Press Release

Ministry of Land, Infrastructure and Transport

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OPR: Construction Safety Division, MOLIT

Collapse of HDC Apartment due to "Unauthorized Structural Change"

Overall unreliable management of working scene with negligent quality control and supervision of concrete assessed to be leading cause of collapse

The Accident Investigation Committee (Chairman: Professor Kim, Gyu-Yong, Chungnam National University, hereinafter referred to as "AIC") for the HDC Apartment Collapse announced the investigation result of the collapse* that occurred at the Gwangju apartment construction site on January 11th.

* On 11 JAN 2022, more than 16 floors of outer walls under the 39th floor of the newly constructing site in Gwangju collapsed when the bottom of the PIT layer** collapsed, resulting in 6 deaths and 1 injured.
** A separate layer for installing pipe lines between the 38th floor and 39th floor (top roof)

With 12 experts in fields of architectural structure, architectural construction, law, and other relevant fields for the investigation, the AIC set the timeline of 2 months from 12 January to investigate the cause of the accident.

* The committee was originally composed with 10 people in January 12 and was introduced with 2 additional experts in January 28

Through field investigations, hearings with concerned parties, document reviews, as well as material strength tests, collapse simulations, etc., the investigation to analyze the cause of the accident was thoroughly conducted with weekly meetings to discuss findings.

The committee announced the cause of the collapse in terms of building structure and construction safety as follows:

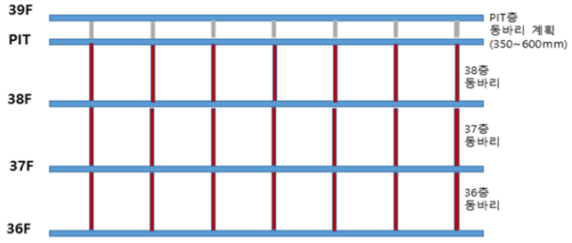
① The construction method and support method of the 39th floor differed from the original design document, and with a concrete fake wall installed at the bottom of the PIT layer, the applied load on the bottom slab of the PIT layer reached a heavier state than the planned design** with the load concentrated toward the center.

* Floor Construction: general slab → deck slab, Support Method: temporary support (supporting post) → concrete fake wall
** Design condition (10.84 kN/m^2) → Site condition (24.49 kN/m^2, +13.65 kN/m^2, 2.26 times the weight of original plan)

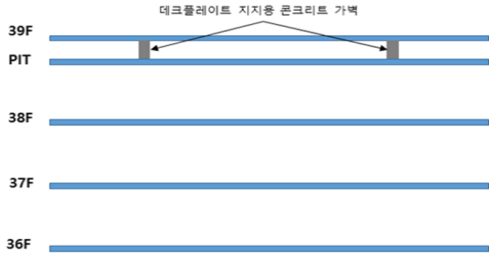
② The first collapse was triggered by an early removal* of the bottom temporary supporting post of the PIT layer, causing the bottom slab of the PIT layer to support the load by itself, followed by continuous collapse toward the lower direction of the building.

* Standard specification for construction work states, “For a high-rise building under construction, the supporting post must be installed on at least three floors

< Normal construction condition >

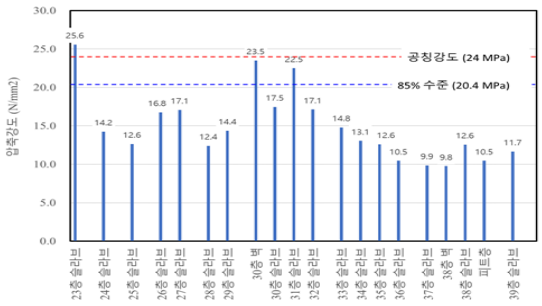


< Site of collapse>

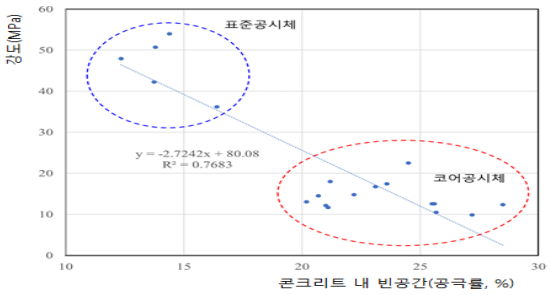


③ A strength test on the concrete specimens collected from the collapsed building showed that most specimens showed 85% level of strength compared to the designed standard strength. The lack of strength of the concrete triggered a decrease in the attachment rate to the rebar reinforcement, leading to a decrease in the safety rate of the building against any collapse.

