A Status Report to the Congress on

Renovation of the Pentagon

Prepared by

The Office of the Secretary of Defense

March 1, 1998

A STATUS REPORT TO THE CONGRESS ON THE RENOVATION OF THE PENTAGON

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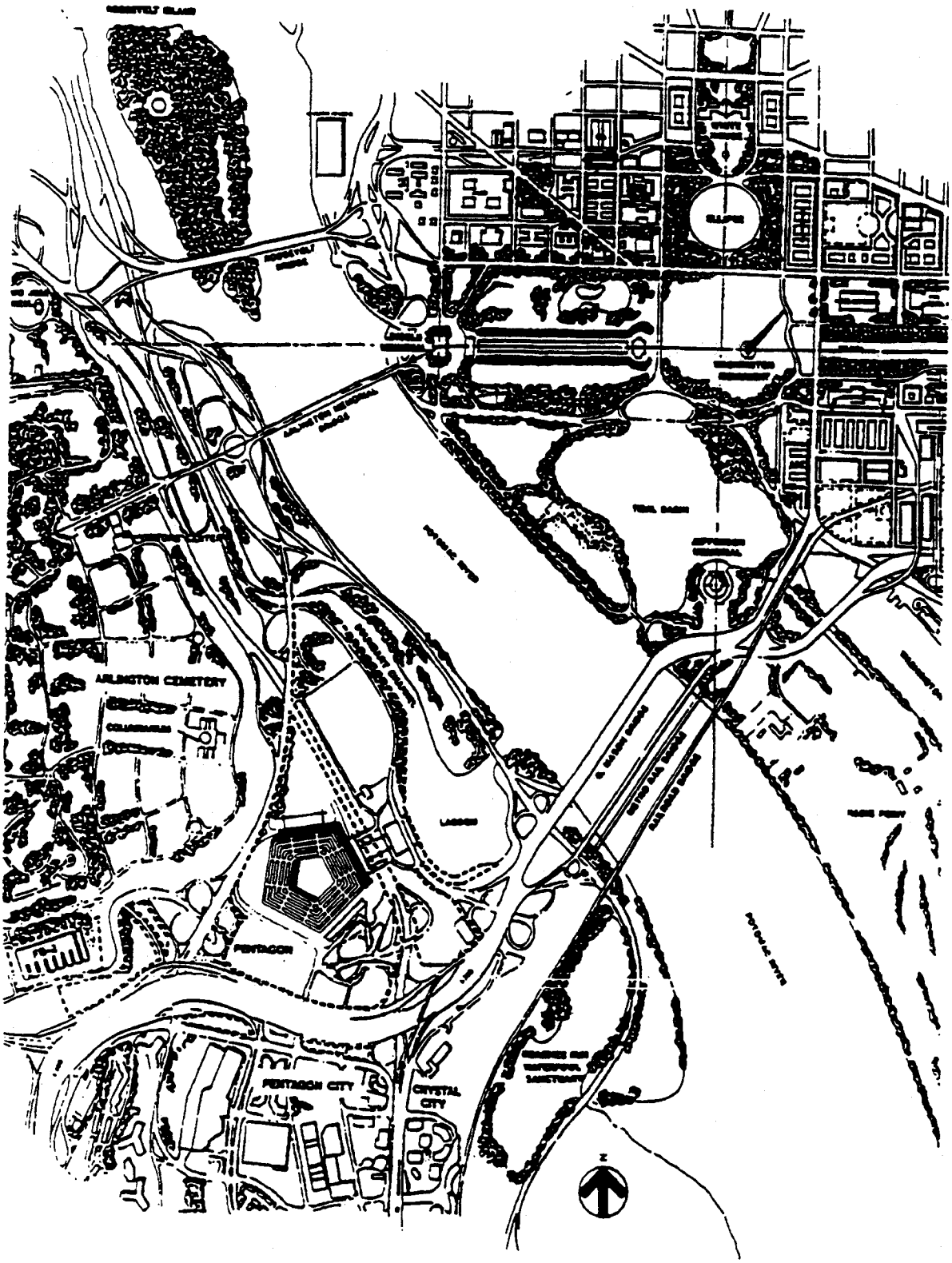
Purpose

This report is provided to the Congress in compliance with Title 10 United States Code, Section 2674. This requires the Secretary of Defense to submit an annual report on the status of the renovation of the Pentagon Reservation, and a plan for the renovation work to be conducted in the fiscal year beginning in the year in which the report is transmitted.

This is the eighth annual report submitted in compliance with 10 USC 2674. The report covers accomplishments to date and actions proposed for FY 1998. In addition, information is included on several related projects which support the overall objectives of operations and maintenance of the Pentagon Reservation.



Pentagon Location Map

I Program Status

The program projects an overall completion of the renovation in FY 2009. The primary activities in the program include the following:

Primary Activities

- Development of Design Guidelines and Criteria for the overall project - ***completed***.
- Design and Construction of Basement/Mezzanine - ***underway***.
- Design and Construction of Wedge #1 - ***underway***.
- Design and Construction of Wedge #2.
- Design and Construction of Wedge #3.
- Design and Construction of Wedge #4.
- Design and Construction of Wedge #5.
- Program, design, build-out, and occupancy of "Swing Space" - ***underway***.

Activity Status Projects Completed

Basement/Mezzanine

- River Terrace Renovation - ***completed***.
- Handicap Access Ramps and Handicap Access Lift - ***completed***.

Other Related Projects

- Heating & Refrigeration Plant - ***completed***.
- Center Courtyard Utilities Tunnel - ***completed***.
- Classified Waste Incinerator Plant - ***completed***.
- Sewage Lift Station - ***completed***.
- New Site Security Checkpoints - ***completed***.
- Ramp and Bridge from North Parking to Corridor 8 Entrance - ***completed***.
- River Terrace Vehicular Bridge - ***completed***.

Activity Status Projects Under Construction

Basement/Mezzanine

- Basement & Mezzanine Renovation.
- Corridor 8 Entrance Renovation.
- Segment 2.A.2 Demolition and Abatement.
- Construction Entrance for Segment 2.A.2.
- Segment 2.A.2 Core & Shell.

Wedge #1

- Wedge #1 Barrier Walls and Temporary Mechanical, Electrical and Plumbing Systems.
- South Terrace Pedestrian Bridges.
- Swing Spaces.

Projects in Design

Basement

- Segments 2 & 3 Core & Shell.

Wedge #1

- Core & Shell - ***completed.***
- Tenant Fit-out.

Other Related Projects

- Intake Piping and Structures for Heating & Refrigeration Plant (H&RP).

II Fiscal Year 1998 Program

The FY 1998 program includes the following activities:

Activities

Basement/Mezzanine Renovation

- Complete construction of Segment 1.
- Complete construction of DiLorenzo TRICARE Health Clinic.
- Complete Demolition and Abatement of Segment 2.A.2.
- Complete the Construction Entrance for Segment 2.A.2 of the Basement and Mezzanine.
- Complete construction of Mug-Handle Infill project.
- Begin construction of Core & Shell for Segment 2.A.2.
- Complete design of Segments 2 & 3 Core & Shell.
- Complete design of Tenant Fit-Out.

Wedge #1 Renovation

- Complete construction of Barrier Wall.
- Complete construction of Temporary Mechanical, Electrical, and Plumbing Work.
- Continue construction of South Terrace Pedestrian Bridge at Corridor 2.
- Begin design of Tenant Fit-Out.
- Complete vacating 5,000 tenants from Wedge #1.
- Continue demolition and abatement activities.
- Award Core & Shell construction project.

Other Related Activities

- Continue with Swing Space Moves.
- Complete design of H&RP Intake Piping and Structures.
- Store historical displays and artifacts.

The facilities involved in the renovation plan will benefit from the modern and efficient heating, ventilation, and air conditioning (HVAC), electrical, and plumbing systems.

The following additional key benefits will result from the renovation:

- Asbestos will continue to be removed.
- Accessibility for the disabled will continue to be provided.
- Improvements to security will continue to be made.

Except for areas vacated during construction, operations will be maintained.

III Work Accomplished

The following is a summary of accomplishments to date:

Renovation Program Development

- A Concept Plan for the renovation of the Pentagon was completed in December 1989.
- All initial prototypical designs are complete.
- Design is now approximately 25% complete for the overall renovation of the Pentagon.

Construction Projects Design

Basement

- Contract for design of the Basement was awarded in February 5, 1993.
- Final design for Basement Segment 1 Core & Shell was completed May 2, 1994.

Core & Shell
(Basic structure and infrastructure to define a generic space)

The design for the renovation of the Core & Shell of the Pentagon building was awarded to HSM&M for Wedge #1 in 1994. The design of the Core & Shell for Wedges #2 through #5 was also awarded to HSM&M in the second quarter of FY 1998.

Tenant Fit-out
(Partitions and specific requirements to define a special space for specific tenants)

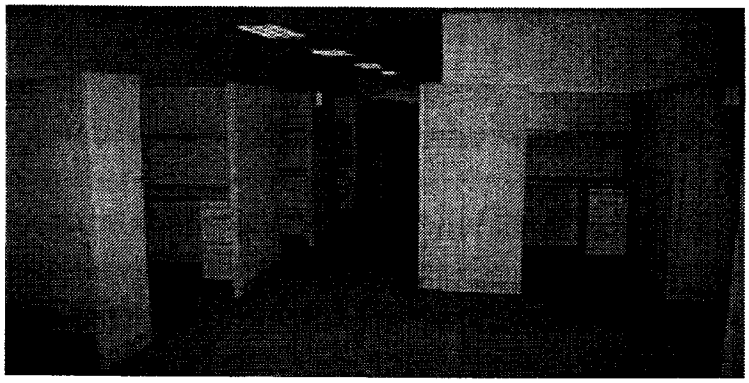
An Indefinite Quantity Contract for the design for the Tenant Fit-out of the Pentagon was awarded to three separate firms: DMJM-3D/I, EYP and Sverdrup in the second quarter of FY 1998.

Construction

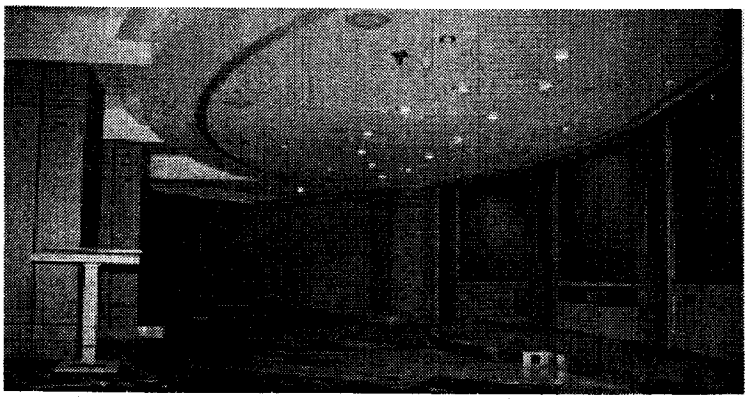
Much of the work accomplished on the Pentagon within the last several years has been out of sight. For example, the Heating & Refrigeration Plant (H&RP), Classified Waste Incinerator Plant, Sewer Line to Federal Building 2 (FB2), Sewage Lift Station, Visitor Parking and Basement/ Mezzanine renovation are not readily visible to building occupants. However, some personnel have experienced the physical impact of renovations because they were relocated into other space within the Pentagon or to swing space out of the Pentagon. Some of the more visible projects that have been constructed recently or are under construction include the River Terrace Vehicular Bridge, the Corridor 8 Entrance renovation, the South Terrace Pedestrian Bridges, and the beginning of Wedge #1 construction.

Construction Progress Basement/Mezzanine

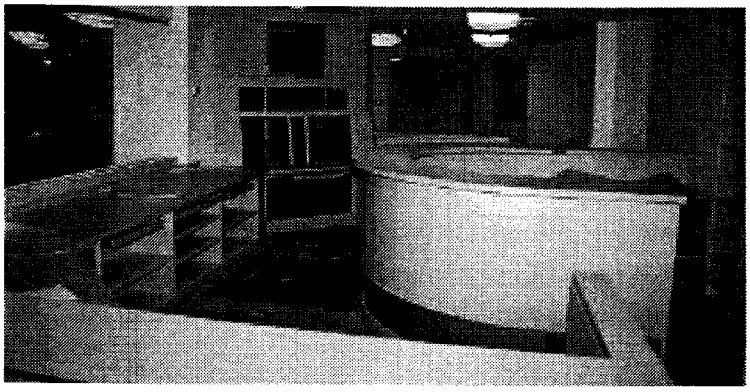
The renovation of Segment #1 the Basement and Mezzanine has been under construction since March 1994 and is now nearly complete. This work is scheduled for completion in FY 1998. The photographs below are representative of the completed areas in the Basement and Mezzanine.



Completed Command and Control Center Automated Data Processing (Administrative Area)



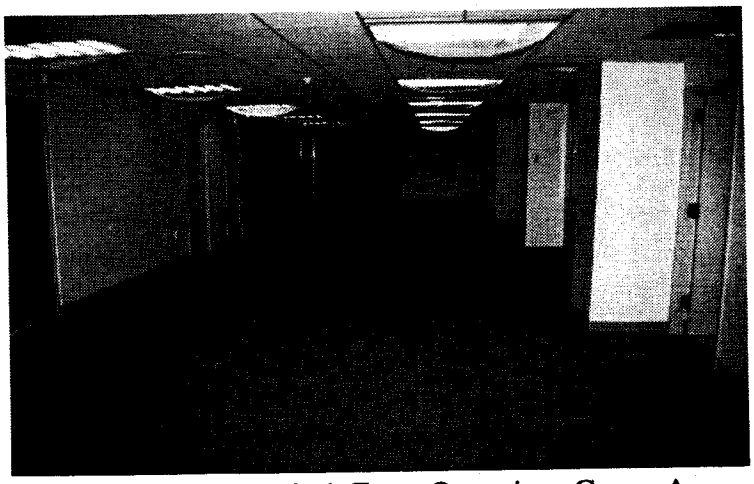
Nearly Completed Air Force Council Room



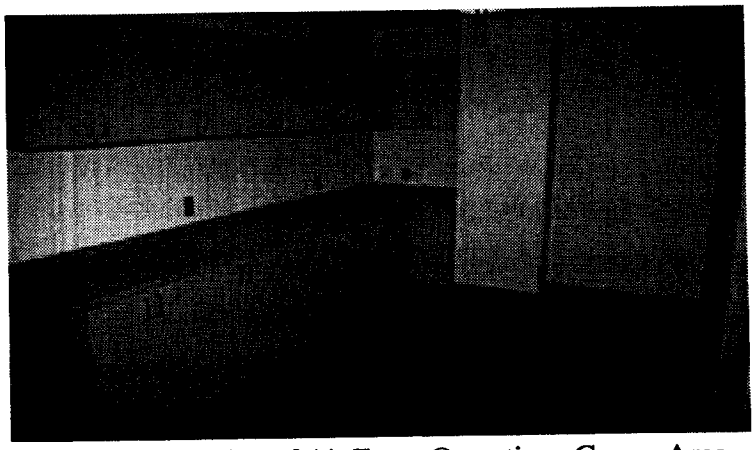
Nearly Completed Air Force Watch Area

Construction Progress Basement/Mezzanine

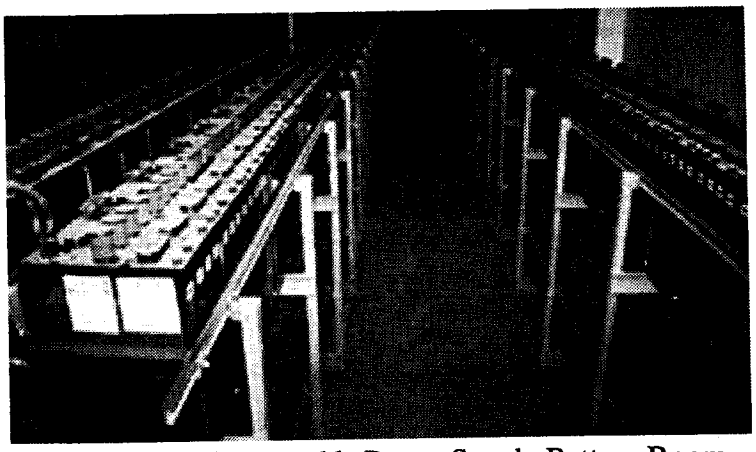
The photographs below are representative of various completed offices and support areas in the Basement and Mezzanine.



Completed Section of Air Force Operations Group Area



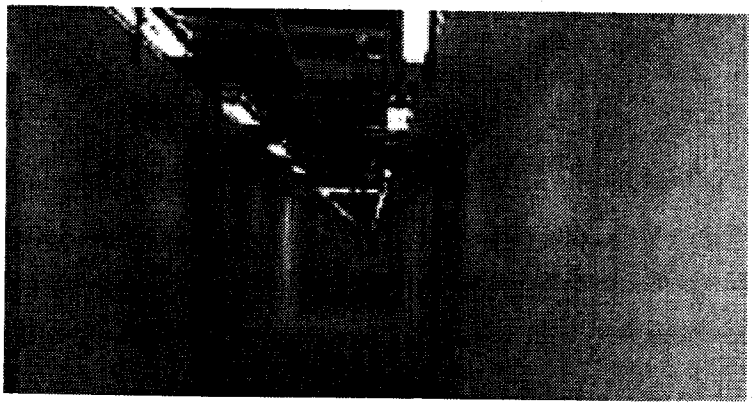
Completed Section of Air Force Operations Group Area



Completed Uninteruptable Power Supply Battery Room

Construction Progress Basement/Mezzanine

The following photographs represent the status of construction on the Mezzanine.



Level E-Ring from Corridor #9 - Under Construction

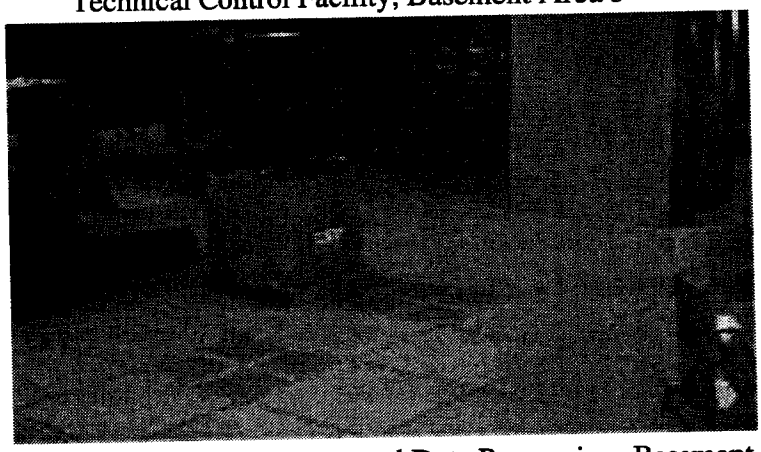
Corridor #8 - Under Construction

Basement Mezzanine- New Air Conditioning Being Installed in a Telephone Closet

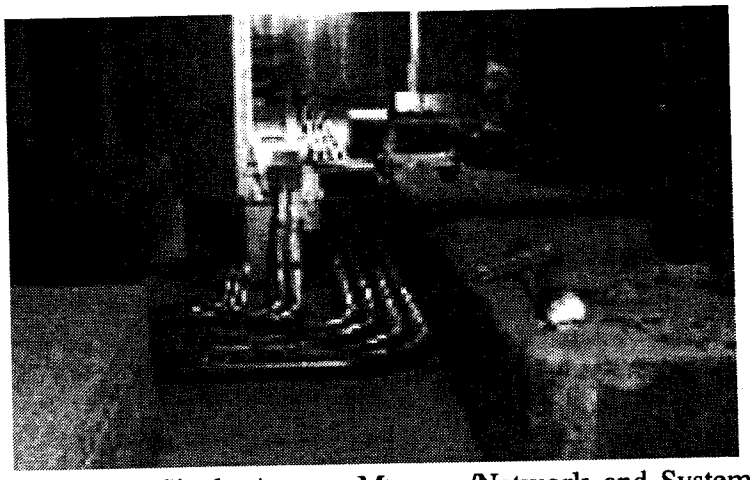
Construction Progress
Basement/Mezzanine

The photographs below represent the status of the construction ares under construction.

