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Construction along the Pentagon's South Terrace

PROGRAM BACKGROUND

THE NEED

The Pentagon, designated a National Historic Landmark in 1992, has never undergone a major renovation, and, after more than 57 years, renovation is essential in order to meet current health, fire and life safety codes, and provide reliable electrical, air conditioning and ventilating services. Absent a major renovation, the building infrastructure will become increasingly unreliable and unable to support the headquarters and nerve center of the national military establishment. Major building engineering systems have deteriorated to such an extent that repairs are no longer effective and entire systems need replacement. The presence of asbestos in the ceiling plaster, heating and ventilating ducts, pipes, and floor coverings is a hazard that makes repairs or alterations extremely disruptive and expensive.

From 1982 through 1990, the Department of Defense discussed with the General Services Administration (then owner of the building) renovation of the Pentagon and, in the mid 1980's, GSA supported the concept of transferring ownership of the building to the DoD in order to proceed with the much needed renovation.

View of the Pentagon under construction in 1942. The 29-acre structure has never undergone a major renovation.

Secretary of Defense, William Cohen (left) during a ceremony on the River Terrace Parade Field. Ownership of the Pentagon was transferred from the General Services Administration to the Secretary of Defense in 1991.

THE TRANSFER

Based on consultation within the Administration and with Congressional committees, legislation was prepared to transfer ownership of the Pentagon from the Administrator of General Services to the Secretary of Defense so that the renovation of the Pentagon could be undertaken.

The Defense Authorization Act of FY 1991 transferred control of the Pentagon Reservation from the Administrator of General Services to the Secretary of Defense. Under the same Act, Congress established the Pentagon Reservation Maintenance Revolving Fund for the expressed intent of renovating the Pentagon. This Act allows the Secretary of Defense to establish rent rates which will support the renovation.

THE PROGRAM

In 1990, a Concept Plan for the Pentagon Renovation was approved based on renovating the building in five 1,000,000-gross-square-foot "wedges" with renovation of the basement as a separate endeavor. The plan envisioned the complete removal of all engineering systems (mechanical, electrical, plumbing) down to the base structure and construction of all new systems. This full-scale removal is dictated by the wide-spread presence of asbestos throughout the building. Replacement of the electrical, mechanical, and plumbing systems is based on the high probability of catastrophic failure.

The Renovation Program will provide all new engineering systems, sprinkler systems, vertical transportation, cable management systems, flexible ceiling, lighting, improvements in fire and life safety systems, and partition systems. The Renovation will also provide accessibility throughout for persons with disabilities. It will preserve historic elements, upgrade food service facilities, construct co-located operation centers, install modern telecommunications support features, comply with energy conservation and environmental requirements, reorganize materials handling, and provide safety improvements in vehicular and pedestrian traffic.

The renovation concept for the Pentagon includes, as a first phase, a new Heating and Refrigeration Plant (H&RP), which has been completed and is operational. In conjunction with the construction of the H&RP, a Center Courtyard Utilities Tunnel was con-

The Pentagon's five-acre Center Courtyard was excavated to clear the way for a new utility distribution system. The new system is now in place and the old antiquated system will be removed as each wedge is renovated.

structed. The tunnel houses mechanical, electrical, and plumbing lines which will distribute building utilities provided by the new plant.

The second phase of the Program is the renovation of the Basement and Mezzanine, which started in September, 1994. The third through seventh phases of the Program are the five wedges of the building from the first floor to the fifth floor. These areas have been determined to be the optimum divisions for renovation while continuing the operation of major utility systems. In order to vacate each wedge prior to renovation, tenants will be moved either to nearby leased office space or to swing space identified within the Pentagon.

In addition to the seven project phases, the Program is working on several ancillary projects, such as the Remote Delivery Facility, the Metro Entrance Facility, and the Heliport Fire Station and the Heliport Control Tower. The Renovation Program's organizational team structure, its in-house expertise and its ability to employ innovative procurement practices, allow it to take on related projects on the Reservation when required.

Aerial view of Wedge 1. Renovation activities have moved into full view of Pentagon personnel and the public.

