

095459

HOD - #35

~~2.05.08~~



REPORT TO THE CONGRESS

72-0075



LM095459

21

Benefits Could Be Realized
Through Reuse Of Designs For
Public Housing Projects B-114863

Department of Housing and
Urban Development

BY THE COMPTROLLER GENERAL
OF THE UNITED STATES

~~700891~~

095459

DEC. 2, 1971



COMPTROLLER GENERAL OF THE UNITED STATES
WASHINGTON, D.C. 20548

B-114863

To the President of the Senate and the
Speaker of the House of Representatives

This is our report on benefits that could be realized through reuse of designs for public housing projects. Federal participation in these projects is administered by the Department of Housing and Urban Development.

Our review was made pursuant to the Budget and Accounting Act, 1921 (31 U.S.C. 53), and the Housing Act of 1954 (42 U.S.C. 1435).

Copies of this report are being sent to the Director, Office of Management and Budget, and to the Secretary of Housing and Urban Development.

A handwritten signature in cursive script that reads "James B. Stacks".

Comptroller General
of the United States

D I G E S T

WHY THE REVIEW WAS MADE

Housing for low-income families is one of the major problems facing the Nation today. Much of this housing has been and probably will continue to be provided by local housing authorities (LHAs) with technical and financial assistance by the Department of Housing and Urban Development (HUD).

Most of the 2,500 public housing projects approved and subsidized by HUD since July 1965 have been individually designed. Designs are often reused, however, in constructing private housing, motels, schools, and other private and public buildings.

The General Accounting Office (GAO) wanted to determine the benefits that might feasibly be realized by reusing designs in the construction of public housing projects.

FINDINGS AND CONCLUSIONS

If housing projects were based on existing designs, construction could be expedited and costs could be reduced significantly.

GAO estimates that, if 50 percent of the housing projects placed under construction in fiscal year 1970 had been based on existing rather than individually developed designs, about \$31 million in design and construction costs could have been saved. (See p. 7.)

--GAO's review indicated that design costs were generally reduced by about 50 percent when designs were reused. On this basis, if half of the 700 projects begun in fiscal year 1970--costing about \$1.26 billion--had been based on existing designs, about \$12 million could have been saved in design costs. (See p. 11.)

--GAO's review indicated also that, by reuse of existing project designs, construction of a housing project could be started at least 5 months earlier, thus some of the escalation of labor and material prices could be avoided. About \$19 million in construction costs could have been saved if existing plans had been reused for half of the 700 projects begun in fiscal year 1970, because construction could have been started 5 months sooner. (See p. 14.)

DEC. 2, 1971

GAO estimates that about 1,400 individual project designs could be made available to LHAs. Such a large number of designs would allow the housing authority to select a design in a way to avoid stereotyped or monotonous projects. (See p. 16.)

Most LHAs interviewed by GAO were willing to cooperate with HUD in making greater use of existing project designs. (See p. 16.)

Most of the architects interviewed said that they would be willing to make the necessary modifications to adapt existing designs for use at new sites. (See p. 18.)

RECOMMENDATIONS OR SUGGESTIONS

HUD should

- implement procedures to encourage greater reuse of designs for public housing projects and
- require that LHA contracts with developers under the turnkey method provide for acquiring title to designs so that they will be available for reuse on all types of low-rent projects. (See p. 19.)

AGENCY ACTIONS AND UNRESOLVED ISSUES

HUD believes that there are some potential economies in time and total development costs by the reuse of public housing designs--plans and specifications--modified to fit different sites but that there are constraints limiting the degree to which the reuse of designs would produce savings. HUD, however, believes it would be desirable and feasible to encourage greater reuse of superior designs by LHAs.

HUD questioned GAO's estimates of time and construction cost savings in the belief that the estimates might be overstated. GAO's estimates of cost savings were developed to indicate the possible extent of savings. The estimates were based on the savings that might have been achieved in fiscal year 1970 if 50 percent of the projects constructed during that year had been based on existing designs and if the architect's fees had been reduced by 50 percent. Savings through the reuse of designs would, of course, vary depending on the number of projects constructed using existing designs and the extent modifications would be needed to adapt the designs for reuse, as shown on page 14.

HUD stated that public housing should not become standardized and must reflect the architectural standards of the neighborhood and community. As pointed out on page 16, the inventory of about 1,400 project designs could be made available to LHAs for selection and such variety would preclude the necessity of duplicating a project in any one community.

HUD's proposal to encourage the reuse of only superior designs would limit the number of designs for selection by the housing authorities and would preclude the reuse of attractive designs which might be well suited to the needs of the community but which might not be recognized as being outstanding.

HUD stated that the rights to designs would have to be obtained and that architects would have to be selected to modify designs developed by others. GAO agrees that designs would have to be modified to adapt them to local conditions. LHAs own all designs for conventional projects and therefore would have to acquire title only to designs for turnkey projects.

HUD stated that implementing a program for reuse of designs would involve an extensive effort and widespread cooperation by LHAs and their architectural firms as well as considerable Federal effort in providing assistance. Because of the willingness of both LHAs (see p. 16) and architects (see p. 18) to reuse designs, GAO believes that the Federal assistance needed to promote such a program should be provided and that the cost of providing such assistance would be minimal compared with the savings that could be achieved.

MATTERS FOR CONSIDERATION BY THE CONGRESS

GAO is issuing this report to inform the Congress that the construction of public housing based on existing designs would result in a more timely availability of housing to meet the needs of low-income families and in reduced costs to the Federal Government.

