A Status Report to the Congress on

Renovation of the Pentagon

Prepared by

The Office of the Secretary of Defense

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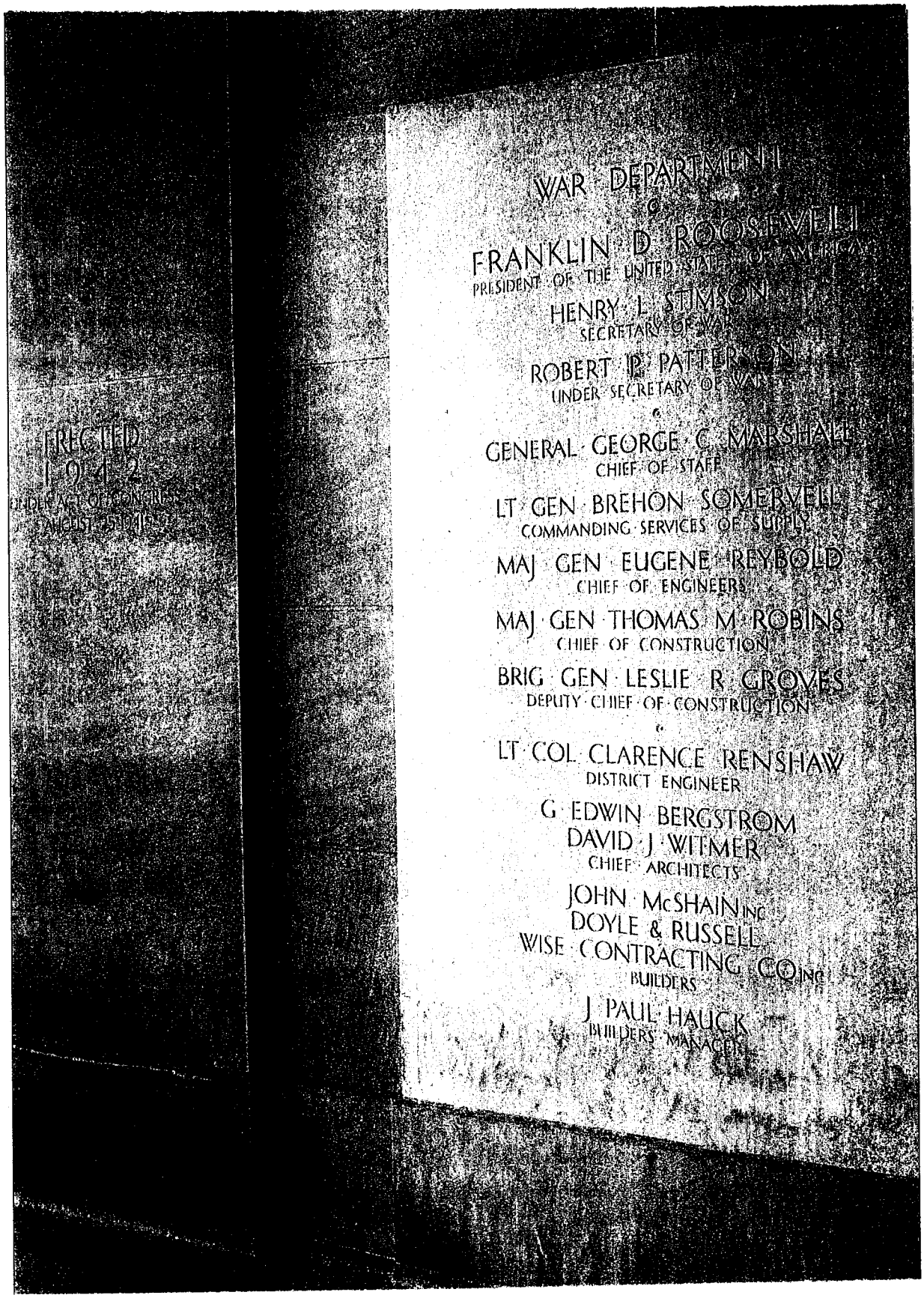
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Purpose

This report is provided to the Congress in compliance with the Defense Authorization Act for Fiscal Year 1991, November 5, 1990 (10 USC 2674). This Act requires the submission of 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 seventh annual report submitted in compliance with 10 USC 2674. The report covers accomplishments to date and actions proposed for FY 1997. In addition, information is included on several related projects which support the overall objectives of the Pentagon renovation.

In compliance with the 1975 Metric Conversion Act, as amended by the 1988 Omnibus Trade and Competitiveness Act, and Executive Order 12770 of July 25, 1991, *Metric Usage in Federal Government Programs,* the Renovation of the Pentagon is using the metric system. This report, in order to gain familiarity with this system, gives all measurements in the current U.S. system of "inch-pound" units and in metric units.

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

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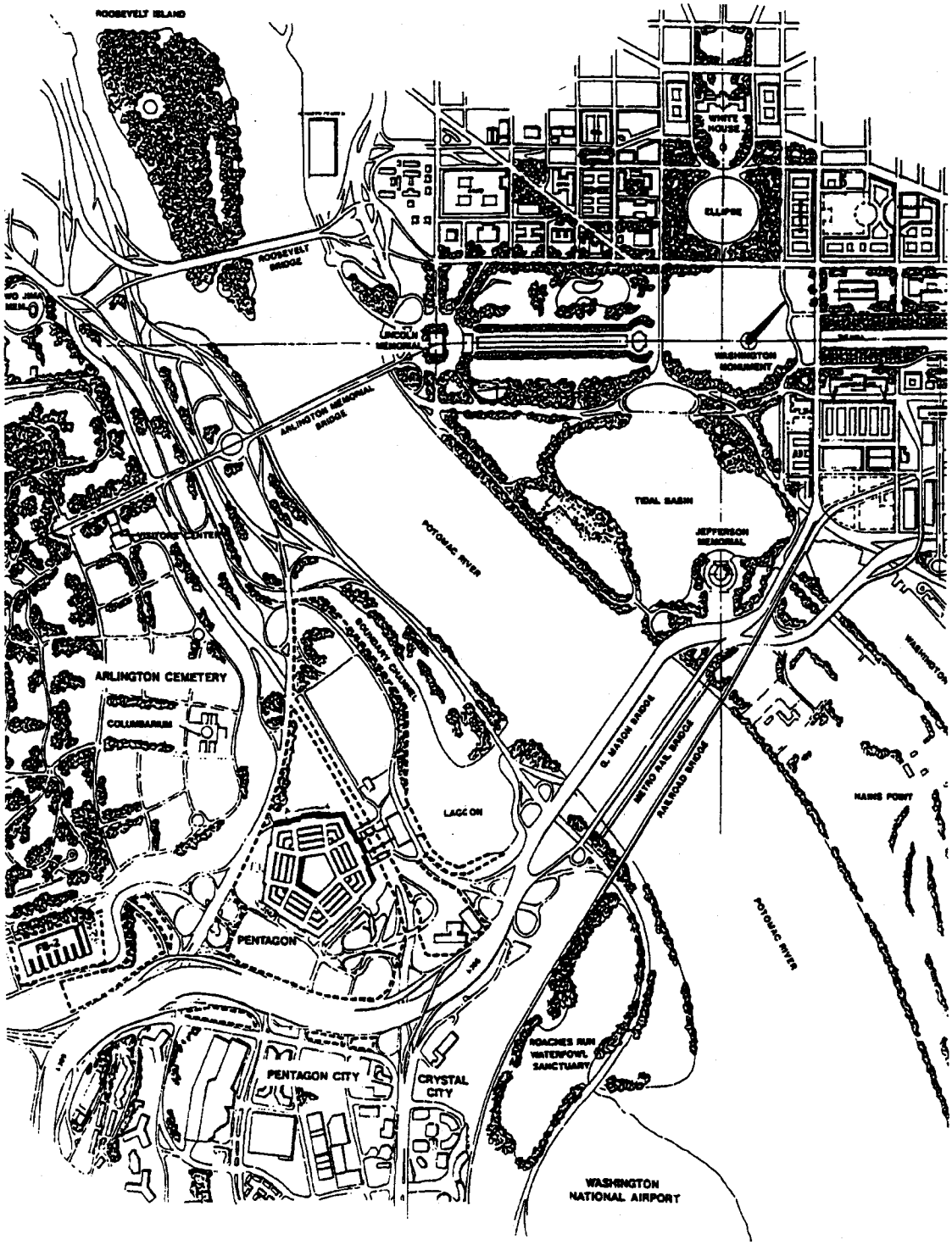


PENTAGON LOCATION MAP

I History

The Pentagon is one of the most recognizable United States Government 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 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. General 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, Generals Reybold and Somervell presented the plan to the Subcommittee. The plan was approved by the House on July 28, 1941 and the Senate on August 14.

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. See Figure 1.

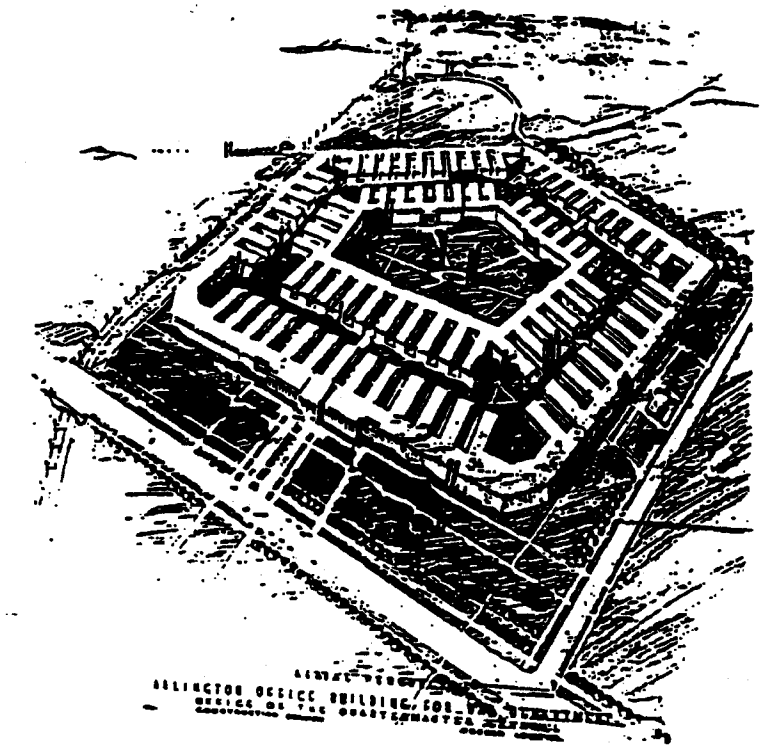


Figure 1 Original Concept of Pentagon, July 21, 1941, from the Archives of U.S. Army Corps of Engineers, Fort Belvoir, Virginia.