STATUS

Fiscal Year 1999 was an exciting year for the Pentagon Renovation Program. Although a lot of work has been accomplished in prior years, much of it was preparatory. Previous projects concentrated on renovating office space for relocating people, developing the central utility infrastructure, and work in the basement, which, although substantial in terms of area, is hidden to most Pentagon tenants. This year saw the beginning of renovation work on the above-ground portion of the Pentagon and greatly increased the visibility and impacts of the project.

PROGRAM CHALLENGES

A complete renovation of the Pentagon is necessary to provide a modern, flexible, and efficient work environment that will endure well into the 21st century. Without a major renovation, the building will continue to deteriorate, ultimately rendering it unable to serve its mission.

A brief summary of each of the specific challenges facing the renovation team is presented below.

To better understand the challenges the renovation team faces, it is important to understand the unique features of the Pentagon itself. Unlike most large office buildings, the Pentagon is the command and control center for our nation's military establishment and headquarters to the senior leadership, including the Secretary of Defense, the Chairman of the Joint Chiefs of Staff and the heads of each of the armed services. It is from within the Pentagon walls that the Department of Defense monitors and deploys forces around the world. Yet, it is within these same walls that renovation activities, often involving heavy construction, must take place.

In terms of size, the Pentagon looks and operates much like a small city: it has its own heating and refrigeration plant, water and sewage facilities, police force, fire station, heliport, child care center, cafeterias, mini-mall, Metro station, and medical clinic. The building itself covers 34 acres and, overall, the Pentagon Reservation includes parking for 10,000 vehicles. In terms of population, the Pentagon's 25,000 employees make it larger than nine out of ten towns in the U.S. The large number of Pentagon personnel, the complexity and the critical nature of their missions, and the sheer magnitude of the building combine to create challenges that can be found in no other renovation project in the world.

Aerial view of the Pentagon's South Terrace as it appeared in February 2000. The Pentagon is often compared to a small city. It is home to 25,000 personnel and has its own medical facilities, post office, mini-mall, Metro station, heliport and fire station, heating and refrigeration plant, sewage treatment facility and parking for 10,000 vehicles.

CHALLENGE: RELOCATE 25,000 PEOPLE DURING THE COURSE OF RENOVATION

It was determined early in the planning process that the most efficient way to renovate the Pentagon was to vacate one fifth of the building (one wedge) at a time and then move ahead with demolition, abatement, core and shell, and tenant fit-out. Pentagon personnel would then be moved from the adjacent wedge into the renovated wedge, clearing the way for the renovation of the next wedge.

Relocating 5,000 employees from Wedge 1 posed significant challenges to the renovation team. To accomplish the task, three office buildings were leased within a three-mile radius of the Pentagon. Over a three-year period, 45 floors of building space were renovated to accommodate the mission-specific needs and security requirements of Pentagon personnel. In addition, new telecommunication lines were established to ensure employees in swing space maintain full and secured connectivity with the Pentagon.

Additional swing space was created in and around the Pentagon to minimize costs associated with leasing external office space. In all, swing space encompasses nearly one million square feet, the equivalent of the space in Wedge 1.

