U.S. Department of Housing and Urban Development
Office of Policy Development and Research

Report to Congress on Alternative Methods for Funding Public Housing Modernization

The analyses forming the basis for this report was conducted by the Policy Development Division in the Office of Policy Development and Research, U. S. Department of Housing and Urban Development (HUD).

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Executive Summary

Why this report

The public housing modernization program is an application program under which public housing agencies (PHAs) apply to the Department of Housing and Urban Development (HUD) for funds to undertake modernization activities at specific housing projects. There is substantial HUD review and oversight involved in the operation of the program.

In 1987, responding to a HUD legislative proposal that called for funding the modernization program by formula for PHAs with 500 or more units under management, Congress amended the statute governing the modernization program to reduce HUD's role and provide for greater freedom and flexibility in using modernization funds for PHAs. These statutory changes could be implemented along with use of a formula to provide predictable funding within which the PHAs would exercise their new responsibility. However, the new statutory provisions could also be consistent with other systems for allocating modernization funds. Congress did not make the choice in 1987 but, instead, provided that no change in the method of allocating modernization funds to PHAs be made until enacted by Congress in subsequent legislation. To assist Congress in making this decision, HUD was required to submit a report to Congress presenting alternative approaches, including formula funding. This report responds to that statutory requirement.

Background (Chapter I, pp. 4 - 13.)

The public housing program is a major source of housing for the poor. The 1,312,000 public housing units (excluding Indian housing) in 3,100 communities across the country house approximately 3.3 million people, almost 1.3 percent of the U.S. population.

From a fairly small start in the late 1960's and early 1970's, public housing modernization has come to be a major housing program which, while not ordinarily providing additional housing units for the poor, upgrades the housing units now available so that they can continue to effectively serve low-income households.

Sources of data used in this report (Chapter I, pp. 13 - 30.)

In developing this report, HUD had the benefit of substantial factual data from two recently completed studies of modernization needs on 1) the outstanding need for modernization work at public housing projects, 2) how those needs arise over time, and 3) project and PHA characteristics. The studies are: Study of the Modernization Needs of the Public and Indian Housing Stock--National, Regional and Field Office Estimates: Backlog of Modernization Needs (Abt Associates, Inc., Cambridge, MA, 1988); and Future Accrual of Capital Repair and Replacement Needs of Public Housing (ICF, Inc., Fairfax, VA, 1989). The data available from these two reports, together with information from HUD operational data systems, permitted a thorough analysis of the implications of a wide range of funding alternatives for the modernization program.

Public housing modernization need (Chapter II, pp. 1 - 14.)

Despite the substantial funding provided by the Federal Government for modernization of public housing projects in the 1980s, we estimate, based on Abt/ICF data, that there remains a large outstanding backlog of unfunded modernization need in 1990. The major categories of public housing modernization backlog and estimates of their unfunded need in 1990 are presented in Table I.

Table I--Categories of Modernization Backlog and Estimates of Their Unfunded Need in 1990 (1990 dollars)

-- Mandatory Backlog Need--work required to be done at all projects by the HUD Modernization Standards.	**$13.36 billion**
Mandatory Backlog Need consists of:	
FIX backlog, the backlog of needed repairs or replacements to existing physical systems in public housing projects.	$12.15 billion
Mandatory ADDs, items that must be added to public housing projects to meet local codes or the HUD modernization standards.	$.55 billion
Lead-based paint testing and abatement. This estimate is based on the Abt national estimates for 1985. Since Federal requirements for lead-based paint abatement have considerably broadened since that time, this estimate is essentially a "placeholder." Actual costs are likely to be much higher.	$.36 billion
Handicapped accessibility. Again, this figure is based on the Abt estimates for 1985. Since regulatory requirements for making projects accessible to the handicapped have broadened, this estimate can also be considered a "placeholder." Actual costs are likely to be higher.	$.30 billion
-- Project-Specific ADDs, 1-2, capital improvements that are not required at all public housing projects, but are necessary or highly desirable for the long-term viability of a specific project.	**$5.89 billion**

-- Project Redesign, substantial structural changes in a project which are necessary for long-term project viability.	$2.39 billion
-- Energy Conservation, energy conservation measures with a payback of 15 years or less.	$.63 billion

Table I shows that the backlog of modernization need ranges from something in excess of a minimum of $13.36 billion if only the backlog of mandatory modernization need is considered, to something in excess of $19.2 billion if Project-Specific ADDs* are included to a total of over $22.3 billion if all work currently approvable under the CIAP program is considered to be part of the outstanding backlog of modernization need.

In addition to the unfunded backlog of modernization need, work that is needed now in public housing projects, new modernization needs are constantly accruing as these projects continue to age and deteriorate. We estimate (in constant 1990 dollars) that the accrual of new modernization need will be approximately $1.8 billion annually in the 1990s, rising to approximately $1.9 billion annually in the early years of the 21st century.

The size of these estimates means that it is not realistic to expect to completely fund in a short period of time the backlog of modernization need and the additional need that is accruing annually. Thus, any redesign of the allocation system for the modernization program must recognize that the modernization program is likely to continue indefinitely. A new funds allocation system should be sustainable over the long term both for meeting modernization needs and for ease of administration.

Fund backlog, accrual or both? (Chapter III, pp. 2 - 7.)

The size of the estimates of backlog and accrual need means that hard choices must be made about whether to fund only backlog, to fund only accrual or to partially fund both.

*This term and others such as FIX and Mandatory Adds used to describe portions of the backlog of modernization need are defined in Table I, pages ES-3 and 4.

Distributing funds on the basis of backlog only would place precedence on taking care of existing needs at public housing projects, but would mean that a new and sizeable backlog would arise from the modernization needs that were accruing as the old backlog was being addressed.

Funding on the basis of accrual only would permit PHAs to maintain their properties and avoid the development of a new backlog of modernization need. However, the problem of the existing backlog would remain unsolved.

A decision to partially fund both backlog and accrual would recognize the validity of both types of modernization need. It would also reflect the relative role of accrued need from 1986 onward in contributing to the 1990 backlog. (The basic backlog of modernization need is based on patterns of need identified in the inspections of public housing projects conducted in 1985 by Abt Associates for the backlog study. As discussed below, the patterns of distribution for accrual are different from those of the 1985 backlog.)

However, it should be recognized that failure to fully fund both the backlog of mandatory modernization need and the accrual of new need will have implications for the condition of the public housing stock. Without full funding, some portion of the existing public housing stock will not be upgraded to basic decent, safe and sanitary condition.

Distributional Effects of Choice of Definition of Modernization Need
(Chapter II, pp. 14 - 19.)

The choice among funding backlog only, funding accrual only, or partially funding both will have important distributional effects, since backlog needs are concentrated in the 21 extra-large PHAs while accrual needs are more evenly spread across PHA size classes. A decision to fully fund accrual and to use any remaining funds for the backlog would mean

relatively less funding for the extra-large PHAs and relatively more funding for the PHAs in other size classes. On the other hand, providing a substantial portion of the appropriation for backlog by heavily weighting backlog in an allocation system would result in relatively more money going to the 21 extra-large PHAs.

The choice of definition of need among the various backlog options--Mandatory Backlog Need only, Mandatory plus Project-Specific ADDS, or all work approvable under the current CIAP program--has much less impact on the distribution of funds. Therefore, while the definition of backlog may need to be decided for budget planning reasons, it need not be decided for the purpose of determining relative allocations of funds to PHAs.

Using the data to allocate modernization funds. (Chapter II, pp. 20 - 31.)

Ideally, one would allocate modernization funds to PHAs based on the observed need for modernization work at their projects. However, the Abt/ICF sample was not large enough to permit us to do this. While the sample size permits direct sample estimates of modernization need for HUD Regions, for some HUD Field Offices, and for the New York City Housing Authority, it does not permit estimates which are sufficiently accurate for direct allocation of modernization funds to most PHAs. Some PHAs were not in the Abt/ICF sample and for many that were, the number of projects and units sampled was not sufficient to allow use of the sample to directly estimate modernization need for that PHA.

However, the data available do permit the development of indirect estimates of modernization need that can be used in a formula for allocating modernization funds to PHAs.

To develop indirect or formula estimates of modernization need, the data on modernization need from the Abt/ICF sample of almost 1,000 projects was analyzed in relationship to various objective public housing characteristics such as project age and PHA size. The results of this

analysis show that specific PHA and project characteristics are closely related to the level of modernization need found in the sampled projects. These characteristics, or indicators of need, can be used to estimate the level of modernization need at projects which were not in the universe of sampled projects for which direct estimates are available.

Chapter II and Appendix B provide detailed information on the techniques used to develop the indirect estimates of modernization need.

The availability of reliable indirect estimates of modernization need make it possible to consider formula funding as one option for funding PHAs to undertake necessary rehabilitation work. This option, and a number of other alternatives for funding the backlog of existing deficiencies at public housing projects and the accrual of new modernization needs over time are discussed below.

How should funds be allocated to PHAs for existing deficiencies? (Chapter III, pp. 8 - 26.)

There are a number of options that should be considered for allocating funds to PHAs to address the existing backlog of modernization need. These include: allocating funds to PHAs by formula; allocating funds to PHAs on the basis of their comprehensive plans; allocating to States for suballocation to PHAs within their jurisdictions; retaining the current competitive allocation process of the CIAP program; offering PHAs the option of automatic formula funding based on their accrual need or competitive project-based funding based on their backlog need; and funding accrual by formula and backlog by competition. Also available are additional project-based options, including 1) funding high needs projects by a modified CIAP program and funding by formula either projects with moderate levels of modernization need or all projects without high needs and 2) an option in which PHAs designate which of their projects should be funded by the backlog formula and which by the accrual formula. Each approach has its advantages and disadvantages.

Formula funding (Chapter III, pp. 8 - 10.)

A formula funding approach would have the basic advantage of providing a predictable stream of funding to PHAs over the years, so that they could effectively plan for making needed repairs and improvements at all of their projects over time. It would also assure that individual PHAs got their fair share of available modernization funds. A formula funding approach, by encouraging local responsibility and reducing Federal intervention in the detailed decisions about what work should be undertaken and when it should be done, is more compatible with the intent of the 1987 amendments to the CIAP legislation than any other funding approach. On the other hand, formula funding is based on an estimate of need for modernization funding at a PHA, while funding under CIAP is based on first hand PHA and HUD judgments of the need for modernization work at a particular project.

PHA comprehensive plans (Chapter III, pp. 10 - 12.)

The major advantage of allocating funds to PHAs on the basis of the relative needs shown in their 5-year comprehensive plans is that a well-prepared plan would show the actual needs of a PHA as well as its unexpended funds at the time the plan was prepared. Using PHA comprehensive plans might be more credible to PHAs than using a formula based allocation system. However, use of PHA comprehensive plans could result in an intrusive HUD role. To assure an equitable allocation of funds, HUD would have to issue detailed instructions on the content of these plans and would have to exercise detailed review and oversight. The end result could be that PHAs are preparing plans to satisfy HUD's instructions, not their own needs in terms of rational allocation of resources to maintain and upgrade their housing stock. Such a system provides incentives for each PHA to maximize the estimate of their modernization need since their funding level would depend both on their own plan and the plans of all other PHAs.

Allocation to States (Chapter III, pp. 12 - 14.)

Allocation of modernization funds to States for their further suballocation to PHAs within their jurisdictions would recognize that the State governments have a potentially crucial role in assuring the availability of decent, safe, and sanitary housing for their lower income residents. Allocating modernization funds to States could include cost sharing by the States. For example, States might be asked to fund accrual needs if the Federal government funded backlog needs (or vice versa), or "bonus" funds might be awarded to States that provided additional funding. Disadvantages to this approach include the possibility that many States would be unwilling to assume these additional responsibilities and that some States would not have the financial resources to do so. Suballocation to PHAs might also be a problem, since the modernization needs of one or two large PHAs in a State would often account for much of the State's allocation of modernization funds, yet it might be politically difficult for a State to suballocate most of its allocation to one or two PHAs. Thus, under a system of allocation to States, the needs of large PHAs might never be met, even if Federal funds were allocated on the basis of those needs.

Current CIAP program (Chapter III, pp. 14 - 15.)

Continuing to fund modernization for all PHAs under the current CIAP program would have the advantage of providing modernization funds on the basis of the detailed cost estimates for work needed at each project at the time the PHA applies for funds. The major disadvantage of this approach is that it retains the current heavy Federal Government involvement in decisions about which projects should be modernized and when. It also encourages PHA disinvestment in projects for which the PHA plans to apply for modernization funds.

PHA choice: formula funding or competitive funding (Chapter III, pp. 16 - 18.)

An approach which offered PHAs the option of automatic formula funding based on their accrual need or competitive project-based funding based on their backlog need would recognize that a formula cannot precisely match the actual needs of specific PHAs. It, therefore, allows PHAs to decide whether the potential benefits of automatic formula funding based on accrual need outweigh the benefits of competing for funding based on their outstanding backlog. This approach assumes that PHAs themselves are in the best position to determine whether modernization funding should be formula-based or based on an application setting forth the needs of a particular housing project. In addition to the basic disadvantages of the competitive CIAP program, this approach could be difficult for HUD to administer. Especially in the initial years, it would not be clear at the beginning of the fiscal year which PHAs would be receiving formula amounts and which would be competing for project-based grants.

Fund accrual by formula; backlog by competition (Chapter III, pp. 19 - 20.)

An alternative would be an approach in which all PHAs received automatic formula funding for accrual, but competed for backlog funds under a modified CIAP competition. This dual funding approach gives each PHA a good amount of predictable accrual funding, and it permits PHAs with extensive needs in some projects to apply for additional funding in a competition. A disadvantage to this approach is that, despite the availability of accrual funds, it would encourage PHAs to disinvest in certain projects on the assumption that the needs of those projects would be met under the modified CIAP competition. A second disadvantage is that, for both HUD and the PHAs, a dual funding approach could have the effect of doubling the staff workload associated with the modernization program.

Fund high needs projects by CIAP, all others by formula (Chapter III, pp. 20 - 23.)

An approach which funded high needs projects by a modified CIAP program and all other projects by formula would have the advantage of permitting individual PHAs to focus their resources on maintaining projects which are now in relatively good condition. It would avoid requiring PHAs to make the hard decision between funneling resources into high needs projects or ignoring their high needs projects in order to maintain the remainder of the inventory in reasonable physical condition. A major disadvantage to this approach is that it would have the effect of encouraging PHAs to disinvest in their high needs projects while waiting for comprehensive modernization funding to become available through the special allocation.

Fund high needs projects by CIAP, moderate needs projects by formula, and provide no funds for low needs projects (Chapter III, pp. 23 - 25.)

A variation of the approach discussed above would fund high needs projects under a modified CIAP competition, moderate needs projects by formula, and provide no modernization funds for low needs projects. This is a "backlog only" option and provides no funds for the accrual of new needs. This approach has the advantage of concentrating available modernization funding on the public housing projects with the most modernization need. Disadvantages of this option include the fact that PHAs will resist the inclusion of any of their projects in the low needs category, since no funding will be available for these units. Thus, either the designation of low needs projects will become administratively burdensome or the basic objective of the option--to focus resources away from these projects--will be defeated.

PHA choice: backlog or accrual formula (Chapter III, pp. 25 - 26.)

The final option is an approach in which formula funding is provided to PHAs for all of their projects, but PHAs choose through their comprehensive plans which projects receive accrual funding and which receive backlog, based on decision rules established by HUD. The amount of funds for each project would be the amount determined by the formula, which is based on objective PHA and project characteristics, without reference to the unique needs of the project. The PHA choice for individual projects as expressed in its comprehensive plan would then govern the level of modernization activity it could plan to undertake with respect to those projects.

The HUD decision rules might provide, for example, that projects with more than $5,000 per unit of backlog modernization need per unit would be funded under the backlog formula, while projects with less than this amount of modernization need would be funded under the accrual formula. While HUD would establish the decision rules, they would have to be implemented by the PHAs through their comprehensive plans because HUD does not have intimate knowledge of the modernization needs of every project at every PHA. Thus, each PHA would identify in its comprehensive plan which of its projects fell into which category. Since certain types of projects are likely to receive more funding under an accrual formula than under a backlog formula, PHAs would have an incentive to downplay the backlog needs for these projects in their comprehensive plans. For example, the accrual formula might provide more funds per unit for a low-rise project than would the backlog formula. Such a project might be allowed $4,500 on the basis of the backlog formula, and $5,000 by the accrual formula, while its actual need per unit might be $7,500. In order to maximize its total formula grant, a PHA might choose to downplay the backlog needs of the project by showing a backlog need below $5,000 in its comprehensive plan. While this would maximize funds available to the PHA, it could not then plan to spend more than $5,000 per unit on repairs and replacements at the project to meet its real backlog needs without being "plainly inconsistent"

with its comprehensive plan. If the PHA acknowledged that its backlog need was greater than $5,000, it could spend the full $7,500 shown in its comprehensive plan, but it would only receive $4,500 for that project. The additional funds would have to come from funds allocated for other projects, but not used at those projects in that year. Thus, this approach could have the disadvantage of encouraging PHAs to ignore the modernization work needed at projects with moderate levels of backlog need, with the consequence that these projects continue to deteriorate.

How should funds be allocated to PHAs to meet accrual needs? (Chapter III, pp. 26 - 31.)

There are three basic approaches for funding accrual, as follows: funding accrual by formula; funding accrual as a portion of the needs presented in PHA comprehensive plans; and funding accrual for individual projects by creating a reserve for projects modernized under the CIAP program.

Funding accrual by formula (Chapter III, pp. 27 - 28.)

Providing modernization funding to PHAs on the basis of an accrual formula would assure PHAs of a reliable, predictable source of funds against which they could plan for their present and future repair and replacement needs. A formula funding approach is also relatively simple for both PHAs and HUD to administer. The principal disadvantage to formula funding for accrual is that formula funding is based upon an estimate of need, while actual needs may vary at particular PHAs depending on the unique circumstances at the PHA.

Funding accrual as portion of need in PHAs' comprehensive plans (Chapter III, pp. 28 - 30.)

Funding accrual as a portion of the needs presented in PHA comprehensive plans might result in funds allocations that are more closely related to the actual accrual of repair and replacement needs at particular PHAs, since a formula cannot take into account the unique circumstances at each PHA. However, since there are no agreed upon real estate industry standards for reserves for replacements, HUD would have to develop instructions for PHAs to use to estimate the accrual needs of each of their projects, based on the estimated lives of building systems and components. The administrative complexity and expense involved in developing comparable accrual estimates might not result in sufficiently greater accuracy than the administratively simpler method of allocating funds by formula.

Funding project reserves under CIAP (Chapter III, pp. 30 - 31.)

Funding project reserves for projects which are comprehensively modernized under the CIAP program would have the advantage of assuring the continued maintenance of a project in good condition once it had been modernized. However, under this approach some PHAs would have both their backlog of modernization need and their future accrual of modernization need at a project or projects funded, while other PHAs would not receive any funds for the existing need for work at their projects.

Additional issues associated with formula funding of modernization

Is a special fund needed to address unpredictable or extraordinary repairs? (Chapter III, pp. 31 - 37.)

Extraordinary repair needs are those repair needs the occurrence and magnitude of which cannot be predicted on the basis of the age of a project or its components. Extraordinary repair needs are included in the backlog of repair needs identified in the Abt/ICF survey and, therefore, are

included in the backlog formula, but, because they are unpredictable, they are not included in the accrual formula. Therefore, there might be a need for a special fund to address extraordinary repair needs if formula funding were chosen for accrual needs. On the other hand, if extraordinary repair needs in viable buildings, such as those caused by fires or vandalism, should be covered by insurance or could be prevented by sound maintenance then a discretionary fund might be unnecessary.

How should emergencies be handled? (Chapter III, pp. 37 - 41.)

Emergency repair needs, for purposes of this report, are those conditions which present an immediate threat to tenant health or safety and, therefore, must be corrected as soon as possible. Because the repairs or replacements which become emergency needs because of their timing are the same repairs or replacements accounted for in the backlog and accrual estimates, formula funding based on these estimates will incorporate funds for emergency repairs. Therefore, the only issue for handling emergency repairs within a formula funding approach is whether PHAs will have funds available to them soon enough to address emergency repair needs.

If emergency repair needs continue to be distributed across PHAs in the same way that they were from 1985 to 1987 and if formula funding at at least FY 1987-88 appropriation levels is provided on the basis of a formula combining backlog and accrual aspects of need, very few PHAs will be unable to address emergency needs out of their annual funds allocations.

However, because emergencies represent an immediate threat to tenant health and safety, it is important that all PHAs have the funds to address them when they arise. This could be handled by having a small fund available at HUD to which PHAs could apply for supplementary funding when the funds available to them were not adequate to meet the full cost of necessary emergency repair work. This supplementary funding could be treated as an advance on future years funding.

Troubled PHAs (Chapter III, pp. 43 - 50.)

Under any formula option a group of very large, troubled PHAs would be allocated much greater funding than they have received recently under CIAP. The relatively low CIAP funding levels for many troubled extra-large PHAs reflect HUD policy to fund only planning, management improvements, and emergency modernization work at PHAs which lack the capacity to effectively manage their modernization programs.

If past experience holds, so that most of the troubled extra-large PHAs are unable to obligate a large increment of funds or to spend them on rehabilitation work of acceptable quality, sizeable sums of money would be unspent or wasted under an unchecked formula allocation system. Rather than tarnish at the outset a formula grant approach that should work for the large majority of PHAs, a reasonable strategy would be to cap the allowable formula funding for the small group of PHAs that HUD has designated as troubled. This cap might be set in the initial year of a formula funding approach as a PHA's average total funding in the most recent CIAP years, and in later years as a maximum of a 25 percent increase over the previous year's funding until the PHA reaches its formula funding level. Troubled PHAs would receive their maximum yearly increase only if they satisfactorily carried out all of the activities outlined in their Memorandum of Agreement with HUD to correct their major management deficiencies. Those troubled PHAs which met some but not all of the goals established under their Memorandum of Agreement would receive increases in their modernization funds allocations proportionate to the percentage of goals achieved under the Memorandum of Agreement.

A decision to cap the modernization funding made available to troubled PHAs would result in a portion of the funds initially allocated to these PHAs becoming available for other modernization uses. One option for use of these funds would be to reallocate them on a proportional basis to all other PHAs participating in the formula funding system. A second option

would be to reallocate capped funds from troubled PHAs to PHAs with 500 or more units under management that HUD currently designates as "recognized performer" PHAs. Because some of the recognized performer PHAs may already have met most of their modernization needs under the existing modernization program, it might be desirable to make recognized performers eligible to apply for the funds available from capping the amount made available to troubled PHAs, rather than automatically distributing these funds to all recognized performers on a formula basis.

In addition to capping troubled PHAs, it may be necessary to withhold or withdraw funds allocated to these PHAs (or other PHAs in the future) if they fail to effectively spend the modernization funds made available to them. This has happened in the past with PHAs with material weaknesses in the management of their modernization programs. The ability to withhold and withdraw these funds is necessary to avoid the development of large unused balances of modernization funds at troubled PHAs, and to provide a method to sanction PHAs which fail to make progress toward meeting the basic objective of the public housing program, to provide decent, safe, and sanitary housing for the resident.

HUD Recommendations (Chapter IV)

-- Fund PHAs with 250 or more units under management on basis of formula which gives equal weight to backlog and accrual.

  - Include PHAs down to 250 units, instead of 500 as now in statute, because analysis of Abt data and MADS data indicates that these smaller PHAs also have modernization experience and would receive a large enough allocation of funds to meet most emergencies as they arise.

- Use formula weighting that provides equal weight to backlog and accrual because the backlog formula captures needs distribution as of 1985 only. The unfunded backlog in the early 1990s will be as much a result of accrued needs since 1985, for which the distribution is better captured by the accrual formula, as it will be of backlog need which existed at the time of the Abt inspections in 1985, for which the distribution is captured in the backlog formula.

- Use of backlog formula alone would provide about a third of all modernization funds to 12 troubled extra-large PHAs that would be subject to capping of their funds allocations.

-- Fund PHAs with less than 250 units under management under current CIAP program. "Pot" for these PHAs to equal the very small PHAs' share of backlog and accrual need determined in the same manner as formula funds allocations for larger PHAs.

-- Formula funding for troubled PHAs would be capped initially at their historical levels of funding, expressed as their average funding for the last three fiscal years. Increases in formula funding, determined on an individual PHA basis, would be limited to a maximum of 25 percent per year until these PHAs reach their full formula funding level. Proportion of maximum annual increase received by these PHAs to be based on the proportion of goals achieved under their Memorandum of Agreement with HUD on actions to be taken to correct major management deficiencies including their achievements in reducing vacancies.

- Example: The 12 troubled extra-large PHAs would receive $200 million more per year under the recommended formula funding system than they received in FY87-88 under CIAP. Unlikely to be able to spend these funds effectively.

-- Funds saved by capping troubled PHAs to be reallocated by formula to recognized performer PHAs, using the same formula that is used for the initial allocations.

- In early years, funds derived from capping of troubled PHAs would provide about 10 percent of all funds for PHAs for reallocation to recognized performer PHAs. These additional funds could provide a real incentive for PHAs which are not now recognized performers to improve their management and seek recognized performer status. A revised and strengthened recognized performer system will be in place before the beginning of FY 1991.

-- Fund emergency modernization needs at those few PHAs which are not able to address those needs with available modernization funds through loans from the Public and Indian Housing Loan Fund. Loans to be repaid from future years allocations of modernization funds.

-- Fund extensive extraordinary repair needs caused by natural disasters from a special $50 million fund maintained by HUD for this purpose. The $50 million for natural disaster extraordinary repairs would be subtracted from the modernization appropriation "up front." PHAs would not be expected to repay modernization funds made available to address extraordinary repair needs caused by natural disasters. The natural disaster fund would be replenished from future modernization appropriations as necessary.

-- Encourage State and local governments to get involved in meeting the modernization needs of public housing projects by providing "bonus" funds to match State and local government contributions to public housing modernization. A special allocation of modernization funds for this purpose should be subtracted from any modernization appropriation "up front."

-- When PHA Comprehensive Plans call for deprogramming units, HUD would reduce formula modernization funding over a 3-year period to eliminate formula amounts for units to be deprogrammed. To avoid discouraging PHAs from deprogramming units which are not and cannot be made viable at a reasonable cost, the per-unit estimated need and therefore the per unit formula amount would not be reduced to reflect the change in the PHA's characteristics as a result of the deprogramming. There would be no reduction if deprogrammed units constituted one percent or less of a PHA's public housing stock. A PHA could use formula modernization funds attributable to deprogrammed units to speed up modernization work on its other projects. HUD would also provide vouchers to the PHAs to maintain same overall level of assisted units.

Report to Congress on Alternative Methods for
Funding Public Housing Modernization

Chapter I--Background

Overview

This chapter presents the basic framework for understanding the discussion of issues associated with modernizing public housing and alternative approaches to funding modernization presented in the remaining chapters of the report. The chapter starts with an overview of the public housing program, presenting a brief history of public housing, a history of the modernization program, and a snapshot of the public housing program as it exists today. It then presents information on the sources of data used in the remainder of the report. There is a brief discussion of HUD operational information systems for modernization, which provide information on past uses of modernization money. The major portion of this section is devoted to the major data source for this report, The Modernization Needs Study: National, Regional and Field Office Estimates: Backlog of Modernization Needs, prepared by Abt Associates, Inc., of Cambridge, Massachusetts, and issued in 1988. The background which led to the development of this study is discussed, study methods are presented, and the HUD modernization standards by which study findings are categorized are briefly covered. The estimates of the backlog of modernization developed from this study are set forth. This chapter ends with a discussion of the final important source of information for this report, the study Future Accrual of Capital Repair and Replacement Needs of Public Housing, prepared by ICF, Inc., of Fairfax, Virginia, and issued in 1989.

A. Why this Report

The Housing and Community Development Act of 1987, enacted February 5, 1988, authorized major changes to the Comprehensive Improvement Assistance Program (CIAP) for public housing modernization as it applies to Public Housing Agencies (PHAs) which own or operate 500 or more public housing units. However, the statute provides that the method for allocating modernization funds should remain substantially the same as it was in the past until the Congress enacts a revised method for allocating assistance under the revised CIAP program. The Department of Housing and Urban Development (HUD) is required to submit a report to Congress outlining alternative methods for providing funds to PHAs under the revised program to assist the Congress in making decisions about the most appropriate approach to funding public housing modernization. Section 119 (f) of the Housing and Community Development Act of 1987 provides that

> (2) Not later than 1 year after the date of the enactment of the Housing and Community Development Act of 1988, the Secretary shall-
>
> > (A) complete the study of the need for public housing modernization initiated pursuant to the Department of Housing and Urban Development-Independent Agencies Appropriation Act, 1984 (Public Law 98-45) and any other studies that are necessary to evaluate the current condition and capital requirements of public housing as well as the future need for rehabilitation and replacement of public housing facilities;
> >
> > (B) submit to the Congress proposed alternatives for determining the relative allocation of funds between activities to correct existing deficiencies and the annual accrual of resources to meet future needs;

(C) submit to the Congress proposed alternatives for allocating funds among public housing agencies to correct existing deficiencies, including formulas for distributing funds to public housing agencies, to regional and field offices of the Department of Housing and Urban Development, or to States, as well as such other allocation methods as the Secretary may wish to recommend;

(D) provide the Congress with--

(i) an analysis of data and other information used to develop recommendations for measuring existing deficiencies, future needs, and anticipated emergencies;

(ii) an analysis of the bases underlying each of the proposed allocation methods; and

(iii) a comparison of proposed allocations to previous allocations under this section;

(E) propose to the Congress criteria for distinguishing capital replacement activities that are routine from those that are not routine;

(F) propose to the Congress alternative methods--

(i) to allocate funds to public housing agencies to meet predictable routine modernization and regular capital replacement expenses;

(ii) provide for unpredictable, infrequent, or extraordinary future capital replacement needs through a fund administered on a national, regional, State or local level or through such other methods as the Secretary may recommend;

(G) consult at least on a quarterly basis with organizations and individuals representing public housing agencies, local government, and tenants regarding progress on the studies referred to in subparagraph (A) and the development of alternatives for improving this section; and

(H) estimate, for not less than the 200 largest public housing agencies, the amount that will be received annually under each such alternative allocation system and compare such amounts to funds received in prior years under this section.

This report responds to that statutory requirement.

B. The Public Housing Program--Brief Description

1. Historical background

The public housing program was established by the U.S. Housing Act of 1937 with twin goals: to provide Depression-era jobs; and to provide decent housing to replace the widespread slum housing of the time. Under the original program design, the Federal Government put its funds and credit behind the obligations issued by local agencies to finance the construction of new housing for low-income families. Beyond the Federal obligation to pay debt service and amortization for public housing, the housing was expected to pay its own way. Income limits for admission to public housing were set at a multiple of the amount necessary to pay for the operation of the housing. Thus, in the early years, public housing did not serve the very poor, but rather working families.

With World War II came a suspension of income limits for eligibility for admission to public housing which, combined with a severe shortage of housing during and after the war, provided strong demand for public housing

among stable moderate-income families. In these years, public housing not only paid its own operating costs, but also returned substantial amounts to the Federal Government to help pay the obligations on the bonds issued to finance the original construction costs for the housing.

The Housing Act of 1949 began the process of change which has led to the public housing program as it exists today, serving the very poor. It reaffirmed the goal of serving lower-income families by requiring a "gap" of 20 percent between the incomes of tenants eligible for admission to public housing and the necessary income to rent decent quality housing in the private market. It also provided that first priority for public housing should be given to families displaced by government action. The Slum Clearance program also authorized in the 1949 Act (later to become Urban Renewal) soon generated pressure on local housing authorities to lower their standards for admission to public housing, in order to take in families which were being displaced by urban renewal. At the same time, liberalization of the FHA mortgage insurance programs provided opportunities for homeownership to moderate-income families who would previously have been renters. (Between 1940 and 1960, homeownership in the United States grew from less than 45 percent of households to over 60 percent).

As the population in public housing grew poorer, tenants had difficulty in paying rents necessary to cover operating costs. Small scale operating subsidies began to be provided to housing authorities in 1961. In 1969 and 1970, the Brooke Amendments to the Housing Act of 1937 limited tenant payments for rent to 25 percent of income, making public housing affordable to the very poor and requiring the Federal Government to begin making substantial payments to local housing authorities to bridge the gap between rental revenues and operating costs. In 1975, these operating

subsidy payments began to be distributed through a formula approach, the Performance Funding System, which is the operating cost subsidy distribution mechanism still in use. The Omnibus Budget Reconciliation Act of 1981 changed the rent requirements for public housing tenants from a maximum rent of 25 percent of adjusted income for rent to a mandatory rent of 30 percent of adjusted income, the welfare shelter rent, or 10 percent of gross income, whichever is the greater. Operating subsidy obligations were $1.5 billion in 1988, and are estimated to be $1.7 billion for 1989 and 1990.

2. The modernization program

The public housing modernization program was created administratively in 1968, 30 years after the public housing program began. In the initial years of the program, PHAs applied for HUD funding for specific work items, such as to repair or replace roofs one year, and to renovate kitchens at the same project the next. There was no provision for doing all the work that was needed at a project at one time. It was not until 1980 that HUD began to fund the comprehensive, instead of piecemeal, rehabilitation of public housing projects.

Originally, the costs for these modernization activities were handled by reopening the original development contract for the project and amortizing the additional rehabilitation cost over the remaining years of the 40-year development contract. This system of financing had the unintended consequence of disadvantaging older projects, since they had fewer years left on the original development contract. In 1978, HUD corrected this bias against older projects by establishing the concept of modernization as a separate project, and funding all modernization over a 20-year term.

In 1980, Congress passed legislation establishing the Comprehensive Improvement Assistance Program (CIAP) for public housing. The purpose of this legislation was to end the piecemeal approach to modernizing public housing projects, and for the first time, required PHAs to address all needs at a public housing project. Thus, when the work was completed the

project would be expected to have a useful life of another 20 years. At the time HUD began funding comprehensive modernization almost half of the units were more than 15 years old, and more than one-third of the units were more than 20 years old. Therefore, a backlog of modernization need existed at the beginning of the CIAP program.

Under the CIAP program, HUD was also authorized for the first time to fund management improvements, such as installing improved accounting systems or improving security at the project to be modernized. The ability to fund management improvements marked a significant change from the earlier modernization program.

The CIAP legislation also made provision for funding a replacement reserve for projects which were funded for comprehensive modernization under the program. This replacement reserve provision was never implemented.

CIAP funding has been awarded to PHAs under the following categories:

Comprehensive Modernization, a modernization program for a project that addresses all needs at the project, both physical and management improvement needs, including cost-effective energy conservation measures and lead-based paint testing and abatement.

Emergency Modernization, modernization work that is needed at a project to address conditions that immediately threaten the life, health, and safety of tenants, or is related to fire safety. Lead-based paint abatement and testing for lead-based paint in units with children with elevated blood lead levels fall into the category of emergency modernization.

Special Purpose Modernization, a modernization program for a project that, prior to FY 1989, was limited to cost-effective energy conservation work. (Section 120 of the Housing and Community Development Act of 1987

expanded the definition of special purpose modernization to include replacing or repairing major equipment systems or structural elements; upgrading security; increasing accessibility for elderly and handicapped families; reducing the number of vacant, substandard units; and increasing the energy efficiency of the units. Funding awards under this expanded definition began in FY 1989.)

Homeownership Modernization, a modernization program for a project under either the Turnkey III Homeownership Opportunities program or the Mutual Help Homeownership Opportunities program. Under homeownership modernization, eligible physical improvements are limited to work items which are not the responsibility of the homebuyer families and which are related to health and safety, accessibility for the physically handicapped, correction of development deficiencies, energy audits, and cost-effective energy conservation measures.

(HUD regulations governing Lead Paint Hazard Elimination, published June 6, 1988, also permit the funding of lead-based paint testing and abatement as a separate modernization category. Implementation of these regulations has been suspended at the direction of Congress.)

In addition to the basic categories of modernization funding, there were also special set-asides in the modernization program in certain fiscal years for several types of activities. In FY 1984, there was a lead-based paint set-aside, in FYs 1983 and 1984 a vacant unit set-aside, and in FY 1985 a vacant building set-aside.

Finally, beginning with FY 1986, successive appropriations acts provided that funds appropriated for the development of public housing could alternatively be used for the "major reconstruction of obsolete projects" (MROP) at the request of PHAs. This use of development funds for modernization activities was subsequently authorized by Section 113 of the Housing and Community Development Act of 1987, which provides that "no more than 20 percent of the funds appropriated for development of public housing also may be committed by the Secretary for the substantial redesign,

reconstruction or redevelopment of existing public housing projects." Thus, some additional funding for modernization activities has been provided outside of the CIAP program, under the category of MROP funding.

The Federal Government has provided substantial amounts of funds to PHAs under the CIAP program, funding $10.1 billion in capital improvements between 1981 and 1989. For FY 1990, an additional $2 billion in modernization funds is expected to be appropriated by the Congress.

3. Public housing today

Public housing today, excluding Indian Housing, provides 1,312,000 housing units in 3,100 communities across the country, and houses approximately 3.3 million people, almost 1.3 percent of the U.S. population. Almost half (45 percent) of the units in public housing are occupied by elderly and handicapped households. Of the elderly, most are single women living in projects especially for the elderly. The average age of elderly residents is 74. Forty-two percent of the units are occupied by families with children. Over half of the families with children have no spouse present in the household, and most of these receive welfare benefits. The remaining 13 percent of public housing tenant households are either non-elderly couples with no children (6 percent), or single non-elderly individuals (7 percent). The single non-elderly individuals are usually the remaining member of a tenant family. More than 90 percent of public housing households have incomes below 50 percent of the median income for the area, and more than 60 percent have incomes below 30 percent of the median income for the area.

Most of the approximately 3,100 public housing agencies are small or very small (under 500 units). However, most of the public housing units are found in the larger PHAs, as illustrated in the following table:

Table 1-1: Number of PHAs and Percent of Units, by PHA Size

PHA Size	Number of PHAs	Percent of Units
New York City	1	11.9%
Extra-Large (over 6,599 units)	21	24.2%
Large (1250-6599 units)	120	24.0%
Medium (500-1249 units)	228	13.6%
Small (below 500 units)	2,733	26.5%
TOTAL	3,103	100.0

SOURCE: HUD FORMS data, as of 1984.

