

PDHonline Course C682 (4 PDH)

Five-By-Five: The Making of the Pentagon

Instructor: Jeffrey Syken

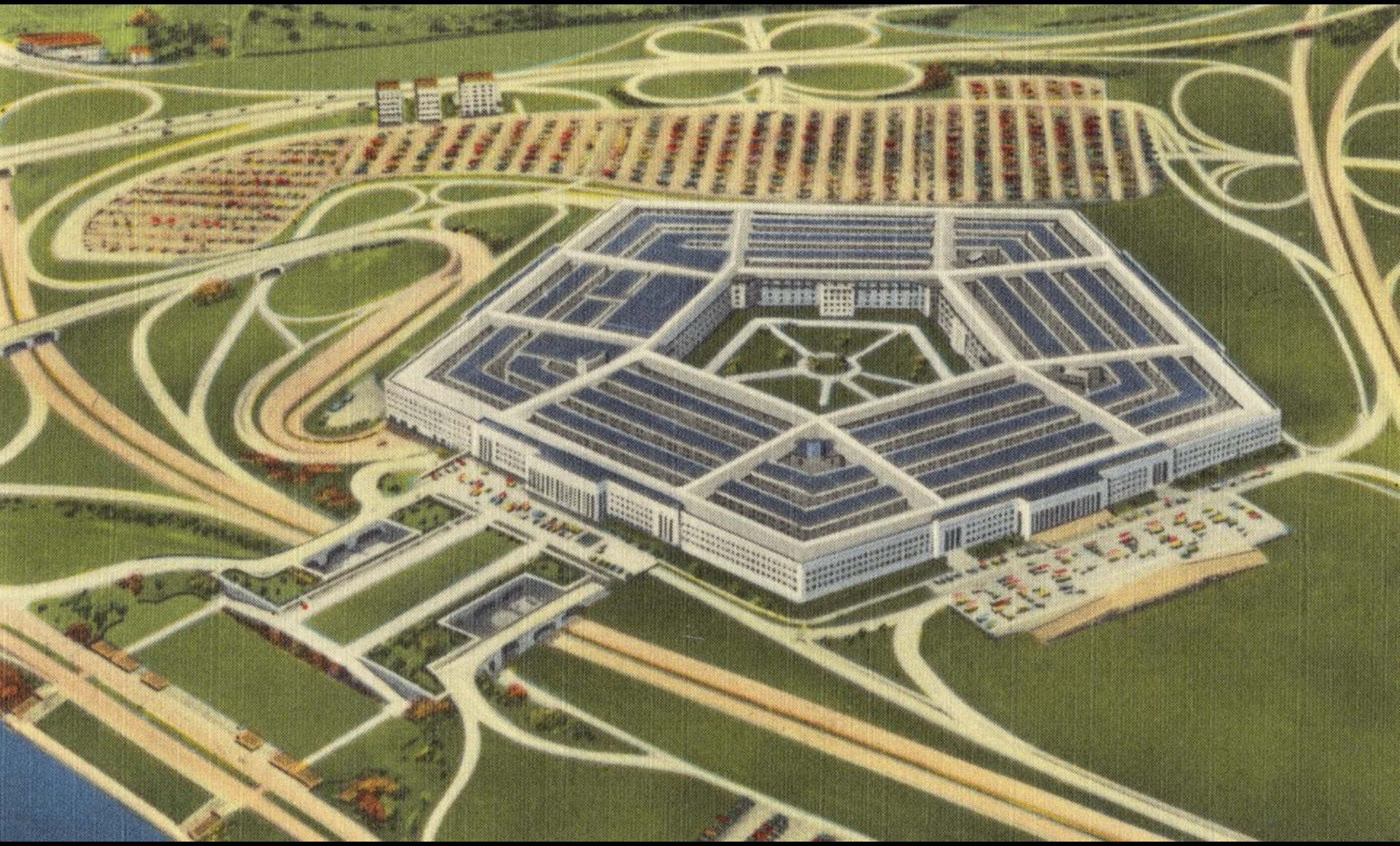
2026

PDH Online • PDH Central

9820 Bucklow Hill Dr
Orlando, FL 32832-7126
info@PDHonline.com
PDHonline.com
PDHonline.org

An Approved Continuing Education Provider

Five-By-Five



The Making of the Pentagon

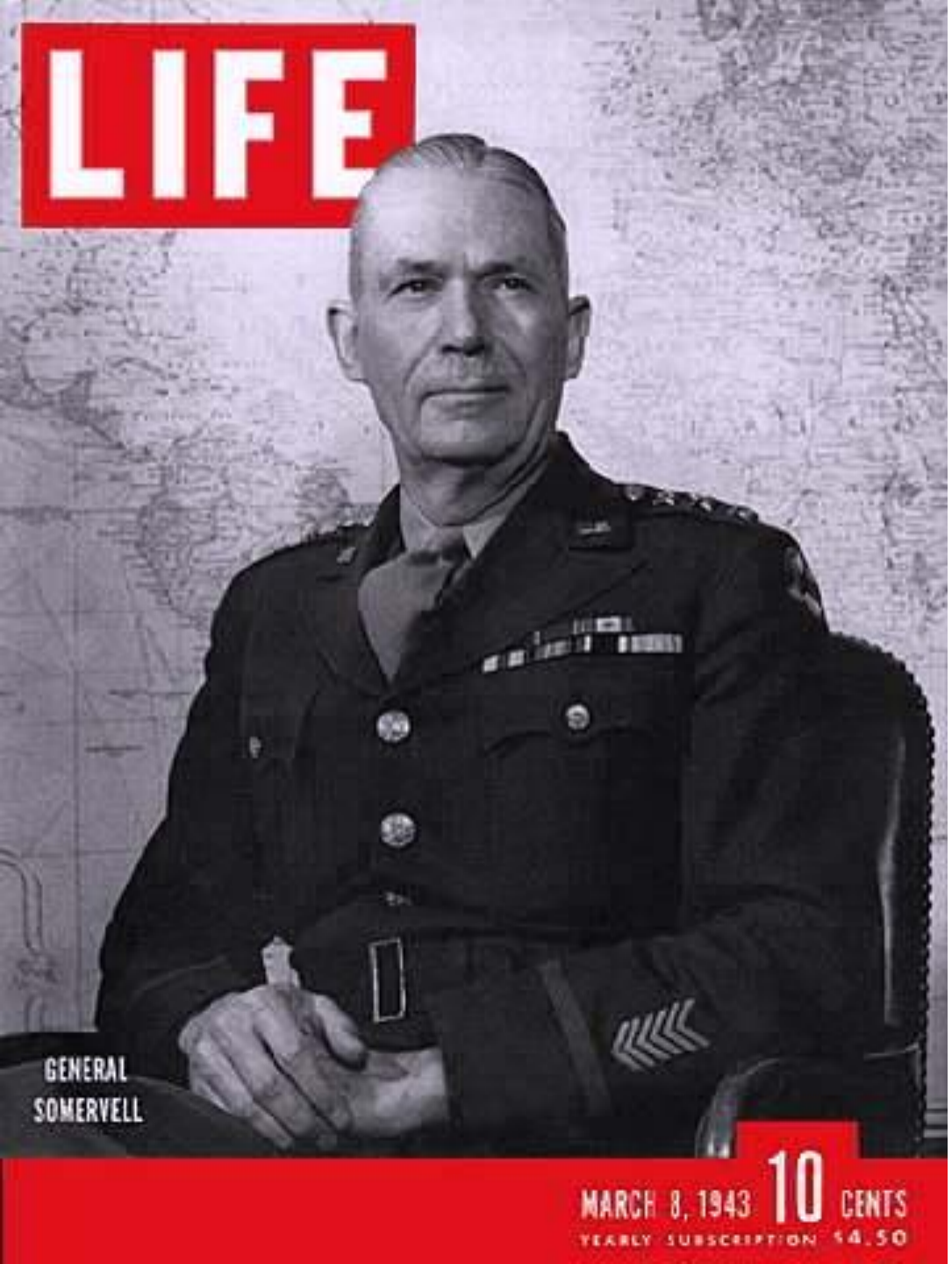
Table of Contents

Slide/s	Part	Description
1	N/A	Title
2	N/A	Table of Contents
3~28	1	Design on the Fly
29~69	2	Barbarians at the Gates
70~93	3	Somervell's Folly
94~127	4	The Reservation
128~250	5	War and Peace

Part 1

Design on the Fly

Dynamite in a Tiffany Box



"On a warm and rainy Thursday evening in July 1941, inside a War Department office in Washington, a small group of Army officers hastily assembled for a meeting and listened in disbelief to the secret plan outlined by their commander. The general spoke in the velvety Southern accent of his native Arkansas. He was not in uniform - Army policy kept officers in civilian clothes so as to disguise from Congress the burgeoning military population in Washington - but he cut an immaculate figure, with his trim build, combed-back, graying hair and neatly groomed mustache. Over the past eight months, the officers of the Army's Construction Division had grown accustomed to bold and quick action from their chief…"

***The Washington Post,* May 2007**

Left: caption: "LIFE's COVER: As head of the Army's vast Service of Supply, Lieutenant General Brehon Burke Somervell is faced with the task of providing our soldiers with all of the materials vital to a successful completion of the war. The six 'hash marks' on his sleeve represent 36 months of duty overseas."



"…At age 49, Brig. Gen. Brehon Burke Somervell had earned a reputation as a smooth but ruth-less operator. 'Dynamite in a Tiffany box' was how an associate later described him. Now Somervell turned his eyes - 'the keenest, shrewdest, most piercing eyes one is likely to meet,' in the words of one observer - toward his chief of design, Lt. Col. Hugh 'Pat' J. Casey. The War Department need-ed a new headquarters, Somervell said. The building he wanted to create was too big to fit in Washington and would have to go across the Potomac River in Arlington. It would be far larger than all the great structures of the city, including the U.S. Capitol…"

***The Washington Post,* May 2007**

Left: Lt. Col. *Hugh Casey*



"…Somervell wanted a headquarters big enough to hold 40,000 people, with parking for 10,000 cars. It would contain 4 million square feet of office space - almost twice as much as the Empire State Building. Yet it must be no more than four stories high - a tall building would obstruct views of Washington and require too much steel, urgently needed for battleships and weapons. The War Department would occupy the new headquarters within half a year, Somervell instructed. 'We want 500,000 square feet ready in six months, and the whole thing ready in a year,' the general said. Somervell ended the meeting with orders to have the basic design plans for the building by Monday morning…"

***The Washington Post,* May 2007**

Left: General *Brehon Burke Somervell*

An Overall Solution

"…Washington was consumed by war anxiety. Three weeks earlier, Adolf Hitler, already in control of much of Europe, had launched a surprise attack on the Soviet Union. President Franklin D. Roosevelt, alarmed by Nazi gains, had declared a national emergency on May 27. The War Department in Washington was growing at an explosive rate, its 24,000 workers spread in 17 buildings, including apart-ment buildings, private homes and several rented garages. Gen. George C. Marshall, the Army chief of staff, needed a quick solution and turned to Somervell to construct tem-porary buildings for the headquarters. At a congressional hearing July 17, Rep. Clifton A. Woodrum, a powerful Virginia congressman, signaled interest in finding an 'overall sol-ution' to the War Department's problem. Somervell took that as a signal for a permanent fix, and the Pentagon, as it would become known, was launched that evening…"

***The Washington Post,* May 2007**

"…The first problem was where to put it – 'incidentally, the largest office building in the world,' Casey later noted dryly. Energetic and experienced, Casey was one of the Army's most brilliant engineers, and he quickly saw big problems with the location Somervell had chosen. Washington-Hoover Airport, at the foot of the 14th Street Bridge in Arlington, had just been replaced with a modern air-field, National Airport, about a mile downriver. Somervell - eager to win the Virginian's blessing for the project - had seized upon the old airport site, but the low-lying land, which was subject to flooding, worried Casey…"

The Washington Post,

May 2007



"…When Casey asked Somervell whether other sites near the airport might be used, the general did not rule it out. Scanning a map, Casey's practiced eye quickly zeroed in on a 67-acre tract about a half-mile upriver from Washington-Hoover. It was Arlington Farm, just east of Arlington National Cemetery. Like the adjacent cemetery, the land had been part of the grand estate of Robert E. Lee that had been confiscated by Union troops in the spring of 1861 for the defense of Washington…"

***The Washington Post,* May 2007**

Left: the "Initial Pentagon Site" was actually Col. Casey's preferred "upriver" site





"…In 1900, Congress transferred 400 acres of the Arlington estate to the Department of Agriculture to use as an experimental farm. In September 1940, Roosevelt approved the return of Arlington Farm to the War Department for use by infantry and cavalry troops at neighboring Fort Myer. Perched on a hill above the Potomac, just below the Lee mansion and overlooking Memorial Bridge, Arlington Farm was one of the most prominent sites in the Washington area…"

***The Washington Post,* May 2007**

Top: caption: "Aerial view of Arlington Farms (outlined in yellow) circa 1949. Note: Pentagon on the left, Arlington Memorial Bridge on the right."

Bottom: caption: "View of the Arlington Experimental Farm, on the southern bank of the Potomac River, October 1907. Part of this land is now the site of the Pentagon. The Custis-Lee Mansion can be seen on the hillside in the distance."

"…Late on Friday afternoon, July 18, George Edwin Bergstrom got to work. A formal man with a brusque manner, his dark hair whitening at the temples, Bergstrom was an accomplished and experienced architect, now in charge of the largest project of his long career. He gathered with his assistants at the division headquarters. Bergstrom led the deliberations. The restrictions were confounding, given the space they needed. The easiest solution, constructing a tall building, was out. They would have to spread out horizontally. But how? A square building that size - with the enormous interior distances to be covered - was too unwieldy, as was a rectangle. The Arlington Farm tract had a peculiar asymmetrical pentagon shape bound on five sides by roads or other divisions…"

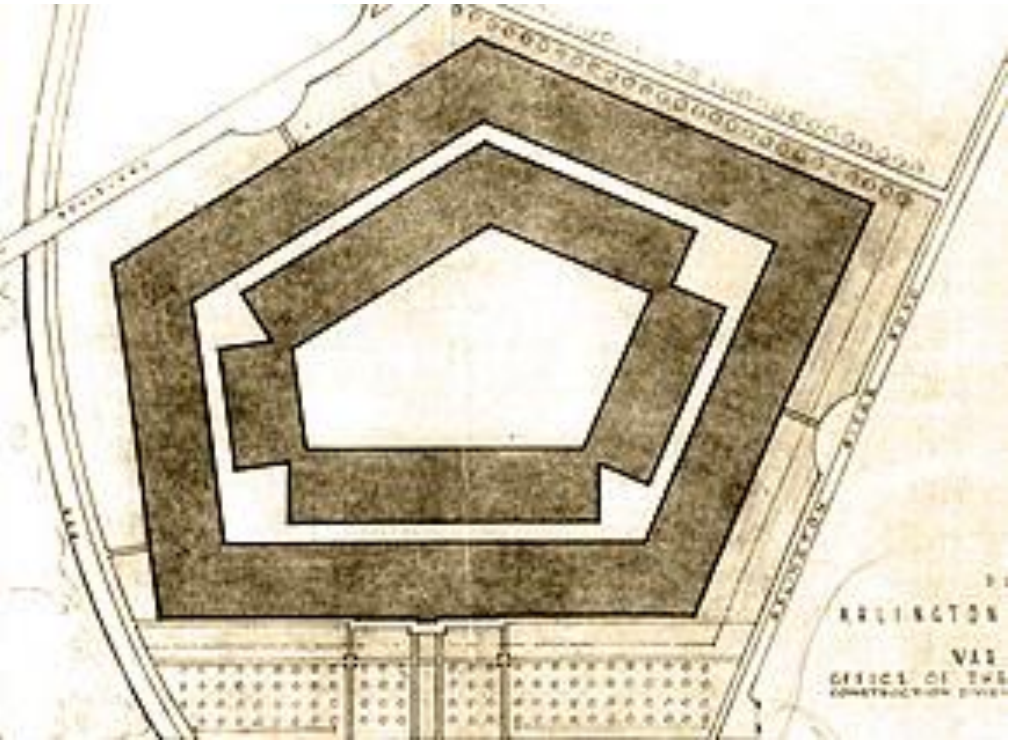
***The Washington Post,* May 2007**

"…One of the first questions visitors ask is; 'Why did the War Department build its offices away out here in Virginia?' David J. Witmer, chief architect for the War Department, explains that the Pentagon is less than two miles from the center of the District of Columbia despite the fact that it is in Arlington County, Virginia. Another oft-repeated query is; 'Why didn't you build a taller building that wouldn't take up so much ground? There are several answers. First, the War Department needed the largest office building in the world and wanted it in a hurry. For reasons of speed and economy it was desirable to put up a structure that would not require elevators. A many-storied building on the Pentagon site would have stuck up like a monstrosity on the Pottomac landscape, obstruction views of and from the National Memorial…"

***Popular Mechanics,* March 1943**



Left: architect *George Edwin Bergstrom* (1876–1955) was the eldest son of *George Bergstrom*, a Norwegian immigrant who co-owned the *Bergstrom Bros. Foundry* in *Neenah, Wis*. After receiving a degree in architecture from MIT in 1899, Bergstrom moved to *Los Angeles*. Bergstrom quickly rose to prominence as one of the West Coast's premier architects, designing many important buildings in and around Los Angeles. His *California* buildings include the *Pasadena Civic Auditorium*, Grauman's *Metropolitan Theater* and the *Los Angeles Athletic Club*. He also designed the *Hotel Utah* (now the *Joseph Smith Memorial Building*) in *Salt Lake City*. He later served as president of the *American Institute of Architects* (AIA). In July 1941, Bergstrom was given the assignment to design a four-million square-foot office building in just three days.



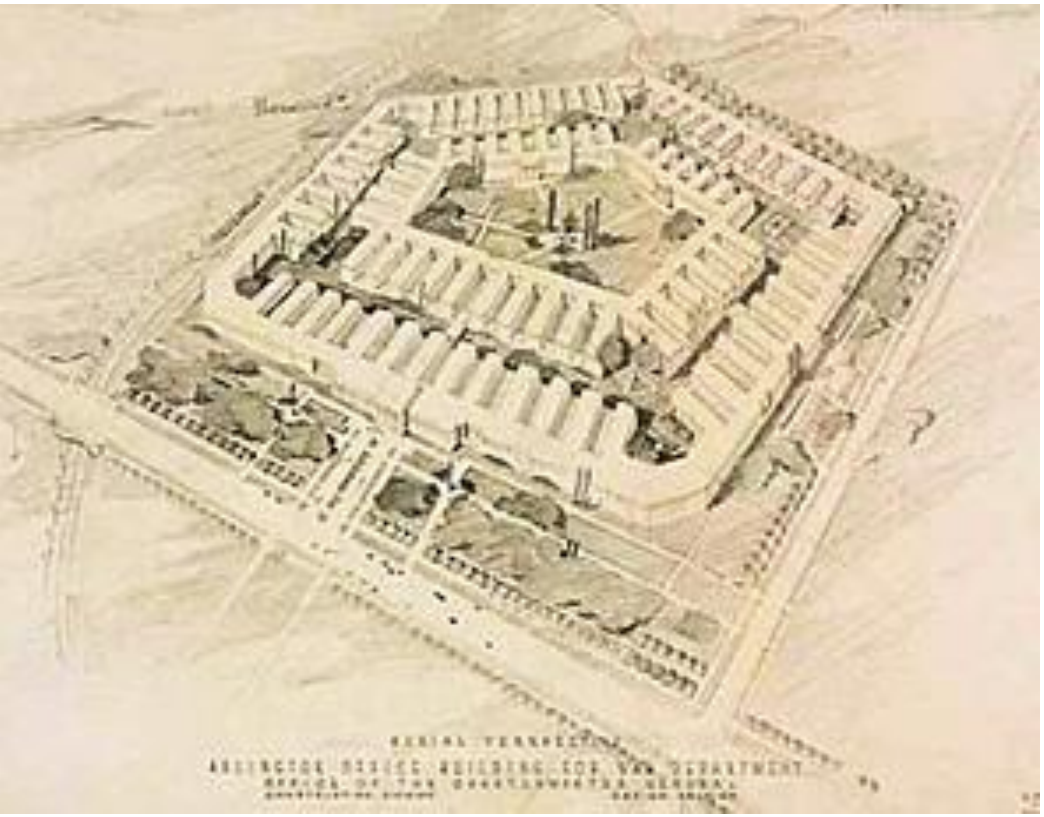
"…Finally, guided by the odd shape of the plot, they designed an irregular pentagon. A sketch by Socrates Thomas Stathes, a young War Department drafts-man, showed a square with a corner cut off, more or less matching the tract's shape. It was really two buildings, a five-sided ring surrounding a smaller one of the same shape…"

***The Washington Post,* May 2007**

"…All through the weekend, the architects refined the design. The interior of the outer ring was lined with 49 barracks-like wings, sticking in like the teeth of a comb. The smaller ring had 34 exterior wings, all pointing toward the outer ring. The wings were 50 feet wide and 160 feet long, separated from each other by 30-foot-wide open-air 'light courts.' Corridors connected the two rings on the ground and third floors. Only the most senior officials would have private offices. Allowing 100 square feet per worker, the building could hold 40,000 employees…"

***The Washington Post,* May 2007**

It Fits



"…There were many problems with the irregular design. The pattern was awkward, and the routes between wings of the two buildings were circuitous. Lacking symmetry, with rows of wings sticking out, the building was frankly quite ugly. Yet, given the site, the pentagonal design had one overriding virtue, Stathes remembered more than 60 years later: 'It fit.'…"

***The Washington Post,* May 2007**



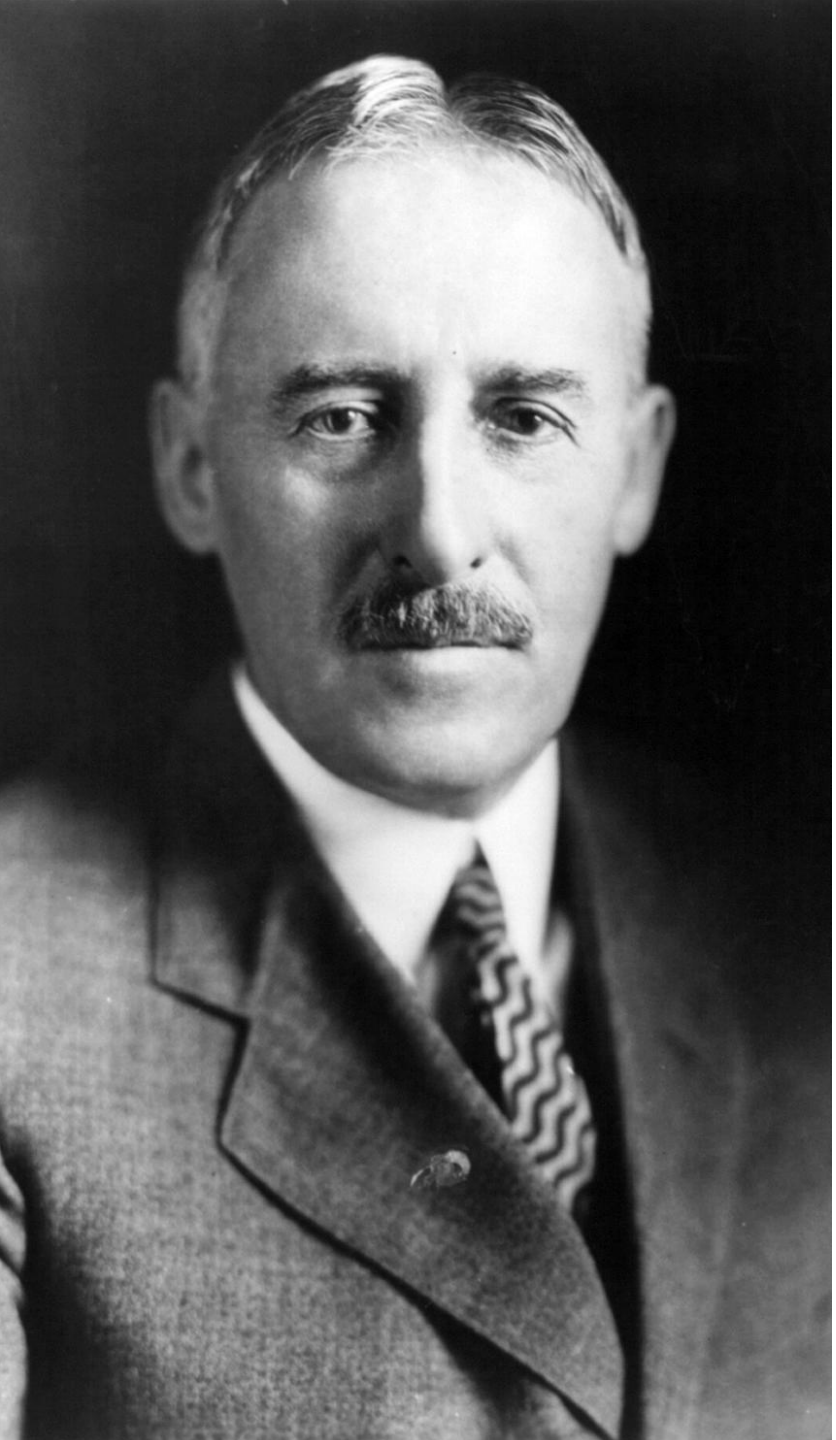
"…The whole idea seemed nonsensical to Secretary of War Henry L. Stimson. The War Department had just opened a new building the previous month in Foggy Bottom, but it had quickly proven inadequate and too small. How could the War Department propose to build a new headquarters so soon?…"

***The Washington Post,* May 2007**

<u>Above</u>: East entrance to the *Harry S. Truman Building* (present day headquarters of the *U.S. Department of State*) at *Foggy Bottom, District of Columbia*


DEPARTMENT
OF
STATE

On Practical and Simple Lines



…"At age 73, the secretary of war was the elder statesman of Roosevelt's Cabinet, and was known for his dignity, wisdom and Yankee reserve. Stimson was, in the words of an officer on the War Department staff, 'like the Rock of Ages.' But he also was imbued with a deep streak of Old Testament temper. Under Secretary of War Robert P. Patterson had telephoned Stimson early the morning of Tuesday, July 22, to inform him about the building Somervell had dreamed up. Patterson, who along with Marshall had given Somervell his approval the day before, arrived at the secretary's headquarters in the Munitions Building, accompanied by Somervell, Brig. Gen. Eugene Reybold and Bergstrom. As they presented their case, the dubious Stimson found himself slowly drawn to the logic. The secretary examined the plans for the building, which struck him as being 'on practical and simple lines.' How long would it take to finish? Stimson asked. One year, Somervell promised. The efficiency of the War Department would improve 25 to 40 percent by having everyone under one roof, Stimson was told. Finally, the secretary conferred his blessing. Sound it out with the House Appropriations Committee, and see what they think, Stimson told his visitors…"

***The Washington Post,* May 2007**

Left: *Henry Louis Stimson*

"…At a hearing that afternoon before Woodrum's sub-committee, the congressman invited Somervell to speak. Exuding confidence, Somervell presented his plan. The building would now be three stories high, instead of four, to better harmonize with its surroundings by Memorial Bridge. The cost would be $35 million, and that covered everything except parking lots for 10,000 cars. 'This thing would not come to pieces very easily, would it?' asked Rep. John Taber, a New York Republican. 'It certainly should not,' Somervell assured him. 'It should not ever come to pieces.' Somervell promised to begin construction in two weeks and finish in a year. As for the huge size, it was no time for restraint, the general told the congressmen. Somervell had sold them; the subcommittee unanimously approved funding for the new building, sending the recommendation to the full committee…"

***The Washington Post,* May 2007**

"It has now reached the stage where the Appropriations Committee has heard of it, and Stimson wants you to know that he is not the author, but that the plan has a lot of merit"

Maj. Gen. *Edwin M. Watson* – President Roosevelt's military aide

RE: on July 24th 1941, Secretary of War Stimson decided it was time to tell the POTUS of the plans that were afoot thus, he approached FDR's military aide – "Pa" Watson



"…Somervell's proposal was reaching the president at an opportune time, as Roosevelt had concluded that the United States probably could not avoid war with Nazi Germany. Earlier that month, the president had agreed to take over the defense of Iceland from Britain. When the proposal was raised during the Cabinet meeting July 24, Roosevelt breezily approved the building…."

***The Washington Post,* May 2007**

Above: on October 31st 1941 the *USS Reuben James* was torpedoed by German submarine *U-552* near *Iceland*. The *Reuben James* had positioned herself in harm's way, between an ammunition ship in a British convoy and the known position of a U-boat "wolfpack." Of the 159-man crew, only 44 survived. An undeclared war between *Germany* and the *United States* had existed from the time FDR authorized the use of American naval vessels to escort *Lend-Lease* convoys bound for *Great Britain*. The Reuben James was the first US naval casualty of this undeclared war.



...pe it is indeed disgraceful.

...e Boston Post

SATURDAY, NOVEMBER 1 1941 **

2 CENTS

RESCUE 44 MEN OF SUNKEN DESTROYER

No Word Yet of 70 More of Crew and Seven Officers on U. S. S. Reuben James When Torpedoed Off Iceland---Believe Others Saved but Ships of Convoy Dare Not Use Their Radios---Sad Scenes as Families Await News

HITS CURLEY AS NO FRIEND OF THE POOR

Mansfield Says He Cut Welfare Aid When Mayor

Post's Mayoralty Poll to Appear Tomorrow

THE U. S. S. REUBEN JAMES

Warship Had Met Subs Before and May Have Bagged Some, Crew Member Declares

No Change in Policy, President Says, as Congress Leaders Demand ...

"…In exactly one week, Somervell had proposed constructing a building of unprecedented size and scale, produced preliminary plans, won the strong support of the War Department leadership, sold it to key congressional leaders, and received a green light from the president of the United States. Nothing, it seemed, could stop him…"

***The Washington Post,* May 2007**

RE: Bergstrom, along with War Department architect *David J. Witmer,* developed plans for a unique reinforced concrete building that would consist of five concentric pentagons separated by light wells and connected by radiating spoke-like corridors. It would have four stories and include a six-acre interior court, numerous ramps and escalators, a large shopping concourse, taxi stands and bus lanes and parking for 8K cars.

Part 2

Barbarians at the Gates

Not in My Backyard



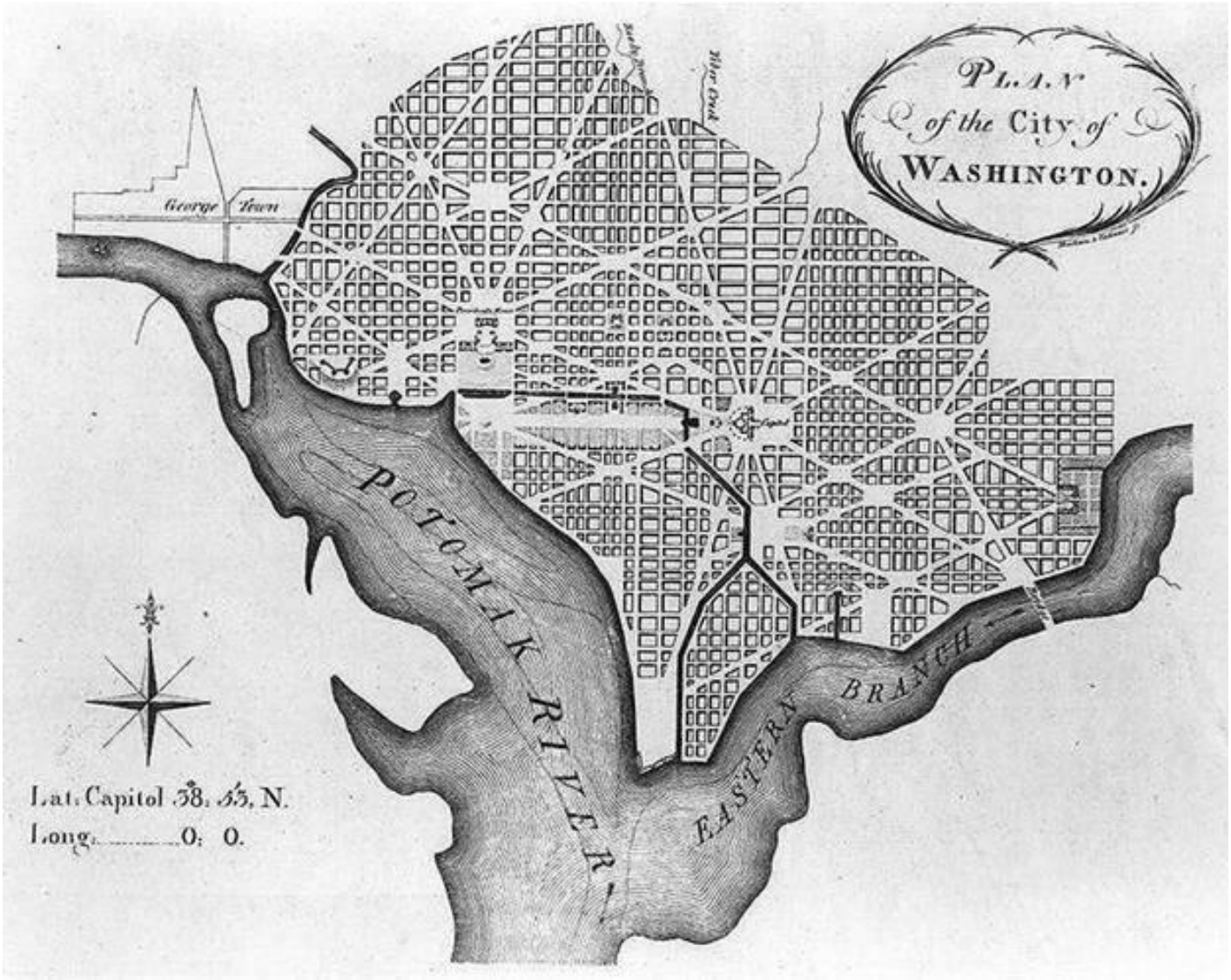
"…In July 1941, Pierre L'Enfant was surely rolling over in his grave. Gilmore D. Clarke, chairman of the U.S. Commission of Fine Arts, was certain of that. L'Enfant, the designer of Washington, was buried in a majestic site at Arlington National Cemetery overlooking the Potomac. It suddenly seemed that L'Enfant's view would be destroyed by the enormous new War Department headquarters Somervell was planning for just a few hundred yards below the major's tomb. Clarke was dumbfounded…"

***The Washington Post,* May 2007**



"It is proposed to place this 'city' at the very portals of the Arlington National Cemetery, thus resulting in the introduction of 35 acres of ugly, flat roofs into the very foreground of the most majestic view of the National Capital that obtains…from a point near the Tomb of Major L'Enfant, the architect of Washington"

Gilmore D. Clarke,* Chairman - *U.S. Commission of Fine Arts


PLAN
of the City of
WASHINGTON.
George Town
POTOMAK RIVER
EASTERN BRANCH
Lat. Capitol 38. 53. N.
Long. ..... 0. 0.