Basement- Unistrut Being Installed in the Consolidated Technical Control Facility, Basement Area 5



Basement- Business Automated Data Processing, Basement Area 5 - Under Construction

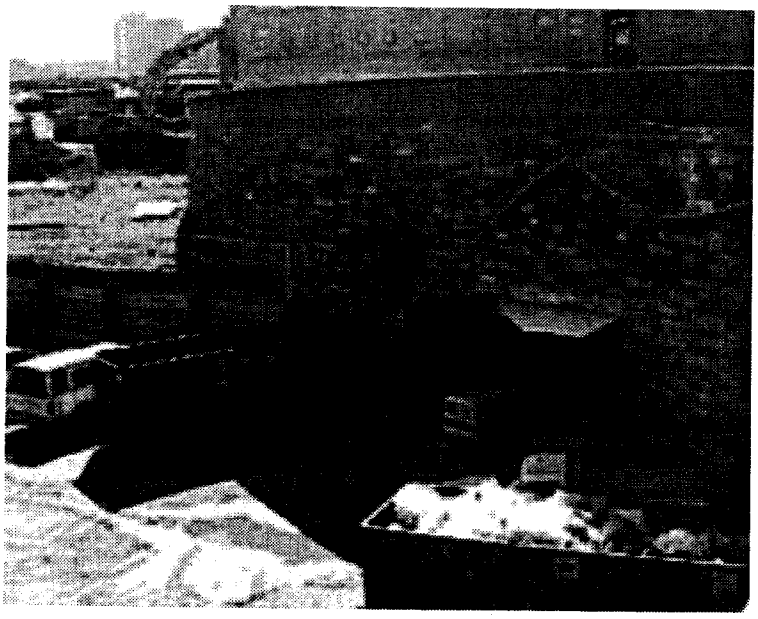


Basement- Single Agency Manager/Network and Systems Management Center Admin., Basement Area 5 - Under Construction

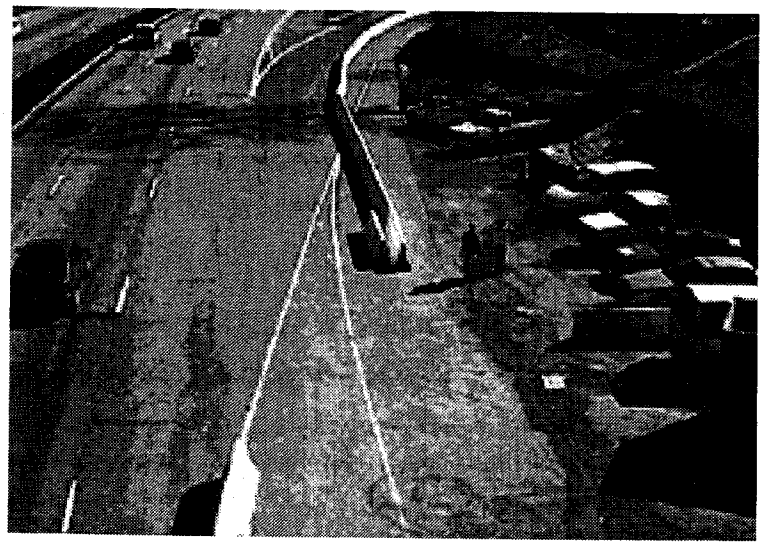
Construction Progress
Basement/Mezzanine

Construction Entrance

The Segment 2.A.2 Construction Entrance is the construction of a temporary vehicle entry road near VA Route 110 and an entrance into the Basement through the exterior wall for all construction contractors. The contract was awarded on August 22, 1997, and is scheduled to be completed in FY 1998.



Entrance Under Construction



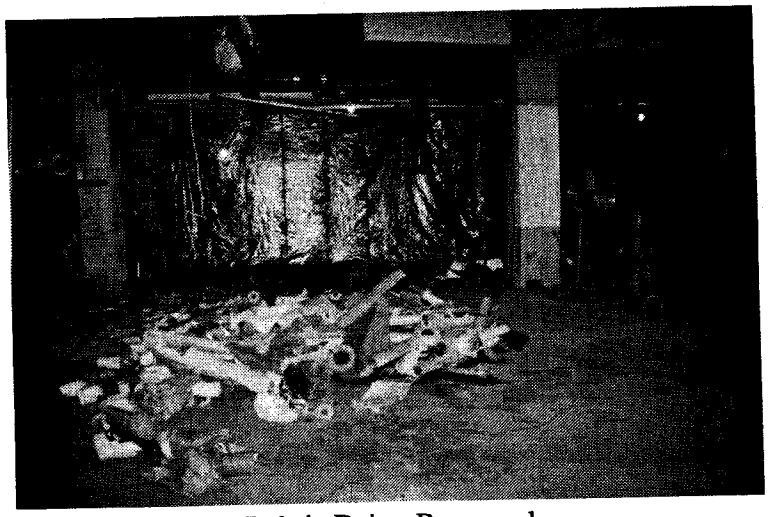
Access Road Under Construction

Construction Progress
Basement/Mezzanine

Segment 2.A.2 Demolition and Abatement

The Segment 2.A.2 Demolition and Abatement contract is the removal, abatement and disposal of all hazardous materials; the removal of all non-structural elements; and re-routing all utilities required to be kept in service during the main Core & Shell renovation of this area. The contract was awarded on August 22, 1997, and is scheduled to be completed in 1998.

Example of Asbestos Containment Configurations

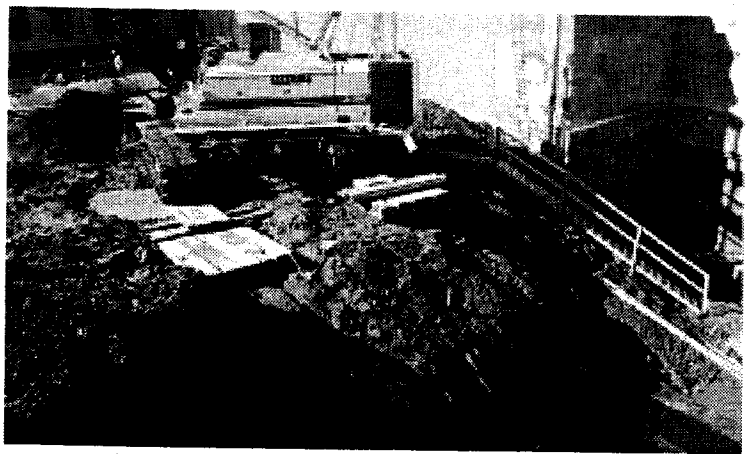


Debris Being Removed

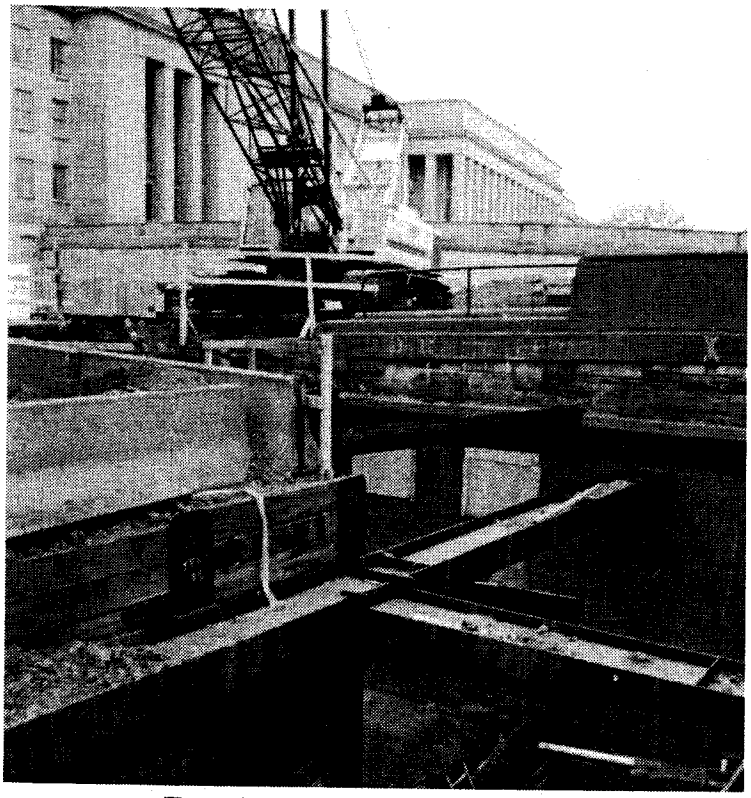
Construction Progress
Basement/Mezzanine

Mug Handle Infill

The Mug Handle Infill project includes excavation, pile foundations, and new slabs. The area involved is the space between the southern edge of the River Terrace and the curved entry to the former motor pool (now the DiLorenzo TRICARE Health Clinic entrance). The construction contract was awarded on October 15, 1997, and is scheduled to be completed in FY 1998.



Excavation in Progress

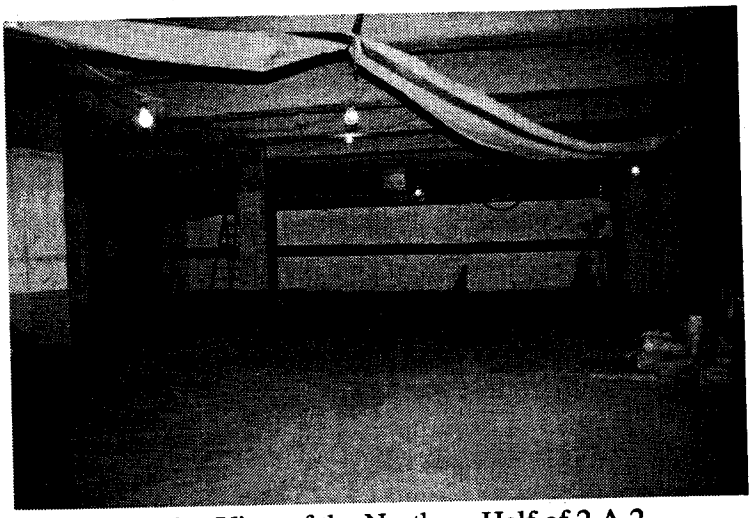


Foundations - Under Construction

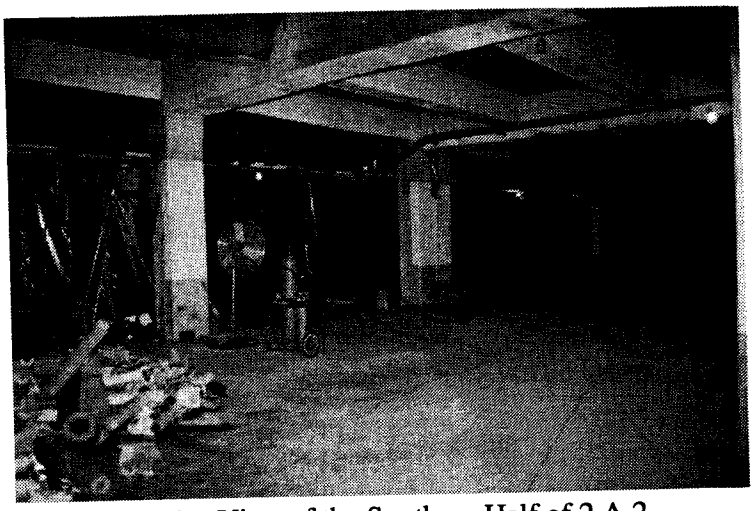
Construction Progress
Basement/Mezzanine

Segment 2.A.2 Core & Shell

The Segment 2.A.2 Core & Shell contract includes lowering the Basement floor and the construction of new foundations, slabs, utilities, mechanical, electrical and control systems, together with barrier walls. This space will be assigned to the Single Agency Manager (SAM). The contract was awarded on January 27, 1998, and is scheduled to be completed in FY 1998.



Interior View of the Northern Half of 2.A.2



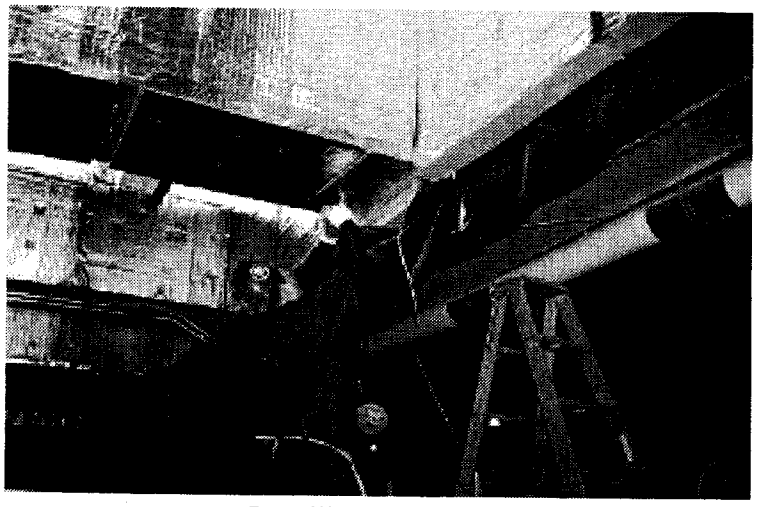
Interior View of the Southern Half of 2.A.2

Construction Progress
Basement/Mezzanine

The DiLorenzo TRICARE Health Clinic

The DiLorenzo TRICARE Health Clinic is being constructed in the area under the River Terrace that formerly housed the Pentagon motor pool. This new state-of-the-art health care facility will replace the Army, Air Force, and Civilian health clinics. This consolidation will eliminate redundancy of services, such as pharmacies, radiology suites, file centers, and other ancillary support functions while saving valuable personnel time. The construction contract for the clinic was awarded on August 21, 1997, and is scheduled to be completed in FY 1999.

Installing Steel Stud Partitions

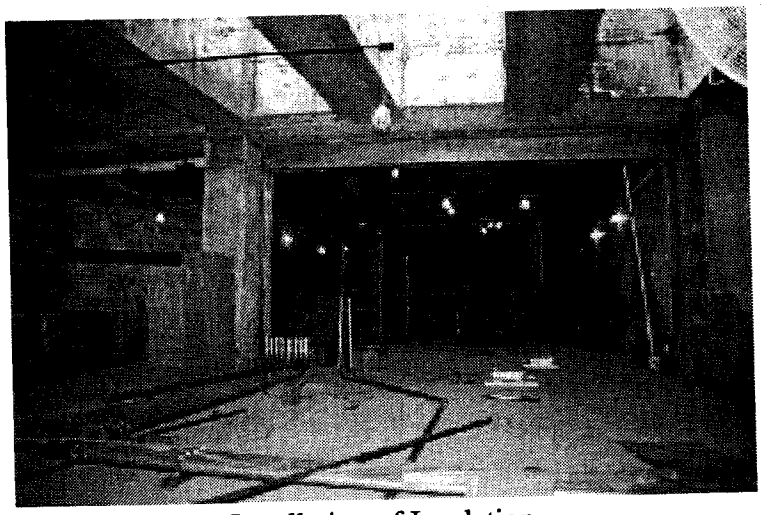


Installing Insulation

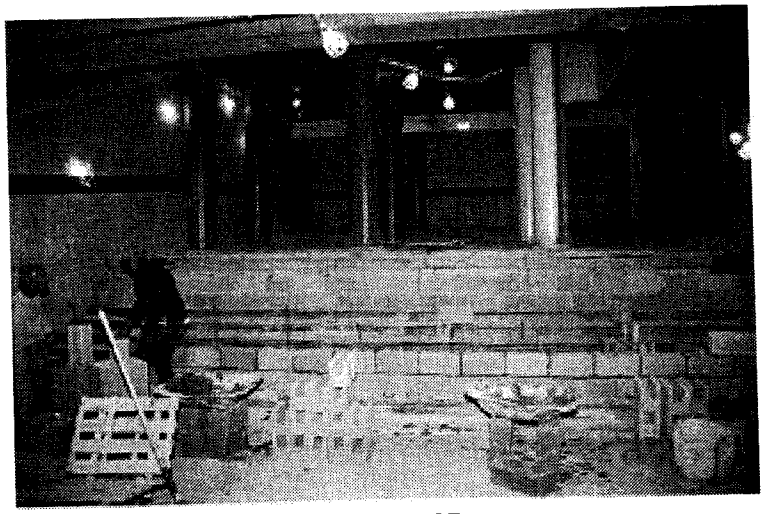
Construction Progress
Basement/Mezzanine

Corridor 8 Entrance Renovation

The Corridor 8 Entrance renovation is the upgrade of entry security and handicap access in compliance with the Americans with Disabilities Act at one of the most heavily used entrances in the Pentagon. Renovation of this entrance was given priority over other entrances because it will provide secure access to the DiLorenzo TRICARE Health Clinic under construction. The construction contract was awarded in July 1997, and is scheduled to be completed in FY 1998.



Installation of Insulation

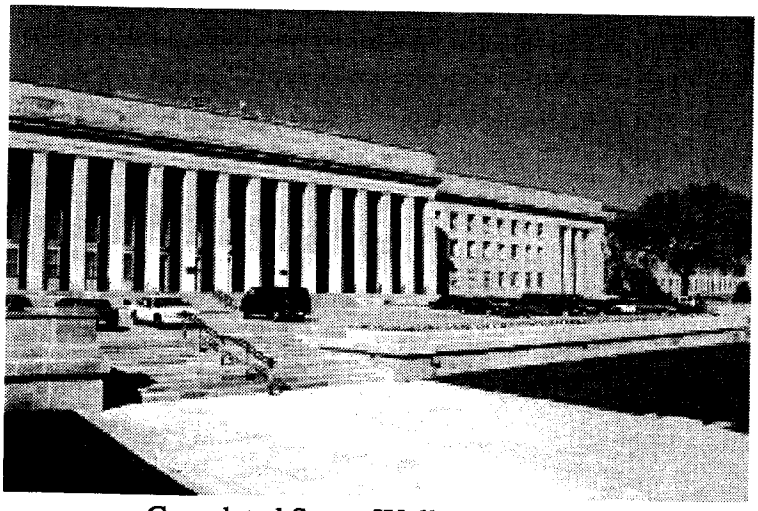


Construction of Ramp

Construction Progress
Basement/Mezzanine

River Terrace Renovation

The renovation of the River Terrace corrected the waterproofing problems and repaired the time-ravaged steps and walkways as well as retaining walls and planting areas. Waterproofing of this area was critical since the area directly below the River Terrace will be home to the DiLorenzo TRICARE Health Clinic and other occupied spaces under construction. These renovations also include modifications to make the River Terrace Entrance compliant with the requirements of the Americans with Disabilities Act within the defining elements of the National Register of Historic Places.



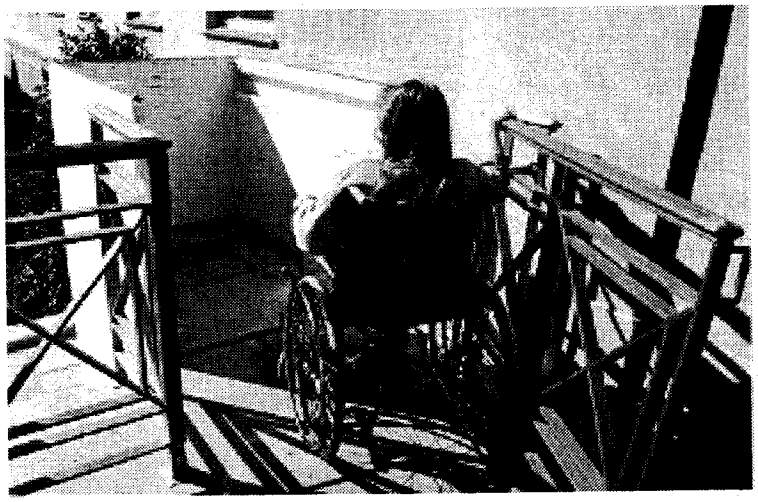
Completed Steps, Walk, and Planters

Completed Parade Grounds and Walkways

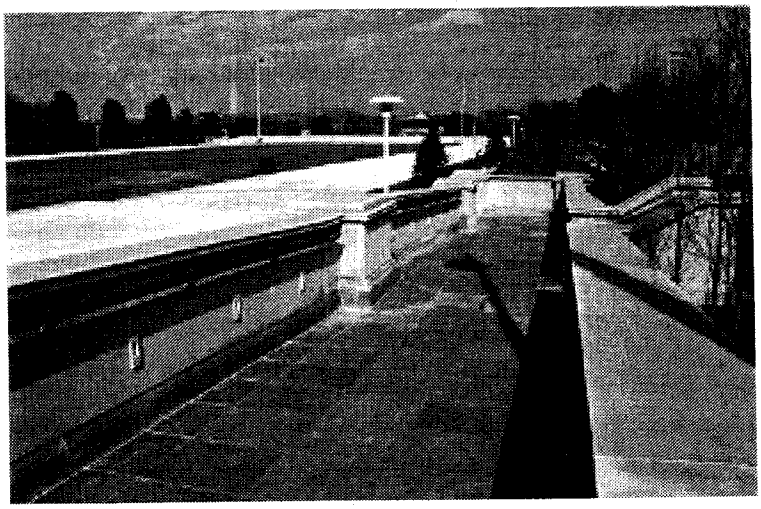
Construction Progress
Basement/Mezzanine

River Terrace Renovation Handicap Access

The renovation program must meet the congressionally-mandated requirements of the Americans with Disabilities Act. Examples of work accomplished in compliance with these requirements include the handicap access ramps on the River Terrace and the handicap access lift at the River Terrace entrance.



