

REAL PROPERTY MAINTENANCE COSTS FOR
THE DEPARTMENT OF DEFENSE

Prepared by

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Real Property Maintenance Activities (RPMA) account for some \$5 billion of the Administration's 1985 budget request for the Department of Defense (DoD). This money will be used to fund major and minor repairs, recurring maintenance, and related activities for DoD's real property capital stock. That stock includes 1.7 billion square feet of buildings and thousands of other structures owned and operated by the military departments of the DoD. At the request of the House Armed Services Committee, the Congressional Budget Office (CBO) is analyzing the costs associated with Real Property Maintenance activities which are funded out of the Operations and Maintenance (O&M) accounts of the Army, Navy, and Air Force. ^{1/} This paper summarizes the results of the CBO analysis and addresses two questions:

- o Is proposed 1985 funding for maintenance of real property adequate in the Administration's budget?
- o What are the likely long-term trends in the costs of maintaining DoD's real property?

ADEQUACY OF 1985 PRESIDENT'S BUDGET

Defining "Adequate" MRP Funding

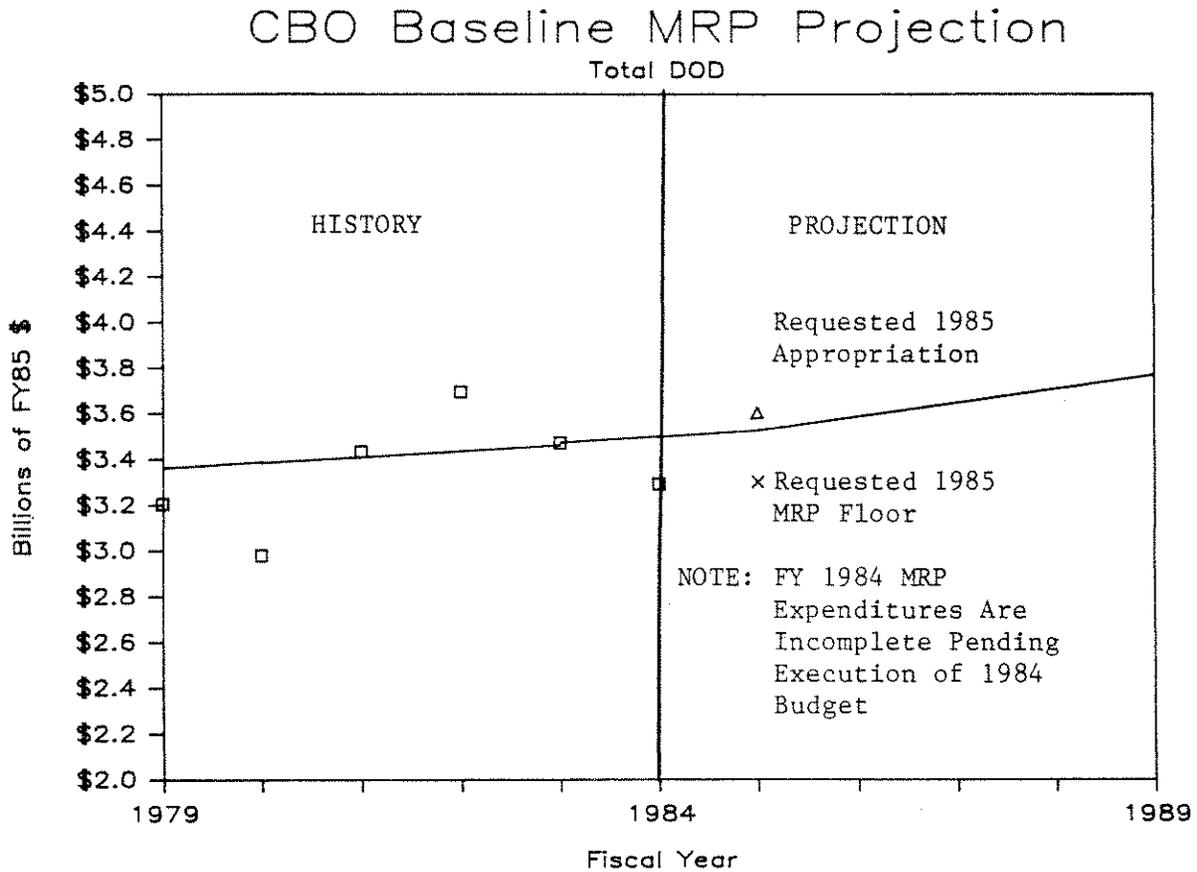
CBO estimated costs for the Maintenance of Real Property (MRP), which includes the maintenance portions of the RPMA account. ^{2/} CBO cannot establish an empirical "requirement" for MRP funding; unfortunately, data do not exist which provide a clear picture of the effects of underfunding MRP requirements. This is due in part to the inherent flexibility of