"…The Commission of Fine Arts was the keeper of L'Enfant's flame. Created by Congress in 1910, the commission carried no legal authority to block projects, but Congress generally followed the recommendations of the distinguished panel of architects, sculptors and landscape architects. Clarke, a New York native, had a reputation as one of the nation's finest landscape architects and had helped design some of the country's first parkways. He was not a building architect, but that did not stop him from passing judgment on those who were. Clarke was accustomed to getting respect. But Somervell had not bothered to notify the commission about the massive new War Department building. When Clarke finally got word of what was afoot, the project had already been approved by the House of Representatives. Clarke was livid…"

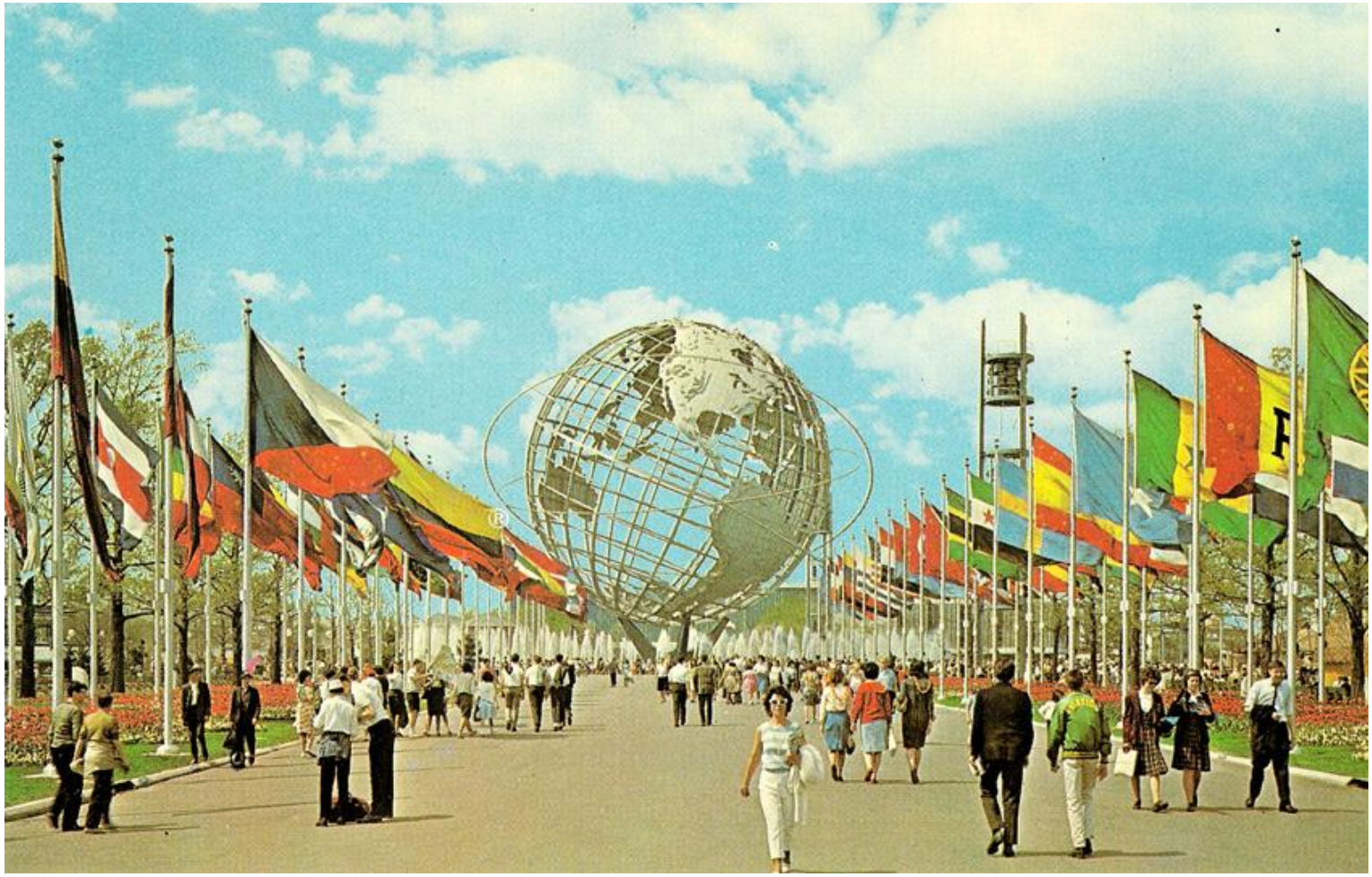
***The Washington Post,* May 2007**



"It is inconceivable that this outrage could be perpetrated in this period of the history of the development of this City, a city held in the highest esteem by every citizen who visits it"

Gilmore D. Clarke, **Chairman -** ***U.S. Commission of Fine Arts***

RE: excerpt from a letter to the U.S. Senate. Clarke (left) is best remembered for having designed *UNISPHERE* – the theme center of the *1964/65 New York World's Fair.*



Uncle Fred



"…Somervell had also ignored the National Capital Park and Planning Commission, assuring Congress that there was no need to consult the commission about the project. Not everyone agreed, including the planning commission chairman, Frederic A. Delano, or, as President Roosevelt called him, 'Uncle Fred.' Delano, younger brother of Roosevelt's mother, Sara, was a pioneer in the field of city planning and was a leading force in resurrecting L'Enfant's plan and clearing out the Mall. Delano pushed Congress to bring order to the capital's development by creating the National Capital Park and Planning Commission, and, Somervell's assurances aside, the law creating the commission clearly gave it oversight over the proposed building in Arlington…"

***The Washington Post,* May 2007**

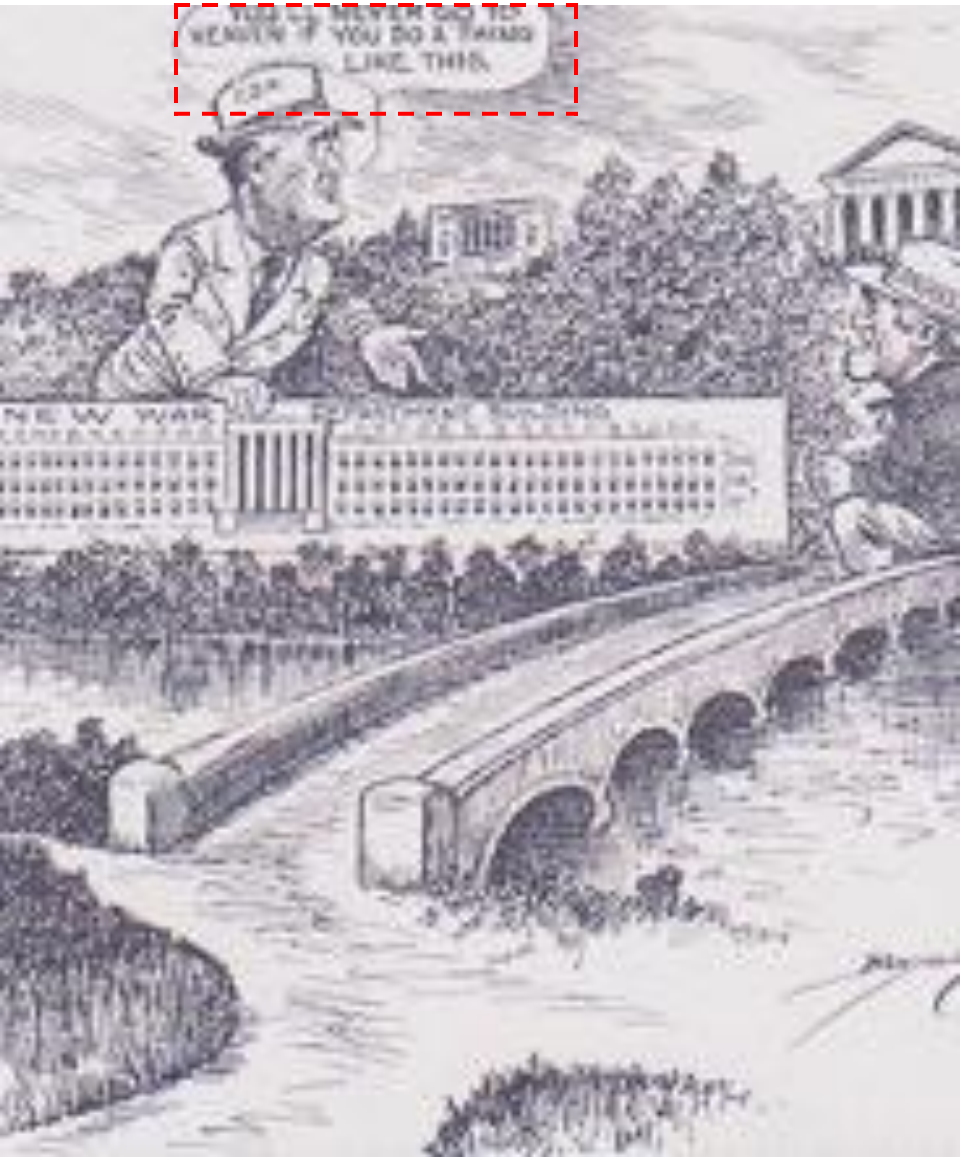
Left: *Frederic A. Delano* (1863-1953)

"…Delano had many concerns about the building, particularly potential transportation problems. At 3 p.m. on Wednesday, July 30, Delano walked into the Oval Office for a meeting with his nephew. He was accompanied by Harold D. Smith, director of the president's budget office. With calm gray eyes behind his rimless spectacles, Smith had the look and sensibilities of a Midwestern justice of the peace. His opinions were held in high regard by Roosevelt. The visitors had a very direct message: 'It was a great pity to construct this building,' the president was told…"

***The Washington Post,* May 2007**

"…Roosevelt had returned the previous day from a five-day visit to Hyde Park, where he had decamped after approving the new building at the Cabinet meeting July 24. Now, faced with his uncle's protests, the president admitted that perhaps he had been a bit hasty. Smith's concerns about the building were not aesthetic. He just could not understand why a huge, permanent building was needed when the growth of the War Department was supposed to be a temporary response to the emergency. Delano and Smith told the president that moving 40,000 people back and forth across the Potomac River between Washington and Virginia every day would create 'terrific' traffic problems and overwhelm the capacity of the bridges. By the end of the meeting, the president had decided that Somervell's building would be cut back considerably in size…"

***The Washington Post,* May 2007**



"When this project was first brought to my attention, I agreed that it should be explored. Since then I have had an opportunity to look into the matter personally and have some reservations which I would like to impart to your committee."

POTUS FDR

RE: excerpt from an August 3rd 1941 letter to *Colorado* Senator *Alva B. Adams*, chairman of the Senate Appropriations Subcommittee that was to consider the new War Department building. Drafted by *Harold D. Smith*, the letter expressed FDR's concerns about whether the site's transportation network could accommodate such a large building with so many employees. FDR urged the Senate to approve a smaller building limited to 20K employees, with additional space provided as the need arose.

<u>Left</u>: caption: "You'll never go to heaven if you do a thing like this"

Hell’s Bottom

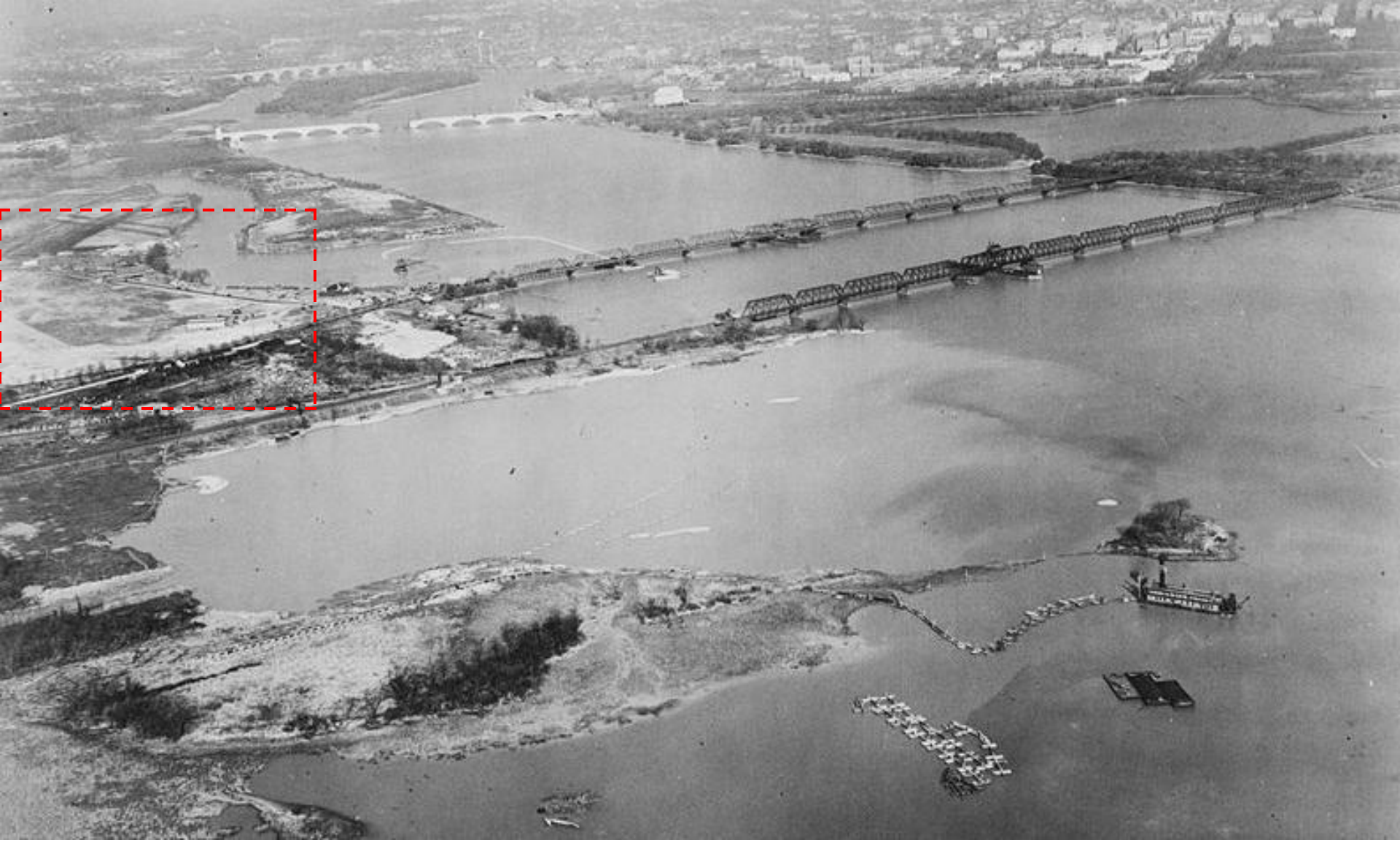
"…Congress remained in session, and the debate over the new War Department building erupted into a full-fledged controversy. Somervell confidently moved forward to construct the building on his own terms, making no adjustments to shrink it. Yet there was no denying that Somervell had suffered quite a reversal. A consensus was settling in some quarters that the new War Department simply could not be built at the foot of Arlington Cemetery, desecrating the view from L'Enfant's tomb. Clarke, the leading opponent, endorsed a proposal to use another plot of land, this one immediately south of the Arlington experimental farm and adjacent to Washington-Hoover Airport. The Army had just broken ground for a quartermaster depot on the site. There would be no aesthetic concerns about building on this low-lying, ignoble tract of land. But Somervell refused to bend, heaping scorn on the quartermaster depot site, set in a picaresque neighborhood known as Hell's Bottom…"

***The Washington Post,* May 2007**



Above: caption: "A 1932 photo of the 14th Street Bridge over the Potomac River, looking from Virginia towards the District of Columbia. At the bottom left of the photo is Hoover Field, a major airport serving the city of Washington, D.C. The road (bottom, curving right) is Military Road. At the bottom right is the northern end of Washington Airport, another major airport serving the city."

Left: location map showing ***Hell's Bottom*** and ***Washington-Hoover Airport***



Above: caption: "Looking NW along the Potomac River in 1938. Washington, D.C., is to the right, and Arlington County, VA, is to the left. The point of land jutting into the river at the bottom of the image is Gravelly Point. In September 1938, Pres. Roosevelt chose Gravelly Point as the location for a new airport, Washington National. Soil dredged from the bottom of the river would enlarge the Point so the airport could be built there. To the center-left of the image, just where the bridge lands on the VA side, are the runways of Washington-Hoover Airport.



"The Chairman of the Fine Arts Commission thinks it is all right to put the War Department down among a lot of shanties, brickyards, dumps, factories and things of that kind."

Brig. Gen. *Brehon Burke Somervell*

<u>Left</u>: shanty in Hell's Bottom (ca. 1916)

"To my mind, there is not any evidence that we shall need such a tremendous building, the largest office building that has ever been built in the entire world…"

Senator *Robert A. Taft*

RE: on August 14th 1941, opponents of the new War Department building fought to derail the project on the floor of the Senate. Leading the attack was Senator Taft of *Ohio* who proposed an amendment to cut the $35 million appropriation in half (it was defeated in a 29 to 21 vote). The bill authorizing construction finally passed with the building sited right where Somervell wanted it to be. The matter seemed to be settled.

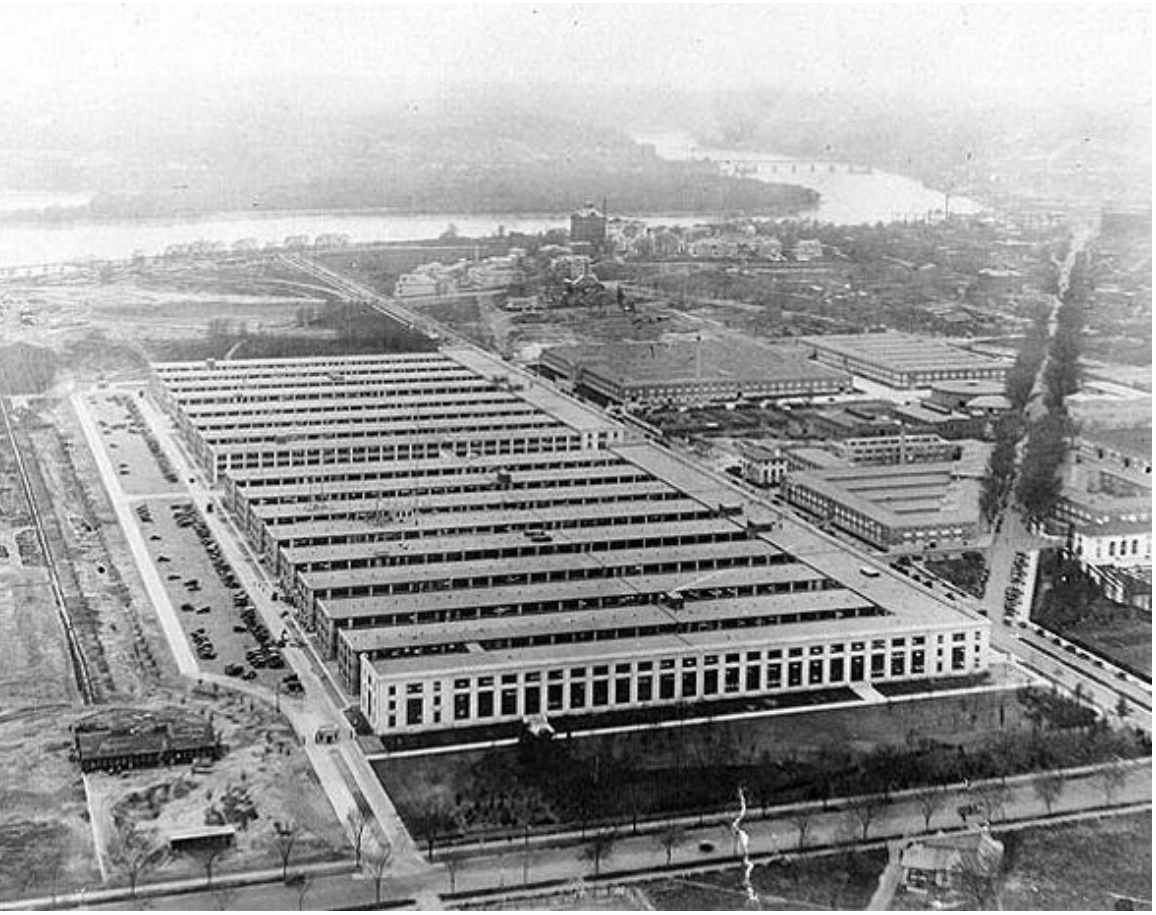
The Rape of Washington

"…Franklin D. Roosevelt arrived back at the White House on Sunday morning, August 17, in good cheer, but he was quickly brought back to earth by awaiting problems. His secretary of the Interior, Harold L. Ickes, was in outright revolt against the War Department project and had written the president 'a very vigorous letter…begging him not to permit this rape of Washington.' A telegram also arrived Sunday from Frederic Delano, traveling out West, telling the president he was 'greatly concerned' by what had transpired. In a follow-up letter sent the same day, Delano urged his nephew to ask Congress to reconsider. The newspapers were also pleading with Roosevelt to act. Unhappy that the Senate had ignored his recommendation that the building's size be halved, the president was chagrined that he had agreed to the Arlington Farm site in the first place…"

***The Washington Post,* May 2007**

"…Roosevelt, who prided himself on his aesthetic sense, already felt a lingering guilt for his leading role in a previous desecration of Washington. As assistant secretary of the Navy when America declared war on Germany in 1917, Roosevelt had persuaded President Woodrow Wilson to allow the construction of large temporary buildings on the Mall along Constitution Avenue to house the Navy and Army, then in desperate need of office space. Nearly a quarter-century after they were built, the barracks-like Navy and Munitions buildings were still there…"

***The Washington Post,* May 2007**



"My present inclination is not to accept that action by Congress. And here it is - under the name of emergency, it is proposed to put up a permanent building, which will deliberately and definitely, for 100 years to come, spoil the plan of the national capital…I have had a part in spoiling the national parks and the beautiful waterfront of the District once, and I don't want to do it again."

POTUS FDR

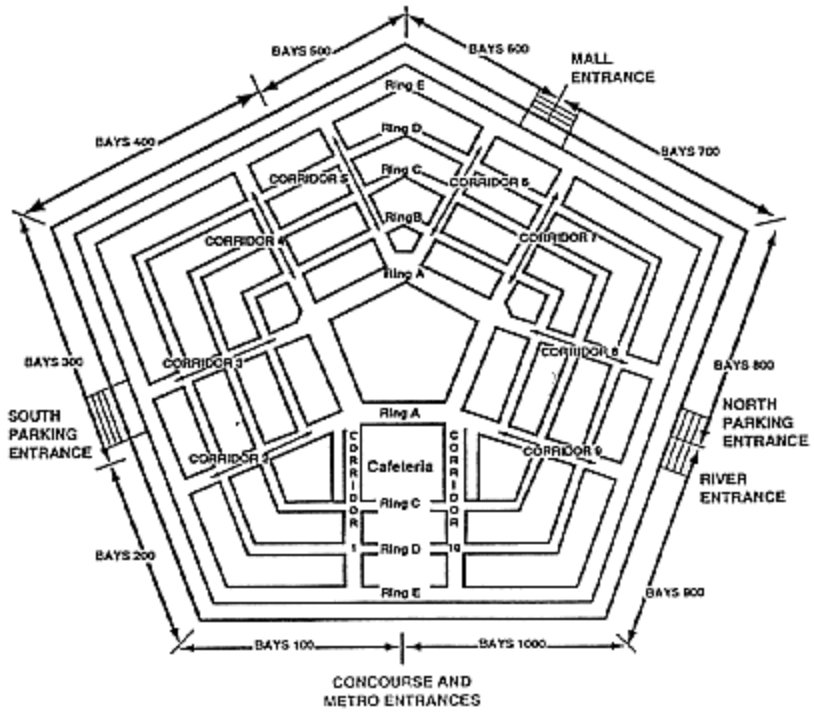
RE: excerpt from an August 19th 1941 press conference

Left: caption: "Main Navy Building (foreground) and the Munitions Building were temporary structures built during WWI on the National Mall."

Best Solution

"…The following afternoon, reporters were brought into the Oval Office for a second press conference. The 'best solution,' Roosevelt announced, would be to put the bulk of the building on the quartermaster site, with a small portion jutting onto the adjacent Arlington Farm land. The bill passed by Congress did not specify where on the Arlington Farm site the new building was to be placed. As long as any part of the project was on Arlington Farm land, the president reasoned, it would technically adhere to the act of Congress. 'So that makes it entirely within the bill,' the president declared. Inspecting Hell's Bottom several days later with Somervell and Clarke, the president looked over the tawdry neighborhood and pronounced the site 'excellent.'…"

***The Washington Post,* May 2007**



FLOOR

Proceed to floor by ramp, stair or escalator

RING

Take the main corridor (A Ring) to each numbered corridor

CORRIDOR

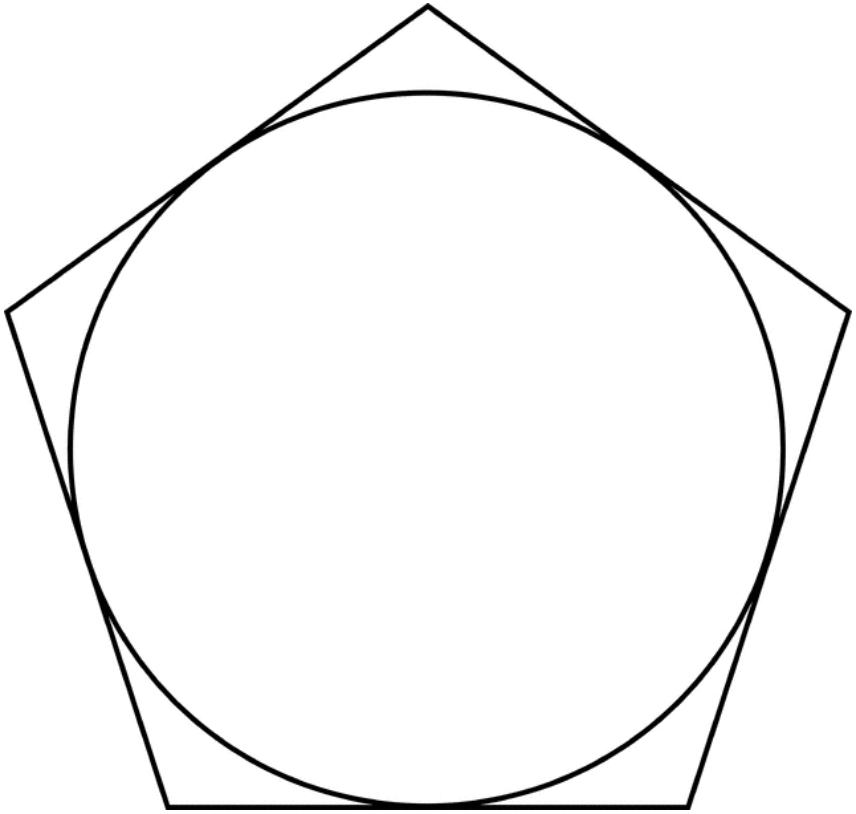
Proceed along the numbered corridors (1 thru 10) to a specific ring (B thru E)

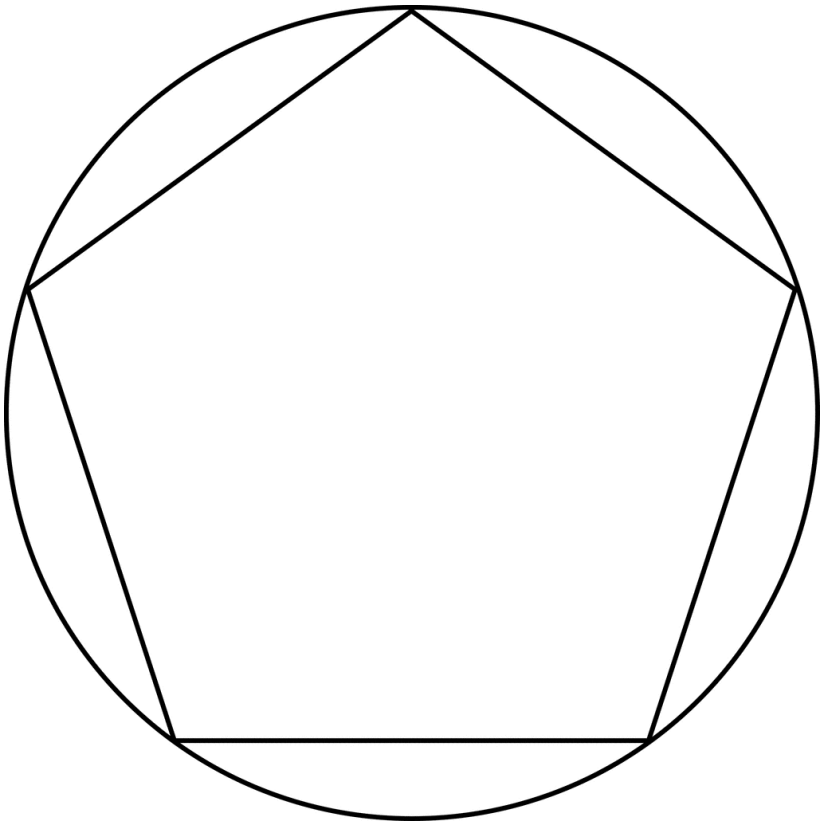
BAY

Enter ring to the left for rooms/bays numbering below 50 and to the right for rooms/bays above 50

"…The original rationale for Bergstrom's pentagonal design was gone. The building no longer would be constructed on the five-sided Arlington Farm site. Yet the chief architect and his team continued with plans for a pentagon at the new location. There was no time to change them. Besides, the pentagon design still worked. Like a circle, a pentagon would create shorter walking distances within the building - 30 to 50 percent less than in a rectangle, architects calculated - but its lines and walls would be straight and, therefore, much easier to build. The move from the odd-shaped Arlington Farm site freed the architects from the need to make the building asymmetrical. The advantages gained - a smoother pedestrian flow, better space arrangement, and easier distribution of utilities around the building – 'proved startling,' the architects concluded…"

***The Washington Post,* May 2007**





"…Planning this architect's dream called for the aid of geometry. In theory a perfect circle would be ideal for access to all offices. More practical structurally, a ring of straight sections would approach a circle closely enough…"

***Popular Science,* February 1943**



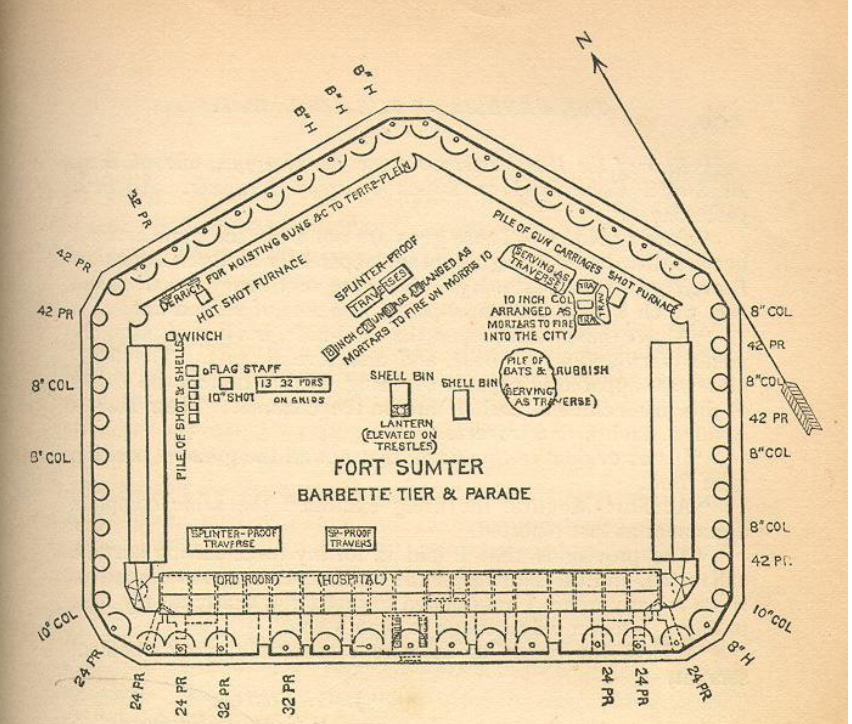


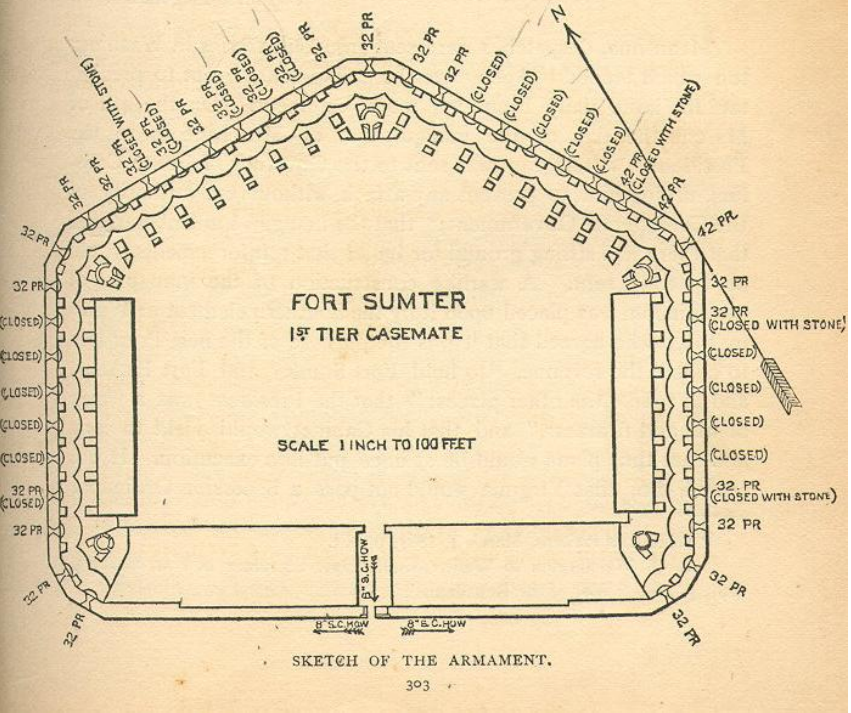
"…The Pentagon shape was dictated by economical and functional reasons. If the building had been made circular, construction would have been more costly. The Pentagon shape permitted rectangular construction of the sections…The architects ruled out plans for one long building because offices in the far ends would have been nearly a mile apart. As it is, no two offices are more than half a mile apart on the same floor…"