C o n t e n t s

	<u>Page</u>
DIGEST	1
CHAPTER	
1 INTRODUCTION	4
Scope of review	6
2 BENEFITS COULD BE REALIZED THROUGH REUSE OF DESIGNS FOR PUBLIC HOUSING PROJECTS	7
Savings in design time would result in expediting construction starts	7
Time savings realized in the con- struction of low-rent public hous- ing	8
Time savings realized by private organizations	9
Cost reductions that could result from reuse of designs	11
Design costs	11
Construction costs	14
3 REUSING DESIGNS NEED NOT RESULT IN STEREO- TYPED PROJECTS BECAUSE OF THE AVAILABILITY OF A LARGE DESIGN INVENTORY	16
4 WILLINGNESS OF ARCHITECTS TO MODIFY EXISTING DESIGNS	18
5 RECOMMENDATIONS, AGENCY COMMENTS, AND OUR EVALUATION	19
Recommendations to the Secretary of HUD	19
Agency comments and our evaluation	19
APPENDIX	
I Letters dated July 21, 1971, from the Secre- tary of Housing and Urban Development and July 22, 1971, from the Assistant Secretary for Housing Production and Mortgage Credit and Federal Housing Commissioner, Depart- ment of Housing and Urban Development	26

APPENDIX

Page

II	Principal officials of the Department of Housing and Urban Development responsible for administration of activities discussed in this report	29
----	-------------------------------------------------------------------------------------------------------------------------------------------------------	----

ABBREVIATIONS

GAO	General Accounting Office
HUD	Department of Housing and Urban Development
LHA	Local housing authority

D I G E S T

WHY THE REVIEW WAS MADE

Housing for low-income families is one of the major problems facing the Nation today. Much of this housing has been and probably will continue to be provided by local housing authorities (LHAs) with technical and financial assistance by the Department of Housing and Urban Development (HUD).

Most of the 2,500 public housing projects approved and subsidized by HUD since July 1965 have been individually designed. Designs are often re-used, however, in constructing private housing, motels, schools, and other private and public buildings.

The General Accounting Office (GAO) wanted to determine the benefits that might feasibly be realized by reusing designs in the construction of public housing projects.

FINDINGS AND CONCLUSIONS

If housing projects were based on existing designs, construction could be expedited and costs could be reduced significantly.

GAO estimates that, if 50 percent of the housing projects placed under construction in fiscal year 1970 had been based on existing rather than individually developed designs, about \$31 million in design and construction costs could have been saved. (See p. 7.)

--GAO's review indicated that design costs were generally reduced by about 50 percent when designs were reused. On this basis, if half of the 700 projects begun in fiscal year 1970--costing about \$1.26 billion--had been based on existing designs, about \$12 million could have been saved in design costs. (See p. 11.)

--GAO's review indicated also that, by reuse of existing project designs, construction of a housing project could be started at least 5 months earlier, thus some of the escalation of labor and material prices could be avoided. About \$19 million in construction costs could have been saved if existing plans had been reused for half of the 700 projects begun in fiscal year 1970, because construction could have been started 5 months sooner. (See p. 14.)

GAO estimates that about 1,400 individual project designs could be made available to LHAs. Such a large number of designs would allow the housing authority to select a design in a way to avoid stereotyped or monotonous projects. (See p. 16.)

Most LHAs interviewed by GAO were willing to cooperate with HUD in making greater use of existing project designs. (See p. 16.)

Most of the architects interviewed said that they would be willing to make the necessary modifications to adapt existing designs for use at new sites. (See p. 18.)

RECOMMENDATIONS OR SUGGESTIONS

HUD should

- implement procedures to encourage greater reuse of designs for public housing projects and
- require that LHA contracts with developers under the turnkey method provide for acquiring title to designs so that they will be available for reuse on all types of low-rent projects. (See p. 19.)

AGENCY ACTIONS AND UNRESOLVED ISSUES

HUD believes that there are some potential economies in time and total development costs by the reuse of public housing designs--plans and specifications--modified to fit different sites but that there are constraints limiting the degree to which the reuse of designs would produce savings. HUD, however, believes it would be desirable and feasible to encourage greater reuse of superior designs by LHAs.

HUD questioned GAO's estimates of time and construction cost savings in the belief that the estimates might be overstated. GAO's estimates of cost savings were developed to indicate the possible extent of savings. The estimates were based on the savings that might have been achieved in fiscal year 1970 if 50 percent of the projects constructed during that year had been based on existing designs and if the architect's fees had been reduced by 50 percent. Savings through the reuse of designs would, of course, vary depending on the number of projects constructed using existing designs and the extent modifications would be needed to adapt the designs for reuse, as shown on page 14.

HUD stated that public housing should not become standardized and must reflect the architectural standards of the neighborhood and community. As pointed out on page 16, the inventory of about 1,400 project designs could be made available to LHAs for selection and such variety would preclude the necessity of duplicating a project in any one community.

HUD's proposal to encourage the reuse of only superior designs would limit the number of designs for selection by the housing authorities and would preclude the reuse of attractive designs which might be well suited to the needs of the community but which might not be recognized as being outstanding.

HUD stated that the rights to designs would have to be obtained and that architects would have to be selected to modify designs developed by others. GAO agrees that designs would have to be modified to adapt them to local conditions. LHAs own all designs for conventional projects and therefore would have to acquire title only to designs for turnkey projects.

HUD stated that implementing a program for reuse of designs would involve an extensive effort and widespread cooperation by LHAs and their architectural firms as well as considerable Federal effort in providing assistance. Because of the willingness of both LHAs (see p. 16) and architects (see p. 18) to reuse designs, GAO believes that the Federal assistance needed to promote such a program should be provided and that the cost of providing such assistance would be minimal compared with the savings that could be achieved.

MATTERS FOR CONSIDERATION BY THE CONGRESS

GAO is issuing this report to inform the Congress that the construction of public housing based on existing designs would result in a more timely availability of housing to meet the needs of low-income families and in reduced costs to the Federal Government.

CHAPTER 1

INTRODUCTION

Housing for low-income families has been and probably will continue to be provided by local housing authorities which develop, own, and operate low-rent public housing projects. LHAs receive financial assistance from the Department of Housing and Urban Development under a program of assistance for low-rent public housing authorized by the United States Housing Act of 1937, as amended (42 U.S.C. 1401).