Completed Handicap Access Lift



Completed Handicap Access Ramp

Construction Progress
Wedge #1

Temporary Construction

The Wedge #1 Temporary Construction contract includes the barrier walls separating Wedge #1 from Wedges #2 and #5, as well as temporary adjustments to the mechanical, electrical, plumbing, fire alarm, communications, and security systems to allow for future construction. The contract was awarded on July 17, 1997, and is scheduled to be completed in FY 1998.

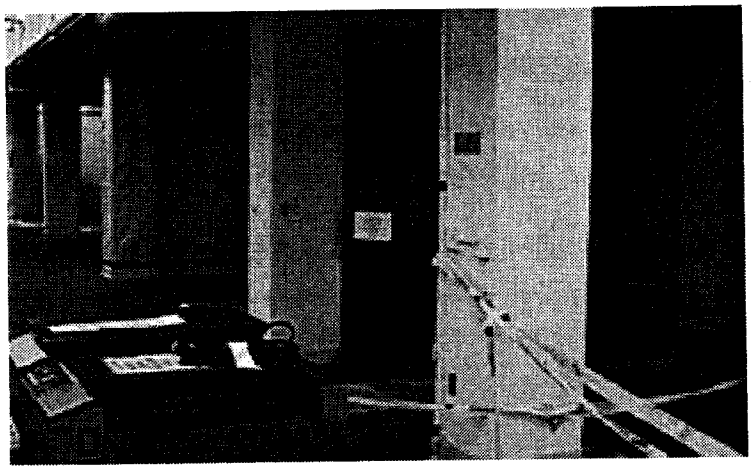
Typical Barrier Wall

Relocated Army Library Entrance

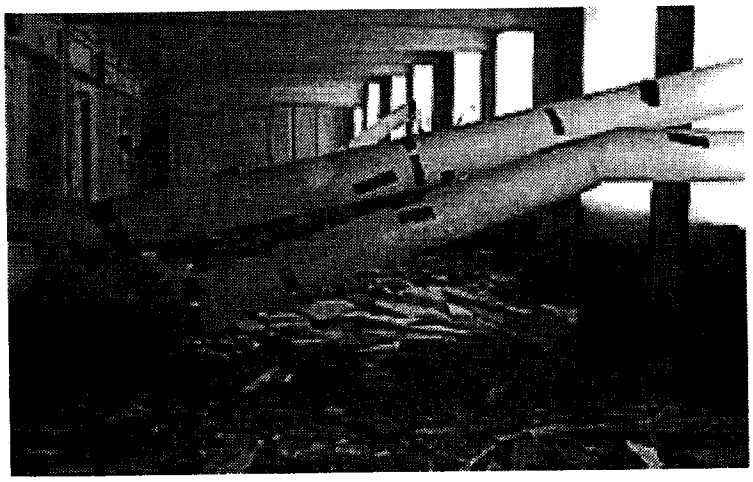
Construction Progress
Wedge #1

Demolition & Abatement

The contractor completed abatement and is near completion on the demolition of Fourth Floor E-Ring, Area A-2. Proper ventilation systems remain throughout both asbestos abatement and demolition.



Wedge #1 Demolition and Abatement



Wedge #1 Demolition & Abatement

Construction Progress
Wedge #1

South Terrace Pedestrian Bridges

The South Terrace Pedestrian Bridges over Rotary Road will link the South Parking and the Pentagon at Corridors 2 and 3 on the second floor. The purpose of these bridges is to provide safe access for pedestrians from South Parking to Corridors 2 and 3 on the second floor; to resolve the conflicts with automobiles, busses, delivery vehicles, and taxis; to increase security at the entrance to the loading dock and A-E Drive; and to reduce the police requirements as traffic officers. Elevators will provide handicap access in compliance with the requirements of the Americans with Disabilities Act. The bridges, scheduled for completion in FY 1999, will be constructed in phases to allow access to the Pentagon from South Parking throughout construction.

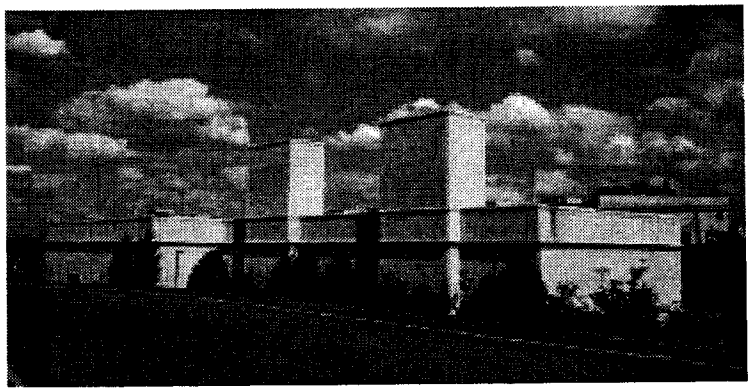
Beginning of Excavation

Beginning of Roadway Preparation

Construction Progress
Other Related Projects

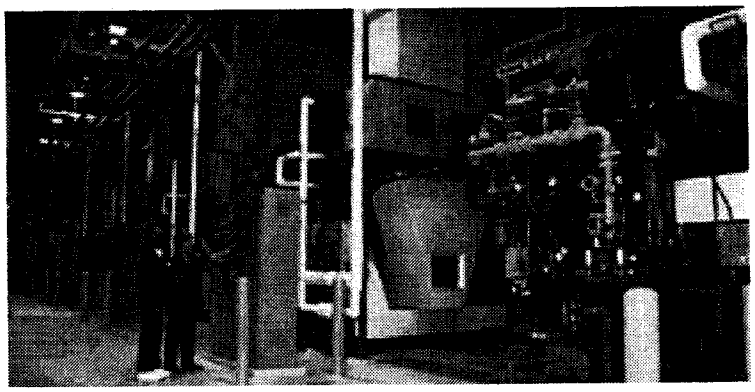
Heating & Refrigeration Plant

The construction contract for the Heating & Refrigeration Plant (H&RP) was awarded on December 30, 1992, and construction began in February 1993. Construction is now complete and the plant is operational. The old H&RP building has been demolished.



Completed New Heating & Refrigeration Plant

Completed New Heating & Refrigeration Plant (Chillers)

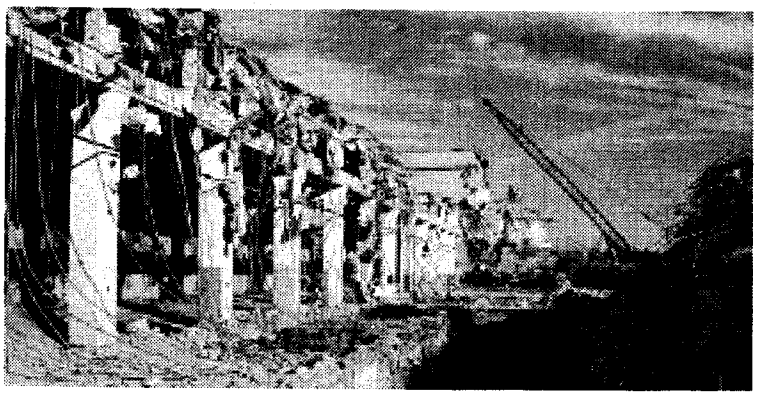


Completed New Heating & Refrigeration Plant (Boilers)

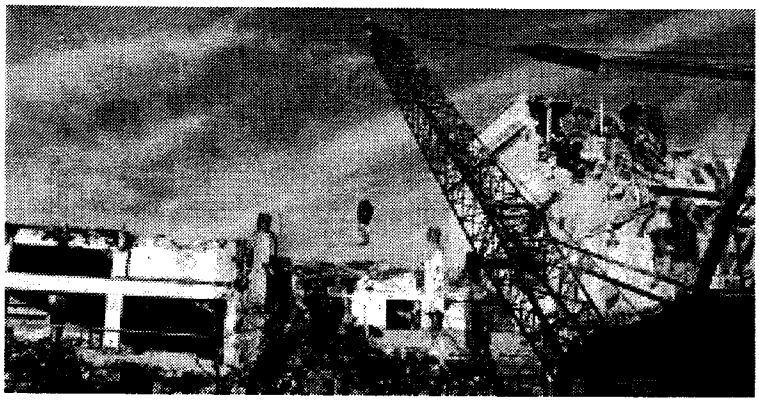
Construction Progress
Other Related Projects

Heating & Refrigeration Plant

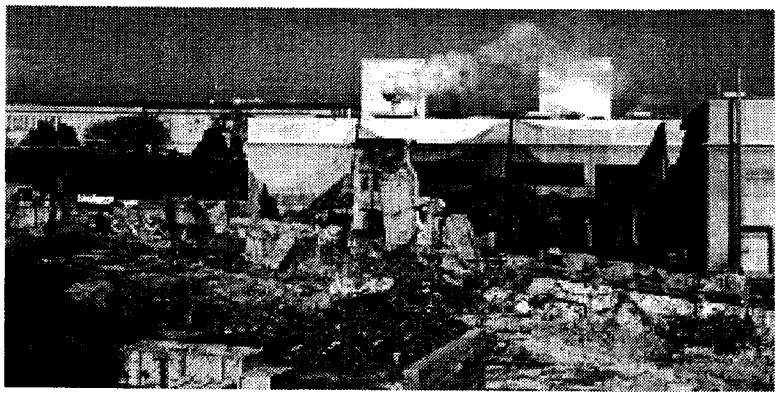
The following photographs represent the extent of work involved in the demolition of the former Heating & Refrigeration Plant. Demolition is complete and the excavated area is being back-filled. New paving for access drives and parking as well as landscaping will be provided.



Old Heating & Refrigeration Plant Being Demolished



Old Heating & Refrigeration Plant Being Demolished

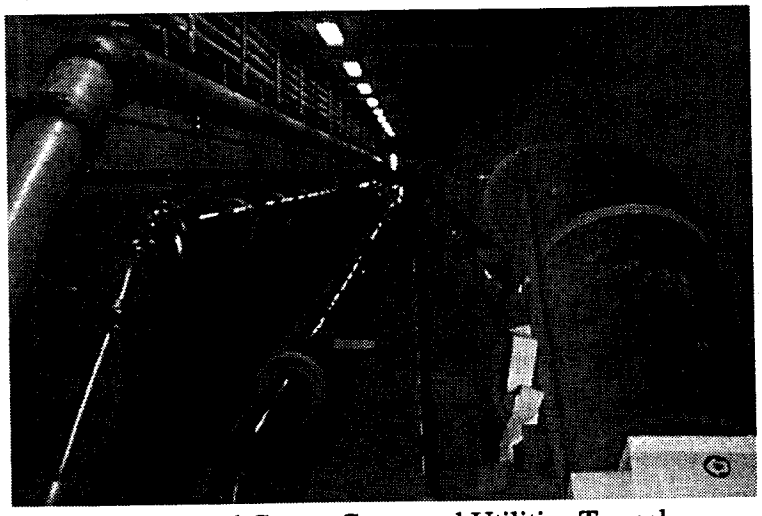


Old Heating & Refrigeration Plant Virtually Demolished with New Heating & Refrigeration Plant in the Background

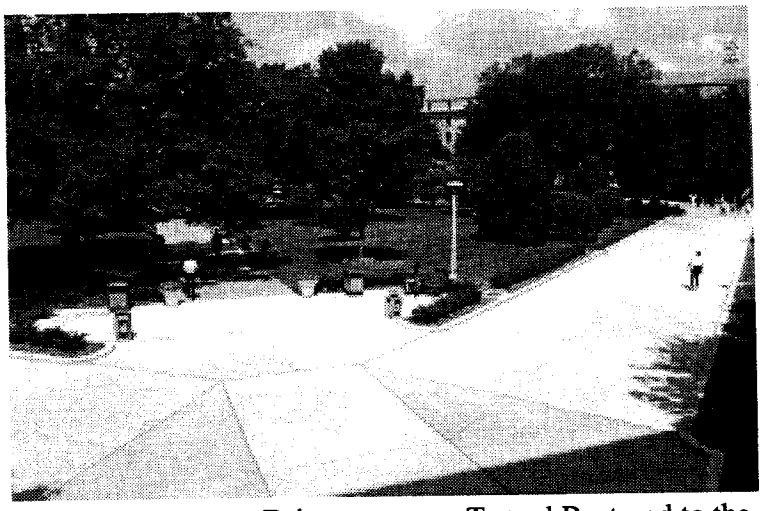
Construction Progress
Other Related Projects

Utilities Tunnel in Center Courtyard

The Utilities Tunnel in the Center Courtyard provides utility lines that are efficient, reliable and easily maintained. The new utility lines are designed as a loop system that can continue to service other portions of the building while specific areas are shut down for localized maintenance. The roof of the tunnel serves as the access driveway for service and emergency vehicles in the Center Courtyard. Contract for design and construction of the Center Courtyard Utility Tunnel was awarded on February 25, 1994, and construction was completed in the Summer of 1997.



Completed Center Courtyard Utilities Tunnel

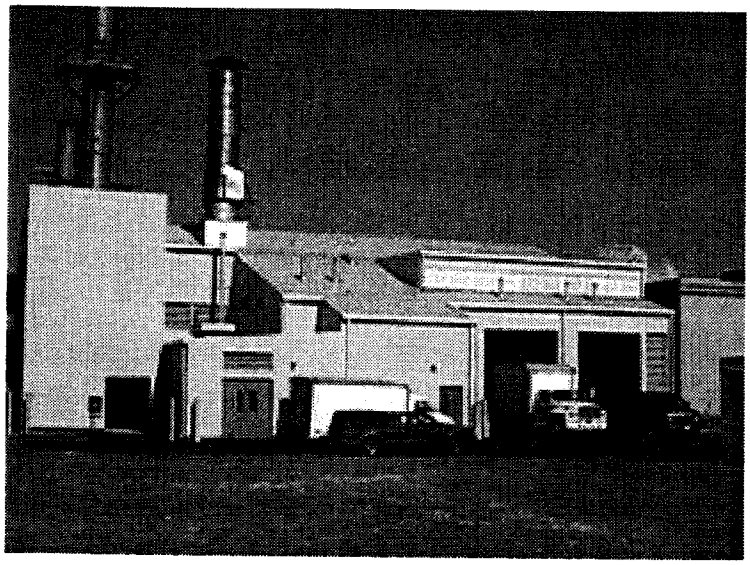


Completed Access Driveways over Tunnel Restored to the Original Condition

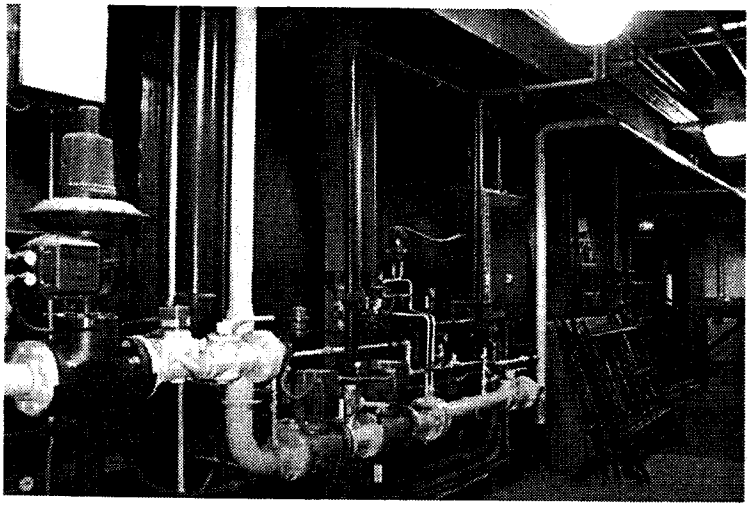
Construction Progress
Other Related Projects

Classified Waste Incinerator Plant

Renovation of the Classified Waste Incinerator Plant, located near the Heating & Refrigeration Plant, included a refurbishment of the existing plant and the replacement of the two existing incinerators. This work was completed while maintaining continuous operations. The new incinerators increase the classified waste burning capacity from 6,000 pounds per hour to 8,000 pounds per hour. The new incinerators are fully automated and their emissions are well under requirements set by the State of Virginia and the U.S. Environmental Protection Agency. The project was completed in 1997.



Completed Classified Waste Incinerator Plant

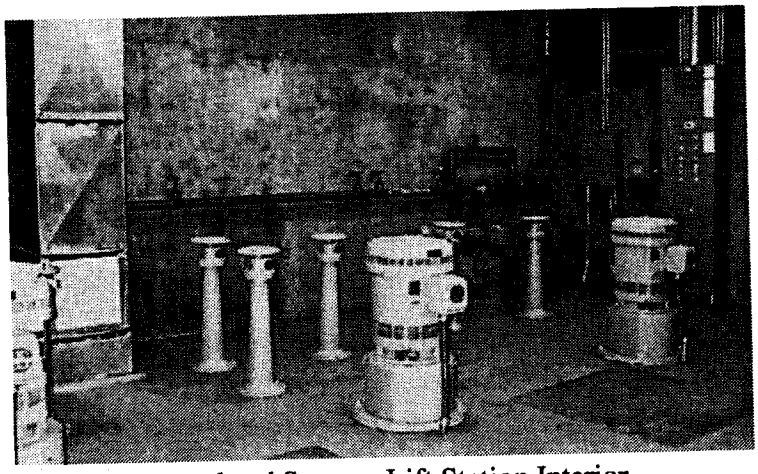


Completed Classified Waste Incinerator Plant

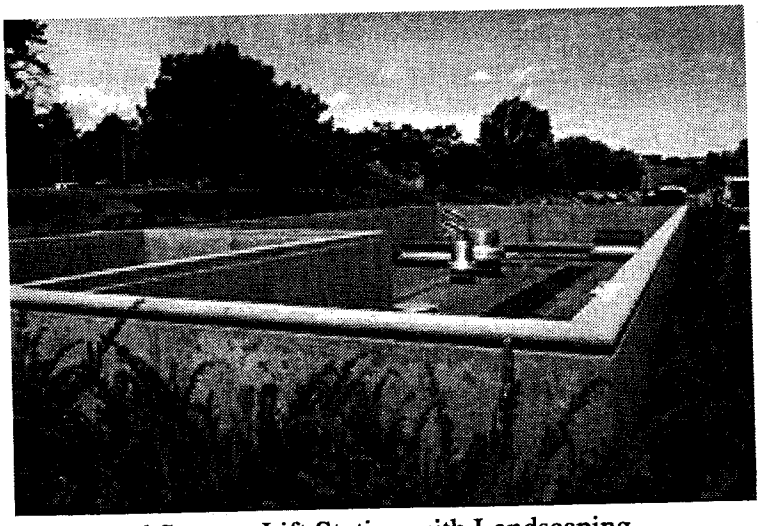
Construction Progress
Other Related Projects

Sewage Lift Station

The new Sewage Lift Station, which replaces the old Sewage Lift Station, is located along the walkway adjoining the North Parking area. The new Sewage Lift Station utilizes gravity flow for the waste from the Pentagon Basement, and the Pentagon Renovation and Planning Office. As the gravity lines carry sewage to the new lift station, a force main pumps sewage away from the new station to the Arlington Lift Station located in Crystal City. The new Sewage Lift Station is connected to the old sewage lift station which remains in place as a backup facility.



Completed Sewage Lift Station Interior

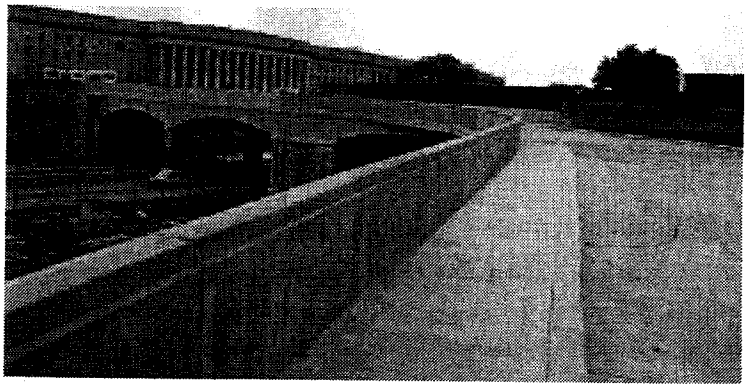


Completed Sewage Lift Station with Landscaping

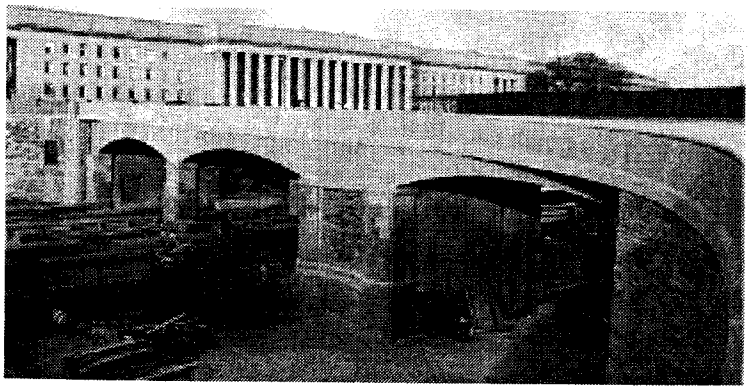
Construction Progress
Other Related Projects

River Terrace Vehicle Bridge

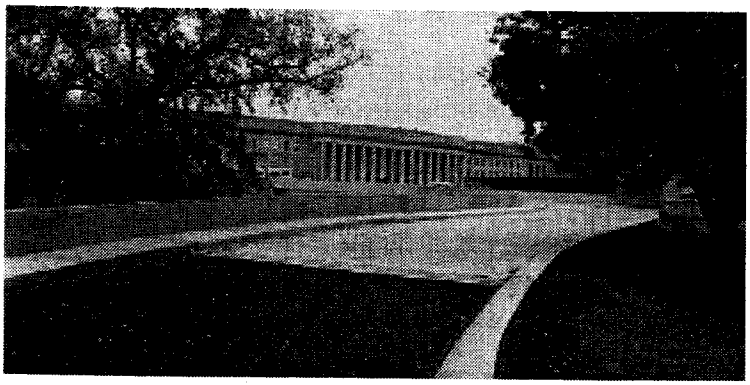
Tests conducted on the River Terrace Vehicular Bridge over Route 110 revealed serious structural problems which required total replacement of the bridge. The construction contract was awarded on September 30, 1996, and construction was completed in October 1997.