***Popular Mechanics,* March 1943**

<u>Above</u>: the Pentagon from the south parking lot

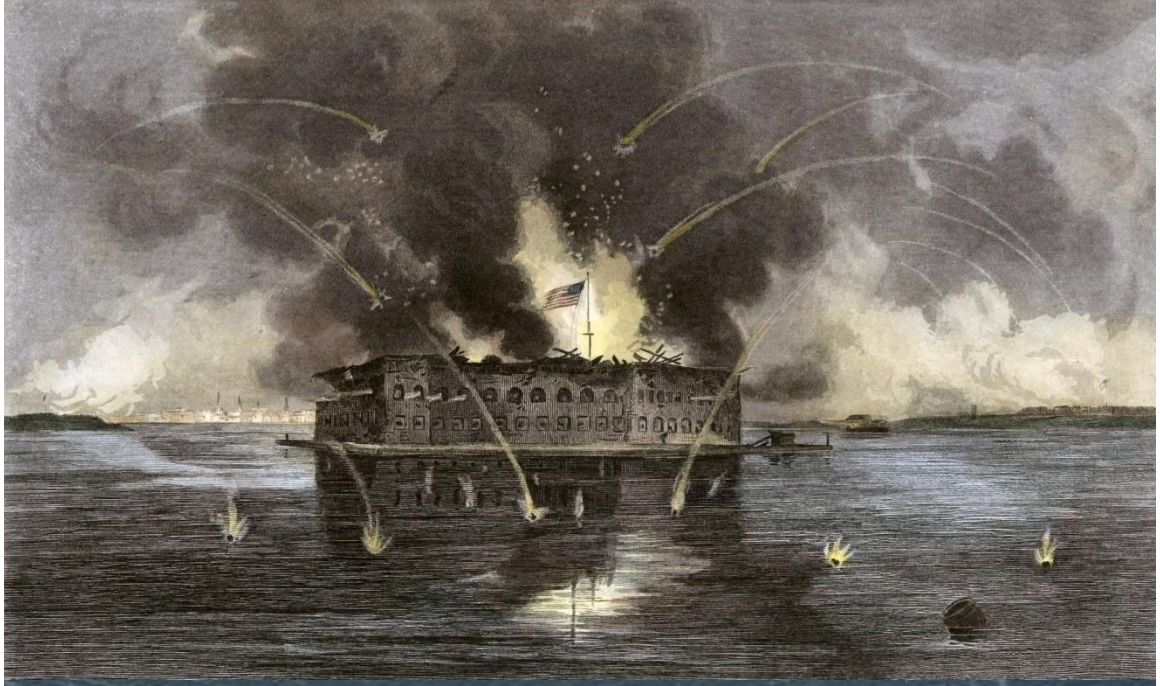
<u>Left</u>: view showing one of the five sides of the Pentagon during construction





"…The symmetrical design also dramatically improved the look of the building. Seen from above, the concentric rings of pentagons, if not beautiful, were at least pleasing to the eye. Something else about a pentagon appealed to Somervell and other Army officers. The five-sided shape was reminiscent of a 17th-century fortress or a Civil War battlement; indeed, the first shot of that war, a mortar shell that burst with a glare at 4:30 in the morning of April 12, 1861, illuminated the dark, five-sided shape of Fort Sumter…"

***The Washington Post*, May 2007**

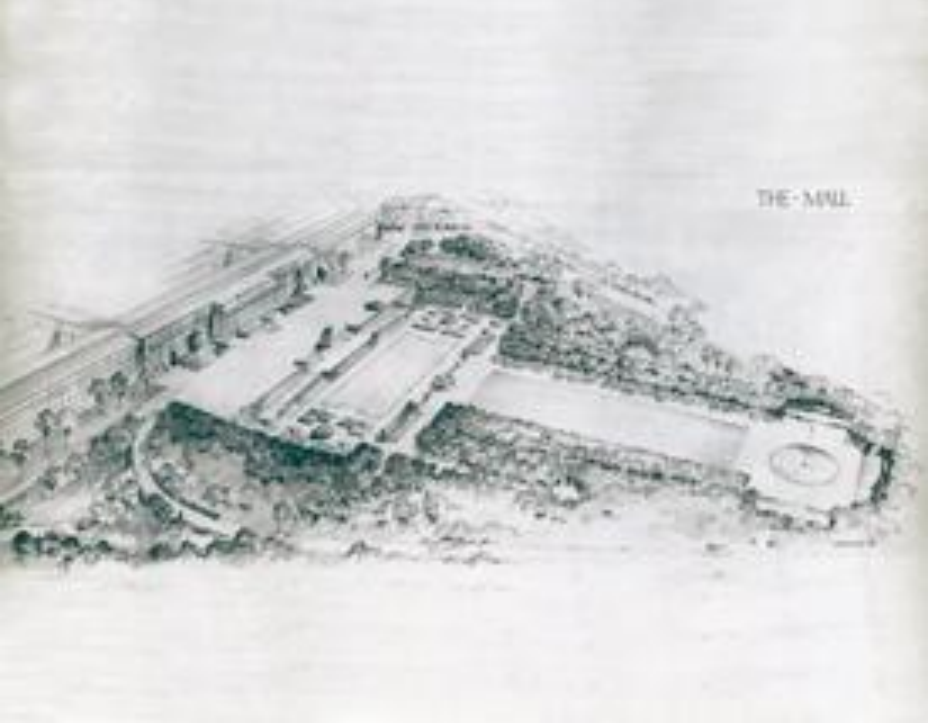




"…Roosevelt made the first foray at changing the design. His vision was for a solid, square building running a fifth of a mile in each direction; the only windows, if any, would be on the exterior. By his own admission, the idea was 'a trial balloon,' but the president was excited about the futuristic possibilities. Somervell and Bergstrom did their best to dampen the president's enthusiasm, and even Clarke, despite his dislike of the five-sided shape, spoke against the idea. 'Well, Mr. President…somebody might throw a monkey wrench into the air-conditioning, and maybe they wouldn't all get out before they suffocated,' Clarke told Roosevelt. 'You know, I never thought of that,' Roosevelt mused…"

***The Washington Post,* May 2007**

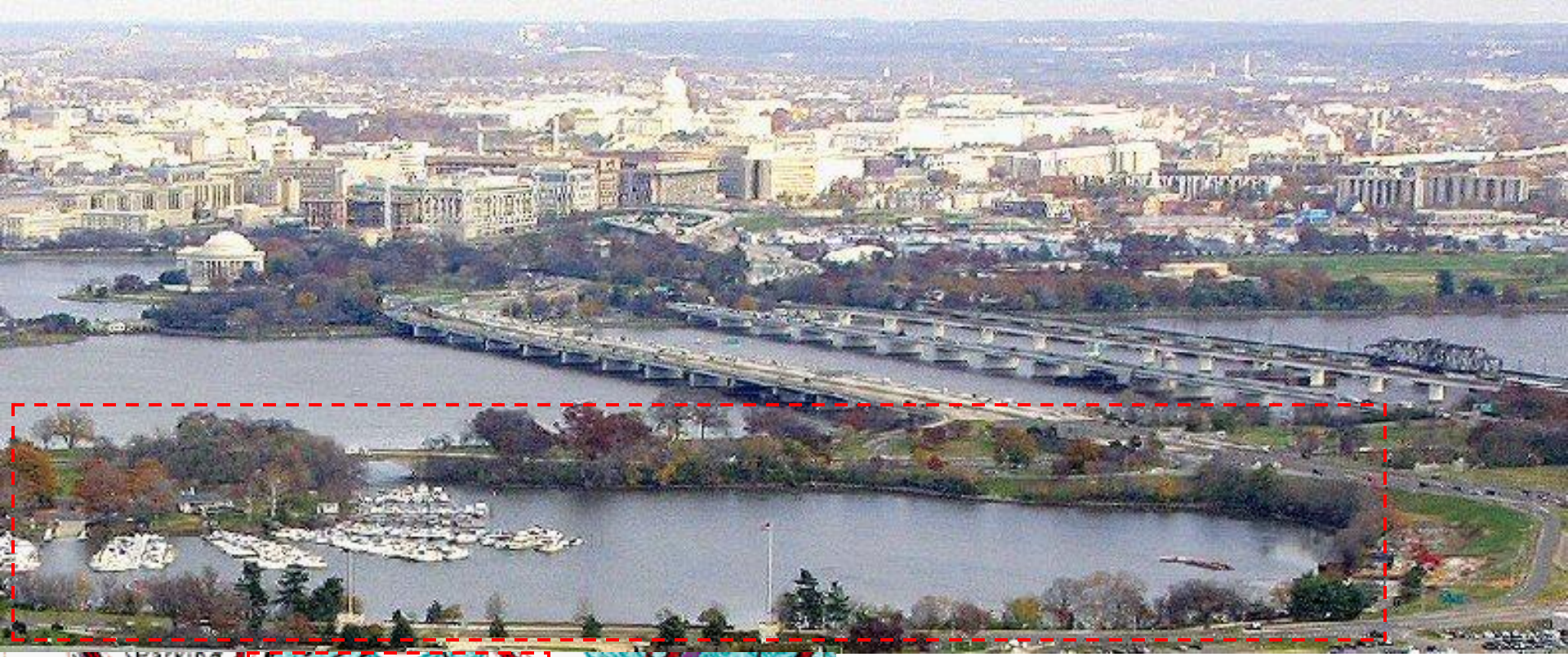




There are large ceremonial terraces in front of the Pentagon's Mall and River Entrances. The *River Entrance* terrace extends 900-feet to the *Pentagon Lagoon* bounded by a ceremonial landing dock and two monumental stairways. The maximum width of the *River Terrace* is 450-feet. The terrace in front of the Mall Entrance is smaller, measuring 600-feet by 125-feet.

<u>Top</u>: caption: "This sketch is a rendering of the proposed Pentagon's River Entrance, drawn by Ray Kennedy prior to construction of the building itself."

<u>Bottom</u>: caption: "Many ideas regarding the construction and appearance of the Pentagon were proposed prior to settling on the final version which was ultimately built. This drawing shows an example of artistic creativity with the landscaping in this sketch of the proposed Pentagon Mall."



The *Pentagon Lagoon* was created during construction of the building as a result of dredging sand and gravel for concrete and to obtain fill for landscaping. The lagoon is also the location of the water intake for the Pentagon's Heating & Refrigeration Plant. The *Roaches Run Waterfowl Sanctuary* lagoon, created during construction of the *George Washington Parkway* in the early 1930s, is used for the Heating & Refrigeration Plant's water discharge outfall.

"…Complying with Roosevelt's instructions, architect Edwin Bergstrom appeared before the commission on the morning of Tuesday, September 2, for a special hearing to review plans for the new building. Gesturing to the drawings, Bergstrom explained the plans. The commission's re-ception was decidedly cool. 'A pentagonal has never worked out well and great confusion is apt to result in the circulation of the building,' said commission member William H. Lamb, a partner in the architectural firm that designed the Empire State Building. A rectangular building would be preferable, Lamb said. His suggestion was endorsed by a most formidable commission member, Paul Philippe Cret, the internationally renowned French-born practitioner of the beaux-arts style and one of America's most distinguished architects. In such a huge building, a pentagonal design would confound visitors, Cret said. 'If one gets into the wrong corridor, he is lost,' he said. He and Lamb also wanted Bergstrom to rework plans for the facade and 'do away with the monotonous appearance.'…"

***The Washington Post,* May 2007**



HOW TO FIND A ROOM IN THE PENTAGON:

Each floor's layout has five pentagonal concentric rings which are connected by ten spoke-like corridors.

Room numbers are comprised of the following information:

The first number or letter indicates the floor on which the room is located; B = Basement, M = Mezzanine, 1-5 = floors.

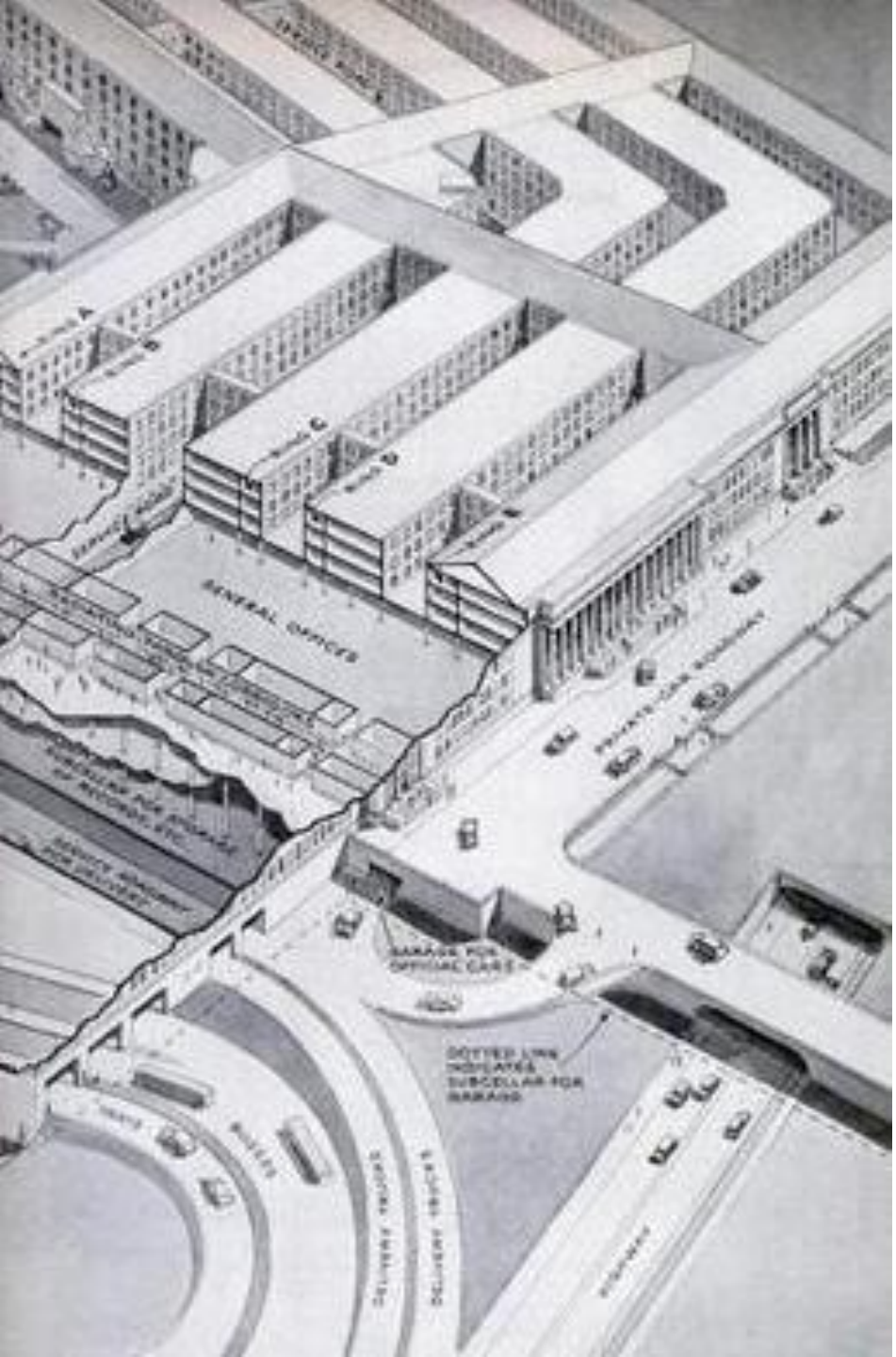
The next letter is the ring on which the room is located. Rings are designated; A,B,C,D, and E for the Mezzanine and floors 1-5 plus the additional rings F and G in the basement only.

The next digit or the next two digits indicates the corridor on which the room is located. Corridors are designated 1, 2, 3, 4, 5, 6, 7, 8, 9 and 10.

The last two digits indicate the specific bay or room number assigned to an office.

EXAMPLE: to locate room 3D126:

1. Go to the third floor, A ring
2. Proceed along the A Ring to the 1st corridor
3. Go down the 1st corridor to the D ring
4. Turn left and proceed to room or bay number 26



"…The numbering system of the offices affords an understanding of the floor plans. To begin with, you must get a general picture of the Pentagon as a five-sided, five-story structure enclosing five concentric 'rings' of connected buildings. Ten 'radial' corridors, like spokes of a wheel, lead to the outside walls from the center court. Five 'ring' corridors spread out from the center, increasing in length toward the perimeter. The inner, or main ring, is numbered A and the others B, C, D and E, respectively. Branching from the rings are 'bays.' The number of an office must reveal floor, corridor, ring and bay. Thus, office 2E257 means second floor, E ring, second corridor and bay 57…"

***Popular Mechanics,* March 1943**

Color Coded Architecture



"…Walls of the five floors are painted different colors so that one may ascertain location with ease. The ground floor is brown (the earth), the second floor green (grass), the third, fourth and fifth are officially and respectively, red, white and blue. The designers, however, softened the white to gray to soften the glare. Doors in the concourse which open on ramps leading to various floors are painted in five colors. The green doors open on a ramp leading to the second floor; the red doors guide workers to the third floor ramp…"

***Popular Mechanics,* March 1943**

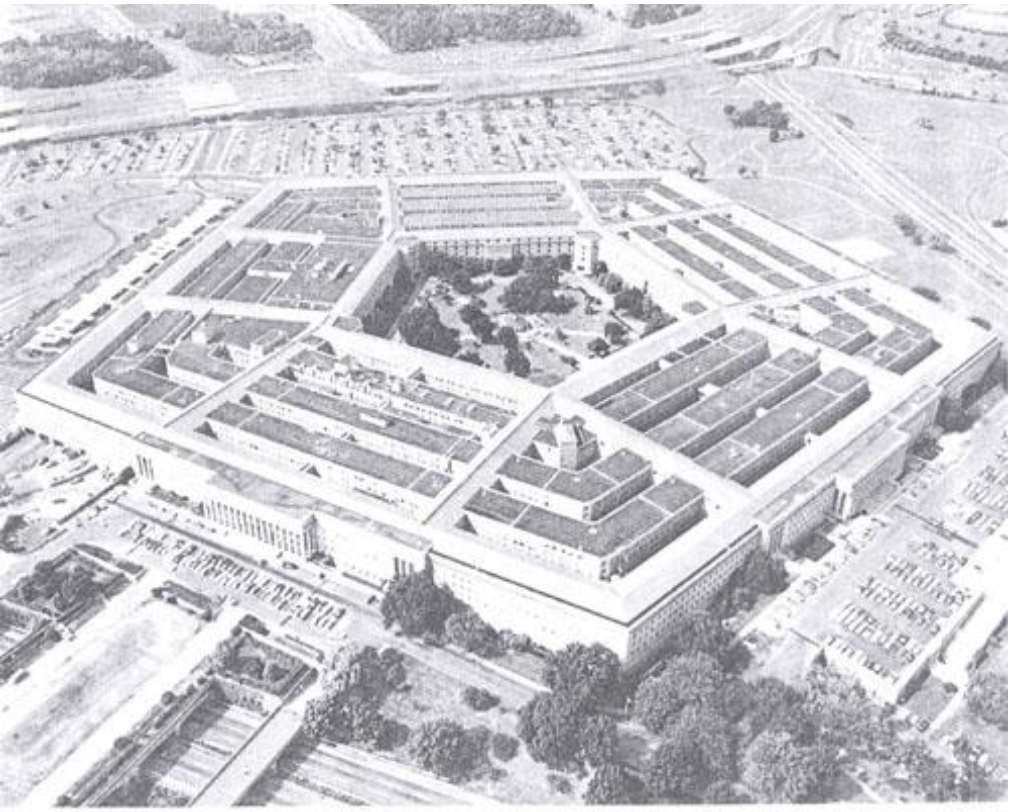
Left: caption: "Ramps lead from the Concourse to various floors. Guards posted at the doorways to the ramps check military passes and civilian's badges. Brief cases, packages, and papers are thoroughly inspected."



"…Bergstrom agreed to make revisions but made it clear he was determined to keep the pentagon. After the War Department architects left the meeting, Cret declared that the fine arts commission should appeal to the president. Somervell beat the commissioners to the punch. At 12:15, the general, nattily dressed in a bow tie and a seersucker suit, strolled into the Oval Office, accompanied by Bergstrom, who was carrying a large sheaf of blueprints. Roosevelt, just back from Hyde Park, reviewed the plans carefully. He asked questions and directed a few changes, then approved the design. Everything was 'coming along fine,' Somervell told reporters as he left the Oval Office…"

***The Washington Post,* May 2007**

Never Been Done Before



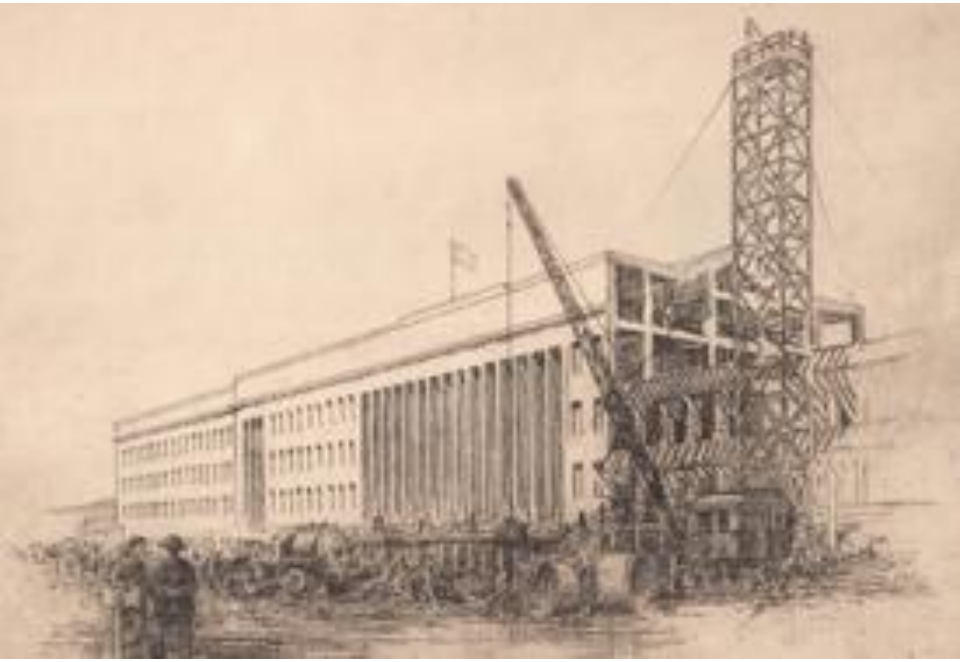
"…At 2:15 p.m., it was the commissioners' turn. Clarke, Cret and Lamb were ushered in to see the president. The mustachioed, dignified old Frenchman presented the case against the pentagonal design, arguing that a rectangle made more sense. Cret also appealed to Roosevelt's sensibilities as commander-in-chief, suggesting that it would be even better to disperse the War Department in several buildings rather than in one single great mass. This pentagon-shaped War Department building, Cret said, would make the biggest bombing target in the world. 'You know, gentlemen, I like that pentagon-shaped building,' Roosevelt said. 'You know why?' 'No,' the commissioners replied resignedly. 'I like it because nothing like it has ever been done that way before.'"

***The Washington Post*, May 2007**

Part 3

Somervell's Folly

A Legendary Proposition



"Few buildings acquire a legendary status before completion. Among them, perhaps foremost, is the giant Pentagon Building - the War Department's new home in Virginia across the Potomac from Washington. From the day the first spadeful of earth was turned, Sept. 11, 1941, the Pentagon has been a 'Legendary' proposition…"

***Popular Mechanics,* March 1943**

<u>Left</u>: artist's rendering of the Pentagon during construction (ca. 1941)

Construction commenced on September 11th 1941 and continued rapidly during the winter of 1941-42. Architects for the project had little or no lead time. Often, construction outpaced planning. On December 1st 1941, when President Roosevelt signed legislation transferring the military construction mission from the *Quartermaster Corps* to the *U.S. Army Corps of Engineers*, 4K men were laboring on the building in three shifts. One section was completed on April 30th 1942 and the first tenants moved in. Originally four floors, a windowless fifth floor was added when the building was half completed. Colonel *Leslie Groves*, who would later head the *Manhattan Project*, was made the project's chief of operations. He worked tirelessly and drove the 15K men working on the Pentagon (in the wake of America's entry into WWII as a result of the *Pearl Harbor* attack on December 7th 1941) relentlessly.



"…In grading the approaches and landscaping the site, some 5,000,000 cubic yards of earth were moved…Preparation of the grounds included removing a slum area and abandoned brick yard, taking over the old Hoover Airport and part of the Arlington Experimental Farm, and creating a lagoon of several acres…"

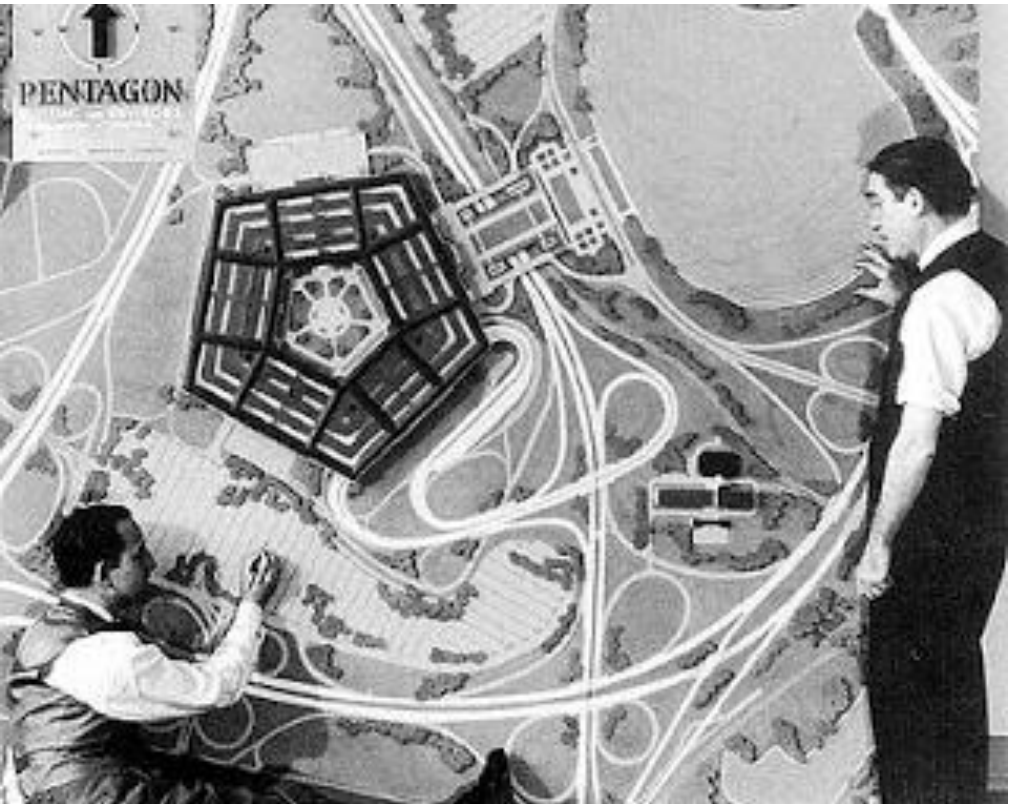
***Popular Mechanics,* March 1943**



"George, I'm speechless. This is the most fantastic operation I have ever witnessed. It's unbelievable."

RE: British Field Marshal *Sir John Dill* to General *George C. Marshall* on viewing construction of the Pentagon

<u>Above</u>: caption: "Northwest exposure of the Pentagon's construct-ion under way; July 1, 1942"



"…The speed of its construction and the vastness of the project, largest office building in the world, captured the imagination of the public. In the early const-ruction days there was the story of a newly hired worker who spent three weeks wandering over the 400-acre site looking for his fore-man…"

***Popular Mechanics,* March 1943**

<u>Left</u>: caption: "Architects working on model of Pentagon in 400-acre site"



General *Leslie R. Groves*, the man in charge of the Pentagon's construction, was not an easy man to work for. He was a notoriously exacting, hard driver who ran through subordinates at an astonishing rate, firing those who didn't perform and replacing them until he found those that did. Major *Robert Furman* of the *U.S. Army Corps of Engineers* was one of the few who actually seemed to thrive under Groves and he soon became Groves' "Number Three." The Pentagon's construction went on non-stop, with three eight-hour shifts that each employed thousands of workmen. Furman was there at all hours, especially during night shifts, checking to make sure the people clocked in were actually working. The ones he caught loafing and getting drunk were fired on the spot. In fact, Furman might well have been responsible for firing *Jack Kerouac*, the future author of *On the Road*, who briefly worked there during construction manning a wheelbarrow.

<u>Above</u>: caption: "Major Robert Furman worked on the construction of the Pentagon and was later part of the Manhattan Project"





"…the five sections were built clock-wise in a record-breaking 14 months under the general supervision of Lt. Col. Clarence Renshaw, Corps of Engineers, and J. Paul Hauck, project manager…"

***Popular Mechanics,* March 1943**

Left: caption: "First floor forms in place ('A')"

Right: caption: "Aerial view of the first two Pentagon 'spokes' under construction"









<u>Top Left</u>: caption: "Among the more random facts about the Pentagon: the building contains an estimated 4,200 clocks - all running, one presumes, on military time"

<u>Top Right</u>: "Workers at shift change (1942). A common union wage was $1.63 an hour (or $65 a week). Drinking, gambling, or loafing on the jobsite were not tolerated. However, most workers greatly appreciated the opportunity to work, after experiencing so many difficult years with the Great Depression."

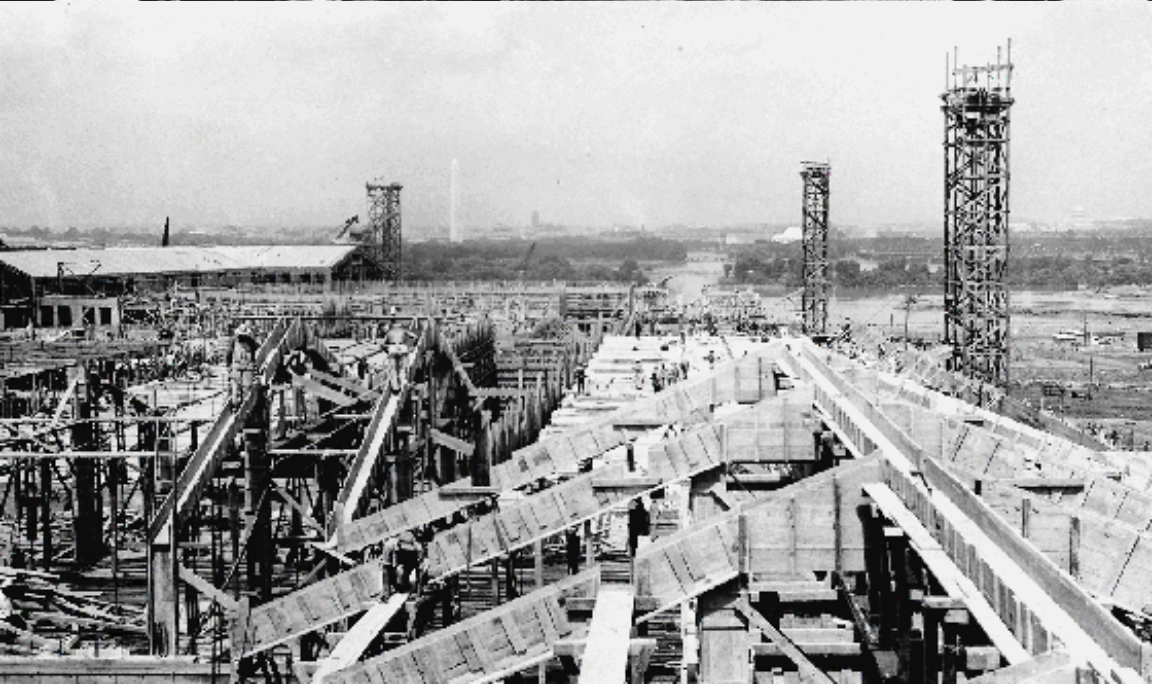
<u>Left</u>: caption: "The Pentagon has 284 rest rooms"

"…The building rests on 40,000 concrete piles, one for every worker in the Pentagon. If these piles were placed end to end they would extend 200 miles…"

***Popular Mechanics,* March 1943**

RE: the Pentagon's designers minimized and/or avoided using critical war materials whenever and wherever possible (enough steel was saved to build a Battleship). They substituted concrete ramps for passenger elevators and used concrete drainpipes rather than metal. Also, they eliminated bronze doors, copper ornaments and metal toilet partitions, and avoided any unnecessary ornamentation. To build the foundation, 5.5 million cubic yards of earth and 41,492 concrete piles were needed. A total of 680K tons of sand and gravel was dredged from the *Potomac River* and processed into concrete for the colossal project. The soil conditions of the Pentagon site, located on the Potomac River floodplain, presented challenges to engineers, as did the varying elevations across the site, which ranged from 10 to 40-feet above sea-level. Two retaining walls were built to compensate for the elevation variations, and cast-in-place piles were used to deal with the poor soil conditions.





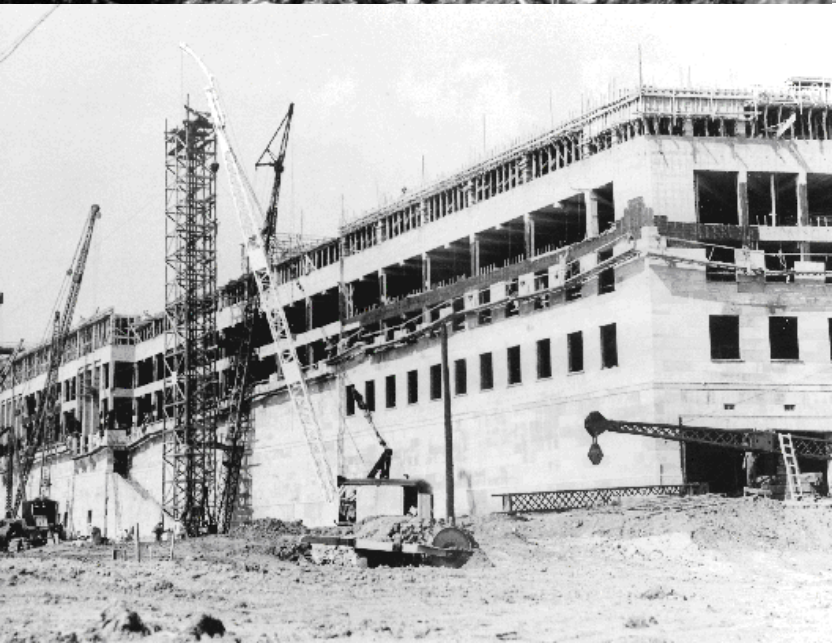
"…By choosing a framework of reinforced concrete, architects and engineers have saved thousands of tons of steel for war needs. They have built a permanent building, they point out, for little more than the cost of a temporary one…"

Popular Science, **February 1943**

<u>Left T&B</u>: concrete foundation and formwork underway for the new War Dept. HQ







Top L&R: caption: "In a May 1943 issue, *LIFE* magazine noted that the exterior of the Pentagon '...has a gray limestone facade, although more than half of the building's substance is sand and gravel dredged from the bottom of the Potomac River…'"

Left: caption: "The Pentagon's facade under construction"









<u>Top Left</u>: caption: "Interior of the Center Courtyard During Construction. July 1, 1942. The wood forms used in casting the concrete walls can be seen. These forms, made from 6"& 8" wide boards, give the walls the texture we see today."

<u>Top Right</u>: caption: "Center of the courtyard, West of the E section. July 1, 1942. Showing E Section, 2nd Floor - Floor Slabs ready to be poured. Note pan construction."

<u>Left</u>: caption: "Taken from the roof of 703 Columbia Pike, Arlington, VA, Southeast of Bldg. July 1, 1942. Showing the intersection of A and E sections. Part of South Parking area in the foreground."



The Pentagon was the largest office building in the country at that time covering 29 acres and housing 17.5 miles of corridors. Design and construction of such a building would normally have taken four years, but the *U.S. Army Corps of Engineers* did it in only sixteen months. At its peak the Pentagon housed nearly 33K workers.