Decent housing for low-income families is one of the major problems facing our Nation today. The need to expedite the construction of housing was emphasized when, concurrently with enacting the Housing and Urban Development Act of 1968, the Congress established the national 10-year housing goal of 26 million housing units--6 million to be for low- and moderate-income families.

Recognizing that the system for providing housing for all people was not sufficient to meet the housing goals, the Secretary of HUD, in May 1969, initiated Operation Breakthrough--a research and demonstration program to improve the entire process by which housing is provided to all people. The program is intended to assist the American housing industry to increase its overall production capability by supporting it in the application of advances in building materials, construction techniques, management and financing methods, and site planning for the production of quality housing in volume and in the creation of better communities for Americans of all incomes.

The development and administration of federally subsidized public housing projects is primarily the responsibility of LHAs. In addition to providing financial assistance, HUD (1) provides technical assistance to LHAs in the development of the projects and (2) reviews the administration of the projects after construction to determine whether they are being operated and maintained in conformance with statutory requirements and in a manner which promotes efficiency, economy, and serviceability.

HUD provides financial assistance by making loans for development and by making annual contributions (subsidies) pursuant to contracts with LHAs. The contracts provide for contributions by HUD which, if made in the maximum allowable amount, will be sufficient to pay the principal and interest on bonds and notes sold by LHAs to the public or, in some cases, to HUD to obtain funds for developing the projects. The contracts provide also for reducing the maximum allowable contributions by the residual receipts, if any, from project operations.

During fiscal year 1970, HUD's annual contributions to all LHAs operating projects under the public housing program amounted to about \$388 million, or about 94 percent of the maximum allowable annual contributions. The major cost incurred in developing a low-rent housing project usually is the cost of construction. Therefore, when the cost of construction is minimized, HUD's maximum liability for annual contributions is also minimized.

LHAs may acquire public housing projects by leasing or purchasing existing structures or by constructing new projects. Projects may be constructed under the conventional method or the turnkey method. Under the conventional method, an LHA acquires a site, contracts with an architect to design the project, advertises for competitive bids from private contractors, and awards a construction contract to the lowest responsible bidder.

The turnkey method of providing public housing was developed by HUD in conjunction with the private residential building industry to expedite the construction of low-rent housing. Under the turnkey method, a developer or builder who owns a site or has an option to a site or can obtain an option to a site may submit, in response to an invitation from an LHA, a proposal to construct a low-rent housing project in accordance with his own plans and specifications. If the proposal is acceptable to LHA and HUD, the parties enter into a letter of intent based upon preliminary designs.

The letter of intent sets a limit for the purchase price for the project, including an amount for the developer's architectural and engineering services and for the site. Upon approval of the final design--plans and

specifications--LHA enters into a negotiated fixed-price contract with the developer to purchase the completed project. During the 5-year period ended June 30, 1970, HUD approved the construction of approximately 2,500 low-rent public housing projects, of which 1,700 were conventional and 800 were turnkey projects.

HUD approves the design of a housing project after it is accepted by an LHA under either the conventional or the turnkey method. HUD's practice has been to permit the use of individual project designs except in a few instances where the reuse of a design has been approved. Design costs--the cost of all services provided by an architect/engineer responsible for designing a project--represent about 3.8 percent of the total cost of a conventional housing project. Assuming that the average design costs are the same for conventional and turnkey projects, we estimate that the cost of designing the 700 housing projects--approximately 400 turnkey and 300 conventional projects--placed under construction during fiscal year 1970 amounted to about \$48 million.

SCOPE OF REVIEW

We examined the applicable Federal laws and HUD's regulations, administrative policies, and practices relating to the design of federally assisted low-rent public housing. Our review included discussions with HUD officials, officials of 39 LHAs, 82 practicing architects, and a number of private contractors and organizations. We also contacted the State Board of Architecture, or equivalent regulatory body, of each State and the District of Columbia to determine the applicability of any laws pertaining to architect services.

Our work was conducted at HUD headquarters in Washington, D.C., at HUD's regional offices in Fort Worth, Texas; Philadelphia, Pennsylvania; San Francisco, California; and Seattle, Washington, and at LHAs under the administrative authority of these regional offices. We also obtained information from LHAs under the administrative authority of HUD's Chicago, Illinois, regional office.

CHAPTER 2

BENEFITS COULD BE REALIZED THROUGH REUSE OF DESIGNS

FOR PUBLIC HOUSING PROJECTS

The construction of public housing by the reuse of housing designs would result in a more timely availability of housing to meet the needs of low-income families, in reduced design and construction costs to LHAs, and also in reduced costs to the Federal Government.

Our review indicated that the construction of a housing project could be started at least 5 months earlier if it was based on an existing design rather than an individually developed design. We estimate that, had 50 percent of the 700 housing projects placed in construction in fiscal year 1970 been based on the reuse of existing designs, the costs of the projects would have been reduced by about \$31 million.

Our review indicates also that the number of individual public housing designs--an estimated 1,400--that are available would permit an LHA to select designs that would require minimum modifications to adapt them for reuse in particular locations and would avoid the construction of a community of stereotyped public housing projects.

SAVINGS IN DESIGN TIME WOULD RESULT IN EXPEDITING CONSTRUCTION STARTS

We reviewed HUD files on about 90 conventional public housing projects selected at random to determine the average time required to develop designs--plans and specifications--for public housing projects. These projects ranged in size from 12 to 250 living units, and an average of 26 months was required to develop the projects' plans. Our review of certain public housing projects that were constructed on the bases of modifications of existing designs showed that construction of the projects was started from about 5-1/2 to 19 months earlier than if the projects had been individually designed.

The available data on time required to modify an existing design for a public housing project to adapt it for use in the construction of another project is limited and may not be truly representative. However, information obtained from a nonprofit organization experienced in the reuse of designs for the construction of buildings indicates that construction of a building could reasonably be expected to start about 5 months earlier when it is based on the reuse of a design.