< Compressive strength of the core specimen from floor 23 to 38 >

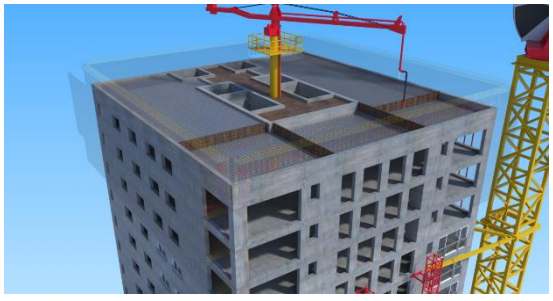


< Difference between the standard specimen and the core specimen >

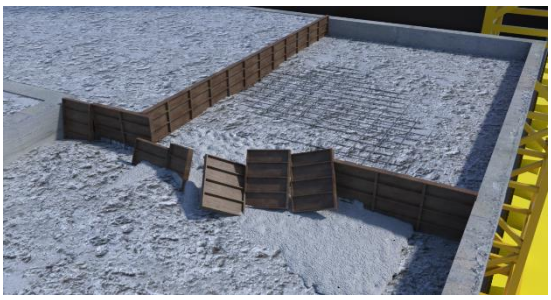


< Structural Collapse Process >

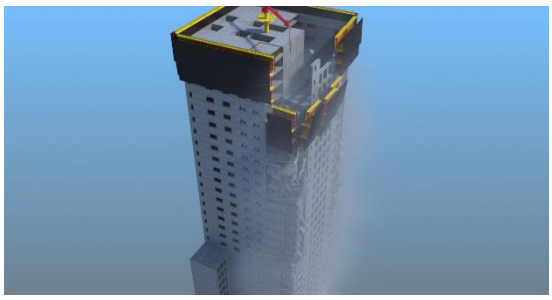
① Fake wall installed for laying slabs on the 39th floor (without structural safety review)



② Supporting post removed on the lower floor (installation of supports on the lower three floors is required according to the SOP)



③ Occurrence of a shifting phenomenon toward the center while depositing concrete at the bottom with fixed load increasing



④ Occurrence of the collapse from the top floor to the 23rd floor (above the evacuation safety floor) as impact was applied to the lower part after the initial collapse of the PIT layer

The committee announced the cause of the collapse in terms of construction management as follows:

The role of the supervisor to verify the construction process and block the risk of the above collapse was insufficient. Structural safety could not be secured as work cooperation with related professional technicians* was not conducted during construction supervision.

* There was a failure to comply with the conditional implementation items of the construction review (Article 91-3 of the Building Act Enforcement Decree)

The supervisor could not confirm the structural safety of the “concrete fake wall,” which was pointed out as the cause of the accident, due to the use of an inspection checklist that was prepared without consideration of the "inspection work standard for each building sector construction type" that was submitted to the ordering agency.

According to the analysis results, the AIC proposed the following measures to prevent recurrence of such collapse: Strengthen system implementation, Improve the current supervision system, Improve the material and quality management, and Improve the subcontracting system.

AIC Chairman Kim, Gyu-Yong said, "During the last two months, the committee has made an effort to conduct close analysis of the accident, and we hope that the results of the investigation will help not only identify the cause of the collapse but also prevent recurrence of similar accidents in the future."

He added, “We plan to submit a final report to MOLIT in three weeks after organizing the investigation results supplementing detailed items.”

MOLIT Director General for Technology and Safety Policy Kim, Young-Guk said "I express my deep condolences to those who passed away in this accident."

He added, “Based on the investigation results identified by AIC, we plan to demand strict actions from the related agencies for the illegal matters and plan to make improvements by preparing measures to prevent recurrence as soon as possible.”

The final report by AIC will be released to the public through the MOLIT website (www.molit.go.kr) and the Construction Safety Management Comprehensive Information Network (www.csi.go.kr).