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BY THE COMPTROLLER GENERAL

Report To The Chairman, Joint Committee On Printing OF THE UNITED STATES

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GPO Needs To Analyze Alternatives To Overcome Physical Limitations In Government Printing Operations

Many inefficiencies in GPO's manufacturing operations are related to the GPO facilities. GPO, which is housed in four aging, multi-story buildings and in six leased buildings, faces problems in material handling, space limitations, and constraints on the arrangement of equipment on the production floor.

Alternatives are available which would lessen, if not eliminate, these problems. These include redesigning the existing facilities, expanding them, or constructing a new facility.

Before an alternative is selected, a cost-benefit analysis of each alternative should be made. On the basis of the outcome of this study, GPO should seek congressional approval for one of the alternatives and develop a master plan for carrying it out.



PLRD-82-20
JANUARY 4, 1982

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UNITED STATES GENERAL ACCOUNTING OFFICE
WASHINGTON, D.C. 20548

PROCUREMENT, LOGISTICS,
AND READINESS DIVISION

B-205592

The Honorable Charles McC. Mathias
Chairman, Joint Committee on Printing

Dear Mr. Chairman:

By letter, dated February 23, 1981, the Acting Chairman of the Joint Committee on Printing asked us to study the operations of the Government Printing Office. He especially asked us to describe any operational inefficiencies attributable to the location, design, and age of the buildings occupied by the Government Printing Office. We found many such inefficiencies. Further, we found that there are alternatives for correcting, to varying degrees, these inefficiencies.

As pointed out in the letter and discussed with your Office, we did not perform a cost-benefit analysis; nor did we do sufficient work to recommend one alternative over another. Also, as requested by your Office, we did not solicit comments from the Government Printing Office.

As arranged with your Office, we are sending copies of this report to the Government Printing Office. Unless you announce its contents earlier, we plan no further distribution of this report until 30 days from the date of the report. At that time, we will send copies to the Chairmen, Senate Committees on Appropriations, on Rules and Administration, and on Governmental Affairs and House Committees on Appropriations, on House Administration, and on Government Operations; and the Director of the Office of Management and Budget.

Sincerely yours,

A handwritten signature in cursive script, reading "Charles A. Bowsher", is written over the typed name.

Comptroller General
of the United States

COMPTROLLER GENERAL'S
REPORT TO THE JOINT
COMMITTEE ON PRINTING

GPO NEEDS TO ANALYZE ALTERNATIVES
TO OVERCOME PHYSICAL LIMITATIONS
IN GOVERNMENT PRINTING OPERATIONS

D I G E S T

Numerous inefficiencies in the Government Printing Office's (GPO's) manufacturing operations can be attributed to the buildings GPO occupies. The main complex does not have enough space to house all GPO operations, and operating in four multistory buildings further hampers efficiency. Alternatives are available which could lessen, if not eliminate, some of these inefficiencies.

GPO provides printing, binding, and document distribution services for the Federal Government. Located near Capitol Hill in Washington, D.C., the main GPO complex consists of four federally owned buildings constructed in 1903, 1930, 1938, and 1939. GPO leases additional space in six buildings, which are used primarily for storage and distribution, in the metropolitan Washington, D.C., area.

The Joint Committee on Printing asked GAO to determine if the location, design, and age of GPO's buildings adversely affected its manufacturing operations and to recommend ways to resolve those problems identified.

MANUFACTURING OPERATIONS
ARE INEFFICIENT

Inefficiencies in GPO occur from the time paper is first delivered at the receiving docks to the time it leaves the shipping docks as a finished product. To validate those inefficiencies identified and to determine which were related to the buildings, GAO observed GPO's manufacturing operations (both daytime and nighttime), visited a commercial printing plant and compared its plant layout and operations to GPO's, and met with a consulting engineer who specializes in printing and related matters.

Movement of raw materials

The location of GPO's main paper storage warehouse, 15 miles from the printing plant, combined with the multistory configuration of

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the main plant itself, results in an inordinate amount of material movement. This situation is aggravated by the inefficient material handling system within the main plant and by the scattered locations of the press and bindery production areas throughout the buildings.

Raw materials must be transported from the warehouse and main plant receiving areas to storage areas and from storage areas to the press or bindery production areas.

In both situations, the paper must be handled several times. Various combinations of fork-lifts and elevators are used in this process; in the case of roll paper, the roll drop and the roll lift are used as well. (For an illustration of sheet paper movement, see p. 7.)