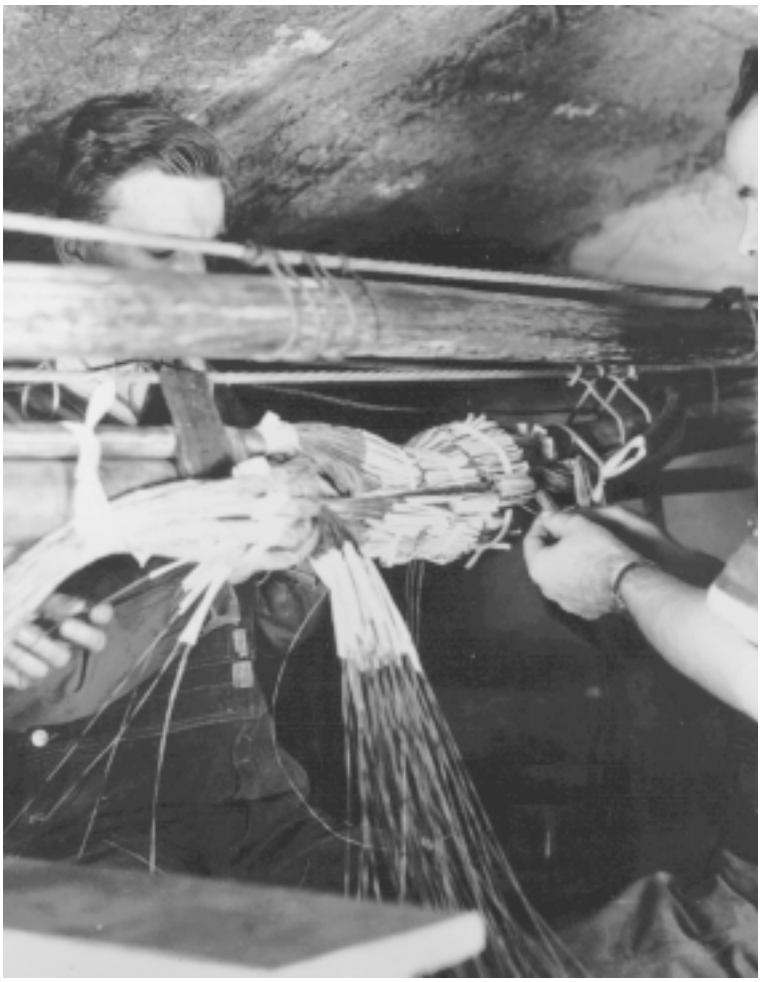
During the course of renovation, all 25,000 employees in the Pentagon, including the Secretary of Defense, will be relocated into new office space in the building.

25,000 military and civilian employees enter the Pentagon's doors each day. All personnel will be relocated to renovated space at some time during the renovation program.

CHALLENGE: KEEP THE PENTAGON OPERATIONAL AT ALL TIMES

By far, the most difficult challenge for the renovation team is to work around the nearly 20,000 Pentagon employees who must continue to execute critical Department of Defense missions uninterrupted.

However, the existing building utility systems are already unreliable. Before the renovation program began, none of the original major building systems had ever been replaced, nor have any been significantly upgraded. Records and documentation are incomplete, at best, and changes made during the last 57 years are seldom reflected on current building plans. Further, with the advent of computers and modern technology, the changing office environment has outstripped the capacity of deteriorated building systems. Electrical, plumbing, and heating, ventilation, and air conditioning systems need to be replaced and modernized to accommodate added loads to be more efficient and flexible. The information systems that were installed in the Pentagon are plagued with abandoned cabling and an unverifiable communications backbone for the building.



Technicians install original telephone wiring in the Pentagon. Much of it still exists as new systems were laid on top of old. Seldom are changes reflected on existing building drawings.

To meet the challenge of maintaining operations during the wedge-by-wedge renovation process, the renovation team first identifies every utility and communication line that needs to be rerouted around the wedge being renovated. This painstaking process is critical to ensure that no utility pathway or communication line is severed while it is still active. Without exception, new temporary and/or permanent utility and information systems are installed before old systems are removed. This requires that new pathways be established, which, in turn, requires the abatement of asbestos and other hazardous materials along the new pathways.

Keeping the Pentagon operational at all times also means minimizing disruption to personnel. This is particularly challenging because much of the renovation requires demolition and heavy construction activities that generate a significant amount of noise. Whenever and wherever possible, the renovation team works with senior officials and the tenants adjacent to construction activities to determine the most appropriate schedule for noise-generating activities. Notices are disseminated to provide tenants the schedule of upcoming activities and, in some cases, work is scheduled at night or on weekends when fewer personnel are in the Pentagon.

CHALLENGE: COORDINATE WITH ALL STAKE HOLDERS

Renovation activities impact a variety of offices and agencies, both inside and outside the Pentagon. Partnering with all the stakeholders is critical to the success of the program in terms of meeting budget and schedule requirements and, most importantly, the needs of the Pentagon tenants. To ensure that all key parties are involved in the renovation process, from early planning through construction, an Integrated Product Team (IPT) structure has been established.

The goal of an IPT is to bring together, at the earliest stage of the renovation process, representatives from all the offices or agencies that will be involved in a specific project. In addition to employees from the Renovation Program and contractors, an IPT includes representatives from the Pentagon Building Management Office (responsible for maintenance), the Defense Protective Service (responsible for physical security), and the tenant groups impacted by the specific renovation activity. Depending on the project, an IPT may also include members of local, state and county governments, area historical planning boards and commissions, and departments of public works and/or transportation.