Public housing projects range in size and have different building configurations. More than half of the units are in low-rise projects, including walk-up apartments, garden apartments, town houses, and single-family detached houses. Thirty-nine percent of the units are in high-rise projects. About half of these units are in family high-rises, many in New York City. Twenty-nine percent of the units are in projects with more than 400 units; 20 percent of public housing units are in projects with 200 to 400 units; and the remaining 51 percent of units are in projects with fewer than 200 units.

As of 1985, approximately 35 percent of the units in the public housing program were in buildings that were more than 25 years old. Twenty-six percent of the units were in projects that had been developed between 15 and 25 years earlier. Finally, 39 percent of the units were in projects that were 14 years old or less. This project data was developed from information gathered during the survey of public housing projects conducted for the study of the backlog of modernization needs in public housing, discussed below. The estimates of the amount of work needed at public housing projects as of 1990 presented in the following table were developed from the same data source.

Table 1-2: The Share of Units and the Share of Mandatory Backlog Need of Projects, Arranged by Backlog Need Per Unit

1990 Backlog Need Per Unit	Non-Cumulative Shares		Cumulative Shares	
	Share of Units	Share of Need	Share of Units	Share of Need
$0-5,000	36.2	9.1	36.2	9.1
$5-10,000	27.1	18.7	63.4	27.8
$10-15,000	13.0	15.2	76.3	43.0
$15-20,000	8.5	14.1	84.8	57.1
$20-25,000	6.3	13.5	91.2	70.6
$25-30,000	4.6	12.0	95.7	82.6
$30-35,000	2.5	8.2	98.3	90.8
$35-40,000	.3	1.2	98.6	92.0
$40-60,000	.8	4.3	99.5	96.3
$60-85,000	.5	3.7	100.0	100.0

Definitions: Units are derived from the unit-weighted sample of 996 projects in the Abt/ICF studies of modernization. Units total approximately 1.3 million in 1990.

Mandatory Backlog Need is the sum of FIX (repairs or replacements to existing physical systems) plus Mandatory ADDs (items that must be added to meet local codes or the HUD modernization standards) plus lead-based paint abatement plus handicapped access. It is estimated to total $13.36 billion in 1990 dollars. The weighted average cost per unit is, therefore, about $10,277 per unit ($13.36 billion/1.3 million units). Chapter II discusses the updating of the 1985 backlog estimates to 1990.

Thus, it appears that, despite its age, most of the public housing stock can be modernized at a reasonable cost, and continue to serve as housing for low-income households.

C. Sources of Data Used in this Report

There are three major data sources used to provide the information on the modernization funding history and modernization needs of the public housing program. These are: 1) HUD operational information systems for the modernization program; 2) the Study of the Modernization Needs of Public Housing: National, Regional and Field Office Estimates: Backlog of Modernization Needs; and 3) the report Future Accrual of Capital Repair and Replacement Needs of Public Housing. These data sources are discussed below.

1. HUD operational information systems for modernization.

Two HUD administrative data systems used to support the operation of the modernization program have been used to provide basic data on modernization funds awards and expenditures for this report.

The Modernization Approvals Data System (MADS), developed by HUD in 1981, contains both PHA-level and project-level information on modernization funds provided to PHAs.

At the PHA level, information provided by the system includes:

-- the total amount of modernization funds requested each year for the 5-year plan;

-- the amounts approved for Management Improvements, Administration, Fees and Costs, and Relocation, and a total of these amounts representing the "soft costs" approved in connection with modernization.

-- the amounts approved for Site Work, Dwelling Structures, Dwelling Equipment, Nondwelling Structures, and Nondwelling Equipment, and a total of these amounts representing the "hard costs" approved in connection with a PHA's modernization program.

-- the modernization "hard costs" approved in each of six categories: Energy Conservation; Physical Accessibility; Removal of Lead-Based Paint Hazards; Health and Safety; Mandatory Standards; and Project-Specific work allowable to ensure the long-term viability of the housing projects.

At the project level, information provided by the system includes funds approved for each project by type of modernization: Comprehensive Modernization, including information on staged approvals; Emergency Modernization; Special Purpose Modernization; Homeownership Modernization; and the various set-asides.

Additionally, this data base includes information on the amount of development funds provided to a public housing project under the provisions governing Major Reconstruction of Obsolete Projects for FYs 1986, 1987, and 1988.

The second administrative data system used, the Modernization Quarterly Reporting System, and its predecessor quarterly summary and exception reports, provide summary information on modernization funds approved, obligated, advanced and expended, and on individual projects which have unobligated funds more than 1 year old for emergency modernization and more than 3 years old for other types of modernization.

2. The Modernization Needs Study: National, Regional and Field Office Estimates: Backlog of Modernization Needs

The modernization needs study, conducted by Abt Associates, Inc., of Cambridge, Massachusetts, provides the basic data on the condition of the public and Indian housing stock used both to estimate the backlog of existing modernization needs at public and Indian housing projects, and to develop estimates of the rate at which new modernization needs arise over time.

a. Background

The issues that led to the study of the modernization needs of public housing are not new. Questions about the need for and the best method of allocating modernization funds have been present for at least a decade.

In March 1980, a joint venture of the architectural and engineering firms Perkins and Will and The Ehrenkrantz Group (PW/E) published the report Evaluation of the Condition of the Public Housing Stock, the results of a 2-year study. Using the then-current minimum property standards (MPS) for multifamily housing, modified to reflect the special conditions relating to capital improvements to already built structures, PW/E surveyed and estimated the funds needed to repair the substandard conditions in a sample of 350 public housing projects. The surveys were conducted during 1979. On the basis of these surveys, PW/E developed cost estimates to upgrade public housing to three standards of modernization, and statistically extrapolated their results to the Nation's public housing stock. Their definitions and national cost estimates (in 1980 dollars) for the three standards were as follows:

Level I, the cost of correcting violations of basic health and safety standards, $260 million.

Level II, the cost of correcting violations of HUD minimum property standards, modified to reflect the special conditions of modernization, as well as health and safety items in Level I, $1,506 million.

Level III, the cost of selected modernization improvements to make projects more habitable, easier to maintain, or more attractive, $6,791 million. (This estimate was in addition to Levels I and II.)

PW/E also developed a cost estimate of $307 million to upgrade public housing to meet the intent of Section 504 of the Rehabilitation Act of 1973 (legislation requiring assisted housing to be accessible to the handicapped).

After researching energy-using systems in public housing and collecting detailed energy usage data for 96 projects, PW/E also developed a model of Energy Conservation Opportunities (ECOs) according to broad project characteristics. PW/E estimated the 1980 capital cost for all ECOs with payback periods of less than 15 years to be $2.2 billion.

The total of all of the modernization needs categories was estimated to be $10.8 billion. These cost estimates are not directly comparable to those developed by the Abt/ICF studies for several reasons. First, according to Abt in its research study design of February 17, 1984, "the PW/E inspections failed to include information on mechanical and heating systems. Their estimates of [Level II] modernization funding needs are therefore biased downwards." Second, the Abt estimates were based on regulatory and code requirements as they existed at the time of the 1985 inspections, not on the requirements in effect in 1979 at the time of the PW/E inspections. Changes, such as the requirement to abate intact as well as defective lead-based paint, would generally increase the cost of meeting applicable regulatory and State and local code requirements. Third, with

respect to energy conservation, declining energy prices in the 1980s necessarily affected the cost effectiveness of various energy conservation measures, which are only included in the energy conservation estimate if they have a payback period of 15 years or less.

The lack of comparability between the PW/E estimates and the Abt/ICF estimates of modernization need can be illustrated by treating the estimates as if they were comparable, and then showing implausible results. Suppose, for example, that PW/E Level II, which incorporates Level I, (correcting basic health and safety violations and correcting violations of the HUD minimum porperty standards) is equivalent to Abt's FIX needs repairs or replacements to existing physical systems to meet the modernization standards), as it appears from the definitions of FIX and Level II. In 1986 dollars, the Level II backlog needs of the 1979 PW/E inspection came to $1609 per unit, whereas the FIX needs of the 1985 Abt inspection come to $6751 per unit--an implausible average increase of 53 percent per year over the 6-year period. In 1986 dollars, the threshold of Level II need for the neediest 7.4 percent of units in the PW/E inspection was only $3125 per unit. By contrast, the neediest 7.4 percent of units in the Abt inspection had FIX needs of at least $16,000 per unit (in 1986 dollars). Barring natural disaster or vandalism on an unforeseen scale between 1979 and 1985, the neediest projects of 1979 could not have acquired so massive a FIX backlog in just 6 years.

Although useful as a pioneering study of a complex problem, the PW/E study had limitations that increased with time. Its most serious problem was the ambiguous definition of Level III. The Level III estimate was the most poorly defined of the three levels. The Level III concept includes a combination of additions of components, upgrades of systems, and major repairs. HUD never accepted the Level III estimates. HUD, therefore, based its appropriations requests on the Level II estimate. Public housing

advocates, on the other hand, argued that basing appropriations on Level II ignored many of the items contained in Level III that were necessary for long-term project viability. This, they argued, resulted in an underestimation of the level of funding required to modernize the public housing stock.

Several other aspects of the study came under criticism as well. The inspection procedures for all categories of need were not clearly defined, and thus it was impossible to tell, for example, if an inspector in New York used the same procedures as an inspector in Florida. The sampling and statistical procedures were questionable. For example, the researchers visited only one project in New York City, despite the large proportion of the public housing stock there, and never calculated any estimate about the possible error in their estimates.

In addition to the need for a new study to clarify these ambiguities in the PW/E results, there were other reasons why an updated study of modernization needs was desirable. Much of the data was never computerized or otherwise put into a form that permitted analysis to reevaluate it in terms of policy options not explored by the study. Another issue, never intended to be addressed by the PW/E study, was how to update the results so that the ongoing accrual of depreciation could be compared with program funding and the current status of the stock's modernization needs could be updated from year to year. These shortcomings of the PW/E study were widely discussed and helped generate requests for a second study of modernization needs.

b. How the new study developed

As HUD staff implemented the CIAP program and developed modernization budget estimates for the 1980s, they became increasingly aware of the need for additional research on modernization needs. More detailed knowledge of

PHA needs and the location of those needs was needed to effectively plan for modernization funding over time and to allocate that funding to Field Offices and PHAs based on their relative needs. During 1982 and 1983, staff of HUD's Office of Policy Development and Research (PD&R) developed the basic features of the research design reflected in PD&R's August 1983 request for research proposals, "Modernization Needs of the Public and Indian Housing Stock" (RFP-HC-5685).

Concurrently, the Senate Appropriations and House Banking subcommittees on housing became convinced that a new study of modernization need in public housing was necessary to guide congressional action on the design and funding levels of the modernization program. Therefore, in the Appropriations Act for Fiscal Year 1983, Congress earmarked $4 million to fund an independent research contract on the modernization needs of public housing. HUD's Office of Policy Development and Research issued a request for proposals (RFP) and evaluated competitive bids that resulted in the award of the contract for the new modernization needs study to Abt Associates, Inc., of Cambridge, Massachusetts. In 1984, Congress appropriated an additional $500,000 for the study.

As the research contract was being awarded, Congress directed HUD to set up a Research Advisory Group (RAG), consisting of representatives from public housing agencies and congressional committees. The RAG included representatives from the National Association of Housing and Redevelopment Officials (NAHRO), the Council of Large Public Housing Authorities (CLPHA), and the Public Housing Authority Directors Association (PHADA), the major public housing interest groups, as well as congressional staff. The

purpose of the RAG was to advise HUD and Abt on the research questions, the research design, the field procedures, and the research reports to assure that the results would be technically acceptable to all parties so that policy discussions would start from an agreed-upon base of facts.

c. Study methods

The modernization needs backlog study involved the inspection of 2,194 dwelling units and 3,120 residential buildings at 1,000 public housing projects nationwide. Scientific sampling techniques were used to select representative projects. Special subsamples were also selected for an energy study at 241 projects and an intensive study of redesign needs at 75 projects. A companion study to assess the need for lead-based paint abatement involved inspections at 131 projects in 34 cities.

Between June and September 1985, the public housing projects in the sample were inspected by specially trained teams of architects and engineers to develop information on the capital repair and replacement needs at these projects. This came to be known as the FIX inspection. In cooperation with PHA staff, these inspectors performed a detailed assessment of the architectural, mechanical and electrical systems in dwelling units and residential and nonresidential buildings at each project, and the overall site itself. Completion of up to 10 separate inspection booklets was required at each site, as inspectors examined and rated the condition of the 101 possible architectural and engineering systems on a five point scale, ranging from "no action required" to "replace." Ordinarily, the inspectors were accompanied by a knowledgeable member of the PHA staff in order to provide access to secure areas, and to provide technical information about the condition of the project's facilities and equipment.

Estimates of FIX costs are based on 101 observable architectural, mechanical and electrical systems, and the costs associated with actions identified by the inspectors as necessary for the systems. These

observable systems range from "bathroom accessories" to "site heating distribution." The actions were derived from categories of actions used by R.S. Means Company, a nationwide cost engineering firm which participated as a subcontractor in the study.

The inspection system and costing procedures were designed to exclude minor operational repairs of the type normally performed by PHA maintenance staff members. For example, stove repairs and painting of walls that are otherwise in good condition are items that are excluded from the capital budget estimates in the FIX inspection. Items needing replacement are costed for replacement to contemporary standards. Thus, a 30-year-old boiler needing replacement is costed for replacement with a contemporary energy-efficient boiler of good commercial quality. Examples of FIX actions include:

-- replace kitchen stoves

-- replace floor covering in corridors

-- restore landscaping

-- repave parking area

-- resurface roof

-- make major repairs in buckling wall.

For every action level of every observable system, a cost file was developed based upon extensive R.S. Means cost estimates for the types of work required in public housing modernization. These cost estimates take into account the costs of materials and installation, area-wide cost differentials, and overhead and profit considerations. After an inspector

identified an action necessary during the inspection and identified the action level on the inspection form, the cost program would then assign an appropriate budget level for the action. The cost program was thus used to translate repair work into budget levels needed to do the work.

For the ADDs component of the study, a special ADDs catalog and form containing detailed information on a "menu" of more than 150 different additions that might be desired at a project was mailed in advance to each sample PHA to be filled out for each of the 1,000 projects prior to the inspection of the project. On the ADDs survey form, the PHA was asked to indicate which items were needed, the quantities needed, and the justification for the ADD. A justification could be coded in one of 15 ways, such as "improve security," "comply with local or State codes," "energy conservation," "maintain or increase occupancy," or "convenience/lack of availability in the neighborhood."

The ADDs form was reviewed by the inspectors for completeness before the inspection. Then, after they had inspected the project, the inspectors reviewed the forms and gave their "second opinion" concerning the appropriateness of the PHA's requests. Inspectors used one of five inspector's second opinion (ISO) codes to indicate their professional opinions as to the appropriateness of the ADD, ranging from "definitely appropriate; clear evidence of need" to "definitely inappropriate; clear evidence that item is not needed."

The ADDs requests for each project were costed in the same way as FIX inspection items. The only difference is that a cost program was created to "net out" any requested ADD if the FIX inspection had already called for the same action.

The Lead-Based Paint Abatement Estimates were based on inspections conducted by local childhood lead poisoning prevention centers. Because inspections of units for lead-based paint required the use of expensive and delicate x-ray fluorescence analyzers (XRF), local lead poisoning

prevention centers were asked to perform the analysis using their own XRFs. Using inspection forms provided by Abt Associates, the local program staffs visited 131 public housing projects and tested for lead-based paint in 262 dwelling units, the common areas of 94 residential buildings, and 33 site-wide facilities. The inspection results were sent to Abt Associates, where they were combined with unit size data and abatement cost estimates from R.S. Means, to obtain cost estimates for abating lead-based paint hazards. These cost estimates were based upon requirements similar to those in the HUD regulations published August 1, 1986, which generally required that lead-based paint on chewable surfaces be abated during modernization, as must defective lead-based paint on flat surfaces.

The estimates for the cost of making the public housing program accessible to the handicapped were based on PHA estimates of the additional need for wheelchair accessible units, and for units able to serve blind and deaf individuals at each project in the sample. Architects developed national per-unit cost estimates to meet these needs. It was considered appropriate to base the estimate of the need for units accessible to the handicapped on PHA estimates, since at that time HUD guidance on this issue called for PHAs to conduct a self-assessment of the need for accessible units based on the needs of their residents and of persons on their waiting lists. The backlog report noted that there was an overlap between this handicapped accessibility portion of the study and accessibility needs of the handicapped identified in the ADDs estimates. The report recommends that unit accessibility ADDs be considered to duplicate the handicapped estimate, but that those ADDs requested for the purpose of making the site accessible be added to the handicapped estimate. The report suggests that approximately one-half of handicapped ADDs relate to site accessibility, and, therefore, that $25 million be added to the handicapped estimate.

The energy conservation assessment was performed by engineers who visited a subsample of 241 projects to collect additional data on energy use and Energy Conservation Opportunities (ECOs). Costs were estimated according to current HUD policy that calls for implementing all ECOs that

have simple payback periods of 15 years or less if the lifetime of the ECO exceeds the payback period. The Abt report pointed out that there is an overlap between Energy ADDs and the energy conservation assessment, and recommended that only the energy conservation assessment estimate be included in any national total of the backlog of modernization needs because it was carefully developed to provide a consistent national estimate.

The redesign component of the study was intended to develop budgets for substantial architectural redesign of projects. Redesign was defined as substantial structural changes in units, buildings and/or the site. A project is considered to require redesign when, in the opinion of the PHA, if it is simply restored to good condition without redesign, the project would become increasingly vacant, continue to deteriorate, or fail to serve the needs of the tenants. Redesign estimates were developed from information gathered by senior architects during intensive 3-day inspections of a sample of 75 developments among those identified by PHAs as needing redesign. The architect would develop estimates of the level of actions required to solve the project's problems, which would then be analyzed by a cost engineer to provide a budget estimate for the actions specified by the architect. It was not possible to "net out" ADDs from the redesign estimate because it was not feasible to determine which ADDs would be rendered redundant by redesign work and which would still be needed. Therefore, there is some double counting between the redesign and the ADDs estimates.

Finally, the budget estimates for modernization work at the sample projects were weighted up to arrive at national totals of the cost of modernization actions in public housing projects.

d. HUD modernization standards

It was agreed by HUD and the RAG that the modernization estimates would be categorized in the contractor's analysis to reflect the

modernization standards found in the 1985 Public Housing Modernization Standards Handbook, HUD Handbook 7485.2 REV-1. This handbook divides modernization actions into three categories:

1) The mandatory standards that must be met wherever a component is not functional or serviceable. In addition, it is mandatory for all projects to meet local code requirements. Often these code requirements become applicable at the time the project undergoes renovation. The mandatory standards have three primary categories: a) health and safety standards, including compliance with local health and safety codes; b) systems integrity, including repairing problems caused by normal wear, abuse, and deferred maintenance, as well as conditions requiring major capital improvements; and c) energy conservation measures determined to be eligible and cost-effective through the use of an energy audit. The modernization standards handbook specifies the use of an energy audit and calls for installing those retrofits found to have a simple payback period of 15 years or less. Additionally, the mandatory standards include actions necessary to comply with Federal laws requiring that housing be made accessible for the handicapped and the abatement of lead-based paint hazards.

2) The project-specific standards addresses the CIAP program objectives of assuring the long-term viability and marketability of public housing projects. Project-specific work is in addition to work required under the mandatory standards and may be approved, or even required, by HUD if conditions at a specific project are such that the work is necessary or highly desirable to ensure the continued availability of the project for the benefit of lower-income families. For example, window security bars on a project in a high crime area may be essential, but this is a project-specific item since they would probably be considered superfluous in a low crime area. Project-specific standards may include redesign on an exception basis where necessary to ensure the long-term viability of a particular project.

3) HUD standards also prohibit some types of modernization. The major category of such items consists of premature replacement, with the exception of special circumstances such as energy conservation, where premature replacement would be cost-effective. Requests to replace items--such as roofs, refrigerators, hot water heaters, or cabinets--that are still serviceable are not fundable. In addition, there is a short list of ineligible work items, including swimming pools, new balconies, dishwashers, and trash compactors. These items are always prohibited.

2.e. Backlog Cost Estimates

The Abt study of the backlog of modernization needs at public housing projects estimated the cost of all modernization actions identified as of September 30, 1985, at $26.7 billion, in dollars as of January 1, 1986.

The report presented a FIX estimate of $9.3 billion. Subsequent corrections in the data base and estimation procedures led to a revised cost estimate of $8.5 billion for FIX. No other categories of the Abt report were affected by the data revision.

Table 1-3: Backlog Estimates
(dollars in millions)

	1985 Backlog (January 1986 $)
FIX	$8,520.0
Mandatory ADDs	
ISO 1 & 2	$881.0
3	408.3
4	170.3
5	105.7
Project Specific ADDs	
ISO 1 & 2	$5,470.4
3	2,028.1
4	1,211.9
5	584.1
Miscellaneous ADDs	
No ISOs	$515.4
Other ADDS	6.1
HUD Prohibited	104.8
Redesign	$2,063.0
Lead-Based Paint Abatement	$446.0
Energy	$939.0
Handicapped	$232.0

D. Future Accrual of Capital Repair and Replacement Needs of Public Housing

The third major source of data used in this report is the study of the future accrual of capital repair and replacement needs in public housing, prepared by ICF, Inc., of Fairfax, Virginia, under contract to HUD. This study, which uses the data collected by Abt Associates in the survey to estimate the FIX backlog of modernization need as the basis for its analysis, estimates the cost of new modernization needs which will arise annually over the next 15 years.

The ICF study identified two major types of repair and replacement needs which can be expected to occur in future years: repair and replacement needs which arise because of aging of projects and are due to normal wear and tear; and extraordinary repair needs, those which occur unpredictably and are not related to building age.

The basic building block of the accrual estimates is the age-related Accrual Forecasting Model. This model uses survival modeling techniques such as those used by the insurance industry to estimate when a building system or component would fail and need major repair or replacement. The FIX inspection data were analyzed to determine which repair or replacement events were the result of normal wear and tear, and thus could be predicted to occur periodically. A variety of techniques such as regression analysis and expert opinion were then used to estimate the expected lives of these systems or components. The forecasting model estimates of useful lives were refined by comparing the model's predictions with the observed frequency of the repair or replacement event in the course of the Abt project inspections.

Using the Accrual Forecasting Model, a baseline estimate providing annual projections of future ongoing repair and replacement needs was developed for each of the next 15 years. This estimate assumed that all

work identified as needed in the backlog study had been completed and that repairs and replacements were made in the future on a timely basis. The baseline estimate for age-related FIX accrual ranges from $1.1 billion in year 1, through $1.2 billion in year 5, $1.4 billion in year 10, to $1.5 billion in year 15 (all in 1988 dollars).

The ICF study also identified a class of future repair or replacement events, which it termed extraordinary repairs. Periodically, repair needs arise from unpredictable events such as fires, natural disasters or vandalism which are not related to building or system age. Because of their unpredictability, it is impossible to estimate with any certainty the amount of these repair needs which might arise in any given year. For purposes of the accrual study, ICF estimated the costs of meeting these types of repair needs which arose in the year preceeding the Abt project inspections to be $515 million, or $397 per unit. This estimate was arrived at simply by assuming that the same proportion of observed extraordinary repair needs arose in the prior year as the proportion of age-related repair needs estimated to have occurred in the prior year based on applying the Accrual Forecasting Model to the observed FIX repair needs.

After developing and presenting the baseline accrual estimates, the ICF study then went on to examine accrual under a more realistic set of assumptions, by estimating the ongoing accrual that is likely to occur under existing funding levels. The study presents an estimate of what is likely to be the probable backlog of modernization need in 1988 and what effect different levels of modernization funding in the future are likely to have on the backlog.

The ICF report estimates the updated FIX backlog in 1988 to be $11.9 billion, and the unfunded 1988 FIX backlog to be $9.9 billion. The increase in this backlog of modernization need reflects a 3 percent growth in the public housing stock and the difference between the ongoing accrual of FIX needs and the amount being spent to meet those needs, as estimated

from data in the MADS system discussed above. Ongoing accrual arose from two different sources: normal age-related accrual as estimated by the Accrual Forecasting Model; and accrual reflecting "the cost of delay," modernization needs which are estimated to have arisen because repairs were not made on a timely basis.

In addition to presenting FIX accrual under a more realistic set of assumptions, the ICF report also presents estimated accrual for the other categories of the modernization backlog identified in the Abt report: ADDs; Redesign; Lead-based Paint Abatement; Handicapped Accessibility; and Energy Conservation. Finally, the report presents estimates of the effect on the backlog of funding modernization at current levels and at 50 percent, 100 percent, 150 percent, and 200 percent more than current levels.

Chapter II--Definition and Distribution of Modernization Need

Both the Abt study of the backlog of modernization need and the ICF study of the accrual of future capital repair and replacement needs in public housing presented cost estimates for a number of different categories of modernization activity. The decision about which categories of modernization activity presented in these studies should be included in the definition of modernization need for Federal funding purposes will be influenced by their budgetary, distributional, and policy implications. This chapter begins to assess these implications. It also extends the discussion in Chapter I on the data used to develop the estimates in the various categories of modernization activity in anticipation of Chapter III's discussion of how best to allocate modernization funds to implement the 1987 amendments to the CIAP program.

This chapter and Chapter III discuss only the public housing program, and the estimates of modernization need in these chapters relate only to that program. The Indian Housing program will be discussed in a separate report.

A. Estimating Modernization Need in 1990

This report uses the data and methods presented in the report by ICF, Inc., on the Future Accrual of Capital Repair and Replacement Needs of Public Housing for its estimates of both the backlog and accrual need. As described in Chapter I, the ICF study not only developed estimates for the accrual of new modernization needs, but also refined and updated the estimates of backlog need from the earlier Abt study.

ICF's estimates of the backlog of modernization need differ from those presented in the Abt report for several reasons. First, ICF corrected implausible quantity counts, cost algorithms, and sampling weights used in Abt's computation of FIX needs. These corrections of FIX needs as of January 1986 lowered the estimate of the cost of addressing this portion of

the backlog from Abt's estimate of $9.3 billion to a revised estimate of $8.5 billion. Second, ICF raised FIX and all other categories of backlog need by adjusting for construction cost inflation between January 1986 and January 1988, and by adding 40,000 net units to Abt's sampling universe to account for additions to the public housing program. Third, ICF used its Accrual Forecasting Model to update the various components of backlog need to reflect the estimated accrual in age-related capital repairs from 1986 onwards (including an upward adjustment for capital needs accruing because of a delay in funding accrual). Fourth, to derive an unfunded backlog need, ICF deducted from the various categories of backlog need the modernization funds estimated to have been expended for or allocated to each category of need. These deductions were made using a model based on information from the Modernization Approvals Data System (MADS).

For purposes of this report, the ICF estimates of unfunded modernization need, which reflect "hard costs" only, have been increased by 11 percent to include "soft costs," various administrative and planning costs including management improvements which are now eligible for funding under the CIAP program. The amount of this adjustment for "soft costs" was based on information from the MADS system. These estimates have also been increased to update them to January 1990, using the same technique used by ICF in the upward adjustment of the estimates from 1986 to 1988. As a result of all of these adjustments, the unfunded backlog of FIX need as of January 1990 is estimated to be $12.15 billion (in 1990 dollars).

ICF devoted most of its study to a year-by-year systems-based estimate of the accrual need for the projects in Abt's sample of public housing projects--the same projects, buildings, and units for which FIX estimates were developed. (Four projects were dropped from the Abt sample by ICF because of problems with the data on these projects.) The accrual estimates used in this report are based on the ICF data and methods. The only systematic change made to the ICF estimates for purposes of this report is to add 11 percent to the accrual estimates to factor in the "soft costs" associated with modernization work.

B. Categories of Modernization Backlog Need

Table 2-1 categorizes the major components of backlog and accrual need and estimates the amount of need which is unfunded as of January 1990. It also establishes labels for the various categories of need in order to ease comparisons in the tables that follow.

Table 2-1 groups four components of the Abt/ICF backlog estimates into the category, Mandatory Backlog Need. These components are FIX, Mandatory ADDs (ISO 1 & 2), Lead-based Paint Abatement, and Handicapped Accessibility. Mandatory Backlog Need represents work items that are appropriate for all public housing projects under the Modernization Standards Handbook.

The major component of unfunded Mandatory Backlog Need is the FIX backlog, estimated to be $12.15 billion in 1990. The FIX backlog--the backlog of needed repairs or replacements for existing physical systems in public housing projects--was the only component of the backlog of modernization need to be estimated by expert, standardized inspections and by cost algorithms for individual capital systems at a representative sample of units, buildings, and sites. It was also the only component of modernization need to be measured for the entire sample of almost 1,000 projects.

Akin to FIX needs in the fact that they are required at all projects, but different in their measurement in the Abt study, Mandatory ADDs are estimated to contribute $.55 billion to Mandatory Backlog Need in 1990. Mandatory ADDs are those items on the ADDs questionnaire that are either required by local code or are required in all projects under the Modernization Standards Handbook. In addition, to be included in this estimate, Mandatory ADDs had to be rated either ISO-1, "clearly appropriate," or ISO-2, "probably appropriate," in the opinion of the Abt inspector. The role of the inspector's second opinion on the ADDs request

TABLE 2-1

Different Components of Unfunded Backlog and Accrual Need: 1990 Estimates (In Billions of 1990 Dollars)

Backlog-Accrual Categories	Unfunded Backlog Needs	Age-Related Accrual Needs	Extraordinary Accrual Needs
MANDATORY BACKLOG NEED			
FIX	12.15	1.76	.61
Mandatory Adds	.55	.01	
Lead-based Paint	.36		
Handicapped Accessibility	.30	—	
TOTAL	13.36	1.77	
PROJECT-SPECIFIC ADDS	5.89	.01	
ENERGY AND REDESIGN NEEDS			
Redesign	2.39	.01	
Energy Conservation	.63		
RESIDUAL ADDS	5.54	0	

and the lesser standardization of estimates of Mandatory ADDs relative to the FIX estimates will be summarized later in a discussion of Project-Specific ADDs.

Lead-based paint testing and abatement is a mandatory modernization activity wherever it is required by HUD regulations. This report uses Abt's national estimates of 1985 for its starting point for estimating the costs associated with lead-based paint abatement in public housing. It also uses Abt's algorithm for allocating lead-based paint abatement need to individual projects on the basis of their age of construction and occupancy characteristics (family or elderly occupancy). Since Abt completed its report, legislative requirements and potential regulatory requirements for lead-based paint abatement have considerably broadened, so that the ultimate cost for this activity could be substantially larger than the cost estimate used in this report. At this time, since we have no way of realistically estimating what this additional cost might be, the Abt estimate is used as a "placeholder." Ultimately, the actual cost may be many times the amount estimated by Abt.

Modernization actions to make public housing projects accessible to the handicapped are also mandatory whenever a PHA's self-assessment indicates that additional accessible units are needed to meet the needs of the handicapped among its tenant population or on its waiting list. This report estimates the unfunded backlog of need for handicapped accessibility to be $.30 billion as of January 1990, based on the handicapped accessibility questionnaire completed by PHAs and half of the Handicapped ADDs, ISO 1 & 2, as recommended in the Abt report. Because Abt provided only a national estimate of the need for handicapped accessibility and gave no guidance for allocating the need to different types of projects, this report assigns to each project the national per-unit average of need for handicapped accessibility. Since Abt completed its report, the Department's regulations governing nondiscrimination against the

handicapped have been issued. These regulations broaden the requirements for accessible units. Therefore, the Abt estimate of the cost of handicapped accessibility should also be considered a place-holder. Actual costs are likely to be higher.

The next grouping of backlog need in Table 2-1 is Project-Specific ADDs, 1-2. Project-Specific Additions rated ISO-1, clearly appropriate, or ISO-2, probably appropriate, by the Abt inspectors are estimated to have an unfunded cost of $5.89 billion in 1990. Project-Specific ADDs 1-2 are ADDs from the Abt ADDs Questionnaire which received an inspector's second opinion of ISO-1 or ISO-2, which are permitted under the Modernization Standards Handbook on a project-by-project basis and are not categorized as Mandatory ADDs, Handicapped ADDs, or Energy ADDs. Some Project-Specific ADDs, such as adding security items (dead-bolt locks in a high crime area), are as essential for project livability as any Mandatory item. Other Project-Specific ADDs, such as adding washer-dryer hookups, while improving project desirability and marketability, are not essential to ensure that the project meets the basic needs of its residents for decent, safe, and sanitary housing. Of the Project-Specific ADDs 1-2, approximately half were rated ISO-1, definitely appropriate by the inspectors, and the rest were considered ISO-2, probably appropriate. While some Project-Specific ADDs are very important and clearly needed, others are less so.

In addition, the measurement of Project-Specific ADDs (or any other ADDs) is not standardized in the same way that measurement of the FIX component of Mandatory Backlog Need is standardized. The identification of ADDs needs for the 843 projects with ADDs data (out of the 1,000 projects in the sample) depended upon PHA responses to the ADDs Questionnaire, and thus in large part on PHA staff initiative and thoroughness in undertaking this task. On the ADDs Questionnaire, PHA staff checked the need for individual ADDs items for all or part of each project, and then coded their justification for each item checked, based on a list of 15 possible justifications for the ADD. Some PHAs did not submit the questionnaires,

while others submitted them too late to be available for the inspector's second opinion. While Abt made every effort to standardize responses to the ADDs Questionnaire through the use of the inspector's second opinion, the degree of variability in the initial PHA responses to the questionnaire raises questions about the fairness of using the ADDs data for distributional purposes.

The third category of backlog need, Energy and Redesign Need, contains two modernization needs that are fundable under HUD modernization standards, but which differ from other modernization needs in the priority which should be placed on them and in their measurement. Energy Conservation Opportunities, with an unfunded backlog estimated at $.63 billion in 1990, are mandatory under HUD's Modernization Standards Handbook and are undoubtedly desirable from both a Federal Government and a PHA standpoint. However, the major advantage of energy conservation improvements is in their impact on Federal operating subsidy payments for utility cost reimbursements, not in their direct impact on improving the physical and social conditions in the public housing project. The Abt study component which estimates Energy Conservation Opportunities in public housing was designed to produce national estimates only. Abt did not estimate Energy Conservation Opportunities at the project, PHA, or Field Office level, and even at the HUD Regional Office level, the estimates are quite tentative. Allocation of an energy component of backlog need below the national level would require either "rules of thumb," as in the current CIAP formula for distributing modernization funds to HUD Regions, or further study.

Redesign, estimated to require $2.39 billion in 1990, may be necessary to improve or ensure the long-term viability and marketability of a project, but its immediate impact on meeting essential requirements for health and safety and building integrity is not as direct as Mandatory Backlog Need or even some of the Project-Specific ADDs. Moreover, as in the ADDs estimates, Abt relied on PHA initiative to identify projects which they believed needed redesign, rather than using a standardized procedure

to identify such projects. Abt inspectors, using a take-off created by Abt Associates, developed and costed out a redesign strategy individually for 75 of the 143 sampled projects designated as having redesign needs. These cost estimates were not intended to be standardized across projects or across PHAs. Overall, the procedure for measuring redesign need was not nearly as systematic as the procedure for measuring FIX need through the use of standardized inspection booklets and techniques at a preselected sample of public housing developments. And, although redesign need was estimated net of FIX need, it was not possible to net out ADDs needs as well. Finally, unlike FIX or ADDs estimates, the estimates of redesign needs were not intended to be accurate below the national level.

The final category of backlog, Residual ADDs, groups ADDs that are not included in previous categories of backlog need, primarily ADDs that were not rated ISO-1 or ISO-2 by the inspectors. It also includes items that are outside the ADDs catalog, items that are currently prohibited by HUD, and ADDs that are double-counted in other categories as discussed in Chapter I. Residual ADDs in 1990 are estimated to total $6.39 billion.

C. Categories of Accrual Need

Table 2-1 also gives estimates for the annual accrual of new modernization need for the categories of modernization activity. The most important component of the category of Mandatory Accrual is the age-related accrual of capital repair and replacement needs associated with FIX--existing systems and building components. Using ICF methods, we estimate that FIX accrual will be $1.76 billion during 1990. This estimate includes the additional accrual needs that will arise because of deferred repair or replacement activities. ICF estimated that failure to undertake needed accrual actions in a timely fashion results in an 8.7 percent increase in accrual costs. By contrast, the age-related accrual for the other components of Mandatory Backlog Need--Mandatory ADDs, Lead-based Paint Abatement, and Handicapped Accessibility--is estimated to be less than $.01 billion ($10 million) in 1990, and is estimated not to reach $.25 billion

until the year 2000 or later. The amount of accrual for these components is quite low because these components themselves are relatively small and new, and age-related failures requiring repair or replacement actions would not be predicted to occur soon with any frequency.

The second largest and the most ambiguous component of accrual need is the extraordinary accrual of repair or replacement needs associated with existing building systems and components. ICF identified certain items found in the FIX backlog and in FIX accrual as "extraordinary" because their occurrence and their magnitude could not be predicted on the basis of the age of a project or its components. These extraordinary repair or replacement needs arise from natural disasters, accidents, faulty construction, and vandalism or abandonment. ICF assumed that extraordinary needs in 1986 accrued in proportion to the extraordinary repair backlog at the same rate that age-related needs in 1986 accrued in relation to that portion of the backlog which is age-related. ICF then made the further assumption that extraordinary accrual remained constant at $.52 billion a year in hard costs in 1988 dollars. This translates to an estimate of $.61 billion per year in 1990 dollars when soft costs (planning and administrative costs) are included. Both of these assumptions are necessarily open to question.

Moreover, some unknown portion of the estimated cost of extraordinary accrual will be covered by insurance. Additionally, high levels of extraordinary backlog, from which extraordinary accrual is estimated, were associated with projects with high vacancies or with projects which had massive structural repair needs. Thus, some portion of the estimated cost of extraordinary accrual is associated with units or buildings that the PHA is likely to find are not viable and will not be rehabilitated and restored to occupancy. Therefore, it is difficult to estimate what portion of estimated accrual costs for extraordinary repairs and replacements should be included in an overall national estimate of the annual accrual of new modernization need.