Left: caption: "Architects and draftsmen work on plans for the Pentagon's construction in the partially completed building in 1942."







Top Left: caption: "January 17, 1942. Progress of the construction project"
Top Right: caption: "January 17, 1942. Showing entire building site, D section in foreground, B section in background."
Left: caption: "1942. The building's characteristic shape is readily apparent."





Left: caption: "Perhaps no other single fact about the Pentagon's construction is more amazing than this: when construction began on September 11, 1941, *LIFE* reported, the groundbreaking took place 'only two weeks after the designing of the structure commenced.'"

Right: caption: "Workers would ultimately complete seven floors for the Pentagon: five of them above the ground and two beneath."



Leslie Groves **(left) had accepted the Pentagon assignment on the promise that once it was completed he'd be given a combat command. But the *War Department* was so impressed by his performance managing such a complex and demanding project that they immediately reneged on their promise and handed him an even more difficult and critical task. In fact, it was so secret that they wouldn't provide any details of what it involved until he accepted the assignment and was sworn into office. That was when Groves learned he was in charge of something called the *Manhattan Project*, which involved developing and building an atomic bomb. using thousands of workers and billions of dollars.**



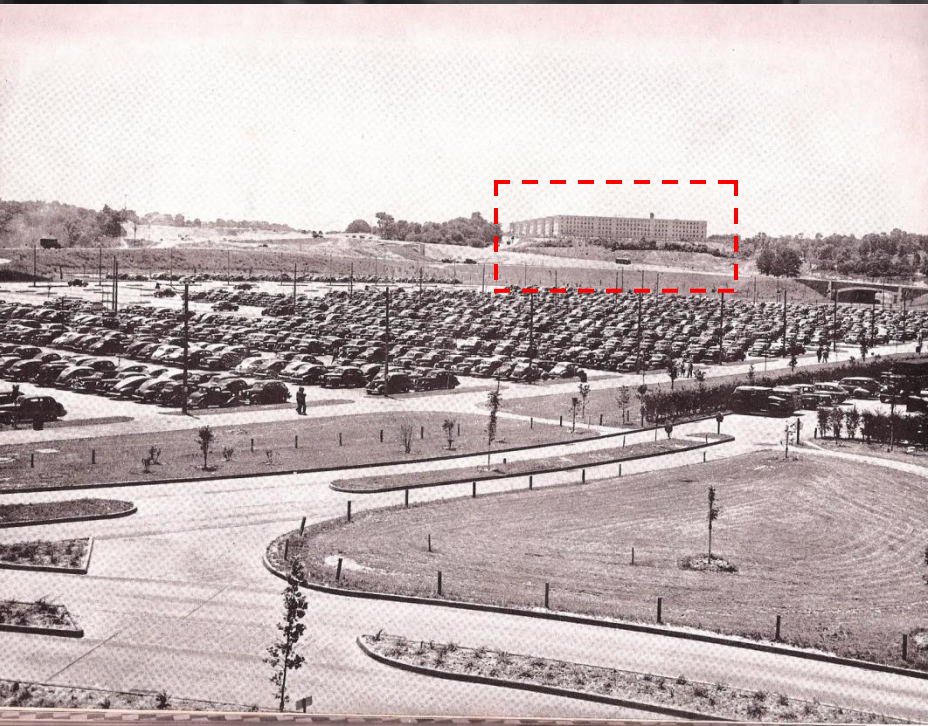


Left: caption: "Standing guard in a still-under-construction corridor. The Pentagon boasts 17.5 miles of hallways."
Right: caption: "An officer chats with a worker by one of the large exhaust fans at the Pentagon, 1942"









The basic shell and roof were finished in one year and the building was dedicated on January 15th 1943. By the time of final completion (February 1943) the building covered twenty-nine acres, had 17.5 miles of corridors and had cost more than $83 million (including infrastructure). During construction it was referred to as "Somervell's Folly." Because of the rapid pace of construction, accidents were endemic and eight workers lost their lives.

Top: caption: "April 1942. Civilian employees reporting for work, through the new War Department Headquarters' South Parking entrance."

Bottom: caption: "The South Parking Area is the larger of the two main parking areas. Into it drive most of the 6,000 cars which arrive at The Pentagon each morning. In the background is the Navy Department's Arlington Annex."


DEPARTMENT OF DEFENSE
PENTAGON
19 43
UNITED STATES OF AMERICA

Part 4

The Reservation

Nerve Center

"You stop at a reception desk and ask to see the Army officer with whom you have an appointment, Casually the operator calls Extension 73,759. 'His office is 2E250,' she tells you. 'Please wait for an escort.' You are glad to have a guide. You are in the largest building in the world, the Army's newly completed Pentagon Building at Arlington, Va. Nerve center of our fighting forces all over the world, it now houses War Department personnel formerly scattered throughout Washington, D.C., in 17 different buildings. The result of this centralization, which effects a tremendous gain in efficiency in the department's job of directing a global war, is a city of 40,000 workers under a single roof…"

***Popular Science,* February 1943**



<u>Above</u>: caption: "Here is this five-sided building, across the Potomac from the city of Washington, the nerve center of our fighting forces – the offices of the War Department. Measuring nearly a mile in circumference, the building still provides easy access from one office to another, and easy access, too, to the capital."





"…Your approach gave you a view of a low-lying building, faced with buff limestone and roofed with dark-green slate – remarkable only for its great length. Actually, you saw only one or two of its five concentric divisions that ring a central court like a medieval fortress. The structure camouflages its sheer immensity. Once inside, you experience something of the sensation of a tourist viewing Niagara Falls for the first time. You walk more than a city block, part of another – and even then you find that you have only reached the six-acre central court…"

***Popular Science,* February 1943**

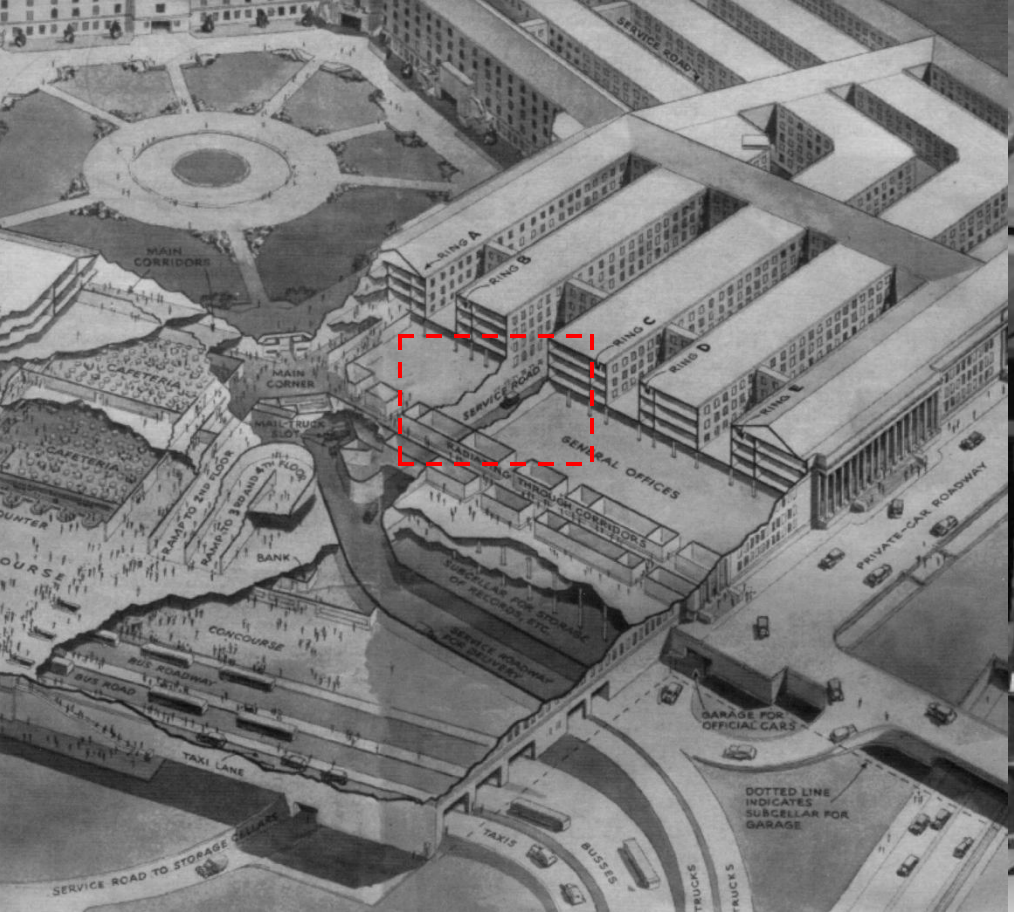




"…Three concentric light courts extend from roof to third floor and a fourth 'court' is a 40-foot-wide service roadway which circles through the building between third and fourth rings. These ring courts are not to be confused with the five acre central court around which the Pentagon is built…"

***Popular Mechanics,* March 1943**

<u>Left</u>: caption: "Workers enjoying the Pentagon's Center Courtyard"





"…The service roadway within the building provides access for delivery trucks or fire protective equipment. Loading platforms along this road are convenient to kitchens, freight elevators, post office and storage rooms…'

***Popular Mechanics,* March 1943**

<u>Left</u>: cut-away section through rings (service road highlighted)

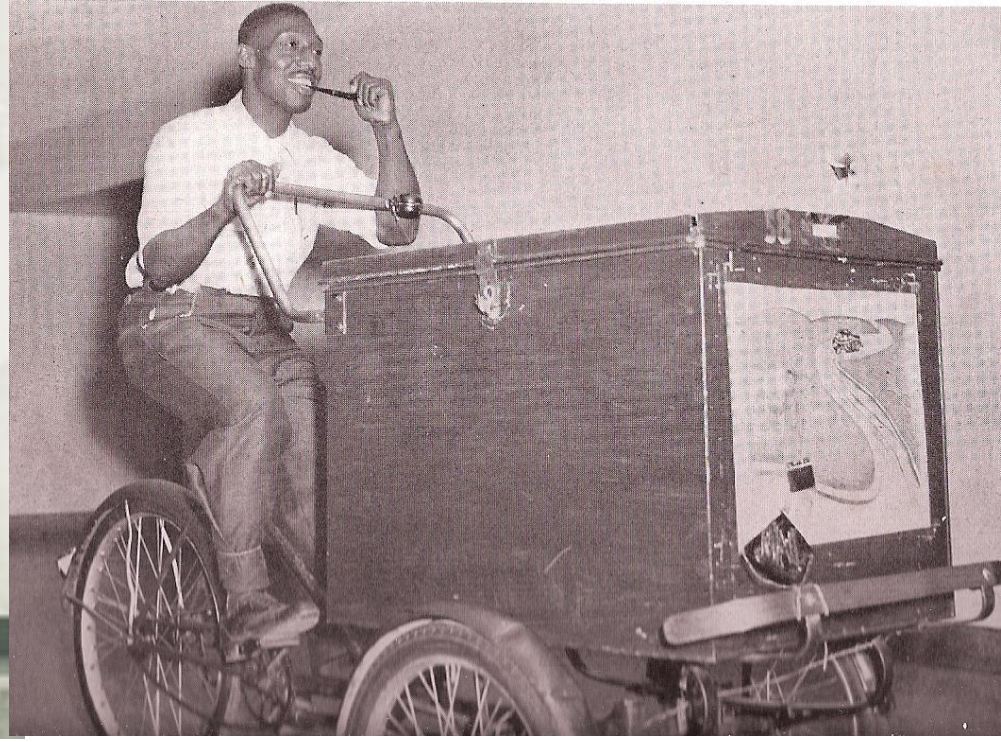
<u>Right</u>: caption: "Paper has long been an important part of the Pentagon culture; the DoD Post Office deals with about 1.2 million pieces of mail monthly"

"…Torrents of humanity swirl through the corridors…At once you are impressed by the absence of confusion. Everyone seems to know exactly where he is going, how to get there – and keeps moving. A maze of passageways that first bewildered you turns out, on further acquaintance, to be a masterpiece of scientific design…From a main corridor bordering the inner court, numbered corridors extend radially to the outer rings. They intersect concentric, lettered passageways in each ring, forming a spider-web pattern. The main, inner corridor becomes a short cut between distant parts of the building. Though the structure measures nearly a mile in perimeter, the maximum walking distance between two offices on the same floor is 1,800 feet, and this is an exceptional figure…"

***Popular Science,* February 1943**


MALL ENTRANCE
RIVER ENTRANCE
ADAMS
Old Gold





"…The most widespread 'legend' is that of the Western Union messenger who got lost in the building and three days later came out a lieutenant colonel. Another story, and this one is true, concerns a captain in the Signal Corps whose duties take him to the far corners of the Pentagon's five floors. One day he strapped a pedometer to his leg after betting a lieutenant that he actually walked more than 10 miles a day. The captain won the bet; the pedometer registered 16 miles at the end of the day…"

***Popular Mechanics,* March 1943**

Left: caption: "Building messengers propel unique bicycle trucks along the Pentagon's wide corridors. Maintenance personnel also used similar vehicles. Only a few pedal powered vehicles survive today, most having been replaced by electric vehicles."

Right: caption: "A messenger pedaling a tricycle loaded with documents and official mail."





"…One interesting section contains the special suites of Secretary of War Stimson and the General Staff. Here are fine offices, dining rooms, kitchen, sleeping quarters and the only passenger elevator in the building…"

***Popular Mechanics,* march 1943**

<u>Left</u>: caption: "Part of the suite for the highest ranking officer at the Pentagon, circa 1942. As *LIFE* wrote in a December issue that year, the Secretary of War 'has a roomy, carpeted office with comfy overstuffed leather chairs. He sits at the handsome desk which has been inherited by every Secretary of War since Robert Todd Lincoln in 1883. At his right is a direct wire to the White House.'"

<u>Right</u>: caption: "The Secretary of War's Office is furnished with a table used by Lincoln (foreground) and a portrait of Timothy Pickering, the second Secretary of War. One phone connects directly with the White House."



"…it has been possible to dispense almost entirely with passenger elevators, yielding the dual advantage of saving space and of avoiding delays and congestion. For vertical travel, occupants use ramps and escalators…"
Popular Science, **February 1943**

Left: caption: "A man presses a button in the elevator reserved for the highest ranking officer at the Pentagon and his guests."



Above: caption: "A private kitchen built to serve the highest ranking Pentagon officials and their guests, should they wish to avoid one of the building's six cafeterias."

Left: caption: "Part of the suite for the Secretary of War. *LIFE* wrote in December 1942: 'The only really happy person in the War Department's whopping new reinforced-concrete 'home' is the Army's civilian chief, Henry L. Stimson.'"





"…Allocation of offices in various parts of the building was carefully planned to facilitate co-operation between officials and departments in related fields…Offices range in size from small rooms to working spaces as large as 50 by 400 feet. Total floor space reaches the staggering figure of $4,000,000 square feet, considerably more than that of the previous biggest building – Chicago's famed Merchandise Mart. Year-round air conditioning assures comfort…"

***Popular Science,* February 1943**

"…Nearly 300 operators, at the world's largest private branch switchboard, daily put through a total of about 200,000 outgoing and incoming calls. Interoffice calls, numbering more than 100,000 a day, are handled automatically. Construction of a switchboard of unprecedented size required special research by engineers of the Bell Telephone Laboratories, the Western Electric Company, and the local telephone company, to solve its intricate technical problems. Telephone cables within the Pentagon Building contain nearly 150,000,000 feet of wire. Twelve submarine cables, each 2,000 feet long, cross the Potomac River to connect with a smaller, completely automatic 'satellite switchboard' in Washington. This serves Army offices remaining there. The cables also link the Pentagon Building with the nation's telephone system…"

***Popular Science,* February 1943**



"…From Arlington, special barges slowly traveled across the river unreeling the cables into trenches previously dredged on the bottom. A diver followed in the wake of the barges and guided the cables into their beds…"

***Popular Science,* February 1943**

<u>Above</u>: caption: "Photograph of some of the +300 telephone operators that were required for a building the size of the Pentagon. They were photographed in September 1942, and their number would have typically served an estimated 125,000 persons had they been in a typical office building."



"…Within the building, dispatches and written memoranda travel by messenger, or are shot through a pneumatic tube system in conveyors that accommodate flat documents up to 10 by 14 inches in size…"

***Popular Science,* February 1943**

Left: caption: "Sending files via the Pentagon's pneumatic tube system - an old-school delivery mechanism that, as late as the mid-1980s, was still handling more top-secret information than the Defense Department's computers"


LAMSON PNEUMATIC TUBE SYSTEM
LAMSON CORPORATION
SYRACUSE, N.Y.





"…Enormous cafeterias, staffed by well-trained help, feed as many as 6,000 persons at a time with military efficiency. Duplicate counters at opposite sides double the number of patrons that may be served at once. Looking around the mass of occupied tables, you miss something – the deafening babel of a crowd of people in animated conversation. A sound-absorbing acoustical ceiling takes care of that…"

***Popular Science,* February 1943**

<u>Left</u>: caption: "Pentagon workers' efficiency is enhanced by excellent lighting, insulation against sound, and a well planned layout. There are 21,000 desks"

<u>Right</u>: caption: "Pentagon Basement Area File Room (mid-1940s)"





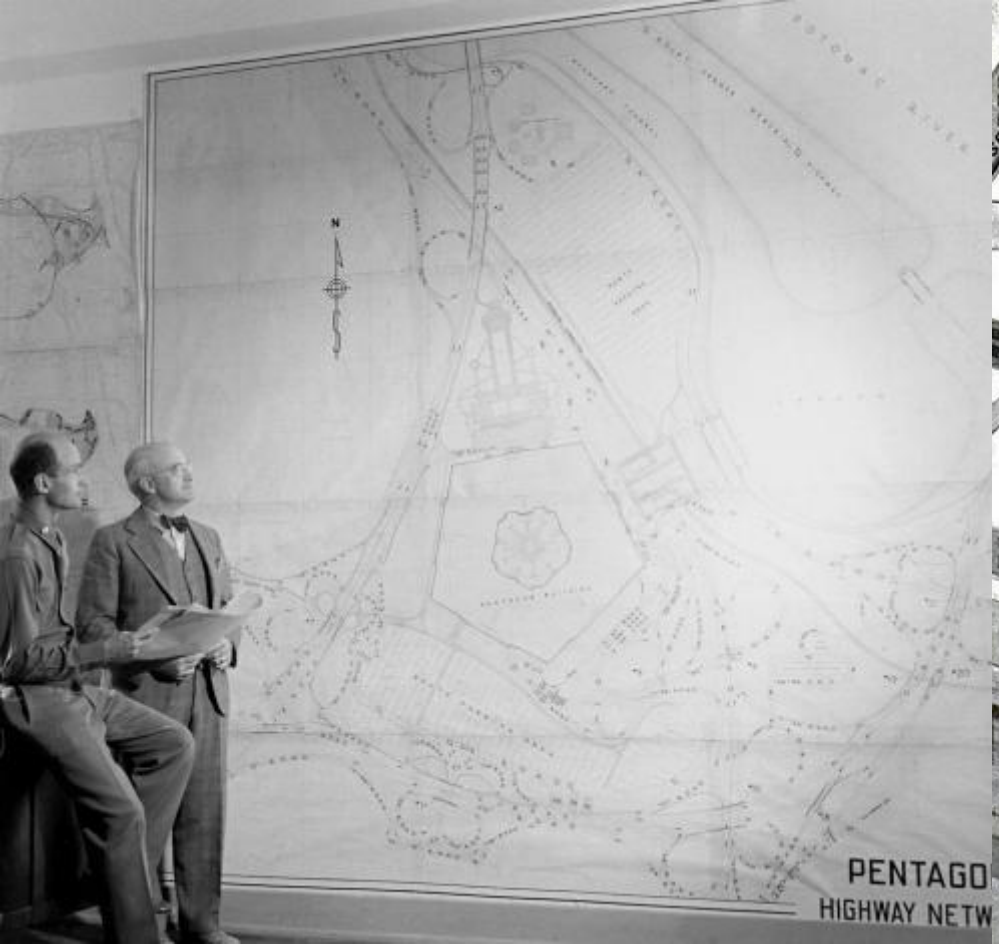
Left: caption: "The Adjutant General's reproduction branch is a great photographing, printing and duplicating establishment. It reproduces such things as battle casualty reports, Army Postal Service Directories, vital 'short run publications' and Bureau of Public relations press releases."

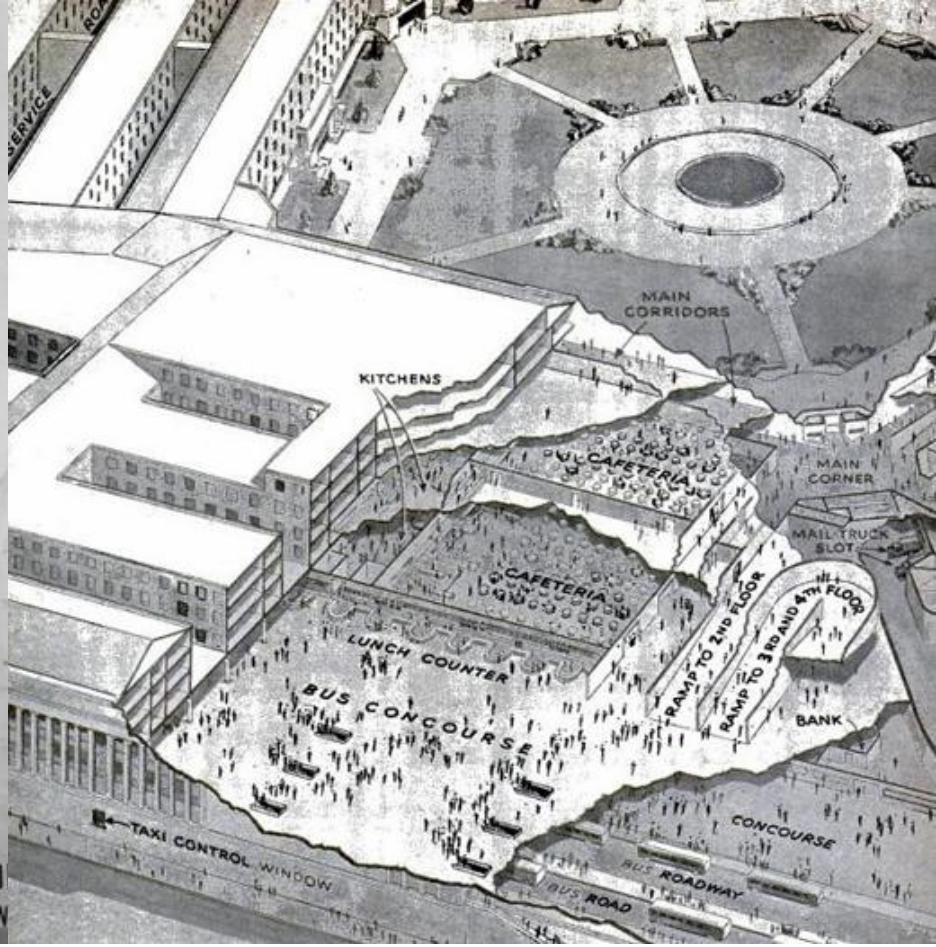
Right: caption: "The Pentagon's Photostat Room, 1944. The large stationary cameras on the right were used to make photographic copies and enlargements. These unwieldy machines and the accompanying chemical developing process were eventually replaced by modern photocopiers."

A Correspondingly Grand Scale

"…Transporting a city's population to and from a single building each day presents a major problem that has been solved on a correspondingly grand scale. A three-lane bus and taxi terminal, with facilities rivaling that of a great railroad station, extends beneath a concourse 680 feet long and 150 feet wide. As many as 28 buses may be loaded simultaneously in each of the two bus lanes, and 30,000 persons may arrive or depart in an hour. Fares are placed in turnstiles, and buses are announced and dispatched by an electrical control system…"

***Popular Science,* February 1943**

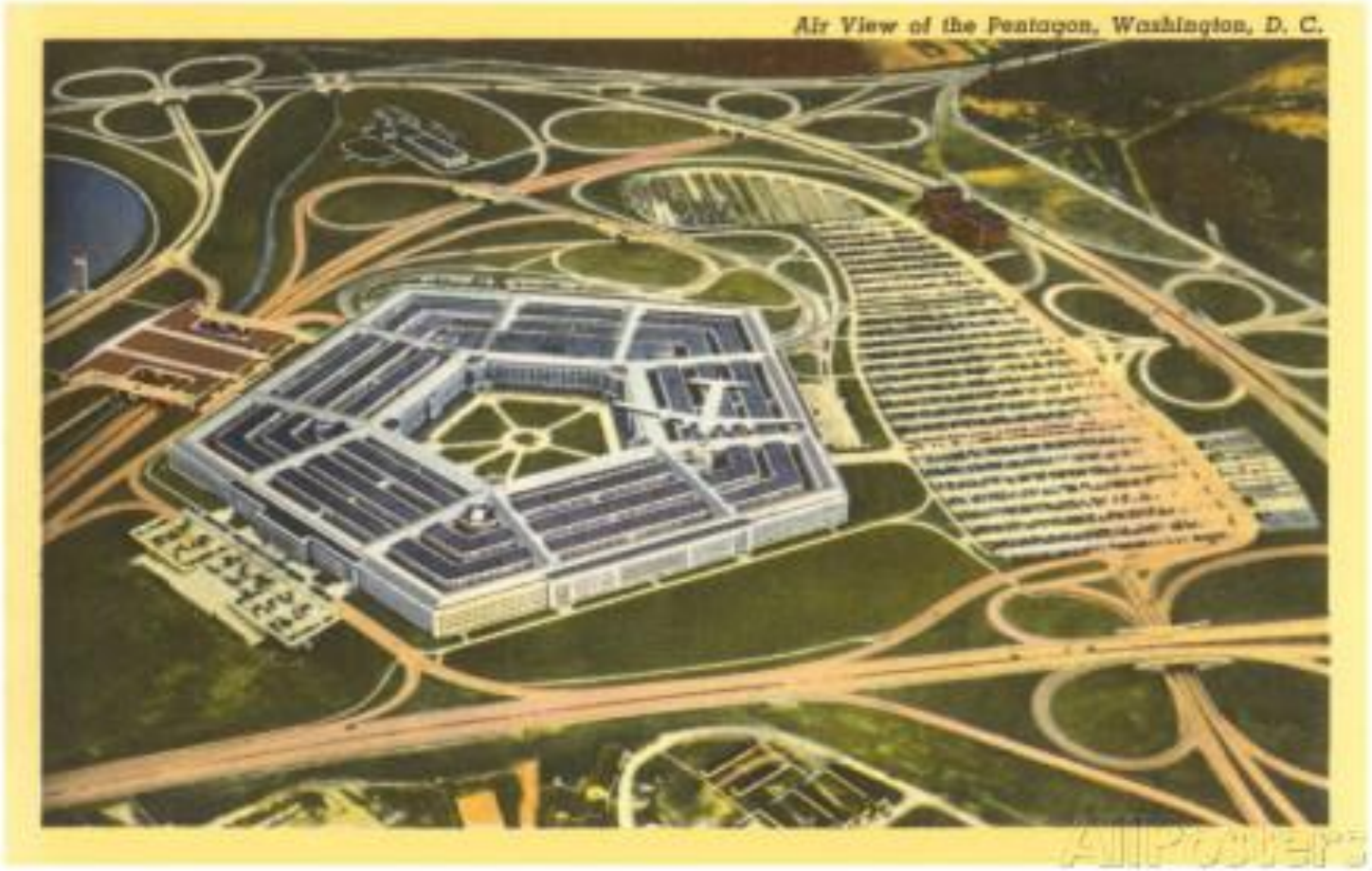




The Pentagon site originally contained three cloverleaf interchanges that were among the earliest such structures constructed in the *United States*. These freeway-scale interchanges were necessary to handle traffic associated with the large number of people working in the building.

<u>Left</u>: caption: "A massive map provides an overview of the Pentagon highway network. With a complex housing roughly 23,000 workers and 16 parking lots for over 8,000 cars, new roads to accommodate the traffic were a necessary part of the construction."

<u>Right</u>: caption: "Highways run right into the big Pentagon Building with provisions for arrival or departure by bus of 30K persons an hour"


Air View of the Pentagon, Washington, D. C.



The *Mall Concourse* (left); 680-feet long by 135-feet wide (at the second level above the bus terminals) houses a variety of shops and services. These include familiar commercial retail institutions which can be found in any typical American town center; a bank, credit union, drug store, small department store, post office etc.



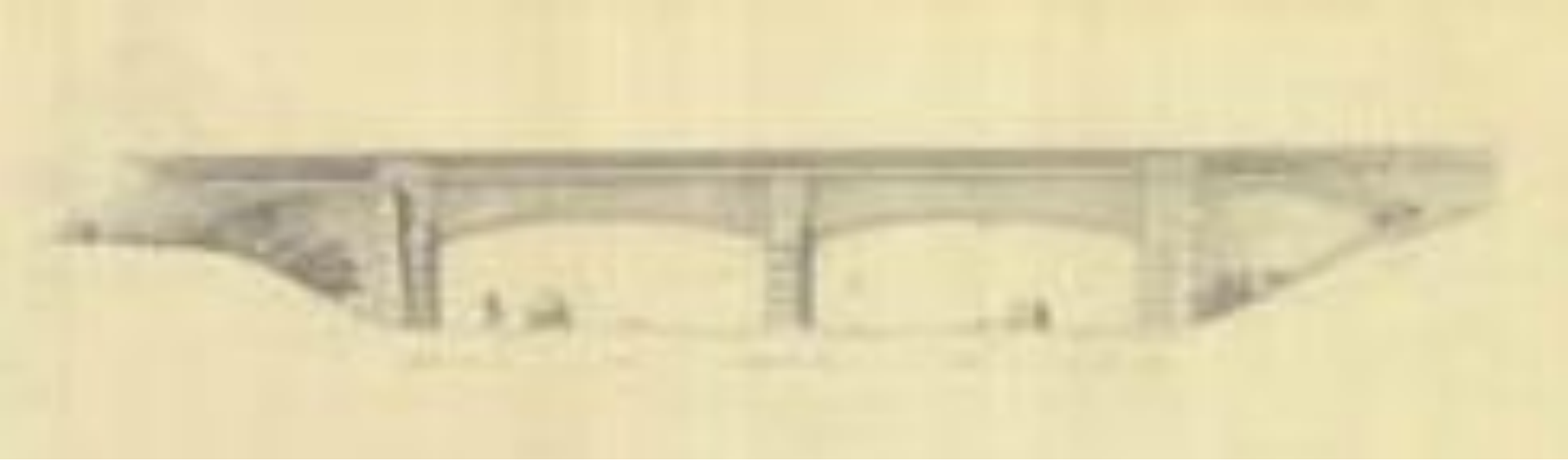
"…For those who drive to work, two enormous paved areas, north and south of the building, provide parking space for 8,000 cars. Within 60 minutes, the spaces can be filled or emptied. Staggered hours are expected to expedite traffic…"

***Popular Science,* February 1943**





"…New highway projects including four clover leaves and connections with through routes, afford speedy travel to any point of the compass, including nearby Washington. Thus the war center has been removed from the congestion of the capital, but has been kept within quick access…"
***Popular Science,* February 1943**

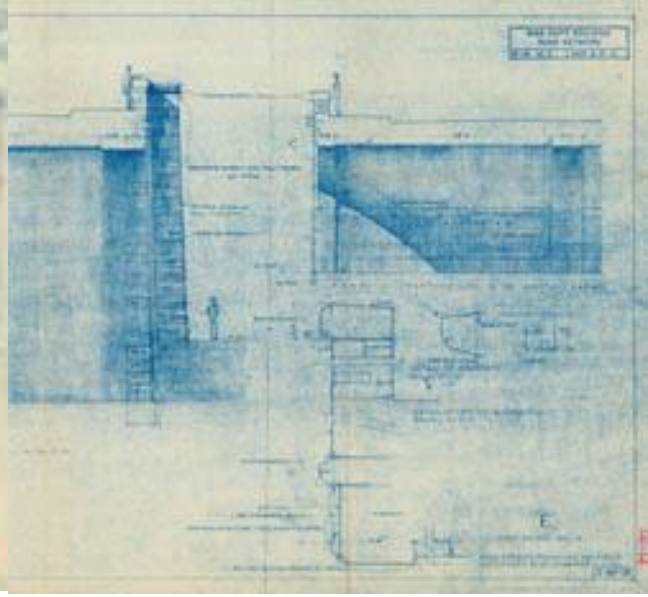


"…Traffic moves in and out of the grounds on a specially built highway system. Forty miles of 24-foot paved roads approaching the building connect with three main highways outside the grounds. Twenty-one bridges provide grade separations at all crossings on the 'reservation' and no stop lights break the flow of traffic. The highway system was worked out by the War Department in cooperation with the Public Roads Administration…"

***Popular Mechanics,* March 1943**

<u>Above</u>: caption: "Bridge No. 1 Alternate Design E – Pentagon Road Network (10/06/1941)"



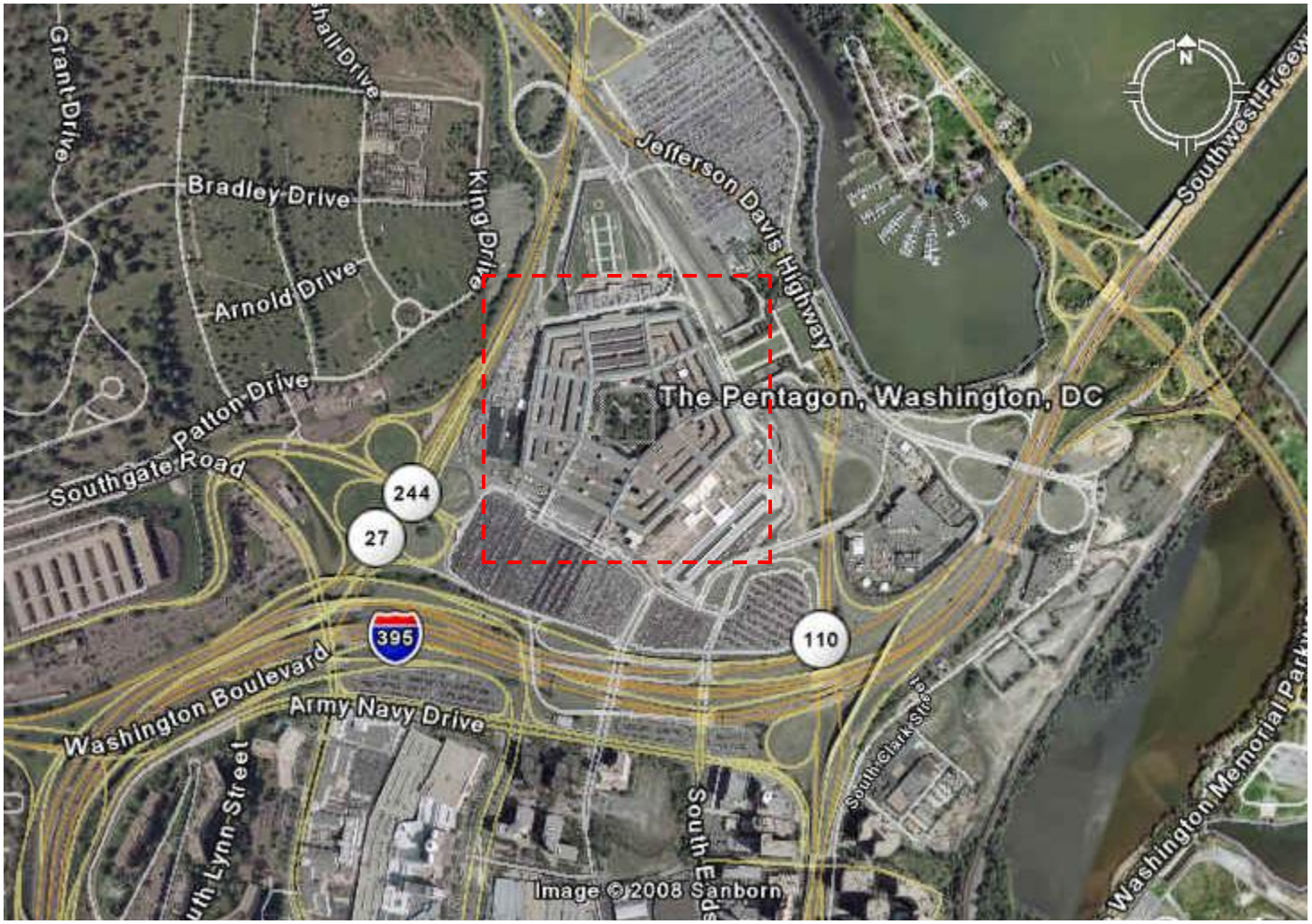




<u>Top Left</u>: caption: "Bridge No. 3 Detail Elevation – Pentagon Road Network (10/28/1941)"

<u>Top Right</u>: caption: "Bridge No. 3 Details – Pentagon Road Network (10/28/1941)"

<u>Left</u>: caption: "Legend - Pentagon Road Network"


Grant Drive
Bradley Drive
Arnold Drive
Patton Drive
Southgate Road
King Drive
Jefferson Davis Highway
The Pentagon, Washington, DC
244
27
395
110
Washington Boulevard
Army Navy Drive
Image ©2008 Sanborn
N

After the War

"…Already the public is asking what will be made of the building after the war. It's anybody's guess, but those best informed believe it will continue to serve as a federal office building and possible storehouse of archives. Right know the Pentagon architects will admit only one fault in the building – it isn't big enough. Vast as it is, the War Department cannot squeeze all of its workers under the green slate roof of the Pentagon."