Time savings realized in the construction of low-rent public housing

We identified a few public housing projects that had been constructed on the basis of existing designs. The following two examples indicate that the time needed to design public housing projects can be significantly reduced when the designs are based on existing designs.

The Milwaukee Housing Authority constructed three conventional projects based on one original design. All three projects were nine-story buildings containing 120 apartments but were constructed with different colored brick. The architect who developed the design for the first project was employed to modify the design to adapt it for the two additional projects. For one of the projects, the basic design had to be modified to provide for a different foundation system. This project was advertised for bids within 6-1/2 months after the architect agreed to adapt the design for the project; the other project was advertised for bids within 4-1/2 months. HUD records showed that it took about 26 months to develop the original design. Therefore, the reuse of that design for each of the two projects resulted in time savings of at least 19 months (26 months - 6-1/2 months).

The Seattle Housing Authority had two high-rise turn-key projects constructed on the basis of the same design. The first project was an eight-story building containing 81 apartments. The architect who developed the design for that building was employed to modify the design to provide for a nine-story building to be constructed at a second site. About 1-1/2 months were required to make the modifications to the original design for the project at the second

site. Seattle Housing Authority records showed that about 7 months were required to develop the design for the original project. Therefore, the reuse of the design resulted in a time saving of about 5-1/2 months.

Time savings realized by private organizations

Representatives of a large nonprofit organization advised us that they had been reusing designs for the construction of various types of buildings for about 8 years. During 1969 this organization constructed about 220 buildings in the United States and in other countries.

This organization's building department estimated that the size of its technical staff would have to be tripled if individual designs were developed for the construction of each building project. They estimated also that construction of a building could be started about 5 months earlier if it was based on an existing design. They also advised us that the development of an original design took about 10 months from the time the architect was selected until final plans were reviewed and approved. They said, however, that there was only a 5-month time lapse between the selection of an architect and final approval of a design when the building was based on an existing design.

Representatives of an engineering and building firm, which has been engaged by a corporation to design and construct 200 high-rise motels in the United States and in other countries during the next 5 years, told us that the firm had developed a design for a nine-story building containing 216 rental rooms and that most of the 200 motels would be constructed on the basis of the design, which could be modified to add or delete floors and rooms. At the time of our visit to the firm, two 216-room motels had been completed and four were under construction.

Representatives of the firm assisted us in examining the working drawings for several motels located in widely separated areas of the United States. The drawings showed that the designs generally were based on modifications of the basic design to meet local conditions and the site foundation requirements. The representatives advised us that the foundations had to be redesigned because of the

site soil support conditions and/or topography and that design changes were also required because of different seismic and climatic conditions and fire and building codes. They advised us also that all such necessary design changes could be identified and made within 30 days after a proposed site was selected.

COST REDUCTIONS THAT COULD
RESULT FROM REUSE OF DESIGNS

Our review showed that the reuse of designs could result in substantial reductions in the cost of designing and constructing public housing projects. We estimate that, had 50 percent of the projects placed under construction during fiscal year 1970 been based on existing designs rather than on individually developed designs, savings in design and construction costs could have amounted to about \$31 million.

Design costs

Services of an architect are generally required when public housing designs are reused. Before its reuse, an existing design may have to be modified to adapt it to the local site, climatic and seismic conditions, and building codes. The extent to which the cost of designing a public housing project can be reduced by reusing an existing design is, of course, dependent on the design modifications. Our review indicated, however, that design costs generally were reduced by about 50 percent when designs were reused. We estimate that the reduction in design costs of the projects placed in construction in fiscal year 1970 would have amounted to about \$12 million if 50 percent of the projects had been based on existing designs.

We contacted a number of architectural firms to obtain their views as to the reduction in design costs that could be realized by revising designs. Their estimates ranged from minimal or no reduction to a reduction of as much as 80 percent. The estimates reflected their opinions as to the changes that generally would be required to adapt an existing design for use at a new site.

One of the architectural firms offered to review a public housing design selected by us and to provide us with an estimate of the cost to modify the design to permit its use in constructing projects at three different locations. We selected an eight-story high-rise project that had recently been completed in Chicago, Illinois, and requested estimates of the costs to modify the design to permit its use in constructing projects at sites in Seattle, Washington;

Dallas, Texas; and Philadelphia, Pennsylvania, based on the assumption that the topography at each of the sites would be comparable to the site in Chicago.

The president of the firm advised us that the necessary design changes could be made at a cost of about \$15,000 a site--a savings of over 60 percent of original design costs. The design changes determined to be necessary included provisions for widening the stairways at all sites, increasing ceiling heights at Philadelphia, and strengthening the structure because of seismic conditions at Seattle.

As discussed on page 8, designs for the construction of two public housing projects were based on the reuse of designs. Our examination into the costs of these projects showed that the reuse of designs resulted in significant reductions in design costs.

1. The Milwaukee Housing Authority constructed three projects under the conventional method on the basis of the same design. The architect's fee for modifying the original design to adapt it for use in constructing the two additional projects was about 30 percent of his fee for developing the original design.
2. The Seattle Housing Authority had two high-rise projects constructed under the turnkey method on the basis of the same design. The negotiated contract price indicated that the architect's fee for modifying the design for use in constructing the second project was about 65 percent of the indicated fee for developing the design for the first project.

In our discussions with representatives of the nonprofit organization (see p. 9) that had been reusing building designs, we were advised that an architect's fee would average about 3 percent of the estimated cost of constructing a building on the basis of an existing design compared with a fee of about 6 percent for constructing a building on the basis of the development of a new design. The records they made available to us on the construction of six projects at an estimated cost exceeding \$200,000 each showed that the architect's fee ranged from 1.8 to 4.1 percent of the estimated cost, or an average fee of about 2.8 percent.