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1. The operations and maintenance accounts of the Army and the Navy typically fund about two-thirds of all real property maintenance costs. Most of the remaining one-third is industrially funded, with a residual amount coming from the RDT&E and procurement accounts. In the Air Force, some 94 percent of MRP is O&M funded.
 2. MRP costs are those which are directly associated with maintenance and repair of real property, and exclude minor construction, operation of utilities, and other engineering support, which are generally included under the umbrella term Real Property Maintenance Activities.

maintenance decisions; most nonemergency maintenance and repairs may be deferred without incurring serious additional future costs, provided that the repairs are done later. Additionally, since there is no objective indicator of the overall state of facilities repair, it is impossible to quantify the costs of underfunding any "requirement."

Given these constraints, CBO based its projections on the historical level of MRP funding in fiscal year 1983. In Figure 1, it can be seen that

FIGURE 1



1983 MRP funding was at a level consistent with average spending since 1980, years when MRP may have been funded at roughly adequate levels. ^{3/} But 1983 spending is higher than levels in 1979 or 1980, when many felt real property conditions were deteriorating because of inadequate funding.

1985 Requirements versus the Budget Request

Given 1983 as a base, CBO developed a model--discussed more fully below--that predicts percentage increases in MRP funding necessary to reflect changes in the size and age of the capital stock. That model predicts that DoD will require MRP funding of about \$3.53 billion in 1985, slightly above the 1983 level of \$3.47 billion (in 1985 dollars).

These results indicate that the Administration's request for MRP funding in its February 1984 budget request is in line with historical patterns. The Administration's request for \$3.6 billion is some 2 percent larger than the \$3.53 billion predicted by the CBO model. But the services also recommend a "floor" on MRP funding below which they are not supposed to cut when funds are reallocated during execution of the budget. The requested MRP floor of \$3.3 billion is below the CBO projection, suggesting that ultimate spending may approximate the model's estimate of \$3.53 billion.