***Popular Mechanics*, March 1943**

Part 5

War and Peace

WAR





"Everything was absolutely ideal on the day I bombed the Pentagon. The sky was blue. The birds were singing. And the bastards were finally going to get what was coming to them."

Bill Ayers,* Leader of the *Weather Underground

RE: excerpt from his 2001 book: *Fugitive Days*

<u>Above L&R</u>: on May 19th 1972 (Ho Chi Minh's birthday), the Weather Underground placed a bomb in the women's bathroom in the *Air Force* wing of the Pentagon. The resulting damage caused flooding that destroyed computer tapes containing classified information. The bombing was "in retaliation for the U.S. bombing raid in Hanoi."

"The existing Pentagon is not compliant with fire safety codes. The existing Pentagon is not compliant with any codes. It is one of the most likely terrorist targets in town. It is an old building. More than 25,000 people work here. There's no way we could design this building or any building to be 100% protected. This was a terrible tragedy, but I'm here to tell you that if we had not undertaken these efforts in the building, this could have been much, much worse. The fact that they happened to hit an area that we had built so sturdily was a wonderful gift."

***Lee Evey*, Pentagon Renovation Program Manager (September 16th 2001)**

RE: the design of *Wedge 1* began in January 1994, and the last revisions were completed in 1999. Construction activity began in January 1998, with a "wall bashing" ceremony in February 1998; to symbolically signify the start of the above-ground work activity. The first tenants began to move into renovated office space in Wedge 1 in February 2001.

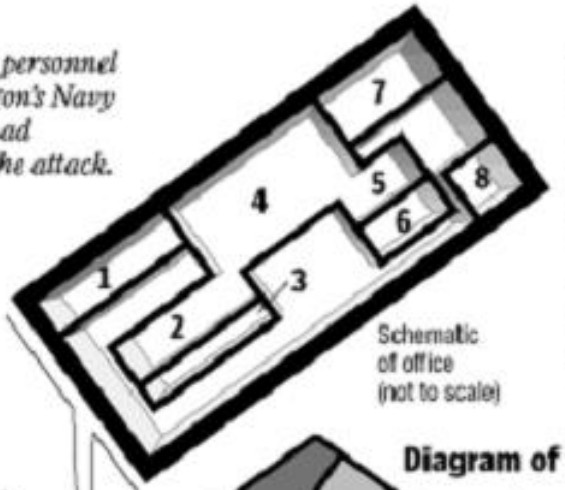
The Pentagon had been the focus of concern for more than a decade among persons charged with keeping its workers and secrets safe and secure. Airplanes flew over it, buses drove up to it, the subway stops under it and commercial trucks were able to drive right into it. Things would change dramatically in the aftermath of the 9/11 terrorist attack on the Pentagon itself which took the lives of 125 civilian and military Defense Department personnel and the 64 people on board the hijacked aircraft. Packed with thousands of tons of asbestos, lead-based paint and constructed with mercury and PCBs when built in the early 1940s, the massive renovation project began in 1994 (inclusive of protective measures against terrorist attack) is credited with saving the lives of many people that faithful day and preventing further damage. The $1 billion project was approximately 20% complete at the time of the attack, but the area completed was ground zero for the impact area of the *Boeing 757*. It was estimated, at the time, that the additional cost to repair the damage would be $300 million and would not be completed until 2014.



Ironically, *American Airlines Flight 77* struck a portion of the Pentagon that was only five-days away from completion of its renovation (the renovation followed the original construction sequence starting with *Wedge 1*). As such, Wedge 1 was the only area of the Pentagon with a sprinkler system and it had been reconstructed with a web of steel columns and bars to withstand bomb blasts. The steel reinforcement, bolted together to form a continuous structure through all of the Pentagon's five floors, kept that section of the building from collapsing for thirty minutes - enough time for hundreds of people to exit the building safely. The area struck by the plane also had blast-resistant windows; two-inches thick, that remained intact during the crash and fire. It had fire doors that opened automatically and newly built exits as well. The fire that swept through the building caused the greatest damage in an un-renovated section with no sprinkler system, blast-resistant windows or steel reinforcement. Fortuitously, many of the offices in this area were empty in anticipation of the upcoming renovation. Approximately 4,500 people would have been working in the hardest-hit areas otherwise. Because of the renovation work, only about 800 were there on that Tuesday morning in September.

Navy Command Center

More than half of the active duty and civilian personnel the Navy lists as missing worked in the Pentagon's Navy Command Center. The first-floor Navy office had recently been renovated but was destroyed in the attack.



Schematic of office (not to scale)

1 Meteorology
2 Watch Team (Duty Captain)
3 Support
4 Communications
5 Technical
6 Operations
7 Conference Room
8 Intel

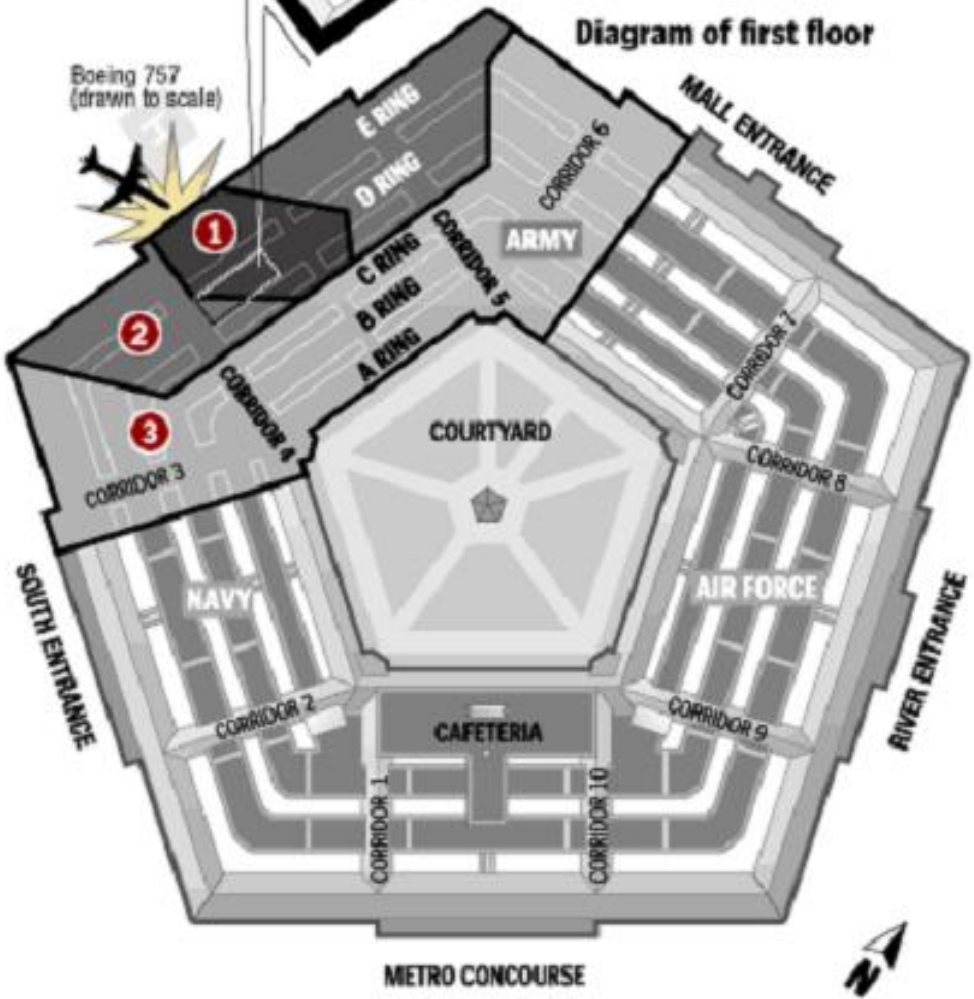
Degree of damage

1 **Structural:** Catastrophic damage was done to support columns on the first and second floors.

2 **Fire:** Fireballs—fed by the jet's fuel—exploded and spread laterally down the hallways of E and D rings. Under the slate roof, spot fires continued to burn as late as Thursday night.

3 **Water:** Water damage extends through roughly a third of the Pentagon as a consequence of firefighting efforts.

Diagram of first floor





"…So resilient was the newly strengthened section of the Pentagon that a glass display case only 40 feet from where the plane entered the building survived without a crack…"

***ArchitectureWeek,* October 2001**





"From a fire-damage standpoint, this was by far the worst, very intense, hot concentrated fire for a prolonged period of time. The heat of the fire drove out the water attached to the cement molecules. It literally disintegrated the paste and turned it to mush."

Steve Wolter, **President -** ***American Petrography Services*** **(APS)**

RE: on September 12th 2001, APS was hired to evaluate the Pentagon's concrete. Their task was two-fold:

- **Test the integrity of the Pentagon's remaining structures, and;**
- **Advise engineers what needed to be replaced**

For the latter, APS needed to determine whether a stronger con-crete mix could be made, such as one that could withstand not only pressure but also intense heat or a bomb blast

Pentagon concrete samples, *Potomac River* gravel mixed with sand, cement and water, were immediately sent to ASP's *St. Paul, MN* laboratory. In all, 170 pieces ranging in size from only a few inches square to more than a foot long were tested. Some samples arrived in such poor condition that super glue had to be used to piece them back together before they could be properly examined. Some samples had a reddish hue or tints of bright orange. These samples came from columns near the crash site. The red and orange colors come from tiny amounts of iron in the rock that were oxidized in extreme heat. When the airplane slammed into the Pentagon, the plane's jet fuel exploded and the resulting fire cracked the rock in the concrete mix.

Oklahoma City



"All the News That's Fit to Print"

The New York Times

Late Edition

VOL. CXLIV . . No. 50,037 NEW YORK, THURSDAY, APRIL 20, 1995 50 CENTS

AT LEAST 31 ARE DEAD, SCORES ARE MISSING AFTER CAR BOMB ATTACK IN OKLAHOMA CITY WRECKS 9-STORY FEDERAL OFFICE BUILDING

CLUES ARE LACKING

U.S. Officials Scurry for Answers — Reno to Ask Death Penalty

By DAVID JOHNSTON

OTHER NEWS

Gas Fumes Create Panic in Yokohama

Court Upholds Anonymity

Lugar Declares Candidacy

Mayor Wants to End Relief

12 Victims Were Children in 2d-Floor Day-Care Center

By JOHN KIFNER

In Shock, Loathing, Denial: 'This Doesn't Happen Here'

By RICK BRAGG

More on the Blast

"April 19, 1995, about 9:03 a.m., at the Murrah Federal Building in downtown Oklahoma City, the unthinkable happened…A stunned nation watched…168 people were dead…Two and a half tons of ammonium nitrate, common farm fertilizer mixed with fuel oil, packed into a rental truck brought the world to an end. Terrorism made simple…it was so easy. So cheap. So destructive."

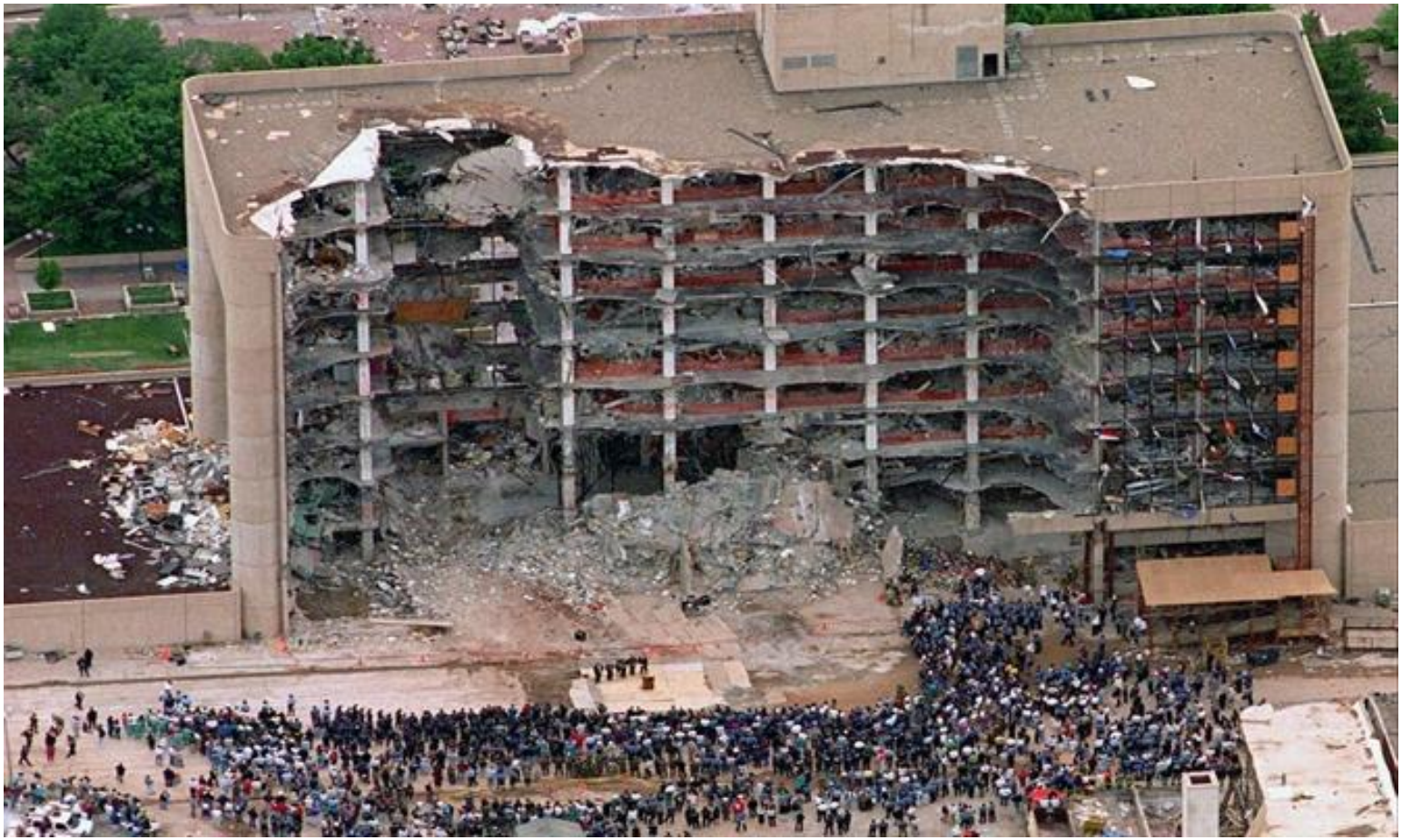
News Report

"Buildings can be made bomb-resistant but not bomb proof. We can't afford it, and it would be a miserable way to live."

***Jim Loftis,* Architect**

"The last casualty of the Oklahoma City bombing may be the loss of our sense of security, now scarred forever"

CNN



"…The scars from the Oklahoma City bombing are still fresh in the minds of government officials six years later when assessing the physical security of likely targets for terrorist attacks. The potential for attacks against the U.S. government was made even more immediate with the bombing of the USS Cole in Yemen last October and the killing of 17 of its sailors and the wounding of 39 others. With this escalation in terrorism came the desire to develop a reasonable protective shield for the nation's foremost symbol of military strength, the Pentagon. The need to reduce the building's vulnerability to a terrorist attack was high on the list of renovation priorities for the sixty-year old headquarters of the Department of Defense…"

***STRUCTURE* magazine, July/August 2001**



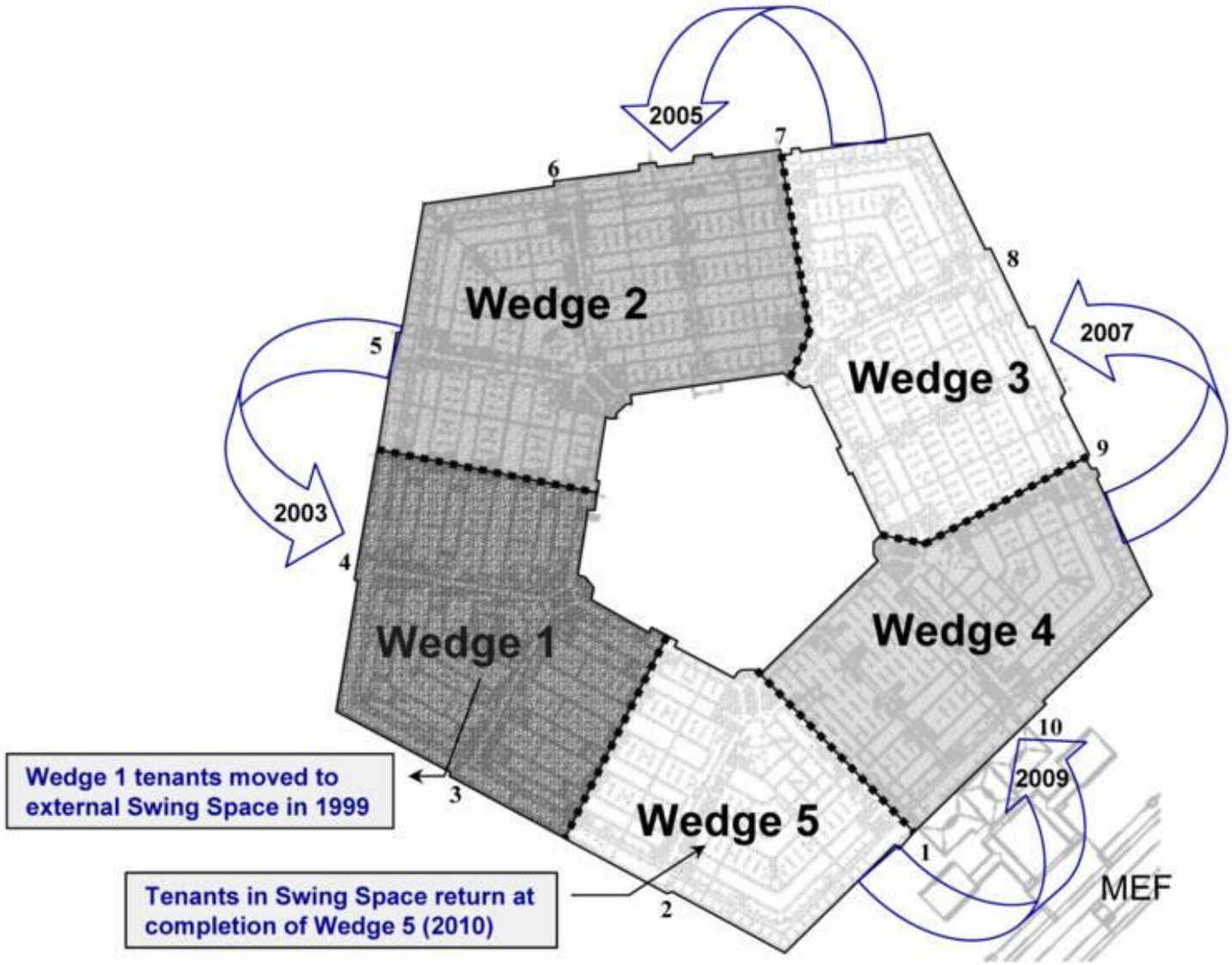
"When the Pentagon was designed and built in the early 1940s, there were a number of concessions made to a country at war. The original designers exercised economies in construction to lessen the impact on strategic materials needed to equip the military…"

***Lee Evey*, Pentagon Renovation Program Manager**



"…The renovation plan, which began in 1993 with the construction of a power plant, was inspired in part by other terrorist attacks in Oklahoma City and abroad. It was also made necessary because the facility was woefully dysfunctional with leaking pipes, a 60-year-old HVAC system including 17.5 miles of ducts made from asbestos, a basement floor that had settled up to 12 inches in some areas, and electrical and communications systems that had been incrementally jury-rigged to bring them up from 1940s standards…As in the original building, the renovated Wedge One kept independent mechanical and electrical systems which were shut down shortly after the attack without affecting ongoing operations of two-thirds of the building…"

***ArchitectureWeek*, October 2001**


2005
Wedge 2
Wedge 3
2007
2003
Wedge 1
Wedge 4
Wedge 5
2009
MEF
Wedge 1 tenants moved to external Swing Space in 1999
Tenants in Swing Space return at completion of Wedge 5 (2010)
1
2
3
4
5
6
7
8
9
10





Situated between a large man-made lagoon and the highlands of *Arlington National Cemetery,* the decision to locate the Pentagon in *Hell's Bottom* placed it within the flood plain of the *Potomac River*. As-built, Basement and Mezzanine levels existed under three fifths of the Pentagon (the Mall and River sides of the building had a Basement area which included a partial Mezzanine). Begun in September 1994, the second phase of the program involved the renovation of the Basement and Mezzanine. The original Basement slab was lowered two-feet (left T&B) in order to accommodate an entirely new level (between the Base-ment and the First Floor). Lowering the Basement slab allowed enough room to build an entirely new Mezzanine level, adding 240K square-feet of usable space The work was divided into three segments whereby abatement of hazardous materials, demolition and new construction was performed sequentially.



In addition to modernizing the Pentagon's space, the renovation program included:

- **New heating and refrigeration plant (completed in 1997);**
- **New health clinic (completed in 2000);**
- **Phoenix Project: post-September 11, 2001, reconstruction (completed in 2002);**
- **Metro Entrance Facility (completed in 2002);**
- **Remote Delivery Facility (completed in 2003);**
- **Pentagon Athletic Center (completed in 2004);**
- **Relocation of Highway 110 (completed in 2004);**
- **Pentagon Library and Conference Center (completed in 2006);**
- **Center Courtyard Cafe (completed in 2008), and;**
- **Pentagon Memorial (completed in 2008)**

"…The extensive use of reinforced concrete and non-reinforced masonry was one concession. Certainly the threat of any kind of terrorist attack on the building was far from the thoughts of the original designers. As a result, the Pentagon was constructed with a thin limestone facade over a brick infill between reinforced concrete floors, structurally supported by a reinforced concrete beam and column frame. Enough to protect from the elements but not from the potential forces of significant blast events. Architecturally, the designers of the huge office building also opted for the extensive use of windows. This feature helped connect workers with the outside world, and further reduced the demand for critical wartime construction materials. Along each 924-foot exterior wall, there are approximately 400 windows, roughly 5-feet wide by 7-feet tall. Together, the lightly constructed facade and large number of windows offer little resistance to terrorist attack. A reasonably forceful blast from any close point along the Pentagon's surrounding network of public roads would create broad personnel risk inside the outermost of the building's five concentric office rings and could cause severe property and structural damage as well…"

***STRUCTURE* magazine, July/August 2001**



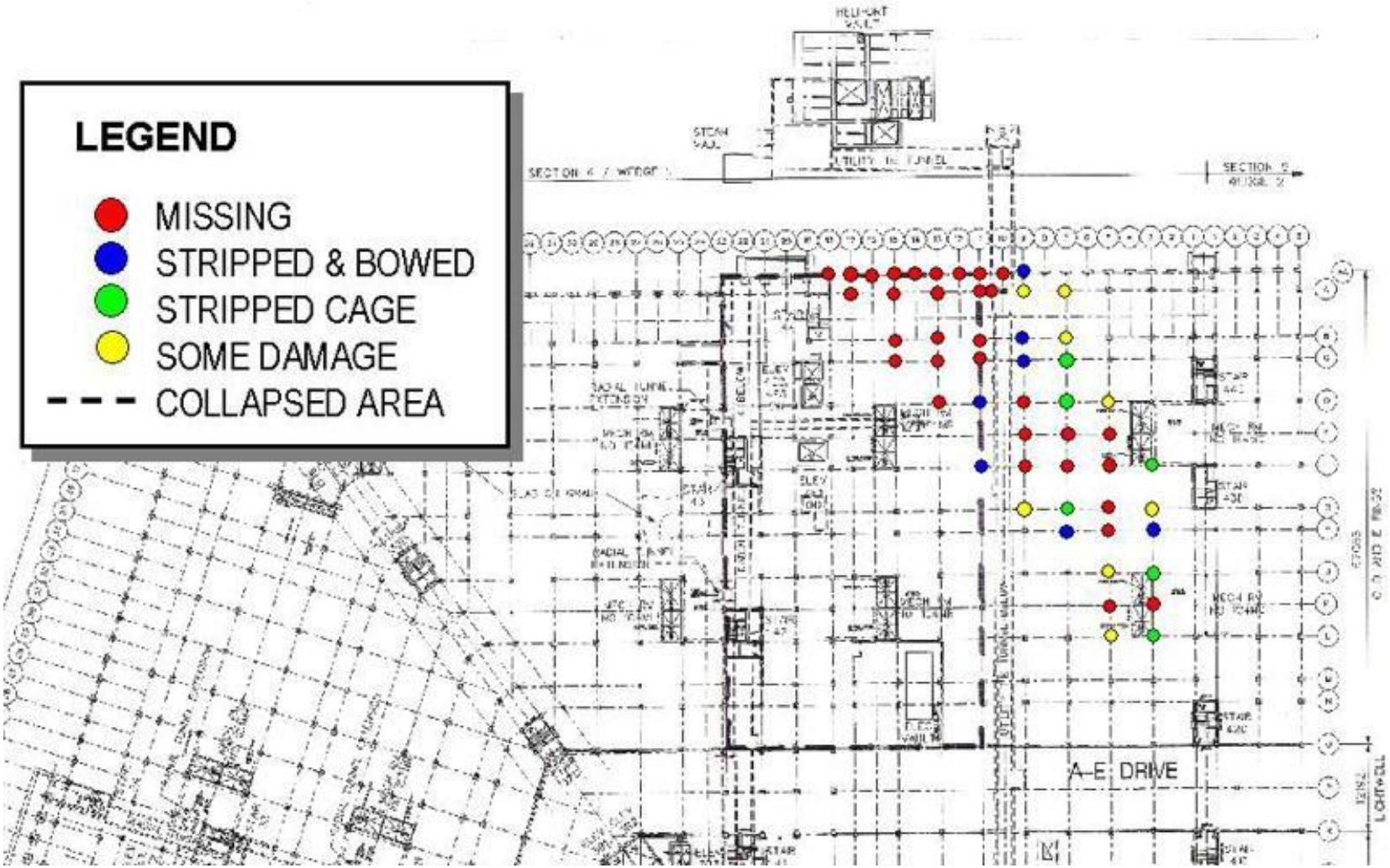
"…From inside to outside, the five rings of buildings are labeled A through E. The airliner entered the ground floor of the west face of the E ring and penetrated through the C ring. Where the airplane struck, the impact, explosion, and fire brought down all five stories and created a hole about 100 feet (30 meters) wide. In the surrounding area, the newly stiffened walls remained only partly damaged or not at all…"

***ArchitectureWeek,* October 2001**


RED SHAPE DENOTES SIZE OF AIRCRAFT
UNBROKEN WINDOWS
NO DAMAGE TO WALL
ACTUAL HOLE CREATED ---->
ONLY PENETRATION -->



STRUCTURAL INTEGRITY



"…The primary structure of the Pentagon is 42,420 steel-reinforced concrete columns. Of these, only 32 were destroyed and 15 seriously damaged. As recovery efforts continue, the structure is being shored up with pressure-treated wood posts to protect against further collapses…"

***ArchitectureWeek,* October 2001**

Hardening the Target

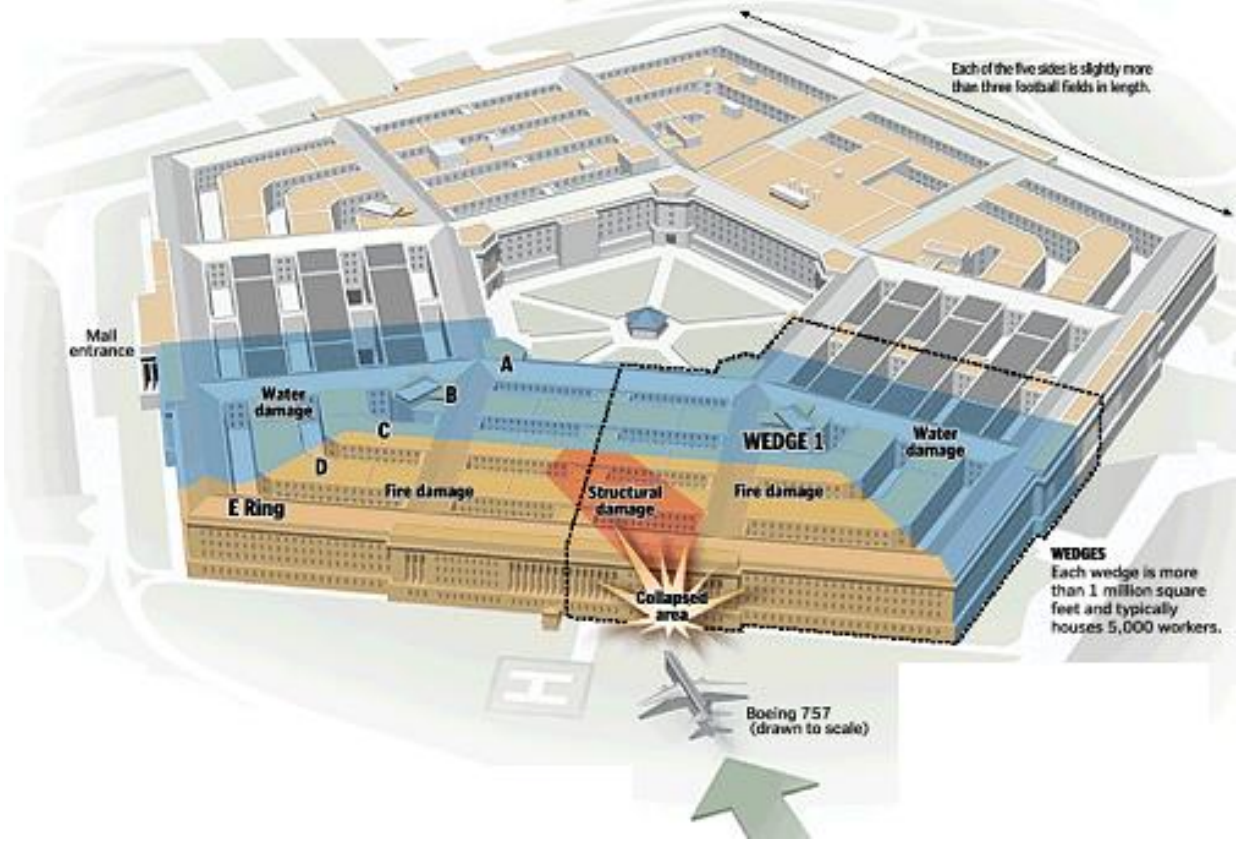


"The Renovation Office recognized this shortcoming and was determined to address it effectively by incorporating improved personnel safety features into the overall renovation program."

***Lee Evey*, Pentagon Renovation Program Manager (left)**

RE: blast protection was included in the renovation design work for the first of the Pentagon's five "Wedges" and served as a template for the follow-on renovation of the other sections. The renovation program included the following improvements to the building:

- **Exterior walls reinforced with steel;**
- **Exterior walls backed with Kevlar;**
- **Blast-resistant windows installed;**
- **Fire sprinklers installed;**
- **Automatic fire doors installed, and;**
- **Creation of a Building Operations and Control Center**



"…In the renovated section outside the immediate crash zone, most damage was caused by smoke and water that poured out of sprinklers. Many of these offices are occupied again. But there was extensive fire damage hundreds of feet away in un-renovated areas that had not yet had sprinklers installed. The fire was so intense it cracked concrete. That meant all five floors of a 100-yard-wide piece of the Pentagon's western face had to come down. In all, trucks carted off 47,000 tons of debris or about 6 percent of the building…"

***The New York Times*, January 2002**



"Looking at some of the concrete that's been fire-damaged, we can see how the cracking proceeds through the aggregate. This tells us a lot about the temperatures the concrete reached. We decided to say to heck with it and not do a surgical type of repair, which is what we thought we would do initially. We decided to take out a large section and demolish the whole thing."

Gerard Moulzolf, **Forensic Geologist -** ***American Petrography Services***

RE: APS concluded that the concrete in the stricken area was irreparably damaged. Instead of working with the Pentagon's remaining columns and beams, they determined that it would be best to remove it all and start over. As such, an area 300 by 150-feet by five stories tall was demolished.