Since extraordinary accrual is by definition unpredictable, it is also impossible to effectively model its occurrence at the project or PHA level. Moreover, since extraordinary backlog need was concentrated at a few projects and PHAs (often troubled PHAs), the occurrence of this portion of the backlog need by itself could not be effectively modeled. In sum, it is not possible to allocate extraordinary accrual need to projects on a realistic basis. Because of its problematic qualities, extraordinary repair need will be treated primarily as a component of the existing backlog of need, rather than as a meaningful component of accrual need. A further discussion of extraordinary repair need is presented in Chapter III.

Accrual need associated with Project-Specific ADDs is estimated to be $.01 billion ($10 million) in 1990. As with Mandatory ADDs, this accrual need is so small because relatively few Project-Specific ADDs can be expected to have been completed by 1990, and those that have been completed will be so new that age-related failures requiring repair or replacement would not be expected to occur.

For the purpose of estimating the distribution of accrual need across projects and PHAs, the accrual need for Mandatory ADDs and Project-Specific ADDs will be made proportional to the levels of backlog need for that ADDs category at the projects and PHAs. The reason for this is that modernization need can only accrue for ADDs items, equipment or systems, that have been installed.

D. Budget Estimates for Funding Modernization

Table 2-2 builds estimates of budgetary need from the different categories of backlog and accrual developed in previous sections. Its first column, which supposes that all backlog is funded in a single budget year, builds directly upon Table 2-1 (rounding its figures for ease of discussion). For example, the accrual only option A1 in column one represents the accrual of age-related mandatory need ($1.76 billion rounded to $1.8 billion), and the accrual only option A1X sums the accrual of age-

related and extraordinary mandatory need ($1.76 billion plus $.61 billion for a total of $2.38 billion, rounded to $2.4 billion). Likewise, the backlog only categories B1 through B4 represent the successive addition of the backlog needs presented in Table 2-1. Backlog consisting only of mandatory need (B1) is estimated at $13.4 billion; that consisting of mandatory backlog plus Project-Specific ADDs 1-2 is estimated at $19.2 billion. The addition of $.63 billion of energy conservation backlog and $2.39 billion of redesign backlog in B3 brings the total to $22.3 billion. Finally, the addition of the $5.5 billion of residual ADDs in B4 brings the grand sum for all identified backlog to $27.8 billion. The accrual-backlog combinations, denoted C1 through C4, simply add accrual and backlog estimates for the same categories of need--for instance, mandatory backlog and its age-related accrual, denoted C1, total $15.2 billion (the sum of $1.8 billion for A1 and $13.4 billion for B1).

While the estimates presenting the cost of fully funding the backlog in a 1-year period are clearly not realistic from a budgetary standpoint, they are useful in that they indicate the relative magnitude of the various possible definitions of Modernization Need. These estimates are also helpful in presenting a base against which to judge the costs of funding various combinations of accrual and backlog over the more realistic time-frames also presented in the table.

TABLE 2-2

Federal Funds Required Per Year to Fully Fund Modernization Under Different Definitions of Need, Over Different Time Horizons Constant Dollars (1990) in Billions

	1 Year	5 Years	10 Years	20 Years
Accrual Only				
A1. Age-Related (Mandatory)[a]	1.8	1.8	1.9	1.9
A1X Age-Related (Mandatory) + Extraordinary	2.4	2.4	2.5	2.5
Backlog Only				
B1. Mandatory[b]	13.4	2.7	1.3	.7
B2. Mandatory + PS ADDs 1-2	19.2	3.8	1.9	1.0
B3. Mandatory + PS ADDs 1-2 + Redesign + Energy	22.3	4.5	2.2	1.1
B4. Mandatory + PS ADDs (1-2) + Redesign + Energy + Residual ADDs	27.8	5.6	2.8	1.4
Combination Backlog + Accrual				
C1. Mandatory Backlog + Age-Related Accrual (Mandatory)	15.2	4.5	3.2	2.6
C1X Mandatory Backlog + Age-Related Accrual (Mandatory) + Extraordinary Accrual	15.8	5.1	3.8	3.2
C2. Mandatory Backlog + PS ADDs 1-2 + Age-Related Accrual (Mandatory)	21.0	5.6	3.9	3.1
C2X Mandatory Backlog + PS ADDs 1-2 + Age-Related Accrual (Mandatory) + Extraordinary Accrual	21.6	6.2	4.5	3.7
C3. Mandatory Backlog + PS ADDs 1-2 + Redesign + Energy + Age-Related Accrual	24.1	6.3	4.2	3.2
C4. Mandatory Backlog + PS ADDs (1-2) + Redesign + Energy + Residual ADDs + Age-Related Accrual (B4 items)	29.6	7.4	4.8	3.4

[a] Includes the cost of delay in the funding of accrual for all time periods. Long-term costs of delay in funding backlog were not modeled by ICF.

[b] Mandatory backlog includes FIX, Mandatory ADDs 1-2, Lead-based Paint Testing and Abatement, and Handicapped Accessibility.

The second column of Table 2-2 supposes that the 1990 backlog is fully funded over a 5-year period, and estimates the accrual to be funded annually as the average accrual for that 5-year period. All estimates are expressed in constant 1990 dollars. For actual funding purposes, the estimates would rise each year to reflect inflation. For example, assuming an annual inflation rate of 4 percent, by 1994 a budget request to fund age-related accrual would have to be almost $2.2 billion, rather than the $1.8 billion shown in the table.

The "accrual only" estimates for the 5-year period are close to those for the 1-year period. The age-related accrual estimated for 1990 does not rise greatly in the next 4 years, and extraordinary accrual (as discussed above) is assumed to be constant. "Backlog only" categories are moderated considerably by funding them over a 5-year period, but they are still substantial. Even the single category of Mandatory Backlog Need (B1) would come to $2.7 billion per year, or about $1 billion more than the 1987-1988 average appropriations for the modernization program, expressed in 1990 dollars. The next category, Mandatory Backlog Need plus Project-Specific ADDs 1-2, (B2), if funded over 5 years, would incur an annual cost of $3.8 billion--or more than current Federal expenditures for both operating subsidy and modernization. Any combination of accrual and backlog funding would be even costlier, starting at $4.5 billion per year for mandatory backlog and age-related accrual (C1).

Column three, which supposes that the 1990 backlog will be fully funded over a 10-year period, substantially reduces the yearly budget impact of funding the backlog. The annual cost of funding Mandatory Backlog Need (B1), $1.3 billion, is now markedly lower than the estimated annual cost of funding the age-related mandatory accrual (A1) of $1.9 billion. The annual cost of funding both the backlogs of mandatory needs and Project-Specific ADDs, at $1.9 billion, is about the same as the $1.9 billion required to fund age-related accrual.

Under the 10-year time period for fully funding the 1990 backlog, the cost of funding the most basic combination of backlog and accrual, mandatory backlog and age-related accrual (C1) is $3.2 billion per year. This is a sizable increase over recent Federal Government funding of modernization of $1.7 billion per year. The cost of the other combinations of backlog and accrual funding range between $3.8 billion (C2) and $4.8 billion (C4) per year when backlog is assumed to be fully funded over a 10-year period.

The fourth column of Table 2-2 supposes that complete funding of the 1990 backlog takes place over a 20-year time , and estimates full funding of accrual over that time. As before, accrual costs per year do not rise greatly over the longer time cycle--in fact, they are estimated to reach a steady state during that time. Backlog costs, however, when divided by 20 years, are greatly reduced in terms of their annual funding requirements. Funding the mandatory backlog need (B1) would cost $.7 billion per year, or only about 40 percent of the cost of funding age-related mandatory accrual. Under the 20-year time period for fully funding the backlog, the cost of funding the combination of mandatory backlog and age-related mandatory accrual would be about $2.6 billion per year in 1990 dollars (C1). Thus, even stretching out the 1990 backlog over 20 years would not result in full funding of backlog and accrual if it is assumed that the recent appropriation levels of $1.7 billion per year continue in the future.

E. Distributional Effects of Different Definitions of Need

This section analyzes the degree to which different definitions of need might affect the distribution of Federal funds allocations to different types of PHAs. The modernization need distributions of this section are based on the national needs estimates in Tables 2-1 and 2-2, and on the weighted Abt/ICF sample of projects. The share of units in PHAs of different sizes in the Abt/ICF weighted sample differs somewhat from the shares of units based on a full listing of all PHAs and their unit counts.

The Abt/ICF sample was designed to develop estimates of the backlog of modernization need at the national and regional levels, and was not intended or designed to reflect actual unit counts by PHA size class. The sample underpresented PHAs with fewer than 500 units, which affects the distribution of need based on PHA size class. However, the national sample of projects in small PHAs was large enough to make the per-unit estimates quite accurate for small PHAs as a class. (The per-unit estimates are the estimates that would be used by HUD as the basis for modernization funds allocations.)

The Abt/ICF weighted sample is used in this section to indicate the distribution under different definitions of need, as measured in the modernization study, so that others working with the modernization needs study data can replicate these findings. The distribution of need under a given definition presented in this section does not represent the exact distribution of funds that would result from a funding formula based on the modernization needs study. In addition to using actual unit counts of projects and PHAs instead of sample weights, operational formula allocations will dampen somewhat extreme values of need measured by the study and will rely on indicators that are available for all projects in all PHAs, not just for an inspected sample of projects. Furthermore, some of the proposed applications of formula funding will apply a PHA-specific adjustment for recent modernization funding under CIAP--an adjustment that is much more precise and equitable than the pro-rata national adjustment that is applied equally to all types of projects and PHAs in this section. Nevertheless, the sample-based findings of this chapter on the relative distribution of need are not markedly different from those based upon formula estimates of need developed in later sections of this chapter.

The tables in this chapter will present the distributional effects of funding alternatives through two basic groupings of PHAs--PHAs grouped by their number of public housing units, and PHAs grouped by their HUD Region.

In addition, Appendix A will present the impacts of different formulas for modernization funds allocation to the 200 largest PHAs, as required by the statute mandating this report.

If the distribution of need did not vary much with the different definitions of need, no decision on a definition of need would be necessary, except for budget planning purposes. However, the tables in this section and in following sections show substantial variation in the shares of unfunded need for modernization for the different groupings of PHAs based on their size or their HUD Region, depending on the definition of modernization need used.

In particular, these tables show that the distinction between backlog and accrual has a far greater impact on the distribution of modernization need than the definition of backlog. The reason for this is that backlog and accrual are markedly different, both in concept and in the way they are measured. Backlog, in concept, is an accumulation of need over time that can be expected to be higher, all else being equal, in older or undermaintained projects. These projects are usually found in larger PHAs. Accrual, in concept, is an incremental project modernization need that arises as systems age, and, at this time, can be expected to be higher in projects which are of medium age. Many medium-sized and small PHAs have housing projects in this age range. In practice, moreover, the accumulation of backlog needs in some projects in larger PHAs led to their partial abandonment by tenants and by management, thereby intensifying their backlog and widening the disparity between their backlog and their predicted accrual. Backlog can mark the ravages of long, neglectful time, whereas accrual is the slow decay of steady time.

These conceptual differences between backlog and accrual were accentuated by differences in the way they were measured. Backlog was measured by Abt as it actually existed in all of its forms--in vacant or undermaintained buildings as well as in well-maintained projects--whereas

accrual was modeled by ICF as it would be expected to occur in a well-maintained project, where repairs and replacements were made as needed. The only behavioral assumption in the ICF model of accrual is that family projects show shorter lives than do elderly projects for a limited number of building components and systems such as elevators. Otherwise, the ICF model had the age, number, size, and complexity of building systems and components working mechanically with cost algorithms to yield an accrual figure. To illustrate, when area cost indices are controlled, ICF's model would often predict a lower accrual cost per unit for a high-rise family project than for a low-rise family project because the high-rise project had physical economies of scale, such as less square footage of roof per unit. By contrast, the high-rise family projects which Abt inspected often had a much higher backlog per unit than comparable low-rise family projects because the high-rise projects were ill-suited to the needs of their tenants.

Table 2-3 sets out the variation in 1990 shares of need for the selected types of need that can reasonably be estimated for the PHA groupings and that have enough priority and magnitude to be considered in the distribution of modernization funds. The largest variation in share of need occurs for extra-large PHAs (excluding New York). Their share of age-related mandatory accrual need (A1) is 25.5 percent. Their share jumps to 39.1 percent when only the FIX and Mandatory ADDs components of backlog need are considered, then falls back to a still-high 35.8 percent share when Project-Specific ADDs are included in the backlog to be funded (B2). For these PHAs, the obvious dividing line is between accrual and backlog--a dividing line that holds in a reverse direction for small PHAs as a group, where their shares under accrual considerably surpass their shares under backlog. For New York City also the dividing line is between its age-related accrual need (with a 13.7 percent share) and its backlog need (between an 11.1 percent and an 11.2 percent share, depending on the definition of backlog used.)

The distribution of shares of modernization need among HUD Regions also shows, in muted fashion, the effect of the distinction between backlog and accrual. The southern Regions IV and VI have considerably lower shares

under the backlog than they do under accrual. The northern Regions II, III, and V have somewhat higher shares under backlog than under accrual. The pattern of Region II is noteworthy because the New York City PHA, with half of Region II's units, had a higher share under accrual than under backlog. The only pronounced regional variation due to different definitions of backlog was in Region I, where the share of backlog need increased from 3.8 percent to 5.2 percent when Project-Specific ADDs were included. In the case of Region I, the important incremental effect of Project-Specific ADDs might reflect both greater PHA thoroughness in answering the ADDs questionnaire, and a greater need for project enhancements (including redesign).

The distributional findings of Table 2-3 and later formula tables refer to "1990 estimates" of modernization need. An important qualification, however, must be attached to their interpretation as the actual 1990 estimates of the distribution of backlog needs. Although the backlog estimates have been updated to reflect the additional dollar amounts of modernization work estimated to have accrued between 1985 and 1990, and which are now part of the backlog, the backlog distribution itself remains based on the findings of the 1985 inspections. The additional need which accrued since 1985 is likely to reflect more closely the accrual distribution than the original backlog distribution. Given that the 1985 FIX backlog is estimated at $10.9 billion in 1990 dollars, that unexpended CIAP funds, most of which were intended for the 1985 backlog, from the time of the FIX inspections up to 1990 are estimated at $5.4 billion, and that accrued FIX needs are estimated at $6.6 billion from 1986 to 1989 (and at $12.0 billion from 1986 to 1992), the actual distribution of Mandatory Backlog Need in the early 1990's is probably closer to an average of the backlog and accrual distributions in Table 2-3 than to the backlog only distribution based on 1985 patterns of need. This would apply as well to the formula distributions later in this chapter and to policy options in Chapter III.

Table 2-3

Percent of Modernization Need, at Different Definitions of Need by PHA Size Class, and HUD Region: 1990 Estimates Based on Modernization Study Sample

	Accrual Only	Backlog Only		
	Age-Related Percent	FIX + Mandatory ADDs Percent	FIX + Mandatory ADDs, and Project-Specific ADDs, 1-2 Percent	Percent of Units in Sample
PHA Size Category				
Small	17.5	12.9	14.1	19.3
Medium	17.8	15.7	16.3	19.2
Large	25.6	21.1	22.7	26.4
X-large (except NYC)	25.5	39.1	35.8	23.3
New York City	13.7	11.2	11.1	11.8
HUD Region				
I	5.3	3.8	5.2	5.9
II	25.3	28.2	30.2	23.4
III	12.0	18.0	15.4	11.7
IV	19.9	15.6	15.6	21.5
V	15.8	15.8	16.5	16.6
VI	9.8	6.5	6.1	9.9
VII	3.2	3.3	2.9	3.3
VIII	1.3	0.9	1.0	1.3
IX	5.7	6.4	5.8	4.4
X	1.9	1.3	1.4	1.9
Total 1990 Need (Billions of 1990 dollars)	$1.58	$12.70	$18.59	

F. Estimating Modernization Need for Funds Allocation Purposes

1. Direct estimates of modernization need

The sampling distributions of Regional need in Table 2-3 have two statistical properties that permit their direct use in funds allocation systems to HUD Regions based upon the categories of need used in the table. First, the sampling weights were calibrated so that the sampling share of units in each HUD Region is the same as its actual share of units based upon administrative counts. Second, the sample size was sufficiently large to allow the average dollar need per unit of a Region's units in the sample to approximate, with reasonable confidence and precision, the actual need per unit of the Region, had all of its units been inspected. With a reliable measure of the total number of units and a reliable sample estimate of average need per unit, Regional total need is reliably estimated as their product (total units times need per unit). These Regional totals yield the Regional shares of sampled modernization need in Table 2-3. The Regional shares of modernization need in Table 2-3, or variants of them based directly on the sample, could be used with confidence to allocate modernization funding to the 10 HUD Regions for further allocation to PHAs. Extreme measurement errors, however, might require adjustment before direct sample estimates are used for allocating funds to HUD Regions.

Direct estimates of need from the Abt sample, however, cannot be used to estimate relative modernization need for a number of HUD Field Offices. The modernization needs study design called for reasonably accurate Field Office estimates of FIX backlog need, and Abt hoped that its sample design would produce those estimates. In retrospect, however, the sample of PHAs and projects was too small in many Field Offices to yield the desired levels of statistical reliability. The inadequacy of the sample could only be known in later stages of the Abt study, after inspection forms were

coded and edited and costed for all of the sampled projects. In particular, only after inspection estimates of project FIX needs were compared to PHA estimates of project modernization need for the sampling frame, could Abt know that a method proposed in its research design to increase statistical reliability would not work.

That method was based on the assumption that estimates of the backlog of modernization need provided by PHAs for each of their projects in the sampling frame questionnaire would correspond reasonably well with the estimates of need made by the Abt inspectors for the same projects. If this were so, the correspondence of PHA-provided estimates and the inspection estimates would compensate for the relatively small sample size and raise the statistical reliability of the Field Office estimates developed through the inspection process. This premise seemed to be borne out by a pretest of the inspection instruments, where the Abt inspection estimates corresponded closely with estimates of modernization needs for the same units and buildings provided by cooperating PHAs. However, the PHA estimates of modernization need developed for the sampling frame were often far off the estimates developed through the standardized inspection process, and the sample size for a number of Field Offices proved too small to sustain reliable estimates of the backlog of modernization need at the Field Office level based on the inspection estimates alone. (Section F.3 of this Chapter and Section B.2. in Chapter III discuss PHA comprehensive plans as another source of PHA-developed estimates of modernization need).

According to Appendix I of the Abt report (pp. 189-191) 16 of the 51 HUD Field Offices, or almost one-third of the Field Offices, had a high enough sampling error that they could not sustain sampling estimates of FIX need within 50 percent of their true value at the 95 percent confidence level. Indeed, at the 95 percent confidence level, the very large Chicago and Atlanta Field Offices could not sustain FIX estimates of need within 57 percent and 66 percent, respectively, and the large Birmingham and Buffalo Field Offices could not sustain FIX estimates within 74 percent and 98 percent, respectively.

To illustrate, the precision and confidence that Abt reported for the Field Offices can be turned into a table of odds. Using the Chicago Field Office as an example, its coefficient of variation of 0.29 shown in Appendix I to the Abt report can be translated into the odds of Abt's estimate of FIX needs for that office reflecting its true needs as follows:

-- Within 20 percent of true need--one chance in two.

-- Between 20 percent and 33 percent off of true need--one chance in four.

-- Between 33 percent and 57 percent off of true need--one chance in five.

-- More than 57 percent off of true need--one chance in 20.

Of course, by chance, the FIX estimate for the Chicago Field Office might be absolutely correct. But the table of odds for Chicago and for other Field Offices, 13 of which have worse odds than Chicago, demonstrate a real danger in relying upon the direct estimates of need for individual Field Offices as the basis of allocating funds to address the backlog of modernization need.

In addition to sampling error, measurement error in applying and coding the inspection forms increases the danger in using the direct esimates of modernization need at the Field Office level in a formula allocation of funds. For example, measurement errors in a small sample of scattered site units, representing thousands of such units, caused an error of several hundred million dollars in Abt's estimate of FIX need for the Philadelphia Field Office. Only a portion of this and other measurement errors could be picked up in ICF's refinement of Abt's FIX estimates.

In refining Abt's work preparatory to doing the analysis for the study of the future accrual of modernization needs, ICF was able to correct certain coding mistakes in the FIX data base, and to apply systematically

to each Field Office a statistical weighting system that removed some of the distortions resulting from Abt's sampling method, especially the reliance on the uneven estimates of project need supplied by PHAs for the sampling frame. Even so, a large degree of sampling imprecision and some degree of measurement imprecision remain for the estimates of FIX need at the Field Office level.

Abt's estimates of sampling error for its Field Office estimates of Project-Specific ADDs are much higher than those for the Field Office estimates for FIX backlog needs. According to Exhibit I-3 (p. 196) of Appendix I to the Abt report, 33 out of the 51 Field Offices, or over half of the Field Offices, had a high enough sampling error that they could not sustain sampling estimates of Project-Specific ADDs, ISO-1 within 50 percent of their true value at the 95 percent confidence level. For Project-Specific ADDs ISO-2, it was 36 out of 51 Field Offices. Although the errors of FIX and Project-Specific ADDs might offset each other in some Field Offices, in other Field Offices they could intensify the difference between estimated and true need. ICF did not make any adjustments to the data base for Project-Specific ADDs in the course of its work on the accrual report.

Estimates of sampled need for most States would be even less reliable than estimates for HUD Field Offices. Many states are part of a HUD Field Office and, therefore, would have a smaller sampling representation. Moreover, Abt did not develop its sample to provide State-level estimates of per-unit or total need.

The number, variety, and sampling weights of projects for individual PHAs included in the sample would usually not sustain precise estimates of their average intensity of modernization need for funds allocation purposes. (The New York City Housing Authority is a notable exception). Moreover, only about half of all PHAs with 500 or more units were represented in the Abt/ICF sample for estimating modernization need.

In sum, except for the HUD Regions, some very large HUD Field Offices, the New York City PHA and perhaps some extra-large PHAs, direct estimates of need from the Abt/ICF sample are statistically unreliable for estimating shares of modernization need.

2. Indirect estimates of modernization need

While estimates of modernization need from the Abt/ICF sample should not be used directly to allocate modernization funds below the Regional level, it is possible to allocate these funds with considerable reliability and fairness to field offices, States, or to PHAs using indirect estimates of need based upon statistical relationships developed from the full set of sample data. The direct estimates of need for the 996 projects in the Abt/ICF sample can be used with other available data to create reasonable indirect estimates of need for any project in any PHA with 500 or more units under management (or for any project in any PHA with 250 or more units). These indirect estimates of project modernization need become reliable formula estimates of need at the PHA level when projects are combined into PHAs, or into groupings of PHAs, and some of the estimation error for individual projects cancels out. These indirect estimates of need can also be used to arrive at formula estimates of modernization need at the State level, or at the HUD Field Office level.

Appendix B details the transformation of direct estimates of need for 996 sampled projects into indirect estimates of need for all projects in all PHAs of 500 or more units, except the New York City PHA, and into direct estimates of need for the New York City PHA and the group of PHAs with fewer than 500 units. The same methods work as well for PHAs with between 250 and 499 units. In essence, a statistical technique called Multivariate Regression was applied to widely available and plausible indirect indicators of need (such as project age, PHA size, and area construction costs) to reestimate direct sampling estimates of need such as FIX plus Mandatory ADDs per unit. To ensure the most precise reestimation of need for as many sampled projects as possible, projects whose cost per

unit (adjusted for bedroom size and area construction costs) were in the highest and lowest 10 percent of unit-weighted projects had their cost per unit capped at the 90th and 10th percentile thresholds of per-unit need, respectively. Percentile thresholds were determined from the universe of projects in PHAs with 500 or more units under management, excluding New York City. The capping procedure was a statistical refinement rather than a significant editing of the data. The impact of capping was modest, as the discussion presented later in this section illustrates, and does not result in underfunding of high-need projects. Projects with extremely high per-unit modernization needs almost always reflect the cost of project redesign, which is not included in the basic data used for formula development, and therefore is not affected by the capping procedures. (Appendix B discusses in more detail the handling of statistical "outliers.")

With estimates of need for 870 projects in 180 PHAs with 500 or more units, excluding New York City, the multivariate technique yielded statistical relationships (numerical coefficients) between sets of indicators and sampled estimates of need. These relationships, which approximated well the direct estimates of need in the sample, can be reliably extended to nonsampled projects with the same sets of indicators. For instance, the set of eight indicators used to reestimate FIX plus Mandatory ADDs per unit or the set of six indicators used to reestimate age-related accrual need per unit were already available in computerized form for almost every project in non-Indian PHAs with more than 500 units (and for all projects in many smaller PHAs). These indicators could be collected and used for projects in PHAs with 250 to 499 units under management, as well.

As a highly simplified illustration of indirect estimation, suppose that only six projects were sampled and that these projects had inspection estimates of FIX need per unit, and PHA-supplied data for the average number of bedrooms per unit and for project age, as follows:

Project	FIX	AVEBED	AGE
Project 1	$4,000	1.0	10
Project 2	$5,000	1.0	20
Project 3	$8,000	2.0	20
Project 4	$9,000	2.0	30
Project 5	$12,000	3.0	30
Project 6	$13,000	3.0	40

If age were the only predictor of FIX need, FIX could be shown to increase with age, but the indirect estimates would be crude. Projects in the example with the same age show very different FIX need per unit. If average bedrooms per unit were the only predictor, a fairly close relationship could be established if FIX need were estimated as $500 plus the result of multiplying $4,000 times the average number of bedrooms per unit (FIX = $500 + $4,000 X AVEBED). This indirect estimate would come quite close to predicting the need of each project, but it would always be either $500 too high or too low. If, however, both average bedrooms per unit and age were combined to predict FIX need, the indirect estimate would be improved, in this case to perfection. It would be expressed as FIX = $3,000 X AVEBED + $100 X AGE.

In contrast to the two simple indicators that account for FIX need in the example, the eight indicators used to account for project backlog needs identified in the Abt inspection sample are much more extensive in scope. They reflect overall community and PHA contexts, as well as individual project characteristics. These eight indicators require a maathematical expression that is somewhat more complicated than that used in the example. Nonetheless, the procedures for developing the indirect estimates detailed in Appendix B use only the basic operations of addition, subtraction, and multiplication. A final difference between a simple example and sample reality is that the indirect estimates of need for the sample could only approximate the estimates of need derived from the inspections.

There are good reasons why any list of believable indicators would fail to predict exactly the needs of each project in the Abt sample. The needs identified through the Abt inspections are themselves not exact, as they reflect considerable sampling error and some degree of measurement error. In addition, the needs estimated for each project from the inspection sample reflect the unique circumstances associated with that project which must partly elude the grasp of standardized indicators. Indeed, certain intensifiers of project backlog need such as poor original construction or extreme shortfalls in maintenance effort and certain deflators such as community assistance for modernization activities should not be captured by widely available indicators of need. Still, too slight a relationship between the indirect estimates of need and the direct estimates of need derived from the sample would render useless formula generalizations based upon widely available indicators.

Fortunately, the indicators of need capture a surprisingly high share of the needs of projects inspected by Abt, and an even higher share of needs for aggregates of projects where the effects of sampling error are much reduced. The indicators of need work especially well in estimating the component of modernization need with the greatest per-unit variation among projects and PHAs--FIX and Mandatory ADDs backlog need. In statistical terms, the eight indirect indicators of FIX plus Mandatory ADDs

account for 54 percent of the unit-weighted variation of the 870 sampled projects and for 67 percent of the unit-weighted variation of the 180 sampled PHAs with 500 or more units. (New York is excluded, and extremely high and extremely low values are capped at the 90th and 10th percentiles, respectively, as discussed above.) But even without capping, the indicators of need capture 64 percent of the inter-PHA variation.

Noteworthy is the ability of the indicators to approximate the needs derived from the inspection sample of individual extra-large PHAs, which contribute a sizable portion of total backlog need and which usually had larger samples and lower sampling error than other PHAs represented in the sample. When the sample estimates for these extra-large PHAs are weighted by their units, the indirect estimates of their FIX plus Mandatory ADDs need come within 15 percent of their sampled need in 56 percent of the cases, and within 22 percent in 86 percent of the cases. The correspondence is especially high for those very large PHAs which had 10 or more projects inspected in the Abt sample. From lowest to highest, the percentage ratios of their indirect estimates of need to their direct estimates of need from the Abt sample are as follows: 71, 91, 94, 94, 94, 107, 110, 111, 115, 119, 121, and 138.

The above comparison, like those before it, is based on direct estimates of project need that are capped for extremely high and extremely low values for all projects in PHAs above 500 units. (Appendix B details the treatment of these outliers.) But even if an uncapped estimate of sampled need is the basis for the comparison, the indirect estimates of need still approximate the estimates of need derived from the inspections for many of the extra-large PHAs with 10 or more projects sampled. From lowest to highest, the ratios of indirect estimates of PHA need to uncapped direct estimates of need are as follows: 65, 73, 93, 100, 102, 112, 114, 114, 120, 124, 132, and 144. For 11 of the 12 PHAs with a large sample size, the ratios of indirect to direct estimates of need were not much affected by the capping procedure. Capping made a sizeable difference on the per-unit values of only a small fraction of sampled projects and an

even smaller fraction of their PHAs. However, in one extra-large PHA with extensive sampling, capping made a sizable difference. This PHA's direct estimate of per-unit FIX and Mandatory ADDs need fell from about $40,000 per unit to $27,000 per unit, and its indirect estimate of need rose from 59 percent of its uncapped direct estimate to 94 percent of its capped direct estimate of need.

When sampled PHAs above 500 units are aggregated into Field Offices, the indirect estimates of need also approximate well the direct estimates of need from the Abt inspection sample. In 72 percent of the cases (Field Offices weighted by their units), indirect estimates of need came within 20 percent of the direct capped estimates. Eighty-six percent came within 30 percent of the direct capped estimates. For the 10 Field Offices with 25 or more projects sampled, the percentage ratios of the indirect to the direct (capped) estimates of need are as follows: 88, 88, 88, 88, 94, 97, 102, 118, 123, and 145.

The good fit between indirect estimates of need and direct estimates of need for individual PHAs and Field Offices, especially those with larger sample sizes, suggests that the indirect estimates of need can be quite reliable in representing the patterns of need of the Abt sample at the level of PHAs and Field Offices. When direct estimates are not available from the sample, or when the sample size is small, the indirect estimates are preferable to direct estimates from the sample or to subjective judgments as a basis for allocation of funds based on need. After all, the indirect estimates developed by formula are based upon large samples of projects, for example, 180 family projects in very large PHAs alone. The indirect estimates average out sampling error and measurement error and thereby lessen the risk of extreme overestimates or underestimates of relative need. Finally, the indirect estimates provide an objective, standardized basis for funds allocation that relies on basic factors that could reasonably be expected to account for most public housing modernization need.

Even when direct sampled estimates of need for a specific PHA or Field Office have low sampling error, the indirect estimates should be preferred for funds allocation as a more equitable and consistent procedure for estimating need relative to that of other PHAs or Field Offices. The only cases in which direct sampled estimates should be used are when their sampling error is low and indirect estimates do not work (New York City). Even for HUD Regions, while direct estimates could be used because sampling error is reasonably low, formula estimates are probably more equitable in smoothing measurement and sampling error.

The sample of 870 inspected projects in PHAs with 500 or more units is large enough that the indirect estimates based upon them can be generalized confidently to any project that has the same set of indicators--in effect, to any project in any PHA, whether or not that project or that PHA was included in the Abt sample. Indirect estimates of need are not confined to the initial inspection sample, although the illustrations of how they work were limited to include only projects inspected by Abt.

In practice, if some or all modernization needs are determined by formula, the indirect estimates of project need would be used in the following manner: The estimated per-unit needs of each project would be multiplied by the number of fundable units in each project to determine the total dollar needs of the project. Then, project dollar needs would be summed to yield the total dollar needs of each PHA eligible for formula funding.

For the New York City PHA and for the group of smaller PHAs below some legislated threshold size, total needs would be computed even more directly as their actual number of units multiplied by the direct sample estimates of their needs per unit. As a final step, summing PHA total needs yields a national total, against which PHA shares of need for that factor are computed. The PHA shares of backlog need and of accrual need determine actual PHA funding once policymakers have determined the total amount of modernization funding to be provided and the respective weights of backlog

and accrual in the formula system. As an example, if a PHA had: 1) an estimated 5 percent share of national backlog need and a 3 percent share of national accrual need; 2) the total appropriation were $1 billion; and 3) the backlog and accrual were weighted .6 and .4, the PHA's funding would be $42 million--$1 billion x (.05 x .6 + .03 x .4) or $1 billion x .042.

3. PHA comprehensive plans

Since 1987, PHAs with 500 or more units under management have been required to develop comprehensive plans describing all of their modernization and management improvement needs. In the comprehensive plans, PHAs identify the total physical and management improvement needs of their projects on a project-by-project basis, as well as PHA-wide management improvements, and provide a rough cost estimate for these improvement needs. Unlike the 5-year plan which is part of the modernization application process, the comprehensive plan estimates are not constrained by the amount of funds reasonably expected to be available or by a set period of time in which the improvements are expected to be accomplished. While HUD specified the general content of the plans, it issued no instructions that would have resulted in standardization of the plans across PHAs. To date, the Department has not required regular updating of the needs identified in the plans or of the cost estimates, some of which are over 3 years old.

Since PHA comprehensive plans represent PHA-specific estimates of total modernization need, it has been suggested that they could serve as the basis for the allocation of modernization funds. A PHA's share of total available modernization funds would be established by determining its share of total modernization need as expressed in the PHA comprehensive plans.

In February 1989, the Office of Public and Indian Housing asked the HUD Regional Directors of Public Housing to respond to a brief questionnaire which asked for information on:

1) Total number of Comprehensive Plans for Modernization (CPMs) expected;

2) Total number of CPMs under review or approved as of February 1, 1989;

3) Total modernization funds requested in CPMs under review or approved; and

4) Total number of CPMs due but not received.

The purpose of this survey was to respond to the Congressional directive in Section 119(g) of the Housing and Community Development Act of 1987 that requires the Secretary to include in the HUD Annual Report to Congress "a national compilation of the total funds requested in comprehensive plans for all public housing agencies owning or operating 500 or more public housing units." Data from this survey are used here to assess the potential for using comprehensive plans as the basis for allocating modernization funds to PHAs.

Table 2-4A compares regional distributions of modernization need derived from PHA comprehensive plans, Abt direct sample estimates, and indirect formula estimates (without PHA-specific deductions of unexpended funds) for PHAs above 500 units which had submitted their comprehensive plans as of February 1, 1989.

Table 2-4A

The Regional Distribution of Need and Total Need for PHAs above 500 units with Comprehensive Plans Submitted as of February 1, 1989: Formula Estimates, Abt Direct Sample Estimates, PHA Comprehensive Plans[1]

Percentage Shares of Need

	Formula Estimates[2]		Abt Direct Sample Estimates[2]			PHA
HUD Region	Mandatory[3] Needs	PS 1-2 + Mandatory	Mandatory[3] Needs	PS 1-2 + Mandatory	CIAP-Allowed[4]	Comprehensive Plan[5]
1	6.1%	6.2%	4.2%	5.5%	6.2%	8.9%
2	35.4	35.8	33.4	36.9	33.8	35.5
3	17.8	16.4	22.6	19.1	18.6	17.2
4	11.4	11.2	12.2	11.5	13.2	11.8
5	10.5	11.0	9.0	9.6	10.7	9.4
6	6.7	6.6	5.4	5.4	5.4	6.9
7	2.4	2.3	3.1	2.8	2.7	3.3
8	.6	.7	.8	.9	.9	.5
9	7.2	7.7	7.6	6.8	7.0	5.5
10	1.9	2.1	1.6	1.5	1.5	1.0
Total (Billions in 1990 Dollars)	N/A	N/A	$9.3	$13.5	$16.4	$10.0

1. The formula and direct sample estimates were adjusted to account for comprehensive plans which had not been submitted to HUD Field Offices, and for the modernization needs of the 27 percent of public housing units which are under the jurisdiction of PHAs with less than 500 units under management which are not required to submit comprehensive plans. PHAs with comprehensive plans submitted as of 1 February 1989 have an estimated 865,000 units under management. Thirty-four PHAs with 500 or more units under management had not submitted their comprehensive plans as of February 1989. These PHAs have an estimated 90,000 units under management. The most important omissions were in Region IV, where plans were not submitted for an estimated 23,000 units, and in Region V, where plans were not submitted for an estimated 56,000 units. In addition, an estimated 343,000 units in non-Indian PHAs below 500 units are not covered by comprehensive plans, and are not included in the Table.

2. The formula estimates and Abt sample estimates are discussed elsewhere in this Chapter. Tables 2-3, 2-5, and 2-6 show distributions of needs for all PHA units under these two estimating procedures. Totals are not applicable to the formula estimates, since the formula is used for estimating shares of need, not total need. Formula estimates can be calibrated to a national total such as the total of the sample from which the formula was derived.

3. Mandatory Needs are represented in this table by their two largest components, FIX and Mandatory ADDs, which contribute over 95 percent of the Mandatory Needs shown in Table 2-1.

4. "CIAP-allowed" includes not only FIX and Mandatory ADDs and Project-Specific ADDs but also Lead-Based Paint Abatement and Handicapped Accessibility (both mandatory needs), energy conservation, and project redesign. The overall contribution of these additional categories of modernization need derives from Table 2-1. Their Regional contribution is derived as follows: 1) Lead-based paint abatement from Abt algorithms for projects; 2) handicapped accessibility from an assumption of uniform per-unit need; 3) energy conservation from Abt Regional estimates which this Table assigned evenly across PHAs; and 4) redesign from tentative Abt Regional estimates, which this Table assigned evenly to PHAs above 500 units.

5. The total needs identified in the submitted comprehensive plans as of February 1, 1989, was $9.4 billion. It was assumed that the typical plan was developed for 1988, and therefore a 6 percent cost factor was applied to convert the needs identified to 1990 dollars. No adjustment was made for new backlog arising from accrual in 1988 and 1989 because national CIAP funds available from FY 1988 and 1989 appropriations come close to estimated national accrual of age-related capital improvement needs for those years.

Overall, Table 2-4A shows that the formula estimates, the Abt direct sample estimates, and the PHA comprehensive plans produce broadly similar Regional distributions of modernization need, although the total need identified is markedly different. Some Regions, however, show a considerable divergence between share of need based on comprehensive plans versus share of need based on formula and direct sample estimates. These are typically smaller Regions (I, VII, IX, X) in which one or two large PHAs greatly influence Regional totals.