An architect who had modified existing designs for the nonprofit organization, advised us that his normal fee to modify an existing design was about 2 percent of the estimated construction cost compared with a normal fee of about 6 percent to develop a completely new design.

Representatives of the firm that had reused designs for the construction of high-rise motels advised us that their experience indicated that design costs could be reduced from 60 to 75 percent by reusing designs--a cost reduction of about two thirds.

The savings in public housing design costs that could be achieved through reuse of existing designs depend on the modifications that would be needed to adapt existing designs for use in constructing additional projects and the number of projects that would be constructed using existing designs. As indicated in the preceding section, it appears that the reuse of designs could result in a reduction of from 25 to 65 percent in design costs.

As of December 31, 1970, about 1,400 individual project designs could be made available to LHAs for the construction of public housing projects. The large number of existing designs indicates that LHAs could select designs that would require minimum modifications and thereby maximize the possible reduction in design costs.

The number of projects that could be constructed on the basis of existing designs appears to be unlimited. Two major factors, however, tend to limit reuse of existing designs--one, the need for a new design when an LHA's requirements cannot be served by an existing design; the other, the need for innovative designs, to make use of new construction techniques or to replace obsolete designs.

Information obtained from architects and other parties contacted during our review indicated that generally designs would not be seriously affected by obsolescence for a period of 4 to 6 years.

Our examination of HUD records for 368 conventional public housing projects showed that design costs averaged about 3.8 percent of total project costs and included such

items as administrative cost incurred by an LHA, relocation costs, etc., or about 5 percent of construction costs. Assuming that the average design costs for conventional and turnkey projects represent 3.8 percent of the total cost of a housing project, we estimate that the design costs for the 700 projects--approximately 400 turnkey and 300 conventional projects--placed under construction in fiscal year 1970 at an estimated total project cost of \$1.26 billion would have amounted to \$48 million. The following table shows our estimate of the range of savings that could have been achieved on public housing projects placed under construction in fiscal year 1970, depending on the extent of the reuse of existing designs.

Possible Savings Through Reuse of Designs

Percent reduction in architect fees	Projects based on reuse of designs				
	10 per- cent	20 per- cent	25 per- cent	50 per- cent	80 per- cent
	(millions)				
25	\$1.2	\$2.4	\$3.0	\$ 6.0	\$ 9.6
30	1.4	2.9	3.6	7.2	11.5
40	1.9	3.8	4.8	9.6	15.3
50	2.4	4.8	6.0	12.0	19.1
65	3.1	6.2	7.8	15.6	25.0

As indicated previously we believe that a reduction of 50 percent of public housing design costs can reasonably be predicted when designs are reused. If 50 percent of the projects placed under construction in fiscal year 1970 had been based on existing designs, the savings in design costs could have amounted to about \$12 million.

Construction costs

The reuse of existing designs could also result in reduced construction costs through the avoidance of price escalation. As previously pointed out, our review indicated that construction of a project could be started at least 5 months earlier when its design was based on the reuse of an existing design and therefore some escalation of labor and material prices could be avoided.

Indexes published by the Department of Commerce showed that construction costs escalated at an average rate of about 0.8 percent a month over a 4-year period ended July 1970. Therefore the price escalation that could have been avoided by starting construction of a project 5 months earlier could have resulted in savings of about 4 percent of construction cost.

Our examination of HUD records for the 368 public housing projects indicated that construction costs averaged about 76 percent of total project costs. On this basis, the construction costs of the 700 projects placed under construction during fiscal year 1970 amounted to about \$963 million. Assuming that 50 percent of the projects placed under construction in fiscal year 1970 were based on existing designs and in view of the indicated escalation in construction costs of 0.8 percent a month, we estimated that savings in construction costs could have amounted to about \$19 million.

CHAPTER 3

REUSING DESIGNS NEED NOT RESULT

IN STEREOTYPED PROJECTS BECAUSE

OF THE AVAILABILITY OF A LARGE DESIGN INVENTORY

We estimated that as of December 31, 1970, about 1,400 individual project designs could be made available to LHAs for use in constructing public housing projects. We believe that the availability of such a large number of project designs would permit an LHA to select a design that would avoid the construction of stereotyped projects within a community.

Because LHAs have the primary responsibility for development of public housing projects, the feasibility of making greater use of existing project designs depends on their willingness to cooperate with HUD. They must be willing to share their designs and to use designs of other LHAs. We interviewed representatives of 39 LHAs both in large metropolitan cities and in small communities to ascertain whether they would be interested in participating in a program to promote reuse of project designs. About 85 percent of these LHAs expressed a willingness to cooperate in implementing a program to promote greater use of existing project designs.

HUD has generally followed the practice of permitting each housing project to be individually designed. HUD's suggested contract form for use by LHAs in turnkey projects does not provide for title to the project designs to be transferred to LHAs. HUD's standard form architect contract used by LHAs for conventional projects, however, provides that all drawings, tracings, and specifications prepared by the architects become the property of LHAs.

HUD records show that about 1,700 conventional projects have been placed under construction since July 1965.¹ These

¹This date was selected because information obtained during our review indicated that some designs might become obsolete after a period of 5 years. However, there may be project designs which are older than 5 years that could be reused.

projects included low-rise and high-rise projects and ranged from small projects with a few living units to large projects with 1,000 units. Discussions with representatives of LHAs indicate that about 1,400 project designs could be made available to LHAs for use in constructing public housing projects.

One technique for promoting reuse of project designs would be for HUD to assemble a catalog of existing designs and make it available to LHAs. The catalog could be developed from LHAs' project designs and could be limited to basic information, such as pictures or drawings of a project, typical floor plans, and other basic data. Detailed working drawings, specifications, and other specific data could be provided by any LHA expressing an interest in constructing one of the projects portrayed in the catalog. Designs in the catalog could be continually augmented to incorporate new innovative designs and construction techniques.