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 having less visual and physical impact. 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 on a 24-hour basis, and 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 square meters) provides approximately 3,800,000 square feet (353,000 m²) occupiable. 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.

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).

Clockwise from its northern point, the Pentagon's five facades are the Mall Entrance, the River (or North Parking lot) Entrance, the Concourse (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. The ornamentation style is classical in origin, but 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.

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.

Exterior walls of the concentric rings and the interior courtyard are bare 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.

The five concentric pentagonal rings are separated by light courts. 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).

The Site

The Pentagon Reservation is located in south western 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 and Interstate 395.

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. This terrace's maximum width 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).

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.

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 and 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 and Refrigeration Plant's water discharge outfall.

The Pentagon Reservation has been altered over the years. A heliport was added; Shirley Highway, 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.

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

None of the original major building systems have ever been replaced or significantly upgraded. The changing office environment with the advent of computers and modern technology has out-stripped 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 and Refrigeration Plant. The overloaded secondary electrical circuits result in as

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.

Typical Plumbing Problems

Windows

There are approximately 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 have bars installed, 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 an increase in energy loss and damage from water penetration.

Exterior Walls

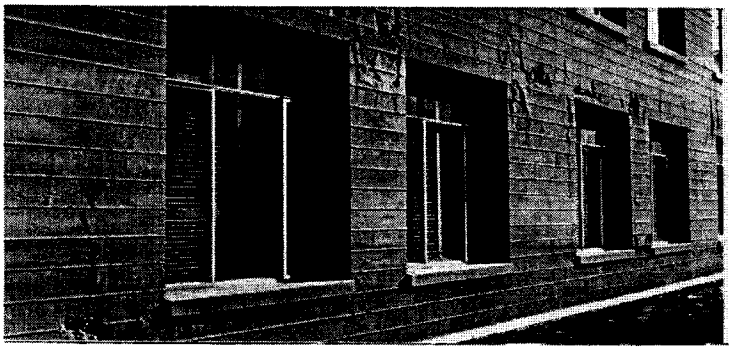
Architectural and structural elements of exterior walls have shifted and settled. Joints are open and moisture has penetrated causing damage. Cracking and evidence of movement is apparent at all five exterior perimeter parapet corners. In some instances these cracks extend below the

parapet wall. The structure is sound, but the architectural enclosure is no longer efficient and in need of repair.

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

All court 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 court walls, cornices are disintegrating, especially between Corridors 7 and 10. There are also problems due to use of non-conforming materials and poor construction. Deteriorated elements in the Center Court need to be replaced or restored to sound condition.

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 Needing Repair

Basement Floor

The Basement floor of the Pentagon was constructed as a slab on grade, and designed to serve as light storage areas. 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. Attempts had been made to repair the distressed areas by pumping concrete under the floor, or by adding leveling slabs, but these repairs were unsuccessful. There is no recourse at this point except to entirely remove the slabs some 300,000 to 500,000 square feet (27,900 m^2 to 46,500 m^2) 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.

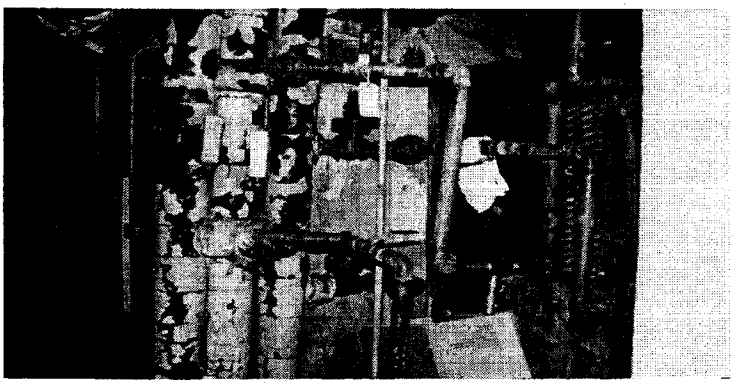
River and Mall Terraces

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 will be required to make these areas watertight.

Typical Deterioration of River Terrace

Asbestos

The finish coat in the Pentagon's plaster ceilings contains asbestos. 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.



Typical Existing Asbestos Piping Insulation

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. Landscaping is almost non-existent. 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 experience water leakage on a continuous basis.

Heating and Refrigeration Plant

In addition to the Pentagon building, the adjoining Heating and Refrigeration Plant, built in 1943, provides utility services (heating steam and chilled water) to the Pentagon as well as to other parts of the Pentagon Reservation. The plant is obsolete and is no longer efficient and serviceable. Temporary chillers and boilers are currently being rented to support the needs of the Pentagon, Federal Building #2 (Navy Annex), and Henderson Hall (Marine base).

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

- Changing requirements for fire and life safety.
- Materials failure.
- Engineering systems failure.
- Changing technology with an increased demand for services.
- Security.

Changing Requirements for 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 entire building.
- Numerous emergency diesel generators are currently located inside the Pentagon presenting a potential fire and carbon monoxide gas hazard.
- The current use of motorized carts for service deliveries throughout building presents a hazard to occupants.
- Current vehicle/pedestrian conflicts exist throughout the reservation.
- Excessively long fire egress routes.

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.
- Basement floor deflection due to lack of stable ground support.
- Water intrusion 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, heating, ventilation, and air conditioning (HVAC) systems.
- Independent air conditioning (A/C) units have been installed in certain areas due to unreliability of current building HVAC systems.
- Overloaded secondary electrical circuits result in daily failures of electrical systems.
- Undersized electrical closets prohibit proper wiring and management of electrical systems.
- Plumbing, chilled and hot water, domestic water and other systems are deteriorated.

Heating and Refrigeration Plant -

- Original coal boilers installed during construction of Pentagon are beyond repair. Existing refrigeration equipment, some nearly 30 years old, is unreliable

and often out of service. Rented package units are 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 large number of dispersed loading docks are difficult to secure.
- Upwards of 100 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).

Note.

In February 1997, a separate book of photographs depicting typical conditions at the Pentagon was forwarded to the staff of the Senate Appropriations and Armed Services Committees and the House Appropriations and National Security Committees.

Historic Status

The Pentagon is a building of interest to local, state, federal, and architectural historians. Reasons for this include:

- It is associated with events that have made a significant contribution to the geo-political role of

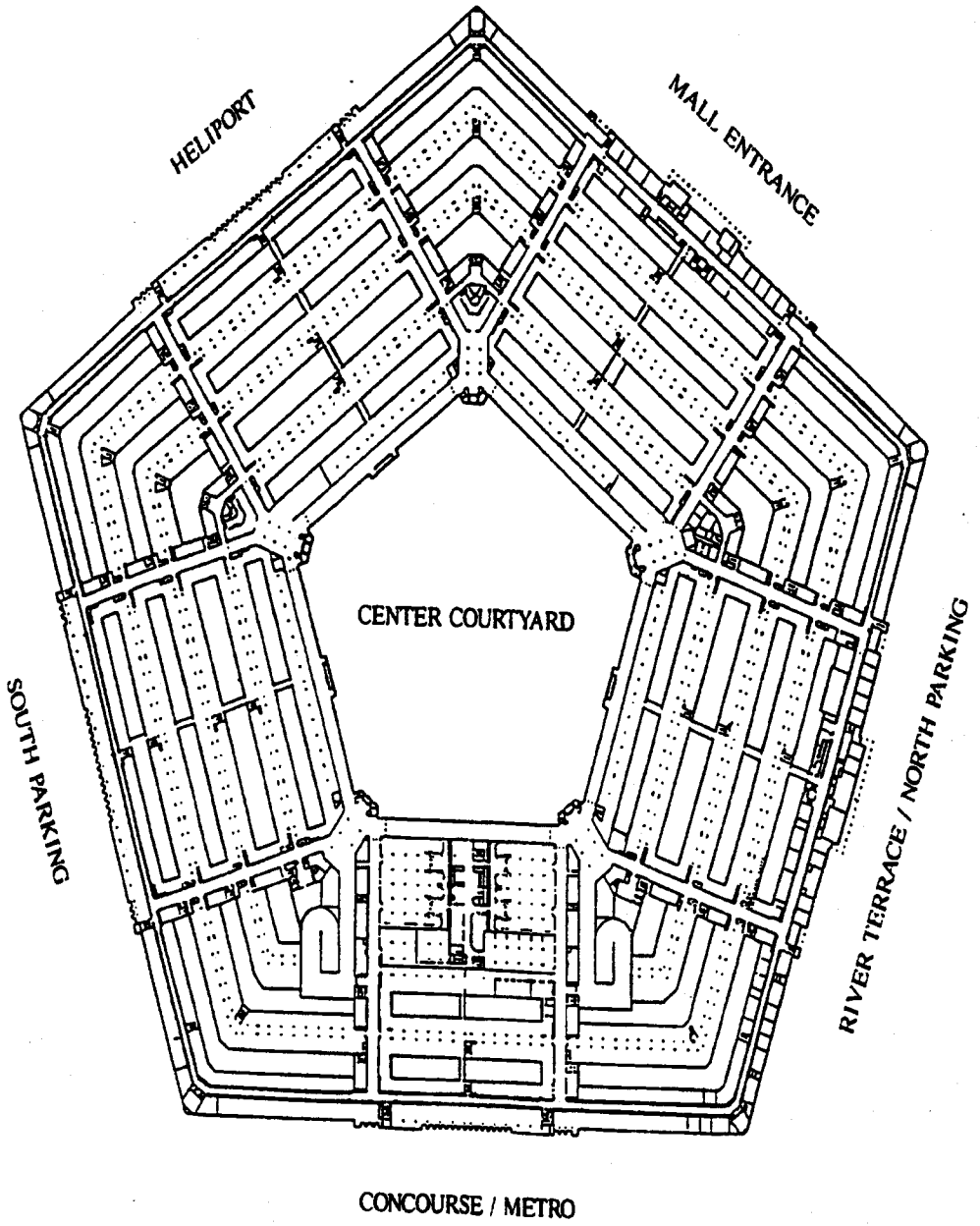
the United States as a superpower during the period from World War II to the present.

- It is associated with the lives of persons significant in American History from the time of it's construction (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 currently classified as the largest low-rise office building in the world.
- It was constructed in a historical period.
- It required a monumental construction effort to build it in 16 months.
- Its site location is in proximity to Arlington National Cemetery.
- It is in proximity to the Nation's monumental core.

The Pentagon is listed on the National Register of Historic Places and has been designated a National Historical landmark by the Secretary of the Interior.