The formula distribution of Mandatory Needs (column 1) comes closest to the distribution of the PHA comprehensive plans (column 6), while the Abt direct sample distribution of CIAP-allowed work (column 5) diverges the most from the comprehensive plan distribution. (The formula and Abt direct sample distributions of Mandatory Need also differ somewhat from each other, especially in Region III, whose direct estimates of need are not controlled for sampling and measurement problems.) Also quite close to the Regional need distribution of the comprehensive plans are the formula and direct sample distributions of the combination of Mandatory Needs and Project Specific ADDs ISO 1-2.

At the level of HUD Field Offices, however, there is no relationship between estimates of modernization need developed from the Abt direct sample estimates and those developed by PHAs in their comprehensive plans. As Table 2-4B shows, overall the shares of Field Office need determined by formula estimates and by the Abt direct sample estimates were closer to each other than to the shares of need determined by comprehensive plans. Formula estimates based on a formula that provides equal weight to backlog and accrual come closer (but still not very close) to the comprehensive plan estimates, perhaps because PHAs project their needs over a period of several years instead of using a fixed moment in time, as occurred for the Abt inspections.

While the general instructions for developing the comprehensive plans indicated that all needs should be identified and costed, it is unknown how much the PHAs that originated the plans and the HUD field staff that approved them fitted the results to their expectations of funds availability. If the comprehensive plans reflect reasonably well PHA-perceived backlog needs, as is the intention, the bottom row of Table 2-4A suggests that the total package of CIAP fundable backlog needs estimated from the Abt and ICF studies is much higher than the actual backlog needs. For the 865,000 units covered in Table 2-4, the Abt/ICF estimate of allowable backlog needs is $16.4 billion, versus the PHA comprehensive plan total of $10.0 billion (in 1990 dollars).

One administrative aspect brought out by Table 2-4A is worth noting. Although PHA comprehensive plans were required to be submitted during 1986 and 1987, with final determinations on project viability made by HUD by the end of January 1988, as of February 1, 1989, 34 large PHAs with about 90,000 units under management had not submitted comprehensive plans. Some of the largest of these PHAs asked for extensions at least until the end of 1989. Were comprehensive plans to be respecified as formula funds allocation tools, these and other PHAs might require several years to work out approvable plans and accurate cost estimates with HUD field staff.

Table 2-4B

The Field Office Distribution of Need and Total Need for PHAs above 500 units with Comprehensive Plans Submitted as of February 1, 1989: Formula Estimates, Abt Direct Sample Estimates, PHA Comprehensive Plans[1]

Percentage Shares of Need

HUD Field Office	Formula Estimates		Abt Direct Sample Estimates[2]			PHA
	Mandatory Needs	PS 1-2 + Mandatory	Mandatory Needs	PS 1-2 + Mandatory	CIAP-Allowed	Comprehensive Plan
Boston	3.6%	3.6%	2.2%	2.7%	3.1%	4.7%
Hartford	1.7	1.7	1.5	1.7	1.8	3.1
Manchester	.3	.3	.2	.5	.5	.4
Providence	.6	.6	.3	.6	.7	.7
Buffalo	1.7	1.7	1.8	2.3	2.2	2.2
Carribean	11.6	11.6	11.3	14.0	12.9	5.4
New York	16.4	17.1	15.8	15.7	13.9	23.4
Newark	5.7	5.5	4.6	4.9	4.8	4.6
Baltimore	2.7	2.5	3.6	2.9	2.9	2.9
Philadelphia	7.9	7.0	11.7	8.6	8.1	6.2
Pittsburgh	3.4	3.3	3.5	3.9	3.8	3.0
Richmond	1.5	1.4	1.6	1.5	1.6	2.2
Washington	2.0	1.9	2.1	2.2	2.1	2.8
Charleston	.3	.3	.1	.1	.2	.0
Atlanta	1.5	1.5	1.4	1.1	1.4	3.1
Birmingham	1.8	1.8	1.5	1.7	2.0	.9
Columbia	.6	.6	.6	1.1	1.2	.5
Greensboro, NC	1.7	1.7	1.4	1.6	1.9	1.7
Jackson	.1	.1	.2	.2	.2	.0
Jacksonville	1.8	1.7	2.9	2.3	2.6	2.0
Knoxville	.8	.8	1.0	.9	1.0	.6
Louisville	1.5	1.4	2.1	1.7	1.7	1.4
Nashville	1.5	1.4	.9	.9	1.2	1.6
Chicago	1.8	1.8	2.0	2.6	2.6	2.1
Columbus	.7	.8	.3	.3	.5	.5
Detroit	.3	.3	.4	.4	.4	.8
Indianapolis	1.0	1.1	.8	.9	1.0	.5
Milwaukee	.5	.5	.4	.6	.7	.4
Minneapolis	1.1	1.2	1.0	1.2	1.4	.9
Cincinnati	1.7	1.6	1.3	1.0	1.2	.8
Cleveland	3.3	3.5	2.9	2.4	2.8	3.4
Grand Rapids	.1	.1	.1	.1	.1	.0

Table 2-4B

The Field Office Distribution of Need and Total Need for PHAs above 500 units with Comprehensive Plans Submitted as of February 1, 1989: Formula Estimates, Abt Direct Sample Estimates, PHA Comprehensive Plans[1]

Percentage Shares of Need

HUD Field Office	Formula Estimates		Abt Direct Sample Estimates[2]			PHA
	Mandatory Needs	PS 1-2 + Mandatory	Mandatory Needs	PS 1-2 + Mandatory	CIAP-Allowed	Comprehensive Plan
Fort Worth	1.7	1.6	1.2	.8	.9	1.0
Little Rock	.3	.3	.3	.3	.3	.1
New Orleans	2.7	2.4	2.2	2.3	2.2	3.0
Oklahoma City	.4	.4	.3	.3	.3	1.2
San Antonio	1.2	1.3	.7	.9	.9	.7
Houston	.5	.6	.6	.8	.7	.9
Kansas City	.5	.5	.7	.7	.7	.5
Omaha	.2	.2	.4	.4	.4	.6
St. Louis	1.7	1.5	2.0	1.7	1.6	2.2
Des Moines[3]	N/A	N/A	N/A	N/A	N/A	N/A
Denver	.6	.7	.8	.9	.9	.5
Honolulu	.8	.9	.6	.6	.7	.6
Los Angeles	2.7	2.8	3.3	2.6	2.7	1.7
San Francisco	2.8	3.1	2.7	2.5	2.6	2.9
Phoenix	.4	.4	.4	.3	.4	.1
Sacramento	.5	.5	.7	.7	.7	.2
Anchorage	.2	.2	.1	.1	.1	.3
Portland	.4	.4	.5	.4	.4	.1
Seattle	1.4	1.5	1.0	1.0	1.0	.6
Total (Billions in 1990 Dollars)	N/A	N/A	$9.3	$13.5	$16.4	$10.0

1. The footnotes of Table 2-4A also apply to this table.

2. As discussed earlier in this Chapter, the Abt direct estimates of need are not reliable to the Field Office level for a number of Field Offices.

3. Since data for PHA comprehensive plans are not available in usable form for this Field Office, the comparative information on Abt direct sample estimates and formula estimates has also not been included in the table.

4. Unit count for funding purposes

An issue which could arise in connection with formula funding of modernization is the number of units in a project for formula allocation purposes. This issue could arise because the number of units which a PHA officially has, the number of units under Annual Contributions Contract (ACC) (used in all tables in this report), might not always be the number of units which should be modernized and maintained over time. Some units are already scheduled or planned for demolition or disposition, and other units may be found to be unsuitable for low-income housing use once their needs are fully analyzed and costed out and the prospect for full occupancy after modernization determined.

There are several possible approaches to determining the appropriate unit count. The number of units to be funded could be the number of units under the ACC, regardless of PHA plans for possible demolition or disposition of specific units. This appproach would avoid penalizing PHAs for taking appropriate demolition or disposition actions such as partial demolition to "thin" a project to improve its long-term viability by reducing the funding they receive as a result of such appropriate modernization actions.

An alternative to using the ACC unit count to determine the unit count for formula allocation purposes for modernization funds would be to use the unit count of units to be retained and modernized as presented in each PHA's comprehensive plan. These comprehensive plans are required for all PHAs of 500 or more units under the 1987 amendments to the modernization statute. Under this approach, the per-unit estimated need of projects might be reduced as a result of an overall change in project characteristics caused by the reduction of the number of units. On the other hand, to do so could have the counterproductive effect of

discouraging a PHA, for instance, from giving alternative housing assistance to its large families, by reducing both the unit count and the per-unit funding for a troubled family housing project. It might be more appropriate to reduce the number of units funded without affecting the per-unit estimates of need for the project. For example, were a PHA and HUD to agree that rehabilitating some vacant three-bedroom units would be prohibitively expensive, the total number of fundable units in the project would be reduced, but there would be no change in the average number of bedrooms per unit used for that project in computing the appropriate modernization funding level. In this manner, the PHA and HUD save on the overall modernization costs, but the PHA retains credit for having a large family project, with its higher per-unit funding level.

5. Deduction of past CIAP funding

A second issue which also arises if formula funding is used is how to appropriately estimate a PHA's need for modernization funding for its backlog in 1990. Because of the 1985 basis of the inspection estimates of need, the estimates of need for a given PHA might not reflect its current need for funding relative to that of other PHAs.

An important reason why PHAs with a similar per-unit work need in 1985 might show dissimilar per-unit funding need in 1990 is that they were funded differently under CIAP in recent years. Such differential funding of need was common. At the aggregate level, for instance, extra-large PHAs which show 35-39 percent of backlog need under the two definitions in Table 2-3 received only 20 percent of the $5.4 billion of CIAP funding from FY 84 to FY 88. Within PHA-size categories, disparities between need for work for individual PHAs and their CIAP funding were even more pronounced.

The disparity in FY 84-88 CIAP funding of individual PHAs relative to their need can have many causes. In some cases, HUD staff may have properly judged that a PHA had shown insufficient capacity to obligate or spend funds provided to it earlier, and thus did not approve further

funding for the PHA. In other cases, a PHA may have received relatively less funding than other PHAs because the CIAP program underfunded the HUD Region in which the PHA was located under a formula that until FY 87 used problematic data from the 1980 PW/E study, and from FY 83 to FY 87 weighted an energy conservation measure as representing 55 percent of the total need. On the other hand, in Regions that were favored by the CIAP formula, PHAs able to spend funds effectively were sometimes very well funded relative to their need. In sum, if only 1985-based indirect estimates of need are used to determine formula need shares for PHAs, without regard to funds allocated but unspent to meet that need, there will be a considerable disparity between the unfunded backlog of modernization need at particular PHAs and the formula estimate of that need. This would be inequitable for PHAs that have received relatively little modernization funding, for whatever reason.

To make the definition of need for funding purposes more equitable, it would be appropriate to deduct CIAP funds allocated to a PHA from the PHA's estimated backlog need. Since FY 1984 modernization funds would not have been spent by the time of the Abt inspections in the summer and fall of 1985, we propose to base deductions on funds allocated to individual PHAs from FY 1984 awards.

The ICF study estimated that about 75 percent of the FY 1984-1988 CIAP allocation will be spent on the FIX and Mandatory ADDs categories of backlog identified in 1985, and about 90 percent on FIX, Mandatory ADDs and Project-Specific ADDs, ISO 1 + 2. These are program-wide averages. Since this percentage will vary somewhat for individual PHAs and projects, we propose to operationalize the deduction for CIAP allocations by establishing a 50 percent deduction of CIAP funds for backlog defined as FIX and Mandatory ADDs, or a 60 percent deduction if backlog includes Project-Specific ADDs. No PHA, however, would have its total need for funding more than halved by this deduction.

It is also arguable that some deduction should be made as well for CIAP funding in 1981 to 1983, so that the relative formula shares of PHAs better reflect their funding histories. After all, if two PHAs had similar shares of need and similar funding from 1984 onward, the PHA funded much more generously from 1981 to 1983 will be in a better position than the PHA funded less well from 1981 to 1983. A partial deduction for 1981 to 1983 CIAP funding, however, poses greater problems than a partial deduction for modernization funding from 1984 onwards. Because of the unusual emphasis in 1983 on energy conservation for CIAP approvals, more PHAs in 1983 than in later years might have had a sizeable share of their CIAP funds go to purposes other than mandatory need and to Project-Specific ADDs. Moreover, over half of CIAP allocations from 1981 to 1983 had been expended by the time of the 1985 Abt inspection, and this expenditure could have influenced certain patterns of need derived from the 1985 Abt inspections (on the other hand, using a PHA-provided indicator of 1981-1984 modernization expenditure did not add to the explanation of project-level need provided by other formula variables).

On balance, the greater equity and realism in estimating the unfunded need of PHAs that can be achieved by deducting a portion of modernization funding is adequately achieved by deducting only CIAP funds from 1984 onward.

G. Distributions of Need Based on Indirect Estimates of Need

Tables 2-5 and 2-6 show the distribution of need for PHA-size groups and HUD Regions when indirect estimates of individual PHA need are the primary building block. The differences and similarities between these tables and Table 2-3 deserve comment. Table 2-3 was based on direct sample estimates of per-unit need, unit-weighted for a sample of projects and PHAs. By contrast, Tables 2-5 and 2-6 apply indirect estimates of per-unit project need to actual counts of ACC units for all projects in PHAs over 500 units (excepting the New York City PHA). For the New York City PHA,

Table 2-5: Percentage Shares of Estimated Formula Funding to PHA Groupings and Selected Formula Need Options, Without Partial Deduction of Unexpended Funds

PHA Size/ Troubled Status	Share ACC Units	Share of 1987-88 CIAP	Formula Options (ACC Unit Basis)			
			Backlog Only		Age-Related Accrual Only	Age-Related Accrual and FIX + Mandatory ADDs Backlog, Equally Weighted
			FIX + Mandatory ADDs	FIX + Mandatory + PS 1-2 ADDs		
1 - 499 Units	26.5	20.8	17.7	20.2	24.0	20.8
500 - 1,249	13.6	15.6	9.9	10.7	12.5	11.2
1,250 - 6,599	24.0	28.9	22.7	22.8	23.5	23.0
6,600 - 60,000	24.2	21.0	38.4	34.6	25.8	32.1
Untroubled	6.8	5.9	8.2	7.4	6.8	7.5
Troubled	17.4	15.1	30.2	27.2	19.0	24.6
New York City	11.9	13.8	11.3	11.7	14.2	12.8
HUD Region						
1	5.8	7.4	5.4	5.5	5.5	5.5
2	23.4	32.0	27.7	27.6	26.0	26.8
3	11.7	14.9	13.8	12.8	11.5	12.6
4	21.6	15.3	15.8	16.2	20.1	18.0
5	16.6	14.4	18.2	17.8	16.3	17.2
6	9.9	8.1	8.0	8.2	9.4	8.7
7	3.3	1.4	2.9	3.0	3.0	3.0
8	1.3	1.0	1.0	1.1	1.2	1.0
9	4.4	4.4	5.6	6.0	4.9	5.3
10	1.9	1.1	1.7	1.9	1.9	1.8

Table 2-6: Percentage Shares of Estimated Formula Funding to PHA Groupings and Selected Formula Need Options, With Partial Deduction of Unexpended Funds

PHA Size/ Troubled Status	Share ACC Units	Share of 1987-88 CIAP	Formula Options (ACC Unit Basis)			
			Backlog Only			
			FIX + Mandatory ADDs	FIX + Mandatory + PS 1-2 ADDs	Age-Related Accrual Only	Age-Related Accrual and FIX + Mandatory ADDs Backlog, Equally Weighted
1 - 499 Units	26.5	20.8	16.4	19.9	24.0	20.2
500 - 1,249	13.6	15.6	8.9	9.9	12.5	10.7
1,250 - 6,599	24.0	28.9	20.9	21.3	23.5	22.1
6,600 - 60,000	24.2	21.0	43.1	37.6	25.8	34.5
Untroubled	6.8	5.9	8.8	7.7	6.8	7.8
Troubled	17.4	15.1	34.3	29.9	19.8	26.9
New York City	11.9	13.8	10.7	11.3	14.2	12.5
HUD Region						
1	5.8	7.4	4.8	5.0	5.5	5.1
2	23.4	32.0	27.2	27.1	26.0	26.6
3	11.7	14.9	13.6	12.4	11.5	12.6
4	21.6	15.3	15.5	16.0	20.1	17.8
5	16.6	14.4	19.2	18.4	16.3	17.7
6	9.9	8.1	8.1	8.4	9.4	8.7
7	3.3	1.4	3.1	3.2	3.0	3.0
8	1.3	1.0	.9	1.1	1.2	1.1
9	4.4	4.4	5.9	6.3	4.9	5.4
10	1.9	1.1	1.8	2.0	1.9	1.9

Tables 2-5 and 2-6 apply ACC-unit counts for the PHA to its per-unit need derived from the direct sample estimate. For PHAs below 500 units, Tables 2-5 and 2-6 apply ACC-unit counts for the sum of these PHAs to their national average per-unit need derived from the direct sample estimate. In contrast to Table 2-3 or Table 2-5, Table 2-6 deducts portions of prior-year CIAP funds from backlog before computing shares of unfunded backlog.

Comparing Table 2-3 and Table 2-5 shows an obvious difference in unit shares. Because units in Table 2-5 are based on actual administrative counts, the unit shares for PHA-size groupings in Table 2-5 diverge from those of Table 2-3, which calibrated its sample counts to actual counts only for the HUD Field Office and HUD Regional Office level. Especially different is the unit share of PHAs below 1,250 units -- PHAs below 500 units have a true 26.5 percent share of total units in Table 2-5, versus their 19.3 percent sample share, while PHAs of 500 to 1,249 units have a true 13.6 percent share of units in Table 2-5, versus their 19.2 percent sample share in Table 2-3.

The use of indirect estimates of need for most of the units in Table Table 2-5 did not alter the relative distributions of need that Table 2-3 showed. As before, small and medium PHAs have shares of backlog need far below their shares of units, and extra large PHAs have a much larger share of backlog need (34.6 percent to 38.4 percent) than their share of units (24.2 percent). Table 2-4 further shows that the troubled group of extra-large PHAs (discussed in Chapter III) have a much more disproportionate share of backlog need relative to their share of units than do the untroubled group of extra-large PHAs.

Both Tables 2-3 and 2-5 show that the disparity between shares of backlog need and shares of units for PHA-size categories is accentuated by a definition of backlog as FIX plus Mandatory ADDs (instead of FIX plus Mandatory ADDs plus Project-Specific ADDs ISO 1-2). Both tables further show that the difference between relative shares of backlog and accrual need for PHA-size groupings is much sharper than the difference between

shares under the two definitions of backlog. As in Table 2-3, Table 2-5 shows that small and medium PHAs have accrual shares only moderately below their unit shares and that extra-large PHAs have an accrual share (25.8 percent) only moderately above their unit share (24.2 percent). The last column of Table 2-5 shows how an equal weighting of age-related accrual and FIX plus Mandatory ADDs backlog splits the difference between the targeted distribution of backlog need and the less targeted distribution of accrual need. For instance, extra-large PHAs show 32.1 percent of equally weighted need, which is still well above their 24.2 percent unit share, or their 21.0 percent share of CIAP funding in FY 87-88.

In broad direction, the Regional shares of need in Table 2-5 follow those of Table 2-3. In both tables, northern Regions II, III, and V have rather higher shares of backlog need (however defined) than their shares of units or their shares of age-related accrual need, and the southern Regions IV and VI show rather higher shares of accrual need than of backlog need. Occasionally, the representation of all projects with actual ACC counts and the use of indirect estimates of need causes Regional patterns of need in Table 2-5 to differ somewhat from those of Table 2-3. For example, Table 2-5 no longer shows the sharp distinction of Table 2-3 between the shares of backlog need in Region I under different definitions of backlog.

Table 2-6 differs from Table 2-5 by computing backlog shares after a partial deduction of unexpended funds. Fifty percent of FY 84-88 CIAP funds are deducted from estimates of FIX plus Mandatory ADDs backlog need, and 60 percent of FY 84-88 CIAP funds are deducted from estimates of FIX plus Mandatory ADDs plus Project-Specific ADDs backlog need (with no PHA above 500 units having its estimate of need reduced by more than half). In aggregate, this partial deduction causes an appreciable increase in the share of unfunded backlog need for troubled extra-large PHAs, especially

for backlog need defined as FIX plus Mandatory ADDs, which increases from 30.2 percent in Table 2-5 to 34.3 percent in Table 2-6. Regions V, VII, and IX also show a moderate increase in their share of backlog need after partial deduction of unexpended funds.

The PHA groupings of Tables 2-5 and 2-6 mute the much greater variation of individual PHAs in their CIAP funding relative to their estimated need and in their shares of estimated backlog need with and without a partial deduction of CIAP funds. The formula tables for the 200 largest PHAs in Appendix A, building upon the definitions and estimates of need in Tables 2-5 and 2-6, illustrate the impact of this and other differences in estimating need. For a given PHA, the operational formula share might differ from that given in Appendix A for reasons such as projects added or deleted since 1985, or more refined data for the indicators being provided by the PHA such as the actual age for an acquired property rather than the age imputed by using the date of its initial operating period as public housing.

The next chapter discusses major policy issues, many of them grounded in the characteristics, costs, and distributions of need presented in this chapter. A summary of this chapter's findings will be useful.

H. Summary Findings from this Chapter

-- The most complete, standardized and reliable data for all sampled projects is for the FIX estimate. This data can be directly assigned to individual projects in the sample.

-- Other measures of need are less reliable at the project level; some were intended for national estimates only; others depend in part on nonstandardized responses to questionnaires.

-- The age-related accrual estimate derives from the FIX project level data and provides a standardized estimate that can be attributed to the project level.

-- Extraordinary accrual is by definition unpredictable, and therefore impossible to model at the PHA or project level.

-- The amount of money (in constant 1990 dollars) needed annually to fund accrual varies very little over time, from $1.8 billion for full funding in 1 year, to $1.9 billion if full funding is assumed over a 20-year period.

-- The amount of money (in constant 1990 dollars) needed annually to fund backlog categories of modernization need decreases substantially as the time period for funding the backlog is extended. Eliminating the mandatory backlog need that existed in 1990 would require $13.4 billion if funded in 1 year; $2.7 billion annually if funded over 5 years; $1.3 billion annually if funded over 10 years; and only $.7 billion annually over a 20-year period. Similarly, addressing mandatory backlog need plus Project-Specific ADDs (ISO 1&2) plus energy and redesign would require $22.3 billion if funded in 1 year; $4.5 billion annually if funded over a 5-year period; $2.2 billion annually over 10 years; and $1.1 billion per year if funded over 20 years.

-- Any combination of full funding of the backlog and accrual would require annual appropriations above the recent appropriations levels of $1.7 billion for modernization. Even the approach with the least budgetary impact, full funding of accrual and mandatory backlog need over a 20-year period, would require appropriations of $2.6 billion per year (in constant 1990 dollars).

-- In funding combinations of accrual and backlog, the relative weight given to accrual or backlog can make a great difference in the distribution of funds among PHA-size categories--a much greater difference than that made by the definition of backlog.

-- Direct estimates of modernization need from the Abt/ICF sample are reliable for fund allocation purposes only for HUD Regions, some large HUD Field Offices, the New York City PHA, and perhaps some extra-large PHAs.

-- Indirect estimates of modernization need based on objective indicators and statistical relationships in the Abt/ICF sample can provide sufficiently reliable estimates of need for fund allocation purposes for all PHAs above 500 units (or for all PHAs above 250 units), for States, and for HUD Field Offices.

-- PHA comprehensive plans, the indirect estimates of need from the formula, and the Abt direct sample estimates produce broadly similar Regional distributions of modernization need, although the total need identified is markedly different. Field Office distributions, however, differ substantially.

-- The accuracy of indirect estimates of PHA funding need in 1990 can be improved by a deduction for unexpended CIAP funds from the time of the Abt inspection onward.

Chapter III-- Basic Issues to be Addressed by Congress

Introduction

This chapter presents the basic issues to be addressed by the Administration and Congress in deciding on the best approach to funding modernization at PHAs with 500 or more units. In doing so, it directly responds to the questions raised in the legislation calling for this report. Policy issues addressed include how to determine the relative allocation of funds between backlog and accrual and the implications of funding only on the basis of backlog, only on the basis of accrual, or of funding on both bases. Alternative approaches to funding the backlog and the accrual of new modernization need are discussed, including allocating funds to PHAs by formula; allocating funds to PHAs on the basis of their comprehensive plans; allocating funds to States or to HUD Regions for redistribution to PHAs; retaining the current application process of the CIAP program; offering PHAs the option of automatic formula funding based on their accrual need or competitive project-based funding based on their backlog need; and funding accrual by formula, backlog by modified CIAP competition. Also discussed are project-based options, including funding high needs projects by a modified CIAP competition and funding by formula either projects with moderate levels of backlog need or all projects, including those with low needs, as well as those with moderate levels of backlog need, and an option under which PHAs designate which of their projects should be funded by backlog formula and which by the accrual formula. Finally, the chapter discusses related policy issues, including the question of a special fund to address unpredictable or extraordinary repairs; the potential ability of PHAs to meet emergency repair needs within their likely formula allocation of funds; whether or not energy conservation improvements should be specifically funded in a formula funding system; the problem of troubled PHAs; and project viability tests.

A. How Should Congress Determine the Relative Allocation of Funds Between Backlog and Accrual?

Historically, the Federal Government has only funded the existing need for modernization work at public housing projects, called "backlog need" in this report. While the 1980 legislation creating the CIAP program contemplated Federal funding of reserves to meet future capital repairs at public housing projects, funds were never requested or appropriated to establish these reserves. The 1987 amendments to the CIAP legislation reopen the question of the extent to which Federal funding should be allocated expressly on the basis of a PHA's ongoing need for reserves for replacement, called "accrual" in this report.

The 1987 amendments to the CIAP legislation are intended to provide PHAs with substantial flexibility in determining the appropriate uses of modernization funds, and to reduce the HUD role in determining how modernization activities are carried out. To that end, the legislation calls for HUD to provide information to Congress on alternative methods for providing funds to PHAs for modernization, including information on possible formula funding approaches. In a formula funding approach, backlog need and/or accrual need can serve as the basis for funds allocation and thus decisions about the relative allocation of funds between these two categories of modernization need have basic importance.

This issue relates to the allocation of modernization funds only, not to their use. Under the legislation, a PHA is free to use the funds for any purpose consistent with the needs of its projects. The PHA may address its backlog of existing modernization need or establish a replacement reserve to fund the accrual of new modernization need without regard to the basis on which the modernization funds were allocated. Thus, in a formula context, decisions on whether to fund accrual or backlog, or to fully or partially fund both, are essentially decisions on how to distribute the funds, not on how the funds are to be used.

The issue of the relative allocation of funds between backlog and accrual arises because of the size of the modernization bill. With estimates of annual accrual at $1.8 billion per year and of a total backlog need ranging from $13.4 billion for the backlog of mandatory modernization need to $29.6 billion for all potential modernization work identified in the Abt report, it is clear that the extent of Federal funding for modernization must be carefully considered. It may not be possible for the Federal Government to fully fund both backlog and accrual, even over an extended time period, because, as Table 2-2 in Chapter II shows, the annual appropriations required for any combination of full funding of backlog and accrual exceed the recent funding level for modernization of $1.7 billion per year (in 1990 dollars). Thus, the Administration and the Congress will need to consider fully the implications of funding only the backlog, only accrual, or of partially funding both types of modernization needs.

1. What are the implications of funding backlog only?

A decision to distribute Federal funding based only on the distribution of the existing backlog of modernization need as identified by the Abt Survey would afford the possibility of full funding of the backlog of Mandatory Modernization Need, as it exists in 1990, over a 10-year period at an annual Federal budgetary level below the $1.7 billion (1990 dollars) level of appropriations for modernization for the 1987-1988 period. The 1990 backlog of Mandatory Modernization Need and Project Specific ADDs rated ISO 1&2 by the inspectors, project specific additions that HUD would be likely to approve under the current modernization program guidelines, could be funded over a 10-year period at a level of funding only slightly higher than the recent appropriations levels ($1.9 billion versus $1.7 billion, in 1990 dollars). Funding the 1990 backlog of Mandatory Modernization Need, Project-Specific ADDs 1&2, and project redesign and energy conservation would require $2.2 billion annually for the next 10 years, a level of funding significantly above recent appropriations levels.

Funding backlog only would provide a distribution of funds based on existing PHA needs. But as shown in Table 2-6, which presents estimated shares of formula funding by PHA-size category (after deduction of unexpended CIAP funds), such a distribution would direct between 38 percent and 43 percent of the funds to 21 extra-large PHAs (excluding New York City), many of them troubled, which received only about 20 percent of all CIAP funds from FY 84 to FY 88, often because of difficulties in obligating and spending their CIAP allocations.

Distributing funding on the basis of the backlog only would clearly place precedence on taking care of the existing needs at public housing projects and avoid the troubling question of how one can in good conscience fund accrual needs while there are conditions in public housing projects which need correction now to assure decent housing for the residents.

A decision to provide Federal funding for only the backlog of modernization need would mean that substantial amounts of modernization funding would go to PHAs that have had problems in the past in spending their modernization funds, unless special provisions were made for the treatment of these PHAs. This raises a concern that the Congress may appropriate funds for modernization which remain in the Treasury and are not used in a timely manner to make repairs and replacements at public housing projects to improve the living conditions of public housing residents. Failure to use the funds would then lead to questions about the need for and the validity of the modernization program itself.

Furthermore, a Federal Government decision to fund only the existing backlog of modernization need identified by the Abt survey could result in the accumulation of a new backlog as the old one is being addressed. The estimated accrual of new modernization need of approximately $1.8 billion to $1.9 billion per year would quickly turn itself into a new and sizeable backlog as the old backlog was being eliminated over time. Thus, a decision to fund only backlog may mean that the Federal Government will be

committed to funding backlog modernization with no end, as accrual needs become new backlog. Even by the early 1990's, the distribution of backlog need might be represented as much by the accrual distribution as by a backlog distribution based on 1985 patterns of need.

2. What are the implications of funding accrual only?

A decision to provide Federal funding only on the basis of the accrual of new modernization need would permit the Federal Government to fully fund modernization at a budgetary level slightly above the level of recent appropriations for the modernization program ($1.8 billion versus $1.7 billion). As Table 2-6 presenting formula funds distribution by PHA-size group shows, funding on the basis of accrual only would result in a distribution of modernization funds of 25.8 percent to the 21 extra-large PHAs (excluding the New York City Housing Authority); 23.5 percent to the 120 large PHAs; 12.5 percent to the 228 medium-sized PHAs; 24.0 percent to the 2,700 smaller PHAs; and 14.2 percent to the New York City Housing Authority. The funding share of the 21 extra-large PHAs would be 12 to 17 percentage points less than under the backlog only funding approach shown in Table 2-4, while the shares of all other size classes of PHAs would rise.

Thus, funds would be distributed more evenly to PHAs under an accrual only approach than under an approach which funds the backlog only. This would reduce concerns about overfunding large troubled PHAs in terms of their capacity to effectively spend modernization funds. However, distribution of funds on the basis of accrual only, and therefore on the basis of a model of needs distribution rather than on the actual distribution as measured by the 1985 Abt inspections, might raise concerns about the degree to which funds allocations will match actual modernization needs.

If the Federal Government funds new modernization need as it accrues, PHAs should be able to appropriately maintain their properties, and a new backlog of modernization need will not develop. While the decision to have the Federal Government fully fund accrual would reflect a Federal commitment to fund both the future operating and the future capital funds needs of the public housing program indefinitely, it would leave the problem of the existing backlog of modernization need unsolved. A long-term failure to address the existing backlog of modernization need could put potentially valuable housing resources at risk and intensify the real rate of accrual of modernization need.

3. What are the implications of full Federal funding of both backlog and accrual?

A Federal Government decision to fully fund both backlog and accrual would require appropriations significantly higher than the level of appropriations provided in recent years for the modernization program. Fully funding the basic combination of mandatory backlog need and accrual would require annual appropriations of $4.5 billion if the backlog were to be funded over a 5-year period; $3.2 billion, if the backlog were to be funded over a 10-year period; and $2.6 billion, if funding for the backlog were extended over a 20-year period. These funding levels substantially exceed the 1987-1988 funding level of $1.7 billion.

4. What are the implications of partial Federal funding of both backlog and accrual?

There are a variety of ways in which the Federal Government could partially fund both backlog and accrual. The Federal Government could fully fund accrual and use the remainder of any appropriation to partially fund backlog, or vice versa. PHAs could be permitted to choose between accrual funding on a formula basis or backlog funding under the competitive funding approach of the current CIAP program. Another approach to partial funding would be to assume full funding of both backlog and accrual over a

predetermined time period, and then, depending on the size of the actual appropriation, apply a pro rata reduction to each PHA's allocation of funds. (This is the method used when operating subsidy appropriations are not adequate to fully fund operating subsidy entitlements.) Or the Federal Government, recognizing that full funding is unlikely, could select set proportions, such as 50-50 or 60-40, for the respective formula roles of backlog need and accrual need in allocating appropriated funds. These proportions could vary over time, depending upon funding levels, the types of needs left unfunded, and their distribution across PHAs.

Decisions on how to allocate funds in a partial funding scheme have important distributional effects. A decision to fully fund accrual and use any remaining funds for the backlog would mean relatively less funding for the extra-large PHAs and relatively more funding for the other PHA size classes. On the other hand, providing a substantial portion of the appropriation for backlog by heavily weighting the backlog in funds allocation would result in relatively more money going to the 21 extra-large PHAs.

A decision to partially fund both backlog and accrual would recognize the validity of both types of modernization need. The weighting chosen for each of these components of modernization need would allow for compensation for the different distributional effects of using either one component or the other for funds allocation. It can also reflect the relative role of accrued need from 1986 onward, as well as the original 1985 backlog, in contributing to the unfunded backlog of the early 1990's.

However, it should be recognized that failure to fully fund both the backlog of mandatory modernization need and the accrual of new need will have implications for the condition of the public housing stock. Without full funding, some portion of the existing public housing stock will not be upgraded to basic decent, safe, and sanitary condition.

B. How Should Funds be Allocated to PHAs for Existing Deficiencies?

There are a number of options available for consideration in allocating funds to PHAs to address the existing backlog of modernization need. These include: a formula allocation approach; an approach which calls for allocating funds to PHAs on the basis of their comprehensive plans; allocation to States for suballocation to PHAs within their jurisdictions; retaining the current competitive application process of the CIAP program; offering PHAs the option of automatic formula funding based on their accrual need or competitive project-based funding based on their backlog need; and funding accrual by formula, backlog by competition. Also available are project-based options, including funding high-needs projects by a modified CIAP program, and funding by formula either projects with moderate levels of modernization need or all projects without high needs, and an option in which PHAs designate which of their projects should be funded by the backlog formula and which by the accrual formula.

1. Formula distribution directly to PHAs with 500 or more units.

A formula approach using objective indicators to estimate need is used for distributing funds when it is not possible, or is prohibitively expensive, to measure actual need for the funds on the part of each grantee. While a formula cannot be completely accurate, the estimation methods summarized in Chapter 2 and detailed in Appendix B indicate a good degree of reliability in allocating modernization funds to PHAs on the basis of indirect estimators of their need.

Providing formula funding to PHAs for the purposes of upgrading and maintaining their public housing projects would have certain basic advantages. Since a formula approach would provide a predictable stream of funding over a period of years, PHAs could effectively plan for making needed repairs and improvements at all of their projects over time. A formula funding system would eliminate the perverse incentive that exists

now in the CIAP program for a PHA to disinvest in one or more projects, while using maintenance funds at other projects, in order to enhance the prospect of these projects successfully competing for CIAP funds for comprehensive modernization. Under a formula funding approach, the incentive for the PHA would be to maintain all projects as well as possible, so that the available modernization funds could be used to the greatest effect.

A formula funding approach could also assure that individual PHAs get their fair share of available modernization funds. Under the current competitive application system, a PHA's skill in preparing applications and the relative needs of its projects proposed for modernization to those of other PHAs in its Field Office or Region determine the amount of modernization funds it receives, instead of its relative overall need for modernization funds. At this time, PHAs with modest needs for modernization work at their projects often do not even apply for competitive funding, because more severe needs at projects at other PHAs may take precedence for HUD funding. A formula funding approach would assure that a PHA with relatively modest but still important modernization needs receives its share of funding to meet those needs. It would also assure that smaller PHAs, which may not have the technical expertise to go through the complex CIAP application process, still get modernization funding to help them upgrade and maintain their projects over time.

A formula funding approach would also have the advantage of improving PHA accountability for the condition of their housing projects. With a predictable source of funds, and the ability to plan for the use of those funds, HUD and the local government will be able to hold the PHA accountable for the effective use of those funds to improve the physical condition of public housing. And, with predictable funding available for modernization activities, PHAs will be better able to manage their public housing stock, deciding which projects warrant substantial investments and which ones should be removed from the stock as too marginal

or too expensive to maintain. Under the current CIAP program, there is no real incentive for PHAs to make hard choices about the future of the public housing stock, since HUD may at any time decide to fund modernization at a particular project.

A formula funding approach, by encouraging local responsibility and lessening Federal intervention in the detailed decisions about what work should be undertaken and when it should be done, is more compatible with the intent of the 1987 amendments to the CIAP legislation than any other funding approach. The liberation of PHA initiative intended by these amendments is fully realized only under a formula approach.

Disadvantages to a formula funding approach include the fact that formula funding is based on an estimate of need for funding for modernization at a PHA, while funding under CIAP is based on actual need for modernization funds at a particular project. Additionally, under a formula approach, all PHAs over 500 units, whether or not they have the capacity to effectively use them, are entitled to an allocation of modernization funds. Under the current CIAP program, HUD may refuse to award modernization funds to PHAs which have been unable to effectively use previously approved modernization funds. A formula approach could apply such judgment by capping the entitlement of troubled PHAs. However, such capping might be difficult to sustain.