Obtaining input from all stakeholders ensures that requirements and issues of concern are addressed early in the planning and design phases, where changes cost far less than during construction. Minimizing changes during construction is critical to keeping a project on budget and on schedule.

Through regularly scheduled IPT meetings, all parties are kept informed of project progress, potential risks, issues and changes, which effectively ensures customer satisfaction when a facility is turned over to the tenant.

Coordination meetings with all the stakeholders are critical to ensuring satisfied customers when a project is complete.

CHALLENGE: IMPROVE THE ENERGY EFFICIENCY OF THE BUILDING

The Pentagon was the first of 500,000 Department of Defense facilities to be designated as an "Energy-Efficient/Environmentally Sensitive Department of Defense Showcase Facility" - an initiative to improve both the energy efficiency and environmental performance of the Pentagon Reservation.

This initiative is particularly challenging in light of the Pentagon's National Historic Landmark status, which places certain restrictions on the extent of modifications that can be made to the building. Despite this, the Pentagon Renovation team has identified several opportunities to increase energy efficiency and reduce waste during the renovation. Selected recommendations made during the Energy Efficient, Environmentally Sensitive DoD Showcase Facility Session held in the first quarter of FY 1995 are being implemented. The renovation of the Pentagon includes improving energy efficiency through:

- Double-pane windows
- Economizer cycles for heating, ventilating and air conditioning equipment
- Energy efficient mechanical and electrical equipment
- Reduced overall lighting load and increased use of task lighting
- Automated energy management system
- Increased use of thermal insulation

In addition, 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 control. The Pentagon is now in compliance with the Clean Air Act after reducing emissions from the Heating & Refrigeration Plant and the Classified Waste Incinerator Plant. Both projects were completed during earlier phases of the renovation.

All 7,748 Pentagon windows need replacement. New double-paned thermal insulated units will greatly improve the energy efficiency of the building and enhance security.

Significant improvements to the working environment include replacement and upgrade of mechanical, electrical, plumbing, and all building support systems to modern standards. Interior spaces are being reconfigured to include vertical transportation systems. New space will be added, both through the conversion of ramp and corridor space to office and support space, and through the expansion of the Mezzanine areas.

In summary, the renovated Pentagon will benefit from improved indoor air quality, the new, highly efficient Heating & Refrigeration Plant, automated energy systems management, energy-efficient lighting, and an improved thermal building envelope. The renovation also will facilitate the reconfiguration of space to provide modern and flexible office space, readily adaptable to accommodate future organizational changes as well as technological advances in office equipment and work-space environments.

CHALLENGE: MAINTAIN AND IMPROVE ACCESSIBILITY FOR PEDESTRIANS AND PERSONS WITH DISABILITIES

Presently, the Pentagon fails to meet codes established by the Americans with Disabilities Act (ADA). Several initiatives within the renovation program will greatly improve accessibility and vertical mobility in and around the Pentagon for all personnel.

Along the South Terrace, pedestrians and persons with disabilities no longer need to cross three lanes of traffic to enter the Pentagon from South Parking. Two bridges will divert pedestrians over traffic, thereby improving safety and decreasing traffic congestion during the morning and evening rush hours. Two elevators in each bridge will provide access for persons with disabilities. The first bridge is now complete and provides access to the Corridor 2 lobby.

Along the River Terrace, wheelchair ramps were added providing wheelchair access to the River Terrace Parade Field from the upper River Terrace parking area. The new ramps marked the first time in 55 years that limestone was added to the Pentagon. To accommodate access to the River Terrace Entrance, a fully concealed handicap access lift was installed, which, at the turn of a key, raises a wheelchair-bound person to the entrance level from the lower parking level. Historical interest groups maintained that a ramp alongside the River Terrace façade would have altered the historical features of the façade. A similar lift was installed in the newly built health clinic.