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

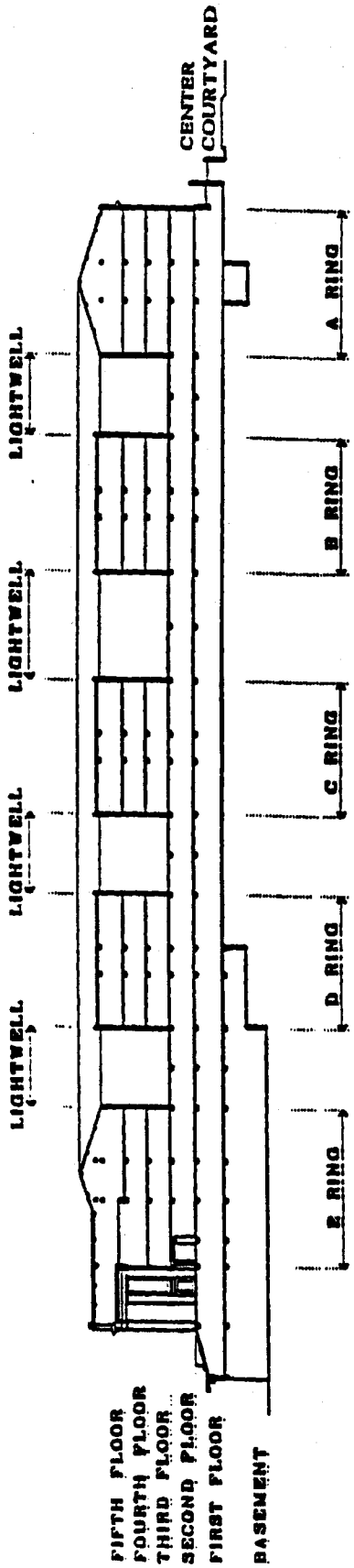
- The five outer facades of the Pentagon.
- The Center Courtyard and surrounding facades.
- Terrace fronting the Mall Entrance.
- Terrace fronting the River Entrance.
- The Pentagon's distinctive five-sided shape.



PENTAGON

TYPICAL EXISTING FLOOR PLAN

THIRD FLOOR LEVEL



LONGITUDINAL SECTION THOURGH MALL ENTRANCE

II Overview of the Pentagon Renovation

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 54 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 or 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 telecommunication 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 needs 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 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 are:

- 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. The Architect-Engineer firm of Howard, Needles, Tammen and Bergendoff (HNTB) was engaged to analyze and make recommendations on how to approach the renovation of the world's largest low-rise office building.

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

The nine conceptual approaches to renovating the Pentagon were:

- Smallest Increment -- 150 increments of 44,000 sq. ft.
- One tenth of a floor horizontal -- 50 increments of 132,000 sq. ft.
- Vertical sections -- 17 increments of 388,000 sq. ft.
- By tenants -- more than six increments of less than 1,100,000 sq. ft.
- Five vertical sections -- five increments of 1,100,000 sq. ft. (Wedges)
- Rings and vertical sections -- five increments of 1,100,000 sq. ft. (Renovate A-B Rings first, then C-E Rings)
- One quarter of building -- four increments of 1,625,000 sq. ft.
- All of the building -- one increment of 6,500,000 sq. ft.

The three approaches selected for additional study were:

- Seventeen vertical sections of building; sections divided along building seams, each part through all floors.
- Five vertical building sections divided along building seams (wedges), relocating tenants in each section.
- 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 area of construction, availability of construction staging areas, minimizing material lead times, minimizing asbestos removal impact, maintaining user operations, construction access to site/building, compatible 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:

- Foyer/vertical circulation modifications.
- New public access.
- Services corridor network.
- Additional Mezzanine space.
- Pentagon Maintenance Facility (formerly Logistics Support Extension).

The Pentagon Maintenance Facility was subsequently deleted by the Secretary of Defense in 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 isolate personnel from mechanized traffic.
- Addition of first floor service corridors and service elevators that separate 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" has been obtained to house displaced activities. Activities displaced from the Pentagon are expected to use swing space 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 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 be unable to serve its purpose.

Several key benefits will result from the renovation. The renovation will provide modern and efficient heating, ventilation, and air conditioning (HVAC), electrical, and plumbing systems. Asbestos will be and is being removed. For the disabled, accessibility will be provided. Security and life safety improvements will be made. Support facilities and special purpose areas will be and are being renovated and re-configured. Except for areas vacated during construction, operations will be and are being maintained. A new Heating and Refrigeration Plant is being built adjacent to the existing obsolete plant.

The new design will enable organizations to be vertically aligned and served with elevators and escalators. Although the Commandant of the Marine Corps has been accommodated with space in the Pentagon, the remainder of the Headquarters staff will be relocated over the duration of the renovation program. The Department of the Navy has determined the location of the Marine Corps within its allocation of Pentagon space. Vertical utility and service chases will improve operational as well as maintenance

capability. Services will branch out on each level, much like branches from a tree trunk. The concept is valid for permanent systems such as HVAC and plumbing, as well as for flexible wiring systems that link computer, telephone, and audio/video networks.

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

The Pentagon Renovation Program includes an overall effort to upgrade the Pentagon Reservation. The program includes site changes to accommodate the new construction and changes to improve inefficient and unsafe pedestrian and vehicle traffic patterns.

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:

- 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, and is also complying with the Clean Air Act by reduced emissions from the Heating and Refrigeration Plant and Incinerator.

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

Renovation Components

The proposed program consists of the following distinct components:

- Basement and Mezzanine Renovation.
- Above grade renovation and site improvements.
- Heating and Refrigeration Plant and other related projects

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 are being lowered and replaced, and foundations are being 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 SF (25,826 m^2) 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 consolidated Technical Control Center.

The Army Motor Pool, previously located in the Mezzanine, has been permanently relocated off-site. After correction of severe structural deficiencies, the former motor pool area will be converted to a tri-service clinic, consolidating the separate Army, Civilian, and Air Force clinics.

A construction contract was awarded February 16, 1994 for the Basement Phase 1 Temporary Mechanical, Electrical, and Plumbing to Walsh Construction Company, Rockville, Maryland. This work has been completed.

A construction contract was awarded September 30, 1994 for the Basement Segment I Renovation to Hyman (now Clark) Construction Company, Bethesda, Maryland; completion of this work is scheduled for FY 1998; the remainder of the basement will proceed in multiple increments starting in FY 1997.

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 to Flippo Construction Company, Forestville, Maryland. This work was completed in February 1997.

Above Grade Renovation and Site Improvements

No major renovations have ever been accomplished at the Pentagon and as a consequence all antiquated internal building systems are proposed to be replaced and brought up to current building, fire protection, and life safety codes. Demolition and removal work is proposed to be slab to slab. In order to install modern mechanical, electrical, and life safety systems, all asbestos-laden plaster ceilings, mechanical ducts and pipes, and tile flooring will be removed. This demolition work will also result in the removal of all existing partitions except at stairwells. It 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, and control centers, library, recreational areas and retail stores are proposed to be renovated.

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

Emergency and back-up power will be provided by emergency diesel generators which will be consolidated at the Heating and Refrigeration Plant site.

The heating, ventilating, and air conditioning system will be replaced. A dual feed loop system will be installed to provide chilled water service 24-hours-a-day 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.

Major public access will be at the second floor level. This will be accomplished by installing vertical transportation and re-configured entrances. This 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 support. The massive floor area of the Pentagon necessitates initial support distribution via motorized carts. Decentralization of support activities will allow control of all but emergency medical vehicles above the first floor. Service elevators will be installed at decentralized locations, along with trash removal facilities.

The intersections of radial corridors at the innermost ring corridor (Ring A) are not efficiently used. 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 in the building. The excess circulation areas at these intersections will be developed to provide conference and training facilities, briefing centers, snack bars, and other multi-purpose functions.

Additional internal modifications will include the narrowing of selected, excessively-wide corridors. All ramps will be removed and replaced with structural floors 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 units and modifications will be made to outer perimeter monumental windows to improve weather-tightness. 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.

Site improvements will include the restoration, replacement or upgrading of all landscaping, roads, walks, paving, bridges, transportation facilities, fences, and other site features (including modifications to meet current security and safety requirements). Vehicular traffic patterns will be realigned and improved.

Other Related Projects and Activities.

Heating and Refrigeration Plant

Replacement of the Heating and 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 existing Heating and Refrigeration Plant, which serves the Pentagon Reservation, is so deteriorated that it is 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 Federal Building No.2, and steam only to Henderson Hall. Services will be provided through new underground distribution systems including a new tunnel under the Pentagon Center Courtyard.

The plant has three components: a heating component, a refrigeration component, and an administrative/shop area. The facility has approximately 106,200 SF (9,900 m^2) of floor area. The primary elements of the plant are multi-fuel boilers (oil/gas), 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 number, size, and configuration of boilers and chillers are based on life cycle cost analyses, as well as considerations for reliability, flexibility, standardization, efficiency, and design features.

The new facility has been built adjacent to the existing heating and refrigeration plant. The existing facility will be demolished in FY 1997.

A construction contract was awarded for the Heating and Refrigeration Plant on December 30, 1992 to Bell, BCI, Upper Marlboro, Maryland. Construction started on February 3, 1993 and will be completed in FY 1997. The chillers are operational and have been turned over to the Pentagon plant operators. The boilers are being operated jointly by the contractor and the plant operators.

Back-up Power Facility

A new facility is to be constructed to provide independent electrical power to Service Operations Centers, fire alarm systems, and other operational and safety-related elements in the event of loss of electrical service from the local utility company.

River Terrace Vehicle Bridge

The River Terrace vehicle bridge over Route 110 has been surveyed and found to be in serious decay and requiring restorative construction. Design was completed in FY 1996 and restorative construction is presently underway with completion anticipated in the first quarter of FY 1998.

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 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 are estimated, at an order of magnitude, to cost approximately $760 million. 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

Approximately 780,000 occupiable square feet of leased swing space has been obtained and will be used to enable construction areas to be vacated. Tenants will move based on minimizing cost and disruption to tenants, and at the same time maintaining critical activities within the Pentagon.

Elements of the Navy occupied their assigned leased space beginning in December 1996. All moves to leased swing space are planned to be completed by December 1997.

III Program

The revised program projects an overall completion of the renovation of FY 2007. There are several primary activities in the program. These are:

- Development of Design Guidelines and Criteria for the overall project.
- Design and Construction of Basement/Mezzanine.
- Design and Construction of Wedge #1.
- Design and Construction of Wedge #2.
- Design and Construction of Wedge #3.
- Design and Construction of Wedge #4, Site Improvements.
- Design and Construction of Wedge #5, Site Improvements.
- Program, design, build-out, and occupancy of "Swing Space."
- Other Projects
  - Design and construction of the New Heating and Refrigeration Plant (H&RP).