2. Allocation to PHAs on the basis of PHA comprehensive plans.

Interest has been expressed in using the PHA comprehensive plans as a basis for determining the relative allocation of funds among PHAs. This approach would call for a formula allocation of modernization funds to HUD Regional or Field Offices, which would then suballocate these funds to individual PHAs on the basis of their relative needs "for restoring public housing shown by the approved comprehensive plans...."

HUD could allocate funds to the 10 HUD Regions with data directly from the Abt sample. While it is not possible to allocate funds to the 51 HUD Field Offices directly from sample data with any degree of precision, it would be possible to develop acceptably precise and standardized allocations to HUD Field Offices through the same formula estimation method that is used in developing allocations of modernization funds to PHAs.

Whether HUD Regions or Field Offices receive the initial pools of funds, actual PHA shares of funds would be based upon their comprehensive plans. This approach might be considered a "modified" formula approach. Once the plans had been created by the PHAs and approved by HUD, a PHA's relative share of need would be determined for the initial year and for future years. Thus, after the initial year of funding under this approach, a PHA's relative level of funding from any appropriation would be automatic and predictable. Predictability is one of the desirable characteristics of a formula approach.

The major advantage of allocating funds to PHAs on the basis of the relative needs shown in their comprehensive plans is that a well-prepared plan would show the actual needs of a PHA for modernization work as well as its unexpended funds at the time the plan is prepared and funds are requested. Thus, fund allocations could be closely related to actual need for funds, based on the estimated costs for the needed work, rather than upon estimated formula need that makes adjustments for unexpended PHA funds, as in Table 2-6. The use of a PHA's comprehensive plan as the basis for funds allocations could also have the benefit of enabling PHAs to seriously plan for the future of their housing projects and make reasoned judgements about the types of capital investments needed at each housing project, and the timing of those investments, so that the public housing stock is maintained in the best possible condition, given the funds available. Thus, use of the comprehensive plan for funding purposes could result in a wise use of Federal modernization funds. Finally, using PHA comprehensive plans for funds allocation purposes might be more credible to PHAs than using a formula-based allocation system.

There are, however, several disadvantages to using PHA plans as the basis for allocating modernization funds. Use of the plans for funds allocation purposes would create an incentive for PHAs to overstate their modernization needs. Each PHA's share would depend directly on its own plan and every other PHA's plan. Because the plans would be used to determine the relative allocation of modernization funds among PHAs, the plans would have to be uniform in content, and each plan exactly comparable to all other plans. Therefore, to assure an equitable allocation of funds based on comprehensive plans, HUD would have to issue detailed instructions on the content of these plans and would have to exercise detailed review and oversight. The end result could easily be that PHAs would prepare plans to satisfy HUD's instructions, not their own needs in terms of rational allocation of resources to upgrade and maintain their housing stock. Finally, there is the question of how to allocate funds to PHAs which are unable to produce acceptable and approvable comprehensive plans. If a PHA is unable to produce an acceptable plan, on what basis would it be funded? Would funds that have been allocated to the Field Office, on the assumption that the total amount of funds included funds for this PHA, then be divided among the PHAs that were able to produce acceptable and approvable plans?

3. Allocation to States

Modernization funds to address the backlog of modernization need could not be allocated directly to States using the Abt sample data with any precision, since the sample was not designed to be used for this purpose. However, acceptably precise and standardized allocations to States could be developed by summing the formula amounts that would have gone to PHAs in each State. Alternatively, the amounts shown in the comprehensive plans for PHAs in each State relative to amounts shown in the Ccmprehensive plans for all States could be used to develop a State's share of modernization funds.

Allocation of modernization funds to States for their further suballocation to PHAs within their jurisdiction would recognize that the State governments have a potentially crucial role in assuring the availability of decent, safe, and sanitary housing for their lower-income residents. While many States have played active roles in recent years in developing and funding housing programs for lower-income households, they have generally left the needs of public housing within their borders to the Federal Government.

Allocating modernization funds to States for the States to allocate to PHAs would also logically lead to consideration of a matching requirement for State funds. As one option, the Federal Government could provide funds to States for the backlog of modernization needs within their jurisdictions, on the condition that the States agree to fund the accrual needs of the PHAs. HUD could establish matching requirements on the basis of accrual needs at public housing projects in the State as determined by the accrual formula.

A second option would be to provide "bonus" funds to States which made financial commitments to modernizing public housing. Under this approach, part of a modernization appropriation would be directly allocated to States on the basis of overall modernization need within the State (either backlog or accrual or both); and the remainder would be allocated to States on the basis of the amount of funds they and their local governments were willing to commit to the modernization of public housing. (The Administration's budget for FY 1990 proposes that a portion of the modernization appropriation be allocated on a matching basis to States which commit modernization funds to public housing projects.)

The allocation of modernization funds to States for their further suballocation to PHAs within their jurisdictions would imply that the Federal Government is no longer willing to assume sole responsibility for the public housing program and expects State governments to play a larger role in the oversight and management of the program than in the past.

While this proposed approach represents a significant change from the current policy of sole Federal responsibility for funding public housing, it is not inconsistent with recent thinking about the appropriate role for State and local governments in assuring the availability of housing for their low-income residents. For example, the Rouse-Maxwell Task Force Report, "A Decent Place to Live," called for State and local governments to take an active role in planning for the future of the most troubled housing projects and to provide housing and community development assistance for these projects.

Disadvantages to this approach include the possibility that many States may be unwilling or unable to assume added responsibilities, including adding the additional staff necessary to oversee the public housing program. Additionally, some States may not have the financial resources to match Federal funds for modernization. States may also have difficulties in developing approaches to suballocating funds to PHAs within their jurisdictions so that these suballocations are perceived as fair and equitable, but still address the needs in the PHAs on which the State shares of funds were determined. This is particularly a problem, since the modernization needs of one or two large PHAs in a State may account for much of the State's allocation of modernization funds. It would be difficult for a State to allocate substantial amounts of its allocation to only one or two PHAs. Thus, under a system of allocation to States, the needs of large PHAs may never be met, even if Federal funds are allocated for this purpose.

4. Retain current CIAP program with its project-based approach to funding the backlog of modernization need

Under this approach, HUD would continue to fund all PHAs under the existing CIAP program on a competitive application basis for work needed at the time of application at specific public housing projects. Funds could be allocated to HUD Regions on the basis of the Abt sample data on a reliable and standardized basis, and decisions made within the Region on

allocation to Field Offices. This approach would have the advantage of assuring that modernization funds are provided to PHAs on the basis of the estimated cost for work needed at a project as of the time of application for funds. It would also provide reasonable assurance that the majority of modernization funds are provided to PHAs with the capacity to use these funds, since HUD policy for the modernization program calls for assessing modernization and management capacity in the decision to award modernization funds. The major disadvantage to this approach is that it retains the current heavy Federal Government involvement in decisions about which projects should be modernized. It does not permit PHAs themselves to make the basic decisions about which projects should be modernized and the extent of modernization activities to undertake at a given project at any one time. Another disadvantage is that this approach encourages PHAs to undermaintain certain projects for which they expect to apply for modernization funds. A further disadvantage is that it would continue to reward "grantsmanship" abilities.

This approach may be considered desirable in light of the size of the existing backlog of Mandatory Modernization Need, $13.4 billion, and the consequent potential demands on the Federal budget. Continuing the current CIAP program with its project-based funding approach for PHAs with 500 or more units, as well as for the smaller PHAs, would continue the current approach of providing Federal modernization funds to projects with a backlog of existing modernization need in PHAs with the necessary modernization management capacity to make sure the funds are used efficiently and effectively. This would avoid the problems of providing more funds to troubled PHAs than they can reasonably be expected to use, a problem which could arise under both the formula funding and PHA comprehensive plan approaches to funds allocation. Continuing the current CIAP program could help to assure that the public housing program provides as much decent, safe, and sanitary housing as possible within the constraints of the limited funds available compared to the overall need for funds as determined from the Modernization Needs Study.

5. Offer PHAs the option of automatic formula funding based on their accrual need, or competitive project-based funding based on their backlog need

Under this approach, PHAs would be asked to choose whether they wantto receive modernization funding on a formula basis, based on their accrual need, or whether they wish to continue to receive funding based on their backlog of modernization need. If PHAs choose funding on the basis of their backlog, they would continue to be funded under the CIAP program as it existed prior to the 1987 amendments. PHAs which opt for formula funding for accrual would be making a permanent choice for this type of funding; they would not be permitted to return to a project-based funding approach in the second or subsequent years under the program. On the other hand, PHAs which opt to remain under a project-based approach for funding their backlog of modernization need would be permitted to switch to formula funding based on their accrual of new modernization need at the beginning of any future funding cycle.

Under this approach, troubled PHAs would be required to participate in the current CIAP program and would not be permitted to opt for funding by formula. Since these PHAs as a group have a large outstanding backlog of modernization need, it makes sense for them to be under the portion of the program which funds the backlog of modernization need. And, because of their past difficulties in effectively administering their modernization programs, it is desirable for them to receive the close supervision of their proposed activities, which is the current practice under the CIAP program. Once these PHAs had demonstrated their ability to effectively use modernization funds, they would be permitted to opt for accrual formula funding if they believed it would better serve their needs.

Under this option, the two funding "pots" would be determined on the basis of a funding formula giving equal weight to the backlog and to accrual. Use of a formula giving equal weight to backlog and accrual for the purposes of determining the "pots" for each purpose would make sure

that the class of PHAs opting for backlog funding and the class of PHAs choosing accrual formula funding would each get their fair share of the available funds.

Although the share of funds available for accrual funding would be determined on the basis of an equal weight for backlog and accrual, the allocation of funds to PHAs opting for accrual would be handled on the basis of an accrual-only formula.

The principal advantage to this dual funding approach is that it recognizes that a formula cannot exactly match the actual needs at specific PHAs. It, therefore, allows PHAs to examine their own circumstances and determine whether accrual formula funding or funding based on the actual outstanding backlog of need at their projects would better serve their needs. For example, some PHAs are able to fund some of the work identified by Abt Associates as part of the backlog of modernization need out of operating reserves which are applied to "betterments and additions," while others may receive some city funds for this purpose. Therefore, their actual unfunded backlog of modernization need may actually be smaller than that estimated for formula funding purposes, and they may feel they would receive more funding from an accrual formula than by applying for CIAP funding. Conversely, a PHA may have one or more projects with a very large outstanding backlog of modernization need and wish to apply for comprehensive modernization funds for these projects to take care of their needs before it moves to accrual formula funding. This approach essentially assumes that PHAs themselves are in the best position to determine whether modernization funding should be formula-based, or based on an application setting forth the needs of a particular housing project, rather than having the Federal Government make this determination.

This approach also avoids the problem inherent in any formula funding approach of providing more modernization funds to troubled PHAs than they can effectively use and then capping or reallocating such funds. Since these PHAs will stay under the CIAP portion of the program, their

applications for modernization work can be evaluated not only on the basis of their need for the funds, but also on the basis of their ability to manage their modernization program.

A disadvantage to this approach may be that more funds are included in the backlog "pot" than can be used by PHAs. Table 2-6 shows that, using a formula providing equal weights to backlog and accrual, the backlog "pot" would be at least 47 percent of the total appropriation, based on a 26.9 percent share for the very large troubled PHAs, and a 20.2 percent share for the PHAs under 500 units which would also remain under the existing CIAP program. The backlog share of the appropriation would rise if additional PHAs choose to remain under the CIAP funding approach rather than opt for formula funding. HUD may not receive sufficient applications from PHAs with modernization and management capability to use the entire appropriation and be under pressure to fund applications which are marginal, or those from PHAs which should only be funded for emergencies or management improvements, under current CIAP program rules. However, since modernization funds are available until expended, it could be clearly understood by Congress and the Administration that if sufficient fundable applications were not received, HUD would carry over unused funds, which would be used to offset the appropriations needed for the following year.

A second disadvantage to this approach is that it may be difficult for HUD to administer, especially in the initial years when it would not be clear at the beginning of the funding year which PHAs would be receiving formula amounts and which ones would be competing for project-based grants. Without a good idea of the workload under each of the two program components, HUD Field Offices will have difficulty in appropriately allocating staff and other resources to assure that PHA data are submitted and verified for PHAs wishing to receive formula funding, and to be sure that required joint reviews and other reviews and other actions take place in a timely fashion for those PHAs remaining under the CIAP program.

6. Fund accrual by formula, backlog by a modified CIAP competition

Under this approach, PHAs would receive automatic funding for accrual and would compete for backlog funds under a modified CIAP competition. For purposes of discussion, it will be assumed that half of appropriated modernization funds in a given year goes to the accrual portion and half to the backlog competition (though somewhat different proportions could also work for the proposed method).

PHAs would receive their accrual funding as a straightforward formula allocation (share of estimated accrual need times total accrual funding). Their backlog, however, would be handled by a competition in which PHAs would apply to have additional work funded from Regional pools of backlog funds (as under CIAP).

The backlog funds competition would be a modified version of the current CIAP competition. PHAs would be required to demonstrate that their accrual formula allocation over the next 5-year period under the comprehensive plan was not adequate to meet their modernization needs in order to be eligible to apply for the CIAP portion of the funds. Additionally, "recognized performer" PHAs could be given additional points in the rating process for the selection of projects to be funded.

This dual funding approach has several advantages. It is conceptually quite straightforward, with an automatic formula component and a competitive component that builds upon extensive CIAP experience. Second, it meets PHA modernization need in a flexible manner--it gives each PHA a good amount of predictable accrual funding and permits PHAs with extensive needs in some projects to apply in a competition that takes into account many factors--factors that automatic formula funding cannot encompass. Third, if the accrual pool received about half of total funding, the automatic formula share for troubled PHAs would be typically less than

their historical funding, and, thus, they would have to demonstrate in the backlog competition their capacity to handle levels of funding more commensurate with their needs. (For troubled PHAs, even the use of accrual funds could be constrained.)

One disadvantage to this approach, however, is that it could encourage PHAs to disinvest in certain projects on the assumption that the needs of those projects would be met under the modified CIAP competition. A second disadvantage for both HUD and the PHAs is that an approach which funds a portion of the inventory by formula and another portion by application could have the effect of doubling the staff workload associated with the administration of the modernization program. PHAs would be required to prepare a comprehensive plan and an action plan and also to prepare CIAP applications. Similarly, HUD staff would be reviewing the comprehensive plans, action plans, and annual statements submitted by the PHAs, and also would be expected to review and rate applications submitted for projects by these same PHAs. The administrative complexity of this approach could be a disadvantage from the point of view of both HUD and the PHAs.

7. Fund high-needs projects by a modified CIAP program, all other projects by formula

Under this approach, projects with mandatory modernization needs exceeding some threshold of need, such as $25,000 per unit, would not be included in the universe for developing the backlog and accrual formulas for distributing modernization funds, nor would they be funded by formula. These high-needs projects would be treated separately and funded out of a special allocation of funds designated for high-needs projects, if they were determined to be viable and modernization were financially feasible. Each high-needs project would be carefully examined by HUD and the PHA to be sure that the expenditure of modernization funds on the project would result in full occupancy of the project over an extended period of time after modernization. If such a finding could not be made, HUD and the PHA would jointly develop an alternative strategy for dealing with the project,

which could range from change of occupancy to outright disposition. PHAs would receive modernization funding for all of their other public housing projects on the basis of a formula distribution which would include elements reflecting both their backlog need and their accrual need.

Data available from the Abt sample would allow HUD to identify, on a national basis, the threshold of need and the approximate number of projects which would fall into the high-needs category and, therefore, the proportion of any annual appropriation for modernization which should be requested and reserved for the special allocation for high-needs projects. However, HUD data are not adequate to identify these projects on a PHA-by-PHA basis. PHAs themselves, through their comprehensive plans, would have to designate which of their projects fell into the high-needs category, and therefore would not be included in their inventory of public housing projects for automatic formula funding purposes. Once modernization work was completed on these projects, they would be incorporated in the PHA's inventory of public housing projects for formula funding purposes on a "new-project" basis, indicating that they had only accrual needs at the outset.

The principal advantage to this funding approach is that it would permit individual PHAs to focus their resources on maintaining housing projects which are now in relatively good condition, and not require them to make the hard decision to funnel resources into high-needs projects to the detriment of projects with moderate levels of rehabilitation needs, or to ignore their high-needs projects in order to maintain the remainder of their inventory in reasonable physical condition. It also offers HUD and the PHAs an opportunity to rationalize the public housing inventory, deciding which high-needs projects are simply old, and have high needs basically because of their age and the need to replace or upgrade "big-ticket" items such as electrical circuitry and kitchens and baths, and

which high-needs projects are fundamentally flawed because of poor original design, construction, or location and may not be expected to function effectively as public housing under any realistic set of assumptions about funding and occupancy.

A major disadvantage to this approach is that it does not make any provision for funding some modernization work at the high-needs projects while they are awaiting funding for comprehensive modernization under the special allocation. The PHA's regular allocation of formula funding for modernization excludes these projects so that, to the extent the PHA finds it necessary to use its modernization funds for these projects in the interim, it will ultimately shortchange its other projects. Since many high needs projects continue to operate at full occupancy despite their overall modernization needs, PHAs will, at a minimum, have to be able to address immediate "emergency" needs at these projects. As a practical matter, PHAs may find it politically difficult within their communities to address less serious needs at projects with moderate rehabilitation needs while, for example, failing to make necessary investments to assure that there is heat and hot water at a high-needs project.

Another disadvantage to this approach is that it could have the effect of encouraging PHAs to disinvest in these projects in terms of ordinary maintenance, on the assumption that those maintainance items which would ordinarily be taken care of on a day-to-day basis would be funded out of the special allocation of modernization funds for the comprehensive modernization of high-needs projects. Thus, what many perceive as a basic flaw in the CIAP program could be intensified in the revised modernization program.

A third disadvantage is that PHAs would have virtually no idea of how much formula funding they would receive in the initial year under the program. Since the formula allocations are based on a variety of characteristics of a PHA's units, withdrawal of certain units from the

formula allocation base will have an effect on the funding level for the PHA far beyond the simple effect of withdrawing "X" number of units from the formula base. Thus, PHAs will have difficulty developing realistic comprehensive plans and annual action plans for the initial year of program operation.

Also, as discussed above under Option 6, an approach which funds a portion of the inventory by formula and another portion by application would have the effect of increasing the staff workload associated with the administration of the modernization program for both HUD and the PHAs.

8. Fund high-needs projects under a modified CIAP competition, moderate-needs projects by formula, and provide no modernization funds for low-needs projects

This option is a backlog-only option intended to direct modernization funds to projects with the greatest need for modernization funding as reported by the Abt inspections in 1985. Under this option, both projects with high needs (such as over $25,000 per unit), and those with low backlog needs (for example, under $5,000 per unit) would be excluded from the formula base and from the formula distribution to each PHA. The modernization needs of the low-needs projects would also be removed from the overall national estimate of the backlog of modernization needs. The high-needs projects would be funded on a competitive basis from a separate allocation of funds requested and appropriated for this purpose. Moderate-needs projects would be funded on the basis of a formula which included only a backlog component. No funding would be provided for the accrual of new modernization need.

In addition to the advantages cited for option 7 above, this approach has the additional advantage of concentrating available modernization funding on public housing projects with the greatest modernization need. Thus, this option would allow PHAs to address the backlog as it existed in 1985 in the most rapid way of all the options.

The disadvantages to this option, in addition to those cited for option 7, include the fact that PHAs would have no incentives to include any projects in the category of those needing $5,000 or less work per unit, since no funding would be available for these units. Instead, the incentive would be for PHAs to maximize the modernization needs of their projects. Since HUD does not have enough data to determine whether a specific project falls into a high-need, moderate-need, or low-need category, the PHAs would make that determination in connection with their comprehensive plans. This incentive to include projects in the moderate-need category to the extent possible could defeat the potentially beneficial goal of focusing modernization funds on the projects with the greatest need.

A second disadvantage to this approach is that it makes no provision for addressing the accrual of new modernization need. Today's accrual is, after all, tomorrow's backlog, and failure to fund accrual simply means the accrual of a new backlog of modernization need.

A further disadvantage to this approach is that no method for meeting existing modernization needs at projects needing $5,000 per unit or less is contemplated. Although these projects obviously have lesser needs than others, they still have active modernization needs which should be addressed. PHAs could be free to use their formula funding to address the needs of any of their projects, even though projects were not included in the formula base. However, since the amount of funds available to any PHA would be dependent upon the number of units in projects with moderate rehabilitation needs, not upon the PHA's overall need for modernization work, some PHAs may be severely underfunded relative to their overall need if most or all of their units are in projects with less than $5,000 worth of needed modernization work.

Finally, dividing a PHA's projects into three separate groups might leave only one or two projects to be funded under the backlog formula. The formula is not sufficiently accurate at the project level to be used for funding only one project, with any degree of confidence that the project will not be grossly underfunded or overfunded relative to its needs.

9. Provide formula funding to PHAs based on their own assessments of which projects should receive backlog funding, and which should receive accrual funding.

Under this approach PHAs, would examine the needs of their individual projects and, based on decision rules established by HUD in consultation with the PHAs, would decide which of their projects should receive formula funding based on their accrual needs and which should receive formula funding based on their backlog needs. For example, all projects with backlog needs estimated at $5,000 or less per unit could be funded under the accrual formula, while all other projects could be funded under the backlog component of the formula.

This approach could place relatively more emphasis on the backlog formula, since nationally approximately 64 percent of all public housing units had mandatory backlog needs exceeding $5,000 per unit. Thus, at least 64 percent of the funds could be allocated to PHAs using the backlog formula. As discussed earlier in this chapter under the section addressing the implications of funding backlog only, the backlog formula provides relatively more funding to extra-large PHAs, many of which are troubled, than does the accrual formula.

However, as noted in the discussion of options 7 and 8, which are also based on PHA identification of project-by-project levels of modernization need, although data available to HUD can be used to identify the national levels of modernization need in terms of per-unit dollar amounts of modernization need, HUD cannot identify levels of modernization need on a

project-by-project basis at particular PHAs. The PHAs themselves, using the decision rules such as dollar amount thresholds established for the program, must identify which of their projects have less than a specified amount of backlog need and, therefore, would fall into the accrual funding category. The identification of levels of need for individual projects upon which the funding category was determined would logically be part of a PHA's comprehensive plan. Certain types of projects, primarily lower-density projects, might receive relatively greater funding under the accrual formula than under the backlog formula, as pointed out in Appendix B. Therefore, PHAs would have a financial incentive to downplay the backlog needs for these projects in their comprehensive plans to the extent possible given the overall condition of the projects. This incentive to ignore part of the backlog at a project could in turn adversely affect the PHA's plans for maintaining the project, since the action plan could not reflect the additional work needed at the project without being plainly inconsistent with the comprehensive plan. This approach could inadvertently encourage PHAs to ignore the modernization work needed at projects with a moderate level of backlog needs, with the consequence that these projects will continue to deteriorate.

C. How Should Funds Be Allocated to PHAs to Meet Accrual Needs?

In addition to raising the question of how funds should be allocated to meet the backlog of modernization need, Congress also asked how funds should be allocated to PHAs to meet new modernization needs as they arise. Three options for funding accrual are discussed, as follows: formula funding; funding accrual as a portion of the needs presented in PHA comprehensive plans; and funding accrual for individual projects in creating a reserve for projects modernized under the CIAP program.

1. Funding accrual by formula

Under this approach, funds would be allocated to PHAs to meet accrual needs through a formula approach such as that described above in the discussion of allocation of funds for the backlog of modernization need. Although funds would be awarded to PHAs on the basis of their accrual needs, they would be free to use them for any modernization purpose. As described in Appendix B, the formula for allocating funds to PHAs would be based on the accrual forecasting model developed by ICF, Inc., for its report Future Accrual of Capital Repair and Replacement Needs of Public Housing.

Any accrual formula allocation system should be based on the age-related accrual of capital repair and replacement needs associated with existing building systems and components. This age-related accrual for existing systems and components is estimated to be $1.8 billion during 1990 and includes the additional accrual of modernization needs that are expected to arise because of delayed funding of the accrual of modernization needs. Since age-related accrual data derive from the FIX project-level data, they provide standardized estimates that can be attributed to the project level, and thus can be used to create a formula allocation system that relies on project-level data for the allocation of funds.

Although the ICF study identifies substantial potential repair and replacement needs which it categorized as extraordinary accrual, and estimated to cost $610 million in 1990, this category of accrual should not be included in the base for a formula for allocation of accrual funds. ICF found extraordinary repair needs to be so unpredictable that they could not be included in the Accrual Forecasting Model. A further discussion of extraordinary repair needs is presented later in this chapter.

Providing modernization funding to PHAs on the basis of an accrual formula would assure PHAs of a reliable, predictable source of funds against which they could plan present and future repair and replacement needs. A formula funding approach is also relatively simple for both PHAs and HUD to administer. Accrual funding would provide modernization funds to PHAs with a relatively small backlog of existing modernization need, as well as to those PHAs with a large backlog of modernization need, thus ensuring that PHAs whose projects are now in basically sound condition will be able to maintain them in that condition into the future.

Disadvantages to formula funding of accrual include the fact that formula funding is based upon an estimate of need for funding for modernization work at a PHA, while actual needs may vary at particular PHAs, depending on the unique circumstances at each PHA. Additionally, under a formula approach, all PHAs over 500 units, whether or not they have the capacity to use the funds effectively, are entitled to an allocation of modernization funds. Under the current CIAP program, HUD may refuse to award modernization funds to PHAs which have in the past been unable to effectively use modernization funds provided to them.

2. Fund accrual as a portion of the needs presented in PHA comprehensive plans

Under this approach, PHAs would include in their comprehensive plans an estimate of the accrual needs of their projects over a specified period of time, and add these needs to their existing backlog of modernization needs to arrive at their total modernization needs. As discussed in the earlier option in this chapter on allocating backlog funds to PHAs on the basis of their comprehensive plans, modernization funds would be allocated to HUD Regions or Field Offices, and then suballocated to PHAs on the basis of their relative shares of need for modernization funds, as shown in their comprehensive plans. In this case, the relative share of needs would include both backlog and accrual needs.

A major advantage to this approach is that it would enable PHAs to plan carefully for the future of all of their housing stock over a reasonable period of time. PHAs would look not only at the condition of the stock today, but also at needs which could reasonably be expected to arise in the future due to the aging of the physical plant and equipment. Thus, allocating accrual funds on the basis of the needs shown in a PHA's comprehensive plan could encourage a wise use of available resources over the long term.

Use of PHA comprehensive plans rather than a formula to allocate accrual funds could also result in funds allocations that are more closely related to the actual accrual of repair and replacement needs at particular PHAs. While a formula can approximate the accrual needs for each PHA, by its nature, it cannot take into account unique circumstances that will affect the amount of funds needed by specific PHAs. Using comprehensive plans as the method for allocating accrual funds might also be more credible to PHAs than using a formula method of allocation.

There are, however, significant disadvantages to using comprehensive plans as the method for allocating accrual funds to PHAs. While many PHAs may already have developed repair and replacement schedules for physical components of their housing projects, these are likely to differ across PHAs, since there are no agreed upon real estate industry standards for establishing reserves for replacements. As ICF points out in the accrual report, not only is there an absence of applicable industry standards on the lives of physical systems, most commonly used "rules of thumb" are driven by tax considerations, which are irrelevant to public housing. This being the case, PHA-plan estimates of funds needed for accrual could not be used to divide up funds available for this purpose with any reasonable certainty that the relative needs among PHAs are accurately reflected in the comparison of needs presented in the various plans, or indeed that the accrual amount projected to be needed by any particular PHA actually reflects what its real needs for capital repairs and replacements in the future will be.

HUD could develop instructions for PHAs to use to estimate the accrual needs of each of their projects, based on the estimated lives of building systems and components developed by ICF for the Accrual Forecasting Model. Use of HUD instructions for developing estimates for capital reserve needs could assure consistency among PHA comprehensive plans in the forecasts of these needs for funds allocation purposes, but this would be quite labor intensive for PHAs. A reasonably accurate estimating process would require PHAs to identify or impute the age of almost 100 building systems and components for each project and calculate the remaining useful life for each of these systems and components. For older projects, many more calculations would be necessary, since individual items in units such as stoves and refrigerators may have been replaced at different times, and therefore have different remaining useful lives. The administrative complexity and expense involved in developing comparable accrual estimates for use in allocating accrual funds based on PHA comprehensive plans may not be worthwhile when the administratively simple, though less exact, method of allocating accrual funds based on a formula is available.

3. Fund project reserves under the CIAP program

As pointed out in Chapter I, the CIAP legislation contemplates funding project reserves for projects which are comprehensively modernized under the program. HUD has never implemented this provision.

Under this approach, PHAs would submit with their CIAP final application an estimate, using the ICF-developed useful lives of building components and systems, of the total cost of replacing the components and systems that would normally be replaced during the next 30 years or during the remaining period of the ACC, whichever is longer. This would include an estimate of the needs accrued to the date of the application, and an estimate of the costs that will accrue during each subsequent year. When a

project was selected for comprehensive modernization under the CIAP program, the amount of the funds awarded would not only be that necessary to fund the existing backlog, but would also include funds to establish the replacement reserve for that project based on the needs identified in the final application.

The basic advantage of this approach is that once a project has been funded for comprehensive modernization, the PHA would have the funds available to maintain that project and make necessary replacements in the future. Thus, comprehensive modernization of a project could assure the continued maintenance of the project in good condition over the long term.

The basic disadvantage of this approach is that PHAs would have to be required to maintain the reserve funds assigned to particular projects for use in those projects, no matter what the existing needs were at their other projects. Thus, while modernization funds would actually be in a PHA's bank account, they could not be used to meet immediate needs for repairs and replacements at projects to which they were not assigned. Additionally, under this approach, some PHAs would have both their backlog of modernization need and their future accrual of modernization need at a project or projects funded, while other PHAs would not receive any funds for the existing need in their projects. Since the existing backlog of modernization need is large, and funding this backlog is likely to take some time, it would be difficult to justify direct funding of a replacement reserve under the CIAP program.

D. Is a Special Fund Needed to Address Unpredictable or Extraordinary Repairs?

ICF identified certain items found in the FIX backlog as "extraordinary" because their occurrence and their magnitude could not be predicted on the basis of the age of a project or its components. These unpredictable or extraordinary repair needs are now funded routinely as

part of the CIAP program. When a PHA applies for modernization funds to address the rehabilitation needs of a public housing project, no distinction is made between repair needs that are predictable and those that are extraordinary. To the extent that modernization continued to be funded under an application process, whether through a project-based application to HUD or to a State or through an application based on a PHA's comprehensive plan, extraordinary repair needs would be expected to continue to be funded routinely. Therefore, the question of a special fund to address unpredictable or extraordinary repair needs really arises in connection with the formula funding of PHAs, particularly the formula funding of accrual needs.

Extraordinary repair needs were classified by ICF from the Abt FIX categories and, therefore, are included in the backlog estimate. Any formula based on the backlog estimates would have extraordinary repairs embedded in the project-level data and would incorporate the need for funds for extraordinary repairs. As a general rule, the higher the backlog portion of a formula, the more it will incorporate existing extraordinary repair needs in the formula base.

The future accrual of extraordinary repair needs were not modeled by ICF in its Accrual Forecasting Model because of their unpredictability. Therefore, as discussed in Chapter II, the accrual of extraordinary repair needs would not be included in any formula based on the ICF model.

In addition to their unpredictability, another problem related to extraordinary repairs is the degree to which they will be funded through insurance reimbursements for damage caused by insurable events such as fire or vandalism. The Abt and ICF reports were not designed to, and did not, provide any information on how these repairs might ultimately be funded, and to what extent they would be a direct charge on the public housing

program or might be funded from insurance payments. Thus, it is difficult to predict how much modernization money might be needed now or in the future to address the extraordinary repair needs of public housing projects.

The backlog of extraordinary repair needs was concentrated in relatively few units, as shown in Table 3-1. More than 60 percent of the extraordinary repair needs were found in slightly less than 7 percent of public housing units.

Table 3-1

Percentage of Units With Extraordinary Repair Needs at Different Levels of Extraordinary Repair Needs, and Percent of Total Extraordinary Repair Need in those Units

Extraordinary Repair Need Backlog Per Unit* (1985 dollars)	Percent Of Units	Percent of Total Extraordinary Repair Need
$5,000 or higher	6.7%	61.3%
$10,000 or higher	3.0%	42.9%
$20,000 or higher	1.2%	25.1%

*Higher levels per unit are included in the percentage of units at lower levels, that is, all units needing $20,000 or higher are included in both $10,000 or higher and $5,000 or higher.

Table 3-2 presents the distribution of the backlog of extraordinary repair needs by PHA-size class. The table shows that the share of extraordinary backlog is roughly proportional to the share of units for small (under 500 units) and medium-sized PHAs (500-1,249 units). For large PHAs (1,250-6,599 units) and New York City, the share of extraordinary backlog is substantially less than their share of total units, while the extra-large PHAs (6,600 or more units) have a disproportionate share of extraordinary backlog need. Within the size class of extra-large PHAs, extraordinary backlog is concentrated in troubled PHAs, with 17.1 percent of the units, but 32.7 percent of the backlog of extraordinary repair needs. Within these extra-large troubled PHAs, extraordinary repair needs were further concentrated in a few projects and PHAs. Less than 15 percent (14.3 percent) of the units in the troubled PHAs accounted for 69 percent of the extraordinary backlog need in the class of extra-large troubled PHAs as a whole. The Chicago and Philadelphia Housing Authorities, with about 30 percent of sampled units in very large troubled PHAs, accounted for 56 percent of the backlog of extraordinary repair needs in extra-large troubled PHAs identified in the sample.

Additional data show that extra-large troubled PHAs as a group had especially disproportionate shares of two components of extraordinary need --extraordinary need of interior systems (44.5 percent) and extraordinary need of building foundations (48.2 percent). On the other hand, shares of extraordinary need of exterior walls were fairly evenly distributed across PHA-size classes.

Table 3-2

Distribution of Extraordinary Backlog Need

PHA-Size Class (No. of Units)	Share of Units	Share of Extraordinary Backlog Need
1-499	19.2%	20.1%
500-1,249	19.2%	18.4%
1,250-6,599	26.4%	16.1%
6,600+	23.2%	39.6%
Untroubled	6.1%	6.8%
Troubled	17.1%	32.7%
New York City	11.9%	5.7%

Because of the inherent difficulty of incorporating extraordinary repair needs in a formula in a way that will accurately predict the location of those needs at a particular PHA, as opposed to among a class of PHAs, it may be appropriate to make provision for discretionary funding of unpredictable or extraordinary repair needs where appropriate to assure that basically viable housing units are maintained in the public housing stock. On the other hand, if extraordinary repair needs in viable buildings should be covered by insurance or could be prevented by sound maintenance, a discretionary fund might be unnecessary.

E. Additional Issues Which Congress Should Consider

1. How should emergencies be handled?

Emergency repair needs, for purposes of this report, are defined as those conditions which present an immediate threat to tenant health or safety and, therefore, must be corrected as soon as possible.

Emergency repair needs are not different in kind from the types of repair and replacement needs identified in the Abt survey and estimated for both the backlog of modernization need and the accrual of new need. Rather, they differ in their urgency. For example, a boiler failure may lead to an immediate need for replacement in order to provide heat and hot water for tenants, and thus fall into the category of an emergency need. A planned replacement of the same boiler in connection with the comprehensive modernization of the housing project would not be an emergency, but would be part of ongoing modernization work and would be identified as either a backlog or an accrual need.

Because the types of repairs or replacements that become emergency needs because of timing are the same types of repairs or replacements accounted for in the backlog and accrual estimates, formula funding based on these estimates will incorporate funds for emergency repairs. Therefore, the only significant issue which arises in connection with emergency repairs in a formula funding approach is whether formula-funded PHAs will have adequate funds available to them to address emergency repair needs as they arise.

The national total of emergency funding has shown only moderate variation year to year from its 1981-1987 average of $170 million per year. Emergency need funding, in fact, has not systematically increased or decreased as total CIAP approvals have increased or decreased from year to year.

In any one year, the aggregate of CIAP funding to all PHAs in a Region or Field Office has been able to handle emergency needs. But, under a comprehensive formula allocation, would individual PHAs receive enough funds to handle their emergencies? If not, how many PHAs could not meet an emergency, and by how much would they be short of funds for this purpose? A useful way to answer these questions is first to assume that emergency needs in coming years will be distributed across PHAs as emergency needs were distributed in the most recent fiscal years for which we have this data, 1985-87. The years 1985-1987 had the two lowest levels of national emergency need (in 1985 and 1987) and the highest level (in 1986) and had an average level of $164 million per year. The second assumption is that non-Indian PHAs in 1990 will be funded nationally at their 1987-1988 level ($1.71 billion in 1990 dollars). (Raising or lowering the amount by 25

percent will not greatly alter the conclusions.) The final assumption is that individual PHAs will receive a per-unit formula amount that approximates their funding under a formula system combining backlog and accrual aspects of need. Table 3-3 presents information on how well PHAs would be able to meet emergency repair needs, based on these assumptions.

As might be expected, the greatest incidence of emergency need exceeding formula allocations occurred in 1986 (with the highest level of national emergency need). Also to be expected is the finding that shortfalls tend to diminish as PHA size increases.

Table 3-3
The Proportion of PHAs and Total Level of Shortfall of Funding for PHAs With Emergency Needs Exceeding Estimated Formula Amounts

PHA-Size Class Units	Number of PHAs	Percentage of PHAs with Shortfall of Annual Formula Funding based on Equal Weights for Backlog and Accrual at $1.7 billion for 1990		
		1985 Emergency Pattern	1986 Emergency Pattern	1987 Emergency Pattern
1-499*	2,733	2.6%	5.1%	2.0%
250-499	387	.8	3.6	3.4
500-1,249	228	.4	2.6	1.3
1,250-6,599	120	.8	3.3	1.7
6,600+	21	0	0	0
New York City	1	0	0	0
		Total Needed in Excess of Formula Allocations ($ Millions)		
1-499*		$10.9	$19.1	$7.6
250-499		2.0	5.5	4.2
500-1,249		.2	8.4	.8
1,250-6,599		.5	6.0	.7
6,600+		0	0	0
New York City		0	0	0
All PHAs		11.6	33.5	9.0
PHAs with 500 or More Units		.7	14.4	1.5

* At this time the statute calls for these PHAs to remain under the existing CIAP program.