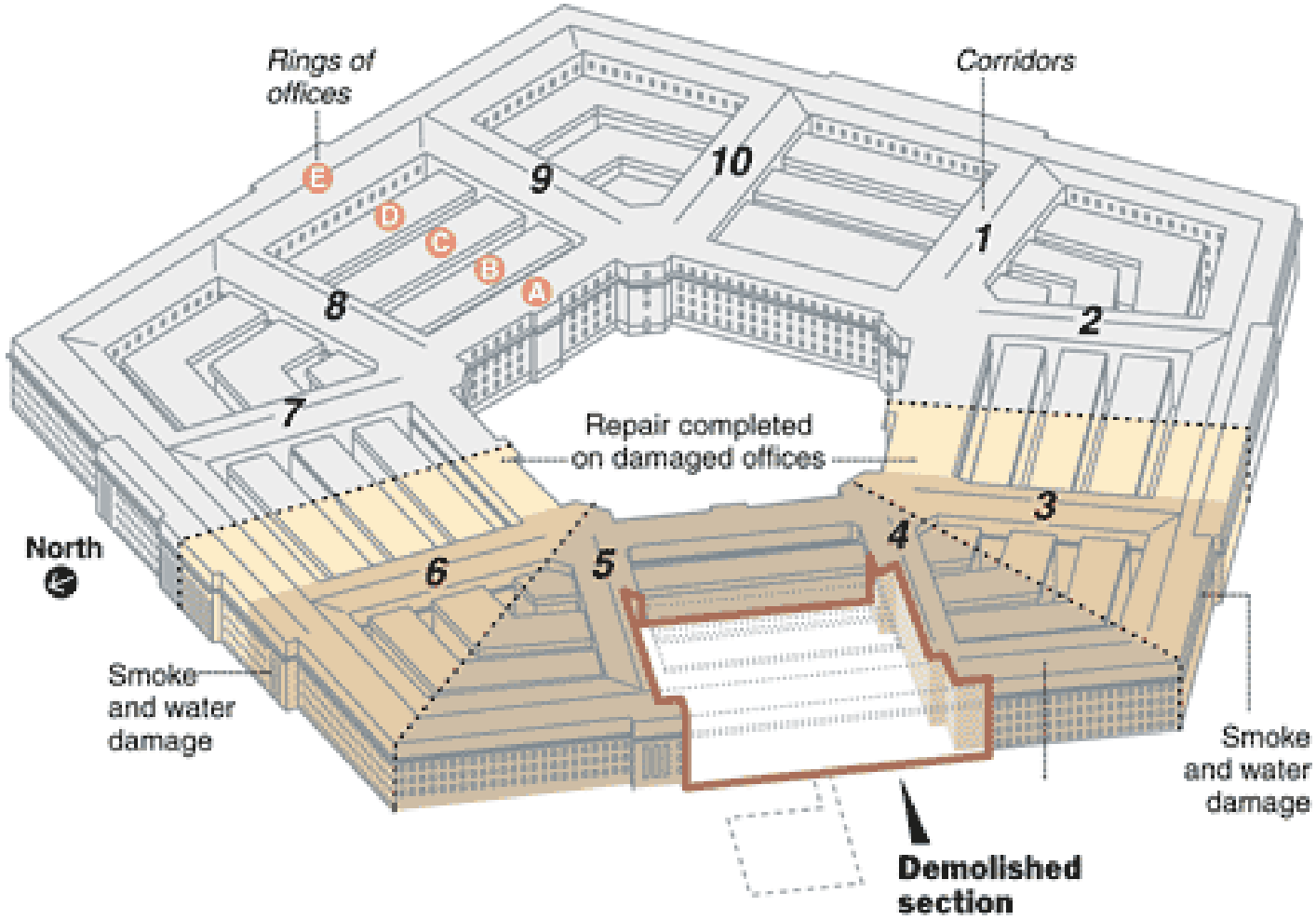


"…The demolition took just one month, aided by round-the-clock work and landfills that stayed open all night. Workers celebrated the day they finished, Nov. 19, by placing a Christmas tree on the roof. There was reason to celebrate because they could now stop tearing down and start building up…"

***The New York Times*, January 2002**







Above: caption: "Exterior: The rebuilt facade will be made from the same Indiana limestone as the original stone facing. Underneath the facade, however, reinforced concrete will replace the original brick walls. Office Space: Some of the offices damaged by smoke and water have been reoccupied, but much of the interior walls, furniture, electrical wiring and phone lines had to be replaced."



"…The U.S. Army Corps of Engineers, Omaha District, Protective Design Center evaluated possible threats to determine a 'most likely' bomb blast scenario, calculating dynamic, time-varying forces for various blast sizes and locations on the building's perimeter. From this analysis, the Renovation Office established blast resistance structural design criteria for the project. The next step in the process was to develop the design, incorporating the established criteria. The Renovation Program architect/engineer for Wedge One, Hayes, Seay, Mattern & Mattern, Inc. (HSMM), worked closely with the Protective Design Center in assessing the blast resistance of the existing walls and the proposed replacement fenestration. During the preliminary evaluation, the engineers studied the outermost (E) and innermost (A) ring walls. The resulting data helped formulate initial cost analysis data for reinforcing outer ring walls and provided a foundation for the final design. While HSMM considered various mitigation approaches, the options were few due to the Pentagon's existing exterior design, the window size/alignment and limestone facade, being considered architecturally significant and historical. Protective improvements, therefore, had to be made on the interior side. Other guidelines restricted new construction to a narrow area behind the exterior wall to avoid consuming significant amounts of interior, occupiable floor space…"

***STRUCTURE* magazine, July/August 2001**


CORRIDOR 5
B-RING WALL
COURTYARD
CORRIDOR 4
Pentagon Renovation Program

Fenestration



"…Merely replacing existing windows with blast-resistant ones anchored to the existing brick infill would not be a workable solution. The newer windows would direct blast pressures to the window support connections at the infill. The tensile and shear loads would overwhelm the existing infill walls and allow the panes and frames to separate from the walls as potential missiles harmful to personnel working in the building. The idea of supporting the brick infill walls with a reinforced concrete wall 'backing' was rejected as a 'typical' approach because of the Pentagon's extensive fenestration (although this design was accepted for 'blank' wall panels with no window openings)…"

STRUCTURE **magazine, July/August 2001**

<u>Left</u>: typical bay with window





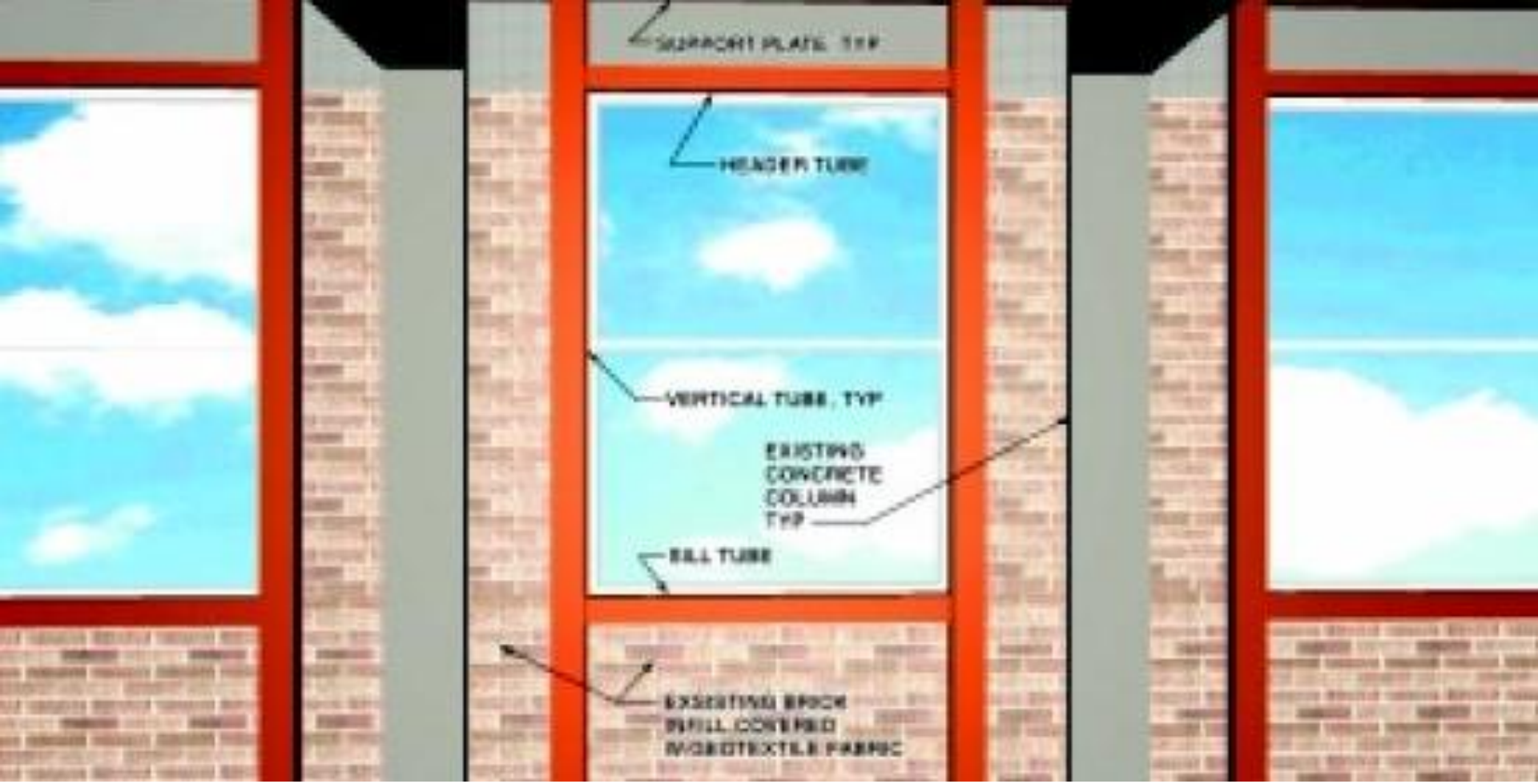
"…Another proposal suggested dropping a continuous, structural tube through roof openings behind the walls and through the floor slabs. Grouting the floor slabs around the tubes would allow the tubes to transfer explosive loads horizontally into the slabs. This idea was rejected, primarily because of the building's structural irregularities. The Pentagon's windowless fifth floor, a late-construction addition, has a large, thick capstone running along the bottom third of the brick wall. This unusual, non-structural feature extends 17 inches into the interior from the wall. A design where the tube penetrates the stone would be costly as well as difficult to construct. Another irregularity is the second floor spandrel beam, which is located under the other spandrels and protrudes several inches beyond the wall into tenant space. The vertical tube would have to bypass this feature, too. To compensate for these irregular features and achieve effective structural protection, large spacers would have to be added to the continuous tube on every floor. This factor made the approach too costly…"

***STRUCTURE* magazine, July/August 2001**

Left: caption: "The capstone protrusion at fifth floor"

"…Belying its regular-looking, geometric appearance, the Pentagon has a number of as built dimensional and structural irregularities. Many of these were never documented during construction and were only discovered during renovation. These unknowns forced HSMM to pursue a general solution that would be cost-effective and feasible for every floor and wall section. The resulting general design solution called for erecting structural reinforcements around the windows, anchoring at the top and bottom to structural concrete floor slabs and not the non-structural brick infill walls. This general solution also accepts blast forces from the walls themselves and transfers both window and wall loads into the horizontal slab diaphragms…"

***STRUCTURE* magazine, July/August 2001**



"…This solution has a tubular frame for each windowed wall panel, consisting of two vertical tubes horizontally braced with tubes welded at each window's head and sill. The frame becomes the structural support for the blast-resistant windows, with the vertical tubes giving new blast protection to the infill walls…"

***STRUCTURE* magazine, July/August 2001**

<u>Above</u>: caption: "This illustration shows reinforcements added to the Pentagon's walls as seen from the inside. Reinforced concrete columns are shown in gray, and tubular steel reinforcements are pictured in red."

"…To make the solution work, HSMM designed a practical floor-ceiling connection scheme for the vertical tubes. The tubes must withstand large deflections to perform their intended function of absorbing blast loads. Large deflections, however, with their inherent shear, create significant tensile force on connecting hardware in a blast situation. This condition eliminated the more direct 'top/bottom' approach of connecting the vertical tubes to the concrete slab above and below with expansion anchors. With the stringent design criteria minimizing intrusion into tenant space, the solution had to work in the narrow space between the tubes' interior face and the interior face of the brick wall, a matter of only a few inches. The answer was to weld the tubes to long, narrow plates running along the floor and ceiling. These plates connect to their counterparts on floors above and below with through-bolts, using ¾"-diameter A36 threaded rods. To maintain good connection to the slab for constructibility and to compensate for variations in tube length, the vertical tubes are also welded to opposed double gusset plates, which in turn are welded to the floor/ceiling plates. This solution connects the window frames from floor to floor. This design directs dynamic horizontal blast forces through the flexible tubes into the floor diaphragms. This approach was uniformly applied to the window panels on the second, third and fourth floors…"

***STRUCTURE* magazine, July/August 2001**

"…The first and fifth floors, due to the existing construction mentioned earlier, posed special problems. Because the first floor is slab on grade, connecting the tubes to the floor slab by through-bolting would not work. And since anchor bolts could not take the calculated tensile and shear forces, a different approach was required. A core-drilled hole in the slab on grade accommodates the tube bottom so the tube will bear horizontally against the floor through a bearing plate. After inserting the greased end of the tubes, the holes are grouted to create a bearing surface and protect the capped tubes' ends from soil moisture corrosion. The first floor ceiling configuration created a separate connection challenge. The spandrel beam from the second floor protrudes approximately 4-inches from the interior wall for about 17-inches down from the ceiling, forcing the vertical tubes several inches away from the infill wall and window frames. The resulting gap below the spandrel had to be 'closed' to maintain structural integrity by using a dry-pack, non-shrink grout and by welding a 3-inch wide spacer tube along the length of the tube face. The tubes' top connection used the same through-bolt scheme as the other floors, aligning with the bottom plates on the floor above…"

***STRUCTURE* magazine, July/August 2001**

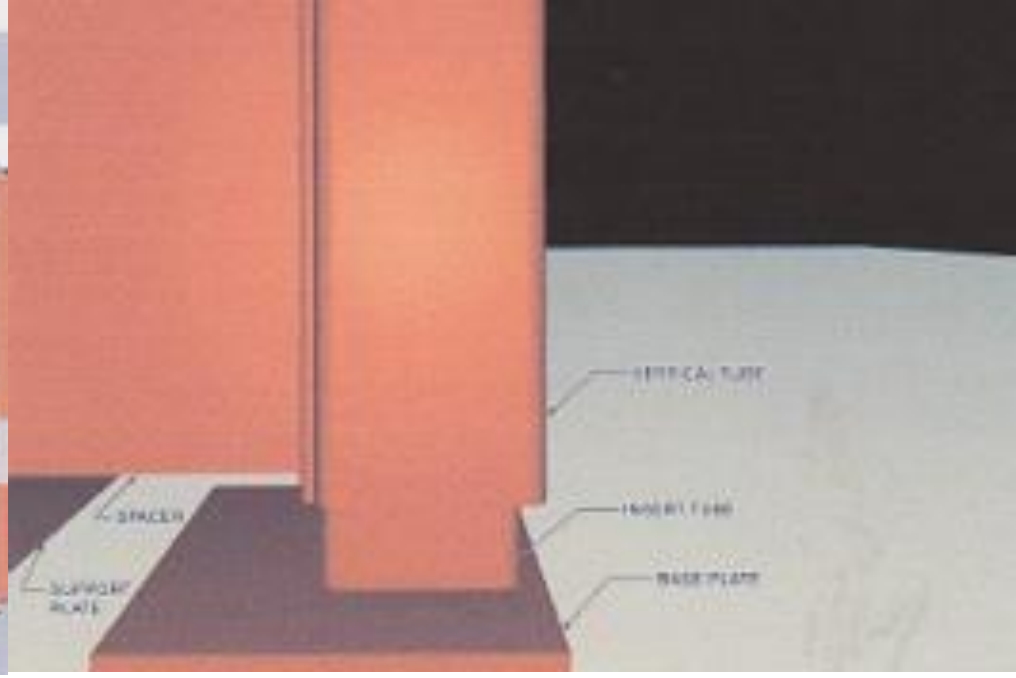


"…The blast-resistant windows were nearly two inches thick. Some of them remain remarkably intact and in place adjacent to the point of impact. Some were popped out of their frames by the force of the exploding jet fuel, but they fell without breaking or splintering. Also on the exterior walls, between the steel columns, the renovation crew had placed Kevlar cloth, similar to the material used for bullet-proof vests. This had the effect of holding together building materials so they wouldn't become deadly projectiles in an explosion…"

***ArchitectureWeek,* October 2001**

"…The other 'non-conforming' area, the windowless (along the outer wall) fifth floor, also required a unique approach. The capstone mentioned earlier prevents alignment of the fifth floor's vertical tubes with those from the floor below. To gain structural benefit for the vertical tubes, again the design turned to spacers to fill the in-space between the verticals and the masonry walls. A wide-flange beam spacer was used above the capstone and a somewhat smaller one above. Four of these new structural tubes with spacers were placed evenly between existing concrete columns to provide improved bracing for the wall section. Since the fifth floor ceiling is also the roof slab, a through-bolt connection would have to go through existing slate or copper roof material. This approach was unacceptable because it would alter the historically protected exterior. The design decision was to use expansion anchors. Though not acceptable for other areas, a design modification allowed their use on the fifth floor. To avoid the tensile strength problem and shear potential on the ceiling anchors, the design was altered to eliminate the tensile force. The first thought was to core-drill as on the first floor…"
***STRUCTURE* magazine, July/August 2001**





"…However, the construction contractor, Morse Diesel International, Inc., suggested using instead a slip-insert assembly to reduce costs, one of the firm's many practical suggestions for successfully installing these various structural supports. The sleeve design allows the tube to slip into the sleeve and bear against it to transfer shear forces to the slab. Because the tube itself is not physically anchored to the sleeve, the tube can slip upward to deflect blast loadings, thus diminishing the tensile forces and allowing the expansion anchors to maintain their integrity…"

***STRUCTURE* magazine, July/August 2001**

Left: caption: "Rendering of the vertical tube braces at fifth floor"

Right: caption: "Close up of the slip connection at fifth floor"



"…Eventually, all of the nearly 8,000 windows in the Pentagon will be replaced with fixed double-pane glass mirroring the original architecture but offering improved thermal and ultra-violet filtering properties. However, the new exterior outermost E-Ring windows facing the perimeter roadways and the innermost A-Ring windows (at the courtyard center of the complex), being the most vulnerable, will be blast resistant. The new windows are an insulated, laminated, fully-tempered assembly that is designed to absorb and resist the blast loads without shattering into small projectiles or leaving the frame as a single unit. This design meets the client criteria for translucency and energy efficiency, as well as for safety in a blast event…"

***STRUCTURE* magazine, July/August 2001**

Left: caption: "Photo of the finished product"

Walls



"…Ironically, the fortress-like appearance provided by the exterior Indiana limestone is misleading. The limestone is not structural but a veneer supported by steel hangers. As the facade is repaired in the near future, matching replacement stone will come from the original quarry in deference to the building's historic status…"

***ArchitectureWeek*, October 2001**

"…Slabs of Indiana limestone cut to match the original exterior started arriving two weeks ago, said Will Bybee, president of the Bybee Stone Company in Bloomington, Ind. The new section will eventually require 18,000 cubic feet of stone, carved from the same vein, though not the same quarry, as the original…"

***The New York Times*, January 2002**













<u>Above</u>: caption: "Renovation plans call for this engraved stone to be placed at the crash site during dedication ceremonies on Sept. 11, 2002. The same quarry that produced the stones to build the Pentagon 60 years ago is again providing stone for current reconstruction efforts. Quarry workers at the Bybee Stone Company in Ellettsville, Ind. signed the stone in honor of those killed when the hijacked airliner struck the building Sept. 11. Signatures also represent some of the hundreds of construction workers currently rebuilding the Pentagon."

"…Another HSMM design consideration was the projectile potential of the brick infill walls in the event of a terrorist bomb. The solution incorporated a system developed by Protective Design Center to mitigate this concern. The Protective Design Center system employs an extremely tough mesh geotextile material, normally used to stabilize highway embankments, to arrest wall debris loosed by a blast. For the proposed solution, the fabric ends are wrapped around steel plates, which are then bolted to the sill tube and to the support plate at the floor slab below the window. The fabric is also installed between the vertical tubes and the existing concrete columns with the wrapped plates bolted to the support plates at the ceiling and the floor…Masonry Arts, Inc., was the contractor for this portion of the work, and likewise offered a number of practical solutions when circumstances varied from the design…This taut screen deflects to absorb missile energy if brick wall masonry is loosed in a blast, allowing the masonry material to fall harmlessly to the building floor…"
***STRUCTURE* magazine, July/August 2001**



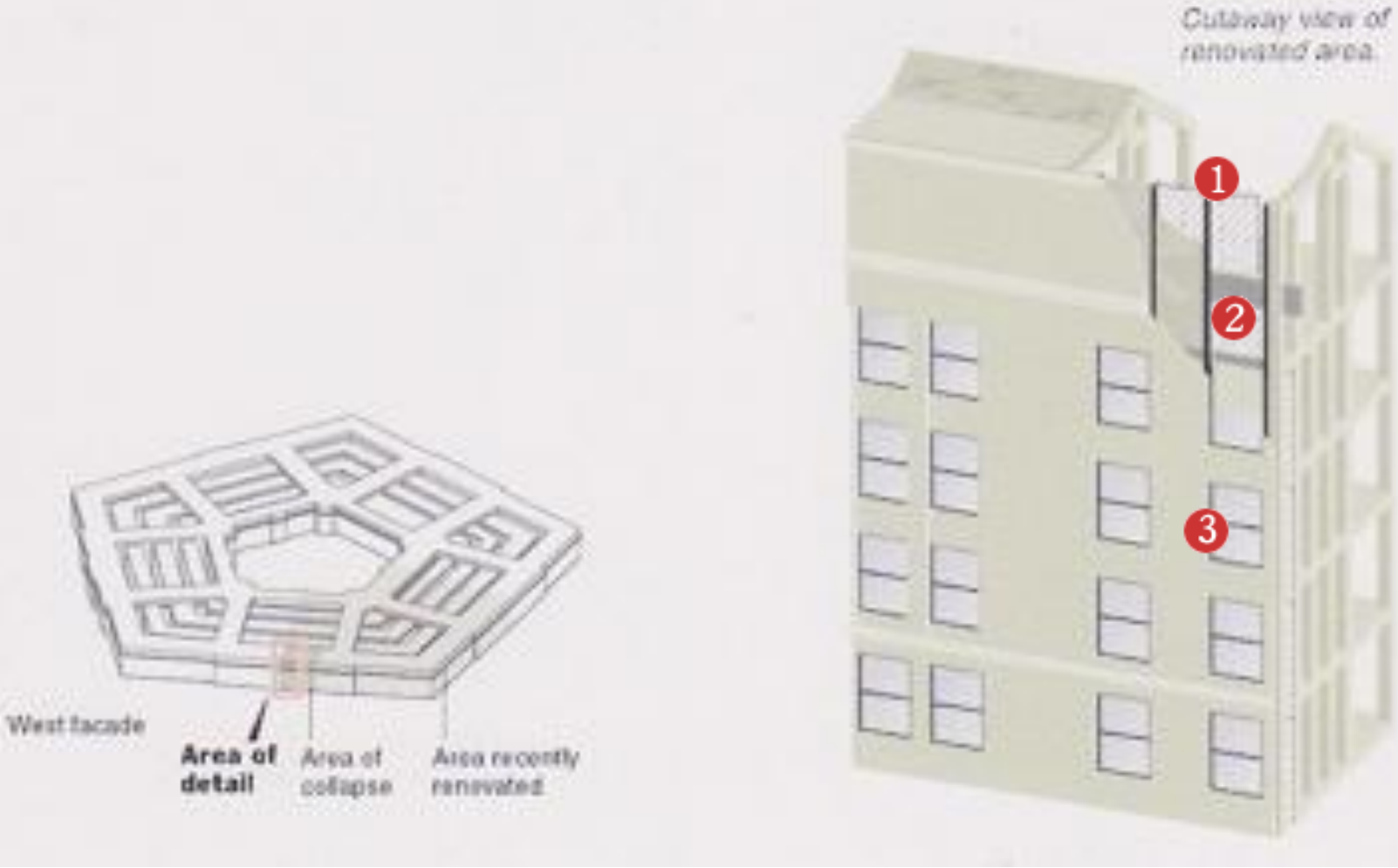




Top Left: caption: "When the Pentagon collapsed, the structure was held together by the 'web' of steel columns and beams, show in maroon, which are bolted together at the floors."

Top Right: caption: "Structural steel, running through all five floors, strengthened the walls around the blast-resistant windows. A Kevlar cloth stretched between the steel tubes prevented debris from becoming shrapnel during the explosion."

Left: installing new blast-resistant window



1 Steel Beams: New vertical steel beams were installed on each side of every exterior window

2 Debris Guards: A very strong mesh material, similar to Kevlar, was stretched between the stabilizing steel beams to contain debris in a blast

3 Blast-Resistant Windows: Every exterior window and frame was replaced,, with new panes an inch and a half thick. Each window, with its frame, weighs 1,600 pounds

Let’s Roll



"…Rebuilding the Pentagon took teamwork, creativity and some ingenuity. The workers also shared a tremendous amount of patriotism, personal pride and emotion - not to mention 20-hour days, six or seven days a week. That emotional tie was evident in the first few days after the attack. Preliminary construction reports estimated it would take three to four years to rebuild the damaged section. But within days, a groundswell of workers began voicing their wish to have offices at the point of impact reoccupied by the one-year anniversary. Walker Lee Evey, the Pentagon Renovation program manager, admits he had some doubts that the goal would be anything more than ceremonial. But if the workers were convinced they could do it in a year, managers had to provide the tools for success, he says…"

***ENR,* September 2002**

Left: caption: "Construction crews adopted the 'Let's Roll' slogan atop the clock marking time to 9/11/02"

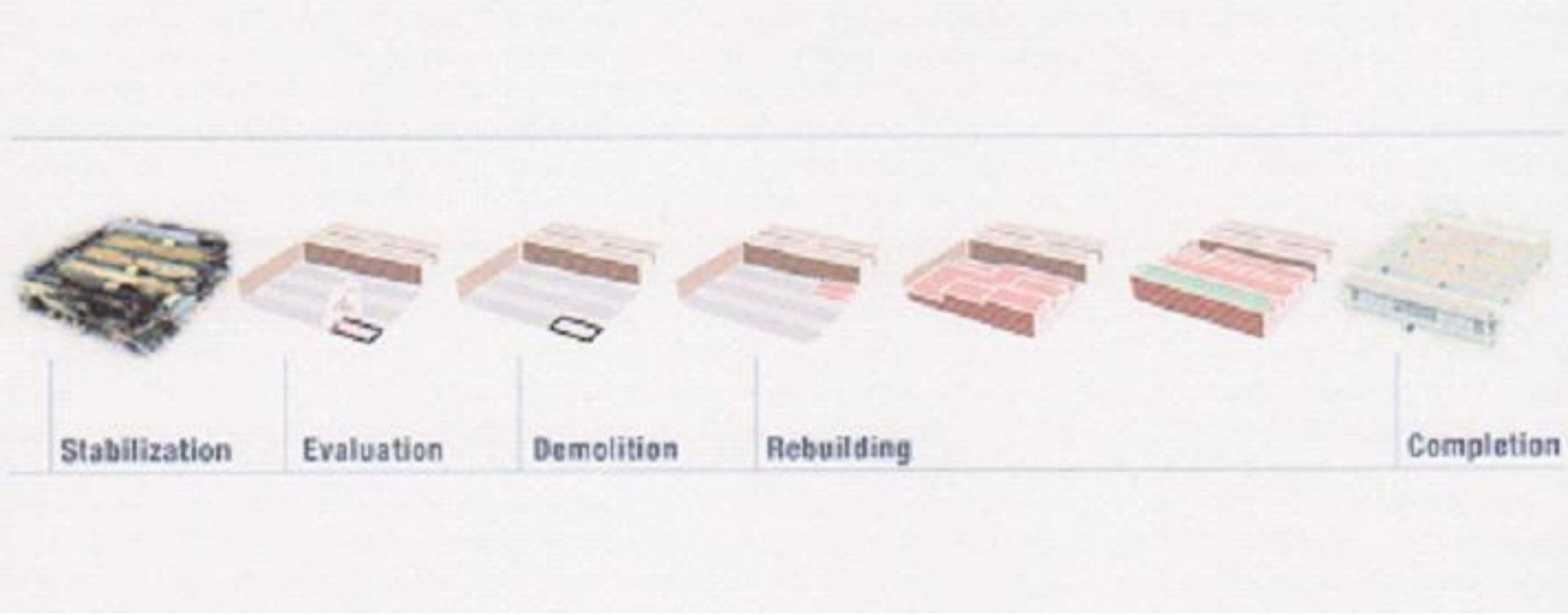


"…'We made this promise,' says Evey. He also made it clear that 'we operate as a partnership.' Evey says his management style is not to tell people how to do their job, but instead tell them, 'this is what I want you to achieve.'…"

***ENR,* September 2002**

Left: *Walker Lee Evey*

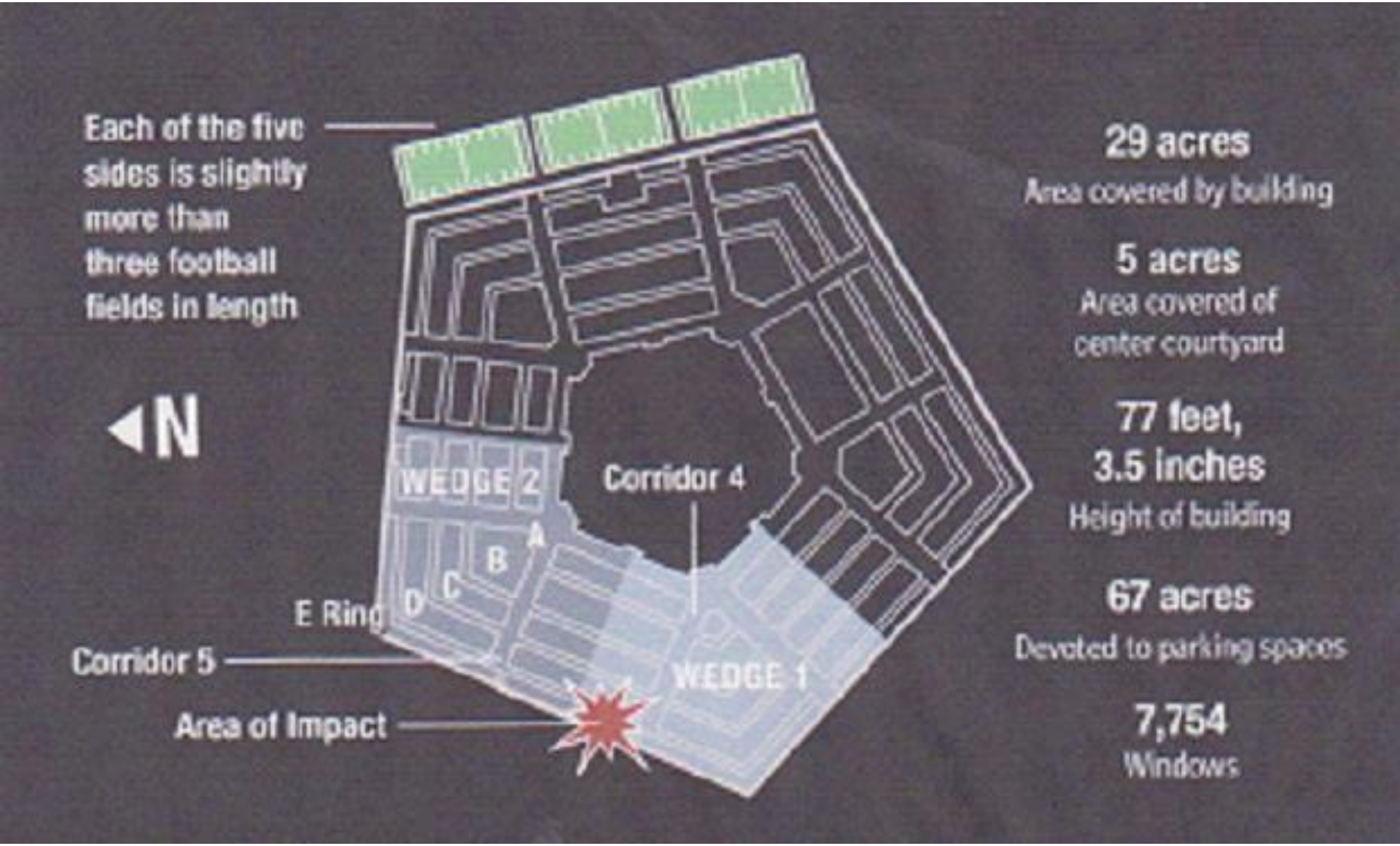
The Phoenix Project



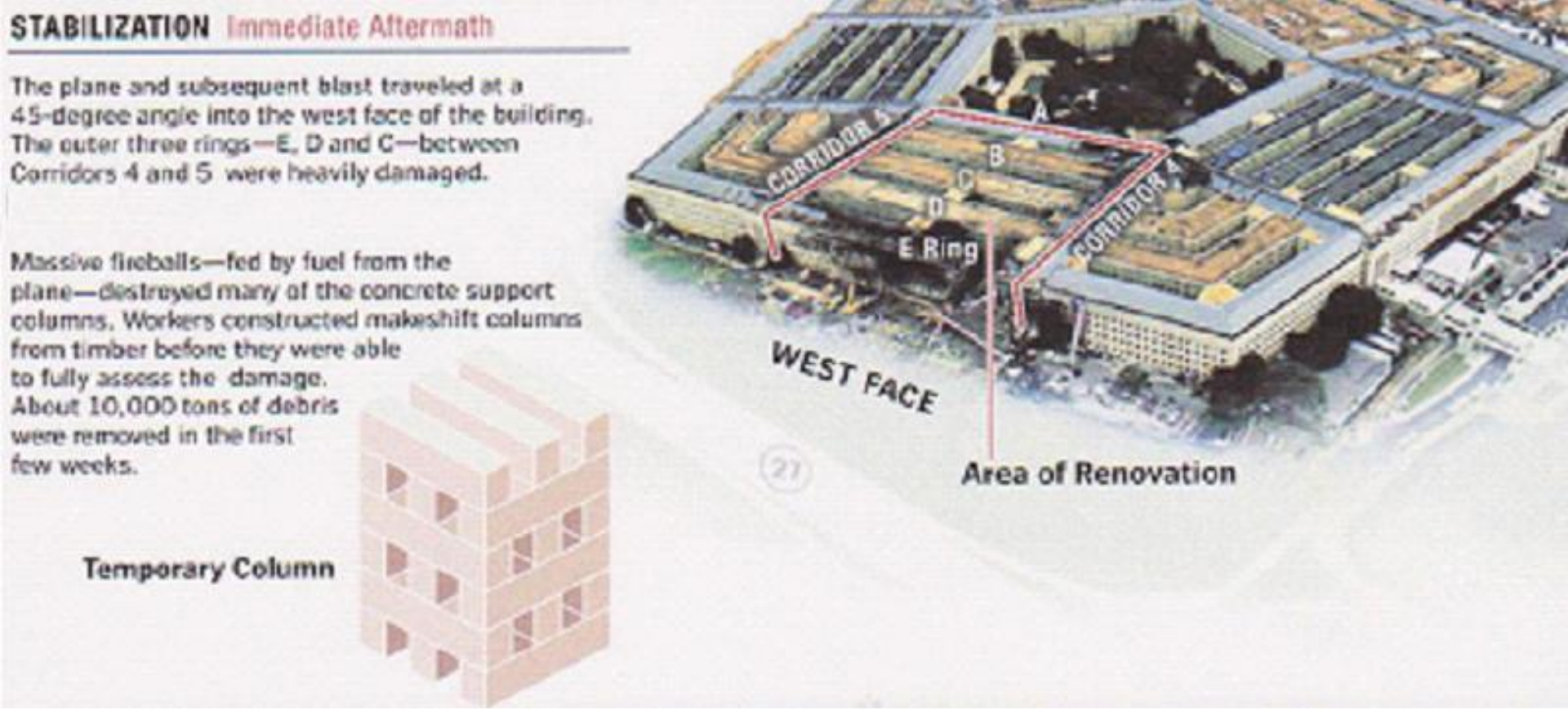
"…The site was a crime scene for two weeks and, during that time, Evey's construction troops formed teams to assess the damage and plot strategy. Having construction crews already on site made a significant difference, he notes. AMEC Construction Management Inc., the Wedge One contractor, pulled in its entire labor force and assigned 230 workers to the site. Architects and engineers were either on site or quickly brought in. Construction firms offered materials, equipment and manpower, suddenly unified by a common bond…"