The use of a catalog system is merely one possible approach to promoting reuse of designs. This is not intended to indicate that other methods may not be more practical or effective. We believe that HUD should study various approaches to encouraging reuse of project designs.

The turnkey method of constructing public housing has become increasingly significant since it was adopted in 1965. Over 55 percent of the 700 housing projects placed in construction during fiscal year 1970 were turnkey projects. Therefore, to realize the full benefits of reusing project designs, it would be necessary to make existing designs available for use on turnkey as well as conventional projects. It would also be necessary for LHAs contracts with developers to provide for LHAs to acquire title to the designs so that they would be available to use on other low-rent housing projects and to augment the inventory of available designs. Because the costs negotiated for turnkey projects include all costs to be incurred in constructing the project, it appears that there should be little or no additional cost if the contract with a turnkey developer provides for LHA to acquire title to designs for turnkey projects.

CHAPTER 4

WILLINGNESS OF ARCHITECTS TO MODIFY EXISTING DESIGNS

Our review indicated that in most cases changes would have to be made in an existing project design to adapt it for use at a new site. Therefore the willingness of architects to make such changes, not only to the designs they developed but to designs developed by other architects, is an important consideration in determining whether reuse of designs for public housing is feasible.

We interviewed 82 architects to ascertain whether they would be willing to modify existing project designs for reuse. These architects were located in various areas of the United States, and many of them had designed one or more projects for an LHA or for other organizations that had constructed projects with financial assistance from HUD. About 75 percent of these architects indicated that they would be willing to consider modifying an existing design. Many stated, however, that they would have to satisfy themselves that a design was good enough to justify its reuse before they would agree to make needed changes.

We also contacted the State Board of Architecture or other similar regulatory body for each State and the District of Columbia to determine whether there were any existing laws or regulations that would preclude the reuse of designs, particularly the use or modification by an architect of plans developed by another. Our contacts with the aforementioned bodies have indicated that most States have laws or regulations that are intended to discourage an architect from indiscriminately placing his seal on designs which are not prepared by him or under his supervision and that the intent of this requirement is to ensure that buildings are adequately designed to protect the health, safety, and welfare of the public.

As of September 1971 two States had advised us that reuse of designs would not be acceptable under existing laws or regulations--these States had an insignificant number of low-rent public housing units--and six States had not advised us of their final determinations on this matter. The remaining States and the District of Columbia advised us that the reuse of designs would be acceptable.

CHAPTER 5

RECOMMENDATIONS, AGENCY COMMENTS,

AND OUR EVALUATION

RECOMMENDATIONS TO THE SECRETARY OF HUD

We recommend that, because significant benefits can be realized through reuse of designs for public housing and because LHAs have indicated their willingness to help achieve these benefits, HUD implement appropriate procedures to encourage greater reuse of designs for public housing projects.

We recommend also that, because LHAs do not acquire ownership of designs for public housing projects acquired under the turnkey method, HUD require that LHA contracts with developers under the turnkey method provide for acquiring title to designs so that they will be available for reuse.

AGENCY COMMENTS AND OUR EVALUATION

HUD, in commenting on a draft of this report in letters dated July 21 and 22, 1971 (see app. I.), informed us that there are potential economies in time and total development cost in the reuse of public housing project plans and specifications modified to fit different sites for such projects. HUD pointed out, however, that there are constraints which limit the degree to which reuse of plans would produce savings but stated that it believes encouraging greater reuse of superior designs by LHAs would be desirable and feasible.

HUD's objections to our recommendations are summarized and evaluated below.

HUD informed us that public housing should not become standardized and must reflect the architectural standards of the neighborhood and community. Also, because of the importance of local determinations in the public housing program, local people should decide the feasibility of reusing a design in their community.

HUD stated that LHAs presently have the option of reusing designs but that the choice of designs for reuse might be widened and facilitated by a program which would systematically bring good plans to their attention in ways which would maximize opportunities to reuse designs suitable to local needs.

HUD stated also that implementation of such an arrangement would involve an extensive effort and widespread cooperation by LHAs and the architectural firms serving them as well as considerable federal assistance in providing personnel, consultants, printed material, visual aids, etc.

Our recommendation is not intended to indicate that LHAs, through the reuse of design plans, should develop standardized low-rent housing projects or projects which do not reflect the architectural standards of a neighborhood or community. As pointed out on page 16, the inventory of about 1,400 project designs could be made available to LHAs for selection, and such variety would preclude the necessity of duplicating a project in any one community.

With respect to the encouragement of greater reuse of existing housing project designs, about 85 percent of LHAs interviewed expressed a willingness to cooperate in implementing a program to promote greater reuse of existing designs. (See p. 16.). About 75 percent of the architects interviewed indicated that they would be willing to modify an existing design. (See p. 18.). Many of these architects, however, stated that they would have to satisfy themselves that a design was good enough to justify its reuse before they would agree to make any needed changes to adapt it for use at a particular location. We believe that, because there is a willingness by both LHAs and architects to reuse designs and because there are a large number of existing designs, the Federal assistance needed to promote such a program should be provided and that the costs associated with providing such assistance would be minimal compared with the considerable savings in time and costs that could be achieved.

HUD stated that the rights to plans would need to be obtained and that appropriate arrangements would need to be developed to facilitate modification of the plans

to suit other sites and location characteristics and to fix responsibilities of the architects selected to modify designs developed by others. HUD stated also that future contracts for architectural services on new designs would need to provide for their reuse under stated conditions at HUD's option.

HUD's standard form architect contract used by LHAs for conventional public housing projects provides that all designs, including drawings, tracings, and specifications, prepared by architects are the property of LHAs. Therefore LHAs need only to acquire title to project designs for turnkey projects, which could be accomplished by incorporating similar provisions in turnkey contracts.