Larger PHAs have more total funding to handle unpredictable emergencies. On the other hand, Table 3-3 shows that the incidence of emergency needs exceeding formula allocations is modest among smaller PHA-size classes. Indeed, the PHA size class of 250-499, below the current legislated formula threshold of 500 units, had an estimated annual incidence of emergencies in excess of formula funds allocations no higher than 3.6 percent (or 14 of 387 PHAs) from 1985 to 1987. The total shortfall--the difference between the emergency needs and the yearly formula amount of PHAs--is also modest for any PHA-size class or for the entire stock of public housing. Table 3-3 shows that PHAs of 500 or more units would have been underfunded in total by less than $15 million in 1986 and by less than $2 million in 1985 or 1987.

Table 3-3 supports several conclusions. First, PHAs with 250-499 units should not ultimately be disqualified from a formula system because of their inability to meet emergency needs from funds allocated by formula. Second, because emergencies represent an immediate threat to tenant health and safety, it is important that PHAs have the funds to address those needs when they arise. This could be handled by a small discretionary fund at HUD to which PHAs could apply for supplementary funding when the funds available to them were inadequate to meet the full cost of necessary emergency repairs. This supplementary funding could be treated as an advance to be repaid out of future-year allocations for the PHAs. An advance might be appropriate since, as noted above, only the timing distinguishes emergency repair needs from the basic repair and replacement needs already encompassed in formula funding.

2. Energy conservation opportunities

Energy conservation opportunities, with an unfunded backlog estimate of $.63 billion in 1990, are currently funded under the CIAP program. In fact, they are mandatory under HUD's Modernization Standards Handbook and are undoubtedly desirable from both a Federal Government and a PHA standpoint. However, the major advantage of energy conservation improvements is in their impact on reducing the Federal Government's payments for operating subsidy, since the Federal Government reimburses PHAs on a

dollar-for-dollar basis for utility costs. Under these circumstances, the incentive for PHAs to make energy conservation improvements is not great. Therefore, it is not appropriate for the Federal Government to include funding specifically for energy conservation improvements in a formula funding system under which PHAs may use the funds at their discretion for any needed repairs or replacements.

Energy conservation improvements at PHAs can be funded in two ways. First, the Modernization Standards Handbook calls for replacements for aging equipment to be made with energy efficient equipment. Therefore, as a PHA modernizes its projects, it will be replacing older, inefficient equipment with modern energy-efficient equipment. The backlog estimates include the cost of new energy-efficient equipment where older equipment was identified as needing replacement, so the formula amounts based on the backlog estimate include this cost.

Second, PHAs can work with private sector companies which make energy conservation improvements in return for a share in the utility savings to identify and undertake those energy conservation measures which are cost-effective. Section 118 of the Housing and Community Development Act of 1987 amended the statutory provisions governing the payment of operating subsidy to allow PHAs to retain 100 percent of the utility cost savings resulting from these energy conservation measures for the term of the contract calling for sharing utility savings, which may be up to 12 years, in order to pay the private company which has made the energy conservation improvements. Thus, the operating subsidy system, which should eventually see the savings from the energy conservation improvements, bears the cost of funding these improvements. The private sector involvement through energy management companies, which expect to make a profit through the utility costs saved, will be beneficial to the PHAs and to the Federal Government by bringing energy management expertise to bear on the needs of public housing projects.

3. Troubled PHAs

Under any of the definitions of need discussed in this report, and at modernization appropriation levels equal to the CIAP yearly average for FYs 1987-1988, a group of very large, troubled PHAs would be allocated much greater funding under any formula option than they have received recently under CIAP. Certain definitions of need or a higher national appropriation, of course, would increase the disparity between the current CIAP funding level and the potential formula funding level for these PHAs. The relatively low CIAP funding levels for many troubled extra-large PHAs reflect HUD policy of funding only planning, management improvements, and emergency modernization work at PHAs which lack the capacity to effectively manage their modernization programs.

The disparity between past and potential future funding levels for extra-large troubled PHAs raises the issue of whether to cap, initially, the formula funding of certain troubled PHAs, and it raises the further issue of withholding or withdrawing formula grant funds in future years if a PHA is unable to use its full allocation effectively to meet program objectives.

Since 1979, HUD has designated certain PHAs as troubled because of exceptional financial or operational problems. With some exceptions, the list of troubled extra-large PHAs has remained the same during the 1980's because those PHAs have been unable to resolve the problems which resulted in their designation as troubled. In a few extreme cases, HUD or the courts have required outside management of the PHA in an attempt to improve conditions in the PHA and its projects.

Table 3-4 lists the 12 extra-large troubled PHAs as of December 1988 (unchanged from the 1985 list). It also shows their percentage increase in annual funding under several formula options relative to their recent annual funding under CIAP. To ensure comparability, the national non-Indian modernization appropriation for formula funding is assumed to be the same as that for CIAP in FYs 1987-1988 ($1.7 billion per year in

Table 3-4: The Increase in Funding of Extra-Large Troubled PHAs Under Formual Options Versus FY 87-88 CIAP Funding: PHAs Ranked by the Increase of Formula to CIAP Funding Under the First Option

PHA Name	ACC Units	Total Vacancies in Projects with 6% or More Vacancies as of 12/31/87	The Percentage Increase (or Decrease) of Formula Options Over CIAP Funding		
			Backlog Only Percent	Backlog Only Minus Past CIAP Funding Percent	Accrual Only Percent
Newark	12,900	5,400	340%	413%	166%
Chicago	39,600	3,400	242	319	86
Los Angeles	8,700	100	227	287	137
Detroit	10,100	2,200	183	242	70
New Orleans	13,600	1,200	154	213	89
San Franciso	6,900	200	114	150	63
Philadelphia	22,200	1,400	91	111	-2
Puerto Rico	56,100	600	71	94	-1
Boston	13,000	1,500	34	16	6
NCHA (DC)	11,700	1,500	24	35	-4
Dade County	10,700	1,000	11	-8	66
Cuyahoga M.	11,800	2,000	1	-4	-13
Units Total	225,300	20,500			
Formula Total			$517 ML	$587 ML	$325 ML
1987-88 Average CIAP Total	-	-	$259 ML	$259 ML	$259 ML
Net Increase	-	-	$258 ML	$328 ML	$66 ML

1990 dollars). A formula based only on a backlog estimate of FIX plus Mandatory ADDs doubles the funding of six of the PHAs, and triples to quadruples the funding of three of them. A similar formula net of 50 percent of FY 1984-1988 modernization funding doubles the funding of seven of these PHAs, and triples to quintuples the funding of five of them. A downward adjustment for vacant units (assuming the comprehensive plan shows that some of these units are not viable, and the PHA does not propose to modernize them) still allows a sharp increase in funding for the extra-large troubled PHAs under these formula options or under any formula option that gives an important role to estimates of backlog need. Even an option based only on accrual need causes sizeable increases of 63 percent to 166 percent for seven of the extra-large troubled PHAs, increases they are unlikely to manage effectively if recent funding decisions by HUD Regional Offices represent reasonable decisions about troubled PHA capacity to effectively obligate and spend modernization funds.

The potential increase in total dollar funding for the extra-large troubled PHAs is impressive. Chicago, for example, would have its modernization funding increased from about $30 million annually under CIAP in FY 1987 and 1988 to between $55 million and $125 million annually under the various formula options. For the 12 PHAs combined, the bottom of Table 3.4 gives annual CIAP approvals for 1987-1988 (in 1990 dollars), the estimated formula funding under the formula options, and the total increase--ranging from $66 million under an accrual-only option to $328 million under the backlog-only option in which 50 percent of 1984-1988 modernization funding for the PHA is deducted. The absolute level and the increase in amount of formula funding for these PHAs are substantial in themselves, and substantial relative to a national funding level set at $1.7 billion in 1990 dollars. Were the annual appropriation to be 50-percent higher, at $2.56 billion in 1990 dollars, the absolute level and the increase in the level of funds for the troubled PHAs would rise proportionately.

If past experience holds so that most of the troubled extra-large PHAs are unable to effectively obligate and spend a large increment of funds, sizeable sums of money would be unspent or wasted under an unchecked formula allocation system. Rather than tarnish at the outset a formula grant approach that should work for the large majority of PHAs, a reasonable strategy would be to cap the allowable formula funding for the small group of troubled PHAs. This cap might be set in the initial year of a formula funding approach as their average total funding in the most recent CIAP years, and in later years at a maximum 25 percent increase over the previous year's funding until they reach their formula funding level. Troubled PHAs would receive some or all of their maximum yearly increases only if they satisfactorily carried out the activities outlined in their comprehensive plans and action plans including activities necessary to eliminate vacancies.

A decision to cap the modernization funding available to troubled PHAs would result in a portion of the funds initially allocated by formula to those PHAs becoming available for other modernization uses. Depending upon the formula option chosen, the amount of money remaining for reallocation after capping of troubled PHAs could be quite large. As shown in Table 3-4, comparing formula funding options with past CIAP funding for troubled extra-large PHAs, the amount available after initial capping could be as high as $328 million if PHAs were formula funded on the basis of their backlog minus past CIAP funding, or as low as $66 million if they were formula funded only on the basis of their estimated accrual needs. If the formula option selected gave equal weight to backlog and accrual, approximately $197 million would be available initially for reuse after capping amounts for extra-large troubled PHAs. Because these estimates are based only on information about extra-large troubled PHAs, the funds available for reuse from capping all troubled PHAs could be expected to be somewhat higher. (These estimates are based on an assumed appropriation of $1.7 billion, the same in 1990 dollars as the average level of appropriations for FYs 1987 and 1988).

The combination of initial capping and of closely monitored and capped annual increases for troubled PHAs could help target Federal modernization funds each year to PHAs with the greatest need, and with the capacity to undertake rehabilitation activities to address that need. One option under this approach would be to reallocate the funds from the capped PHAs to all other PHAs with 500 or more units on a proportional basis. The minor complications that may ensue in later years of formula funding of modernization are outweighed by the advantages of effectively funding modernization need in the early 1990's.

A second option would be to reallocate capped funds from troubled PHAs to PHAs with 500 or more units under management that HUD currently designates as "recognized performers" on the basis of seven performance criteria. This option has the advantage of rewarding high PHA performers by speeding up the funding of their modernization programs. It also augments funds for PHAs that, on average, can be expected to spend them most effectively. While the current performance standards for recognized performers do not include a standard for modernization performance, the Department is now working to develop such a standard. Additionally, the current list of recognized performers includes very few non-troubled PHAs in large cities which often have the highest unfunded backlog and which sometimes have received and effectively spent higher levels of CIAP funds than they would receive under a formula. Reallocating capped funds from troubled PHAs to recognized performers would encourage these PHAs, as well as others, to make the effort to become recognized performers.

As of December 1988, recognized performer PHAs of over 500 units had less than 17 percent of all units and less than 14 percent of formula-estimated need (backlog and accrual equally weighted) of all PHAs above 500 units. If additional PHAs did not seek and achieve recognized performer status, giving these PHAs the entire reallocated amount would double their share under a formula that equally weighted backlog and accrual. Such an

automatic doubling of initial formula funds for a relatively small and less needy group of PHAs might put undue strain on the designation of "recognized performer" for modernization funding purposes.

Because some of the recognized performer PHAs may already have met most of their modernization needs under the existing modernization program, while some of the larger PHAs in this class still have substantial needs for modernization work, it may be more appropriate to make recognized performers eligible to apply for the funds available from capping the amount made available to troubled PHAs, rather than automatically distributing these funds to all recognized performers on a formula basis. Using an application process rather than a formula funding process to reward exemplary PHAs would still have the desired effect of encouraging PHAs to achieve recognized performer status, but might avoid the potential problem of overfunding some PHAs relative to their modernization needs. However, if the number of eligible PHAs is small relative to the funds available, this approach might still overfund some PHAs.

Selecting the appropriate use of funds remaining after capping troubled PHAs will depend in part on the formula option chosen under a formula funding allocation system, since, as discussed above, the amount of money available will vary significantly depending on the formula used to allocate modernization funds.

Capping the formula grants for the troubled PHAs which cannot be expected to absorb and use their initial formula allocations effectively addresses one issue relating to troubled PHAs with a proven incapacity to effectively spend their funds. A different issue arises if these PHAs, or other PHAs in the future, are unable to effectively spend the modernization funds allocated to them under the formula, either their full allocation or the capped allocation. Under the CIAP program, funds provided to PHAs lacking in the ability to manage their modernization program are normally restricted to funds for planning, management improvements, and emergencies. Under a formula funding approach, these PHAs would be entitled to either their full allocation of formula funding or, in the case of troubled PHAs, their capped allocation. To avoid having modernization funds appropriated but unused by PHAs to which they are provided build into large sums of unobligated and unexpended funds, a formula funding approach needs some mechanism to withhold or withdraw and reallocate these funds when appropriate.

The 1987 amendments to Section 14 provide that HUD may condition a PHA's annual modernization program when a PHA fails to make substantial progress toward meeting the goals and objectives set forth in its comprehensive plan and annual statement of work.

If HUD conditions the annual formula grant amount, and the PHA fails to take the required corrective action and correct the deficiency, HUD could withhold part or all of the annual grant after giving notice to the PHA.

HUD has proposed that, after a PHA's annual grant has been withheld for 2 consecutive years and the PHA has still failed to correct the deficiencies which led to the withholding of the grant, the PHA's grant amounts be reallocated to other PHAs which are capable of using the funds. These funds would be restored to the PHA once it had developed a reasonable capacity to manage its modernization program and could be expected to make effective use of the funds.

One important consideration in being able to withhold and withdraw PHA formula grants is to avoid the development of a large balance of appropriated funds which are not being used for the purposes for which they were provided. The existence of such an apparent surplus of funds could raise questions about whether the money was in fact needed, possibly jeopardizing the modernization program as a whole.

A second consideration is the need for some method to sanction PHAs with material weaknesses in their management of modernization program such that they fail to make progress toward meeting the basic objectives of the public housing program, to provide decent, safe, and sanitary housing for their tenants. Withholding or withdrawing modernization funds from PHAs which are not effectively managing their programs can focus local government and private sector attention on the problems of the PHA, and has the potential for forcing management improvements at the PHA. Without the ability to withhold or withdraw modernization funds, the Federal Government would have no real means of imposing sanctions on a poorly performing PHA, since withholding of operating subsidy is not a realistic option because it can directly and immediately adversely affect the tenants.

Chapter IV--HUD Recommendations

Summary

-- Fund PHAs with 250 or more units under management on basis of formula which gives equal weight to backlog and accrual.

- Include PHAs down to 250 units, instead of 500 as now in statute, because analysis of Abt data and MADS data indicates that these smaller PHAs also have modernization experience and would receive a large enough allocation of funds to meet most emergencies as they arise.

- Use formula weighting that provides equal weight to backlog and accrual because the backlog formula captures needs distribution as of 1985 only. The unfunded backlog in the early 1990s will be as much a result of accrued needs since 1985, for which the distribution is better captured by the accrual formula, as it will be of backlog need which existed at the time of the Abt inspections in 1985, for which the distribution is captured in the backlog formula.

- Use of backlog formula alone would provide about a third of all modernization funds to 12 troubled extra-large PHAs that would be subject to capping of their funds allocations.

-- Fund PHAs with less than 250 units under management under current CIAP program. "Pot" for these PHAs to equal the very small PHAs' share of backlog and accrual need determined in the same manner as formula funds allocations for larger PHAs.

-- Formula funding for troubled PHAs would be capped initially at their historical levels of funding, expressed as their average funding for the last three fiscal years. Increases in formula funding, determined on an individual PHA basis, would be limited to a maximum of 25 percent per year until these PHAs reach their full formula funding level. Proportion of maximum annual increase received by these PHAs to be based on the proportion of goals achieved under their Memoranda of Agreement with HUD on actions to be taken to correct major management deficiencies including their achievements in reducing vacancies.

- Example: The 12 troubled extra-large PHAs would receive $200 million more per year under the recommended formula funding system than they received in FY87-88 under CIAP. Unlikely to be able to spend these funds effectively.

-- Funds saved by capping troubled PHAs to be reallocated by formula to recognized performer PHAs, using the same formula that is used for the initial allocations.

- In early years, funds derived from capping of troubled PHAs would provide about 10 percent of all funds for PHAs for reallocation to recognized performer PHAs. These additional funds could provide a real incentive for PHAs which are not now recognized performers to improve their management and seek recognized performer status. A revised and strengthened recognized performer system will be in place before the beginning of FY 1991.

-- Fund emergency modernization needs at those few PHAs which are not able to address those needs with available modernization funds through loans from the Public and Indian Housing Loan Fund. Loans to be repaid from future years' allocations of modernization funds.

-- Fund extensive extraordinary repair needs caused by natural disasters from a special $50 million fund maintained by HUD for this purpose. The $50 million for natural disaster extraordinary repairs would be subtracted from the modernization appropriation "up front." PHAs would not be expected to repay modernization funds made available to address extraordinary repair needs caused by natural disasters. The natural disaster fund would be replenished from future modernization appropriations as necessary.

-- Encourage State and local governments to get involved in meeting the modernization needs of public housing projects by providing "bonus" funds to match State and local government contributions to public housing modernization. A special allocation of modernization funds for this purpose should be subtracted from any modernization appropriation "up front."

-- When PHA Comprehensive Plans call for deprogramming units, HUD would reduce formula modernization funding over a 3-year period to eliminate formula amounts for units to be deprogrammed. To avoid discouraging PHAs from deprogramming units which are not and cannot be made viable at a reasonable cost, the per-unit estimated need and therefore the per-unit formula amount would not be reduced to reflect the change in the PHA's characteristics as a result of the deprogramming. There would be no reduction if deprogrammed units constituted one percent or less of a PHA's public housing stock. A PHA could use formula modernization funds attributable to deprogrammed units to speed up modernization work on its other projects. HUD would also provide vouchers to the PHAs to maintain same overall level of assisted units.

Introduction

HUD has developed a series of recommendations for funding public housing modernization in the future. These recommendations are based on the information and analyses presented in the report to Congress on Alternative Methods for Funding Public Housing Modernization. A discussion of each of the recommendations follows.

1. Provide formula funding for modernization to PHAs with 250 or more units under management.

Formula funding for PHAs with 250 units or more under management would provide predictable funding levels which would allow these PHAs to effectively plan for the modernization needs of their projects over the long term. Under a formula funding approach, PHAs would have the flexibility to decide how best to meet the needs of their projects for capital repairs and replacements and over what period of time. This would be unlike the current project-based application system in which HUD ultimately has the decision-making power over what projects to fund and when to fund them. Additionally, it would eliminate the perverse incentive in the existing CIAP program for a PHA to disinvest in a project in order to enhance that project's prospect for competing successfully under a competitive application process. Under a formula funding approach, the incentive for the PHA would be to maintain all projects as well as possible, so that the available modernization funds could be used to greatest effect. Formula funding would also assure a steady stream of funds to all participating PHAs, so that PHAs with relatively modest, but still important, modernization needs would receive their share of funding. Formula funding would be administratively simpler for both HUD and the PHAs than many of the alternative approaches. Finally, formula funding for modernization might permit HUD to concentrate staff resources on monitoring and technical assistance rather than on making funding decisions.

The approach that comes closest to formula funding is funding based on PHA comprehensive plans. Under this approach. the comprehensive plans would be used to determine the relative needs of PHAs for modernization work and, therefore, their relative shares of modernization funds. This could be considered a modified formula approach. It would have the same advantages of predictability and enhancing PHA decision-making powers as does the straight formula approach. It would have the additional advantage

of providing more localized, PHA-specific estimates of PHA needs for modernization work than is possible using a formula to estimate PHA needs for this work. However, use of PHA comprehensive plans for funds allocation would result in an intrusive HUD role. To assure an equitable allocation of funds based on comprehensive plans, HUD would have to issue detailed instructions on the content of these plans so that each plan would be exactly comparable to all others. This process of developing comparable plans would be administratively time-consuming and labor intensive for both HUD and the PHAs. Even if the PHAs followed the HUD instructions to the letter, they would have an incentive to prepare plans to maximize their relative share of funding rather than to achieve the most rational allocation of resources to upgrade and maintain their housing stock, since their funding level would depend both on their plan and the plans of all other PHAs.

Retaining the current CIAP program, with its project-based funding approach, would have the advantage of directing all modernization funds to the large existing backlog of modernization need. However, this advantage is outweighed by the disadvantages inherent in the CIAP program: retaining the current heavy Federal involvement in decisions about which projects to fund for modernization, rewarding disinvestment in public housing projects, and limiting the ability of PHAs to effectively plan for the future of their public housing projects.

Options for funding modernization which include both formula and CIAP aspects are not recommended because they create double workload for PHAs and for HUD by imposing two sets of processes. These options also retain the current perverse incentive for PHAs to disinvest in particular projects while awaiting modernization funding for these projects.

2. Include PHAs with 250 to 499 units under management in the formula funding approach to modernization, as well as larger PHAs.

Formula funding should be provided to all PHAs with 250 or more units under management, rather than only those PHAs with 500 or more units. Analysis of the Abt/ICF and MADS data indicate that these smaller PHAs have backlog modernization needs. They also generally have some experience with the modernization program and, therefore, could be expected to use a formula allocation of modernization funds effectively without intensive HUD supervision.

HUD's original legislative proposal calling for formula funding of modernization limited formula funding to PHAs above 500 units because of a concern that smaller PHAs might not receive enough funds to address emergency needs. A comparison of data from MADS on funding for emergencies and probable formula amounts for smaller PHAs based on appropriations levels similar to those for FYs 1987 and 1988 shows that this concern was unfounded. Most of these smaller PHAs would be able to address emergency needs out of their formula allocation of funds. Therefore, there is no reason to deny the smaller PHAs the benefits of stability and predictability which arise from formula funding of modernization.

3. The formula which is used to fund modernization should give equal weight to backlog and accrual.

We recommend providing equal weight to the formula based on backlog needs and the formula based on accrual needs in the allocation system providing funding for modernization. There are several reasons why it is desirable to use both the backlog and accrual formulas. First, the backlog formula is based on modernization needs as they existed at one point in time, the summer and fall of 1985, and does not reflect new needs which

have accrued since that time. The accrual formula is likely to better capture the distribution of modernization needs which accumulated in the five years from 1986 to 1990 and which now form part of the backlog of modernization needs. Thus, the accrual formula also funds a portion of the current backlog of modernization need.

Second, the backlog formula would distribute to the 12 troubled extra-large PHAs about a third of all modernization funds, a much larger share than they have received in the recent past. These PHAs have generally had difficulty obligating and expending modernization funding. For this reason, we are recommending that formula allocations for these PHAs be capped initially at their historical level of funding under the CIAP program. Using the backlog formula alone to distribute modernization funds would have the effect of providing large amounts of funds to these PHAs with one hand and taking them away with the other.

Third, the formula funding system is intended to permit PHAs to address modernization needs as they arise over time. The distribution of funds made by the accrual formula is more likely to match the distribution of new modernization needs and thus more likely to permit PHAs to address those needs in the future.

4. Mandatory Modernization Need should be used as the basis for the backlog portion of the allocation formula.

For estimating PHA shares of need for formula distribution purposes, the backlog needs should be defined as Mandatory Modernization Need. The recommendation for use of this definition of backlog relates only to the distribution of funds, not to the amount of funds to be provided. Mandatory Modernization Needs are dominated by the FIX category of needs in the Abt/ICF study, which is the category of backlog need with the greatest standardization of measurement. FIX needs are 91 percent of Mandatory

Backlog Needs. Standardization of measurement is important in this context because the formula will determine relative shares of need among PHAs. For formula allocation purposes, the greater the standardization of the basic data, the more likely it is that the formula will reflect fairly the real differences in the backlog needs of PHAs.

As it happens, the choice of definition of need for the backlog formula purposes has little effect on the distribution of funds among PHA size classes or HUD regions. (The distinction between backlog and accrual has a much greater distributional effect.)

5. A portion of past modernization funding should be deducted from each PHAs estimated backlog need to arrive at realistic estimates of the relative need for funds to address the backlog among PHAs.

The allocation formula will be used to distribute modernization funds to PHAs based on their need for those funds. PHAs have markedly different past CIAP funding experiences. Some PHAs have received substantial amounts of funds to address the backlog of need identified in the Abt/ICF survey, while others have received relatively little funding. To account for this difference in past funding, we recommend that 50 percent of modernization funds provided to a PHA in Fiscal Year 1984 and all later Fiscal Years be deducted from the PHA's backlog of mandatory modernization need. If only the indirect estimates of need based on the 1985 inspections were used to determine formula need shares for PHAs, without regard to funds allocated to meet that need, there would be considerable disparity between the unfunded backlog of modernization need at particular PHAs and the formula estimate of that need. This would clearly be inequitable to the PHAs which have received relatively little modernization funding in the past.

The modernization funds deduction begins in FY 1984 since FY 1984 modernization funds would not have been spent at the time of the inspections in the summer and fall of 1985. Obviously, no funds allocated since that time could have been spent at the time of the inspection to address identified needs. The ICF study estimated that about 75 percent of the FY 1984-1988 modernization allocations will be spent on the FIX and Mandatory ADDs categories of backlog identified in 1985. These are program-wide averages. Since this percentage will vary somewhat for individual PHAs and projects, we recommend operationalizing the deduction for modernization allocations by deducting 50 rather than 100 percent of such funds. In addition, no PHA will have its total estimated need for backlog funding more than halved by this deduction.

6. PHAs with less than 250 units under management should continue to receive modernization funds under the current CIAP program.

Funding for PHAs with less than 250 units under management should continue to be provided under the current CIAP program, with its competitive application process based on current project need for modernization work. A portion of the total appropriation for modernization equal to the share of backlog and accrual needs of this group of PHAs, based on direct estimates of unfunded need, should be set aside for the competition for these smaller PHAs. These PHAs should remain under a project-based funding system because they would be unlikely to receive adequate funding in any single year under a formula-based system to address either emergencies or comprehensive modernization needs at specific projects. At the same time, many of these PHAs may have little or no experience with modernization activities, and need assistance from the HUD Field Office in developing and implementing modernization proposals.

7. Formula funding for Troubled PHAs should be limited initially to their historical levels of funding, expressed as their average funding for the last three fiscal years. Increases in formula funding, determined on an individual PHA basis, should be limited to a maximum of 25 percent per year until these PHAs reach their full formula funding level. The proportion of the maximum annual increase received by these PHAs would be based on the proportion of goals achieved under their Memoranda of Agreement with HUD on actions to be taken to correct major management deficiencies including their achievements in reducing vacancies.

Under any formula option most troubled PHAs would be allocated much greater funding than they have received recently under CIAP. The relatively low CIAP funding levels for many troubled PHAs reflect HUD policy to fund only planning, management improvements, and emergency modernization work at PHAs that lack the capacity to effectively manage their modernization programs.

For example, as of December 1988, 12 extra-large PHAs were designated by HUD as troubled. At FY 1987-1988 funding levels, funding modernization on the basis of a formula which was based only on a backlog estimate of FIX plus Mandatory ADDs, with 50 percent of FY 1984-1988 modernization funds deducted, would at least double the funding of the 12 PHAs and more than triple the funding of five of them. Even an option based only on accrual need would cause sizeable increases of 63 to 166 percent for seven of the extra-large troubled PHAs.

If past experience holds, so that most of the troubled PHAs are unable to obligate a large increment of funds or spend them on rehabilitation work of acceptable quality, sizeable sums of money would be unspent or wasted under an unchecked formula allocation system. Rather than tarnish at the outset a formula grant approach that should work for the large majority of PHAs with 250 or more units under management, a reasonable strategy would be to cap the allowable formula funding for the small group of PHAs that HUD has designated as troubled. This cap should be set in the initial year

of formula funding as the average of CIAP funding for the PHA in the three most recent years, and in later years as a maximum of a 25 percent increase over the previous year's funding until the PHA reaches its formula funding level.

Troubled PHAs would receive their maximum yearly increase only if they satisfactorily carried out all of the activities outlined in their Memorandum of Agreement with HUD to correct their major management deficiencies. Those troubled PHAs which met some but not all of the goals established under their Memorandum of Agreement would receive increases in their modernization funds allocations proportionate to the percentage of goals achieved under the Memorandum of Agreement.

8. Funds saved by capping troubled PHAs should be distributed by formula to recognized performer PHAs along with their initial allocation of funds to supplement available funds to meet their modernization needs.

Funds initially allocated for troubled PHAs but not distributed to them would be awarded to recognized performer PHAs on a formula basis to allow them to address their backlog of modernization need at a more rapid rate than they could using only their basic formula allocation of funds. The intent of restricting this additional formula distribution of modernization funds to recognized performer PHAs is to encourage other PHAs to improve their management and seek recognized performer status. HUD has very few incentives it can provide to PHAs to improve their management. It seems reasonable to allow some modernization funds to be used to provide such incentives. In addition, recognized performer PHAs can be expected to be able to use additional modernization funds both expeditiously and effectively.

HUD is currently working on a revised and strengthened recognized performer system to be in place by the start of FY 1991. The new system will include factors specifically relating to modernization, as well as to internal financial controls.

In the early years of the program, the funds available for redistribution from capping troubled PHAs will be about 10 percent of funds available for formula funding of modernization.

9. HUD should provide loans to formula funded PHAs from the Public and Indian Housing Loan Fund to meet emergency modernization needs in those cases where the PHA's annual allocation of modernization funding is inadequate to address the emergency need, and other available funds cannot be reprogrammed to meet this need. Future years' formula allocations of modernization funds would be pledged as security for the loan.

Since emergencies represent an immediate threat to tenant health and safety, it is important that PHAs have the funds to address them as soon as they arise. If emergency repair needs continue to be distributed across PHAs in the same way that they were from 1985 to 1987, a few PHAs may be unable to address emergency repair needs out of their annual funds allocation or other available funds under the formula funding approach. In the PHA size class of 250 to 499 units, only 14 of 387 PHAs would have had emergency needs in excess of the funds they would have received under the recommended formula approach. The percentage was smaller for larger size classes of PHAs, but shortfalls would have occurred for a few PHAs in all size classes except the extra-large PHAs. Although the definition of emergency repair need would be narrower under the formula than under the current CIAP program, a few PHAs still might not be able to address emergency repair needs expeditiously on the basis of their annual formula allocation of funds or by reprogramming other funds. Therefore, it is appropriate to have a source of funding available for this purpose.

Funding for emergency repair needs which exceed the funds available to a PHA should be treated as a loan, with future years' allocations of modernization funds pledged as security for the loan. Since repairs or replacements which become emergency needs because of their timing are the

same repairs and replacements accounted for in the backlog and accrual estimates, formula funding based on these estimates incorporates funds for emergency repairs. If a PHA received a special grant instead of a loan from HUD for emergency repairs as well as its full formula allocation of modernization funds in subsequent years, the distribution of funds would be unfair to other PHAs.

10. HUD should maintain a special fund of $50 million to which PHAs with extensive extraordinary repair needs arising from natural disasters can apply for additional modernization funding. This special fund should be subtracted from the modernization appropriation up front, prior to determining the formula allocations of funds to PHAs.

Formula funding cannot by its nature provide for unpredictable idiosyncratic events, such as earthquakes or hurricanes, that can cause severe damage to an individual PHA's property. Therefore, some provision must be made to address extraordinary modernization needs caused by these unpredictable events.

Because the events are unpredictable in both their timing and magnitude, it is desirable to have a reasonable sum of money available throughout the fiscal year to address potential modernization needs which might arise because of natural disasters. Based on experience with Hurricane Hugo and the Loma Prieta earthquakes in 1989, we estimate that a natural disaster reserve of approximately $50 million would be adequate to address most natural disaster modernization needs. This fund would be taken "off the top" from the initial appropriation of modernization funds for the revised modernization program, and be available until expended. Funds not needed would be carried over to the next fiscal year. If funds had been expended during the fiscal year for modernization needs arising

from natural disasters, the natural disaster reserve fund would be restored to its original $50 million level again by taking the necessary funds "off the top" from the next modernization appropriation. PHAs would not be expected to repay modernization funds made available to them to address extraordinary repair needs caused by natural disasters.

11. State and local governments should be encouraged to get involved in meeting the needs of public housing projects within their jurisdictions by providing "bonus" funds to match State and local contributions for public housing modernization. A special allocation for this purpose should be subtracted from any modernization appropriation "up front."

Despite substantial funding provided by the Federal government for the modernization of public housing projects in the 1980's, a large unfunded backlog of modernization need remains. This need can be addressed more quickly, and the living conditions of public housing residents improved more rapidly, if State and local governments join the Federal government in funding modernization work needed at public housing projects. Additionally, because State and local governments can be more intimately familiar with the conditions at particular PHAs and projects, State and local government participation can help to assure that modernization funding is targetted and spent at viable projects with the greatest need and greatest potential for lasting improvement in the lives of the tenants.

Some communities, such as New York and Baltimore, are already providing funding for public housing. A "bonus" allocation of modernization funds, in addition to the regular formula allocation of modernization funds, to PHAs which have received a commitment for funds for

physical improvements from their State or local government would encourage these communities to continue to assist public housing and encourage other States and localities to become involved with public housing by providing financial assistance to modernize specific public housing projects.

Funds for the special allocation of "bonus" modernization funding would be taken "off the top" of any modernization appropriation.

12. Formula amounts to be provided to individual PHAs should be phased down over a 3-year period when PHAs plan to demolish or dispose of units that cannot be effectively modernized. The per-unit estimated need and therefore the per-unit formula amount should not be reduced to reflect the changes in the PHA's characteristics as a result of the deprogramming. There should be no reduction in formula funding if deprogrammed units constitute one percent or less of the PHA's housing stock. Housing vouchers should be provided to these PHAs to maintain the total number of assisted housing units at the same level.

When PHA Comprehensive Plans call for deprogramming units, HUD should phase down formula modernization funding to eliminate formula amounts for units to be deprogrammed. Instead, modernization funds attributable to the units to be deprogrammed should be used by the PHA to speed up modernization work on other projects. Additionally, HUD should provide vouchers to the PHA to replace the public housing units to be demolished or disposed of, so that the PHA would maintain the same level of assisted housing units.

If HUD were to immediately reduce the unit count for formula funding purposes to reflect decisions to demolish or dispose of nonviable public housing units, this would discourage PHAs from making the decision, already difficult, to eliminate from the public housing program those units that are severely deteriorated and, because of site problems, faulty original design, poor construction, or other reasons, can not reasonably be expected to be rehabilitated at a reasonable cost and to serve effectively as public

housing over the long term. For the same reason, it would be counterproductive to reduce both the per-unit formula amount and the number of units to be funded at the end of the 3-year phase-down. The recommendation not to change the formula amount where one percent or less of a PHA's stock is planned for deprogramming is based on administrative convenience, since it would not be worthwhile to recalculate the formula based on a 2 or 3 unit change in the PHA's composition.

APPENDIX A

Estimated Formula Funding Compared to Average 1987-1988 CIAP Funding for the Largest 200 PHAs

This appendix contains two tables, as follows:

Table A-I, Estimated Formula Funding to PHAs and Selected Formula Need Options, with Partial Deduction of Unexpended Funds; and Table A-II, Estimated Formula Funding to PHAs and Selected Formula Need Options, without Partial Deduction of Unexpended Funds.

The tables in this appendix are developed from the 1985 Abt list of PHAs, and therefore use the 1985 unit count for these PHAs. This 1985 Abt list is the only source with all the data on PHA and project characteristics which are needed to develop the estimates of formula funding for PHAs. For actual funding determinations under a modernization formula, PHAs would submit updated and corrected data, as they do now for funding under the PFS, the formula used to provide operating subsidy to PHAs. The data submitted by the PHAs could affect the formula estimates. If needs other than those estimated here are funded by formula, such as lead-based paint abatement, their inclusion would also modify the formula estimates.

The Abt list did not include two PHAs which were among the largest 200 PHAs in 1985, and therefore formula allocations could not be calculated for these PHAs at this time. They are the San Diego City PHA in California and South Delta Economic Development District, Inc., in Mississippi.

The formula allocations under the various formula options are based on national (non-Indian) funding of modernization of $1.708 billion for 1990, the same amount as the average non-Indian CIAP funding for 1987-1988, updated to 1990 dollars. Formula allocations are expressed in dollars per ACC unit. Total funding for a PHA under any option would be the number of units in the PHA times the per-unit amount.

Table headings for formula options mean:

FMS--FIX + Mandatory ADDs (a backlog only option)

FPMS--FIX + Mandatory ADDs + Project-Specific ADDs 1&2 (also a backlog only option)

FAS--Age-related Accrual Only

FMAS--Age-related Accrual (50% weight) + FIX + Mandatory ADDs Backlog (50% weight)

CP8788UM--1987-88 average CIAP funding, updated to 1990 dollars

NFMS-- FIX + Mandatory ADDs Net of 50 percent of unexpended modernization funds (a backlog only option)

NFPMS--FIX + Mandatory ADDs + Project-Specific ADDs 1&2 Net of 60 percent of unexpended modernization funds.

NFMAS---Age-related Accrual (50% weight) and FIX + Mandatory ADDs, Net of 50 percent of unexpended modernization funds (50% weight)

For the options that deduct a portion of unexpended modernization funds from backlog, such unexpended funds were operationalized as total FY 84-88 CIAP and FY 87-88 MROP (Major Reconstruction of Obsolete Projects) funds. No PHA can have its backlog share of need reduced more than 50 percent by the deduction of unexpended modernization funds.

The formula estimates are intended primarily to yield PHA shares of formula need which can be converted into total funding or into per-unit funding amounts at a given level of appropriations. But the formula estimates can also yield an estimate of total unfunded backlog needs for a

particular PHA under two definitions of backlog. An example will show how this can be done. Suppose a PHA in this table had 1,708 units and had a $1,000 per-unit figure under option NFMS (FIX plus Mandatory ADDs net a portion of unexpended modernization funds), then its total funding would be $1,708,000 and its share of the $1.708 billion of funding assumed in the tables would be .1 percent. The share of .1 percent also represents the PHA's estimated share of unfunded FIX and Mandatory ADDs needs nationwide in 1990. According to Table 2-1, these needs came to $12.70 billion ($12.15 billion + $.55 billion), so that .1 percent would come to $12.7 million total needs for the PHA in the example.