***ENR,* September 2002**

Above: reconstruction phases


Each of the five sides is slightly more than three football fields in length
N
WEDGE 2
Corridor 4
A
B
C
D
E Ring
Corridor 5
WEDGE 1
Area of Impact
29 acres
Area covered by building
5 acres
Area covered of center courtyard
77 feet, 3.5 inches
Height of building
67 acres
Devoted to parking spaces
7,754
Windows

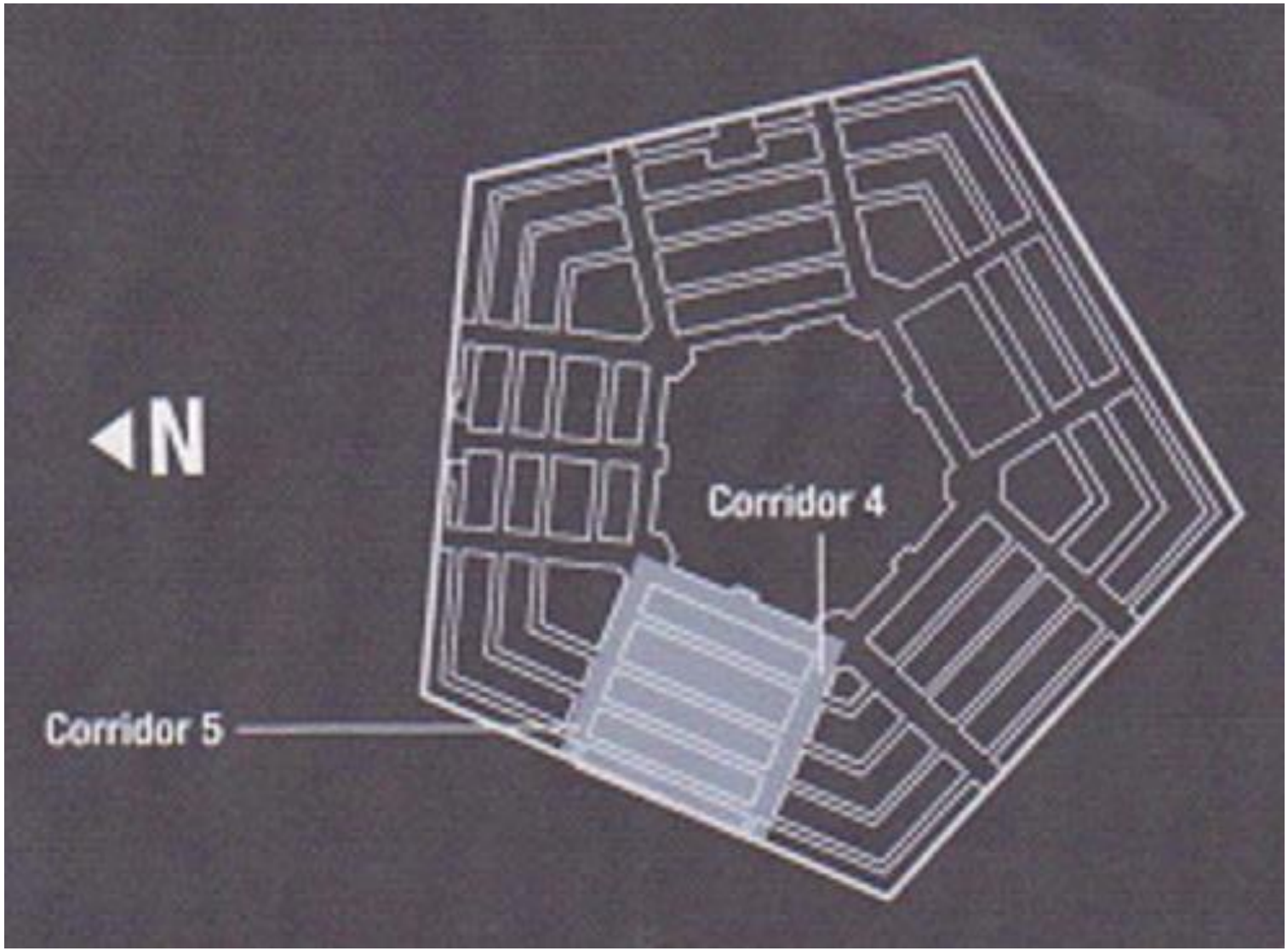




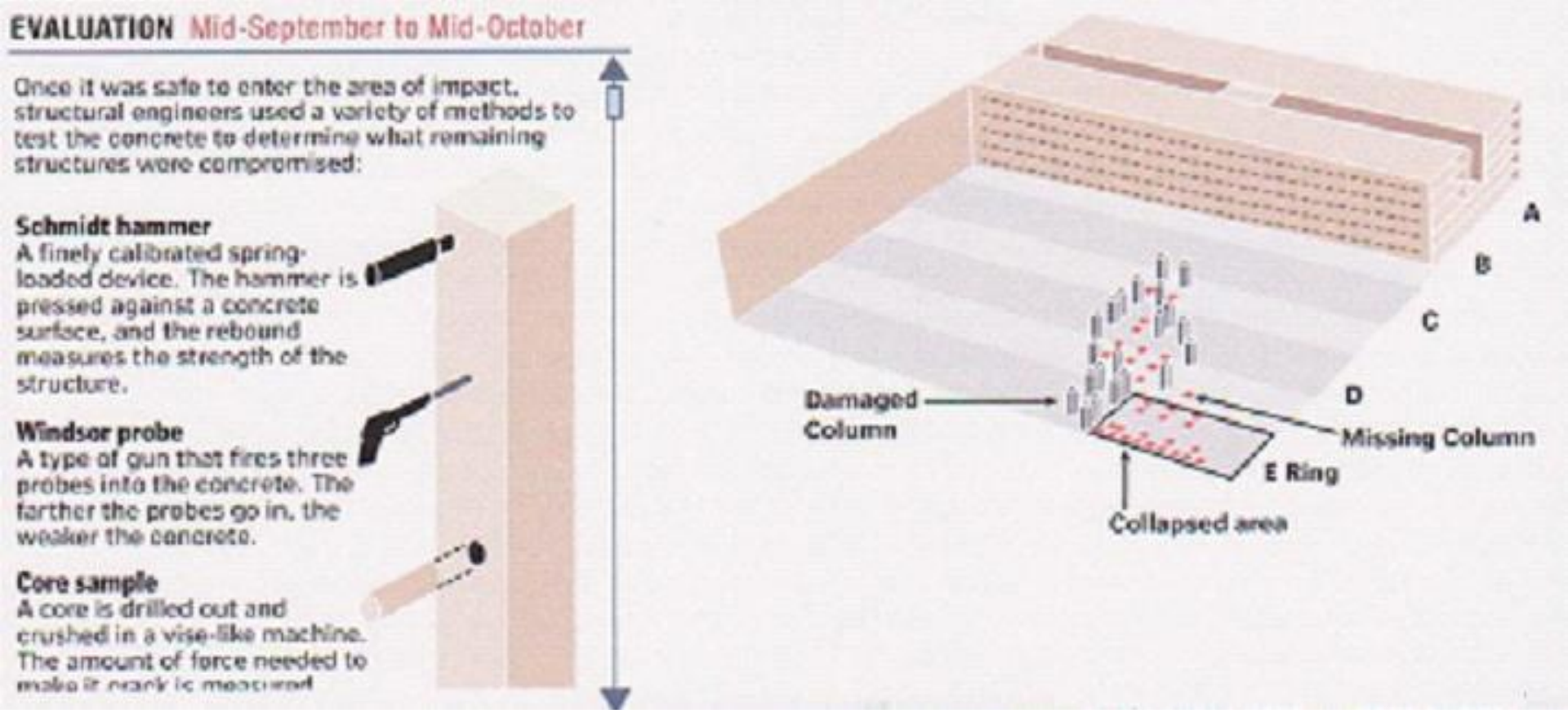
"It is rare in our business for the lead consultant to be the structural engineer but this was a damaged structure and the dominant work was structural"

***Ronald E. Vermillion*, AMEC Project Executive**

RE: *KCE Structural Engineers* of *Washington, D.C.* was chosen as the Construction Manager for the *Phoenix Project*. The rebuilding was undertaken as a modified design-build project (the original Wedge 1 construction was design-bid-build). Prior to 9/11, officials had decided that the contract for the remaining wedges would be awarded as one large design-build contract.


N
Corridor 4
Corridor 5



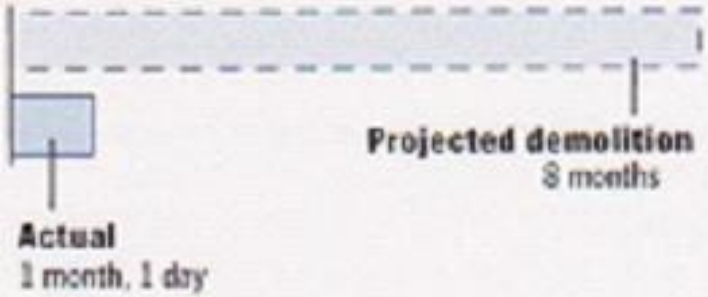


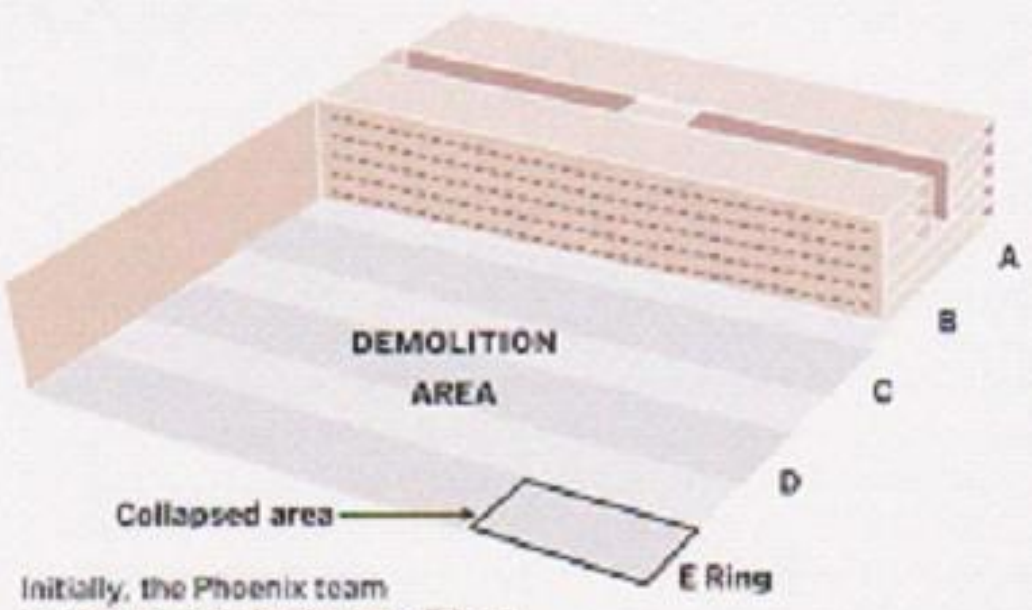
"…were working together in a way that never happens. These were handshake deals. To this day, no one has a contract. Everyone left their egos in the south parking lot."

***Allyn E. Kilsheimer*, KCE Principal**

DEMOLITION Oct. 18 - Nov. 19, 2001

Initial estimates had demolition lasting up to 8 months. With a highly motivated force of skilled laborers working in shifts 24 hours a day, seven days a week, the demolition was completed in one month and one day.





Initially, the Phoenix team had hoped that the damage did not extend far beyond the area of visible collapse.

However, it was determined that 400,000 square feet of space covering all five floors between Corridors 4 and 5 required complete structural demolition.

"…Kilsheimer brought in a team of professionals with whom he had previously worked. He selected three firms for every discipline, choosing companies with a local presence and national offices to capitalize on their size. Work in each discipline was divided between two of the firms while the third firm served as a peer-review group within that design team…Shop drawings were responded to in about two calendar days instead of the typical 14 to 21 business days. And there was an unusually low number (327) of requests for information, which were responded to in hours rather than in days…"

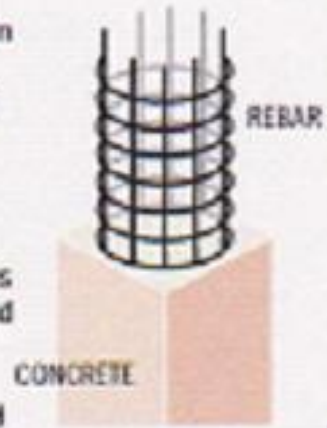
***ENR*, September 2002**

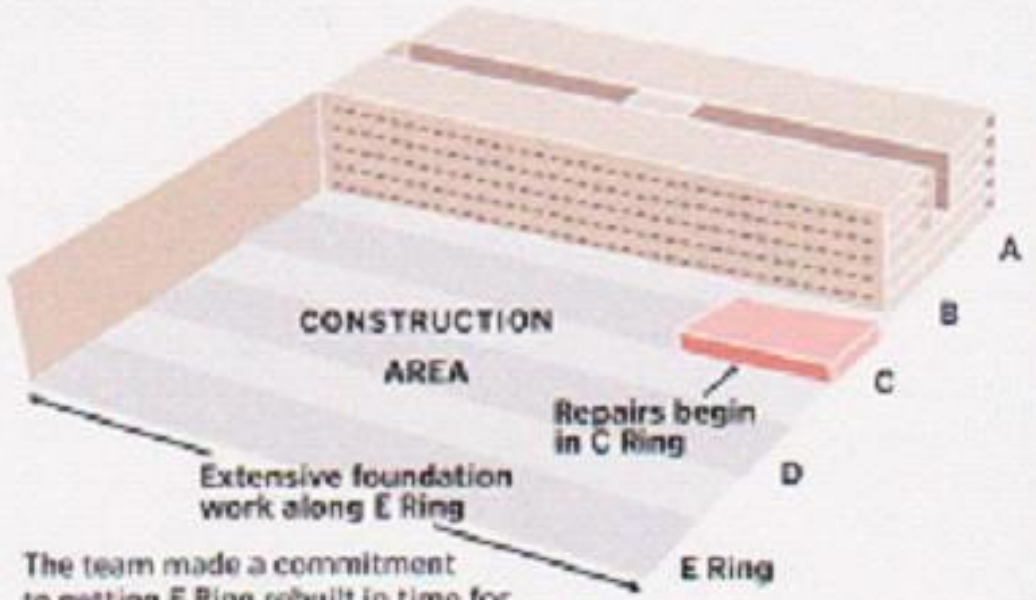
REBUILDING Nov. 19, 2001 - Spring 2002

The Pentagon was five days away from the completion of the renovation of Wedge 1—the first $250 million installment of an 11-year project to upgrade the 1942 building to current standards—at the time of the terrorist attack. With the newly demolished work site straddling Wedges 1 and 2, the Phoenix team had to rebuild from the ground up.

Rebuilding the columns

Following the original design of the building and maximizing the strength of the columns, each new column began with a steel cage of spiral rebar. The rebar was joined to 1.25-inch, high-strength stainless steel dowel rods and planted into the foundation. Formwork was secured around the rebar cages, and





The team made a commitment to getting E Ring rebuilt in time for the one-year anniversary of the attack, but it could not begin rebuilding E Ring immediately—extensive work on the foundation in front of E Ring was needed first.

To keep overall repairs on schedule, workers began in C Ring in the area of collapse.

"…Several daily meetings, some as early as 6:00 a.m., allowed key players to discuss progress and identify problems early. Contractors also met with Pentagon construction officials daily. 'That's new to get the owner that deeply involved,' says AMEC's Vermillion. Everyone on the team – owner, architect, contractor and subcontractors – has to understand what the project goals are, he says. No one can be kept in the dark. 'That's something that I'll carry to the next job,' Vermillion says…"

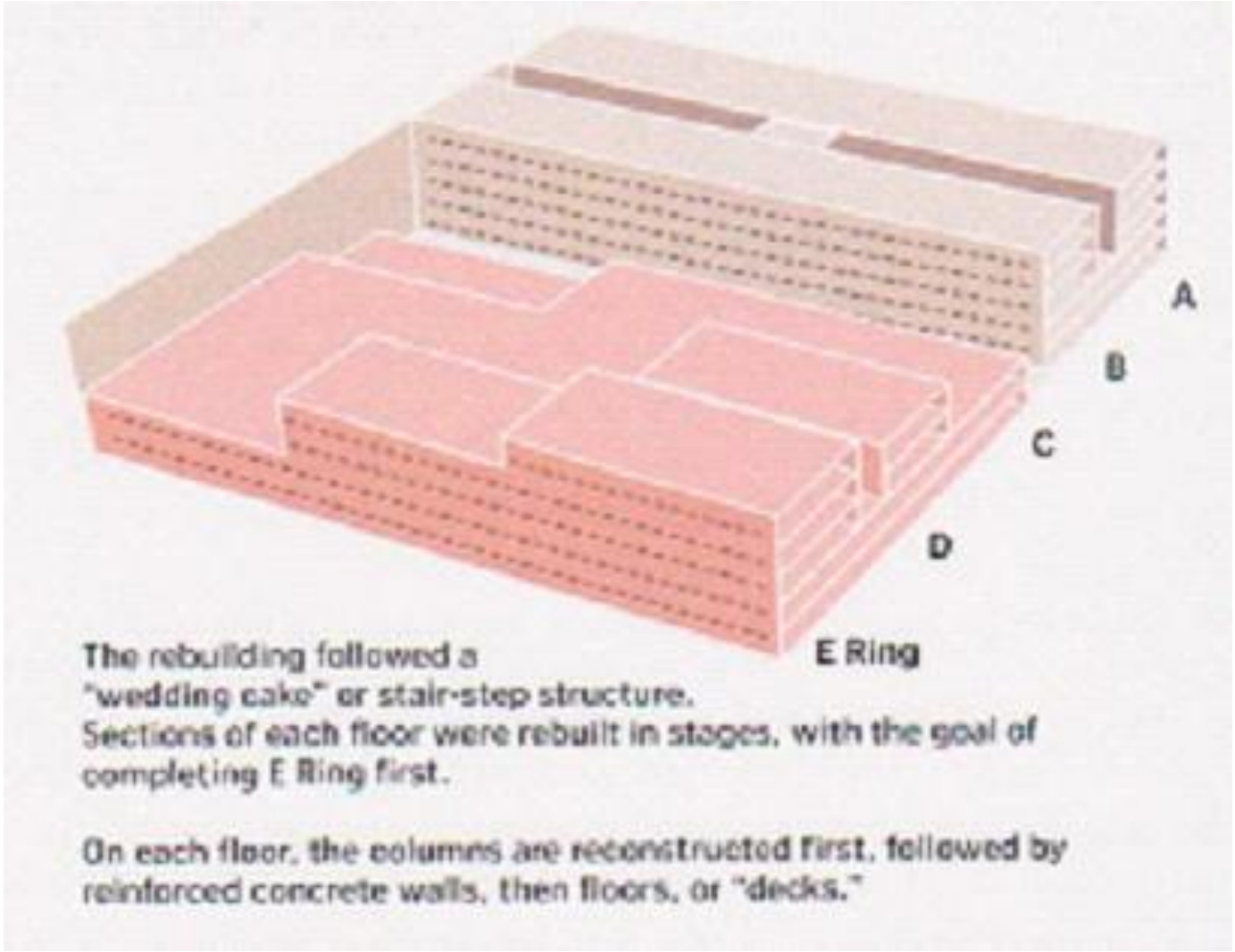
***ENR*, September 2002**



"…These collaborative sessions also helped develop strategies to make the work proceed faster. Kilsheimer, whose firm also was working on another federal construction project, used some of the methods from that project as a starting point to develop a new framing system to limit progressive collapse. The system, which is different from the original Wedge One renovation, is designed to resist certain lateral forces. New support columns have more rebar and less concrete to support the floor above. Pile load tests showed the foundation remained viable, but designers supplemented the existing foundation to enable it to carry increased loads…."

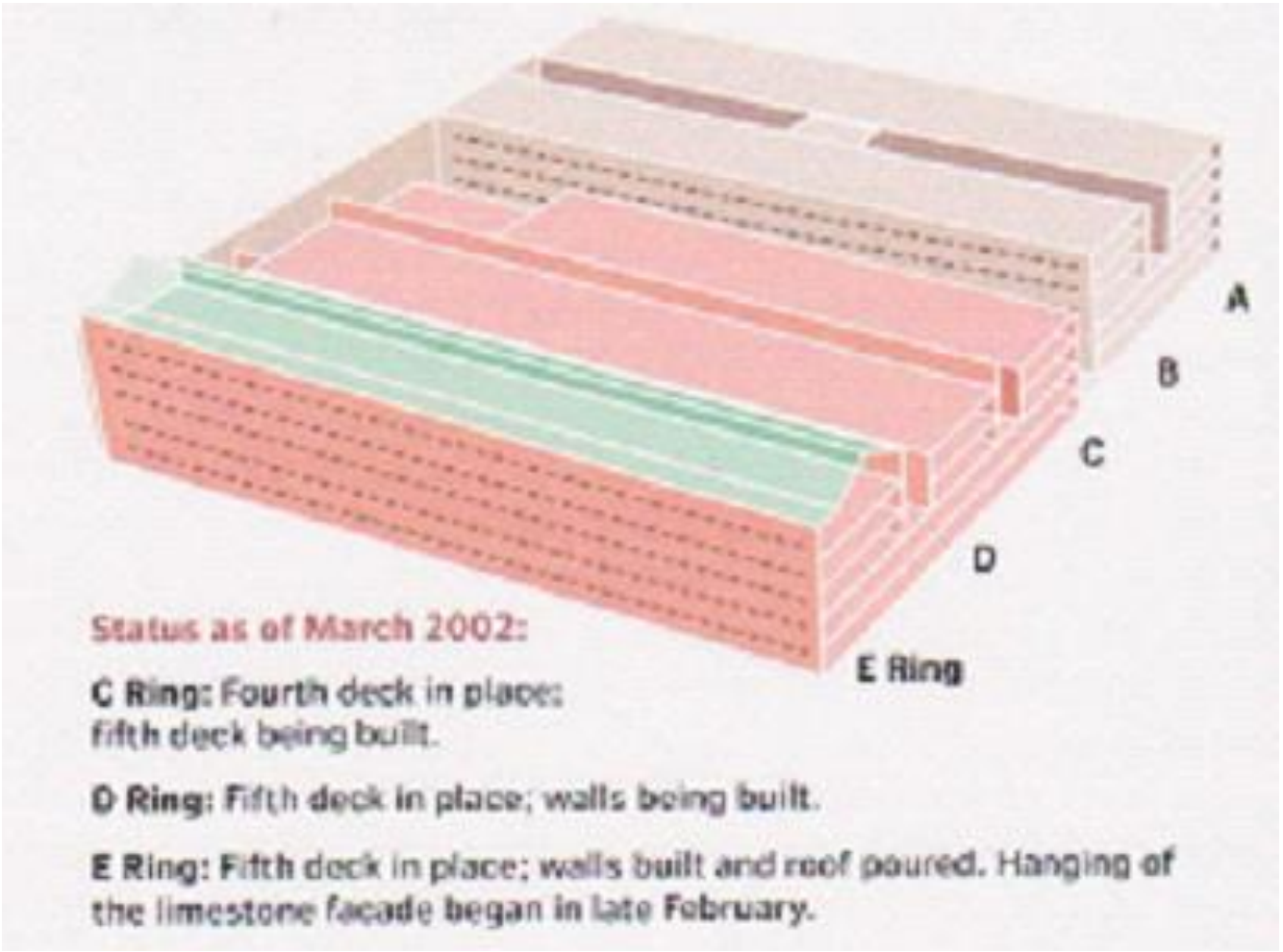
***ENR,* September 2002**

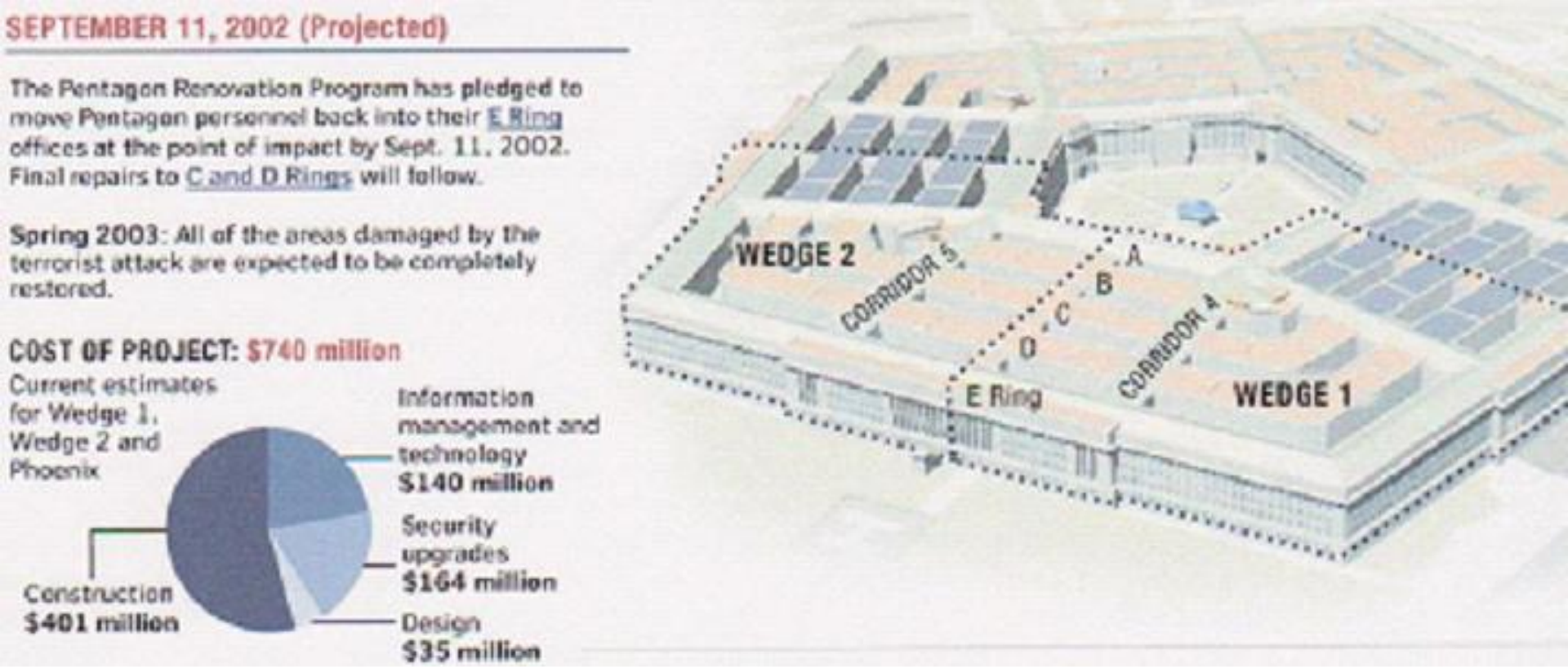
Left: caption: "Workman prepares rebar to reinforce concrete columns"



The rebuilding followed a "wedding cake" or stair-step structure. Sections of each floor were rebuilt in stages, with the goal of completing E Ring first.

On each floor, the columns are reconstructed first, followed by reinforced concrete walls, then floors, or "decks."


A
B
C
D
E Ring
Status as of March 2002:
C Ring: Fourth deck in place; fifth deck being built.
D Ring: Fifth deck in place; walls being built.
E Ring: Fifth deck in place; walls built and roof poured. Hanging of the limestone facade began in late February.



"…There are other security and structural upgrades in the rebuilt wedge that Pentagon officials decline to discuss. But the blast-resistant windows installed in the exterior walls are credited with saving lives and lessening the damage in the renovated section. Crews discovered a message scrawled on some damaged drywall that read: 'Thank you for the safety windows + reinforcement! All our people escaped.' Since the Phoenix is entirely rebuilt, some improvements were made to the approximately 175 exterior windows, which each weigh about 1,500 lbs. and cost $10,000…"
***ENR,* September 2002**


ArchitectureWeek.com

"…Evey's background as a procurement and acquisitions expert also helped keep the project ahead of schedule and under budget. Items that demanded long lead times were ordered in bulk and earlier than needed. Specifically, a mass purchase of new elevators, eight of which are in Wedge One, proved to be a savvy decision. The elevator contractor already was on site and 'we didn't have to go out and do another acquisition,' he says. Officials also worked early with Bybee Stone Co., Ellettsville, Ind., allowing the fabricator of the limestone facade to work through the winter. The project also boasts an impressive safety record, with only three lost-time incidents in 1.9 million hours, says Vermillion. 'There is no magic bullet,' insists Evey, who refuses to take credit for the project's success. 'Technology helps, but it all comes down to people.'…"

***ENR,* September 2002**

"…From ruin and heroism on 9/11, the construction industry in only a year has restored the gap in the Pentagon's facade and the nation's confidence. Tenants are moving into the reconstructed section and the renovation of the remaining unscathed wedges has been quickened. Although a sense of normalcy is returning at the Pentagon, nothing ever will really be the same. The restored walls once again give it the imposing appearance of the five-sided fortress that it really is…"

***ENR,* September 2002**


September 11, 2001

Cold War



"Rumor has it that during the Cold War the Russians never had any less than two missiles aimed at this hot dog stand. They thought this was the Pentagon's most top secret meeting room, and the entire Pentagon was a large fortress built around this hot dog stand. They (Soviets) thought the officers were going to get their top secret briefings in a protected area, but really they were just going to get lunch."

***Brett Eaton*, Information and Communications Officer for Washington Headquarters Services (2006)**



"It's rumored that a portion of their (Soviet) nuclear arsenal was directed at that building, the Pentagon hot dog stand. This is where the building earned the nickname Cafe Ground Zero, the deadliest hot dog stand in the world."

Penatgon Tour Guide

RE: during the *Cold War,* Soviet spy satellites observed groups of officers entering and/or leaving the central courtyard's hot-dog stand. Believing it led to a top-secret underground bunker, they are believed to have targeted the Owl (left) atop the stands roof cupola with one or more ICBM's. In September 2006, the Pentagon announced that the existing hot-dog stand (built in the 1980s) was to be torn down and replaced with a larger, more modern facility. In 1992, the Pentagon was declared a *National Historic Landmark* with the central courtyard one of five historically protected features of the building. As such, the new structure was required to conform to its predecessors architectural design. The original wooden Owl was required to be placed atop the new structure when complete (to scare away birds). The new structure is the third eatery at the center of the courtyard and seats about fifty people.



PEACE

"…The $1.6-billion Pentagon Wedges 2-5 Renovation project, submitted by Hensel Phelps Construction Co., Chantilly, Va., was a 4.5-million-sq-ft undertaking that took nearly 10 years to complete. And even though approximately 1 million sq ft of space was under renovation at any one time during that decade, the ongoing renovations were always invisible to the 23,000-plus military and civilian personnel working there…Three days after the terrorist attacks of Sept. 11, 2001, the U.S. Dept. of Defense and Washington Headquarters Services awarded Hensel Phelps Construction a design-build contract to restore and rebuild the Pentagon's damaged Wedge 2. Shortly thereafter, the scope of work was revised and expanded to 4.5 million sq ft for the renovation of wedges two through five. The new contract included complete demolition and abatement down to the concrete structure; hardening of the exterior envelope; upgrading of all MEP and life safety systems; building flexible office and command center space; restoring numerous historic building features; and relocating the secretary of defense, the Joint Chiefs of Staff, and the National Military Command Center. Originally scheduled for a 14-year duration, Congress cut that down by four years, to just 10…"

***ENRSoutheast,* November 2011**





"Arlington's Pentagon renovation project was the most significant construction projects of 2011, the Associated General Contractors of America announced today. As a result, the project's contractor, Hensel Phelps Construction Co., was the grand award winner…The team completed the renovation nearly four years ahead of the original schedule, allowing 25,000 Pentagon employees to continue working with minimal disruption. The Alliant Build America Awards recognize the nation's most significant construction projects…"

***Associated General Contractors of America,* March 16th 2012**

Left: caption: "Newly renovated space inside the Pentagon"

Right: caption: "Pentagon Library and Conference Center"

"…Lessons learned during the renovation of Wedge One and its subsequent rebuilding are being applied to this project to improve the efficiency and safety of the building. A mock-up office incorporating the Universal Space Plan (USP) devised by general contractor Hensel Phelps, Greeley, Colo., to rapidly reconfigure new office space without time-consuming and expensive relocation of utilities and data lines has helped future tenants understand how the system works, says Michael R. Sullivan, the Pentagon Renovation Program's deputy program manager. The system centers around 5-ft, 6-in.-high 'smart walls' spaced every 20 ft. The walls are never moved and include all utilities, communications and data wiring. An infill piece can be added on top of the wall to close off an area, creating a private office…"

***ENR*, September 2002**





"The scope and magnitude of this project was without comparison. As the home of our country's military operations, the renovations occurred during the height of two major conflicts, and construction succeeded with no minor or major disruptions of the thousands of Pentagon employees. The fee for the design/build prime contractor and others was awarded nearly 100% of the time over nine-plus years, indicating owner satisfaction and contractor/designer attention to detail."

Mark Wylie*, President of the *Central Florida* chapter of *Associated Builders and Contractors

RE: ENR Southeast's Region's *Best Award* (2011) - the top prize given in the magazine's *Best Projects* competition.