Completed Sidewalk and Wall



Completed Bridge

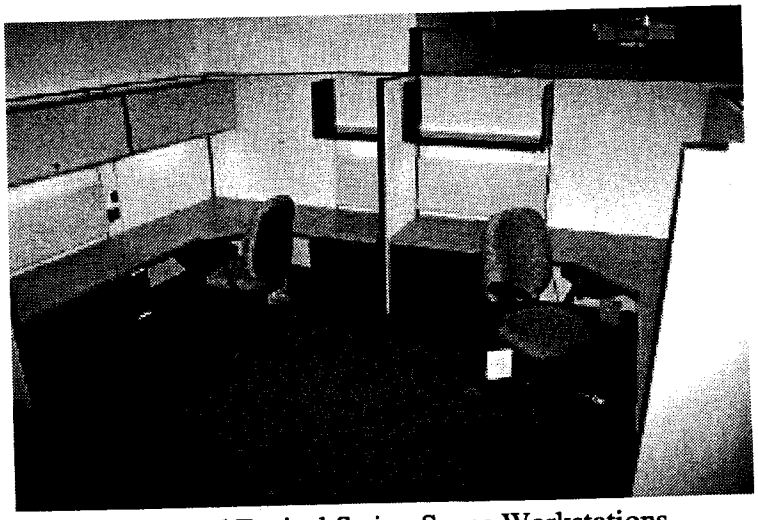


Completed Restored Driveway

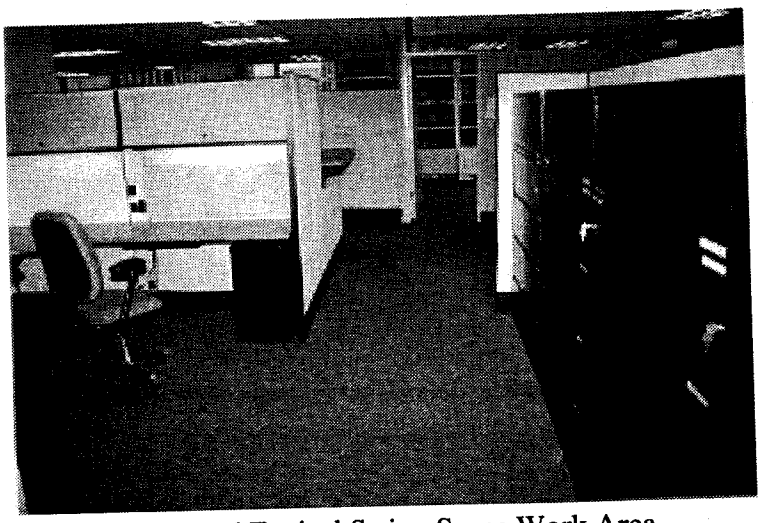
Construction Progress
Other Related Projects

Swing Spaces

In order to permit Wedge #1 to be renovated, some 6,600 personnel were involved in the relocation process from Wedge #1 and elsewhere within the Pentagon. However, of the approximately 5,000 personnel within Wedge #1, approximately 1,000 were relocated within the Pentagon while approximately 4,000 were relocated to swing space in off-site locations.



Completed Typical Swing Space Workstations



Completed Typical Swing Space Work Area

IV History

The Pentagon is one of the most recognizable buildings in the world. It has been inseparably linked with the United States Military since its construction during World War II.

During the first half of 1941 the War Department found it increasingly difficult to provide space for the headquarters staff of an expanding army. In May, the Public Buildings Administration proposed erecting temporary structures for various agencies on the outskirts of the city. In July 1941, 24,000 personnel were scattered among seventeen buildings in Washington, D.C., with others in Fort Myer and Alexandria, Virginia. By the beginning of 1942, the number of personnel was expected to reach 30,000. The President, therefore, asked Congress for authority to construct additional buildings within or near the District of Columbia. The War Department's Chief of Construction, Brigadier General Brehon B. Somervell, had a better idea, a scheme to house the entire War Department under one roof. He talked to General Moore, Deputy Chief of Staff, and to U.S. Representative Woodrum (D-Virginia) about the idea.

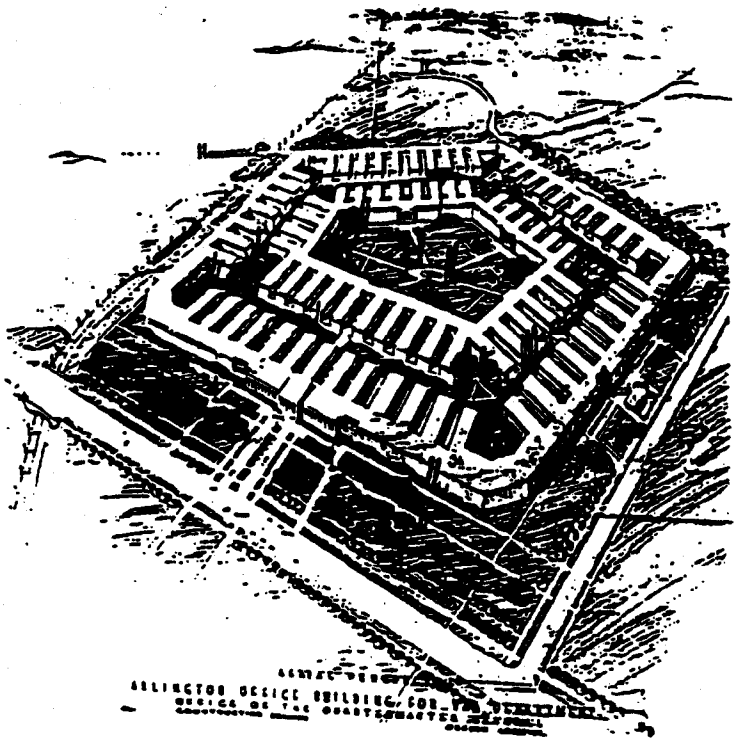
Congressional Approval

At a Thursday, July 17, 1941, hearing on construction projects before the House Subcommittee on Appropriations, the Chairman, Mr. Woodrum of Virginia, suggested to Brigadier General Eugene Reybold and Brigadier General Somervell that the War Department find an overall solution to its space problem rather than the partial solution proposed by the Public Buildings Administration. Somervell directed Architect G. Edwin Bergstrom to place on his desk, by 9 o'clock Monday morning, basic plans and architectural perspectives for an office building to house 40,000 people. Five days later, on Tuesday, July 22, 1941, Reybold and Somervell presented the plan to the Subcommittee. The plan was approved by the House on July 28, 1941 and by the Senate on August 14, 1941.

On August 25, 1941, President Roosevelt signed the bill appropriating funds for construction. However, because of considerable controversy over the proposed location at the foot of Arlington National Cemetery, he reserved the right to pick the site. The following day, the President directed that the construction site be moved south to the Pentagon's present location.

The Design

The Pentagon's unusual five-sided configuration was dictated by the site originally proposed (adjacent to Memorial Drive, about three-fourths of a mile north of where the building was actually constructed). An early plan called for a square structure with one corner cut off to accommodate an existing road. This resulted in a skewed Pentagon shape from the Archives of U.S. Army Corps of Engineers, Fort Belvoir, Virginia.



Original Concept of Pentagon, July 21, 1941

Serious objections were raised to locating the building on open land directly between Arlington Cemetery and Washington's Monumental Core, and discussions ensued regarding selection of a building site resulting in less visual and physical impact from the project. During the debate on the site, the project's chief architects, George Edwin Bergstrom and David J. Witmer continued to refine the design. The final design retained the five sides, in the form of a regular pentagon, which gave rise to the building's name. That shape resulted in the most efficient use of available space. The concept of using several concentric rings to contain the space evolved during further refinement of design. Preliminary design and drafting took just 34 days. A project of this magnitude and urgency demanded the rapid assembly of an unprecedented design and

production effort. The office of the chief architect rapidly grew to 327 architects and engineers who were supported by 117 field inspectors. The weekly output of prints ranged from 12,000 to 30,000 with reproduction machines running on a 24-hour basis. For periods of time, new drawings were issued nightly. The reproduction effort consumed 15,000 yards (13,700 m) of print paper per week.

Construction began on September 11, 1941, and was completed on January 15, 1943. At one stage of construction, 15,000 people were employed on the job working three shifts, 24 hours a day. At night, they worked under floodlights. Construction took just 16 months, a remarkable feat of engineering and management effort.

The Pentagon Building

The Pentagon building, at 6,500,000 square feet (603,900m²), provides approximately 3,800,000 square feet (353,000 m²) of occupiable space. At the peak of World War II, 33,000 people were provided working space in the building. The Pentagon is the Headquarters of the Department of Defense (DoD) and the national defense establishment. It houses the Offices of the Secretary of Defense, the Joint Chiefs of Staff, and the Secretaries of the three Military Departments.

Size

The Pentagon building is composed of five concentric pentagonal rings connected by ten radial corridors. Each of its outer walls is 921.6 feet (280 m) long. The building covers 29 acres (12 hectares), the largest ground area of any office building in the world. A five-acre (2 hectares) pentagonal courtyard is located in the building's center. The building and its central courtyard cover 34 acres (14 hectares). There are 17.5 miles (28.2 km) of corridors in the building. The structure is three times the size of the Empire State Building and 50 percent larger than Chicago's Merchandise Mart. The building rests on 41,492 concrete piles which, if placed end to end, would stretch 200 miles (322 km). The five concentric pentagonal rings are separated by interior courts which serve as light wells. This design feature increases the number of windows allowing in natural light. Each ring has five stories. The Mall and River sides of the building have a Basement area which includes a partial Mezzanine. The innermost and outermost rings have sloping slate roofs, while the other three rings have flat, built-up roofs. The rings are connected at each floor level by a series of ten radial corridors extending from "A" ring (innermost) to "E" ring (outermost).

Exterior

Exterior walls of the concentric rings and the interior courtyard are exposed concrete. They appear to have a wood-grain texture because they were poured into wooden forms made of 8-inch (232 mm) boards. A gap was left between boards enabling concrete to ooze and form a slight ridge. From a distance this gives an appearance of limestone.

Clockwise from its northern point, the Pentagon's five facades are the Mall Terrace Entrance facade, the River Terrace Entrance (or North Parking lot) facade, the Concourse Entrance (or Metro Station) facade, the South Parking Entrance facade, and the Heliport facade. The outer facades of the Pentagon are simple, with a minimum of ornamental embellishment. Although the ornamentation style is classical in origin, it has been greatly simplified. The outer walls are limestone, as a direct result of a restriction by President Roosevelt that there be no marble in the building.

Material Shortages

The shortages of materials required for war production raised many design and construction problems. The use of reinforced concrete in lieu of structural steel for the building made possible a saving of 43,000 tons (39,000,000 kg) of steel, more than enough to build a battleship. The use of concrete ramps rather than elevators reduced steel requirements still further. Drainage pipes were concrete; ducts were fiber, interior doors were wood. An unusual wall design - concrete spandrells carried to window sill level - eliminated many miles of through-wall copper flashing. When Somervell was asked to make still more drastic reductions, he agreed to "striptease" the entire structure. Bronze doors, copper ornamentation, and metal partitions in rest rooms were among the first to go. The stripping process continued throughout construction.

The Site

The Pentagon Reservation is located in southeastern Arlington County, Virginia, and is situated between a large man-made lagoon (the Pentagon Lagoon, formed during construction) and the southeastern corner of Arlington National Cemetery. The northeastern and eastern facades have unobstructed vistas of the Monumental Core of the

Nation's Capital across the Potomac River. The Pentagon's relatively low profile also permits clear vistas of Washington from the highlands of Arlington National Cemetery.

Terraces

There are large ceremonial terraces in front of the Pentagon's Mall and River Entrances. The River Entrance terrace extends 900 feet (274 m) to the Pentagon Lagoon bounded by a ceremonial landing dock and two monumental stairways. The maximum width of the River Terrace is 450 feet (137 m). The terrace in front of the Mall Entrance is smaller, measuring 600 feet (183 m) by 125 feet (38 m).

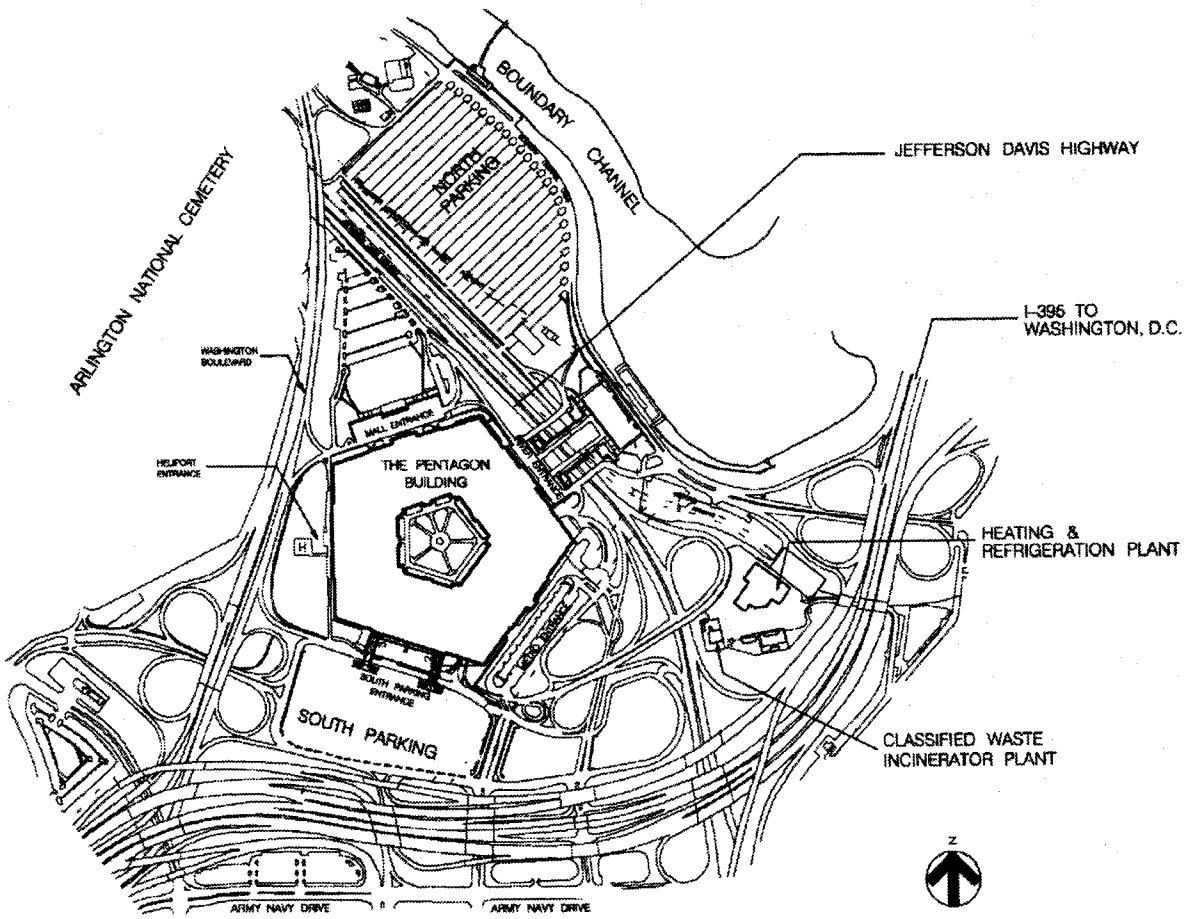
Access

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.

Lagoon

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 1930's is used for the Heating & Refrigeration Plant's water discharge outfall.

The Pentagon Reservation has been altered over the years. A heliport was added; Shirley Highway (now I-395), a limited access Interstate Highway and interchange, infringed on the Pentagon site on the south side; a major Metro station and transfer point was added, and under-building bus/taxi tunnels were converted to offices. See Existing Site Plan of the Pentagon Reservation.



Pentagon Reservation Site Plan

Building Condition

The circa 1943 Pentagon has suffered from decades of neglect and under-funded maintenance and repair programs. Many of the building systems have deteriorated beyond economical repair and require complete replacement. Building code violations and unsafe conditions are rampant, which have been brought about by the Pentagon's non-compliance with the fire protection and life safety standards established over the last 50-plus years. Structural deficiencies also need to be corrected. Some areas of the Basement have settled as much as 12 inches (305 mm) due to the poor load bearing capacity of soils under the floor slab.

Interior Space Layout

The Pentagon's original interior space layout has been modified over the years. Walkways and service corridors have been closed and converted to office and storage space. Original office areas that were large open spaces have been chopped up and enclosed with full height partitions that make the building functionally inefficient. This adversely affects heating, ventilating, and air conditioning system controls and distribution.

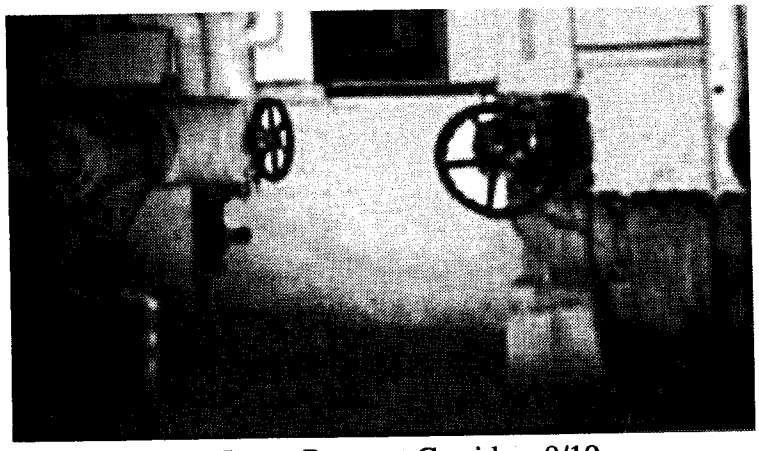
Building Systems

Before the renovation program began, none of the original major building systems had ever been replaced nor had they been significantly upgraded. The changing office environment with the advent of computers and modern technology has outstripped the capacity of deteriorated building systems. Electrical, plumbing, heating, ventilation, and air conditioning (HVAC) systems need to be replaced and modernized to accommodate added loads and designed to be more efficient and flexible. The building has individual packaged air conditioning units providing cooling for special use areas in addition to the chilled water provided by the Pentagon Heating & Refrigeration Plant. The overloaded secondary electrical circuits result in as many as 20 localized power outages every day, which increases to between 30-40 a day in the winter when people bring unauthorized space heaters into the building to compensate for the deteriorated HVAC

system. Regular plumbing failures occur as a result of the deteriorating piping systems which are 55 years old. Of the 691 drinking fountains in the Pentagon, approximately 30 are out of service on a daily basis.

Typical Plumbing Problems in Walls

During Desert Shield/Desert Storm, a fire broke out in the JCS area of the Pentagon. Arlington County, which provides fire protection to the Pentagon, pressurized a standpipe and consequently, blew out a four foot section of ten inch pipe. Water flooded approximately 350,000 SF of the Pentagon basement, nearly causing the Army and Air Force Operations Centers to shut down. The water flowed through a steam tunnel to the Heating & Refrigeration Plant basement, where the water reached a height of seven feet. Shown is the steam room at Corridors 9/10 where water reached a height of 20 inches.