Each of these design primary activities is discussed briefly on the following pages of this report.

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.

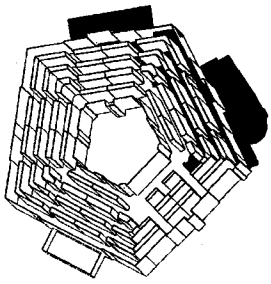
A Management Support Architect-Engineer (MSAE), has prepared design guidelines and criteria; has prepared the Reservation Master Plan which addresses environmental issues; has developed prototypical designs for architectural standards, heating, ventilating and air conditioning systems, plumbing systems, 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 throughout the duration of the renovation.

Basement Renovation

Renovation of the Basement will include 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, will provide 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.

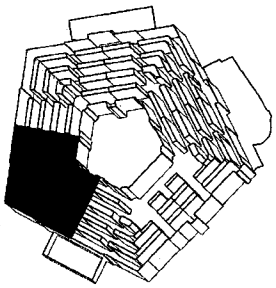


FY '94 Basement

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 the Segment 1 of the Basement, preceded by the temporary re-routing of utilities, will be completed in FY 1997. The design of the remaining segments will begin in FY 1997. Construction will proceed as the Services Operations Centers are relocated.

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 January 1998. Wedge #1 initiates renovation of above-grade areas of the Pentagon. Work will be centered around corridors 3 and 4.



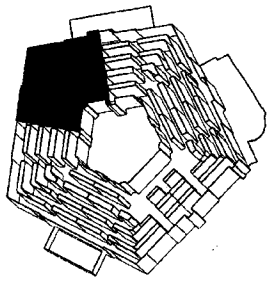
Wedge #1

The renovation in this area involves a complete slab-to-slab reconstruction of the space. 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 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" consistent with the Concept Plan. The site improvements include the new South Terrace entrance aligned around the renovated South Loading Dock. The design of Wedge #1 began in January 1994 and is scheduled to be completed in 1997.

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 bridges accommodating pedestrian traffic entering the Pentagon at the second floor between Corridors 2 and 3.

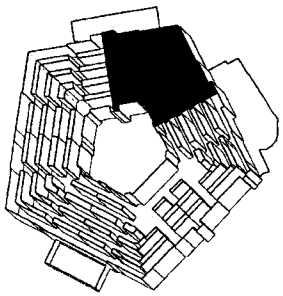
Wedge #2



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. The work is centered around corridors 5 and 6. As discussed previously, the removal of non-masonry partitions will open the space to an "open office" concept.

Wedge #3

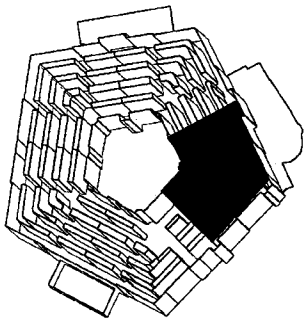


Wedge #3

Wedge #3 includes a complete slab-to-slab reconstruction of the space. The work will be centered around corridors 7 and 8. 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.

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

Wedge #4 and Site Improvements



Wedge #4

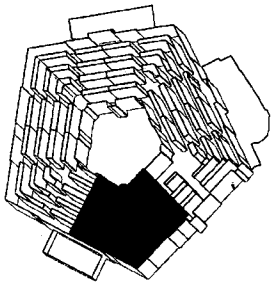
A slab-to-slab reconstruction of the space in Wedge #4 is programmed. All electrical, mechanical, and plumbing services will be replaced and a modernized telecommunication infrastructure will be installed. The removal of non-masonry partitions will open the space to an "open office" concept.

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.

Site improvements cover all exterior modifications, repairs, storm drainage, revised traffic circulation, landscaping, and redesigned parking areas. Site work, except for the South Terrace entrance under Wedge #1, will be constructed during Phases 6 and 7.

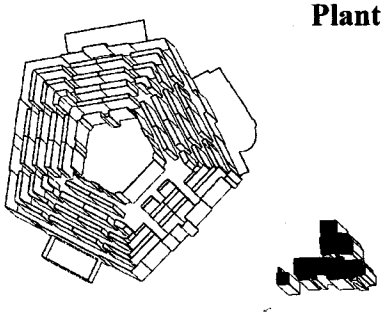
Wedge #5 and Site Improvements



Wedge #5

This final Phase 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.

Heating and Refrigeration Plant



FY '93 Heating and Refrigeration Plant

The Heating and Refrigeration Plant is a replacement facility with all new, high-efficiency, multi-fuel boilers to generate steam for heating and refrigeration equipment to provide chilled water for cooling. As part of the plant construction, a new distribution system was installed, including a tunnel under the Center Courtyard of the Pentagon. Design began in May 1990 and was completed in mid-FY 1992. Construction began in February 1993 and will be completed in 1997.

Ancillary Projects

A roof renovation project was funded by GSA but transferred to DoD. Construction award was made to William V. Walsh Construction Company, Inc., Rockville, Maryland on June 30, 1992 for $5,604,776.00 and was completed in FY 1995.

FY 1992 funding was approved for renovation and upgrading of the Classified Waste Incinerator located on the Heating and Refrigeration Plant site. Construction award was made to Twigg Corporation, Upper Marlboro, Maryland, on March 3, 1993 and is scheduled for completion in the last quarter of 1997.

Construction award for a new steam line to replace the deteriorated line from the Pentagon to Federal Building 2 was made to Jones & Wood, Washington, D.C., on November 9, 1993 for $2,855,967.00 and the work was completed in January 1995.

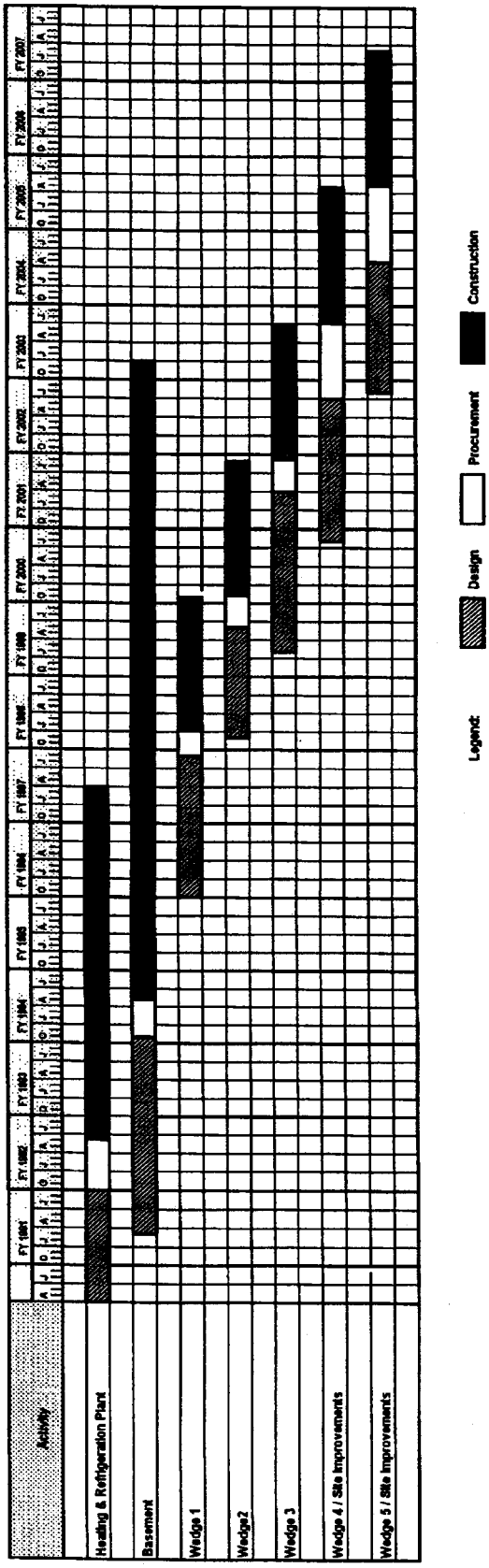
The North Parking Pedestrian Ramp at the River Terrace 8th Corridor entrance has also been surveyed and found to be in need of repair. Design was completed in FY 1994 and construction, by Wm. D. Euille & Associates, Inc., was completed in the second quarter FY 1996.

The River Terrace vehicle bridge over Route 110 has been surveyed and found to be in serious decay and requiring restorative construction. Design was completed in FY 1996 and construction was awarded to Wm. D. Euille & Associates, Inc. on September 30, 1996 with completion projected for FY 1998.

Activity Chart

The following chart graphically depicts the timing for key activities of the Pentagon Renovation project based on the revised program schedule. Preliminary design activities have been initiated including time and cost studies. As the project progresses further into design development and final design, refinements, and adjustments in the schedule and estimated costs may occur.

Pentagon Renovation Program Schedule



IV Budget

Source of Funds

The Pentagon Reservation Maintenance Revolving Fund (PRMRF) was established by the FY 1991 Defense Authorization Act (10 USC 2674) (see Appendix). The Act transferred responsibility for the operation, maintenance, protection, repair, and renovation of the Pentagon Reservation from the General Services Administration (GSA) to the Office of the Secretary of Defense (OSD). The PRMRF is the funding source for the Pentagon Renovation Project. In addition, it finances the activities of the OSD's Washington Headquarters Services in providing space and a full range of building services for DoD Components, including the Military Departments, and other activities housed within the Pentagon Reservation.

The renovation was initially conceptualized 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.

In implementing the PRMRF, DoD maintained consistency with guidance provided by the Senate and House Committees on Armed Services in report language accompanying their respective versions of National Defense Authorization Act for FY 1992 (Ref. SASC #102-113, HASC #102-60) and the Senate Committee on Appropriations (Ref. SAC #102-154 and SAC #102-147).

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 operation, maintenance, protection of the Reservation, and essential

capital improvements including all costs associated with the Pentagon Renovation Project.

In the Conference Report (#102-328) accompanying the FY 1992 Defense Appropriations Act, the conferees expressed concern regarding the relative advantages offered by the PRMRF versus more traditional modes of funding through direct appropriations within the Defense Appropriations or MILCON Bills. Accordingly, as directed by the Committees, the Department submitted on June 1, 1992, a report detailing alternative funding methods for the renovation project, with the end result that the funding method remained unchanged.

Funding the Pentagon Renovation

During the FY 1988 to FY 1991 period, funds from the Operations and Maintenance Account and the MILCON Account were used to prepare the initial planning and design documents, including the design of the new Heating and Refrigeration Plant and the partial design of the since terminated Pentagon Maintenance Facility. During FY 1991 the PRMRF became the primary funding source for Renovation Program activities. Beginning with FY 1997, funding was established under the Army as Executive Agent for IM&T modernization beyond replacement of existing capabilities.