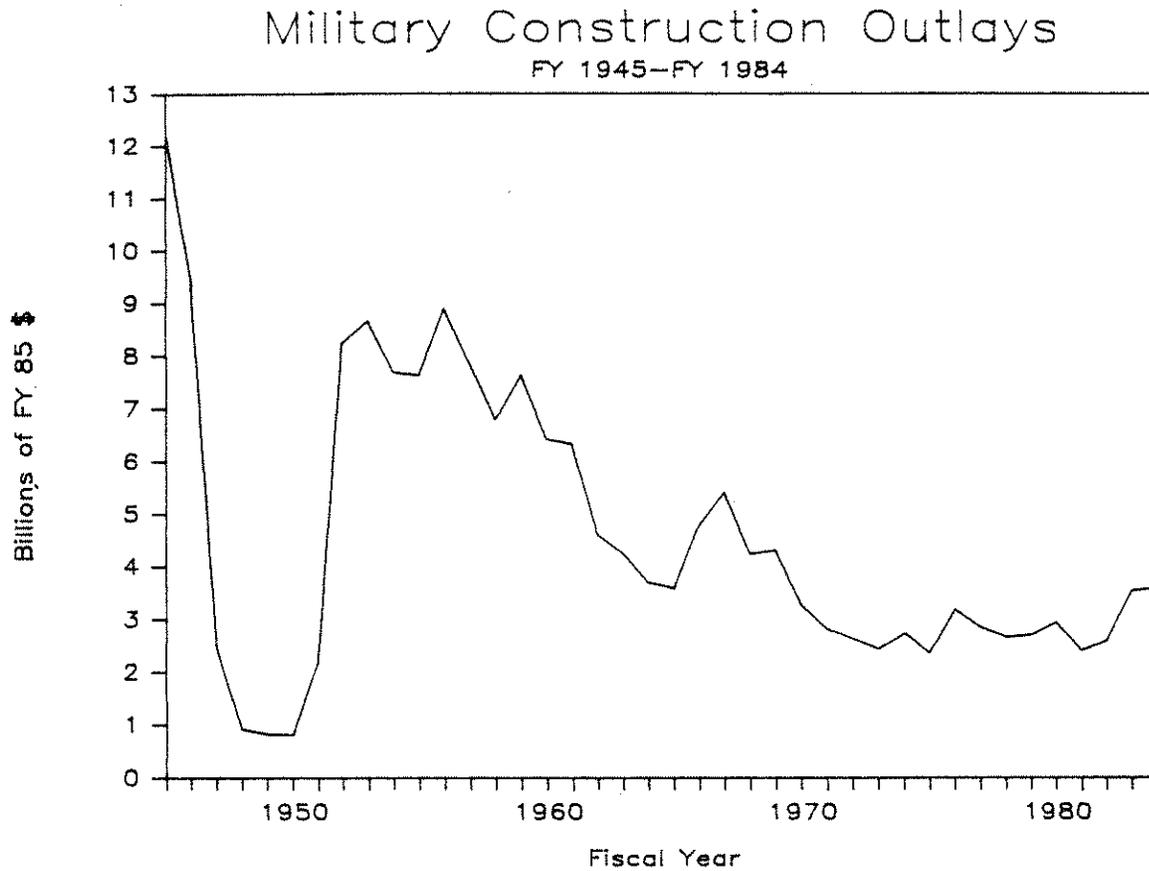
Reasons for Increases in MRP Funding

One reason that CBO predicts increases in MRP requirements is that more facilities are being built. Expanding missions for the military services in the near future will entail the acquisition of new facilities, such as the new sites for the ground-launched cruise missile in the United Kingdom and the expansion of facilities for prepositioning of equipment and stores in Europe and in the Indian Ocean.

Past investment patterns are another reason for rising MRP needs. Over the past 25 years, investment in real property facilities has declined in real (constant dollar) terms, as illustrated in Figure 2. Declining rates of real investment meant that many aging facilities have not been replaced in

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3. 1983 was chosen as a year when MRP funding was adequate, neither exceptionally low--as in 1980--nor high--as in 1982, a "get well" year where past MRP underfunding was funded (see Figure 1).

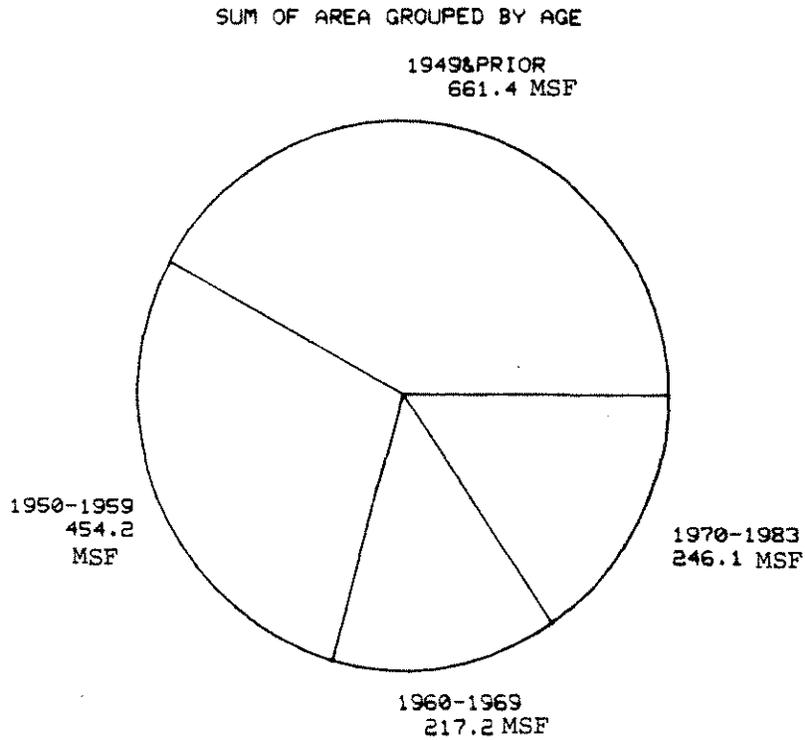
FIGURE 2



a timely manner; as a result, military facilities today are, on the average, 31 years old. The current distribution of facilities by age is shown in Figure 3. Nearly 70 percent of all DoD facilities were constructed before 1960. (By way of comparison 47 percent of the private housing stock and 17 percent of commercial and industrial facilities fall in this category.) This means that the "average military building" was constructed in 1953, although it has probably been remodeled several times since then. Furthermore, many of these facilities are obsolete, either in terms of their engineering or their capability to perform the functions for which they were designed. For example, a motor pool bay built to service the M60 main

FIGURE 3

AGE DISTRIBUTION OF DOD FACILITIES



battle tank is unusable with the M1, which replaces the M60, because the bay is too narrow to traverse the turret to access the tank's engine; this typifies "technological obsolescence" of facilities.