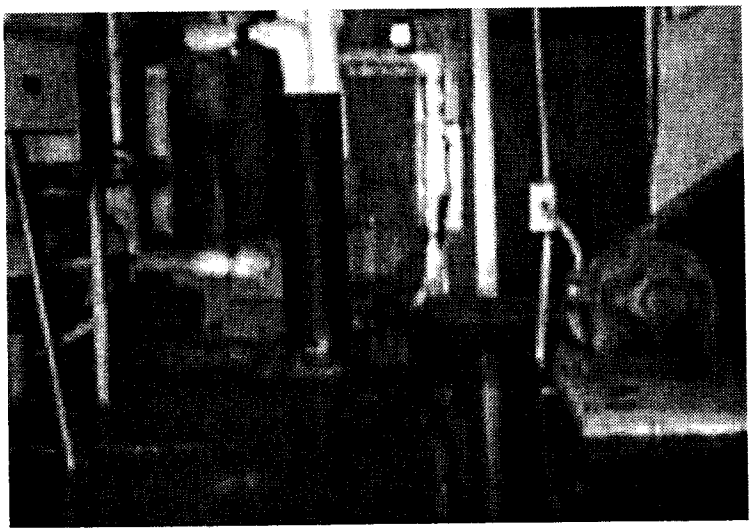
The Steam Room at Corridors 9/10

Frequent leaks, breaks in pipes and clogged pipes not only escalated the operation and maintenance costs but also created potential health hazards.

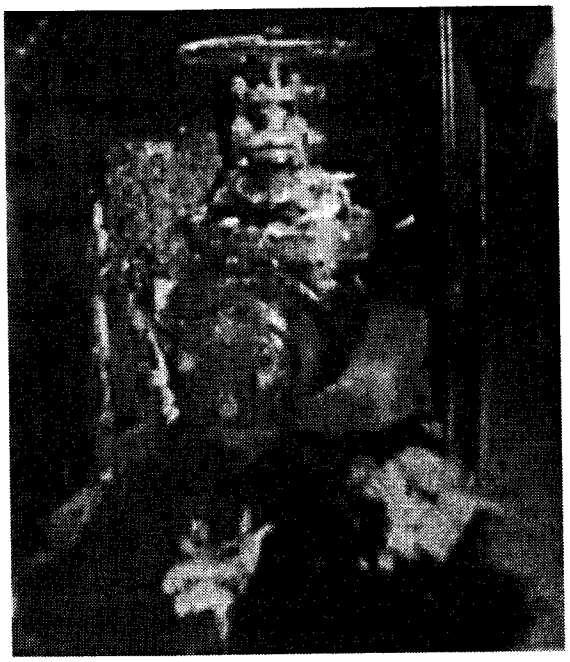
Vertical Sanitary Riser Pipe Split from First to Fourth Floor

Typical Example of Drain Pipe, Clogged After Years of Deposits and Deterioration.

The Basement has been flooded as the result of condensate leakage, inoperable sump pumps that were unable to accommodate rising ground water and rusted and corroded valves. Only valves that have been replaced are operable.



Flood in Basement

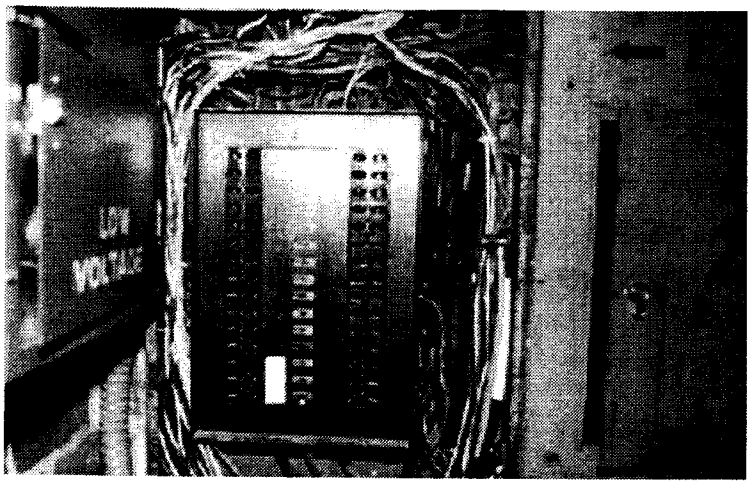


Typical Rusted and Corroded Valve

The HVAC systems are original and in need of replacement. Approximately 17.5 miles of the Pentagon's ductwork are made from asbestos, typical of the time when the Pentagon was built. The Pentagon has approximately 150 miles of ductwork, a substantial portion of which is surrounded by asbestos insulation.

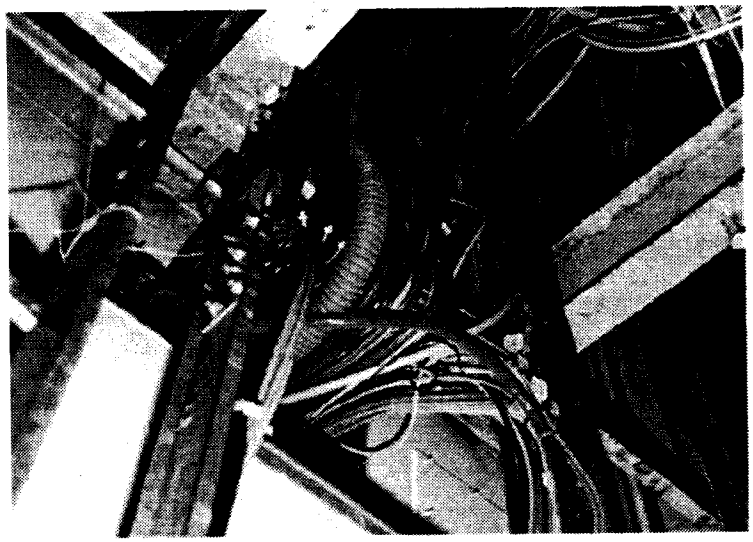
Deteriorating Heating, Ventilation, and Air Conditioning (HVAC) Ductwork.

The electrical system was designed for a manual office and does not support the demands of today's high-tech office environment. Approximately 20 (30-40 in winter) localized power outages occur daily, with at least 30 minutes downtime per outage. Obsolete components make maintenance/repair difficult. Panel boards are loaded beyond maximum capacity and do not meet code, thereby creating a fire and safety hazard.



Original Electrical Panel Still Used In Pentagon

The information systems that were installed in the Pentagon are plagued with abandoned cabling and an unverifiable backbone for the building. Consequently, there are numerous LANs that are operated independently of one another which causes problems.



Typical Information & Telecommunications Cable/Wiring

Windows

There are 7,748 windows in the building. They are of two types: steel casements located in the perimeter walls of the concentric, inner courts, and steel double-hung units in the outermost perimeter and in the Center Courtyard walls. The double-hung units in the central pavilions of the Mall and River Entrances are steel. The casements are rusted and corroded at joints, racked out of shape, and cannot be properly closed. Casement windows are inefficient even when properly maintained. In the present state of disrepair, the energy loss, summer and winter, is a serious problem. Some windows have security alarm tapes. Other windows are closed with tempered hardboard or plywood, or are filled with masonry block or with equipment. Many of these ad-hoc modifications were not properly sealed and are now leaking. Failure to replace casement windows and double-hung units will result in continued energy loss and damage from water penetration.

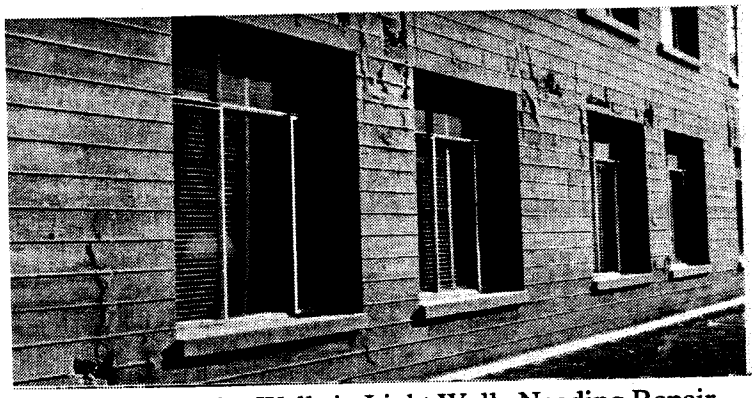
Exterior Walls

Architectural and structural elements of exterior walls have shifted and settled. Joints are open and moisture has penetrated causing damage. Cracking and evidence of movement is apparent at all five exterior perimeter parapet corners. In some instances these cracks extend below the parapet wall. The exterior walls are not thermally efficient and the stone facing is in need of cleaning and repair to insure its weather tightness.

There are two types of courtyards at the Pentagon: (1) interior courts (light wells) between concentric rings of the building and, (2) the Center Courtyard.

All courtyards walls are of concrete with surface conditions ranging from fair to failing. Concrete is spalling, particularly where rusting reinforcing bars are exposed; patch material is failing; cracks, efflorescence, and water stains are evident everywhere. In addition to problems cited in the courtyards walls, cornices are disintegrating, especially between Corridors 7 and 10. There are also problems due to use of non-conforming materials and poor construction. In the Center Courtyard, the asphalt paving at the peripheral walkways is extensively cracked and the concrete curbs at these walkways are damaged or missing.

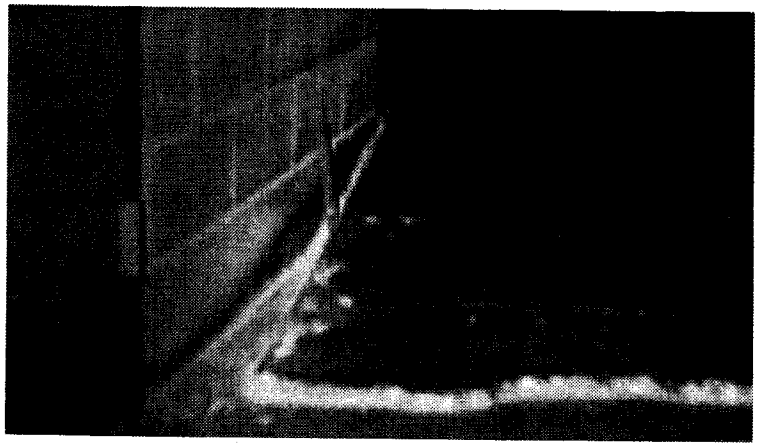
Access bridges span several interior courts at the approximate mid-point of the court length. Originally, these bridges were open, crossing the court at each floor level. A number of the bridges have been enclosed and incorporated into secondary corridor systems while others open directly from individual offices. All of these bridges show evidence of deterioration with present conditions ranging from fair to failing. Attempts made to control leaks at the interior spaces have been unsuccessful. At a minimum, replacement of the roof/bridge drainage system will be required at each bridge. Concrete surfaces and waterproofing will have to be repaired and interior surfaces will also have to be restored.



Typical Exterior Walls in Light Wells Needing Repair

Basement Floor

The Basement floor of the Pentagon was constructed as a slab on grade, and designed to serve as a light storage area. A 1983 report on the stabilization of the depressed floors states that the basement floor slab was placed directly on the underlying soil fill, which consists of surface fill materials overlying compressible organic soil. The subsidence has been gradual over the years and was aggravated by voids under the slab, leaking utility lines, and at times by the dewatering during the construction of Metrorail. These subsurface conditions along with the assignment (and re-assignment) of special purpose activities and the storage of heavy loads of material and equipment, the Basement slab has settled up to 12 inches (305 mm) in some areas causing severe damage to critical communication centers. Repairs were made to correct the distressed areas by pumping concrete under the floor, or by adding leveling slabs, but these repairs were unsuccessful. The only recourse is to remove entirely some 300,000 to 500,000 square feet (27,900 m^2 to 46,500 m^2) of slab and reframe the floor as an independent floor slab bearing on new and existing pile caps. Lowering the Basement slab in some areas will allow maximum expansion of the Mezzanine space.



Basement Slab Deflection

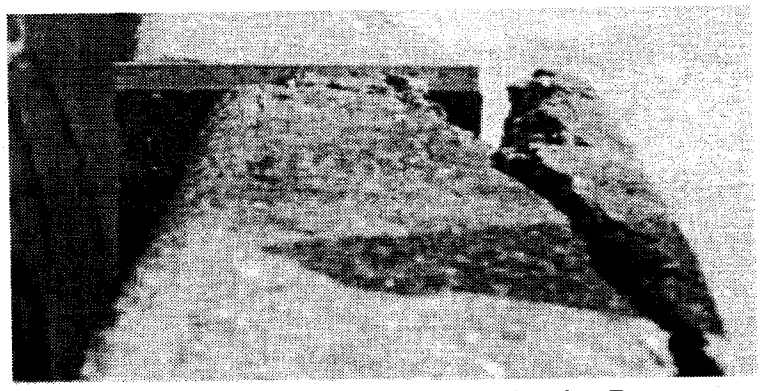
River and Mall Terraces

The River and Mall terraces extend beyond the exterior perimeter of the building and the occupied areas beneath have experienced considerable damage from water intrusion. Extensive reworking of expansion joints, deteriorated waterproofing and concrete elements is required to make these areas watertight.

Typical Deterioration of River Terrace Stairs

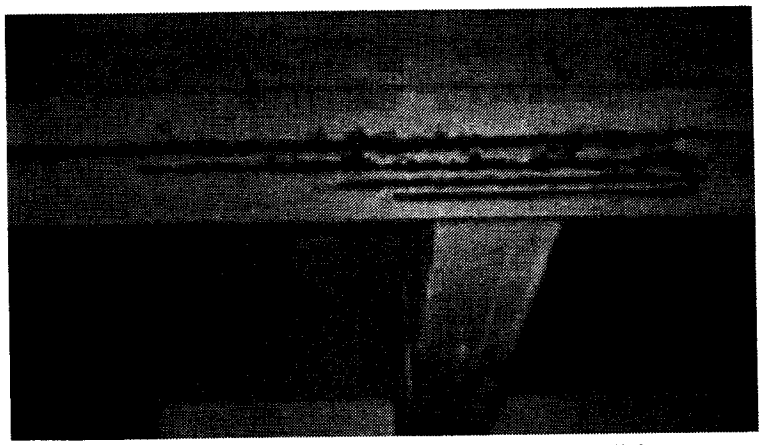
Ramp and Bridge from North Parking

The ramp, bridge and railing leading into the Corridor 8 Entrance from the North Parking lot has undergone serious deterioration as noted by the out-of-plumb support wall along the bridge.

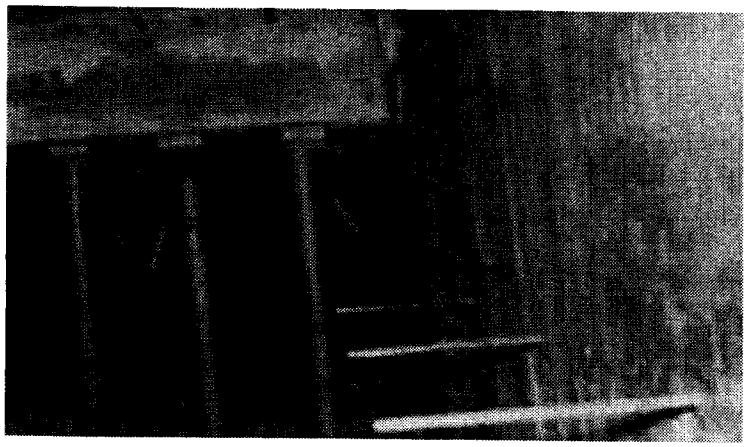


Deterioration at North Parking Pedestrian Ramp
Leading to the Corridor 8 Entrance.

Exposed reinforcing bars underneath the River Terrace parade field and parking lot resulted from the failure of waterproofing, which allowed water and chemical damage to the structure below. This created the potential for failure of the terrace above, along with the threat to persons both above and below the structure. Temporary jacks were installed as an emergency measure to support this failing structure.



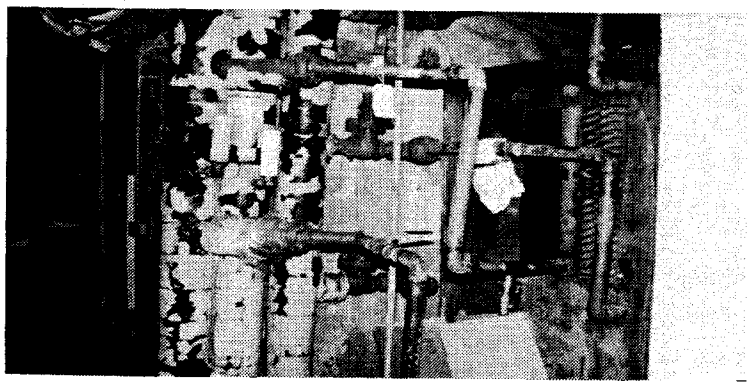
Deteriorated River Terrace Structural Conditions



Temporary Jacks Supporting Failing Ramp

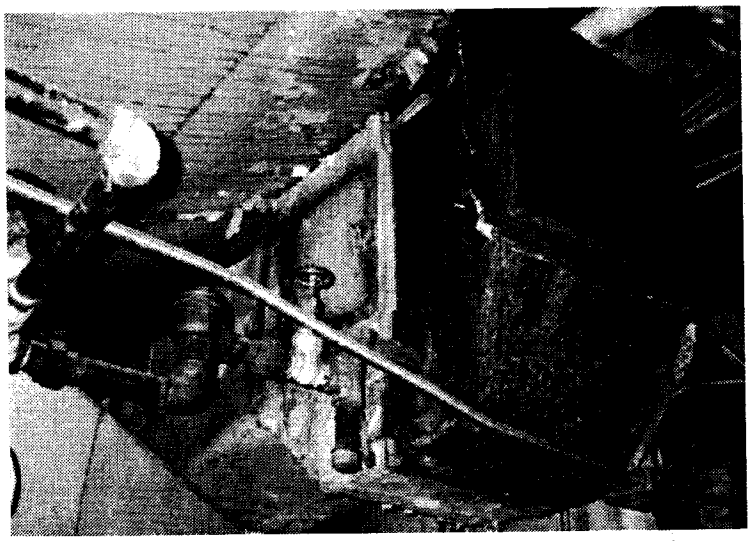
Asbestos

The finish coat in the Pentagon's plaster ceilings contains asbestos and the resilient flooring is vinyl asbestos. Even minor alteration projects require extensive and expensive containment procedures. Under-the-window induction heating and cooling units have asbestos insulation on the pipes and asbestos insulation material was used on many of the plumbing lines and air conditioning ducts. These materials represent health hazards.



Typical Existing Asbestos Piping Insulation

Condition of Original Ductwork

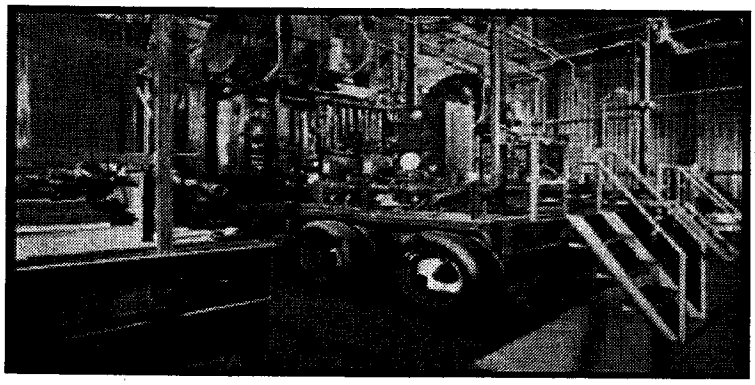


Typical Ductwork Surrounded by Asbestos Insulation

Deteriorating Asbestos-Covered Steam Pipes

Heating & Refrigeration Plant

The Heating & Refrigeration Plant that was built in 1943, provided utility services (heating steam and chilled water) to the Pentagon as well as to other parts of the Pentagon Reservation. The plant became obsolete and was no longer efficient and serviceable. Temporary chillers and boilers were being rented to support the needs of the Pentagon, Federal Building #2 (Navy Annex), and Henderson Hall (Marine base). Three rental boilers and six rental chillers were used from 1989 to 1996 for a cost of over $2,000,000 per year.



Portable Rental Boilers Used in Old H&RP

Sitework

Traffic conditions, especially in the South Parking areas, are very hazardous. Reconfiguration of roadways, bus, and truck access areas and parking is necessary to provide safety for pedestrians. Parking lots are in poor condition with minimal landscaping. Roads, walks, fences, bridges, and other structures and elements exhibit significant deterioration. Bridge abutments are clearly out-of-plumb and the stonework is crushed and spalled. Exterior steps and terraces are spalled, joints are open, and the occupied areas below these elements have experienced water leakage on a continuous basis.

Summary

Generally, the Pentagon's problems requiring a full scale renovation can be grouped into five categories:

1. Changing requirements for fire and life safety.
2. Materials failure.
3. Engineering systems failure.
4. Changing technology with an increased demand for services.
5. Security.

Failure to Keep Pace with Changing Standards for Health, Fire, and Life Safety

- Pervasive asbestos contamination of interior surfaces and pipe insulation requires the use of asbestos containment procedures for even minor repairs to avoid possible health risks to building occupants when these materials are disturbed. This is a significant time and cost restraint to the maintenance and repair program.
- Inadequate sprinkler systems to protect the entire building.
- Numerous emergency diesel generators are currently located inside the Pentagon presenting a potential fire and carbon monoxide gas hazard.
- Excessively long fire egress routes in the building.
- Vehicle/pedestrian conflicts exist throughout the reservation.