Funds allocated from FY 1988 through FY 1991 totaled $14,445,000: $1,345,000 O&M, $6,300,000 MILCON, and $6,800,000 PRMRF.

In FY 1992 and FY 1993, $24,000,000 was allocated for planning and design activities and $80,100,000 for construction of the new Heating and Refrigeration Plant and the Classified Waste Incinerator. Allocations for design and construction have been: FY 1994 - $99,500,000; FY 1995 - $52,500,000; FY 1996 - $75,300,000; and FY 1997 - $46,900,000.

The above allocations do not include costs for swing space, moves, furniture, leasing, portions of the information management and telecommunications, infrastructure operations, maintenance, and protection; these activities are however, included within the PRMRF official budget estimates.

Certification

The Defense Appropriations Act for FY 1996 (Public Law 104-61) 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.

Subsequent to this certification, the Department of Defense Appropriations Act for FY 1997 (Public Law 104-208) reduced the total cost of the renovation to not exceed $1,118,000,000. This certification requirement is $100,000,000 less than 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 the Military Construction Program, this estimate does not include the cost of: 1) design and construction of the Heating and Refrigeration Plant and the Classified Waste Incinerator; 2) purchase and installation of Information Management and Telecommunications (IM&T) equipment; 3) rental and operation of leased swing space, and 4) purchase and installation of furniture. The Defense Appropriations Act for FY 1997 and the required certification are enclosed as Appendix B.

Pentagon Renovation Certification Summary

Fiscal Year	Design and Construction	Item
1994	$77,900,000	Obligations
1995	$50,200,000	Obligations
1996	$64,500,000	Obligations
1997	$46,900,000	Budget
1998-2007	$878,500,000	Program
Total	$1,118,000,000	

In the period FY 1994 through FY 1996, design and construction obligations falling under the certification requirement total about $192.6 million. Approximately $12 million has been used for planning activities such as development of prototypical, building-wide architectural and engineering support systems to obtain about a 10 percent level of design for the entire building, preparation of investigative engineering studies and reports, program schedules and cost estimates.

Approximately $42 million has been used for design activities such as the overall basement renovation ($21 million), the core and shell design of Wedge #1 ($12 million), the Sewage Lift Station, the Backup Power Facility, the A-E Drive Primary Electrical Power Distribution, Replacement of the River Terrace Vehicular Bridge, Energy Management Control System, Elevators, Escalators, Windows, Hardware, Interior Signs, Computer Aided Facility Data Management System as well as preparation of overall space allocation plans.

Work under construction accounts for about $130 million in this period and includes the cost of government supervision and administration of the various contracts. Major construction elements include Segment 1 (about 434,000 gross square feet of space) of the basement ($115 million), the Sewage Lift Station ($9 million), the River Terrace Pedestrian Ramp ($1 million) and the River Terrace Vehicular Bridge ($5 million). Construction in the basement includes about $5 million for temporary mechanical, electrical and plumbing work, about $56,000,000 for core and shell (foundations, basic building support systems, public areas, toilets, information technology infrastructure, elevator shafts); about $24,000,000 for tenant areas (ceilings, flooring, lights, sprinklers, partitions); about $9 million for policy-mandated work stoppages; $12 million for unforeseen conditions uncovered during construction such as broken foundation piles, rotted sewer lines requiring the installation of a separate force main, hazardous materials such as asbestos and lead paint which were hidden from view and had to be removed, contaminated soils, incredibly poor original workmanship (see photo of brick wall), extensive uncovering of rusted-out steel reinforcing of concrete beams, barrier wall changes to protect facilities

which could not be relocated in a timely manner, and re-routing of hidden chilled water, steam, plumbing, electrical and information technology lines, valves, equipment and appurtenances; about $9 million for program scope changes such as a portion of converting the Army Motor Pool to a Tri-care Clinic, re-allocation of space due to the loss of the Pentagon Maintenance Facility, advanced replacement of freight elevators and installation of an elevator to serve disabled persons occupying adjoining areas not under construction.

The remaining $8.6 million was available with the Corp of Engineers for continuation of active design and construction contracts and contracts under procurement.

V Work Accomplished

The work on the Pentagon Renovation, through early FY 1997 consists of planning studies, design, and construction and leasing activities. 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.
- The Corps of Engineers was designated as Design and Construction Agent for the project in February 1989.
- A project manager for IM&T implementation was designated under the Army as executive agent in February 1991.
- A contract for Program Development of the Pentagon renovation and for providing services as Management Support Architect-Engineer for seven years of the renovation was awarded to a joint venture between Daniel, Mann, Johnson and Mendenhall and 3D/International (DMJM-3D/I) in May 1990. The Management Support Architect-Engineers services will be re-competed in 1997.
- The Management Support A-E has been used to complete studies, facilitate planning and assist in managing other A-E firms needed to complete the Pentagon Renovation Program.
- All initial prototypical designs are complete. Design is now 10% complete for the overall renovation of the Pentagon.

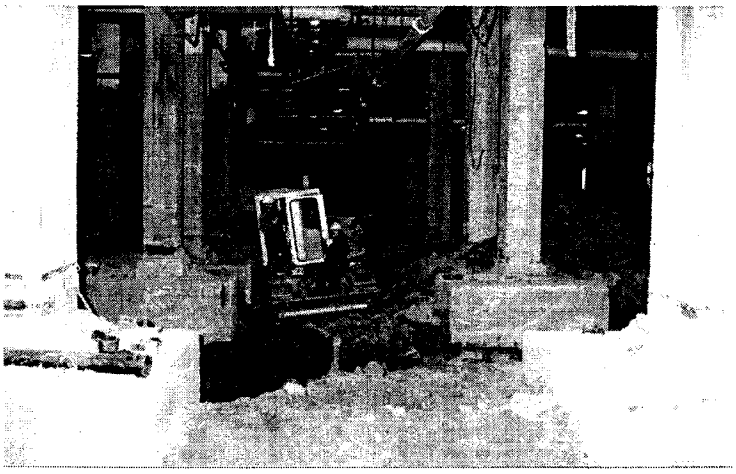
Construction Projects — **Status**

Basement — **Design**

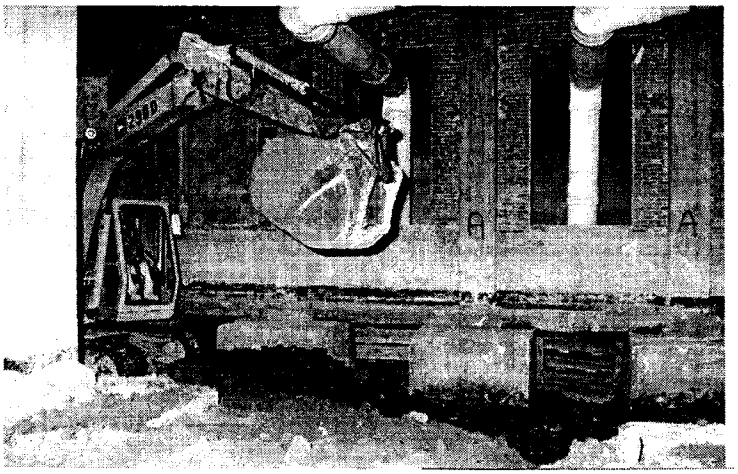
- Contract for design of the Basement awarded to URS Consultants February 5, 1993.
- Final design for Basement Segment I was completed May 2, 1994.
- Final design for Basement Segments II and III is planned for accomplishment in various stages.

Construction

- Construction award for Basement Temporary Mechanical, Electrical, and Plumbing was made to Walsh Construction Company on March 3, 1994 and this work has been completed.
- Construction award for Basement Segment I was made to Hyman (now Clark) Construction Company on September 30, 1994. Construction is 85% complete, and expected completion is FY 1998.

