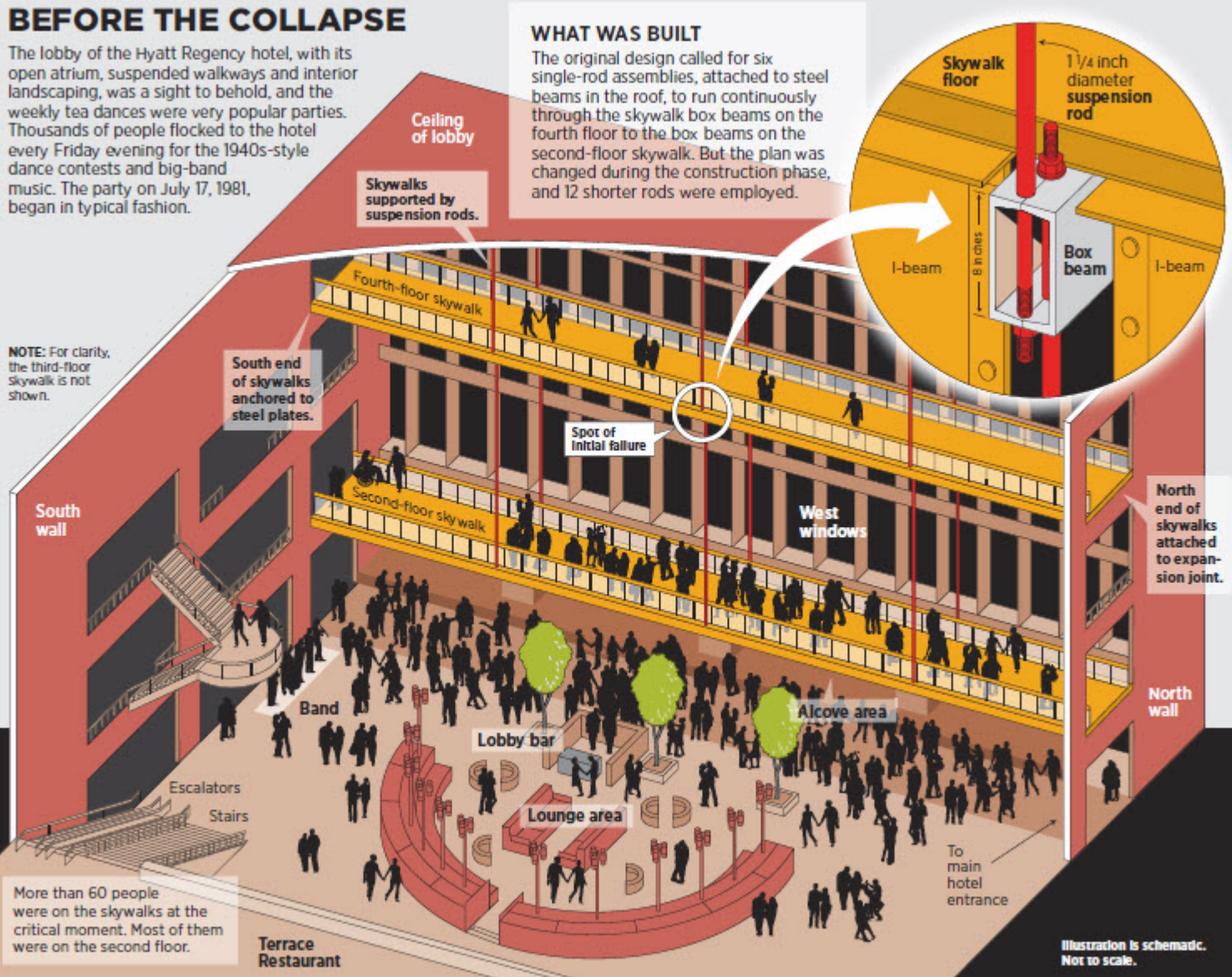
American Society of Civil Engineering (ASCE) adopts a report that states structural engineers have full responsibility for design projects.

The structural engineers subsequently were allowed to be practicing engineers in states other than Missouri.