Press division functions

The major building-related problems which contribute to the inefficiency of the press division are inadequate storage space, equipment placement constraints, and material handling delays.

Staging space is needed near the presses so they can run continuously without waiting for more paper. Presses throughout the plant have inadequate staging areas for paper supplies. As a result, some of the staged paper must now be placed in the aisles or around the presses, where it adds to the already crowded conditions.

Space is also needed to temporarily store raw materials and printed products when a higher priority job bumps a job in progress and to store products before going on to the next process. Again, areas along the aisles and around the presses must be used, further adding to the congestion on the floor.

A number of physical constraints in the GPO complex limit the installation and positioning of presses. To accommodate the large presses, floors have to be reinforced. There is also limited clearance above the presses, as well as a lack of space between the columns that line the press production floor. These factors affect the arrangement of presses on the floor and the types of presses that can be used.

GPO also faces problems if it plans to install new presses. Because of the size of these presses and the location of the press areas above ground level, the presses must be lifted by crane to the floor they are to occupy. A door or opening must be made in the outer wall of the building through which they can enter. This is a time-consuming and expensive way to install equipment.

Material handling in the press division is affected adversely by the lack of storage areas and the limited space between and around presses. Movement of finished products between floors is hampered by GPO's elevator system. When elevators are being used to move priority work, or when they are broken down, there are delays in moving printed products from the presses to the bindery division, and the materials waiting to be moved often back up into the aisles and work areas.

Bindery division functions

The major problems identified in the bindery division are material movement problems and crowded conditions. These problems are not entirely building related, but are due in part to the physical arrangement of bindery production lines.

The different types of binding and the many steps in the binding process require many intrafloor and interfloor movements of printed products. The lack of in-line production in the bindery complicates the material movement process, as do the elevators which must be used for movement between floors. Insufficient work staging areas and narrow passageways add to the crowded conditions.

UNAVOIDABLE BUILDING COSTS

Due to the age and the physical limitations of the current plant, major costs for leased space, building repairs, and renovations are unavoidable if GPO expects to continue to use this facility for its operations.

During the current fiscal year, GPO is leasing over 900,000 square feet of warehouse, office, and storage space at a cost of about \$2.6 million. Over half of the leased space is used for distribution operations of the Superintendent

of Documents; however, it is not necessary that these operations be collocated with the manufacturing operations.

GPO also leases its main roll paper storage facility because of the space limitations of its main facility.

Buildings in the main GPO complex range in age from 42 to 78 years. With buildings of this age, there is a continuing need for major repairs and renovations.

Major building renovation projects scheduled over the next 3 years include elevator replacement and refurbishment, roof replacement, and window replacement. GPO has also made an effort to correct major safety-related deficiencies. Estimated costs for all major projects designed to enhance both the physical structure and the safety of GPO's facilities totaled about \$12 million from fiscal years 1981 to 1983, an average of about \$4 million a year.

The leasing and renovation and repair costs alone would not justify a new building, now estimated at over \$220 million. They are important, however, and should be considered when doing a cost-benefit analysis.

ALTERNATIVES THAT NEED TO BE CONSIDERED

GPO continues to consider alternatives to its present facilities. GAO did not do a cost-benefit analysis of these alternatives nor did GAO do sufficient work to recommend one alternative over the others. The major alternatives include redesigning or expanding the existing facilities and building a new facility.

Benefits realized from redesigning the existing facilities relate chiefly to material handling. Installation of such devices as conveyor systems and automated lifts could reduce GPO's reliance on elevators and industrial trucks while speeding the movement of materials. Better alinement of bindery equipment, as well as acquisition of new, more efficient equipment, would cut down on material movement and would accelerate the overall process. Problems with this alternative

include space constraints, continued equipment placement problems, and unavoidable leasing and building repair costs.

Expansion of the existing facilities would involve construction of an annex behind building 3, allowing GPO to extend the production floors so that products could flow in a straight line from the presses to the bindery to the shipping operations. Depending on the size of the annex, storage and equipment placement problems could be alleviated to a great extent. The addition of automated conveyors and lift systems could ease material handling problems. Remaining problems would include those which are inherent in the existing facilities, such as the need for repairs and renovation.

A new building would consolidate all operations in GPO's main complex and leased facilities into one building. If properly designed, the new building would eliminate all the building-related inefficiencies found at the present site.

Although various alternatives, such as expansion or construction of a new facility, have been studied in the past, GAO found no evidence that a detailed study had ever been done to compare the alternatives from a cost-benefit perspective.