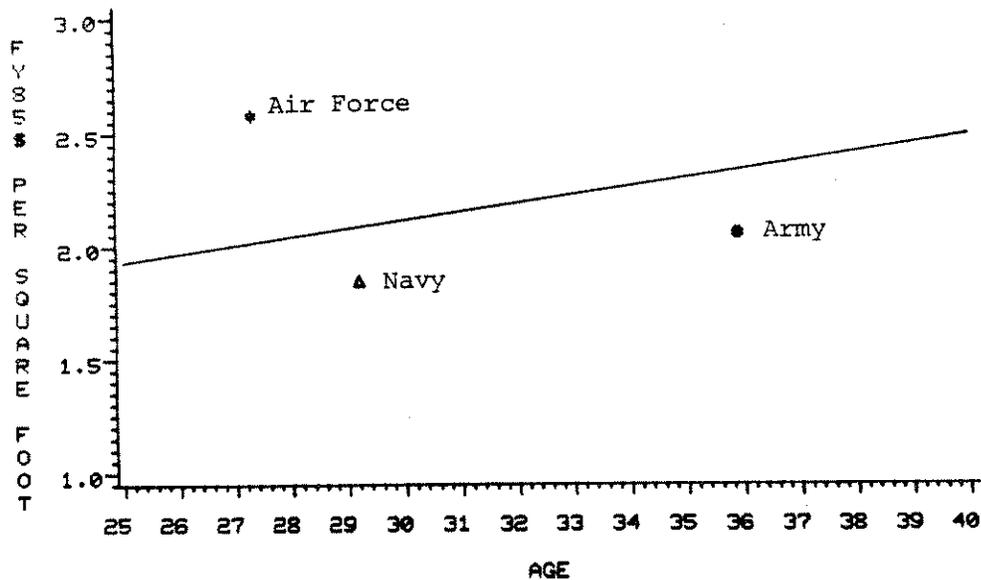
Aging trends will probably continue into 1985, pushing up MRP requirements. Only a major infusion of new construction, accompanied by retirement of older buildings, could reverse the aging trend. But, as was noted above, much of the new construction money will be needed to expand facilities to meet the needs of new military missions.

Differences Among Services

While each of the services should show rising trends in MRP costs (since all facilities are subject to the same influences of aging), the analysis did reveal important differences among the services in terms of capital stock and MRP funding. The Army, on average, has facilities that are older than either the Navy's or the Air Force's (see Figure 4). Too, the Air Force funds MRP at a significantly higher unit level than either of the other services. This may result from two factors. The Air Force's real property capital stock may have proportionately more facilities of types which have higher unit MRP costs, although CBO did not have sufficiently detailed data to address that issue. Additionally, the Air Force has historically maintained its facilities to a higher standard of repair than the other services; this represents a "management philosophy" different from either the Army or the Navy as to what is an "adequate" state of facility repair.

FIGURE 4

AVERAGE AGE AND UNIT MRP COSTS COMPARISON OF THREE SERVICES



Projecting MRP Costs

To provide the results discussed above, CBO developed a model to predict changes in MRP costs. Specifically, the model relates MRP costs per square foot of CONUS buildings to the average age of the capital stock. The model is a relationship based on the MRP outlays funded from the operation and maintenance account, and the average age and size of the capital stock, between 1976 and 1982. ^{4/} Because data for the other services were not available, model results are based on Army numbers only. But percentage changes in MRP due to aging should apply to the other services since all the services operate similar types of real property facilities.