Materials Failure

Problems related to materials failure include:

- Rusted and corroded casement window frames in most of the 7,748 windows.
- Shifting of architectural and structural elements causing opening of joints, cracking of building elements, and water penetration.
- Spalling of concrete, rusting reinforcement bars in the concrete, and deteriorating cornices.
- Deterioration of roof/bridge connections and bridge drainage systems.
- Deflection of the basement floor due to lack of stable ground support.
- Intrusion of water through expansion joints and deteriorated waterproofing.
- Deterioration of roadway bridges.
- Deteriorated plumbing and domestic water supply pipes and fixtures.
- Deteriorated chilled and heated water supply piping and fixtures.
- Deteriorated and non-code compliant electrical wiring.

Engineering Systems Failure

Pentagon

- Severely undersized, inflexible and unreliable, heating, ventilation, and air conditioning (HVAC) systems.
- Unreliability of current building HVAC systems has resulted in independent air conditioning (A/C) units having been installed in certain areas.
- Overloaded secondary electrical circuits result in daily failures of electrical systems.
- Undersized electrical closets prohibit proper wiring and management of electrical systems.
- Deteriorated plumbing, chilled and hot water, domestic water and other systems.

Heating & Refrigeration Plant

- The original coal boilers installed during construction of the Pentagon were beyond repair. Existing refrigeration equipment, some nearly 30 years old, was unreliable and often out of service. Rented package units were being used to supply heating and cooling services to building.

Changing Technology Requirements

- Increased electrical and HVAC loads due to office equipment such as computers and copier machines, and special equipment such as video and graphics production equipment.
- Current wire chases cannot accommodate cabling systems for telephones, computer networks, and audio/video information systems.
- Inflexible and inefficient space arrangements limit the continued utility of the Pentagon office and support space.

Security

- Metro escalators penetrate into the building envelope forcing the security perimeter inward.
- The dispersed loading docks are difficult to secure.
- Numerous delivery vehicles penetrate the building security perimeter daily.
- Limited approach ways hinder security control at loading docks and delivery entrances (distance from

non-control to control areas is so short that guards have no response time before vehicle has reached the guard position).

Historic Status

The Pentagon is a building of interest to local, state, federal, and architectural historians for the following reasons:

- It is associated with events that have made a significant contribution to the geo-political role of the United States as a superpower during the period from World War II to the present.
- It is associated with the lives of persons who are significant in American history from the time of construction in 1941 to the present day.
- It embodies the distinctive characteristics of the "stripped classical" variant of architectural classicism. This stylistic mode flourished during the second quarter of the 20th century, and was a major theme in federal architecture.
- It is classified currently as the largest low-rise office building in the world.
- It was constructed during an important historical period.
- It was built in 16 months which required a monumental effort in design and construction.
- It is located adjacent to Arlington National Cemetery.
- It is in proximity to the Nation's Monumental Core.
- It is situated along a major gateway to the Nation's Capital.

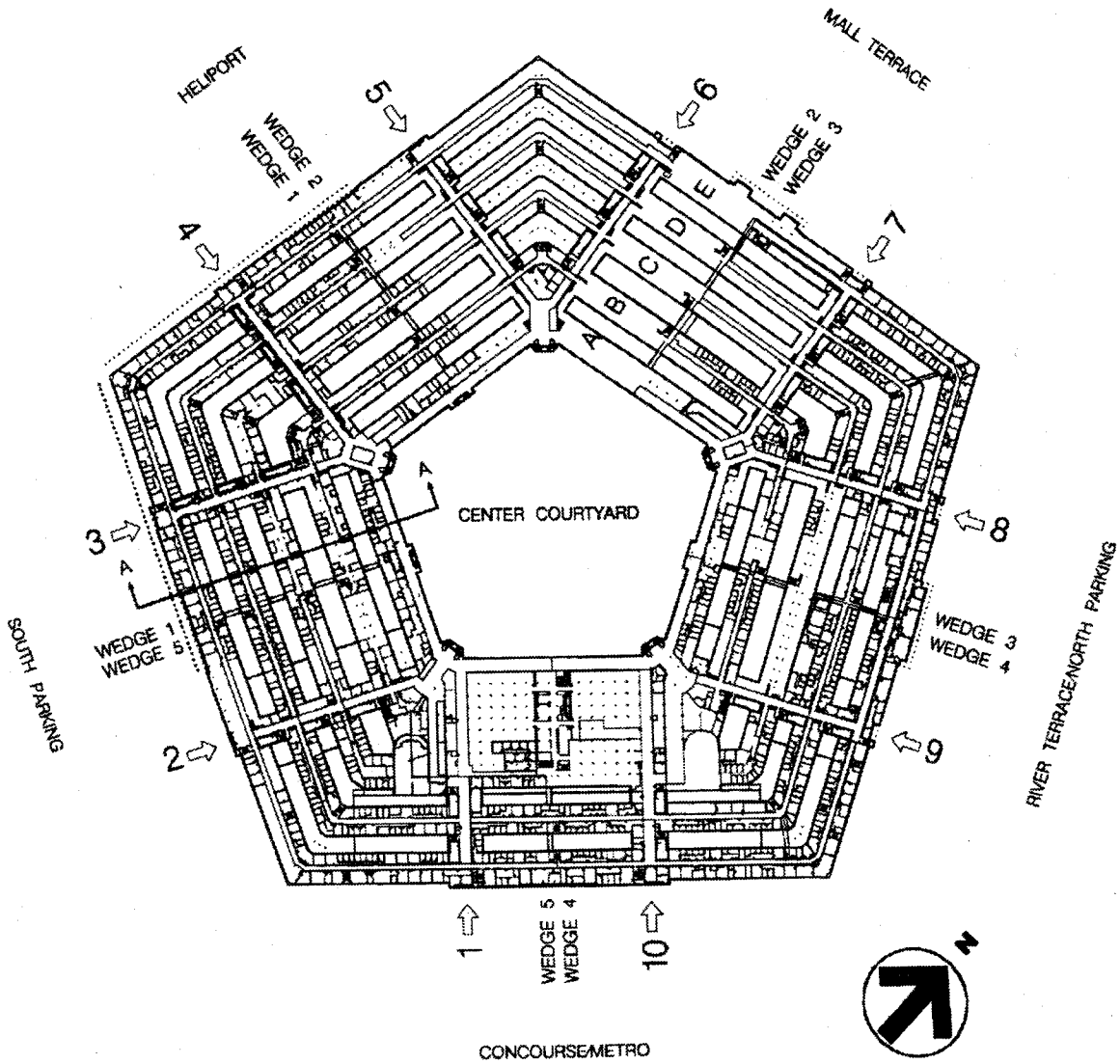
The Secretary of Defense, the Honorable Richard Cheney, was notified by the Secretary of the Interior, the Honorable Bruce Babbit, that the Pentagon had been designated as a National Historical Landmark on October 5, 1992. This designation also automatically places the Pentagon in the National Register of Historic Places.

There are five historic elements of the Pentagon that are cited for special attention:

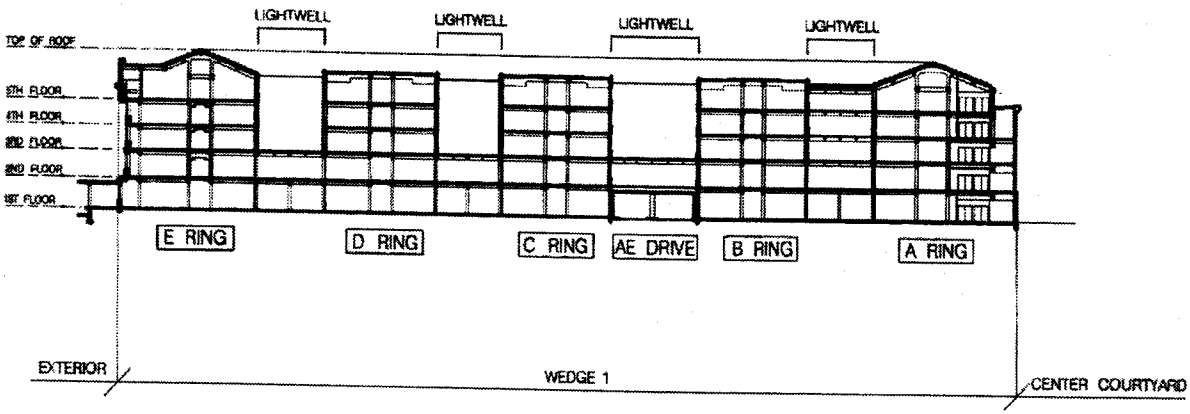
- The five outer facades of the Pentagon.
- The Center Courtyard and surrounding facades.
- The Terrace fronting the Mall Entrance.
- The Terrace fronting the River Entrance.

- The Pentagon's distinctive five-sided shape.

A ceremony celebrating the 50th Anniversary of the Pentagon in May 1993 included presentation of a bronze plaque stating "THIS PROPERTY POSSESSES NATIONAL SIGNIFICANCE IN COMMEMORATING THE HISTORY OF THE UNITED STATES OF AMERICA." This ceremony was hosted by Les Aspin, the Secretary of Defense, and General Colin Powell, Chairman of the Joint Chiefs of Staff.



Pentagon Typical Existing Floor Plan Third Floor



Section A-A Through Wedge One

V Overview

General

As the headquarters of the National Defense Establishment and the nerve center for command and control, the Pentagon needs to be maintained in superior operational condition. In the past this has not always been the case. All building systems have a useful life, which is generally considered to be about 20 years. The 55-year-old Pentagon, with many of its original systems still in place, has deteriorated to the point where distribution outages, plumbing leaks, water supply failures, and heating, ventilation, and air conditioning (HVAC) failures occur on a daily basis.

The antiquated utility systems cannot provide adequate services to support a modern and flexible office environment. Computers, copy machines, and other heat-generating, power-consuming equipment normal in today's administrative offices did not exist in 1943. The HVAC systems were never designed for, nor intended, to accommodate today's loads. The plumbing services, although adequately sized, have simply worn out. New demands have been placed on the structure's telecommunications and security systems which the original architects never anticipated. The tremendous increase in sophisticated computer equipment requires new, efficient, and integrated HVAC systems as well as additional power distribution sources.

A key element in planning the renovation is the fact that the Pentagon was constructed with plaster finish ceilings throughout which concealed the mechanical, electrical, and plumbing systems. Therefore, in order to replace or install the mechanical, electrical, and life safety systems, all asbestos-laden plaster ceilings, asbestos ducts, pipes and tile flooring must be removed from the building. Such demolition work will require the removal of the majority of obsolete full height office partitions. These steps, in turn, facilitate and make possible the reconfiguration of space to provide modern flexible open office space (many associated offices are not contiguous and are not efficiently housed). The sequence of events shows that the health and life safety requirements and the physical constraints of the building will not accommodate a "piece-meal" renovation approach nor one that would stop and start arbitrarily.

These conditions require a plan of comprehensive scope, and in turn, provide the benefits of a comprehensive building renovation.

Reservation Master Plan

A Pentagon Reservation Master Plan and an associated Environmental Assessment have been approved by the National Capital Planning Commission and the Commission on Fine Arts. This plan facilitates the integration of existing elements with new construction and site improvements. Objectives of the Master Plan for the Pentagon Reservation were:

- Establish an integrated program for renovation, demolition, and construction of structures and facilities on the Reservation.
- Recommend improvements in transportation, traffic flow and parking, giving priority to transit, ride sharing, and multiple-occupant modes.
- Recommend improvements in the quality of the human environment while minimizing potential adverse impacts.
- Describe improvements necessary to reinforce the symbolic nature of the Pentagon Reservation as part of a major gateway to the Nation's Capital.
- Assure that site development and new construction are compatible with existing buildings and surrounding features.
- Provide a sense of unity and identity for the entire Reservation.

Program Development

A Concept Plan, upon which the renovation plan was initially based, was completed in December 1989, refined in 1990 and formed the basis for planning the renovation of the world's largest low-rise office building.

Eight conceptual approaches to renovating the 6,500,000-gross-square-foot (603,900 m^2) Pentagon were examined. These approaches ranged from the very small, 150 sections of the building with each section about 44,000 gross square feet (4090 m^2) of space, to one very large section (the total building) of 6,500,000 gross square feet (603,900 m^2) of space. Following an extensive evaluation, three of these conceptual approaches were selected for further study.

The eight conceptual approaches to renovating the Pentagon were:

1. Smallest Increment -- 150 increments of 44,000 sq. ft. (4090 m^2).
2. One tenth of a floor horizontal -- 50 increments of 132,000 sq. ft. (12,268 m^2).
3. Vertical sections -- 17 increments of 388,000 sq. ft.
4. By tenants -- more than six increments of less than 1,100,000 sq. ft. (102,230 m^2).
5. Five vertical sections -- five increments of 1,100,000 sq. ft. (102,230 m^2) (Wedges).
6. Rings and vertical sections -- five increments of 1,100,000 sq. ft. (102,230 m^2) (Renovate A-B Rings first, then C-E Rings).
7. One quarter of building -- four increments of 1,625,000 sq. ft. (151,022 m^2).
8. All of the building -- one increment of 6,500,000 sq. ft. (603,900 m^2).

The three approaches selected for additional study were:

1. Seventeen vertical sections of building; sections divided along building seams, each part through all floors.
2. Five vertical building sections divided along building seams (wedges), relocating tenants in each section.
3. Rings and vertical building sections divided along building seams, do A Ring first, then five vertical sections.

On each of these concepts, additional investigation was performed. Evaluation factors included: maintaining support services, managing areas of construction, availability of construction staging areas, minimizing material lead times, minimizing asbestos removal impact, maintaining user operations, construction access to site/building, compatibility with utilities/building systems, maintaining physical security, minimum construction time frame, availability of required construction personnel, and minimum total project costs.

Renovating in five vertical sections (wedges) emerged as the best fit to the evaluation criteria and the option most likely to be successful. The Concept Plan divided the Pentagon into five major phases of work plus the Basement

and further identified five improvement alternatives to enhance the overall operation of the building:

1. Foyer/vertical circulation modifications.
2. New public access to the second floor.
3. Services corridor network.
4. Additional Mezzanine space.
5. Pentagon Maintenance Facility (formerly Logistics Support Extension).

The Pentagon Maintenance Facility was canceled by the Secretary of Defense on July 23, 1993, after consultation with Congress.

Incorporation of the other alternatives increases the building's efficiency and improves the internal organization of space and building systems. Key changes planned are:

- Modification of internal circulation patterns to allow better vertical integration of space. This will be done through the introduction of passenger elevator services and the addition of more escalators to replace current ramps and to augment stairwells.
- Re-orientation of public entrances to channel visitors to the second floor. This will isolate sensitive areas; improve internal security; and separate personnel from mechanized traffic.
- Addition of first floor service corridors and service elevators that could reduce the intermingling of mechanized delivery vehicles from pedestrians in the main corridors. This makes it safer for building occupants and reduces damage to corridor floors and walls.
- Creation of flexible, expandable, mechanical, electrical, plumbing, and cabling systems to ensure that future demands for maintenance and new services can be met economically and efficiently.

Because renovation includes asbestos removal, with associated containment procedures, it will be necessary to completely vacate the areas under renovation while work is in progress. This requirement to completely vacate areas being renovated is a critical project planning factor.

Temporary "swing space" must be obtained to house displaced activities. Activities displaced from the Pentagon are expected to use swing space on a temporary basis until their renovated space is completed.

Renovation of the Pentagon involves the coordinated implementation of a number of related actions that will collectively address the building's condition. Since a major renovation has never been done at the Pentagon, this project involves extensive demolition and reconstruction. Significant construction activities include replacement and upgrade of mechanical, electrical, plumbing, and all building support systems to modern standards. Interior spaces will be and are being re-configured and vertical transportation systems will be installed. New space will be added to the inventory through the conversion of ramp and corridor space to office and support space, and the expansion of the Mezzanine areas. The renovation is needed to provide a modern, flexible, efficient operating environment well into the 21st century. Without a major renovation the building will continue to deteriorate and at some point will be unable to serve its mission.

The Pentagon Renovation will enable organizations to be aligned vertically, and to be served with elevators and escalators. Although the Commandant of the Marine Corps has been accommodated with space in the Pentagon, the remainder of the Marine Corps Headquarters staff will be relocated over the duration of the renovation program. The Department of the Navy will provide the location of the Marine Corps within its allocation of space in the Pentagon.

Security will be enhanced by restructuring visitor access areas and directing general visitors to the second floor of the Pentagon through security check points.

Environmental/ Energy Improvements

The Pentagon Renovation affords the opportunity to make the facility a model of energy efficiency and waste reduction. Selected recommendations made during the Energy Efficient, Environmentally Sensitive DoD Showcase Facility Session held in the first quarter FY 1995 are being implemented. Through the Renovation, the Pentagon will obtain a healthy indoor environment by

increasing air changes per hour, eliminating smoking areas and removing asbestos. The renovation of the Pentagon includes improving energy efficiency through:

- Improved thermal insulation.
- Double-glazed windows.
- Economizer cycles.
- Energy efficient mechanical and electrical equipment.
- Reduced overall lighting load and increased use of task lighting.
- Automated energy management systems.

The Pentagon Reservation will continue to comply with environmental regulations by testing soils and ground water for contamination, and by using appropriate soil erosion and sediment management. The Pentagon is complying with the Clean Air Act by reduced emissions from the Heating & Refrigeration Plant and the Classified Waste Incinerator Plant.

In summary, the renovated Pentagon will benefit from quality indoor air, a new, high-efficiency Heating & Refrigeration Plant, automated energy systems management, energy-efficient lighting, and an improved thermal building envelope.

Renovation Components

The Pentagon Renovation Program includes the following distinct components:

- Basement and Mezzanine Renovation.
- Above grade building renovations of Wedges 1-5.

Basement/Mezzanine

The overall renovation of the Basement/Mezzanine is being accomplished in multiple increments, and began with the area centered around Corridor 8.

The deflected Basement floor slabs were lowered and replaced, and foundations have been modified for the revised structural conditions.

The Mezzanine space in the two-story-high Basement areas is being extended and its completion will provide about 278,000 sq. ft. (25,826 m5) of additional occupiable space. The Basement/Mezzanine has been designed to accommodate the co-located, National Military Command

Center (NMCC), the Services Operations Centers, Business Automated Data Processing Centers and the consolidated Technical Control Center.

The Army Motor Pool, previously located in the Mezzanine, has been permanently relocated off-site. Correction of severe structural deficiencies have been completed and this former motor pool area is being converted into the DiLorenzo TRICARE Health Clinic which consolidates the separate Army, Civilian, and Air Force clinics.

A construction contract was awarded on February 16, 1994, for the Basement Segment 1 Temporary Mechanical, Electrical, and Plumbing. This work has been completed.

A construction contract was awarded on September 30, 1994, for the Basement Segment 1; completion of this work is scheduled for FY 1998; the construction of the remainder of the basement will proceed in multiple increments starting in FY 1998.

To eliminate the need for the undesirable existing sewage ejectors in the basement, a construction contract was awarded September 29, 1995, for the Sewage Lift Station. This work was completed in January 1997.

Above Grade Renovation of Wedges #1 - #5

No major renovations had ever been accomplished at the Pentagon and as a consequence all antiquated internal building systems will be replaced and brought up to current building, fire protection, life safety codes and accessibility standards. The renovation work involves the demolition and removal of all partitions, ceilings, floor finishes, mechanical, electrical, plumbing, fire protection and communications systems. The basic structural system as well as the stairwells and their enclosing walls will remain. This renovation work will facilitate the reconfiguration of space to provide modern, flexible, open office space, readily adaptable to accommodate future organizational changes as well as technological advances in office equipment and work space environments. This configuration will also allow for the consolidation of organizations which are now fragmented.

Support facilities, including food service, communications, control centers, a library, recreational areas and retail stores will be renovated as the wedges in which they are located are scheduled for construction.

New primary and secondary electrical service and distribution systems, including a cable management system, will be installed. Emergency lighting, fire protection, un-interruptible power supplies and panels will be installed as well.

The heating, ventilating, and air conditioning systems will be replaced. A dual feed loop system will be installed to provide chilled water service 24 hours daily for off-hours operations (thereby eliminating numerous package systems within the building). Toilet rooms will be relocated, brought up to current standards, including requirements for the disabled, and reduced in number. All new waste and supply piping will be installed.

The building will be equipped throughout with a sprinkler system and a re-configured fire alarm system.

The completion of the South Terrace Pedestrian Bridges will provide improved public access at the second floor level. Internal circulation will be enhanced by the installation of escalators and personnel elevators. In addition, these changes will improve security by isolating sensitive spaces on or below the first floor.

An independent service corridor network serving the vertical transportation elements will be constructed on the first floor to improve efficiency of distribution. The massive floor area of the Pentagon necessitates initial support distribution via motorized carts at this floor level. Decentralization of support activities will allow control of all but emergency medical vehicles above the first floor. In addition to replacing the present old freight elevators, new service elevators will be installed at decentralized locations, along with trash removal facilities.