CONCLUSIONS AND RECOMMENDATIONS

The primary alternatives under consideration to improve GPO's manufacturing operations involve the (1) redesign of the existing facilities, (2) expansion of the existing facilities, and (3) the construction of a new facility. Before a particular alternative is selected, GAO recommends that the Chairman of the Joint Committee on Printing have GPO make a cost-benefit analysis of all the alternatives. Upon completion of the analysis, an alternative should be chosen, and a plan developed to ensure proper implementation of the alternative.

Regardless of which alternative is chosen, a decision is needed soon. GPO could then plan for the optimal use of the existing facilities, or, if a new facility is the chosen alternative, major changes to the current plant could be avoided.

AGENCY COMMENTS

At the request of the Chairman, Joint Committee on Printing, GAO did not obtain comments from GPO.

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ABBREVIATIONS

GAO	General Accounting Office
GPO	Government Printing Office
JCP	Joint Committee on Printing

CHAPTER 1

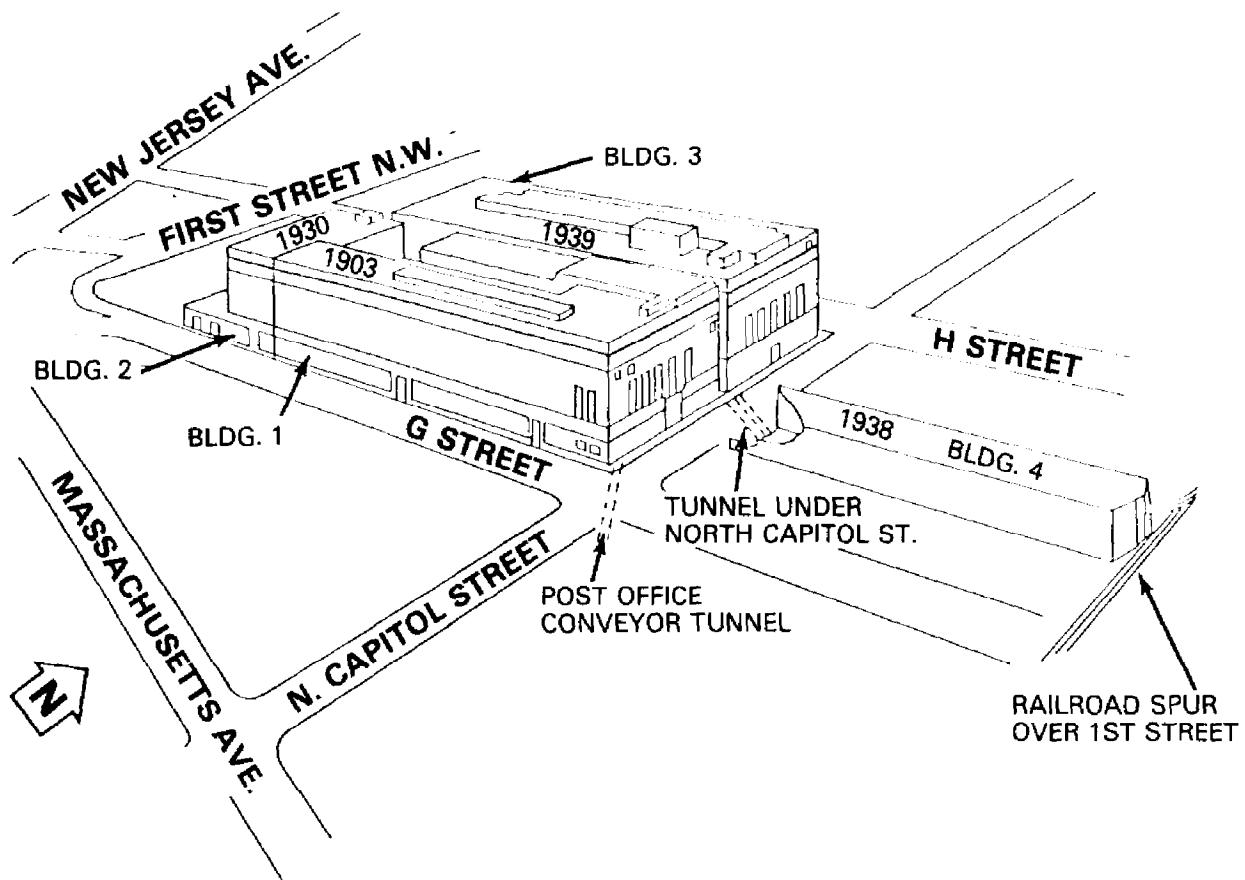
INTRODUCTION

The Government Printing Office (GPO) was established in 1860 to provide printing, binding, and document distribution services for the Federal Government. GPO provides overnight printing for the Congress and processes urgent work for executive departments and the judiciary branch. Its workload consists mainly of printing the daily Congressional Record; the daily Federal Register; and legislative hearings, bills, reports, and calendars. GPO also contracts out work which cannot be completed in-house within time and technical constraints to commercial printers. GPO's documents section operates as the distributor and/or vendor of Government documents.