Model results suggest that, with the current age/size profile of the capital stock, MRP costs per square foot, exclusive of inflation will increase at a rate of slightly over 2 percent for each one-year increase in the

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4. CBO derived a relationship between average age and unit MRP costs where unit MRP is the total MRP funding (in fiscal year 1984 dollars) divided by the total area of CONUS building and AVAGE is the average age of those buildings. Since actual expenditure data were available only for the Army from the period 1976-1982, those data were used to construct a linear relation. Since age-driven MRP cost growth is a result of physical phenomena which should apply equally to each service, CBO assumed that the slope of this line was the same for each service. However, in order to compensate for differing age/stock profiles and management philosophies, the equation was calibrated to the fiscal year 1983 level of funding for each service. These equations, which differ only in their intercept terms, are the basis for the CBO MRP cost projections made in this paper. The average of the three equations suggests that $MRP = .77 + .036 AVAGE$. (The equation is statistically significant.)

Additionally, many experts believe that, in the long term, the effect of aging on unit MRP costs is not linear, but rather exponential. In other words, the MRP costs increase a constant percentage for each one year increase in the average age of the stock. While not enough data were available to empirically validate this assertion, CBO did estimate a least squares fit exponential relationship between unit MRP costs and average age. This resulted in a MRP cost growth of approximately 2 percent per year.

average age of the stock. ^{5/} Investment in new and replacement facilities will generally mean an annual increase of less than one year in the overall average age. Nevertheless, the real increase in MRP requirements attributable to aging is noticeable even in 1985--some \$31 million over the 1984 level--and will become even more important in later years.

LONG-TERM MRP TRENDS

Beyond 1985, the size and age of the capital stock--and hence needed MRP costs--depend critically on the amount and nature of new construction funds. If the total quantity of facilities is increased by new construction, total MRP costs will increase. On the other hand, if new facilities replace older and more obsolete ones which are in turn retired, the average age of the stock will decrease and so will unit MRP costs. (This latter point simplifies a complex process. DoD rarely replaces existing facilities with new ones of comparable design. Modern, sophisticated mechanical systems designed to be more efficient and to comply with new environmental standards replace older, simpler ones. Thus maintenance and repair costs could well be higher, even with a new building replacing an "obsolete" one. But CBO could not account for this shift in the types of building.)

A precise projection of future MRP costs thus requires knowledge not only of the levels of new investment, but also of the mix between expansion- and replacement-oriented investment. The level of future military construction funding is in itself highly speculative in light of likely cutbacks in defense spending; the composition of that spending (expansion versus replacement) is even more so since DoD does not provide the Congress with detailed plans. The CBO analysis focuses on three alternative cases for military construction, analyzing the implications of each for MRP requirements.

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5. The DoD stock of facilities is composed of many different types of structures, which are not all measured in comparable units; this makes it impossible to derive a true "overall" average age. Since buildings represent some two-thirds of all real property capital MILCON investment, the CBO analysis uses the total area (square footage) and average age of buildings as indicators of the total quantity and overall age of facilities. Implicit in this method is an assumption that the ratio of non-square foot denominated assets--such as pipelines, wharfs, and runways--to buildings is roughly constant over time.