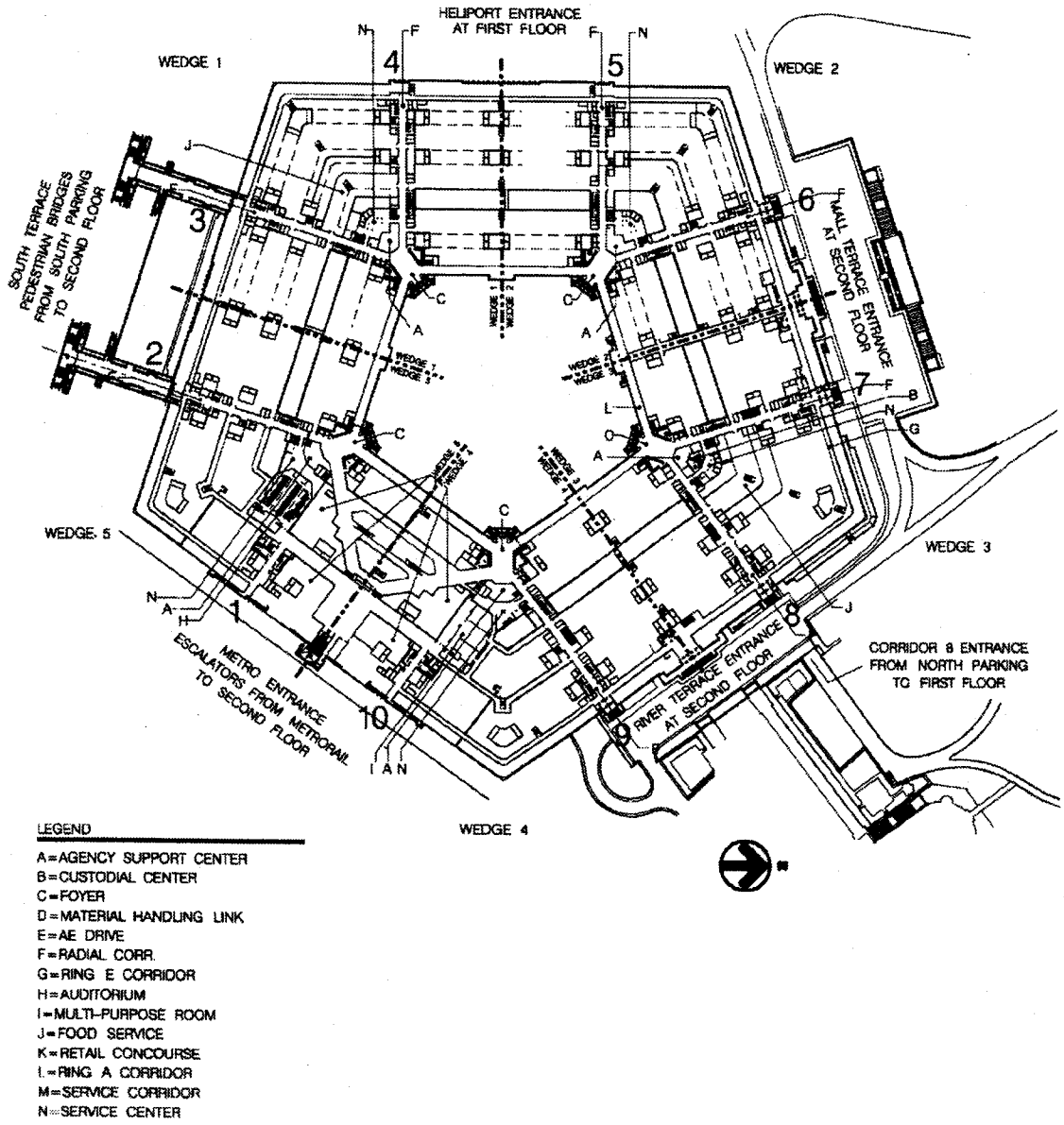
Additional internal modifications will include the narrowing of selected, excessively-wide corridors. All ramps will be removed and replaced with structural floors thereby providing occupiable space. Auditorium and conference spaces will be expanded.

Roof, roof gutters, down spouts, and flashing will be repaired/replaced where deterioration is encountered in the renovation work. In concert with historical agencies, existing steel casement and double-hung windows will be replaced with new, energy-efficient and appropriately secure units. Modifications will be made to outer perimeter monumental windows to improve weather-tightness and security. All exterior masonry and concrete finishes and waterproofing elements will be restored to sound condition.

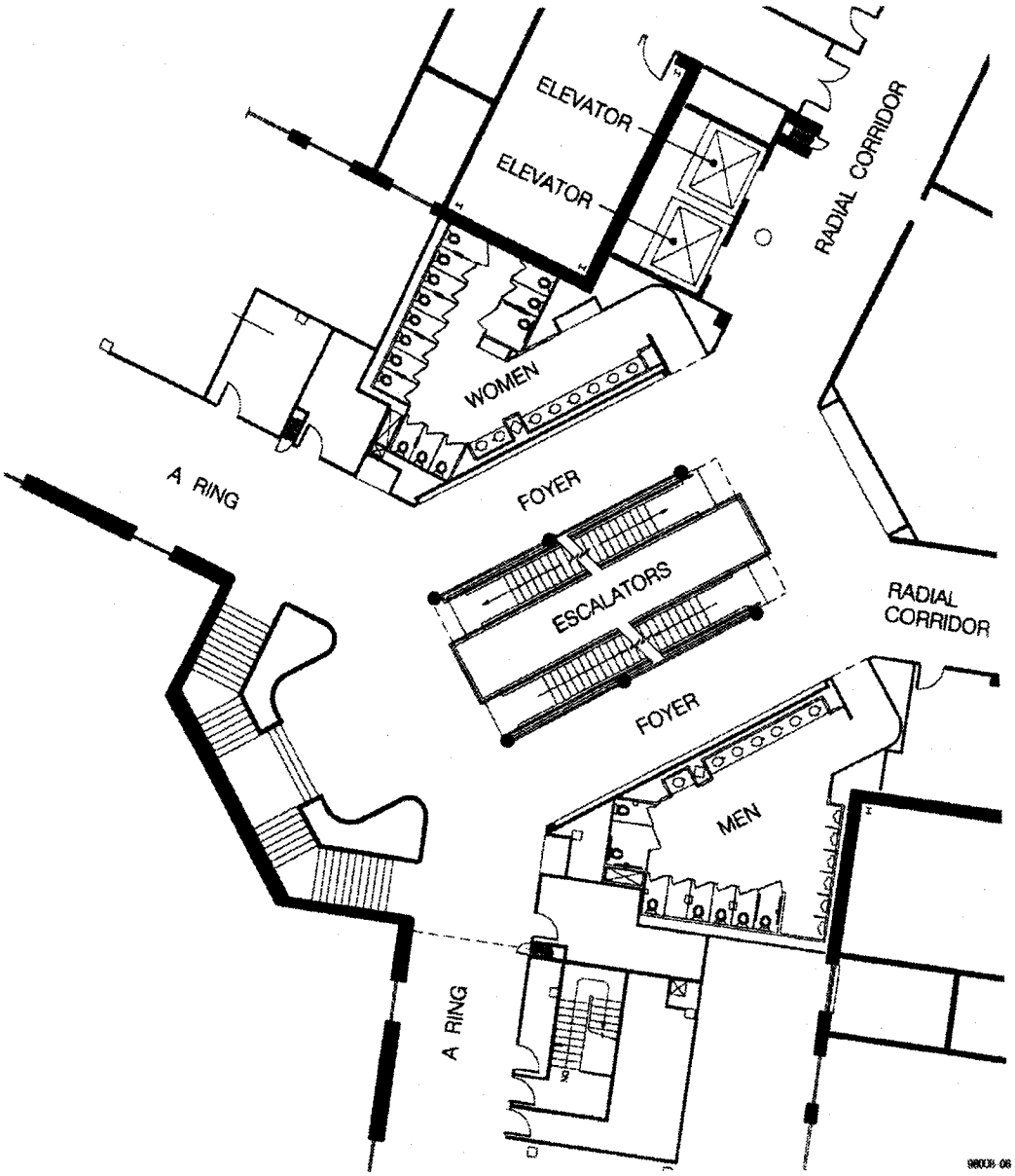
Construction will be completed in five sequential and separate wedges based on isolation of building systems and minimum disruption of tenants.

The intersections of radial corridors at the innermost ring corridor (Ring A) are not efficiently used at present. These areas will be renovated to provide vertical transportation for improved passage throughout the building. The introduction of vertical transportation will facilitate the consolidation and assignment of organizations vertically throughout the building. The current excess areas at these intersections will be developed to provide conference and training facilities, briefing centers, snack bars, and other multi-purpose support functions. The drawings and renderings on the following pages illustrate the planned development of the above grade renovations:

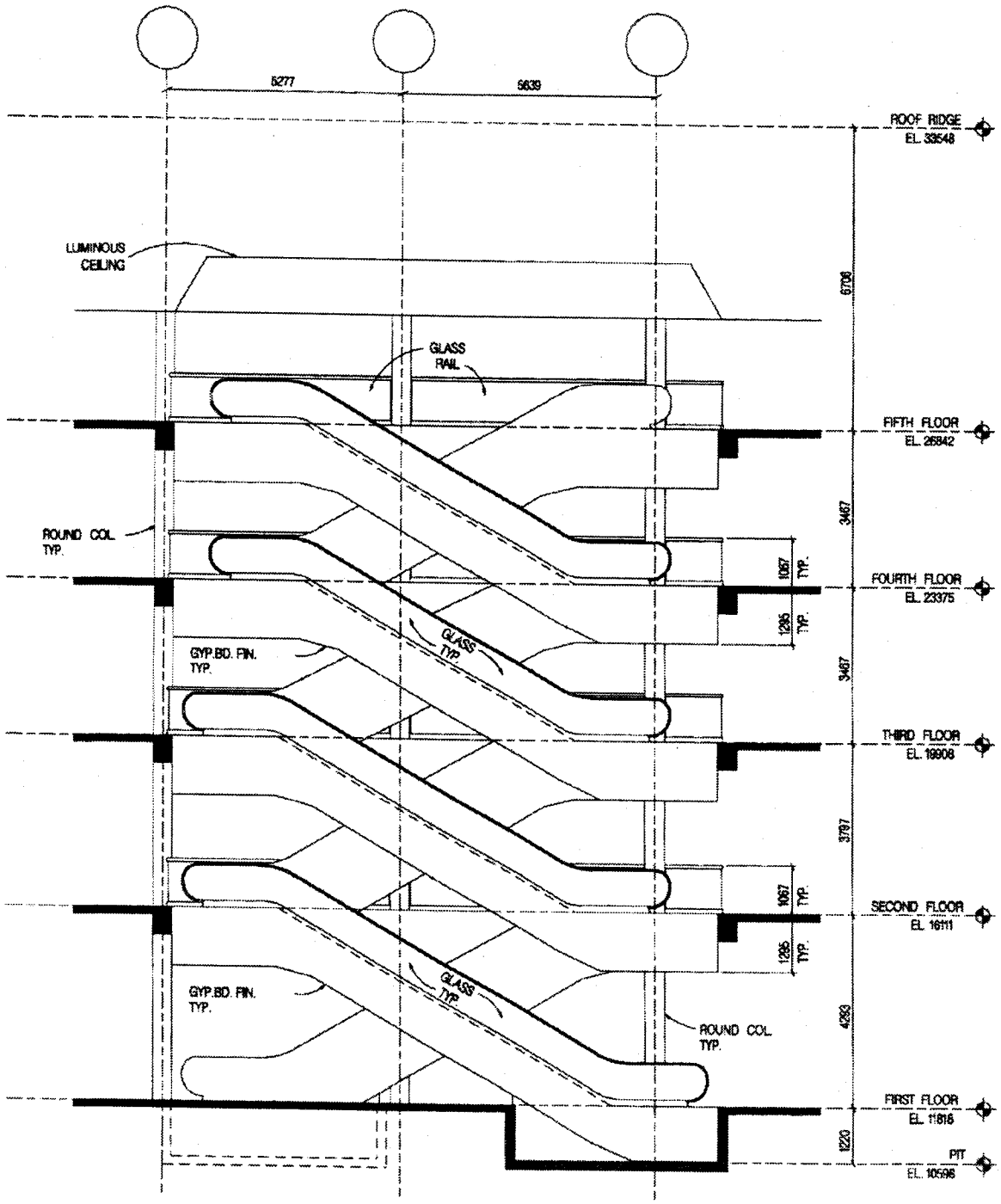
- Pentagon Building Master Plan Second Floor Plan.
- Plan of Proposed Typical Foyer at Apex with New Elevators and Escalators.
- Section of Proposed Typical Foyer at Apex with New Escalators.
- Proposed Apex Foyer.
- Proposed Corridor 8 Entrance.
- Proposed South Terrace Pedestrian Bridges.



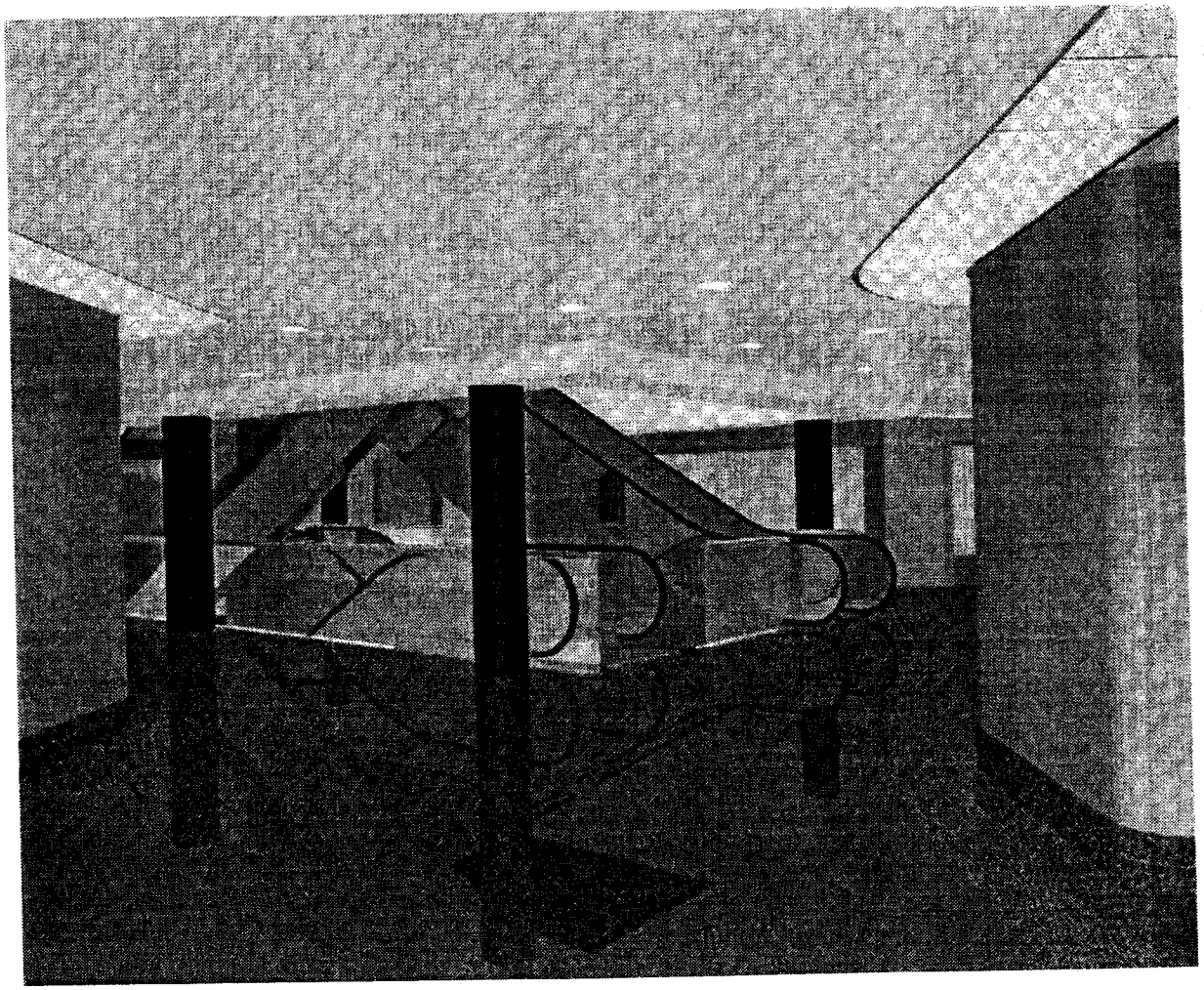
Pentagon Building Master Plan - Second Floor Plan



Plan of Proposed Typical Foyer at Apex with New Escalators and Elevators

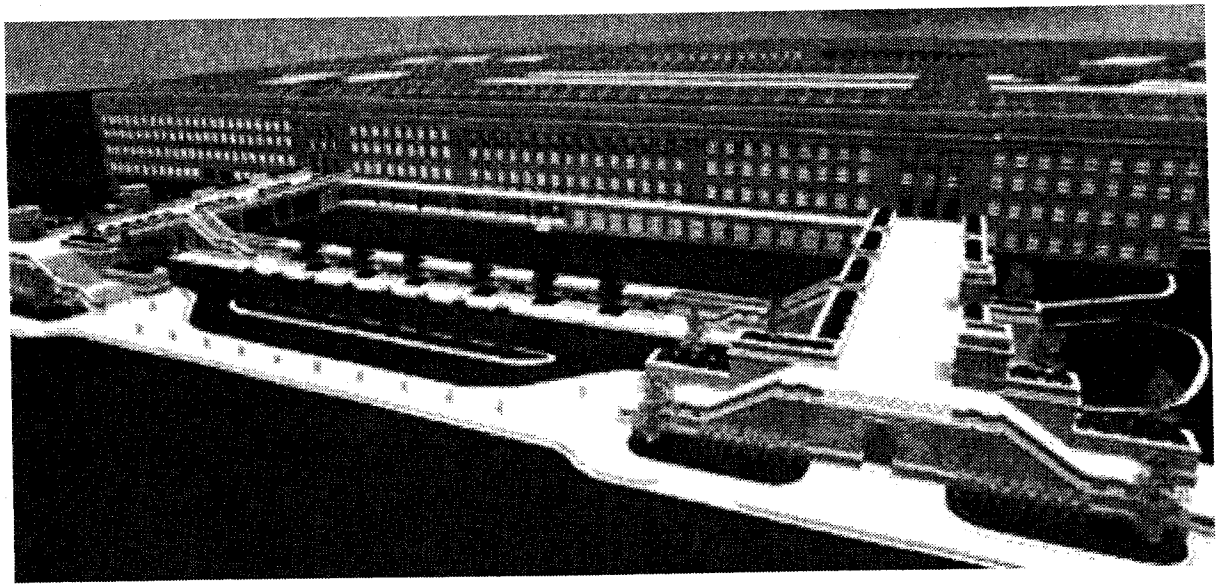


Section Through Proposed Typical Foyer at Apex with New Escalators



Proposed Apex Foyer

Proposed Corridor 8 Entrance (Under Construction)



Proposed South Terrace Pedestrian Bridges (Under Construction)

Other Related Projects

There are a number of initiatives ongoing at the Pentagon Reservation which are separate from, but related to, the Renovation Program. The related initiatives which coincide with the Renovation effort reflect the fact that the Pentagon remains the fully operational headquarters of our Military Establishments while it is undergoing renovation. Thus, there are a number of other facilities projects that are being closely coordinated with, and sometimes performed by, the Renovation Office.

Heating & Refrigeration Plant

Replacement of the Heating & Refrigeration Plant began the initial work on the Pentagon Reservation because the plant was nearly inoperative, relying on rented boilers and chillers to provide the necessary services. The Heating & Refrigeration Plant is completed and is now fully operational.

The original Heating & Refrigeration Plant (H&RP), which served the Pentagon Reservation for over 55 years, was so deteriorated that it was more cost-effective to replace it completely than to renovate the existing facility and equipment. The new facility has been sized to provide steam and chilled water to the Pentagon and to Federal Building No.2 (FB2) and steam only to Henderson Hall. Services are provided through new underground utilities distribution systems in a new utilities tunnel from the H&RP to FB2.

The facility has approximately 106,200 SF (9,900 m5) of floor area. The primary elements of the plant are six multi-fuel boilers (oil/gas), ten chillers, two 250,000 gallon (947,500 liters) fuel oil storage tanks, and office and maintenance areas. The Plant can provide 200,000 pounds per hour (25.25 kilograms per second) of steam heating capacity and 37,500 tons (131,900 kw) of cooling.

The new facility has been built adjacent to the former Heating & Refrigeration Plant. Demolition of the original facility was completed in February 1998.