With respect to architects' modifying existing designs, most States have laws or regulations that are intended to discourage an architect from indiscriminately placing his seal on designs that are not developed by him or under his supervision. The intent of this requirement is to ensure that buildings are adequately designed to protect the health, safety, and welfare of the public. Therefore the architect's responsibility would continue to be governed by State laws and regulations.

Forty-two States and the District of Columbia advised us that the reuse of project designs would be acceptable, and about 75 percent of the architects we interviewed indicated that they would be willing to consider modifying existing project designs to adapt the designs for use in particular locations.

HUD questioned our estimate of the time and construction costs savings and stated that these economies might not be as extensive as we estimated. HUD also indicated doubt as to whether the turnkey program would be affected by greater reuse of public housing plans.

Our review showed that two housing authorities realized time savings of 5-1/2 and 19 months when design plans were reused. Further, information that we obtained from a non-profit organization experienced in design reuse indicated that construction could reasonably be expected to start at least 5 months earlier when designs are reused. On the basis

of these facts, we believe that time savings of 5 months would be possible. We noted also that the two housing authorities that had reused design plans realized savings-- the architects' fees were approximately 30 percent and 65 percent of the fee charged for designing the original project.

We believe that, because of the time savings, the reuse of designs should result in reduced construction costs through the avoidance of price escalation. Our estimates for time savings and construction cost savings were developed to show that savings are available when designs plans are reused. The savings in public housing design costs that could be achieved through reuse of existing designs depends on the modifications that would be needed to adapt existing designs for use in constructing additional projects and the number of projects that would be constructed using existing designs.

We believe that LHAs could obtain title to turnkey projects designs and have a wider selection of designs to choose from. We believe further that the economies available from reuse of designs, which, HUD states, are currently available under the turnkey program, would be increased if LHA-owned designs are made available to turnkey developers. Our belief is based on the fact that cost breakdowns of negotiated turnkey contract prices show that they include design costs which are generally as high as the design costs for conventional projects; therefore we believe that, if LHAs made existing designs available to turnkey developers, the LHAs would be in a position to negotiate lower overall costs for such projects.

HUD stated that public housing sites--terrain, subsoil conditions, orientation, existing trees, zoning, street and utility layouts--commonly differ so widely that development of completely new site and landscape plans is inevitable.

We agree that public housing designs would have to be modified to adapt the designs to local conditions and particularly to meet foundation requirements. As pointed out on page 8, LHAs have reused project designs. Representatives of an engineering and building firm advised us that necessary changes in the basic design for buildings that it

was constructing could be identified and made within 30 days after a proposed site was selected. We believe therefore that the revision of a public housing design to adapt it for use under specific site landscape and other conditions would not present a major problem to LHAs or architects involved in the development of low-rent public housing.

HUD stated that it hopes to develop a systematic method of bringing successful public housing designs to the attention of housing authorities, nationwide, for their consideration. HUD concluded by stating that the reuse of designs except under special conditions, was neither feasible nor desirable but that extensive efforts to assist LHAs and their architects in design of good and more economical housing would be vigorously pursued.

In view of the urgent need for decent housing for low-income families and our conviction that significant benefits could be realized through the reuse of public housing designs, we disagree with HUD's position that, except under special conditions, it is neither feasible nor desirable to reuse design plans. Further, we believe that HUD's proposal to encourage reuse of only superior housing designs would limit the number of project designs for selection by LHAs and would not afford LHAs the opportunity to reuse project designs which go unrecognized but which are attractive, well designed, and suitable to the needs of certain communities. We believe also that by reusing only superior designs, which would of course limit the number of designs an LHA would have at its disposal, it is possible that future public housing projects could become stereotyped and monotonous and thus would not reflect the architectural standards of the neighborhood and community.



THE SECRETARY OF HOUSING AND URBAN DEVELOPMENT

WASHINGTON, D. C. 20410

July 21, 1971

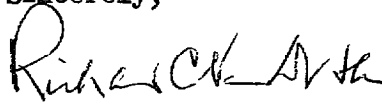
Mr. Victor L. Lowe
Associate Director, Civil Division
United States General Accounting Office
Washington, D.C. 20548

Dear Mr. Lowe:

Thank you for your letter of March 29 enclosing for review and comment the GAO draft report, Benefits That Could Be Realized Through Reuse Of Designs For Public Housing Projects.

While I do not agree with the conclusions of this report, and have asked Assistant Secretary-Commissioner Gullledge to respond in more detail, we expect to include in our issuances a discussion of the benefits of existing successful designs such as those receiving design awards and resident acclaim and suggest that local housing authorities consider such reuse possibilities at the initiation of project planning.

Sincerely,


for George Romney

APPENDIX I



DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
FEDERAL HOUSING ADMINISTRATION
WASHINGTON, D. C. 20411

ASSISTANT SECRETARY-COMMISSIONER

JUL 22 1971

Mr. Victor L. Lowe
Associate Director, Civil Division
United States General Accounting Office
Washington, D. C. 20548

Dear Mr. Lowe:

Secretary Romney has asked me to respond to your request of March 29, 1971, for comments on your draft of a proposed report to the Congress entitled "Benefits That Could be Realized through Reuse of Designs for Public Housing Projects."

There is a potential for economies in time and total development cost in the idea of reusing plans and specifications for public housing projects, modified to fit different sites. However, we do not believe that these economies would be as extensive as estimated in the draft report.

There are constraints, some of which I am sure you recognize, which limit the degree to which reuse of plans is feasible to produce savings. With the qualifications and limitations enumerated below, we believe it to be desirable and feasible to encourage greater reuse of superior designs by local housing authorities under the low-rent public housing program.

Congress has directed that public housing reflect architectural standards of the neighborhood and community. This directive must be followed by local housing authorities and by HUD in determining where and under what circumstances it is appropriate to reuse housing plans. Public housing projects stand in quite a different light from motels or similar establishments built by national chains with standard designs. There is commercial value to standardization of motels since the traveling public identifies a motel chain with certain facilities already tried and found satisfactory. This objective does not apply to public housing. It is important for public housing to be part of its neighborhood and not set apart from other housing units in the locality. A home presents a very different set of requirements from a motel, stemming from permanent occupancy and need for a varied community life.