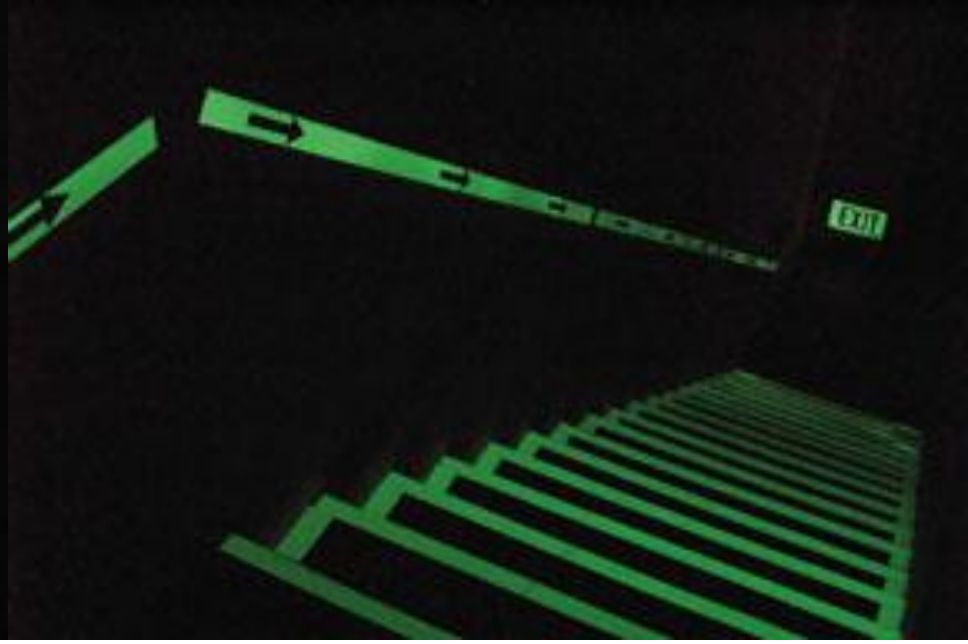

DEPARTMENT OF DEFENSE
SECRETARIES OF DEFENSE



"…Originally scheduled for a 14-year duration, Congress cut that down by four years, to just 10. The scope of work was even more daunting than it sounds, explains John Saul, project executive for Hensel Phelps. The Pentagon's more than 800 tenant groups, including both military and civilian, all required custom-designed improvements. Adding to the complexity was the reality that in an estimated 20% of these instances, due to re-assignments, the tenants that eventually moved into the space were not the ones for which it had been designed. As a result, the team often had to re-design and rebuild the space, all without impacting the schedule. With a battalion of 700 to 800 craft workers laboring around the clock, delays in moving through the planned progression were not acceptable. 'We had to keep that train moving,' Saul says. Also added to the work was the rebuild of a temporary version of the Pentagon's concourse - the collection of shops, fast food and service centers, such as banks and barber shops - that workers depend upon on a daily basis, again without impacting the schedule. The team worked hard to keep its work under wraps."

***ENRSoutheast,* November 2011**





"…Another lesson learned in the aftermath of Sept. 11 was that emergency exit signs traditionally placed above doorways could not be seen through the smoke and flames by people crawling to safety. Designers chose photo-luminescent signs that absorb ambient light and then glow in the dark without the benefit of electricity to mark exit paths and doorways. LUNAplast, manufactured by Luna Technologies International Inc., Kent, Wash., incorporates a proprietary formulation that replaces traditional zinc sulphide. It allows longer visibility - as much as 30 hours - and lower levels of light necessary to 'recharge.' The material used in the Pentagon has higher fire and smoke ratings than conventional materials, says Luna Technologies President Kimberly Landry."

***ENR*, September 2002**

"I thought in general our security needed to be improved; I worked very hard at it. I always thought that was the third-most likely terrorist target in the town, behind the White House and the Capitol. It remains a potent target because of the larger symbol it conveys that the American military is susceptible to attack at its heart, at its central nervous system…The subway was a major concern and it remains a major concern. Right now, if there was an explosion, the blast effects would just be pulled up into the building like a chimney."

***John Hamre*, Deputy Secretary of Defense during the Clinton Administration (September 16, 2001)**

RE: seeking a balance between security and public access, the Pentagon is situated between a network of freeways and is just a few miles from one of the area's major airports. A subway station served the Pentagon with an escalator that led straight up into the building. As such, a bomb planted on the Metro platform would have sent much of its blast into the Pentagon. The subway stop was/is also vulnerable to a biological weapon and/or chemical attack.


Pentagon City



The *Metro Entrance Facility* project was directed by *Congress* in the FY2000 *Department of Defense Appropriations Act* in response to security assessments that identified the need to improve the physical security of the Pentagon. These initiatives involved relocating the bus station and removing the existing direct entry into the Pentagon from the *Metrorail* station. The *Pentagon Metro Station* is the most highly trafficked Metro stop in *Northern Virginia* with over 34K riders daily. The project's goal was to improve the security of the Pentagon's Metro entrance by reorganizing Pentagon arrival, access and circulation areas to create a safe, secure environment. In order to improve the security of the Pentagon Metro entrance, the *Pentagon Renovation Program* removed the escalators and elevators connected to the Pentagon from the Metrorail platform and relocated all vehicle traffic away from the building.





The *South Terrace Project* included two pedestrian bridges over *Rotary Drive*, renovation of the loading dock and connection to the 2nd Floor of the Pentagon (at Corridors 2 and 3). The main purpose of the project was to provide separation of vehicular and pedestrian access while easing traffic congestion along the Drive. The first of two bridges was completed in December 1999. The second bridge (and connecting bus stop wall) was completed in February 2001. To organize Pentagon arrival, a more controllable ingress/egress procedure was established for employees, visitors and public transportation users. Inside the Pentagon, all pedestrian traffic is elevated to the second floor. Design and construction of the new bus facility began in Spring 2001 and was operational in November 2001. The *Physical Fitness and Readiness Facility* (PFRF) replaced the existing 55-year old *Pentagon Athletic Facility* with a larger, modern facility. The 130K-square-foot PFRF is located at Basement Level underneath and adjacent to the Pentagon's *Mall Terrace.*

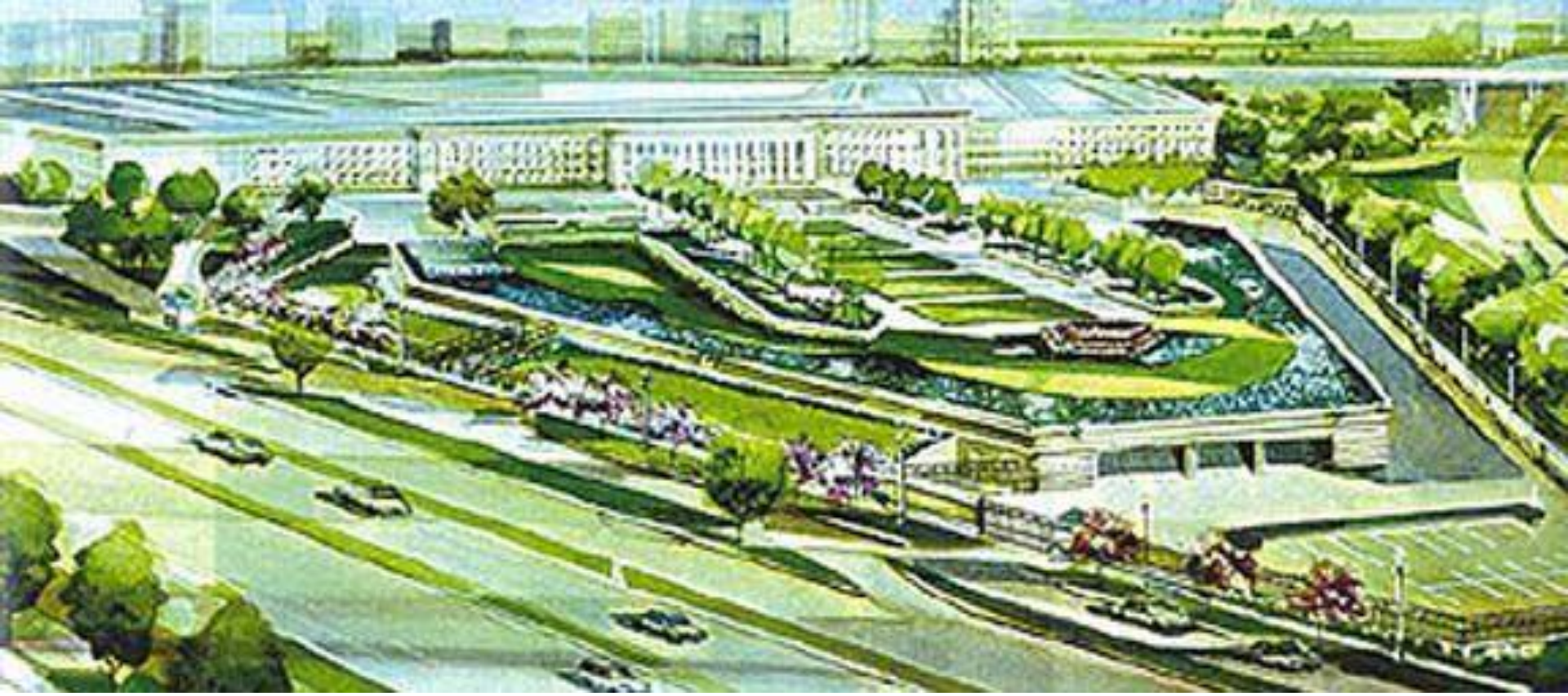


A new structure was built adjacent to the face of the Pentagon to allow for the screening of visitors prior to entering the Pentagon. This new building also houses the Pentagon tour and badge offices.

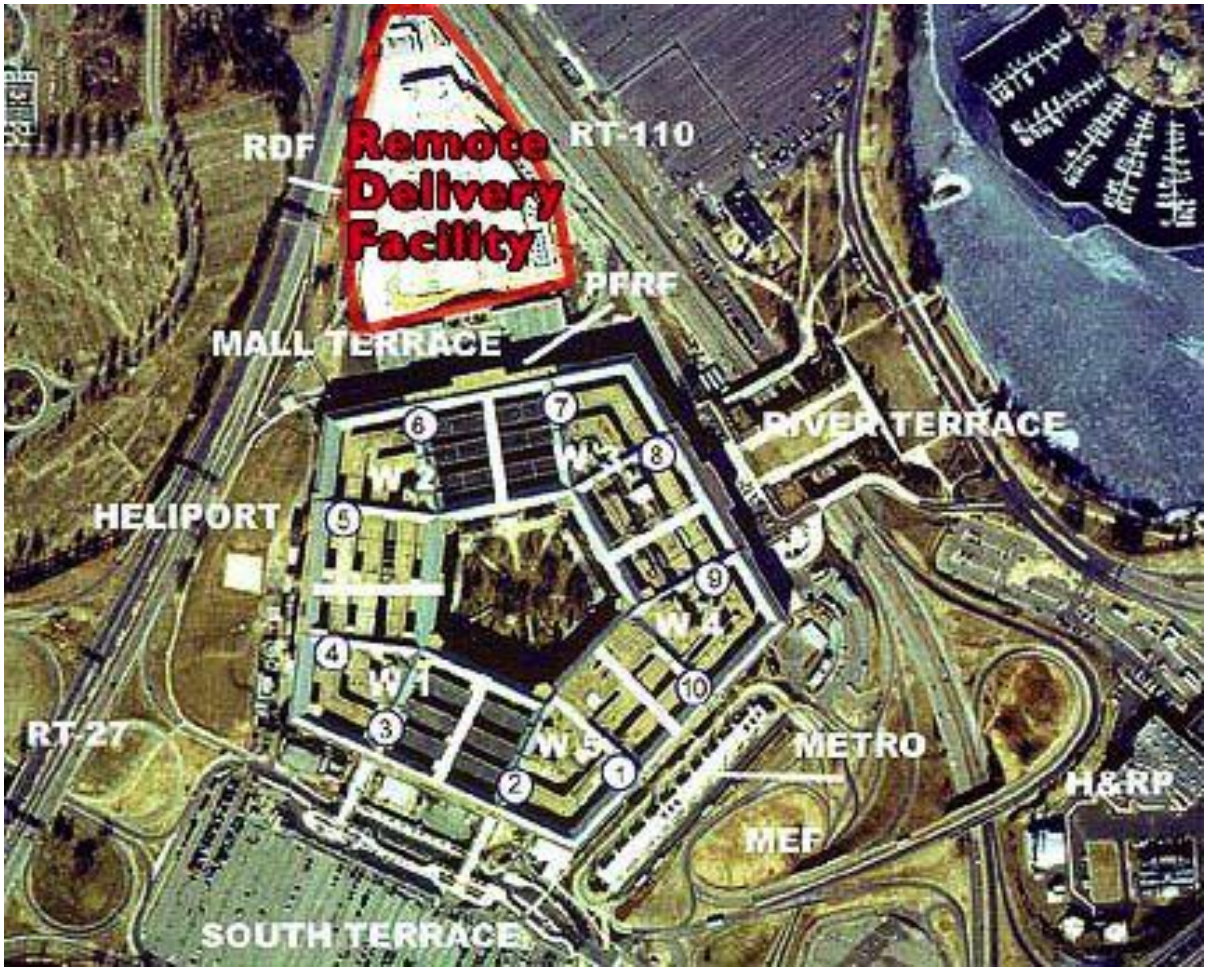

PENTAGON RENOVATION & CONSTRUCTION PROGRAM OFFICE
PROJECTS
PENTAGON ATHLETIC CENTER
RT-110 BYPASS
WEDGES 2-5
PENTAGON MEMORIAL & GATEWAY
LIBRARY and CONFERENCE CENTER
RDF ACCESS LANE
ALT SITES
COMMAND & COMMUNICATIONS SURVIVABILITY PROGRAM
ITS MODERNIZATION / RENOVATION
SECURITY PROJECTS
ANCILLARY PROJECTS
INTAKE / OUTFALL

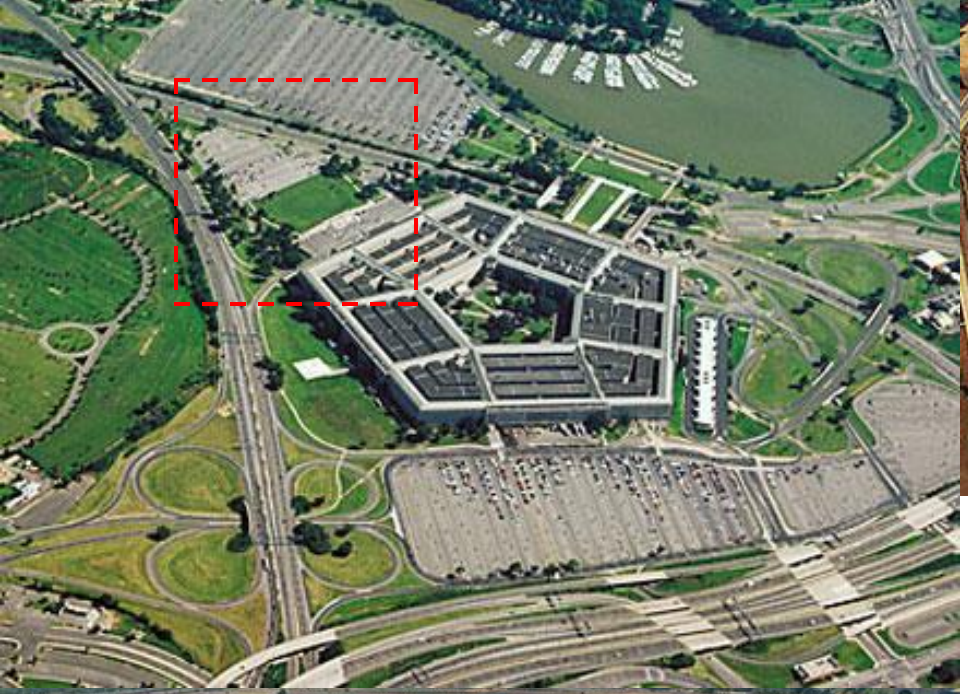


RDF

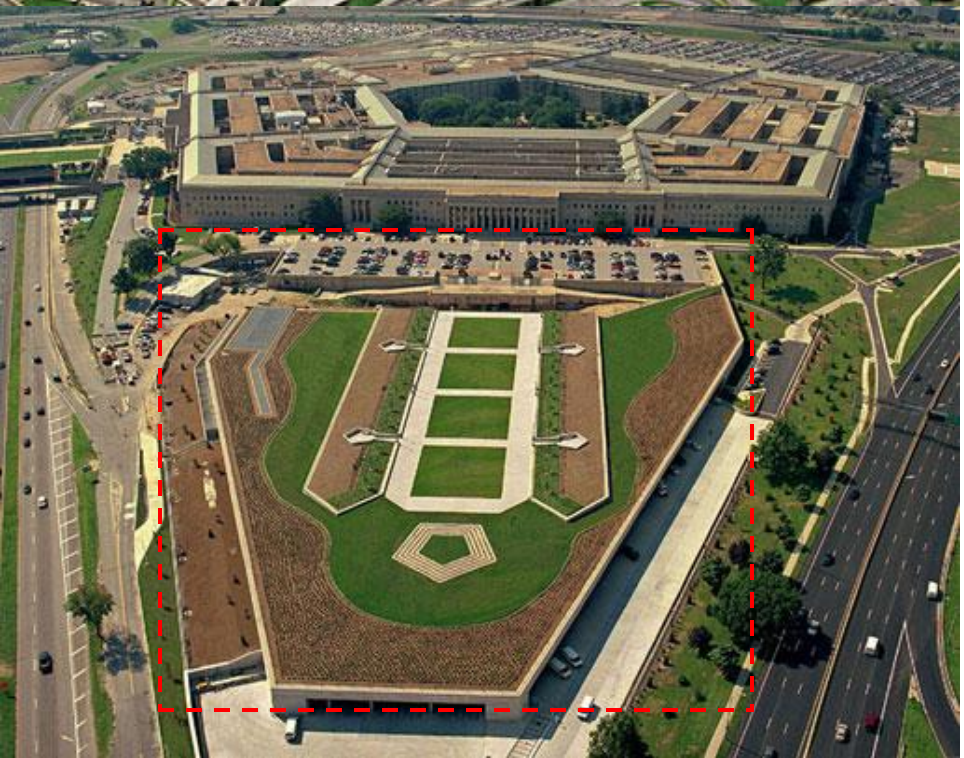


The Pentagon's *Remote Delivery Facility* (a.k.a. "RDF" – conceptual rendering above) is a 250K-square foot shipping and receiving facility adjoining the Pentagon completed in March 2002. The RDF significantly improved the physical security of the Pentagon by providing a secure, consolidated location for receiving and screening thousands of items shipped to the building each day. Before construction of the RDF could begin, the *Mall Extension* parking lot was demolished. By storing the excavated soil at sites around the Pentagon Reservation (for later use instead of disposing of it off-site), the program saved over $1 million (demolition was completed in June 1999). The landscaping of the roof of the facility created a park-like atmosphere, enhancing the view for the tenants who work on the E-ring of the *Mall Terrace* and created an alternate location for some of the ceremonial activities that take place on the *River Terrace*.


Remote
Delivery
Facility
RDF
RT-110
PFRF
MALL TERRACE
RIVER TERRACE
HELIPORT
W1
W2
W3
W4
W5
RT-27
METRO
H&RP
MEF
SOUTH TERRACE







Top Left: location of the RDF (highlighted) prior to construction

Above & Lower Left: Aerial view of the RDF facility. The four grass squares in the middle of the photograph are *Grasspave2* heliports. Helicopters land on the concrete pad/s and park in one (of four) small pentagon shapes (flanking the four landing pads). Grass-pave2 was selected as a "green" alternative for helicopter landing pads having a high compressive strength (5,721psi). The Pentagon RDF is also a *LEED Certified Project* and it has the largest green roof east of the *Mississippi River*.

Hall of Heroes

"Resolved by the Senate and House of Representatives of the United States of America in Congress assembled, That the President of the United States be, and he is hereby, authorized to cause two thousand 'medals of honor' to be prepared with suitable emblematic devices, and to direct that the same be presented, in the name of the Congress, to such non-commissioned officers and privates as shall most distinguish themselves by their gallantry in action, and other soldier-like qualities, during the present insurrection"

S.J.R. No. 82 - signed by POTUS *Abraham Lincoln* on July 12th 1862

RE: the idea of the *Medal of Honor* originated with Army Assistant Adjutant General Lieutenant Colonel *Edward Davis Townsend*. However, the Army's top officer; General *Winfield Scott*, the nation's greatest soldier in the first half of the nineteenth century, rejected it. Secretary of the Navy *Gideon Welles*, desperate to find a way to restore morale among the ranks of a *U.S. Navy* that had been decimated by defections to the Confederacy, however, loved the idea. On December 21st 1861, President Lincoln signed into law the bill establishing the Navy Medal of Honor for enlisted personnel (officers became eligible in 1915). On July 12th 1862, the Army established a Medal of Honor for its enlisted personnel (officers became eligible March 3rd 1863). Though the Medal of Honor was specified to expire at the end of the *Civil War*, it was made a permanent decoration for: "Conspicuous Gallantry and Intrepidity in Action at the Risk of His/Her Life above and Beyond the Call of Duty."



<u>Left</u>: view of the Pentagon's *Hall of Heroes*, in which the name of every *Medal of Honor* recipient is listed. Displayed on the wall are representations (from left to right) of the Army, Navy / Marine Corps / Coast Guard and Air Force Medal/s of Honor



U.S. Army Medal of Honor



U.S. Navy/Marine Corps/Coast Guard Medal of Honor



U.S. Air Force Medal of Honor

Most Decorated Soldier

MURPHY, AUDIE L

Rank and organization: Second Lieutenant, U.S. Army, Company B 1 5th Infantry, 3d Infantry Division. *Place and date*: Near Holtzwihr France, 26 January 1945. *Entered service at*: Dallas, Tex. *Birth*: Hunt County, near Kingston, Tex. *G.O. No.*. 65, 9 August 1945.

Citation:

2d Lt. Murphy commanded Company B, which was attacked by 6 tanks and waves of infantry. 2d Lt. Murphy ordered his men to withdraw to prepared positions in a woods, while he remained forward at his command post and continued to give fire directions to the artillery by telephone. Behind him, to his right, 1 of our tank destroyers received a direct hit and began to burn. Its crew withdrew to the woods. 2d Lt. Murphy continued to direct artillery fire which killed large numbers of the advancing enemy infantry. With the enemy tanks abreast of his position, 2d Lt. Murphy climbed on the burning tank destroyer, which was in danger of blowing up at any moment, and employed its .50 caliber machinegun against the enemy. He was alone and exposed to German fire from 3 sides, but his deadly fire killed dozens of Germans and caused their infantry attack to waver. The enemy tanks, losing infantry support, began to fall back. For an hour the Germans tried every available weapon to eliminate 2d Lt. Murphy, but he continued to hold his position and wiped out a squad which was trying to creep up unnoticed on his right flank. Germans reached as close as 10 yards, only to be mowed down by his fire. He received a leg wound, but ignored it and continued the single-handed fight until his ammunition was exhausted. He then made his way to his company, refused medical attention, and organized the company in a counterattack which forced the Germans to withdraw. His directing of artillery fire wiped out many of the enemy; he killed or wounded about 50. 2d Lt. Murphy's indomitable courage and his refusal to give an inch of ground saved his company from possible encirclement and destruction, and enabled it to hold the woods which had been the enemy's objective.



THE UNITED STATES OF AMERICA

TO ALL WHO SHALL SEE THESE PRESENTS, GREETING:

THIS IS TO CERTIFY THAT
THE PRESIDENT OF THE UNITED STATES OF AMERICA
PURSUANT TO ACTS OF CONGRESS APPROVED MARCH 3, 1863
AND JULY 9, 1918, HAS AWARDED IN THE NAME OF CONGRESS TO

Second Lieutenant Audie L. Murphy, United States Army

THE MEDAL OF HONOR

FOR
CONSPICUOUS GALLANTRY AND INTREPIDITY INVOLVING
RISK OF LIFE ABOVE AND BEYOND THE CALL OF DUTY
IN ACTION WITH THE ENEMY

near Holtzwihr, France, on 26 January 1945

GIVEN UNDER MY HAND IN THE CITY OF WASHINGTON
THIS 23rd DAY OF April 1945

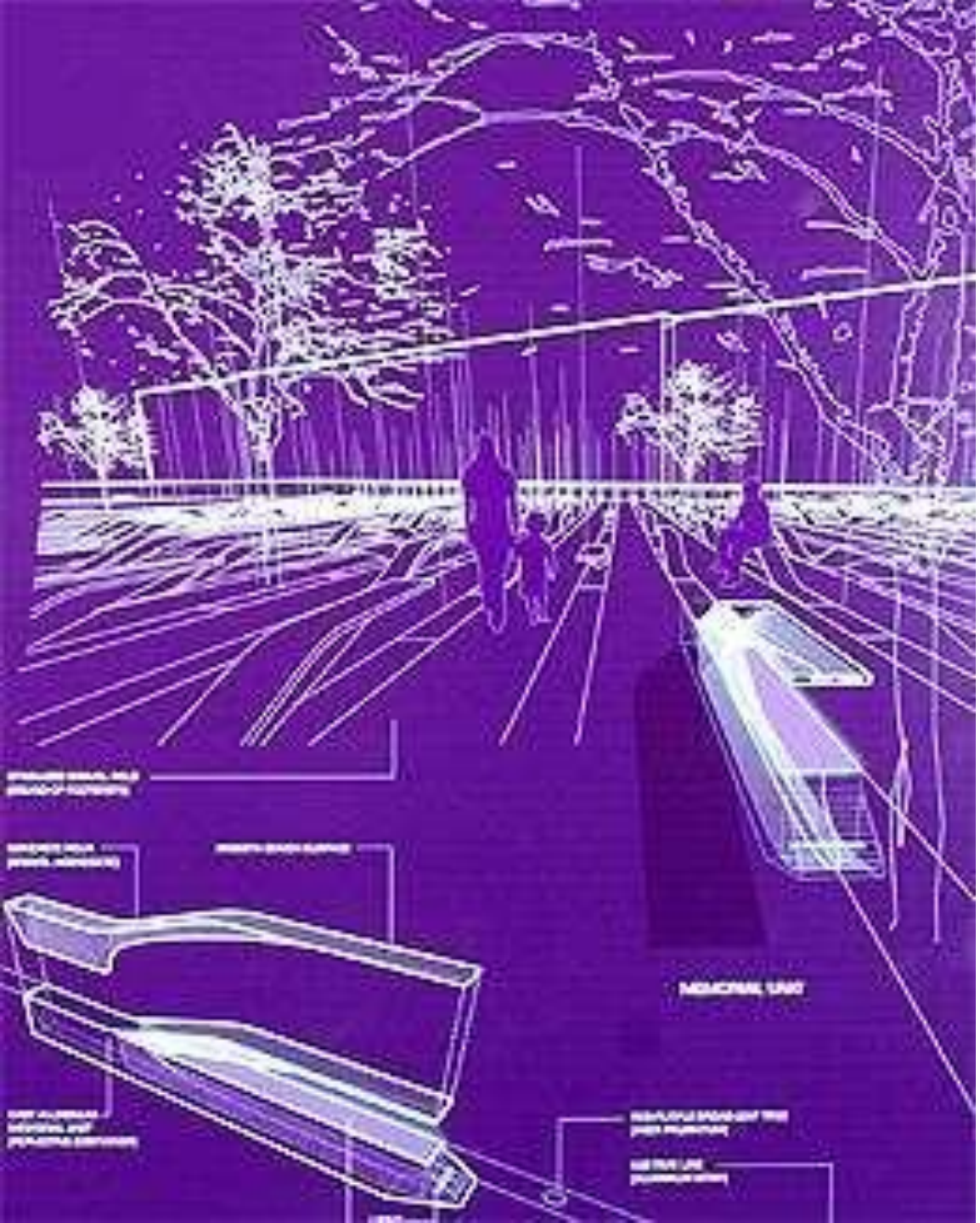
Henry L. Stimson
SECRETARY OF WAR



By the end of WWII, *Audie Murphy* had been awarded 33 decorations; among them, in addition to the nation's highest award for valor; the *Medal of Honor*, were two *Silver Stars*, two *Bronze Stars*, three *Purple Hearts*, the *Distinguished Service Cross* and the French *Croix de Guerre*. He was the most highly decorated soldier of the *Second World War*


LIFE
MOST DECORATED SOLDIER
JULY 16, 1945 10 CENTS

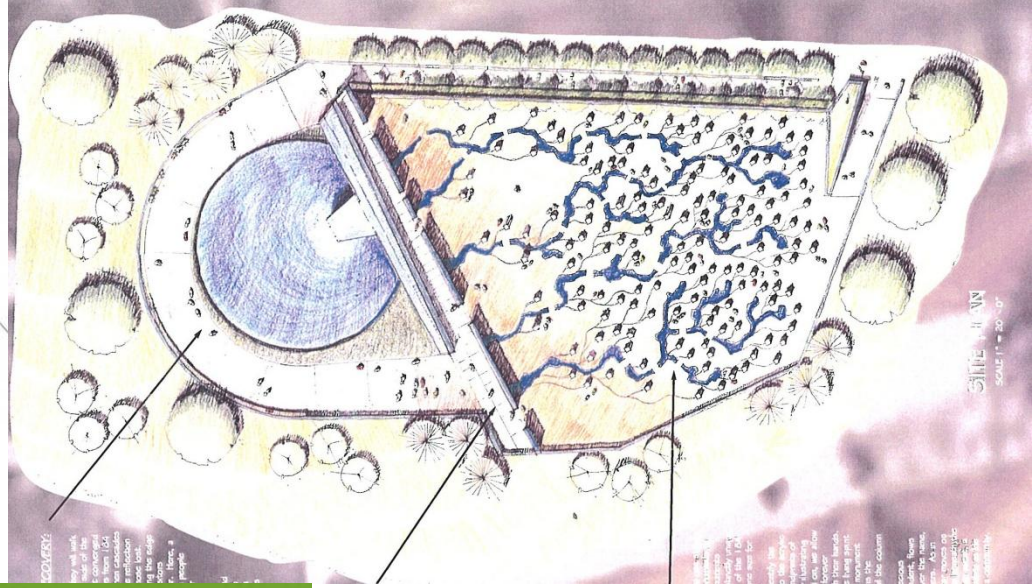
In Memoriam



"The Department of Defense today announced the selection of the Pentagon memorial design by the design selection jury. The winning design is the so-called 'Light Benches' submitted by Julie Beckman and Keith Kaseman of New York…The memorial will be built on a 1.93-acre plot on the Pentagon reservation near the spot where the attack occurred on the building. Washington Headquarters Services and the Pentagon renovation team will supervise construction of the memorial. The memorial encompasses the entire memorial site and includes 184 benches with the name of each victim engraved into the face of the bench. The benches are to be comprised of cast, clear, anodized aluminum polyester composite matrix set on an eight-inch concrete pad for stabilization…"

Digital Journal, **March 2003**







<u>Above L&R & Left</u>: three landscape designs submitted for the *Pentagon Memorial Design Competition* honoring the 184 victims of the 9/11 terrorist attack on the Pentagon





On September 11th 2008, POTUS *George W. Bush* dedicated and opened to the public the *Pentagon Memorial*, located just southwest of the Pentagon itself. It is a permanent outdoor memorial to the 184 men and women who died in the building and on *American Airlines Flight 77* during the September 11th 2001 terrorist attack.

A total of 184 illuminated benches – one for each victim of the 9/11 attack - were arranged according to the victim's age/s, beginning with *Dana Falkenberg*, 3yo, up to *John Yamnicky Sr.*, 71yo. Set in a landscaped 1.93-acre plot, each bench is engraved with the name of a victim. The benches representing the victims that were inside the Pentagon are so arranged that those reading the names face the Pentagon's south facade, where the plane struck the building. Benches dedicated to victims aboard the plane are arranged so that those reading the engraved name will be facing skyward along the path the plane traveled that day. If more than one member of a family died during the attack, family names are listed in the reflecting pool beneath the bench (in addition to the separate benches that have been created for each individual). A wall along the edge of the Memorial begins at a height of three-inches and rises to a height of seventy-one inches; the ages of the youngest and oldest victim of the attack. Approximately eighty-five *Paperbark Maple* trees are planted on the memorial grounds as well. The memorial was designed by *Julie Beckman* and *Keith Kaseman* of the architectural firm of *Kaseman Beckman Advanced Strategies* with support from engineer *Buro Happold.*






COL CANFIELD D. BOONE, USA

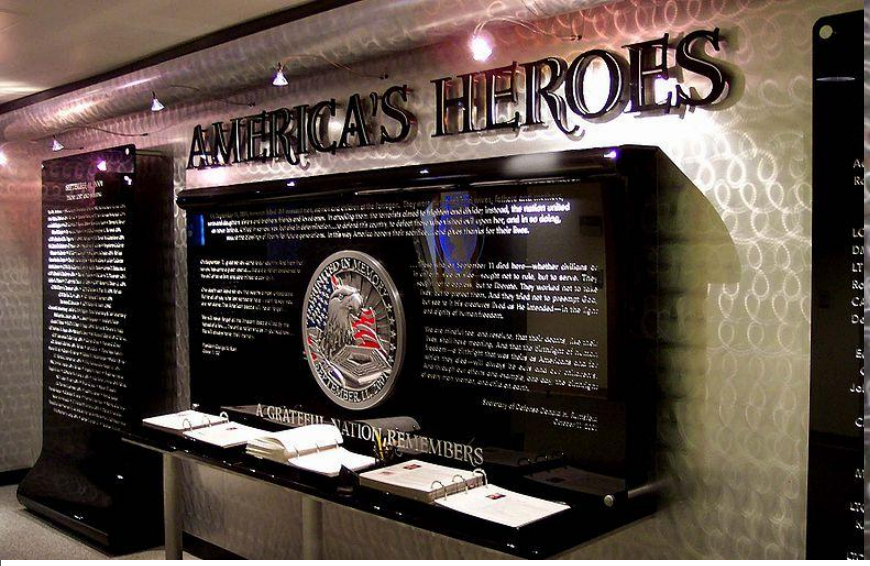





On September 11, 2001, acts of terrorism took the lives of thousands at the World Trade Center in New York City, in a grassy field in Shanksville, Pennsylvania and here at the Pentagon.
We will forever remember our loved ones, friends and colleagues.
1968 · Paul W. Ambrose
1973 · SPC Craig S. Amundson, USA
1973 · YN3 Melissa Rose Barnes, USN
1932 · MSG Max J. Beilke, USA, Retired
1966 · Yeneneh Betru
1977 · IT2 Kris Romeo Bishundat, USN
1953 · Carrie R. Blagburn
1948 · COL Canfield D. Boone, USA
1936 · Mary Jane Booth
1958 · Donna M. Bowen
1970 · Allen P. Boyle
1990 · Bernard C. Brown II
1977 · ET3 Christopher L. Burford, USN
1949 · CAPT Charles F. Burlingame III, USNR, Retired
1979 · ET3 Daniel M. Caballero, USN
1957 · SFC Jose O. Calderon-Olmedo, USA
1957 · Suzanne M. Calley
1950 · Angelene C. Carter
1963 · Sharon A. Carver
1947 · William E. Caswell
1945 · SFC John J. Chada, USA, Retired
1938 · Rosa Maria Chapa
1962 · David M. Charlebois



Located in *Arlington National Cemetery* is the *Victims of Terrorist Attack on the Pentagon Memorial* (left), a five-sided granite marker commemorating the five individuals for whom no remains were ever recovered (it lists the names of all victims of the attack on its faces). The remains of twenty-five victims (recovered from the Pentagon) are buried beneath the marker.





<u>Above</u>: opened in September 2002, the *America's Heroes Memorial* and chapel are located where *American Airlines Flight 77* crashed into the Pentagon. The memorial includes a book of photographs and biographies of the victims. Also included are five large black acrylic panels: one displays the *Purple Heart* medal awarded to military members killed in the attacks while the other displays the medal given to civilian victims. Two back wall panels are etched with the victims' names, and a center panel includes tribute statements. The small chapel, (located in an adjacent room) has stained glass windows with patriotic-themed designs.


THE PENTAGON
WASHINGTON D.C.