Table A-I
Estimated Formula Funding to PHAs and Selected Formula Need Options, with Partial Deduction of Unexpended Funds

PHANAME	STATE	PHAUNITS	NFMS	NFPMS	FAS	NFMAS	CP8788UM
BESSEMER	ALABAMA	1226	585	667	1336	961	1487
BIRMINGHAM	ALABAMA	6702	1497	1239	1308	1403	221
GREATER GA	ALABAMA	1042	1031	1061	1298	1164	634
HUNTSVILLE	ALABAMA	1755	951	983	1278	1114	437
MOBILE	ALABAMA	4192	813	803	1307	1060	1288
MONTGOMERY	ALABAMA	2615	1036	1039	1288	1162	1330
PHENIX CIT	ALABAMA	940	1069	1069	1293	1181	917
TUSCALOOSA	ALABAMA	967	947	963	1237	1092	0
ALASKA STA	ALASKA	1332	1989	2429	1500	1745	748
PHOENIX	ARIZONA	2043	772	887	1382	1077	2977
LITTLE ROC	ARKANSAS	1659	586	671	1202	894	2586
NORTH LITT	ARKANSAS	1078	551	621	1158	855	1574
CONTRA COS	CALIFORNIA	1140	1248	1619	1641	1445	3017
FRESNO	CALIFORNIA	1072	1338	1681	1721	1530	3554
KERN COUNT	CALIFORNIA	919	1344	1658	1563	1454	0
LOS ANGELE	CALIFORNIA	2323	1997	2054	1376	1686	520
LOS ANGELE	CALIFORNIA	8745	2678	2555	1641	2159	693
OAKLAND	CALIFORNIA	3140	2380	2426	1514	1947	2222
SACRAMENTO	CALIFORNIA	1843	1760	1933	1463	1612	1574
SAN BERNAR	CALIFORNIA	1575	2072	2205	1612	1842	0
SAN FRANCI	CALIFORNIA	6898	2338	2448	1523	1930	934
SAN JOAQUI	CALIFORNIA	1097	1518	1784	1747	1633	3886
DENVER CIT	COLORADO	4568	1158	1260	1379	1269	1809
BRIDGEPORT	CONNECTICUT	2808	1443	1352	1420	1431	1401
HARTFORD	CONNECTICUT	2981	1972	1785	1427	1699	1577
NEW HAVEN	CONNECTICUT	3752	1049	1172	1263	1156	1488
STAMFORD	CONNECTICUT	1051	1371	1420	1238	1305	514
WILMINGTON	DELAWARE	2584	827	805	1240	1034	3526
NATIONAL C	DIST. OF COL	11662	2003	1785	1433	1718	1486
DADE COUNT	FLORIDA	10698	635	608	1144	889	689
DAYTONA BE	FLORIDA	1102	1113	1091	1247	1180	0
FORT MYERS	FLORIDA	1070	333	264	940	637	2032
JACKSONVIL	FLORIDA	3399	794	777	1171	983	1561
ORLANDO	FLORIDA	1662	1316	1269	1343	1329	0
ST PETERSB	FLORIDA	1051	556	387	986	771	1136
TAMPA	FLORIDA	4790	1139	970	1218	1179	1163
ALBANY	GEORGIA	937	568	693	1243	906	0
ATHENS	GEORGIA	1232	1006	1030	1274	1140	793
ATLANTA	GEORGIA	14965	1530	1308	1288	1434	866
AUGUSTA	GEORGIA	2781	1651	1460	1258	1454	1979
COLUMBUS	GEORGIA	2117	855	831	1215	1035	1570
MACON	GEORGIA	2126	625	705	1341	983	547
ROME	GEORGIA	1100	1062	1050	1206	1134	0
SAVANNAH	GEORGIA	2420	756	777	1262	1009	1947
HAWAII	HAWAII	5123	1737	1909	1471	1604	1507
CHICAGO	ILLINOIS	39635	3107	2486	1382	2244	742
COOK COUNT	ILLINOIS	2182	494	675	1005	750	1010
EAST ST LO	ILLINOIS	2634	1437	1372	1350	1394	3485
JOLIET	ILLINOIS	1099	937	1056	1152	1045	429
LA SALLE C	ILLINOIS	937	998	1136	1113	1056	166
PEORIA	ILLINOIS	1854	961	1673	1325	1143	2632

Estimated Formula Funding to PHAs and Selected Formula Need Options, with Partial Deduction of Unexpended Funds

PHANAME	STATE	PHAUNITS	NFMS	NFPMS	FAS	NFMAS	CP8788UM
ROCKFOPD	ILLINOIS	1605	857	1011	1309	1083	2455
SPRINGFIEL	ILLINOIS	1394	839	772	1307	1073	4291
ST CLAIR C	ILLINOIS	1018	348	394	923	636	4572
EVANSVILLE	INDIANA	1129	682	829	1177	929	2278
GARY	INDIANA	2256	1878	1907	1493	1686	522
INDIANAPOL	INDIANA	2622	943	1075	1279	1111	636
NEW ALBANY	INDIANA	1083	1176	1295	1257	1216	24
KANSAS CIT	KANSAS	2146	757	905	1152	955	568
COVINGTON	KENTUCKY	998	1074	1188	1285	1179	1703
LEXINGTON	KENTUCKY	1844	1792	1618	1408	1600	1338
LOUISVILLE	KENTUCKY	6176	2121	1815	1362	1741	1116
PADUCAH	KENTUCKY	1101	797	811	1179	988	670
EAST BATON	LOUISIANA	1350	726	874	1100	913	0
MONROE	LOUISIANA	1522	1435	1380	1468	1451	786
NEW ORLEAN	LOUISIANA	13627	2339	1895	1411	1875	748
PORTLAND	MAINE	1024	732	790	1189	961	1217
ANNAPOLIS	MARYLAND	1101	1200	1208	1284	1242	815
ANNE ARUND	MARYLAND	971	368	562	965	666	1169
BALTIMORE	MARYLAND	18205	1557	1355	1349	1453	1603
HAGERSTOWN	MARYLAND	1181	612	638	1143	878	4787
MONTGOMERY	MARYLAND	1078	649	791	1061	855	862
BOSTON	MASSACHUSETT	12974	1541	1460	1416	1478	1333
BROCKTON	MASSACHUSETT	1260	557	765	1041	799	1859
CAMBRIDGE	MASSACHUSETT	1661	903	1010	1230	1067	3164
FALL RIVER	MASSACHUSETT	1880	1254	1301	1247	1251	281
LAWRENCE	MASSACHUSETT	1060	726	786	1211	969	2455
LOWELL	MASSACHUSETT	1636	1020	1151	1280	1150	3260
MALDEN	MASSACHUSETT	987	1132	1270	1184	1158	1342
NEW BEDFOR	MASSACHUSETT	1650	1640	1674	1423	1532	548
SPRINGFIEL	MASSACHUSETT	1343	1100	1222	1163	1132	740
WORCESTER	MASSACHUSETT	2259	996	1100	1137	1066	1361
DETROIT	MICHIGAN	10068	2924	2436	1452	2188	854
FLINT	MICHIGAN	1089	1472	1437	1351	1412	734
SAGINAW	MICHIGAN	965	790	913	1166	978	926
DULUTH	MINNESOTA	1228	555	716	1165	860	3030
MINNEAPOLI	MINNESOTA	6780	1092	1159	1237	1164	811
ST PAUL	MINNESOTA	4222	1020	1134	1219	1120	1138
MISSISSIPP	MISSISSIPPI	1644	975	1085	1405	1190	0
KANSAS CIT	MISSOURI	2399	1171	1275	1234	1203	1014
ST LOUIS	MISSOURI	6997	3237	2675	1276	2257	602
OMAHA	NEBRASKA	2868	633	732	1173	903	2373
LAS VEGAS	NEVADA	2394	1377	1570	1273	1325	175
MANCHESTER	NEW HAMPSHIR	1199	701	847	1065	883	1540
ATLANTIC C	NEW JERSEY	1948	834	824	1169	1001	4698
BAYONNE	NEW JERSEY	1295	853	1105	1214	1034	1900
CAMDEN	NEW JERSEY	2237	1213	1106	1309	1261	4631
ELIZABETH	NEW JERSEY	1679	1498	1544	1349	1423	223
HOBOKEN	NEW JERSEY	1353	886	850	1194	1040	4920
JERSEY CIT	NEW JERSEY	3836	1579	1578	1405	1492	2425
NEWARK	NEW JERSEY	12904	2670	2261	1387	2028	521
NORTH BERG	NEW JERSEY	985	806	941	1057	931	0

Estimated Formula Funding to PHAs and Selected Formula Need Options, with Partial Deduction of Unexpended Funds

PHANAME	STATE	PHAUNITS	NFMS	NFPMS	FAS	NFMAS	CP878SUM
PATERSON	NEW JERSEY	2390	1172	1124	1321	1247	4884
TRENTON	NEW JERSEY	1954	1043	1177	1268	1155	1526
ALBANY	NEW YORK	1731	827	877	1206	1016	4594
BUFFALO	NEW YORK	5017	998	961	1334	1165	3613
HEMPSTEAD	NEW YORK	1209	555	797	1031	793	2056
NEW YORK C	NEW YORK	149416	1183	1250	1578	1381	1527
ROCHESTER	NEW YORK	2406	1708	1764	1207	1458	480
SCHENECTAD	NEW YORK	1045	719	730	1070	895	5548
SYRACUSE	NEW YORK	2304	872	803	1215	1043	6319
TROY	NEW YORK	1412	912	921	1190	1051	3574
UTICA	NEW YORK	1104	587	616	997	792	2068
YONKERS	NEW YORK	2053	1338	1424	1310	1324	1230
ASHEVILLE	NORTH CAROLI	1402	393	489	1050	721	2067
CHARLOTTE	NORTH CAROLI	4077	811	758	1231	1021	891
DURHAM	NORTH CAROLI	2099	1365	1273	1344	1354	267
FAYETTEVIL	NORTH CAROLI	902	976	1046	1276	1126	925
GOLDSBORO	NORTH CAROLI	1225	629	762	1194	912	2115
GREENSBORO	NORTH CAROLI	2405	813	832	1227	1020	574
HIGH POINT	NORTH CAROLI	1348	520	572	1215	868	671
RALEIGH	NORTH CAROLI	1984	510	562	1144	827	1314
WILMINGTON	NORTH CAROLI	1666	1172	1036	1313	1243	192
WINSTON	NORTH CAROLI	2141	1338	1266	1316	1327	0
AKRON METR	OHIO	4563	1085	1182	1315	1200	562
BUTLER CO	OHIO	1267	646	754	1009	828	1220
CINCINNATI	OHIO	6863	1933	1752	1387	1660	1084
COLUMBUS M	OHIO	5288	1152	1210	1404	1278	1351
CUYAHOGA M	OHIO	11785	1554	1598	1416	1485	1622
DAYTON MET	OHIO	4325	1603	1639	1340	1472	890
LORAIN MET	OHIO	1389	1524	1681	1315	1419	175
STARK METR	OHIO	2304	1156	1330	1364	1260	1292
TOLEDO MET	OHIO	3169	1241	1402	1507	1374	2460
WARREN MET	OHIO	1456	1394	1475	1300	1347	248
YOUNGSTOWN	OHIO	1932	1299	1325	1317	1308	2097
OKLAHOMA C	OKLAHOMA	3108	547	656	1173	860	1286
TULSA	OKLAHOMA	2584	973	1085	1155	1064	500
PORTLAND	OREGON	2492	1139	1333	1264	1202	1105
ALLEGHENY	PENNSYLVANIA	4316	938	1051	1194	1066	1497
ALLENTOWN	PENNSYLVANIA	1376	1194	1214	1194	1194	1040
BEAVER COU	PENNSYLVANIA	1945	1011	1187	1204	1107	1111
BETHLEHEM	PENNSYLVANIA	1272	545	495	1048	797	1574
CHESTER	PENNSYLVANIA	1704	2069	1907	1324	1696	1284
ERIE	PENNSYLVANIA	1727	1508	1459	1462	1485	188
FAYETTE CO	PENNSYLVANIA	1468	1033	1238	1297	1165	1099
HARRISBURG	PENNSYLVANIA	1700	1792	1571	1212	1502	2172
JOHNSTOWN	PENNSYLVANIA	1675	1239	1241	1177	1208	1884
LACKAWANNA	PENNSYLVANIA	1153	338	490	909	623	616
LAWRENCE C	PENNSYLVANIA	990	546	603	1171	858	2216
LUZERNE CO	PENNSYLVANIA	1262	749	911	961	855	0
MC KEESPOR	PENNSYLVANIA	1227	837	810	1210	1024	4629
PHILADELPH	PENNSYLVANIA	22238	3449	2707	1608	2528	1634
PITTSBURGH	PENNSYLVANIA	9745	2300	1939	1425	1863	2520

Estimated Formula Funding to PHAs and Selected Formula Need Options, with Partial Deduction of Unexpended Funds

PHANAME	STATE	PHAUNITS	NFMS	NFPMS	FAS	NFMAS	CP8788UM
READING	PENNSYLVANIA	1618	1341	1694	1176	1508	129
SCRANTON	PENNSYLVANIA	1334	355	946	1139	997	1674
WASHINGTON	PENNSYLVANIA	1002	741	1005	1212	977	2769
WESTMORELA	PENNSYLVANIA	1833	608	823	1052	830	1040
YORK	PENNSYLVANIA	943	576	763	1156	866	1341
PUERTO RIC	PUERTO RICO	56143	2353	2634	1453	2153	1474
NEWPORT	RHODE ISLAND	1106	797	832	1312	1054	3816
PAWTUCKET	RHODE ISLAND	1149	684	703	1167	925	5340
PROVIDENCE	RHODE ISLAND	2491	800	778	1236	1018	5877
WOONSOCKET	RHODE ISLAND	1285	1150	1216	1181	1166	1067
CHARLESTON	SOUTH CAROLI	1544	737	667	1275	1006	3155
COLUMBIA	SOUTH CAROLI	2239	582	556	1191	886	1206
GREENVILLE	SOUTH CAROLI	1123	387	371	1041	714	1568
S C REGION	SOUTH CAROLI	1326	964	1064	1399	1182	493
SPARTANBUR	SOUTH CAROLI	1522	1123	1134	1307	1215	90
CHATTANOOG	TENNESSEE	3685	1004	986	1281	1143	1026
JACKSON	TENNESSEE	1027	804	841	1178	991	128
KNOXVILLE	TENNESSEE	3695	901	891	1217	1059	1005
LA FOLETTE	TENNESSEE	1050	540	692	1237	889	422
MEMPHIS	TENNESSEE	7099	1256	1180	1322	1289	1342
NASHVILLE-	TENNESSEE	6421	1123	1025	1263	1193	607
AUSTIN	TEXAS	1984	472	606	1165	819	1628
BROWNSVILL	TEXAS	952	792	784	1066	929	169
CORPUS CHR	TEXAS	1899	995	966	1235	1115	822
DALLAS	TEXAS	6571	1329	1575	1370	1599	157
EL PASO	TEXAS	6151	806	822	1281	1043	1745
FORT WORTH	TEXAS	1308	818	869	1229	1024	1790
GALVESTON	TEXAS	1233	1234	1285	1268	1251	1164
HOUSTON	TEXAS	3070	1253	1314	1364	1309	1810
LAREDO	TEXAS	905	694	813	1365	1030	1508
SAN ANTONI	TEXAS	8022	1287	1304	1337	1312	425
WACO	TEXAS	903	780	774	1041	911	1138
VIRGIN ISL	VIRGIN ISLAN	4567	899	988	1374	1136	5104
ALEXANDRIA	VIRGINIA	949	1513	1533	1269	1391	0
HAMPTON RE	VIRGINIA	996	370	392	991	681	1911
NEWPORT NE	VIRGINIA	2164	716	655	1250	983	2579
NORFOLK RE	VIRGINIA	4059	1068	1106	1305	1187	2237
PORTSMOUTH	VIRGINIA	1907	1068	1092	1375	1221	2723
RICHMOND R	VIRGINIA	4461	550	448	1088	819	1537
ROANOAKE R	VIRGINIA	1467	476	535	1011	744	2484
KING COUNT	WASHINGTON	3197	1327	1485	1287	1307	416
SEATTLE	WASHINGTON	6449	1390	1447	1341	1365	318
TACOMA	WASHINGTON	1459	2167	2172	1554	1860	40
CHARLESTON	WEST VIRGINI	1450	879	973	1239	1059	540
HUNTINGTON	WEST VIRGINI	954	806	881	1162	984	861
WHEELING	WEST VIRGINI	946	718	817	1097	908	1234
MILWAUKEE	WISCONSIN	4618	725	792	1248	987	1612

NUMBER OF CASES READ = 200 NUMBER OF CASES LISTED = 200

Table A-II
Estimated Formula Funding to PHAs and Selected Formula Need Options, without Partial Deduction of Unexpended Funds

PHANAME	STATE	PHAUNITS	FMS	FPMS	FAS	FMAS	CP8788UM
BESSEMER	ALABAMA	1226	771	801	1336	1053	1487
BIRMINGHAM	ALABAMA	6702	1245	1074	1308	1277	221
GREATER GA	ALABAMA	1042	1024	1043	1298	1161	434
HUNTSVILLE	ALABAMA	1755	842	882	1278	1060	437
MOBILE	ALABAMA	4192	907	880	1307	1107	1288
MONTGOMERY	ALABAMA	2615	1122	1105	1288	1205	1330
PHENIX CIT	ALABAMA	940	1083	1076	1293	1188	917
TUSCALOOSA	ALABAMA	967	858	881	1237	1048	0
ALASKA STA	ALASKA	1332	1911	2264	1500	1706	746
PHOENIX	ARIZONA	2043	1176	1251	1382	1279	2977
LITTLE ROC	ARKANSAS	1659	824	848	1202	1013	2586
NORTH LITT	ARKANSAS	1078	839	898	1158	999	1574
CONTRA COS	CALIFORNIA	1140	1900	2132	1641	1771	3017
FRESNO	CALIFORNIA	1072	1780	1971	1721	1751	3554
KERN COUNT	CALIFORNIA	919	1694	1878	1563	1629	0
LOS ANGELE	CALIFORNIA	2323	1657	1750	1376	1516	520
LOS ANGELE	CALIFORNIA	8745	2263	2221	1641	1952	693
OAKLAND	CALIFORNIA	3140	2250	2296	1514	1882	2222
SACRAMENTO	CALIFORNIA	1843	1645	1793	1463	1554	1574
SAN BERNAR	CALIFORNIA	1575	1663	1827	1612	1637	0
SAN FRANCI	CALIFORNIA	6898	2001	2133	1523	1752	934
SAN JOAQUI	CALIFORNIA	1097	1865	2010	1747	1806	3886
DENVER CIT	COLORADO	4568	1353	1395	1379	1366	1809
BRIDGEPORT	CONNECTICUT	2808	1798	1658	1420	1609	1401
HARTFORD	CONNECTICUT	2981	1775	1648	1427	1601	1577
NEW HAVEN	CONNECTICUT	3752	1261	1318	1263	1262	1488
STAMFORD	CONNECTICUT	1051	1391	1419	1238	1314	514
WILMINGTON	DELAWARE	2584	1260	1282	1240	1250	3526
NATIONAL C	DIST. OF COL	11662	1837	1681	1433	1635	1486
DADE COUNT	FLORIDA	10698	767	721	1144	956	689
DAYTONA BE	FLORIDA	1102	906	917	1247	1076	0
FORT MYERS	FLORIDA	1070	507	421	940	724	2032
JACKSONVIL	FLORIDA	3399	907	870	1171	1039	1561
ORLANDO	FLORIDA	1662	1002	1011	1343	1172	0
ST PETERSB	FLORIDA	1051	700	538	986	843	1136
TAMPA	FLORIDA	4790	1066	937	1218	1142	1163
ALBANY	GEORGIA	937	797	855	1243	1020	0
ATHENS	GEORGIA	1232	935	961	1274	1104	793
ATLANTA	GEORGIA	14965	1480	1272	1288	1384	366
AUGUSTA	GEORGIA	2781	1629	1472	1258	1443	1979
COLUMBUS	GEORGIA	2117	983	937	1215	1099	1570
MACON	GEORGIA	2126	946	952	1341	1143	547
ROME	GEORGIA	1100	817	843	1206	1012	0
SAVANNAH	GEORGIA	2420	1032	997	1262	1147	1947
HAWAII	HAWAII	5123	1639	1783	1471	1555	1507
CHICAGO	ILLINOIS	39635	2537	2123	1382	1959	742
COOK COUNT	ILLINOIS	2182	675	786	1005	840	1010
EAST ST LO	ILLINOIS	2634	2018	1860	1350	1684	3485
JOLIET	ILLINOIS	1099	973	1056	1152	1063	629
LA SALLE C	ILLINOIS	937	946	976	1113	979	166
PEORIA	ILLINOIS	1854	1417	1424	1325	1371	2632

Estimated Formula Funding to PHAs and Selected Formula Need Options, without Partial Deduction of Unexpended Funds

PHANAME	STATE	PHAUNITS	FMS	FPMS	FAS	FMAS	CP8798UM
ROCKFORD	ILLINOIS	1605	1138	1250	1309	1249	2455
SPRINGFIEL	ILLINOIS	1394	1278	1229	1307	1293	4291
ST CLAIR C	ILLINOIS	1018	529	627	923	726	4572
EVANSVILLE	INDIANA	1129	1035	1123	1177	1107	2278
GARY	INDIANA	2256	1561	1628	1493	1527	522
INDIANAPOL	INDIANA	2622	1055	1136	1279	1167	636
NEW ALBANY	INDIANA	1083	1025	1139	1257	1141	24
KANSAS CIT	KANSAS	2146	777	887	1152	964	568
COVINGTON	KENTUCKY	998	1356	1394	1285	1321	1703
LEXINGTON	KENTUCKY	1844	1677	1548	1408	1543	1338
LOUISVILLE	KENTUCKY	6176	1844	1636	1362	1603	1116
PADUCAH	KENTUCKY	1101	773	784	1179	976	670
EAST BATON	LOUISIANA	1350	669	793	1100	885	0
MONROE	LOUISIANA	1522	1217	1202	1468	1342	786
NEW ORLEAN	LOUISIANA	13627	1899	1607	1411	1655	748
PORTLAND	MAINE	1024	923	933	1189	1056	1217
ANNAPOLIS	MARYLAND	1101	1262	1251	1284	1273	815
ANNE ARUND	MARYLAND	971	544	667	965	754	1169
BALTIMORE	MARYLAND	18205	1581	1407	1349	1465	1603
HAGERSTOWN	MARYLAND	1181	932	1016	1143	1038	4787
MONTGOMERY	MARYLAND	1078	752	844	1061	907	862
BOSTON	MASSACHUSETT	12974	1784	1670	1418	1600	1333
BROCKTON	MASSACHUSETT	1260	763	891	1041	902	1859
CAMBRIDGE	MASSACHUSETT	1661	1375	1460	1230	1303	3164
FALL RIVER	MASSACHUSETT	1880	1195	1236	1247	1221	281
LAWRENCE	MASSACHUSETT	1060	1106	1171	1211	1158	2455
LOWELL	MASSACHUSETT	1636	1497	1516	1280	1389	3260
MALDEN	MASSACHUSETT	987	1078	1191	1184	1131	1342
NEW BEDFOR	MASSACHUSETT	1650	1451	1501	1423	1437	548
SPRINGFIEL	MASSACHUSETT	1343	1624	1127	1163	1093	740
WORCESTER	MASSACHUSETT	2259	996	1073	1137	1066	1361
DETROIT	MICHIGAN	10068	2415	2097	1452	1933	854
FLINT	MICHIGAN	1089	1543	1495	1351	1447	734
SAGINAW	MICHIGAN	965	1616	1072	1166	1091	926
DULUTH	MINNESOTA	1228	844	982	1165	1005	3030
MINNEAPOLI	MINNESOTA	6780	998	1062	1237	1119	811
ST PAUL	MINNESOTA	4222	1070	1147	1219	1145	1138
MISSISSIPP	MISSISSIPPI	1644	886	983	1405	1146	0
KANSAS CIT	MISSOURI	2399	1135	1218	1234	1185	1014
ST LOUIS	MISSOURI	6997	2629	2267	1276	1953	602
OMAHA	NEBRASKA	2868	964	1002	1173	1068	2373
LAS VEGAS	NEVADA	2394	1098	1291	1273	1186	175
MANCHESTER	NEW HAMPSHIR	1199	777	876	1065	921	1540
ATLANTIC C	NEW JERSEY	1948	1270	1293	1169	1219	4698
BAYONNE	NEW JERSEY	1295	1246	1376	1214	1230	1900
CAMDEN	NEW JERSEY	2237	1347	1761	1309	1578	4631
ELIZABETH	NEW JERSEY	1679	1542	1563	1349	1445	223
HOBOKEN	NEW JERSEY	1353	1349	1354	1194	1272	4920
JERSEY CIT	NEW JERSEY	3836	2352	2212	1405	1879	2425
NEWARK	NEW JERSEY	12904	2291	2015	1387	1839	521
NORTH BERG	NEW JERSEY	985	346	942	1057	951	0

Estimated Formula Funding to PHAs and Selected Formula Need Options, without Partial Deduction of Unexpended Funds

PHANAME	STATE	PHAUNITS	FMS	FPMS	FAS	FMAS	CP8788UM
PATERSON	NEW JERSEY	2390	1784	1791	1321	1553	4884
TRENTON	NEW JERSEY	1954	1250	1317	1268	1259	1526
ALBANY	NEW YORK	1731	1259	1397	1206	1232	4594
BUFFALO	NEW YORK	5017	1517	1371	1334	1426	3613
HEMPSTEAD	NEW YORK	1209	845	1011	1031	938	2056
NEW YORK C	NEW YORK	149416	1258	1292	1578	1418	1527
ROCHESTER	NEW YORK	2406	1368	1460	1207	1287	480
SCHENECTAD	NEW YORK	1045	1095	1162	1070	1083	5548
SYRACUSE	NEW YORK	2304	1328	1278	1215	1271	6319
TROY	NEW YORK	1412	1389	1467	1190	1289	3574
UTICA	NEW YORK	1104	858	832	997	928	2068
YONKERS	NEW YORK	2053	1649	1658	1310	1479	1230
ASHEVILLE	NORTH CAROLI	1402	599	648	1050	824	2067
CHARLOTTE	NORTH CAROLI	4077	851	797	1231	1041	891
DURHAM	NORTH CAROLI	2099	1107	1070	1344	1225	267
FAYETTEVIL	NORTH CAROLI	902	873	941	1276	1074	925
GOLDSBORO	NORTH CAROLI	1225	842	909	1194	1018	2115
GREENSBORO	NORTH CAROLI	2405	901	897	1227	1064	574
HIGH POINT	NORTH CAROLI	1348	728	731	1215	971	671
RALEIGH	NORTH CAROLI	1984	746	745	1144	945	1314
WILMINGTON	NORTH CAROLI	1666	1147	1036	1313	1230	192
WINSTON -	NORTH CAROLI	2141	1019	1008	1316	1167	0
AKRON METR	OHIO	4563	1018	1101	1315	1167	562
BUTLER CO	OHIO	1267	734	801	1009	871	1220
CINCINNATI	OHIO	6863	1728	1608	1387	1557	1084
COLUMBUS M	OHIO	5288	1252	1275	1404	1328	1351
CUYAHOGA M	OHIO	11785	1634	1647	1416	1525	1622
DAYTON MET	OHIO	4325	1557	1584	1340	1448	890
LORAIN MET	OHIO	1389	1258	1421	1315	1287	175
STARK METR	OHIO	2304	1080	1226	1364	1222	1292
TOLEDO MET	OHIO	3169	1578	1643	1507	1543	2460
WARREN MET	OHIO	1456	1113	1217	1300	1206	248
YOUNGSTOWN	OHIO	1932	1700	1646	1317	1509	2097
OKLAHOMA C	OKLAHOMA	3108	675	737	1173	924	1286
TULSA	OKLAHOMA	2584	869	971	1155	1012	500
PORTLAND	OREGON	2492	1130	1280	1264	1197	1105
ALLEGHENY	PENNSYLVANIA	4316	980	1058	1194	1087	1497
ALLENTOWN	PENNSYLVANIA	1376	1067	1098	1194	1131	1040
BEAVER COU	PENNSYLVANIA	1945	1051	1179	1204	1128	1111
BETHLEHEM	PENNSYLVANIA	1272	529	789	1048	939	1574
CHESTER	PENNSYLVANIA	1704	1960	1839	1324	1642	1284
ERIE	PENNSYLVANIA	1727	1544	1491	1462	1503	188
FAYETTE CO	PENNSYLVANIA	1468	1228	1352	1297	1262	1099
HARRISBURG	PENNSYLVANIA	1700	1830	1638	1212	1521	2172
JOHNSTOWN	PENNSYLVANIA	1675	1314	1297	1177	1246	1884
LACKAWANNA	PENNSYLVANIA	1153	443	544	909	676	616
LAWRENCE C	PENNSYLVANIA	990	831	943	1171	1001	2216
LUZERNE CO	PENNSYLVANIA	1262	571	726	961	766	0
MC KEESPOR	PENNSYLVANIA	1227	1275	1291	1210	1242	4629
PHILADELPH	PENNSYLVANIA	22238	3125	2571	1608	2367	1634
PITTSBURGH	PENNSYLVANIA	9745	2278	1981	1425	1851	2520

Estimated Formula Funding to PHAs and Selected Formula Need Options, without Partial Deduction of Unexpended Funds

PHANAME	STATE	PHAUNITS	FMS	FPMS	FAS	FMAS	CP87PSUM
READING	PENNSYLVANIA	1618	1468	1404	1176	1322	129
SCRANTON	PENNSYLVANIA	1334	1110	1134	1139	1124	1674
WASHINGTON	PENNSYLVANIA	1002	1111	1255	1212	1162	2769
WESTMORELA	PENNSYLVANIA	1833	694	848	1052	873	1040
YORK	PENNSYLVANIA	943	877	982	1156	1017	1341
PUERTO RIC	PUERTO RICO	56143	2512	2380	1453	1982	1474
NEWPORT	RHODE ISLAND	1106	1214	1229	1312	1263	3816
PAWTUCKET	RHODE ISLAND	1149	1042	1120	1167	1104	5340
PROVIDENCE	RHODE ISLAND	2491	1218	1239	1236	1227	5877
WOONSOCKET	RHODE ISLAND	1285	1080	1138	1181	1131	1067
CHARLESTON	SOUTH CAROLI	1544	1121	1063	1275	1198	3155
COLUMBIA	SOUTH CAROLI	2239	857	787	1191	1024	1206
GREENVILLE	SOUTH CAROLI	1123	589	590	1041	815	1568
S C REGION	SOUTH CAROLI	1326	803	904	1399	1101	493
SPARTANBUR	SOUTH CAROLI	1522	913	951	1307	1110	90
CHATTANOOG	TENNESSEE	3685	1038	1013	1281	1160	1026
JACKSON	TENNESSEE	1027	833	854	1178	1006	128
KNOXVILLE	TENNESSEE	3695	922	906	1217	1070	1005
LA FOLETTE	TENNESSEE	1050	544	661	1237	891	422
MEMPHIS	TENNESSEE	7099	1206	1147	1322	1264	1342
NASHVILLE-	TENNESSEE	6421	989	927	1263	1126	607
AUSTIN	TEXAS	1984	719	805	1165	942	1628
BROWNSVILL	TEXAS	952	833	816	1066	949	169
CORPUS CHR	TEXAS	1899	1004	974	1235	1120	822
DALLAS	TEXAS	6571	1454	1305	1370	1412	157
EL PASO	TEXAS	6151	961	944	1281	1121	1745
FORT WORTH	TEXAS	1308	1137	1119	1229	1183	1790
GALVESTON	TEXAS	1233	1248	1279	1268	1258	1164
HOUSTON	TEXAS	3070	1444	1453	1364	1404	1810
LAREDO	TEXAS	905	934	985	1365	1150	1508
SAN ANTONI	TEXAS	8022	1087	1128	1337	1212	425
WACO	TEXAS	903	781	772	1041	911	1138
VIRGIN ISL	VIRGIN ISLAN	4567	1368	1573	1374	1371	5104
ALEXANDRIA	VIRGINIA	949	1151	1221	1269	1210	0
HAMPTON RE	VIRGINIA	996	564	625	991	777	1911
NEWPORT NE	VIRGINIA	2164	1090	1043	1250	1170	2579
NORFOLK RE	VIRGINIA	4059	1405	1373	1305	1355	2237
PORTSMOUTH	VIRGINIA	1907	1427	1380	1375	1401	2723
RICHMOND R	VIRGINIA	4461	838	714	1088	963	1537
ROANOAKE R	VIRGINIA	1467	711	715	1011	861	2484
KING COUNT	WASHINGTON	3197	1077	1238	1287	1182	416
SEATTLE	WASHINGTON	6449	1191	1263	1341	1266	318
TACOMA	WASHINGTON	1459	1680	1754	1554	1617	40
CHARLESTON	WEST VIRGINI	1450	1192	1210	1239	1216	540
HUNTINGTON	WEST VIRGINI	954	1019	1039	1162	1090	861
WHEELING	WEST VIRGINI	946	840	894	1037	968	1234
MILWAUKEE	WISCONSIN	4618	1104	1139	1248	1176	1612

NUMBER OF CASES READ = 200 NUMBER OF CASES LISTED = 200

APPENDIX B

The Development of Formula Shares for Backlog and Accrual Needs for a Modernization Grant Formula

Overview

This appendix describes, in some detail, the method for estimating PHA shares of backlog needs and accrual needs--the major potential components of a modernization grant formula. The appendix proposes and explains a method of statistical estimation applied to a weighted sample of 996 projects from the Abt and ICF studies of modernization need. The statistical relationships that are developed for this sample between project measures of need and widely available project, PHA, and community indicators can be generalized from the sample to all public housing projects in PHAs above 500 units--those PHAs required to submit Comprehensive Modernization Plans under the 1987 amendments to the legislation governing public housing modernization. (They can also be generalized to all projects in PHAs above 250 units).

The proposed method creates a formula system for modernization that is objective, equitable, and computerized. It clarifies and leaves to policy makers the choice of the final parameters--the discount for unexpended pipeline funds, the relative weighting of backlog and accrual needs, and the total amount to be funded using the formula. These parameters, together with the estimated PHA shares of backlog and accrual need, will determine the allocation to individual PHAs.

The Measures to be Estimated

Formula development for the modernization need of PHAs must handle two different aspects of need--backlog need, a cumulative measure of past needs, and accrual need, an ongoing measure of future needs. Urgency of the need, quality of data, and statistical weighting can help determine the

specific measures of both backlog and accrual need. For this appendix, two components of backlog need, FIX need and Mandatory ADDs (ISO 1&2) are the basis on which the formula is developed. Subappendices, however, apply the techniques of the basic formula development to two other categories of backlog, lead-based paint abatement and Project-Specific ADDs. In this appendix, accrual need is measured as the 1986-1995 average of age-related capital accrual needs as modeled by ICF from Abt data and updated to 1990 national totals. Both backlog and accrual are expressed in 1990 dollars and assume a non-Indian public housing unit total of about 1.3 million units.

It should be noted that the basic measures used to develop the formula--FIX and Mandatory ADDs--do not constitute the full category of Mandatory Modernization Need presented in Chapter II. The category of Mandatory Modernization Need also includes lead-based paint testing and abatement, and handicapped accessibility. The backlog estimates of FIX and Mandatory ADDs contain approximately 95 percent of the backlog of Mandatory Modernization Need, and are used for formula development because standardized information which can be applied to the project level is available for these two categories. Subappendix A shows how a formula applying to lead-based paint testing and abatement can be independently modeled and be added to the backlog formula or the accrual formula or be used independently. The estimated costs of handicapped accessibility, the final component of Mandatory Modernization Need, cannot be modeled for the purposes of allocating funds to the PHA or project level, since this information was collected on a national basis only. However, since Abt Associates estimated the cost of making projects accessible to the handicapped at approximately 2 percent of the total backlog of Mandatory Modernization Need, handicapped accessibility would have little impact on the relative distribution of funds, the purpose for which the formula is developed.

Generalizing the Measures of Need: A Project-Based Strategy

Measures of FIX and accrual need are available for almost 1,000 projects sampled by Abt inspectors in 1985, and measures of Mandatory ADDs and of Project-Specific ADDs are available for 843 projects. These projects form a sizable sample, enough to provide accurate sample estimates of need for the universe of public housing. On the other hand, the number of projects sampled (and of buildings and units subsampled) in individual PHAs is usually too small to directly sustain precise estimates of their modernization needs (New York is a notable exception).

While the Modernization Needs Study is the best source of information on the need for repairs and maintenance of the entire inventory of nearly 1.3 million public housing units, it was not designed to, and cannot, provide direct estimates of need for each of the roughly 3,100 PHAs because fewer than 300 of the PHAs are actually represented in the sample. Even the larger authorities, i.e., those with over 500 units, are not all represented, since only about 200 of the 370 authorities are included in the sample.

The wealth of data for a large sample of individual projects suggests an alternative, indirect method based on the characteristics of public housing projects for determining the relative modernization need of individual PHAs. This indirect method involves estimating statistical relationships between modernization needs and characteristics of a PHA's inventory of projects. These relationships can be estimated from the information provided in the Modernization Needs Study and from supplementary information provided by HUD and Census on the PHAs and communities in which the projects are located. These relationships are then applied to a data base containing project, PHA, and community characteristics for each authority with over 500 units to yield an estimate

of modernization needs for each of these PHAs. These PHA need estimates when expressed as relative shares of total modernization needs provide indicators of relative need and possible allocation factors that can be used to distribute aid in a formula-based funding system.

The Abt and ICF studies of modernization provide the essential tools for estimates of PHA need based on project characteristics. First, they provide measures of backlog and accrual needs for 996 projects on the basis of standardized inspection and modeling. Second, Abt collected indicators of project condition for these and 5,670 other projects in more than 950 PHAs (including almost all projects in PHAs above 500 units). Previous Abt and HUD studies also provided contextual indicators of need at the PHA and community level to apply to all of the projects. Third, the Abt and ICF studies provided sampling weights that enable statistical relationships of need for the 996 inspected projects to be generalized to all projects with the same set of objective indicators--the Abt sampling frame of 6,670 projects as well as other projects for which the data are easily collected.