Internal circulation will be enhanced by the installation of escalators and 40 personnel elevators. Today, persons with disabilities must use any of 12 original freight elevators, whose doors close vertically from the floor and ceiling. More than 40 head injuries have been reported during the last three years by building occcupants attempting to use the elevators. Because they must use freight elevators, persons with disabilities often ride alongside garbage dumpsters and electric freight vehicles, often resulting in collisions with motorized carts. New freight-only elevators will minimize vehicle/pedestrian conflicts.

As each wedge is renovated, new restrooms will meet current ADA requirements, eliminating the need for persons with disabilities to travel long distances to access an ADA-compliant restroom. Internal workspace areas will also be more accessible as space is converted to an "open bay" environment with fewer ceiling to floor partitions and improved access to individual office stations.

Representatives from the Pentagon Renovation Program, Pentagon Building Management Office and the DoD Disability Manager's Office toured the Pentagon in March 1999 to examine existing hazards in the Pentagon for persons with disabilities.

CHALLENGE: PRESERVE HISTORICAL FEATURES

The Pentagon was declared a National Historic Landmark in 1992. This status places significant restrictions on external renovation activities and presents several challenges to the renovation team. The renovation team regularly coordinates and obtains approval from a variety of planning and historical review agencies, including the National Capital Planning Commission, the Fine Arts Commission, the Virginia Department of Historic Resources and the Advisory Council.

A new wheelchair ramp for persons with disabilities marked the first time in 55 years that limestone had been added to the Pentagon. The new stone was obtained from the Indiana quarry where the original limestone was cut for the Pentagon to match the color and texture of the River Terrace facade. Another ramp lies on the opposite side of the parade field.

Pentagon construction in 1942. As evidenced by the photo on the opposite page, the outer facades have changed little since the structure was completed in 1943. The Pentagon was declared a National Historic Landmark in 1992.

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

1. The five outer facades of the Pentagon.
2. The Center Courtyard and surrounding facades.
3. The terrace fronting the Mall Entrance.
4. The terrace fronting the River Entrance.
5. The Pentagon's distinctive five-sided shape.

Within budget constraints, renovations to or along the outer facades of the Pentagon must replicate existing conditions. Where allowances are made for changes, such as the two wheelchair access ramps on the River Terrace or pedestrian access bridges along the South Terrace, project teams paid special attention to architectural details so that all new additions match the style, color and ornamentation of existing Pentagon features. For example, to ensure a close color match with new limestone used on both the access ramps and new bridges, the renovation team purchased the needed limestone from the Indiana quarry where the original limestone was obtained for the Pentagon in 1942.

In Wedge 1, every window along the inner façade (A Ring) and outer façade (E Ring) will be replaced with new blast-resistant units, which match the historical details of the existing windows, including the location of the handles, even though the new units will be secured in a closed position to optimize the new HVAC system and to aid the improved safety system.

Throughout the program, the renovation team will continue to preserve and maintain the historical integrity of the original Pentagon design while ensuring that the "new" Pentagon will endure well into the 21st century.

PROGRAM SCHEDULE

Since last year's report, the completion date of the Program reflects a time growth of about two years. This growth is a result of the knowledge gained from work done on the first wedge and readjustment of calculations of requirments to complete the program. These experiences include:

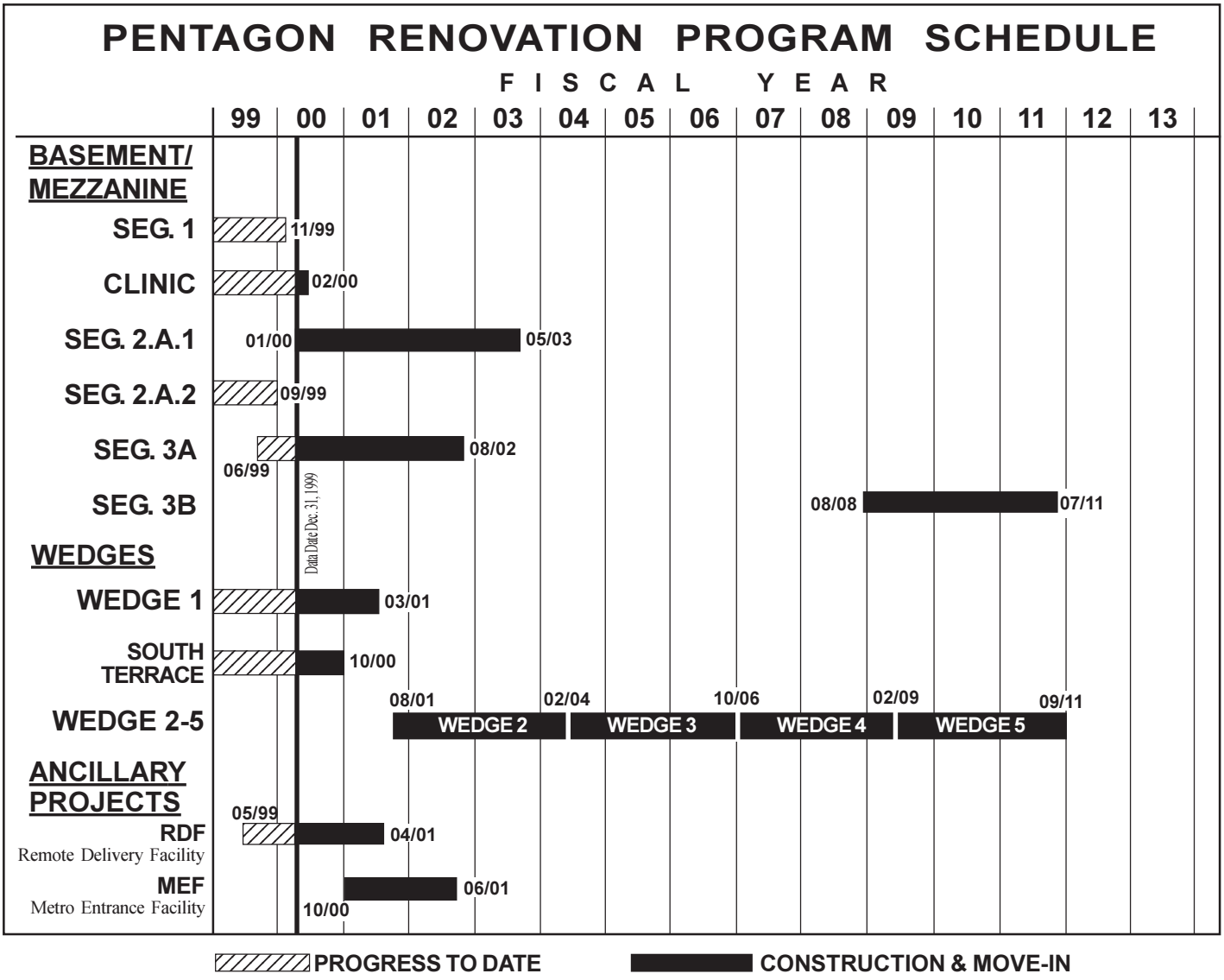
- The actual time required to relocate 5,000 tenants and removal of surplus materials prior to the start of demolition and abatement work. Over the life of the renovation more than 25,000 occupants will be relocated.
- The difficulties in removing 4,000,000 pounds of asbestos and 15,000,000 pounds of demolished construction debris for one wedge.
- The actual time required installing barrier walls, temporary mechanical, electrical, plumbing, and telecommunications systems.
- When actual conditions were exposed, more reliable information for the estimate of construction durations was realized.

15,000,000 pounds of debris have been removed from Wedge 1. Actual time tables for debris removal and other activities in the wedge allow program shedulers to more accurately predict the project duration.

Factoring in the experience and actual conditions referenced above, the estimated time duration to complete the renovation of each wedge was increased. This estimate includes tenant move-out, demolition and abatement, core and shell construction, tenant fit-out construction, telecommunications backbone installation, installation of systems furniture and furnishings, security systems installation, migration of command center systems, and tenant move-in.

Further factoring in the limitation of swing space to accommodate tenant moves, the renovation of wedges is being performed in a sequential manner. We have also increased the schedule for contingency at the end of each wedge, 2 through 5, to allow for unforeseen conditions.

As a result of program shedule and budget matters, the Renovation Program is being restructured. We are currently developing performance-based requirements coupled with design/build contracts. This new approach will preserve flexibility in our requirements and contracts so that we can take advantage of cost and progress efficiencies that the successful offeror may provide.