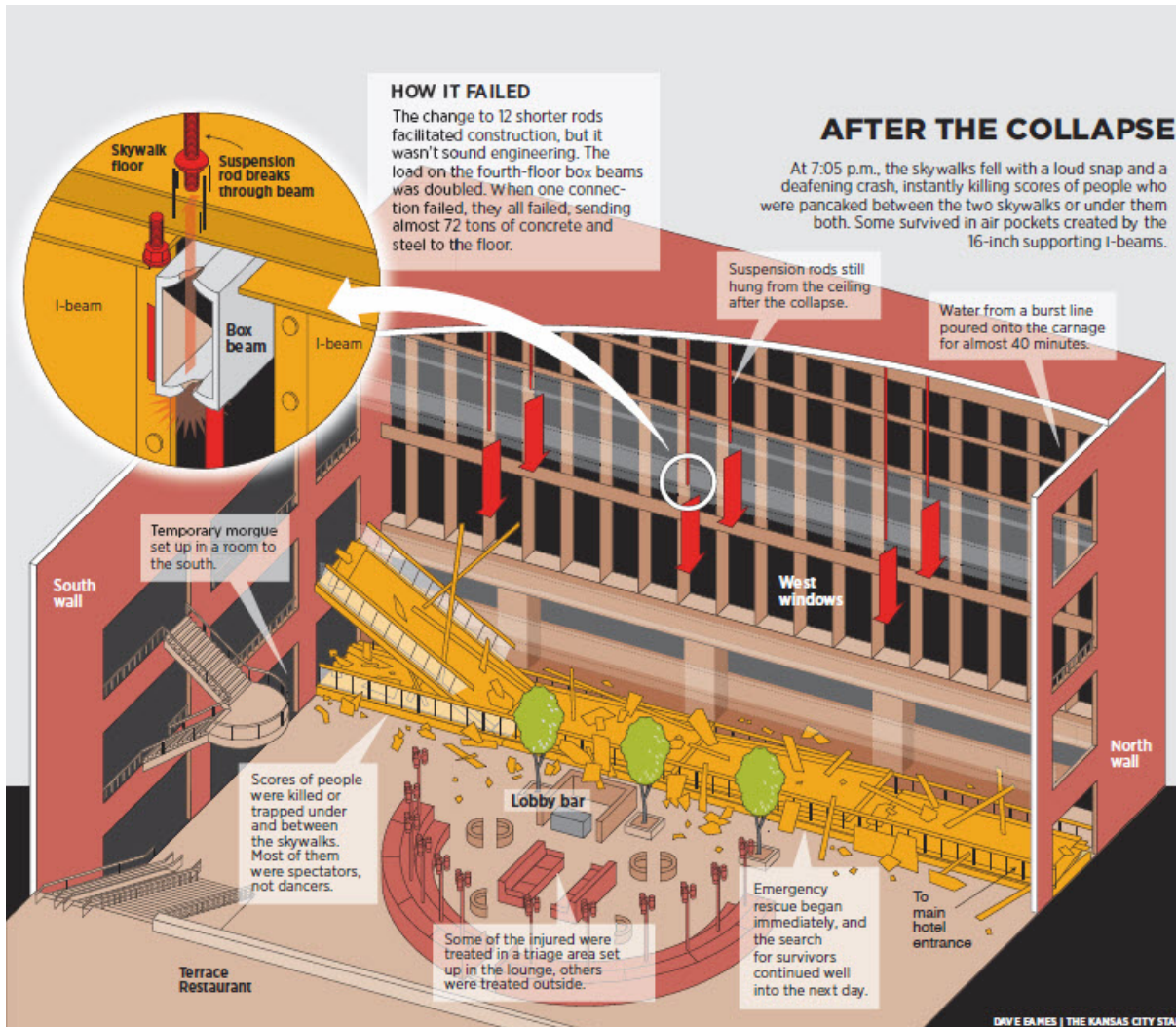
## BEFORE THE COLLAPSE

The lobby of the Hyatt Regency hotel, with its open atrium, suspended walkways and interior landscaping, was a sight to behold, and the weekly tea dances were very popular parties. Thousands of people flocked to the hotel every Friday evening for the 1940s-style dance contests and big-band music. The party on July 17, 1981, began in typical fashion.

**NOTE:** For clarity, the third-floor skywalk is not shown.







**HOW IT FAILED**  
The change to 12 shorter rods facilitated construction, but it wasn't sound engineering. The load on the fourth-floor box beams was doubled. When one connection failed, they all failed, sending almost 72 tons of concrete and steel to the floor.

### AFTER THE COLLAPSE

At 7:05 p.m., the skywalks fell with a loud snap and a deafening crash, instantly killing scores of people who were pancaked between the two skywalks or under them both. Some survived in air pockets created by the 16-inch supporting i-beams.

Suspension rods still hung from the ceiling after the collapse.

Water from a burst line poured onto the carnage for almost 40 minutes.

Temporary morgue set up in a room to the south.

Scores of people were killed or trapped under and between the skywalks. Most of them were spectators, not dancers.

Some of the injured were treated in a triage area set up in the lounge, others were treated outside.

Emergency rescue began immediately, and the search for survivors continued well into the next day.



HYATT REGENCY KANSAS CITY  
TEA DANCING 5-8 EVERY FRIDAY  
STEVE MILLER AND THE HYATT REGENCY ORCHESTRA  
KMBAS *Paul Murphy* MASTER OF CEREMONIES



## Comparison to Hyatt Regency Hotel in Crystal City (Arlington, VA) @ National Airport

- What was the main structural element design difference? It was designed and built during the same general time period.

# Questions and Conclusions

For clarity,  
11-floor  
is not

South end  
of skywalks  
anchored to  
steel plates.

Spot of  
initial failure

Second-floor skywalk

West  
windows

Band

Lobby bar

Alcove area

Lounge area

To  
main  
hotel  
entrance

Escalators

Stairs

Terrace  
Restaurant

More than 60 people  
were on the skywalks at the  
time of the collapse. Most of them  
were on the second floor.

Illustration is  
Not to scale.

### HOW IT FAILED

The change to 12 shorter rods facilitated construction, but it wasn't sound engineering. The

### AFTER THE COLLA