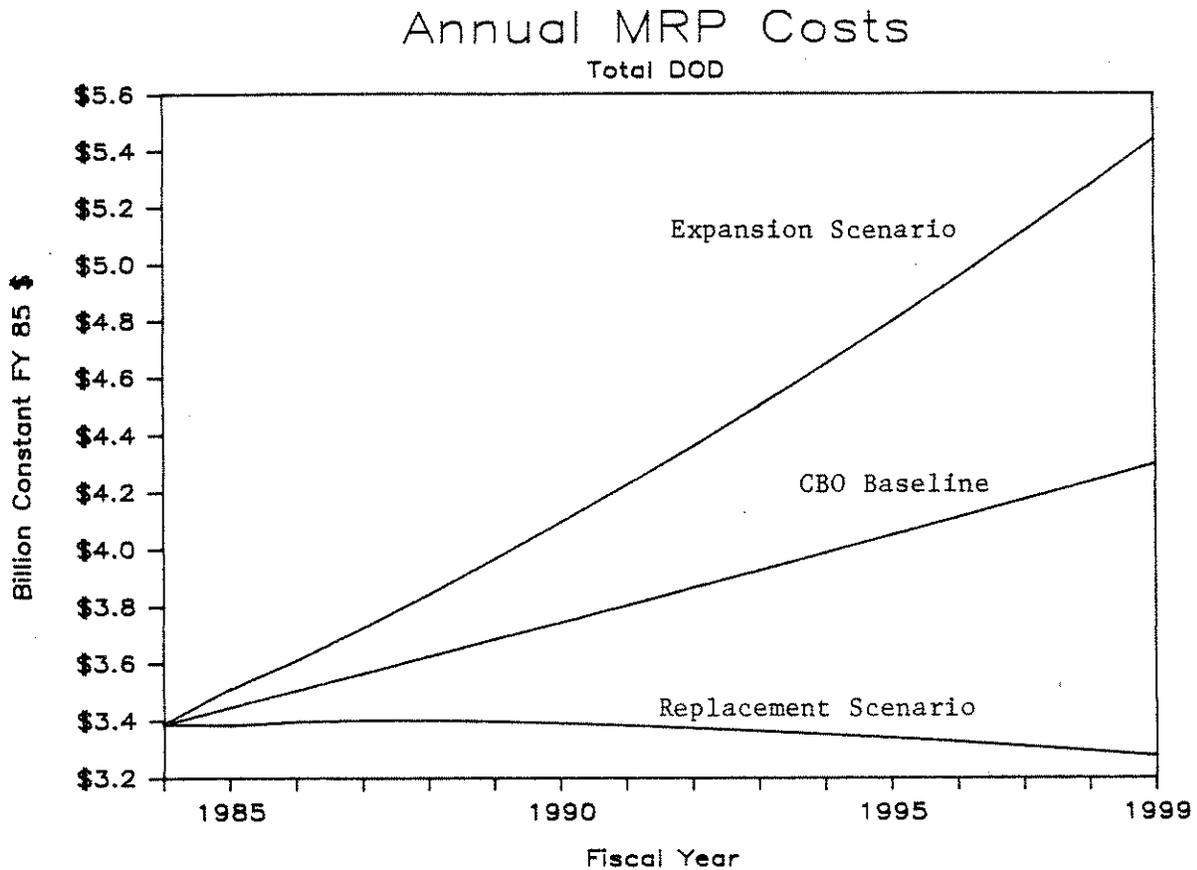
- o CBO Baseline: As a baseline, military construction budget authority is presumed to grow only at the rate of inflation beyond its fiscal year 1984 appropriation level (no real growth), with spending evenly divided between expansion and replacement of existing facilities.
- o Administration Plan, Expansion Emphasized: The President's budget projections for military construction are used, with real growth in outlays of 3 percent assumed after fiscal year 1989. All spending is presumed devoted to the expansion of the current stock of facilities. This is labeled the "expansion" scenario.
- o Administration Plan, Replacement Emphasized: This scenario has the same spending path as the previous case, but with all new construction devoted to replacement of current facilities, so that the total size of the stock remains fixed. This option can be regarded as a "modernization" alternative.

Most of these cases suggest that MRP costs will continue to grow (see Figure 5). The CBO baseline, which assumes no real growth in military construction, results in an aging capital stock and, by 1989, MRP requirements equal \$3.69 billion, 4.5 percent above today's level in real terms. Heavy emphasis on expansion leads to even higher costs; by 1989 annual MRP costs equal \$4.0 billion, 8.4 percent above the CBO baseline and nearly 13.3 percent above today's level in real terms. In this case, however, the total size of the capital stock is nearly 16 percent larger than if all investment is concentrated on replacing obsolete facilities.

Only the scenario that devotes all construction monies to replacement holds down MRP costs. By 1989, under the total replacement scenario, MRP costs are \$3.4 billion, 7.9 percent below the CBO baseline costs and about equal to spending today. But this case is probably unlikely. Some construction money will be devoted to building new facilities. Moreover, the overall increase in construction money in this case is probably unrealistically high because they are based on the Administration projections which seem very optimistic when compared to historical trends. Under Administration plans, military construction outlays will grow an average of 17 percent each year from 1985 through 1989. By way of comparison, however, from 1971 through 1981 the average real growth in military construction outlays for the Defense Department was -0.37 percent per year, a net decrease in real investment.

In the years beyond 1989, alternative approaches to military construction produce more radically divergent MRP requirements, but again most

FIGURE 5



suggest that MRP requirements will continue to grow. Continuation of the Administration's plan, with an expansion emphasis, could lead to annual MRP requirements of \$5.44 billion in 1999, 27 percent above the CBO baseline projection. Only continued increases in construction money, with all the money devoted to replacement of old facilities (the replacement case), would reverse the upward trend in MRP requirements. But concentration of all construction funds on replacement seems unlikely. Moreover, even in this case, the Congress would have to ensure that those buildings replaced by new ones were actually demolished. Otherwise, even this replacement case would be similar to the expansion scenario, with its much larger MRP requirements.