PROGRAM BUDGET

SOURCE OF FUNDS

Section 2804 of the Department of Defense Authorization Act, 1991 (Public Law 101-510, see Appendix), established the Pentagon Reservation Maintenance Revolving Fund (PRMRF). The Act transferred responsibility for the operation, maintenance, protection, repair, and renovation of the Pentagon Reservation from 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.

Soil removed from the Remote Delivery Facility site north of the Pentagon's Mall Terrace is being stored on the grounds surrounding the Pentagon just one quarter mile away. Typically, dump trucks would have been required to bring the soil to a dump site 20 miles away. By significantly reducing the hauling distance, the Program saved close to $1,000,000. The soil will be returned to its original site during the final phase of the project.

The renovation was designed to be 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 for the PRMRF may be generated from various sources; however, the fund depends primarily upon monies collected from a user charge for space and building services. These charges are paid by the DoD components and other tenants using Pentagon Reservation facilities or land, with rates corresponding to six categories of space: office, storage, special, joint use, commercial support, and outside parking. The 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 OF COST

Based on early estimates of the costs to be incurred, 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 Renovation shall 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 was $100,000,000 less than the certification ceiling initially supported by the Department and the Congress. The Department of Defense Appropriations Act for FY 2000 increased the certification ceiling amount to $1,222,000,000 for specific security improvements.

At this early state in the construction process, it is difficult to determine the full impact of the revised certification ceiling on the ultimate design of the renovated Pentagon. The total program cost will depend heavily on inflation of construction costs over the next 10 to 12 years and the effectiveness of management and contracting initiatives undertaken by the Program. Internal management controls are in place to insure accurate tracking and monitoring of costs associated with the certification ceiling and to segregate costs of ancillary projects.

TOTAL ANNUAL PROGRAM COSTS FOR DESIGN & CONSTRUCTION

Fiscal Year	Design & Construction	Cumulative Totals	Items
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	97,100,000	348,700,000	Obligations
1999	131,000,000	479,700,000	Obligations
2000	138,900,000	618,600,000	Budgeted
2001	160,100,000	778,700,000	Budgeted
2002			
2011	443,300,000	1,222,000,000	Program
Total	1,222,000,000	1,222,000,000	

Consistent with cost estimates for projects in a military construction program, this estimate does not include the cost of: 1) design and construction of the Heating & Refrigeration Plant, the Classified Waste Incinerator, the Remote Delivery Facility, and the Metro Entrance Facility; 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; 5) some recently required security enhancements and 6) costs prior to FY 1994. The Department of Defense Appropriations Act for FY 1999 and the required certification are included in the Appendix.

In order to continue critical programs, the Program will endeavor to constrain the cost of project design and construction to within the current limitation through increased efficiency.

Fundamental changes have been made to meet this challenge. These have included restructuring the three organizations responsible for supporting the Renovation Program into geographic and functional Integrated Product Teams. Each geographic project within the program has a Geographic Integrated Product Team responsible for the entire renovation activity within that geographic area. Coupled with these internal management changes are procurement changes which have streamlined the whole process. Construction awards, previously based on firm fixed-price low bids, resulted in continuous conflicts between the general contractor

A renovation program team leader describes project site conditions to construction contractors who will team with the project designer during a portion of the design phase.

and the Renovation Program. These conflicts included multiple claims, contract changes, increased costs, and delays.

Contract awards, negotiated between the government and the contractor, are now based on best value to the taxpayer and the government, not necessarily the lowest proposed cost. Best-value determination is based on an analysis of factors including past performance, management approach, technical approach, probable cost, and small and disadvantaged business support. Oral proposals and page limits on proposals reduce time and help gain additional insight into contractor capabilities.

Active partnering is being used with general contractor offers in multi-phase source selections. The most promising offerors are brought on board to team with architect/engineers (A/E) in the design and development of areas to be constructed. Sophisticated contracting vehicles are being used to reinforce team partnering. Savings incentives reward efficient contract performance. Award fees are used to reward creativity and efficiency on the part of contractors. The intention is to secure superlative contract performance at reasonable cost by fundamentally changing the relationship between the government and the contractor. The Program is working hard to form partnerships with industry which will improve contractor performance, reduce cost, and meet schedule parameters.

