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Lessons Drawn From Attack on Pentagon May Stay Secret

By JAMES GLANZ

It was a rare sliver of positive news on Sept. 11. Unlike the twin towers, where many of the 2,795 people who died were trapped inside until the structures collapsed, the Pentagon — where 125 military personnel and civilian workers were killed — contained the blast and fires well enough to allow nearly everyone who survived the initial impact from the hijacked jetliner to escape.

Just three days after the crash, a blast expert at the Army Corps of Engineers was at the scene to begin leading the Pentagon team that would assess the attack's effect on the building. At the trade center, it took an investigative team weeks to assemble, and then it had trouble gaining access and crucial documents. The Pentagon team's report, completed last July, contained not only an analysis of how the building, parts of which had been recently renovated and reinforced, held up, but also recommendations for using the lessons learned to make other buildings safer.

But there is another sharp contrast between the two efforts. The World Trade Center report was completed and released last spring, but the Defense Department, fearing that the strengths and perhaps vulnerabilities of its headquarters were too clearly drawn, has held up the Pentagon study in a classification review and may never allow it to be publicly released.

The review, which was specifically intended to consider Pentagon security in the light of new terrorist threats, has provoked strong but conflicting reactions from engineers who saw it before all copies were abruptly ordered returned. Some, confused over what could be considered sensitive in the report, have expressed outrage that the lessons it may hold for other buildings could be squandered. They also think that a deeper understanding of what happened at the twin towers, gained through a comparison with the findings at the Pentagon, could be denied both the general public and the families of victims.

"I really think this is nothing but bureaucratic inertia," said Mete Sozen, a professor of structural engineering at Purdue University who is a member of the Pentagon assessment team, and who was asked to return his copies of the report around the first anniversary of the attack.

"I don't see anything there that would be against a national interest or make it more likely to be a terrorist target," Professor Sozen said.

That is not the view taken by the Pentagon Force Protection Agency, created last May. Its acting director, John Jester, points out that terrorists returned to the World Trade Center after a bomb failed to destroy it in 1993.

"We're concerned that when we do reviews of buildings, we're looking at how are they good and how are they bad, and you don't want to advertise that to the world," Mr. Jester said. "We've obviously been the site of a terrorist attack, so we don't want to disclose anything that would assist someone who would want to attack us again."

Mr. Jester said he thought it was likely that parts of the report contained material too sensitive to release, but added that a final determination on the report's release had not been made.

The study, led by Paul F. Mlakar, a blast expert at the Research and Development Center of the Army Corps of Engineers, was sponsored by the American Society of Civil Engineers with the approval of the Pentagon. Dr. Mlakar said team members knew from the start that the report would see a Defense Department review, and so they attempted to avoid including any sensitive material.

The team's findings identify "things I think we want to incorporate in other buildings for lots of unforeseen incidents" — like terrorist attacks, Dr. Mlakar said. But if those lessons are ultimately classified, Dr. Mlakar said, even he would have mixed feelings about the decision because he is aware of security concerns.

Engineers outside the investigation say the implications are considerable, since the reinforced-concrete structure of the Pentagon — unlike the steel skeleton of the twin towers — is similar to the buildings in which most Americans live and work. The investigation, like others the engineering society carried out after the Loma Prieta earthquake in California in 1989 and the bombing of the Alfred P. Murrah Federal Building in Oklahoma City in 1995, is therefore more likely to result in changes to building practices.

The findings of the World Trade Center investigation have already led to a re-examination of building codes and engineering practices in New York and other cities. And those who have seen the Pentagon study say that parts of it support a finding that was already hinted at in the trade center study: that some older buildings with sturdy structural frames and thick, stout layers of fireproofing may perform better than modern, lightweight structures in the extreme conditions of a terrorist attack.

"I think it's critical that it be published," said Charlie Carter, chief structural engineer for the American Institute of Steel Construction in Chicago, who said he was asked to review the Pentagon report. "It has information directly relevant to all the things that have either been claimed or mistaken about other structures that were hit that day."

The Pentagon was built in just 16 months, mostly of steel-reinforced concrete. Construction began on Sept. 11, 1941. The five outer faces, each 922 feet long, were built of heavy layers of limestone and brick as well as concrete. Partly because it was thought the building would ultimately become a warehouse for paper records, the structure was made especially strong.

Tight spirals of steel reinforcing bars were embedded in each of the 41,492 concrete columns within the building's five stories and 6.5 million square feet of space. The floors were designed to support 150 pounds of weight per square foot, more than double the strength of many modern office buildings.

Throughout the building, reinforcing bars from one section had long, tightly connected overlaps with those from the next. On Sept. 11, that continuity "made the whole thing perform together rather than as little pieces," said W. Gene Corley, a structural engineer and senior vice president at Construction Technology Laboratories who led the World Trade Center investigation.

Several people who have seen the Pentagon review said it shows that when the hijacked Boeing 757 plunged through the west face, the spirally reinforced columns inside acted as powerful shock absorbers, often bowing sideways without snapping.

Parts of the plane bowled through the bottom two floors of three of the Pentagon's five concentric rings, but the stout, continuous structure was able to bridge over the missing columns and avoid an immediate collapse. The structure was even able to stand up against the raging fire that broke out when the plane's fuel ignited.

"It was striking to me how little of the building was involved in the fire," said Dr. Corley, who has reviewed the Pentagon report. The fire, he said, "didn't spread and trap other people in the building."

Of the 2,600 people in the immediate area of impact, all of those above the second floor had time to escape

before a 100-foot-long section of the outer ring collapsed 35 minutes into the disaster. Recently installed blast-proof glass and new steel reinforcements in the impact zone have also been credited with saving some lives on the upper floors.

While 125 Pentagon workers and 59 passengers and crew members on the plane died, few if any of the workers who died were from outside the immediate impact zone.

"The engineer wants to design to resist collapse," said Dr. Mlakar, the team leader. "We had a very positive example of the kinds of things that will do that in the Pentagon."

Several engineering experts said that a direct comparison with the collapse of the twin towers was fraught with difficulties. The towers were 110 stories high and held up with steel protected only by lightweight, spray-on fireproofing that was probably dislodged by the impacts of the planes.

But the engineers said that the differences themselves should help them understand which vulnerabilities were peculiar to the towers and which ones might be true of any building, no matter how it was constructed.

An understanding of certain older buildings around the perimeter of the trade center site, which were hit with flaming debris but remained standing, should also be advanced by the Pentagon findings, some of the engineers said.

Mr. Jester of the Pentagon said that even if the study is classified, its findings could probably be shared with officially sanctioned engineers working on projects like government or military installations. But a public document would almost certainly see wide distribution, finding its way onto the Internet, for example, Mr. Jester said. Then, he added, "it can be reviewed by anyone in the world."

Because the findings could likely be applied to a wide range of projects, however, many wonder where the line between military security and public safety should be drawn.

"I have conflicting feelings," said John Durrant, executive director of the Structural Engineering Institute of the American Society of Civil Engineers. "We believe the findings would be of benefit to the profession. On the other hand, we are very sensitive to the need for national security."