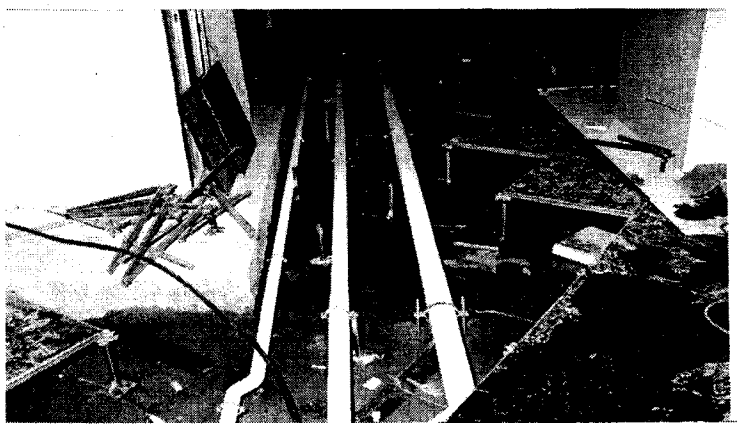


Basement Excavation for Trench

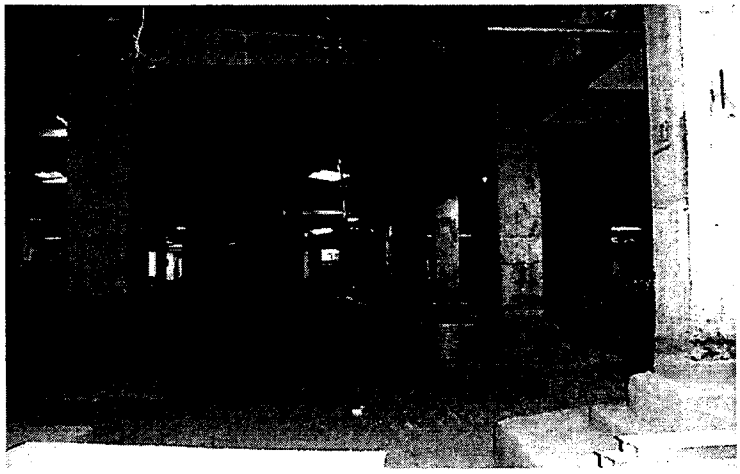


Basement Excavation, River Moat Side

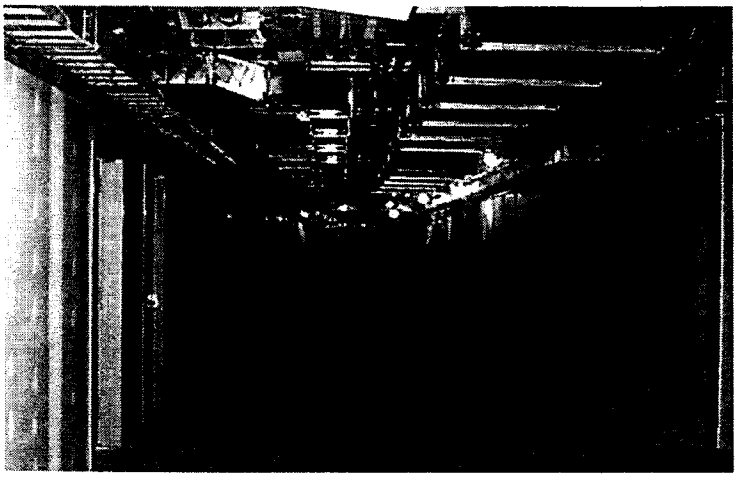
Basement Under Construction



Basement Under Construction

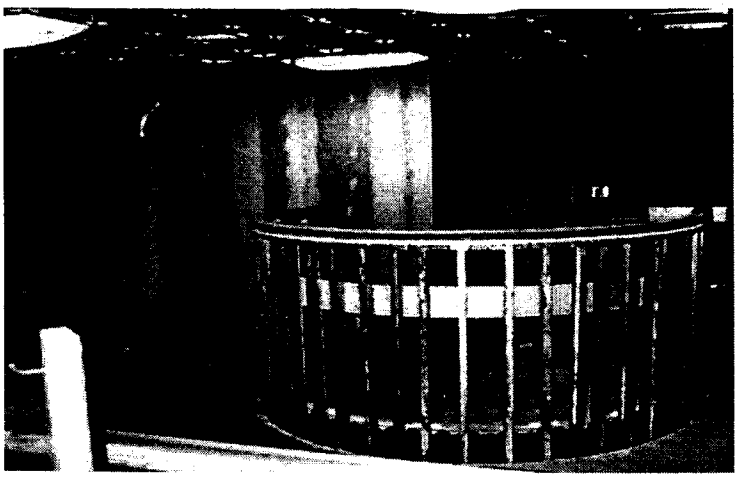


Basement Under Construction

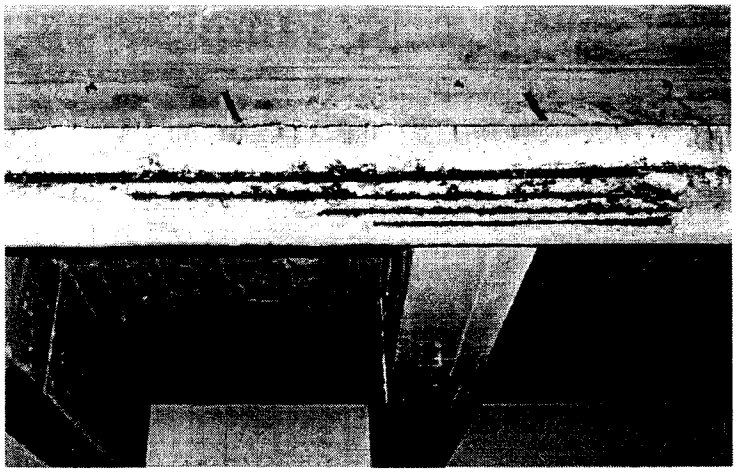


Basement Under Construction

Basement Under Construction

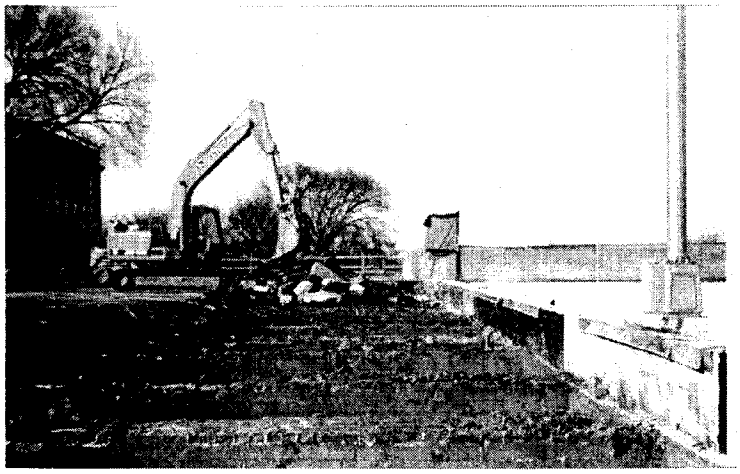


Basement Under Construction

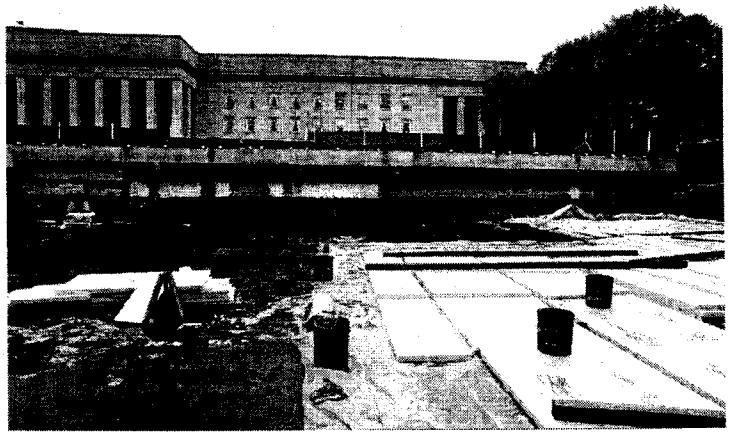


River Terrace Entrance Structural Conditions
(Part of Basement Contract)

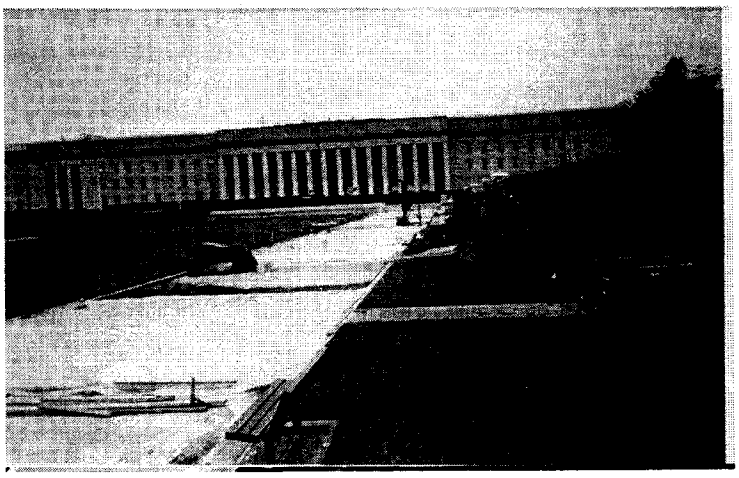
River Terrace Entrance Renovation Under Construction
(Part of Basement Contract)



River Terrace Entrance Renovation Under Construction
(Part of Basement Contract)

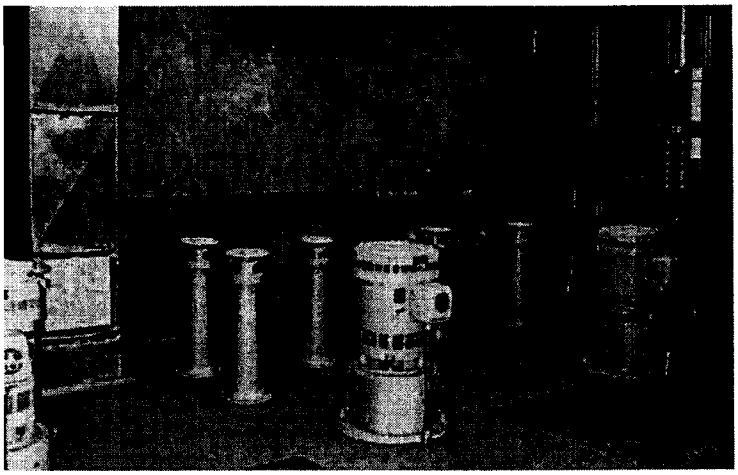


River Terrace Entrance Renovation Under Construction
(Part of Basement Contract)

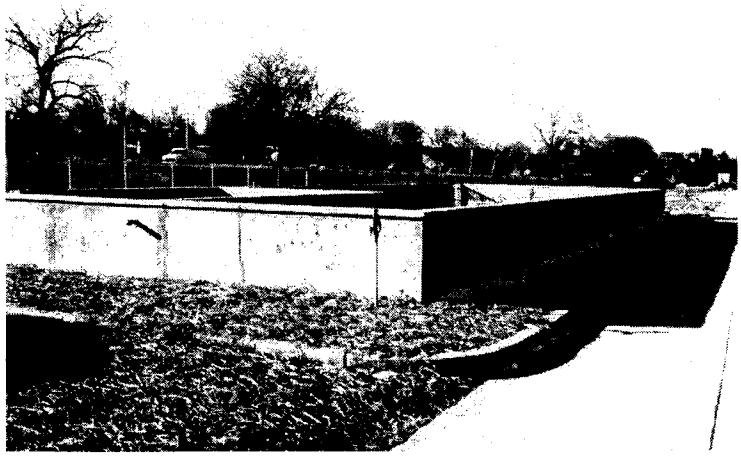


River Terrace Entrance Under Construction
(Part of Basement Contract)

- Construction award for the Sewage Lift Station was made to Flippo Construction Company on September 29, 1995. Construction was completed in February 1997.



Sewage Lift Station



Sewage Lift Station

Construction Projects

Heating and Refrigeration Plant and Other Related Projects

Status

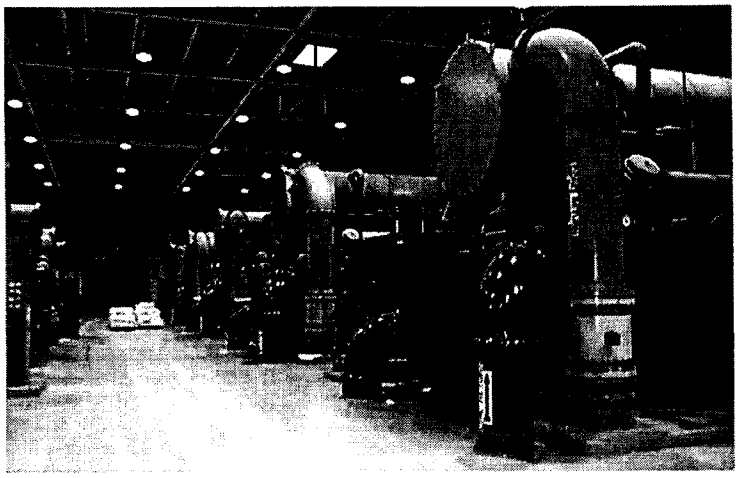
Design

- Contract for design of the Heating and Refrigeration Plant awarded to the Architect-Engineer firm of Black & Veatch in May 1990.
- Design was completed in February 1992.