Site

Site improvements include the continued operation, repair, maintenance, restoration and replacement or upgrading of

landscaping, roads, walks, pavement, bridges, transportation facilities, fences, modifications to meet current security and safety requirements, as well as realignment and improvement of vehicular traffic patterns.

Information Management & Telecommunications

The basic information system infrastructure in the Pentagon was installed long before the advent of personal computers, facsimile machines, video teleconferencing, and digital telephone service, and has evolved without design or plan. Facilities and systems were added as requirements emerged with little or no regard to existing capabilities or long term requirements. The individual military departments and agencies engineered and installed equipment and cables to meet their specific requirements. Many of the existing information systems in the Pentagon are now outdated, non-interoperable, duplicative, inefficient and expensive to operate and maintain. Systems and cables no longer needed have been abandoned in place, clogging the available cable paths and telecommunications closets. In an era of information warfare, the Pentagon could enter the fight armed and supported by obsolete equipment and systems. Despite the past expenditure of millions of dollars, the Pentagon is seriously deficient in the information technology infrastructure necessary to function efficiently and to comply with the Presidential mandate to implement electronic commerce.

The modernization and improvements are required to provide basic information infrastructure elements, relocation of command and control centers, technologies, systems, and the National Military Command Center and the Services' Operational Centers for tomorrow. The selection of desired features, systems, and inter-operability capabilities are presently under study by the military departments and agencies housed in the Pentagon to determine the best solutions.

Swing Space

Renovation of each wedge of the Pentagon requires the relocation of approximately 5,000 employees. As of March 1998, approximately 3,000 tenants in Wedge 1 have been

relocated to external swing space. "Swing Space" refers to office space outside the Pentagon that tenants will occupy during renovation.

Swing space accommodations are critical to keeping the renovation program on schedule. Presently, three office buildings in Arlington, Virginia, have been leased to accommodate 4,120 Army, Navy, Air Force, and OSD personnel for the duration of the renovation. Two office towers in Rosslyn will house 2,390 employees while an office tower in Crystal City will be home to another 1,730 employees. Other employees will be relocated elsewhere on the Pentagon Reservation. All swing space facilities must maintain full connectivity with the Pentagon through classified and unclassified LANs, phone lines and electronic mail. All three buildings have been renovated for DoD tenants, and feature modern offices with professional workstations, state-of-the-art voice/data communication systems and sophisticated security systems. Communications with the Pentagon will be maintained.

VI Program Development

Design Development

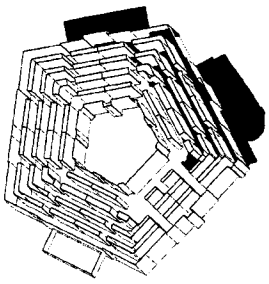
Control of the design process over the life of the project requires the development of design guidelines and criteria. This control is necessary because of the size and duration of the project, the multi-acquisition approach, and design activities occurring throughout the project as each increment is renovated. The revised Pentagon Renovation Plan must be translated into appropriate design guidelines and criteria that will establish design parameters.

A Management Support Architect-Engineer (MSAE), has prepared design guidelines and criteria; has prepared the Reservation Master Plan which addresses environmental issues; has prepared the Pentagon Building Master Plan; has developed prototypical designs for architectural standards, heating, ventilating and air conditioning systems, plumbing systems, fire protective systems, electrical systems, and security systems; is developing programming and swing space requirements; is developing schedules and cost estimates; is providing technical and management support; and is completing Computer-Aided Design Documents (CADD) for record drawings and shop drawings and shop drawing reviews. Broad-scale design criteria, which is equivalent to a concept stage, will ensure that each individual increment will be compatible with the rest of the work. The goal is to achieve a completed project that has uniform and compatible materials and systems that are economic to maintain.

Design development activities have been intensive during the early stages of the project, and will continue at a less intensive level throughout the duration of the renovation.

Basement Renovation

Renovation of the Basement includes the reconstruction of the floor slab which has settled in many areas due to the low soil bearing capacity. In addition, the build-out of the Mezzanine, one of the improvements recommended in the Concept Plan, provides the opportunity to co-locate all command and control functions of the National Military Establishment to the Basement and Mezzanine. The renovation of the Basement will be completed in multiple phases.

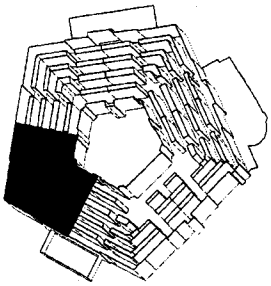


FY '94 Basement

The design of the Segment 1 renovation of the Basement was completed in mid-FY 1994 with the construction

beginning October 1994. The construction of Segment 1 of the Basement, preceded by the temporary re-routing of utilities, will be completed in FY 1998. The design of the remaining segments began in FY 1997. The Services Operations Centers will be relocated as the construction proceeds.

Wedge #1



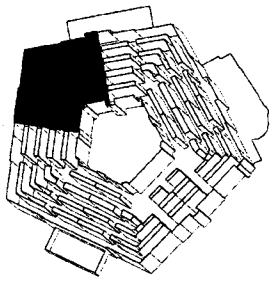
Wedge #1

In December 1996, the Deputy Secretary of Defense directed that Wedge #1 be vacated by December 1997, and the construction of Wedge #1 to start by FY 1998. Renovation of above-ground areas of the Pentagon begins with Wedge #1. Work is centered around corridors 3 and 4.

The renovation work involves the demolition and removal work includes all partitions, ceilings, floor finishes, mechanical, electrical, plumbing, fire protection, and communications systems. The basic structural system, as well as the stairwells and their enclosing walls, will remain. All electrical, mechanical, and plumbing services will be replaced and a modernized telecommunication back-bone infrastructure will be installed. Utility connections will be made through the new Center Courtyard Utilities Tunnel without affecting the rest of the building. Wedge #1 will have a new food service facility, new vertical transportation service and enhanced foyers. Much of the renovated space will be configured as "open office" space consistent with the Concept Plan. The improvements include the new South Terrace Pedestrian Bridges which will connect South Parking to Corridors 2 and 3. This work incorporates some of the security improvements by re-routing public access to the second floor and improves safety by separating pedestrians from the vehicular traffic on the very busy Rotary Road in South Parking. The South Terrace structure consists of two bridges accommodating pedestrian traffic entering the Pentagon at the second floor at Corridors 2 and 3.

The design of Wedge #1 began in January 1994, and was completed in FY 1997. 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. Construction is scheduled for completion in FY 2001.

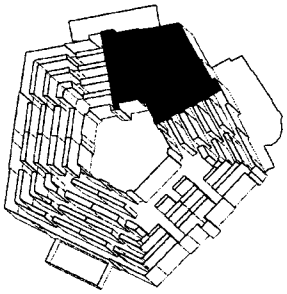
Wedge #2



Wedge #2

Wedge #2 is also a complete slab-to-slab reconstruction of the space. Replacement of all electrical, mechanical, and plumbing services will occur in accordance with the new design and a modernized telecommunication back-bone infrastructure will be installed. As discussed previously, the removal of non-masonry partitions will open the space to an "open office" concept. The work is centered around Corridors 5 and 6.

Wedge #3

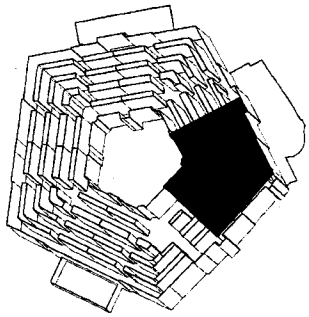


Wedge #3

Wedge #3 includes a complete slab-to-slab reconstruction of the space. All electrical, mechanical, and plumbing services will be replaced in accordance with the new design and a modernized telecommunication infrastructure will be installed. The removal of non-masonry partitions will open the space to an "open office" concept. The work will be centered around Corridors 7 and 8.

This work also incorporates some of the security improvements by re-orienting public access to the 2nd floor.

Wedge #4



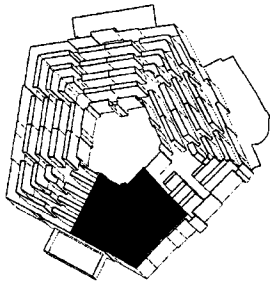
Wedge #4

A slab-to-slab reconstruction of the space in Wedge #4 is programmed. All electrical, mechanical, and plumbing services will be replaced and a modernized telecommunication infrastructure will be installed. The removal of non-masonry partitions will open the space to an "open office" concept. The work will be centered around Corridors 9 and 10.

This incremental area houses portions of the cafeteria facilities, the Concourse, and the Metro entrance.

This area also incorporates some of the security improvements by re-orienting public access to the 2nd floor. Existing ramp space to upper floors will be redistributed to incorporate expanded multi-purpose facilities as well as additional office space.

Wedge #5



Wedge #5

This last area will also undergo a slab-to-slab reconstruction. All electrical, mechanical, and plumbing services will be replaced and a modernized telecommunication infrastructure will be installed. The removal of non-masonry partitions will open the space to an "open office" concept. This last incremental area is centered around Corridors 1 and 2.

The area houses the remaining portions of the cafeteria facilities and the Concourse. Existing ramp space to upper floors will be redistributed to incorporate auditorium facilities.

VII Budget

Source of Funds

The Pentagon Reservation Maintenance Revolving Fund (PRMRF) was established by the FY 1991 Defense Authorization Act (P.L. 101-510, Section 2804) (see Appendix). The Act transferred responsibility for the operation, maintenance, protection, repair, and renovation of the Pentagon Reservation from the administration of the General Services Administration to the Secretary of Defense. The PRMRF is the funding source for the Pentagon Renovation Project. In addition, it finances a full range of building services for DoD components, including the Military Departments, and other activities housed within the Pentagon Reservation.

The renovation was designed as budget-neutral to the Department of Defense in that the Department could operate, maintain, protect, and renovate the Pentagon for the rent the Department would have paid to the General Services Administration over a 12 to 14 year period.

Accordingly, the PRMRF has been designed to operate on a break-even basis over the long term. Revenue to the PRMRF may be generated from various sources. However, the Fund is primarily dependent upon funds collected from a basic user charge for space and building services. Basic user charges are paid by the DoD components and other tenants using Pentagon Reservation facilities or land. This basic user charge consists of rates set for six categories of space assigned to tenants within the Reservation. The categories of space are: office, storage, special, joint use, commercial support, and outside parking. The basic rates are established to recover the cost of day to day operations, maintenance, protection of the Reservation, and essential capital improvements including all costs associated with the Pentagon Renovation Project.

Certification

The Defense Appropriations Acts for FY 1995 and FY 1996 required that the Secretary of Defense certify that the total cost for the planning design, construction, and installation of equipment for the renovation of the Pentagon Reservation will not exceed $1,218,000,000.

Subsequently, the Department of Defense Appropriations Act for FY 1997 reduced the cost certification for the

renovation to $1,118,000,000. This certification requirement is now $100,000,000 less that the certification ceiling supported by the Department and the Congress over the past several years. In order to continue with this critical program, the Department will constrain the total cost of the renovation to $1,118,000,000. At this early stage in the actual construction process, it is difficult to determine the impact that the $100 million reduction in the ceiling will have on the ultimate design of the renovated Pentagon. Among other things, the total cost depends heavily on inflation in construction costs over the next 10 to 12 years. Costs and estimates will be monitored closely, however, and the Department will seek adjustment of the certification ceiling as appropriate. Consistent with cost estimates for projects in a Military Construction Program, the timing and delineation for the certification, this estimate does not include the cost of: 1) design and construction of the Heating & Refrigeration Plant and the Classified Waste Incinerator Plant; 2) purchase and installation of Information Management and Telecommunications (IM&T) equipment; 3) rental and operation of leased swing space; 4) purchase and installation of furniture; and 5) recently required security enhancements and costs prior to FY 1994. The Defense Appropriations Act for FY 1998 and the required certification are enclosed as Appendix B.

Pentagon Renovation Certification Summary

Fiscal Year	Design and Construction	Cumulative Totals	Item
1994	$77,900,000	$77,900,000	Obligations
1995	$50,200,000	$128,100,000	Obligations
1996	$64,500,000	$192,600,000	Obligations
1997	$59,000,000	$251,600,000	Obligations
1998	$97,600,000	$349,200,000	Budget
1999-2009	$768,800,000	$1,118,000,000	Program
Total	$1,118,000,000		

VIII Appendix

Legislative Authorization

INDEX

A. FY 1991 - Legislative Authorization
B. FY 1998 - Department of Defense Appropriations Act, with Certification

A. FY 1991 LEGISLATIVE AUTHORIZATION

SEC 2804. OPERATION AND CONTROL OF THE PENTAGON RESERVATION

(a) IN GENERAL - (1) Chapter 159 of title 10, United States Code, is amended by inserting after section 2673 the following new section:

"§2674. Operation and control of the Pentagon Reservation

"(a)(1) Jurisdiction, custody, and control over, and responsibility for, the operation, maintenance, and management of the Pentagon Reservation is transferred to the Secretary of Defense.

"(2) Before March 1 of each year, the Secretary of Defense shall transmit to the Committees on Armed Services of the Senate and the House of Representatives, the Committee on Environment and Public Works of the Senate and the Committee on Public Works and Transportation of the House of Representatives a report on the state of the renovation of the Pentagon Reservation and a plan for the renovation work to be conducted in the fiscal year beginning in the year in which the report is transmitted.

"(b) The Secretary may appoint military or civilian personnel or contract personnel to perform law enforcement and security functions for property occupied by, or under the jurisdiction, custody,

and control of the Department of Defense, and located at the Pentagon Reservation. Such individuals—

"(1) may be armed with appropriate firearms required for personal safety and for the proper execution of their duties, whether on Department of Defense property or in travel status; and

"(2) shall have the same powers as sheriffs and constables to enforce the laws, rules, or regulations enacted for the protection of persons and property.

"(c)(1) The Secretary may prescribe such rules and regulations as the Secretary considers appropriate to ensure the safe, efficient, and secure operation of the Pentagon Reservation, including rules and regulations necessary to govern the operation and parking of motor vehicles on the Pentagon Reservation.

"(2) Any person who violates a rule or regulation prescribed under this subsection is liable to the United States for a civil penalty of not more than $1000.

"(3) Any person who willfully violates any rule or regulation prescribed pursuant to this subsection commits as Class B misdemeanor.

"(d) The Secretary of Defense may establish rates and collect charges for space, services, protection, maintenance, construction, repairs, alterations, or facilities provided at the Pentagon Reservation.

"(e)(1) There is established in the Treasury of the United States a revolving fund to be known as the Pentagon Reservation Maintenance Revolving Fund (hereafter in this section referred to as the 'Fund'). There shall be deposited into the Fund funds collected by the Secretary of space and services and other items provided an organization or entity using any facility or land on the Pentagon Reservation pursuant to subsection (d).

"(2) Monies deposited into the Fund shall be available, without fiscal year limitation, for expenditure for real property management, operation, protection, construction, repair, alteration, and related activities for the Pentagon Reservation.

"(f) In this section:

"(1) The term 'Pentagon Reservation' means that area of land (consisting of approximately 280 acres) and improvements thereon, located in Arlington, Virginia, on which the Pentagon Office Building, Federal Building Number 2, the Pentagon heating and sewage treatment plants, and other related facilities are located, including various areas designated for the parking of vehicles.

"(2) The term 'National Capital Region' means the geographic area located within the boundaries of (A) District of Columbia, (B) Montgomery and Prince Georges Counties in the State of Maryland, (C) Arlington, Fairfax, Loudoun, and Prince William Counties and the City of Alexandria in the Commonwealth of Virginia, and (D) all cities and other units of government within the geographic areas of such District, Counties, and City."

(2) The table of sections at the beginning of such chapter is amended by inserting after the item relating to section 2673 the following new item:

"2674. Operation and control of the Pentagon Reservation."

P.L. 101-510 LAWS OF 101st CONG.—2nd SESS. Nov. 5
Sec. 2804

(b) TRANSFER OF FUNDS FOR FISCAL YEAR, 1991.—For fiscal year 1991, the Secretary of Defense may transfer into the Pentagon Reservation Maintenance Revolving Fund (established by section 2674(e) of title 10, United States Code), from funds appropriated to the military departments and the Defense Agencies, amounts equal to the amounts that would otherwise be paid by the military departments and the Defense Agencies to the General Services Administration for the use of the Pentagon Reservation.

B. DEPARTMENT OF DEFENSE APPROPRIATIONS ACT, FY 1998 WITH CERTIFICATION

FILE h2266.enr

PUBLIC LAW 105-56

--H.R.2266--

H.R.2266

One Hundred Fifth Congress
of the
United States of America
AT THE FIRST SESSION
Begun and held at the City of Washington on Tuesday,
the seventh day of January, one thousand nine hundred and
ninety-seven
An Act
Making appropriations for the Department of Defense for the fiscal year ending September 30, 1998, and for other purposes.

[Italic->] Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled [<-Italic] , That the following sums are appropriated, out of any money in the Treasury not otherwise appropriated, for the fiscal year ending September 30, 1998, for military functions administered by the Department of Defense, and for other purposes, namely:

TITLE VIII
GENERAL PROVISIONS

SEC. 8070. None of the funds appropriated in this Act may be transferred to or obligated from the Pentagon Reservation Maintenance Revolving Fund, unless the Secretary of Defense certifies that the total cost for the planning, design, construction and installation of equipment for the renovation of the Pentagon Reservation will not exceed $1,118,000,000.

OFFICE OF THE SECRETARY OF DEFENSE
WASHINGTON, DC 20301

Program Manager
Pentagon Renovation

FEB 9 1998

Honorable Newt Gingrich
Speaker of the House of Representatives
United States House of Representatives
Washington, DC 20515

Dear Mr. Speaker:

Section 8070 of the FY 1998 Defense Appropriations Act (Public Law 105-56) requires the Secretary of Defense to certify that the total cost for the planning, design, construction and installation of equipment for the renovation of the Pentagon will not exceed $1,118,000,000. This certification requirement is $100,000,000 less than the certification ceiling supported by this Department and the Congress until last year. In order to continue with this critical program, I certify that the Department will constrain the specified costs of the renovation to $1,118,000,000. At this early stage in the construction process, it is difficult to determine the impact of the current ceiling on the ultimate design of the renovated Pentagon. Among other things, the total cost depends heavily on inflation in construction costs over the next 10 to 12 years and our ability to institute more cost effective contracts. We will be monitoring costs and estimates closely. The Department will seek adjustment of the certification ceiling, as appropriate, as we proceed with the demolition and construction of the first of five "wedges" this year.

Consistent with cost estimates for projects in the Military Construction Program, this certified amount does not include the cost of: 1) purchase and installation of Information Management and Telecommunications equipment, 2) rental and operation of leased swing space, and 3) purchase and installation of furniture for the renovated Pentagon. The certification also does not cover ancillary projects including the design and construction of the Heating and Refrigeration Plant, the Classified Waste Incinerator, recently required security enhancements and costs prior to FY 1994.

If you have questions about the Pentagon Renovation Program, please have your staff contact me (703) 693-8954.

Sincerely,

Walker Lee Evey

WALKER LEE EVEY
Program Manager
Pentagon Renovation

cc:
Honorable Bob Livingston
Chairman, Committee on Appropriations

Honorable David R. Obey
Ranking Minority Member
Committee on Appropriations

Honorable Floyd Spence
Chairman, Committee on National Security
Honorable Ronald V. Dellums
Ranking Minority Member
Committee on National Security

OFFICE OF THE SECRETARY OF DEFENSE
WASHINGTON, DC 20301

Program Manager
Pentagon Renovation

FEB 9 1998

Honorable Albert Gore, Jr.
President of the Senate
United States Senate
Washington, DC 20515

Dear Mr. President:

Section 8070 of the FY 1998 Defense Appropriations Act (Public Law 105-56) requires the Secretary of Defense to certify that the total cost for the planning, design, construction and installation of equipment for the renovation of the Pentagon will not exceed $1,118,000,000. This certification requirement is $100,000,000 less than the certification ceiling supported by this Department and the Congress until last year. In order to continue with this critical program, I certify that the Department will constrain the specified costs of the renovation to $1,118,000,000. At this early stage in the construction process, it is difficult to determine the impact of the current ceiling on the ultimate design of the renovated Pentagon. Among other things, the total cost depends heavily on inflation in construction costs over the next 10 to 12 years and our ability to institute more cost effective contracts. We will be monitoring costs and estimates closely. The Department will seek adjustment of the certification ceiling, as appropriate, as we proceed with the demolition and construction of the first of five "wedges" this year.

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If you have questions about the Pentagon Renovation Program, please have your staff contact me at (703) 693-8954.

Sincerely,

WALKER LEE EVEY
Program Manager
Pentagon Renovation

cc:

Honorable Ted Stevens,
Chairman, Committee on Appropriations

Honorable Robert C. Byrd
Ranking Minority Member
Committee on Appropriations

Honorable Strom Thurmond
Chairman, Committee on Armed Services

Honorable Carl Levin
Ranking Minority Member
Committee on Armed Services