Because of the importance of local determinations in a public housing program, we believe local people should decide the feasibility of reusing a design in their community. We already give housing authorities the option of reusing

designs in their public housing programs but we agree that the choice of designs for reuse might be widened and facilitated by a program which would systematically bring good plans to their attention in ways which would maximize opportunities to reuse designs suitable to local needs. Implementation of such an arrangement will involve an extensive effort and widespread cooperation by local housing authorities and the architectural firms serving them as well as considerable federal assistance in providing personnel, consultants, printed material, visual aids, etc.

The rights to plans would need to be obtained and appropriate arrangements developed to facilitate their modification to suit other sites and location characteristics and to fix responsibilities of architects who might be selected to modify designs prepared by others. Future contracts for architectural services on new designs would need to make provision for reuse under stated conditions at the option of HUD. These steps may transfer some current design costs to an increased departmental administrative budget.

Again the expectation of total savings in time and expense is probably not as great as your draft report suggests. The estimate of an average time savings of 19 months or 76 weeks is questionable.¹ In a circular dated January 22, 1969, HUD established milestones of 42 weeks in conventional projects and 18 weeks in turnkey projects for the local authority's planning and design period. Adding HUD review, these times might increase to 57 and 33 weeks, respectively. Savings of 76 weeks is hardly conceivable even if the milestones are optimistic. If these milestones are not met HUD policy now provides for contract cancellations. We must point out that production of plans and specifications alone does not account for the long development periods mentioned. Public projects require many more approvals and time than do private projects. Reuse of plans will not help in this respect to any great degree.

The estimated reduction in construction costs is also questionable. The types of structure used in public housing are well known to building contractors, and most of them already have enough cost experience to propose prices that are competitive. Price escalation is a factor of time and most delays are not design time.

[See GAO note, p. 28.]

The concept of the increasingly popular turnkey program is to have developers offer to build housing of types in which they have had experience, can fully apply the economies which come from repetitive production, and can therefore build at a lesser cost. The economies available from reuse of designs and from construction by a builder largely inherent in the turnkey concept. The turnkey developer may, for example, offer to build and sell to the local housing authority for use as a public housing project a structure following plans which he has previously used successfully in building a conventional project for the general rental market.

¹GAO note: The 19-month time savings referred to in the report relate only to two projects in Milwaukee, Wisconsin. Our computation of cost savings was based on a time savings of 5 months, as shown on page 15.

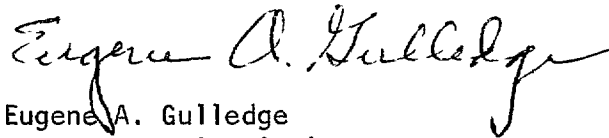
APPENDIX I

It is doubtful whether the turnkey program would be affected by the proposed plan for greater reuse of public housing plans, and I would not expect that there would be any significant saving in this category of construction under the public housing program.

We plan to explore possibilities for greater reuse of housing designs with appropriate adaptations consistent with architectural standards of the neighborhood and community. One effort in this direction is HUD's design awards program in which meritorious projects are given wide recognition. LHA's are familiarized not only with the projects but perhaps more important, with architects of skill and experience. We believe the response to plan reuse of the local housing authorities and architectural firms which serve the housing program may be favorable especially in some row house or cluster housing projects where superiority has been demonstrated in designs producing liveability, attractiveness and low maintenance. To use such plans with a minimum of alterations, similar conditions governing such factors as codes, wind and snow loads, fuel and energy costs skills of local labor and availability of materials would have to be much the same if appreciable design savings for the buildings were to be made. As for the site, however, identical conditions are hard to imagine where terrain, subsoil conditions, orientation, existing trees, zoning, street and utility layouts commonly differ so widely that a completely new site and landscape plans are inevitable.

We hope to develop a systematic method of bringing successful project design to the attention of housing authorities on a nationwide basis for their consideration. Design reuse except under special conditions is neither feasible nor desirable but extensive efforts to assist LHA's and their architects in design of good and more economical housing will be vigorously pursued.

Sincerely yours,



Eugene A. Gullledge
Assistant Secretary-Commissioner

GAO note: Deleted comments relate to matters discussed in the draft report but omitted from the final report.

PRINCIPAL OFFICIALS OF THE
DEPARTMENT OF HOUSING AND URBAN DEVELOPMENT
RESPONSIBLE FOR ADMINISTRATION OF ACTIVITIES
DISCUSSED IN THIS REPORT

	<u>Tenure of office</u>	
	<u>From</u>	<u>To</u>
SECRETARY OF HOUSING AND URBAN DEVELOPMENT (formerly Administrator, Housing and Home Finance Agency):		
Robert C. Weaver	Feb. 1961	Dec. 1968
Robert C. Wood	Jan. 1969	Jan. 1969
George W. Romney	Jan. 1969	Present
ASSISTANT SECRETARY FOR HOUSING MANAGEMENT:		
Don Hummel	May 1966	Feb. 1969
Howard J. Wharton (acting)	Feb. 1969	Mar. 1969
Lawrence M. Cox	Mar. 1969	July 1970
Norman V. Watson	July 1970	Present
ASSISTANT SECRETARY FOR HOUSING PRODUCTION AND MORTGAGE CREDIT AND FEDERAL HOUSING COMMISSIONER:		
Eugene A. Gulledge	Oct. 1969	Present

Copies of this report are available from the U. S. General Accounting Office, Room 6417, 441 G Street, N W., Washington, D.C., 20548.

Copies are provided without charge to Members of Congress, congressional committee staff members, Government officials, members of the press, college libraries, faculty members and students. The price to the general public is \$1.00 a copy. Orders should be accompanied by cash or check.