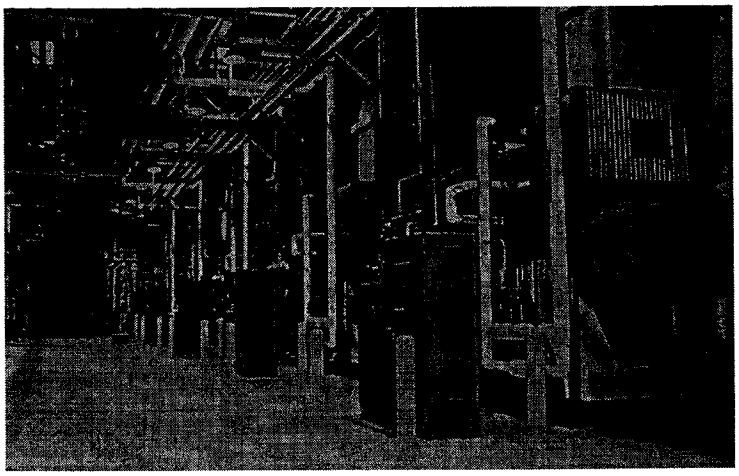
Construction

- Awarded construction contract December 30, 1992 to Bell BCI Company.
- Construction started February 1993.
- Construction is complete; the chillers are operational and have been turned over to the Pentagon plant operators. The boilers are being operated jointly by the contractor and the plant operators.

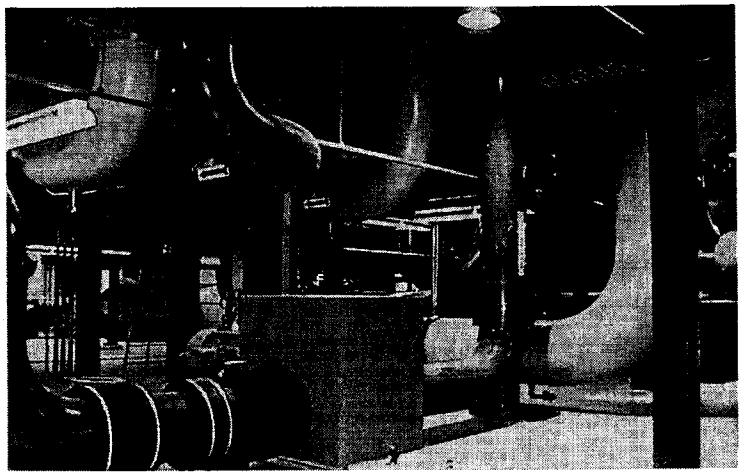
New Heating & Refrigeration Plant



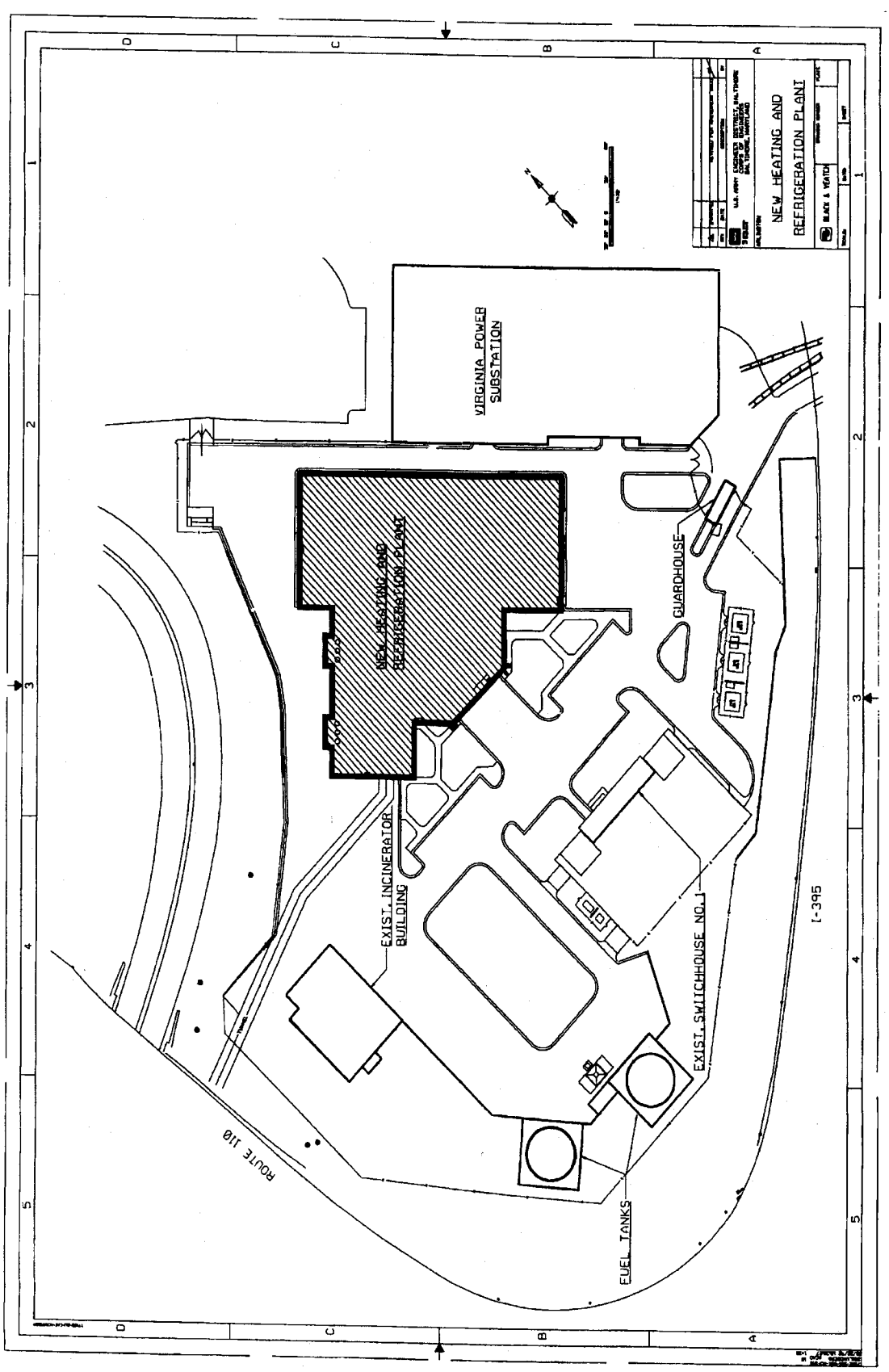
New Heating & Refrigeration Plant
(Chillers)



New Heating & Refrigeration Plant
(Boilers)



New Heating & Refrigeration Plant
(Chilled Water Piping)



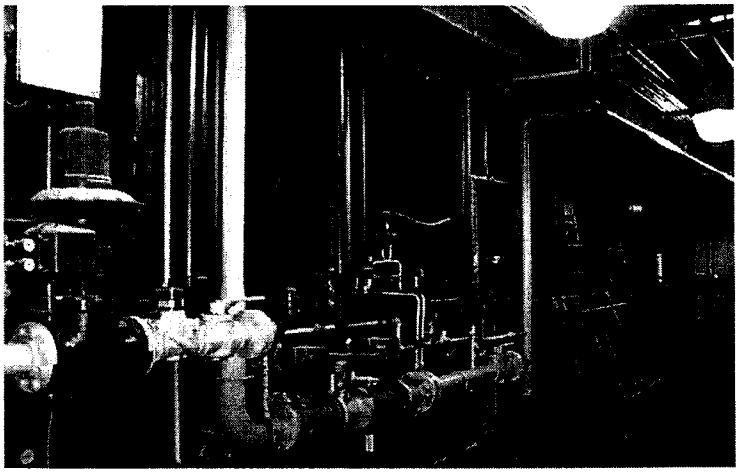
Site Plan of New Heating & Refrigeration Plant

Ancillary Projects

Construction

- Construction award for the Classified Waste Incinerator was made to Twigg Corporation on March 3, 1993. Contract is expected to be completed in the fall of 1997.

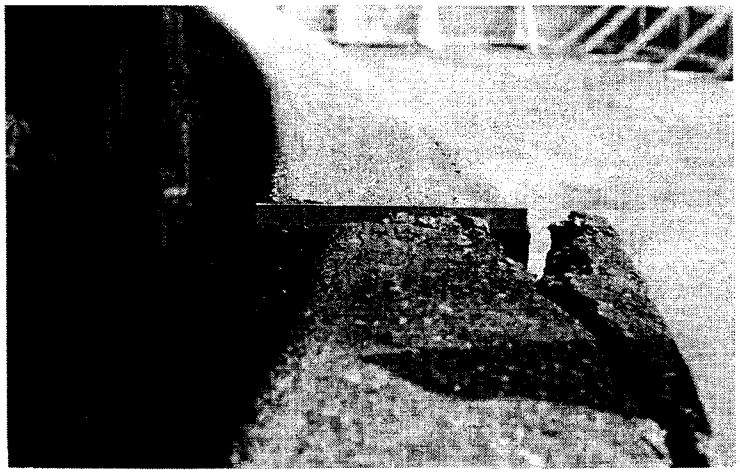
Classified Waste Incinerator Under Construction



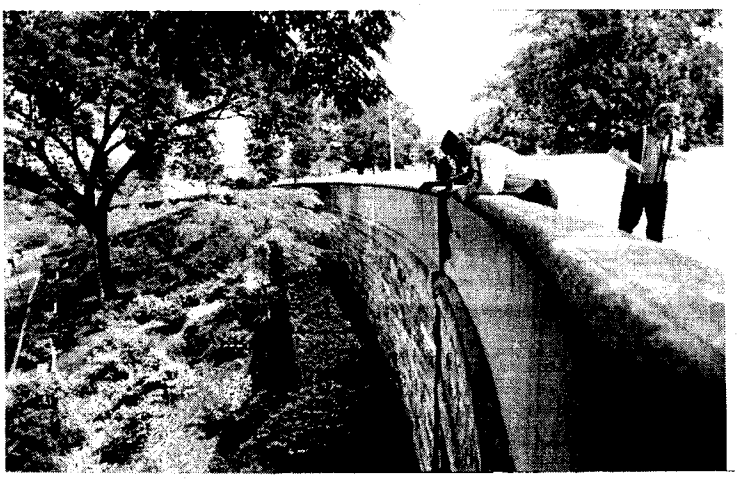
Classified Waste Incinerator Under Construction

- Construction award for a new steam line to replace deteriorated line from the Pentagon to Federal Building 2 was made to Jones & Wood on November 9, 1993. Construction was completed in January 1995.

- Construction award for the North Parking Pedestrian Ramp was made to Wm. D. Euille & Associates on September 5, 1995. Construction was completed in November 1996.