GPO'S OPERATIONS AND FACILITIES

GPO's production operations are currently located in a federally owned complex in Washington, D.C. Document distribution operations and warehousing space are in six leased facilities, containing over 900,000 square feet, which are scattered throughout the metropolitan Washington, D.C., area. (See p. 25.)

The main complex in Washington consists of four buildings which were built in 1903, 1930, 1938, and 1939. Buildings 1, 2, and 3 are eight-story buildings which are connected to each other. They house GPO's production operations and administrative offices. Building 4, which is used for paper storage and post card production, has three stories and is connected to building 3 by an underground tunnel. See page 2 for a sketch of the GPO complex.



GOVERNMENT PRINTING OFFICE COMPLEX

OBJECTIVES, SCOPE, AND METHODOLOGY

On February 23, 1981, the Acting Chairman of the Joint Committee on Printing (see app. I) asked us to:

- Describe any operational inefficiencies that are attributable to the location, design, and age of the buildings occupied by GPO.
- Recommend any corrective action(s) or alternatives, together with some advantages and disadvantages of each. However, he did not expect us to estimate the cost of each recommended corrective action or alternative.

GPO's operations can be broken down into the manufacturing process and the distribution process. We reviewed the manufacturing process (see the flow diagram on p. 4) to identify those inefficiencies which could be attributed to the present buildings. While inefficiencies can also be created through management or the handling of personnel, these areas were not included in our review. We did not review the composing division in depth because it is not adversely affected by the buildings and because GPO officials believe it is efficient. Also, we did not review the distribution process because its operations are not housed in the main plant; our only concern was that these operations are in leased facilities.

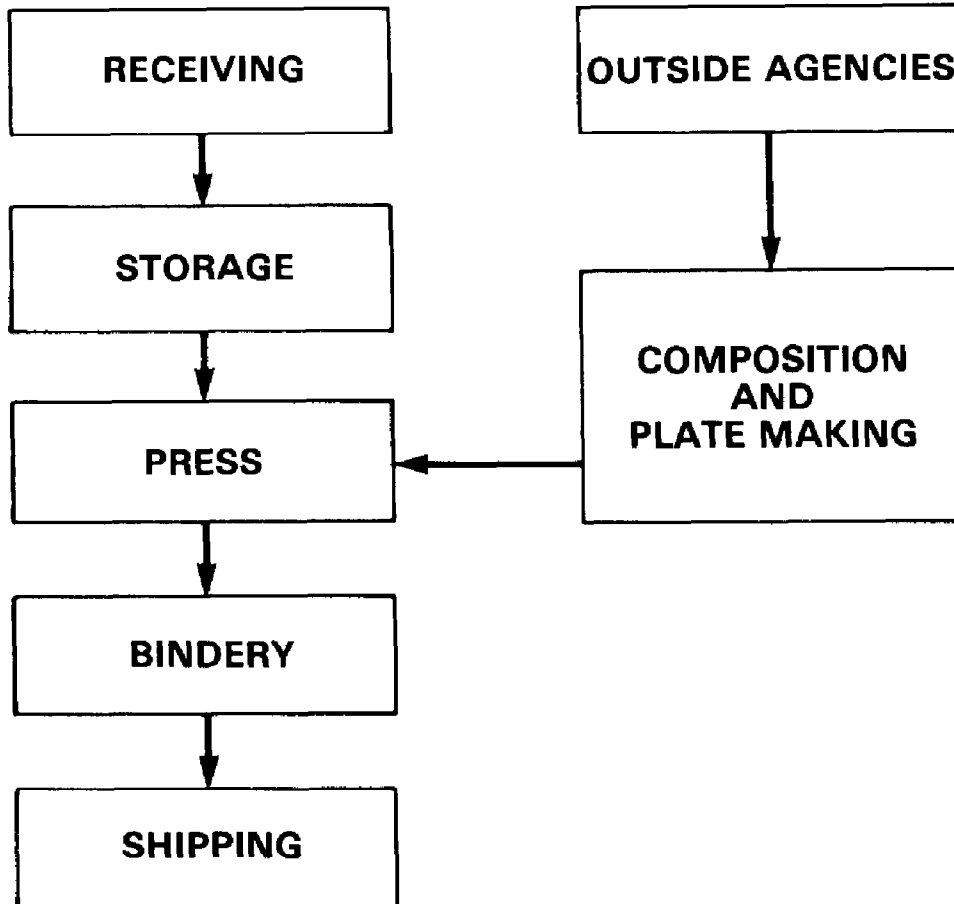
We asked GPO officials to identify (1) the inefficiencies under their control and (2) those costs which could be attributed to the age, design, and insufficient space of the current facilities. To validate those inefficiencies identified and to determine which were related to the buildings, we observed GPO's manufacturing operations (both daytime and nighttime), visited a commercial printing plant and compared its plant layout and operations to GPO's, and met with a consulting engineer who specializes in printing and related matters. In addition, we examined available studies on GPO and its manufacturing operations. Some of the studies focused on changes needed within the current facilities, and others provided support for building a new plant.

