Sampoong Department Store
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Building History

- Located in Seoul, South Korea
- Construction began in 1987
- Structure was built on top of a landfill
- Original design was for an office building with four floors
- Mid construction, chairman wanted to turn building into a department store
Building History

- During construction, multiple support columns were removed escalators.
- Chairman Lee Joon fired the contractors that refused to make the changes and hired own building company.
- Completed in 1989.
- Building opened in 1990.
- Chairmen Lee Joon wanted to add a 5th floor.
- Construction company advised him the structure would not support the weight, they were fired.
- 5th floor consisted of a restaurant with a heated concrete base.
- Air conditioning unit was installed on the roof.
What Happened

- The roof started cracking two years after construction so the air conditioning units were to cover the cracks.
- When people started noticing the cracks on the 5th floor Lee had management move merchandise from the top floor stores to the basement.
- On June 29 the cracks were so massive the top floor of the building was shut down and the air conditioning turned off; however, Lee did not shut the building down and order an evacuation, with the exception of the executives.
What happened.

- Engineers inspected the structure and stated the building was at risk of collapse approximately 8 hours before collapse.
- The vibrations from the air conditioner radiated through the cracks causing the floor to open approximately 10 cm, the air conditioners were turned off... again.
- At approximately 1700 hours the ceiling began to sink and workers blocked off the 5th floor but not the rest of the building.
- At approximately 1750 hours workers began to evacuate the building.
- At approximately 1752 hours the roof gave way and the air conditioning unit fell through the roof causing the main columns to weaken causing the escalator to collapse.
- This led the rest of the south wing collapsing like a pancake.
As a result

- 1500 people were trapped and over 500 people died.
- Approximately $216 million in property damage.
- Rescue crews did not begin searching until the next day.
- Authorities called off the search due to the unstable remains and rescuers would be at risk.
- When officials began the search with the remains of the structure being steadied by guide cables.
- After two day workers assumed anybody left were dead so they were more concerned with recovery.
- One individual survived for 16 days in the collapse with just a few scratches drinking rain water to survive.
Investigation determined the following factors caused the collapse:

- Poorly laid foundation
- Built on unstable ground
- Substandard concrete mix
- Poorly reinforced concrete for ceiling and walls
- Built with incorrect application of “flat slab construction”
- Additional 5th floor
- Fire shields were installed improperly
Investigation - Trigger Point

- The air conditioners had been moved in 1993 across the ceiling.
- Management noticed cracks.
- Instead of lifting with a crane the air conditioners were put on roller and dragged across the roof causing the surface to destabilize.
- The cracks formed in the roof slabs and the main support columns were forced downward.
- Column 5e was the first column to collapse.
What happened to Lee Joon?

- Charged with criminal negligence and was sentenced to 10.5 years in prison.
- Sentenced was reduced to 7 years.
- 3 days after he was released he died of complications relating to heart failure.
- Two city officials and chief administrator were also jailed for bribing and concealing illegal changes in construction.
- Approximately 3293 settlements were filed and awarded approximately $350 million was paid out to these individuals.
What it looked like

- http://www.youtube.com/watch?v=aQXTSR9koCg&feature=related
• http://www.horizon-engineers.com/moh.htm
• http://en.wikipedia.org/wiki/Sampoong_Department_StoreCollapse#Building_overview