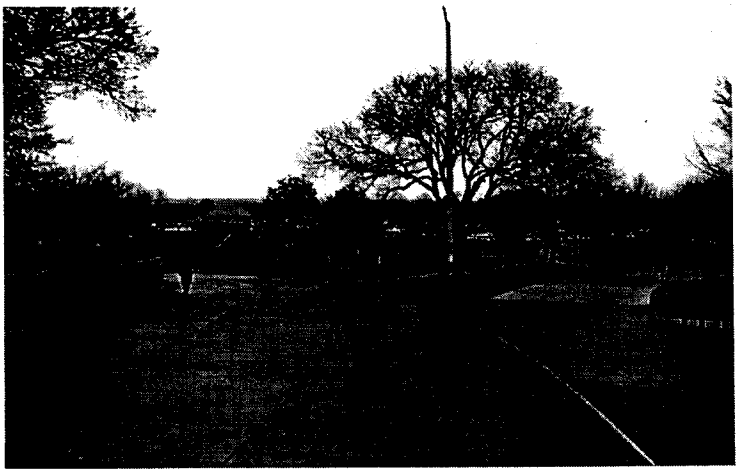


Deterioration at North Parking Pedestrian Ramp
(Close-up of wall)



Deterioration at wall on North Parking Pedestrian Ramp

Completed Renovated North Parking Pedestrian Ramp



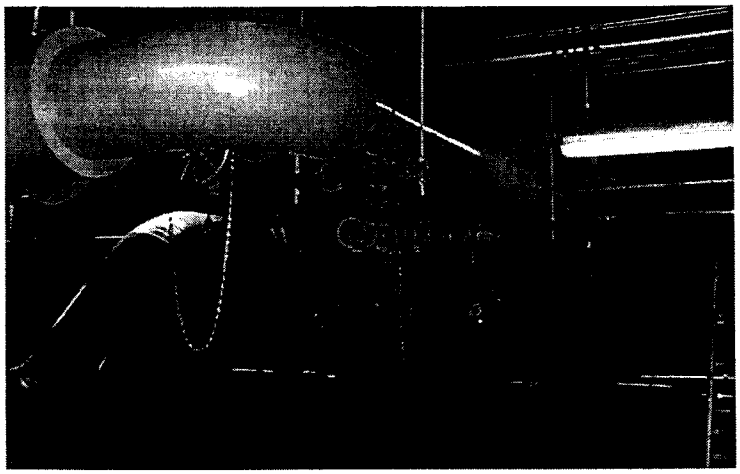
Completed Renovated North Parking Pedestrian Ramp

Center Courtyard Utility Tunnel

Design and Construction

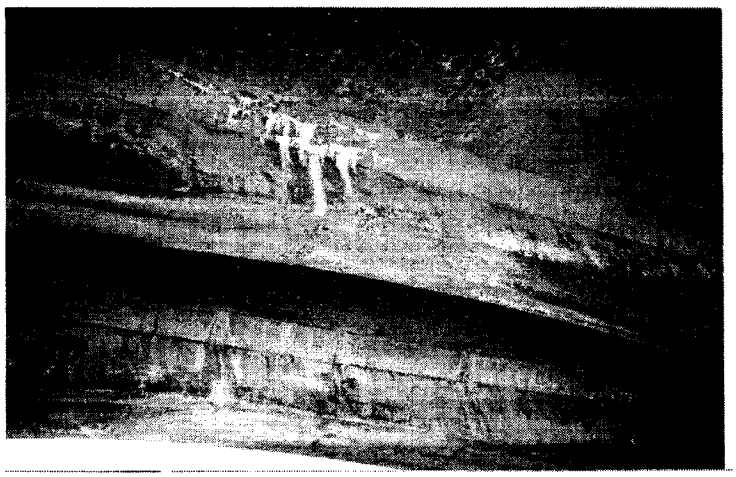
- Contract for design and construction of the Center Courtyard Utility Tunnel was awarded to Grimberg Construction Company on February 25, 1994.
- Construction is expected to be completed in the Summer of 1997.

Center Courtyard Utility Tunnel Under Construction

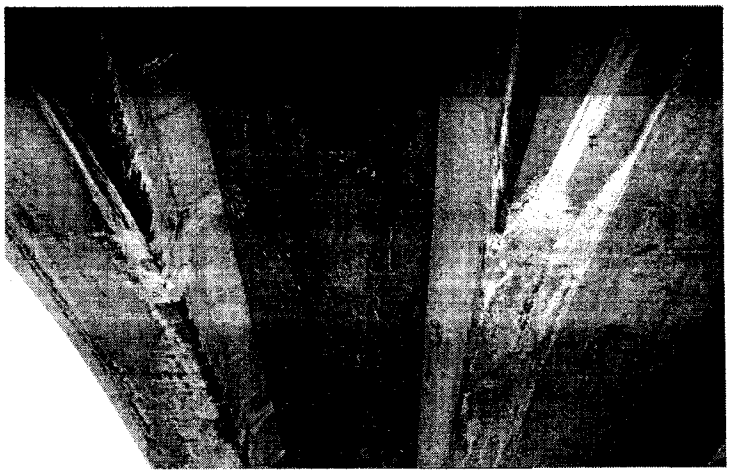


Center Courtyard Utility Tunnel Under Construction

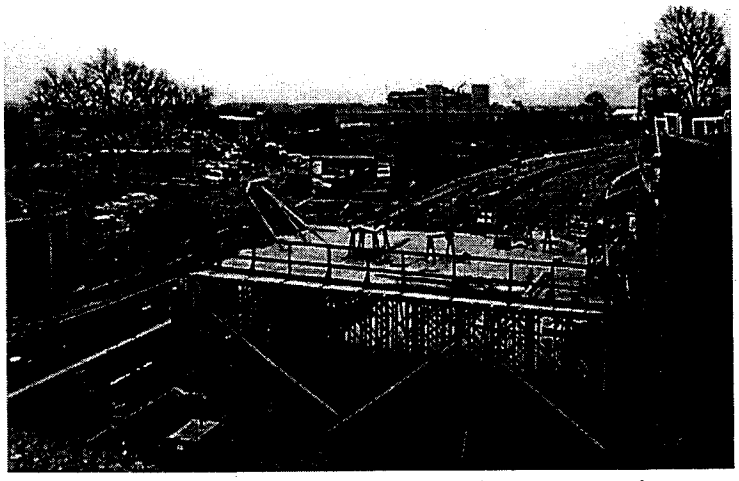
- Construction award for the River Terrace Vehicle Bridge was made to Wm. D. Euille & Associates on September 30, 1996. Construction is 40% complete and expected completion is first quarter of 1998.



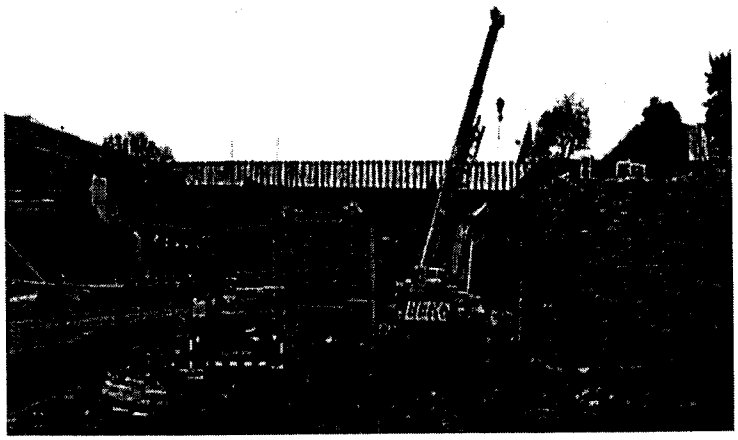
Deteriorated River Terrace Vehicle Bridge



Deteriorated River Terrace Vehicle Bridge



River Terrace Vehicle Bridge Under Construction



River Terrace Vehicle Bridge Under Construction

River Terrace Vehicle Bridge Under Construction

VI Fiscal Year 1997 Plan

Activities planned for FY 1997:

Basement	• Complete 95% construction of Basement - Segment I • Complete Design and start construction for Basement - Segment 2A2 • Complete River Terrace Renovation • Complete River Terrace Vehicular Bridge Renovation • Construction of Sewage Lift Station (Completed) • Complete Design and start construction of Tri-Services Clinic • Complete Design and start construction of A-E Drive Electric Power Distribution
Back-Up Power Facility	• Complete Design
Wedge #1	• Complete Design and start construction of Temporary Mechanical, Electrical and Plumbing • Complete Design and start construction of South Terrace.
New Heating and Refrigeration Plant and Other Related Projects	• Complete turn over of New Heating and Refrigeration Plant to Pentagon plant operators • Complete Incinerator Renovation • Complete construction of Center Court Utilities • Complete Design Intake/Outfall Condenser Water Lines

VII Appendix

Legislative Authorization

INDEX **Page No.**

A. FY 1991 - Legislative Authorization 59
B. FY 1997 - Department of Defense Appropriations Act, With Certification 62

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 $1,000.

"(3) Any person who willfully violates any rule or regulation prescribed pursuant to this subsection commits a 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 for 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) the 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
Sec. 2304

LAWS OF 101st CONG.—2nd SESS. Nov. 5

(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.

DEPARTMENT OF DEFENSE APPROPRIATIONS ACT, FY 1997 WITH CERTIFICATION

PL 104-208 (HR 3610)
September 30, 1996

110 STAT. 3009

An Act making omnibus consolidated appropriations for the fiscal year ending September 30, 1997, and for other purposes.

Be it enacted by the Senate and House of Representatives of the United States of America in Congress assembled,

SEC. 8079. 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
1950 DEFENSE PENTAGON
WASHINGTON, DC 20301-1950

ADMINISTRATION & MANAGEMENT

15 JAN 1997

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

Dear Mr. Speaker:

Section 8079 of the FY 1997 Department of Defense Appropriations Act (Public Law 104-208) 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 over the past several years. In order to continue with this critical program, I certify that 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. We will be monitoring costs and estimates closely, however, and the Department will seek adjustment of the certification ceiling as appropriate as final planning for and demolition and construction of the first of five "wedges" starts in earnest in 1997 and early 1998.

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. As well, the certification does not cover ancillary projects including the design and construction of the Heating and Refrigeration Plant, the Classified Incinerator and costs prior to FY 1994.

If you have questions about the Pentagon Renovation Program, please have your staff call Mr. Jerry Shiplett at (703) 693-8954.

Sincerely,

D. O. Cooke
Director

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
1950 DEFENSE PENTAGON
WASHINGTON, DC 20301-1950

ADMINISTRATION & MANAGEMENT

15 JAN 1997

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

Dear Mr. President:

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Sincerely,

D. O. Cooke
Director

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