RENOVATION SEQUENCE

One of the 5,500 employees to move out of the Pentagon and into swing space as of February 2000.

New telecommunication conduits in Wedge 1. Old conduits have been terminated and rerouted.

The Pentagon Renovation consists of several individual projects that all follow a similar sequence towards completion. In the following section, this sequence will be identified with icons to outline the progress of each project.

MOVE-OUT

One of the major challenges faced by the Renovation Program on a daily basis is the necessity of working around 25,000 people. Before renovation of an occupied area can begin, the people in that space must be moved to leased office space, temporary space built out within the Pentagon, or new permanent space after the completion of Wedge 1. This move includes all of the tenants personal belongings, computer equipment and telephones. A major factor in the move-out process is the fact that Pentagon employees cannot afford any downtime in their daily activities. Therefore, the swing space must be renovated and operational to meet the needs of the displaced Pentagon tenants before the move-out process can occur. After the move, tenants are typically up and running at normal speed within a 24-hour period.

TEMPORARY MECHANICAL, ELECTRICAL, PLUMBING AND COMMUNICATIONS (TEMP MEP/ COMM)

Temporary mechanical, electrical, plumbing, and communications are necessary to keep the Pentagon tenants surrounding the area under construction operational with minimal disruption. Temporary barrier walls, constructed to ensure the safety and security of the tenants, prevent noise, dust, and hazardous work conditions from being a distraction.

DEMOLITIOIN & ABATEMENT (DEMO & ABATE)

Before construction can begin, the area must undergo the demolition of all existing utilities and the abatement of hazardous materials including asbestos, lead-based paint, and PCBs. This is a very expensive and time consuming effort but absolutely essential in order to assure the health and safety of Pentagon tenants.

Demolition in the Pentagon's basement included excavation of 45,000 cubic yards of soil.

CORE & SHELL

Core and shell refers to the build-out of common elements in an area, including walls and public corridors, and the rebuilding of main utility systems.

Worker installs support for new beam in Wedge1.

TENANT FIT-OUT (TFO)

Tenant fit-out is the building of interior office space based on the requirements of the intended tenants.

Tenant space is defined as workers in Wedge 1 construct new stud walls.

Control area in the Network Systems Management Center.

INFORMATION MANAGEMENT & TELECOMMUNICATIONS (IM&T)

The information management and telecommunications group works to meet the requirements of the intended tenants while ensuring that the technological needs of future tenants can be met without another major renovation. Modern telecommunications and information management sources are provided throughout the Pentagon with access to global networks. Backbone communications are renovated to support voice, data, video, and other user requirements such as local area networks (LANs).

Systems furniture installed in the basement is composed of just 19 basic components.

FURNITURE, FIXTURES AND EQUIPMENT

After the interior office space has been fitted-out and the information technology equipment installed, flexible systems furniture is installed to facilitate the operation of a modern office environment. The systems furniture includes a spine-wall work station configuration, providing easily accessible race-ways for telecommunications. This allows much greater flexibility in both the initial furniture layout and future reconfigurations.

SECURITY

Before commissioning can be completed, the area must obtain security accreditation by several different organizations.

COMMISSIONING

Commissioning is the process of verifying and documenting the performance of building systems in accordance with the design and the owner's functional and operational needs. Commissioning starts in the design phase and extends through the construction process and warranty period.

MOVE-IN

After the space has been completely renovated and is ready for occupancy, the move-in effort occurs. As with the move-out, the Renovation Program strives to minimize any tenant downtime in their daily operation. Tenants are typically back to full operation within 24 hours of vacating their temporary offices in swing space for their newly renovated space in the Pentagon. This includes the relocation of all personal items and the reattachment of computers and telephones to IM&T infrastructure.

PHASE NOT STARTED or NOT APPLICABLE

If the phase of the project being discussed has not yet been started, than "Not Started" will appear with the icon. If the phase does not apply to the project being discussed than "Not Applicable" will appear with the icon.

Police officers on duty at the main security station in the renovated Corridor 8 entrance area.

Employees use the new pedestrian bridge at Corridor 2 to safely enter the Pentagon from South Parking.

More than 1,200 personnel have moved into renovated space in the Pentagon's basement/mezzanine.