For the FIX plus Mandatory ADDs measure and for the accrual measure, a useful way to establish statistical relationships with explanatory indicators is multivariate regression. Multivariate regression, a technique that HUD already uses to help set PHA allowable operating expense levels for the PFS, allows selection of a set of indicators which maximizes the explanation (or "fit") of an independent measure. The multivariate technique also suggests the explanatory contribution of each indicator, individually and in combination with other indicators. As with all statistical techniques, judgment and interpretation are necessary in multivariate regression--especially in the handling of cases that do not fit the general pattern.

The Universe of PHAs for Formula Estimates

The legislation amending Section 14 sets a threshold of 500 units for PHAs which might be formula-funded. Indicators for almost all of these PHAs were collected and computerized by Abt. There are about 370 PHAs with over 500 units, out of 3,100 non-Indian PHAs. But PHAs of 500 or more units contain about 73.5 percent of all non-Indian units. An analysis of regression coefficients and of need characteristics by PHA size, using the PHAs in the Abt sample as well as analysis of past and potential funding, all point to an eventual formula threshold of 250 units. Although this appendix provides statistical patterns for PHAs of 500 or more units, it could have shown patterns for PHAs of 250 or more units.

A common practice in estimating need for public housing is to see how much the results differ if the New York City PHA is excluded. This practice is mandatory in the case of a weighted estimate, like this one, where New York's projects represent about 150,000 units, or 15 percent of all units in PHAs of 500 or more units. Cross-tabulations as well as regression estimates show that the accrual and especially the backlog need of New York's projects are atypical of projects in other very large PHAs. Inclusion of New York projects considerably lowers the statistical goodness of fit and distorts the relative impact of any plausible set of explanatory variables. Thus, the New York PHA was excluded from the final regression estimation. Fortunately, the New York City PHA is the only PHA in the Abt sample with a sufficient number and variety of inspected projects to sustain precise sample estimates of its backlog and accrual needs. These estimates are made consistent with measures of need for the other PHAs by also capping extreme values.

Capping Extremes Values of Measures and Estimators of Need

It is possible that extreme FIX plus Mandatory ADDs backlog need values will unduly influence estimated relationships, especially in regression estimates which are designed to minimize the "squared"

difference between observed and predicted values. Extremely high and extremely low values of FIX, Mandatory ADDs, and their sums were replaced with upper and lower bounds in order to minimize these possibilities. For their sum, for instance, the upper bound was the value above which fell 10 percent of the actual FIX plus Mandatory ADDs need values after correcting for differences in the projects mix of bedroom sizes and eliminating geographic cost differences. The lower bound was selected as the value below which fell 10 percent of the FIX plus Mandatory ADDs need values (similarly adjusted). This process was carried out separately for predominantly elderly and predominantly family projects. A similar procedure was employed for values of age-related accrual need. After adjusted values were capped at high and low bounds, they were returned to their original form, which took bedroom size and geographic costs as a given.

Subappendix B4 provides a distribution of 1990 estimated need per-unit of projects before and after the capping. It shows, for instance, that the maximum capped value of FIX plus Mandatory ADDs for a project was $35,695 per-unit versus the maximum uncapped value of $81,851 per-unit and that about 1.9 percent of units in sample projects had their values capped from above $35,695 to $35,695 or below per-unit.

Selection of Project Characteristics Used as Explanatory Indicators

The project characteristics tested had to meet several criteria in order to be used as explanatory indicators in the final regression estimates of backlog need and accrual need (each estimated separately):

(1) Plausibility--Previous studies or professional judgment related the variable to some aspect of public housing need.

(2) Individual Explanatory Significance--The project characteristic variable had to be significantly related (positively or negatively), with 97.5 percent confidence, to the need measure--in statistical terms, a "t-ratio" above 2 or below minus 2 as appropriate.

(3) Net Explanatory Impact--When added to other characteristic indicators, the characteristic adds significantly to the fit (for this appendix, an increase in "adjusted R-squared " of at least .25, when the maximum R-squared is 100).

(4) Expected Sign--The characteristic is related to the estimated measure in the expected direction (over different time periods, in the case of the accrual measure).

(5) Non-collinearity--The explanatory indicator cannot be explained to a large degree by one or a set of other explanatory indicators (operationalized by an R-squared of less than 75, where 100 is maximum). When indicators are collinear, the indicator with the best data quality and rationale is chosen, or collinear indicators are combined.

(6) Clarity--The indicator has a clear-cut specification not easily manipulated in data reporting.

(7) Continuity--The indicator has as continuous a range of values as possible to avoid a notch effect.

(8) Ease of Collection--The indicator has been collected, or can be collected, in standardized form from all PHAs.

Indicators Selected for the Backlog Estimate

Under the selection guidelines just described, eight indicators were chosen to estimate FIX plus Mandatory ADDs per unit. (See subappendix B-3 for methods and indicators considered but not chosen). These indicators, their exact specification, and a brief rationale of their influence on backlog are summarized below. The first five indicators are project specific, and the next three apply to the PHA and community environment:

1. Average Number of Bedrooms Per Unit in a Project (AVEBED) (efficiencies counted as zero bedrooms). Represents the mix of elderly and family units and represents the square footage per unit that can require repair. A higher number should yield higher backlog per unit.

2. Total Family Units in a Project (FAMPR) (Total number of units with 2 or more bedrooms, capped at one thousand). Represents the concentration of households with children and their possible burden on physical and administrative capacity. It also represents the physical and social environment of a large city. A higher number should yield higher backlog per unit.

3. Large Family Units in a Project (LFAM) (The difference between the average number of bedrooms per unit and 2.5, with values below zero set to zero). Represents very large families and a concentration of children in a project, with consequent wear and tear on the physical facilities. A higher number should yield higher backlog per unit.

4. High-rise Family Project (HRFAM) (A value "1" is given for projects averaging at least 35 units per buildings and averaging at least 1.5 bedrooms per unit or averaging between 1.2 and 1.5 bedrooms per unit and having at least 100 units of 2 or more bedrooms). Represents the special problems such as elevator

repair of housing families with children in high-rise buildings. A value of 1 should yield higher backlog per unit, relative to all other projects given a value of zero.

5. Age of the Project (BLDAG) (The physical age of the project as of 1985, capped at 50 years for acquired projects). Represents years of physical wear and, sometimes, years of undermaintenance. A higher value should yield higher backlog per unit.

6. Total Family Units in a Large PHA (FAMLPHA) (The number of units with 2 or more bedrooms in a PHA, with 5,000 deducted from that number. Values are capped at zero and 15,000). Represents the complex social and physical environment of housing low-income families in a concentrated manner in a large PHA. A higher number should yield higher backlog per unit.

7. Area Cost Index (MEANS) (The R.S. Means index, used in the Abt and ICF studies, calibrated nationally at 1.00, with values expressed as the index minus 1). Represents inter-area differences in the cost of rehabilitating a given physical property. A higher value should yield higher backlog per unit.

8. Severe Population Decline in the Community (SPOPL) (Population loss from 1970 to 1980 in excess of 12 percent for the community. When community population loss is below 12 percent or when the project is elderly, the value is zero). Represents community and neighborhood problems, such as abandonment of property, that can accentuate wear and tear for projects with children. A higher value should yield more backlog per unit.

Goodness of Fit and Final Specification

Across projects in the inspection sample in PHAs of 500 or more units, excluding the New York City Housing Authority, these eight indicators account for 51.1 percent of the statistical variation in the capped measure of FIX plus Mandatory ADDs per unit. This is a very good fit because project backlog costs can vary for reasons that objective indicators cannot easily reflect or are not desired to reflect. Such reasons include sampling and measurement error in Abt's estimate of FIX, the non-standardized PHA judgements that underlay Mandatory ADDs, the varying soundness of initial project construction, the varying quality of past management, disparities in modernization and maintenance funding, natural catastrophe, vandalism, and so forth. Moreover, the degree of fit between estimated and measured values of backlog is 15 points higher at the PHA level, because some of the difference in the measures and estimates of need for projects cancel out within PHAs. PHAs in the sample typically had projects whose estimated backlog need was higher than measured backlog need and projects whose estimated need was lower than measured backlog need. (For extra-large PHAs with many projects in the sample, the sum of the differences between estimated and measured project need was often less than half of the sum of these differences expressed in absolute terms (i.e., negative and positive values were always treated as positive). When individual PHAs were combined into large groupings such as PHAs grouped by number of units, the fit between estimated and actual and measured values is even closer. For instance, the unit-weighted sum of projects in extra-large PHAs (PHAs of more than 6,600 units, excluding New York) had a capped measure of FIX plus Mandatory ADDs of $14,199 per unit, extremely close to the regression estimate of $14,060 per unit.

The initial capping of the measures and indicators of backlog need was sufficiently restrained that the sample shows a few projects whose estimated need is far below or above their measured need. These projects, which often have problematic data, distort a representative relationship between the estimators and measure of backlog, because regression

statistics and coefficients are based on the squared difference between measured and predicted values. To prudently lessen distortion, .5 percent of unit-weighted projects with the greatest positive and negative difference were dropped from the final regression estimation (though such projects would be funded in any formula allocation). In the final regression estimate, the project-to-project degree of fit rose from 51.1 percent to 53.8 percent of the variation explained (with 67 percent of inter-PHA variation explained).

Although the above procedure attempts to represent most fairly the needs of different PHAs rather than replicate the initial measured values of FIX and Mandatory ADDs, the regression estimates come quite close to reproducing the sampling distribution of measured need for larger groupings of PHAs. For instance, the backlog need of extra-large PHAs based on regression estimates is 37.5 percent of the total, versus its 39.1 percent share of measured need (which included projects with uncapped need well above $50,000 per unit). Examination of the regression process further shows that six of the eight indicators provide over 95 percent of the statistical fit betweeen estimated and measured need. A final formula specification would have to balance the costs of each indicator with the additional precision it provides.

Table 1 presents regression coefficients of the eight indicators as well as the "constant" term that calibrates the expected and measured average of backlog need. It then shows how backlog is estimated for a variety of projects.

Table 1: Estimating FIX Plus Mandatory ADDs Per Unit for Three Types of Project

Indicator[a]	Regression Coefficient	Indicator Values — Project Type: FM[c]	EL[d]	LFL[e]	Net Effect on Estimated Need[b] — Project Type: FM	EL	LFL
1. AVEBED	1237.0	2.0	1.0	3.0	$2474	$1237	$3711
2. FAMPR	3.07	100	0	300	307	0	921
3. LFAM	8346.9	0	0	.5	0	0	4173
4. HRFAM	4666.0	0	0	1.0	0	0	4666
5. BLDAG	180.6	20	10	30	3612	1806	5418
6. FAMLPHA	.427	0	0	2000	0	0	854
7. MEANS	15897.9	-.02	+.02	+.02	-318	318	318
8. SPOPL	685.4	0	0	4	0	0	2742
Constant	309	309	309	309	309	309	309
		Predicted Need Per Unit:			$6,384	$3,670	$22,873[f]

(See footnotes next page)

Footnotes

a The indicators are listed in the same order as they are explained in the text on pages 7-8. They can be summarized as follows:

(1) AVEBED - Average number of bedrooms per unit in a project
(2) FAMPR - Number of family units in a project
(3) LFAM - High share of large family units in a project
(4) HRFAM - High-rise family project
(5) BLDAG -Age of the project
(6) FAMLPHA - Family units in a large PHA
(7) MEANS - Means cost index Minus 1.0
(8) SPOPL - Severe population loss

b Regression Coefficients of Table 1 multiplied by the respective indicator values. Thus, $2474 is the product of $1237 and 2.0.

c A "family" project in a medium PHA. It is assumed to average 2 bedrooms per unit; to be in a PHA with 400 units of 2 or more bedrooms; to be in an area with a R.S. Means index of .98 (so the Means indicator is -.02=.98-1.0); and to be in a community whose population increased 1 percent from 1970 to 1980.

d An "elderly" project in a very large PHA. It is assumed to average one bedroom per unit and to be in an area with a R.S. Means index of 1.02, so that .02=1.02-1.00. Although the PHA for this elderly project has 7000 family units and its area had a population loss of 16 percent, the "elderly" project is still given a value of zero on the FAMLPHA and SPOPL indicators. Compare this to the very large family project assumed to be in the same PHA (footnote e).

e A large family project in a very large PHA. It is assumed to average 3.0 bedrooms per unit (so the value for LFAM is .50, which is 3 minus 2.5); to be in a PHA with 7000 units of 2 or more bedrooms (so its indicator value for FAMLPHA is 2000=7000-5000); and to be in a community with a population loss of 16 percent from 1970 to 1980 (so its value for SPOPL is 4=16-12).

f In order to be calibrated to estimated 1990 levels of unfunded need, the regression coefficients and the constant (and the net effect on estimated need) would be multiplied by 1.103.

By setting up "simple" values for three varied projects, Table 1 clarifies the definition of indicator values and their relative impact when regression coefficients are applied to them. Table 1 presents values for three quite different projects: a family project in a medium-sized PHA (Project FM), an elderly project in an extra-large PHA (Project EL), and a large family project in the same extra-large PHA (Project LFL). Table 1 first illustrates how values are derived for the eight indicators this appendix has defined. For instance, the variable "LFAM," defined as the positive difference between average bedrooms per unit and 2.5, takes on the value of 0 when the average number of bedrooms per unit is set at 1.0 or 2.0 and takes on the value of .50 (3.0-2.5) when the average number of bedrooms per unit is set at 3.0.

Table 1 then illustrates how a single indicator such as LFAM differentiates the estimated backlog need per unit of an elderly and a large family project in the example by $4173, or the regression coefficient of 8346.9 times the LFAM value of .50 for the large family project. Table 1 further illustrates how regression coefficients work interactively. For instance, if "LFAM" were the only estimator of backlog, it would differentiate by much more than $4173 the per-unit need of the elderly and large family projects. But in a multivarite regression, "LFAM" is one of many indicators, some of which have related impact on need. One such estimator in Table 1 is AVEBED, which LFAM might be said to intensify, and AVEBED differentiates the illustrative elderly and family projects by an additional $2474 per unit ($3711 minus $1237).

Indicators Selected for the Accrual Estimate and Differences from Backlog Indicators

Using the selection guidelines described earlier for backlog, six indicators were chosen to estimate accrual need per unit.[1] Summarized below is the exact specification of these indicators and a brief rationale of

their expected influence on the accrual measure (as modeled by ICF, averaged for 1986 to 1995, and capped for very low and high values). The first four indicators are project-specific:

(1) Average Number of Bedrooms Per Unit (AVEBED) (efficiencies counted as zero bedrooms). Represents the mix of elderly and family units and represents the square footage per unit that can require repair. A higher value should yield higher accrual per unit.

(2) Age of the Project (BLDAG) (The physical age of the project as of 1985 capped at 50 years for acquired projects). Represents stages of system lives. Up to a certain age, as modeled, a higher value should yield higher accrual per unit.

(3) Large Family Units in a Project (LFAM) (The difference between the average number of bedrooms per unit and 2.5, with values below zero set to zero). Represents large families, with more children per unit, and, consequently, more wear and tear on physical systems. A higher value should yield higher accrual per unit.

(4) Low-rise Projects (LRIS) (The difference between five units per building and the actual number of units per building, e.g., a maximum value of four for single-unit buildings with values below zero set to zero). Represents the likelihood of fewer economies of scale for major systems and the likelihood of larger square footage of floors, walls, and roof covering when number of bedrooms per unit is held constant. A higher value should yield higher accrual per unit.

(5) Cost Index (MEANS) (The R.S. Means Index used in the Abt and ICF studies, calibrated nationally at 1.0, with values expressed as the index minus 1.0). Represents inter-area differences in the cost of rehabilitating a given physical property. A higher value should yield higher accrual per unit.

(6) PHA Total Units (PHAUN) (The total number of units in the PHA capped at 8000). Represents the probable complexity of physical systems not captured by project-specific indicators. A higher value should yield higher accrual per unit.

Despite points of similarity, the selected indicators of accrual differ in their specification, impact, and statistical fit from the selected indicators of backlog need. Consider specification first. The accrual list does not include an indicator of total family units in a project, and its measure of PHA size does not give a special threshold role to extra-large PHAs, as does the backlog measure of size. Moreover, the accrual indicator for low-rise buildings tends, all else being equal, to work for small PHAs with their greater share of low-rise buildings. By contrast, the backlog list had an indicator for high-rise family buildings, which are concentrated in several very large PHAs.

Table 2 illustrates the impact of the accrual indicators in a regression equation developed in the same manner as the equation developed for backlog. The table uses the same prototypical projects from the backlog example--a family project in a medium-sized PHA, an elderly project in an extra-large PHA, and a large family project in the same extra-large PHA. As with backlog, the estimated accrual need of the large family project in the extra-large PHA is highest; that of the family project in the medium PHA is next highest; and that of the elderly project is lowest. But the percentage differential is much less for accrual need than for backlog need--for instance, the large family project in the extra-large PHA had estimated accrual needs 20 percent higher than the total of the family project in the medium-sized PHA, whereas its estimated backlog need in Table 1 was 257 percent higher. These percentage differences are illustrative, not exact averages.

Differences in the indicators of accrual and backlog needs simply reflect differences in the measures of backlog and accrual needs that are being estimated. Backlog and accrual are markedly different both in concept and in the way they are measured. Backlog in concept is an accumulation of need that can be expected to be higher, all else being equal, in older or undermaintained projects. These types of projects are usually found in larger PHAs. Accrual in concept is an incremental project modernization need that arises as systems age and begins to be high in projects of medium age. Many medium-sized and small PHAs have housing projects in this age range. In practice, moreover, the accumulation of backlog needs in some projects in larger PHAs led to their partial abandonment by both tenants and management, thereby intensifying their backlog. Backlog can mark the ravages of long, neglectful time, whereas accrual is the slow decay of steady time.

TABLE 2: Estimating Accrual for Three Types of Projects

Indicator[a]	Regression Coefficient	Indicator Values, Project Type[c] FM	EL	LFL	Net Effect on Estimated Need[b], Project Type FM	EL	LFL
1. AVEBED	100.1	2.0	1.0	3.0	$200 [b]	$100	$300
2. BLDAG	10.4	20	10	30	205	104	312
3. LFAM	356.7	0	0	.5	0	0	178
4. LRIS	87.1	3	0	0	261	0	0
5. MEANS	679.1	-.02	+.02	+.02	-14	+14	+14
6. PHAUN	.0144	1000	8000	8000	14	115	115
Constant	602.1	602.1	602.1	602.1	602	602	602
		Predicted Accrual Per Unit:[d]			$1268	$935	$1521

Footnotes

[a] Indicators are defined in the order named, on pages 13-14 of the text.

[b] Regression coefficients of Table 1 multiplied by the respective indicator values. Thus, $200 is the product (rounded) of $100.1 and 2.0.

[c] See the footnotes to Table 1 for a discussion of indicator values (often of overlapping variables).

[d] The regression coefficients and the predicted accrual estimates were developed to yield relative project levels of need, not their absolute level for a given year. Relative levels, however, can be calibrated to absolute levels. For example, in order to be calibrated to estimated 1990 levels of need, the regression coefficients and constant (and the net effect on estimated need) would be multiplied by 1.143.

These conceptual differences between backlog and accrual were accentuated by differences in the way they were measured. Backlog was measured by Abt as it actually existed in all of its forms, in vacant or undermaintained buildings as well as in well-maintained projects, whereas accrual was modeled by ICF as it would be expected to occur in a well-maintained project, where repairs and replacements were made as needed and where vandalism was not a problem. The only behavioral assumption in the ICF model of accrual is that family projects show shorter lives than elderly projects for a limited number of building components and systems such as elevators. Otherwise, the ICF model had the age, number, size, and complexity of building systems and components working directly with cost algorithms to yield an accrual figure. To illustrate, ICF's model would often predict a lower accrual cost per unit for a high-rise family project than for a comparable low-rise family project, because the high-rise project had physical economies of scale such as less square footage of roof per unit. By contrast, the high-rise family projects Abt inspected often had a much higher backlog per unit than comparable low-rise family projects, because the high-rise family projects ill-fit the needs of their tenants.

The final important difference between the accrual and backlog estimates is that the accrual estimates fit the accrual measure less precisely than the backlog estimates fit the backlog measure. Whereas the backlog regression equation accounted for 54 percent of statistical variation, the accrual regression equation accounted for 37 percent of project variation. The accrual fit is decent enough, and it is somewhat higher for projects grouped into their PHAs. This allows large aggregates of projects and PHAs to have an estimated need quite close to modeled need. For instance, projects in very large PHAs averaged an estimated total accrual need that was 98.4 percent of their total need as modeled by ICF.

If per-unit accrual need varies much less than backlog need between projects and PHAs, then estimates of accrual need do not have to be as precise as the estimates of backlog to work in a formula system. Indeed, part of the reason for the lesser precision of the accrual estimates is that accrual, as modeled, varied only moderately between types of projects and their PHAs. The other part of the reason is that the variations remaining in the accrual estimates were the by-product of a complex, differential aging of different physical systems--an aging that was not linked to project or PHA characteristics in a simple way. For instance, many of the costliest accrual actions were modeled to occur, on average, about the 20th year of a system's age. Consequently, buildings that in 1985 were about 20 years old (or 40 years old) averaged much higher accrual for the period 1986-1995 than projects which were 25 to 35 years old in 1985. An indicator that reflected these results improved the statistical fit of the accrual estimate by several percentage points. But this indicator was not used because it was too complex for a formula system and because it applied only to the period 1986-95.

Summary

In summary, this technical appendix shows how per-unit estimates of FIX plus Mandatory ADDs backlog need and accrual need can be made for any project with the objective indicators available for all projects in PHAs over 500 units (or PHAs over 250 units). The subappendix that follows shows that the method works for an enlarged definition of backlog need.

SubAppendix B1: Alternative Measures of Backlog

This section presents two modifications to the backlog measure of FIX plus Mandatory ADDs used in the body of the appendix. These are: enlarging the definition of backlog need to include lead-based paint abatement and including Project-Specific ADDs, ISO 1&2. It shows that the methods developed for the measure of backlog can be extended to these modifications.

Lead-Based Paint Abatement

The first alternative would enlarge the formula definition of backlog need to include lead-based paint abatement. Lead-based paint testing and abatement is a mandatory modernization activity, whenever it is required by HUD regulations. A possible difficulty in its inclusion for a formula is that the regulatory requirements and, therefore, the cost implications of lead-based paint abatement are in flux. Once regulatory requirements and estimated costs of meeting those requirements are agreed upon, lead-based paint need could be added to the estimates of FIX plus Mandatory ADDs for each project. Abt developed algorithms for assigning the incidence of lead-based paint abatement needs on the basis of a project's age and family status. An algorithm appropriate to the regulatory requirements for lead-based paint abatement could be applied to an estimate of total lead-based paint abatement costs to determine per unit amounts for each project in the formula inventory. Then, total project and PHA needs for lead-based paint abatement could be computed. These PHA totals would be added to the PHAs totals of FIX plus Mandatory ADDs, as part of an overall estimate of PHA backlog need, from which PHA shares would be computed for the backlog part of the formula.

Project-Specific ADDs

Project-Specific ADDs, ISO 1&2, share with Mandatory ADDs a basis in PHA responses to a coded checklist for projects in Abt's inspection sample--responses that lacked the standardization and inspection detail of the FIX estimates. It is also arguable that many Project-Specific ADDs, especially those rated 2 ("probably appropriate") by the Abt inspectors, lack the priority of a typical FIX action for the physical repair of the stock and the health and welfare of tenants. Nonetheless, Project-Specific ADDs can be incorporated into an estimate of backlog need, and in such a way that some of its problems are muted.

The method is similar to that used for incorporating Mandatory ADDs into FIX. For PHAs above 500 units, excluding New York City, the adjusted values of Project-Specific ADDs, ISO 1&2, of FIX plus Mandatory ADDs, and of their sums are capped separately for family and elderly projects in the same way as described in the basic appendix. Subappendix B4 provides a distribution of 1990 estimated need per unit for FIX plus Mandatory ADDs plus Project-Specific ADDs, ISO 1&2, before and after the capping. It shows, for instance, that the highest uncapped valued of a project was $129,651 per unit, versus the maximum capped value of $48,715 per unit, and that about 2.6 percent of units had their values capped from above $48,715 to $48,715 or below per unit (usually to between $35,000 and $45,000 per unit).

The indicators used to estimate FIX plus Mandatory ADDs work well to estimate FIX plus Mandatory ADDs plus Project-Specific ADDs. In fact, using the indicators explained 53% of the statistical variation--a high fit that is assisted by the capping procedure, because some of the per-unit project values of Project-Specific ADDs were extremely high and were not explainable by objective indicators of project condition.

Table 3 shows the regression coefficients for the seven indicators finally used in the regression equation for a backlog consisting of FIX plus Mandatory ADDs plus Project-Specific ADDs, ISO 1&2. It also applies the coefficients to indicator values for the prototypical projects used in Tables 1 and 2. The relative role of the coefficients in Table 3 approximates their role in Table 1, when only FIX plus Mandatory ADDs were being estimated. That is no surprise, because FIX plus Mandatory ADDs dominate the combined measure of backlog need that is estimated in Table 3. The moderate difference between the regression estimates in Tables 1 and 3, reflecting the capped as well as uncapped distributions of the various measures of need, is that inclusion of Project-Specific ADDs lessens somewhat the relative need of extra-large PHAs. The regression equation in Table 3 gives a relatively lesser role (i.e., relative to the other coefficients) to the direct indicator of extra-large PHA size, (FAMLPHA),

and it deletes one indicator, FAMPR, an indicator of total family households in a project, that was highly associated with PHA size. Moreover, the regression equation in Table 3 lessens the relative role of the intensive measure of large families, LFAM. Thus, inclusion of Project-Specific ADDs lowers somewhat relative differences in backlog need between types of projects and PHAs.

Table 3 -- Estimating FIX Plus Mandatory ADDs Plus Project-Specific ADDs 1&2 for Three Types of Project

Indicator	Regression Coefficient	Indicator Values Project Type: FM	EL	LFL	Net Effect on Estimated Need Project Type: FM	EL	LFL
AVEBED	2858.7	2.0	1.0	3.0	5718	2859	8577
FAMPR	N/A	100	0	300	N/A	N/A	N/A
LFAM	7295.7	0	0	.5	0	0	3648
HRFAM	5555.8	0	0	1.0	0	0	5556
BLDAG	206.5	20	10	30	4130	2065	6195
FAMLPHA	.433	0	0	2000	0	0	866
MEANS	27544.3	-.02	+.02	+.02	-551	551	551
SPOPL	759.5	0	0	4	0	0	3038
CONSTANT	1412.9	1413	1413	1413	1413	1413	1413
	Predicted Need Per Unit:				10,710	6,888	28,844

Note: See footnotes to Table 1 for an explanation of the variables and of the illustrative indicator values. In order to be calibrated to 1990 nationwide totals of unfunded need, the regression coefficient and constant (and the net effect on estimated need) would be multiplied by 1.116.

Subappendix B2: Updating Backlog Need at the Project and PHA Level

The PHA and project backlog needs estimated in this paper are based on Abt inspections and PHA reporting in the summer of 1985 and costed in January 1986 dollars. Although the backlog measures are updated by calibrating them to 1990 national projections of need, the relative distribution of project and PHA need in 1985 still underlies the regression estimates of project and PHA need in 1990. The question, then, is whether the methods used to update the national projections of backlog of need from 1986 to 1990 can also be used to update the estimates of need for projects and their PHAs.

The national estimates of backlog need, presented in Chapter I, were updated in four essential ways--applying construction cost indices of inflation, adjusting the inventory for net growth, adding accrual need, and deducting unexpended modernization funds approvals. The first two methods can easily be incorporated into project and PHA estimates of backlog, the third should not, and the last method can be incorporated in part.

Construction cost indices can be obtained in fairly current form for local areas and, as appropriate, can be entered into regression equations.

Adjusting the inventory to determine the fundable unit count of projects within each of the PHAs would be undertaken when the formula is implemented. For most PHAs, the unit counts in 1990 will not differ much from their unit counts in 1986.

A major influence in updating 1986 national totals to 1990 national totals was adding the accrued need for 1986 to 1989, according to ICF's "realistic" scenario of annual accrual in that period. This paper, however, did not use ICF's project-level estimates of accrual for 1986 to 1989 as a way to approximate the impact in 1990 of 1986-1989 accrual on 1985 project and PHA backlog need. Implicitly, this paper instead assumed that project-level backlog in 1990 was in proportion to project-level backlog in 1986--in other words, that accrual was a constant percentage of

backlog for the sampled projects in these years. This assumption is certainly unrealistic. But the alternative of using the ICF project accrual estimates to update the project backlog posed greater policy and technical problems. In 1990 dollars, superimposing almost $6.5 billion of accrual needs for 1986 to 1989 onto $10.9 billion of 1985 backlog need would have given modeled accrual figures an overly important role in determining backlog estimates of need which are based on project inspections. For formula clarity, it seemed best to preserve the distinction between shares of need based on backlog and shares of need based on accrual.

The final influential update of national estimates of backlog need in Chapter I of this report was to deduct modernization funds approved before 1985 for the appropriate categories of backlog need but not spent at the time of the Abt inspection, and all modernization funds approved since that time that were intended to address these categories. Approximately 75 percent of modernization funds from FY 84 to FY 88 represent unspent funds that could reduce backlog defined as FIX plus Mandatory ADDs. When Project-Specific ADDs are also included, the estimate rises to 90 percent of FY 84-88 allocations. Since this percentage will vary somewhat for individual projects and PHAs, it is proposed that 50 percent of all PHA modernization funds from FY 84 onward be deducted from PHA backlog estimates of FIX plus Mandatory ADDs and that 60 percent be deducted from PHA backlog estimates of FIX plus Mandatory ADDs plus Project-Specific ADDs, ISO 1&2. Such deductions are intended to compensate for the frequent disparity between PHAs in their levels of unexpended modernization funding. For Federal funding purposes, therefore, backlog need at the PHA level should be the unfunded backlog, not all backlog.

Subappendix B3: Methods and Indicators Considered but Not Used for Final Estimates of Need

Methods

The most significant method considered but not chosen was to directly estimate statistical relations at the PHA level between the Abt/ICF measures of need and objective indicators of need, by aggregating the need and indicator data for the sampled projects into weighted PHA data. This would have meant weighting data for the 872 sampled projects in PHAs of 500 or more units into 183 PHAs of 500 or more units that were sampled. This method had the advantage of directly yielding indicators of need for PHAs, the ultimate recipients of formula funds, and of reducing the impact of project-by-project sampling and measurement error (some of which canceled out at the PHA level). But this method had major disadvantages. First, it reduced the number of statistical "cases" from a sizable 872 projects to a moderate 183 PHAs, without reducing sampling error commensurately. Second, this method so aggregated the data as to suppress the impact of certain indicators which intensively differentiated need at the project level. Only after the project-level analysis was conducted, and the best indicators were revealed, was it useful to weight measures and indicators of need into PHAs as one test of the validity of the project-specific results. It might be noted that, from the start, the project-level estimation of need used PHA and community contextual indicators of need as well as project-specific indicators of need.

Two variants of the project-level method of analysis were also considered and rejected. The first was to estimate measures of need divided by their R.S. Means Cost Index, then multiply the estimates of need by the R.S. Means Cost Index. This method, however, yielded a somewhat higher average difference between the estimates and measures of need than the method chosen (treating R.S. Means costs as an embedded indicator.) A second variant was to separately estimate need for family and elderly

projects. The problem with this method was that it made the distinction between family and elderly projects even more critical than did the present method (which assigns zero values for some indicators in elderly projects). It also exaggerated the impact of a few projects in the estimates for the elderly projects (even after capping of extreme values). The separate estimation procedure also would have introduced a double set of computations for formula estimates, without necessarily raising the precision of the estimates.

Indicators

Indicators were selected or rejected on the basis of criteria described in pages 6-7 of Appendix B. When two similar indicators met all the criteria, the indicator contributing most to goodness of fit was usually selected. In some cases, the impact of an indicator on other indicators also had to be judged, so that all indicators finally selected met the selection criteria and maximized goodness of fit.

Overall, the selected indicators proxy a wide range of project, PHA, and community characteristics and were tested against a large number of alternatives. All indicators, those selected and those not selected, were tested not only for the aggregate of projects but also for groupings of projects by PHA size and troubled status, region, family/elderly composition, project age, and levels of need. Analyzing disparities between estimates and measures of need suggested whether existing indicators should be respecified or whether additional indicators should be tested.

The indicators not chosen (or not available) are arranged by the type of need they were meant to represent. The phrases, "bounded at alternate levels" or "interaction," represent many variations tested for a listed indicator.

PHA Status

1. Total units in PHA, bounded at alternate levels.

2. Total two or more bedroom units in PHA, bounded at alternate levels.

3. HUD designation as troubled.

4. Median household income of families (not available).

5. Proportion of family units, large family units in the PHA.

Community Status

1. CDBG formula, formula-B per capita.

2. Population growth 1970-80, bounded at alternate levels.

3. Climatic harshness (a specific indicator not used).

4. Percent of households female-headed.

5. Percent of persons in poverty.

6. HUD Region recodes ("dummy" variables).

Project Household Composition

1. Percent elderly.

2. Percent two or more bedroom (sometimes interacting with other indicators).

3. Percent three or more bedroom.

Project Size

1. Total units, bounded at alternate levels.

2. Total two or more bedroom units, bounded at alternate levels.

Project Density

1. Average units per building, bounded at alternate levels.

2. Medium high-rise recodes ("dummy" variables).

3. Scattered-site status.

4. Maximum height in stories (an indicator not available for the project sample).

5. Weighted height in stories (not available for the project sample).

Project Age

1. Low age, high age recodes ("dummy" variables).

2. Absolute value of 20-age, 40-age: bounded zero to 10.

3. A recode of projects aged 19 to 26 years in 1985.

4. Age interacting with family, elderly status.

Project Maintenance and Modernization

1. Vacancy rate, 1984.

2. Modernization approvals, 1981-84 (estimated by PHA).

3. Modernization spending, 1981-84 (estimated by PHA).

4. Estimate of need per unit in 1984 (estimated by PHA).

5. High need per unit (estimated by PHA).

6. High redesign need (estimated by PHA).

7. FIX need per unit (for accrual estimation).

8. Age-related FIX need per unit (for accrual estimation).

Subappendix B4: Distributions of 1990 - Estimated Need Per Unit, Before and After Capping for Regression Estimates: Weighted Values of Projects in PHAs of 500 or More Units (Excluding the NYC PHA)

A: FIX Plus Mandatory ADDs Per Unit:

Need Per Unit	Percent of Units in Category 1/		Cumulative Percent of Units 1/	
	Uncapped	Capped	Uncapped	Capped
$0-2500	20.8%	15.1%	20.8%	15.1%
2500-5000	18.0	20.5	38.8	35.6
5000-7500	11.6	13.4	50.4	49.0
7500-10000	9.8	9.1	60.1	58.1
10000-12500	8.0	9.1	68.1	67.2
12500-15000	5.6	5.2	73.8	72.4
15000-17500	5.7	4.8	79.4	77.3
17500-20000	4.2	4.7	83.6	81.9
20000-22500	2.6	4.3	86.3	86.2
22500-25000	4.0	3.3	90.3	89.6
25000-27500	2.4	4.9	92.7	94.5
27500-30000	2.4	1.5	95.1	96.0
30000-32500	1.2	2.1	96.3	98.1
32500-35000	1.8	1.8	98.1	99.9
35000-50000	.9	.1	98.9	100.0
50000-75000	.6		99.6	
75000+	.4		100.0	
Maximum	$81,851	$35,695		

1/ The uncapped and the capped distributions are calibrated to sample estimates that nationwide yielded $12.7 billion of unfunded FIX plus Mandatory ADDs need as of 1990 (Table 2-1).

B: FIX Plus Mandatory ADDs Plus Project-Specific ADDs, ISO 1+2

Need Per Unit	Percent of Units in Category 1/		Cumulative Percent of Units 1/	
	Uncapped	Capped	Uncapped	Capped
0-2500	9.9%	5.0%	9.9%	5.0%
2500-5000	11.1	8.0	21.0	13.0
5000-7500	12.0	16.9	33.0	29.9
7500-10000	11.8	10.0	44.7	39.9
10000-12500	8.2	11.0	52.9	50.9
12500-15000	5.3	6.9	58.2	57.8
15000-17500	6.7	6.6	64.8	64.4
17500-20000	6.2	6.2	71.1	70.6
20000-22500	5.4	4.3	76.5	74.9
22500-25000	4.4	4.4	80.8	79.3
25000-27500	4.2	5.0	85.0	84.2
27500-30000	2.2	3.3	87.2	87.5
30000-32500	1.6	4.9	88.8	92.4
32500-35000	2.9	2.4	91.7	94.9
35000-37500	1.4	1.5	93.1	96.3
37500-40000	2.3	2.3	95.4	98.6
40000-42500	.7	.6	96.1	99.2
42500-45000	.5	.7	96.6	99.9
45000-50000	.9	.1	97.5	100.0
50000-75000	1.7		99.3	
75000-100000	.7		100.0	
100000+	.0		100.0	
Maximum	$129,651	$48,715		

1/ The uncapped and capped needs are calibrated to sample estimates that nationwide yielded $18.5 billion of unfunded FIX plus Mandatory ADDs plus Project Specific ADDs ISO 1+2 need as of 1990 (Table 2-1). When all CIAP-allowed needs such as redesign needs are estimated (totaling $22.2 billion), 6.4 percent of units in PHAs above 500 units (excluding the NYC PHA) have an estimated uncappped need of more than $50,000 per unit.

Age-Related Accrual Per Unit Per Year[1/]

Need Per Unit	Percent of Units in Category		Cumulative Percent of Units	
	Uncapped	Capped	Uncapped	Capped
$300-600	3.9%	.3%	3.9%	.3%
600-900	17.4	16.3	21.3	16.6
900-1200	26.5	29.7	47.7	46.3
1200-1500	21.6	21.4	69.3	67.7
1500-1800	12.9	14.8	82.2	82.5
1800-2100	8.7	9.4	90.8	91.9
2100-2400	4.0	5.2	94.9	97.1
2400-3000	3.2	2.8	98.1	99.8
3000-3600	1.0	.2	99.1	100.0
3600-4500	.9		100.0	

1/ The uncapped and capped distributions are calibrated to sample estimates that nationwide yield $1.76 billion of age-related accrual in 1990 (Table 2.1)

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