We did not make a cost-benefit analysis of the alternatives nor did we do sufficient work to recommend that one alternative be selected over another.

FLOW DIAGRAM GPO's MANUFACTURING PROCESS

PAPER TO FINISHED PRODUCT

COPY TO PRESS



CHAPTER 2

INEFFICIENCIES IDENTIFIED IN

MANUFACTURING OPERATIONS

Past studies have disclosed inefficiencies in GPO's manufacturing operations. Our study confirmed that inefficiencies exist and that many of them are related to the buildings which GPO currently occupies. In general, the main complex does not have enough space to house all of GPO's operations, and operating in four multistory buildings hampers efficiency. While these inefficiencies suggest that improvements are needed, it should be noted that the improvements could prove to be more costly than the problems. As discussed in chapter 4, alternatives are available which could lessen, if not eliminate, some of the inefficiencies identified.

Material handling is a key function at any printing plant, and the amount of material moved within GPO is enormous. For example, during the first 6 months of fiscal year 1980, over 53,000 pallets ^{1/} of paper were moved. In view of such volume, material movement and handling should be as efficient as possible; the more and the further material is moved, the more expensive it becomes. But, GPO's operations are characterized by excessive material handling and an inefficient material handling system. Intertwined with this problem is the lack of sufficient storage space.

CUMBERSOME SYSTEM FOR MOVING PAPER AND FINISHED PRODUCTS

GPO's facilities, where materials are handled, include the leased Springbelt warehouse in Virginia and the four-building multistory main complex in Washington, D.C. The warehouse is about 15 miles away from the main complex. This combination causes an excessive movement of materials that is aggravated by an inefficient material handling system at the main plant, consisting mainly of industrial trucks and elevators. Although storing paper away from the main plant and manually moving materials is inefficient, when the cost of land and warehouse space in the city is compared with that in the suburbs, and when the cost of potential material handling systems is evaluated, these inefficiencies could be cost effective. The cost-benefit analysis referred to on page 32 should explore issues such as these.

The magnitude of material handling can be demonstrated by the fact that 231 industrial trucks (152 riding and 79 walking)

^{1/}Pallets are portable platforms for moving cargo or freight.

and 23 elevators were used and about 260,000 labor hours were expended to move materials during the first 9 months of fiscal year 1981. The labor costs alone were more than \$2.4 million.

Receiving paper and moving it to storage

GPO receives two types of paper stock--rolls and sheets--at the Springbelt warehouse and building 4. The paper received at Springbelt is handled several times between receipt and pre-production storage. First, a forklift removes the paper from a freight car and moves it to storage. Then, a forklift moves it from storage to a truck, which transports it to building 3 at the main plant, at a transportation cost of over \$145,000 in fiscal year 1981. Again, a forklift moves it from the truck to an automated roll drop which lowers it to the basement. In the basement, it is once again moved by a forklift to storage. Moving the paper from the roll drop to storage can cover distances up to 100 yards.

To observe this material receipt and handling process, we randomly selected one delivery of paper rolls to the shipping docks of building 3. When the delivery truck reached the shipping docks, an industrial truck driver offloaded 38 rolls and deposited them down the roll drop. This part of the process took approximately 28 minutes. Once the rolls reached the basement, two industrial truck drivers moved the paper, concurrently with the dropping of the rolls, from the drop area to the storage bins where another industrial truck driver stacked the paper. Moving the paper from the roll drop area to storage took approximately 28 minutes, and stacking it took another 15 minutes.

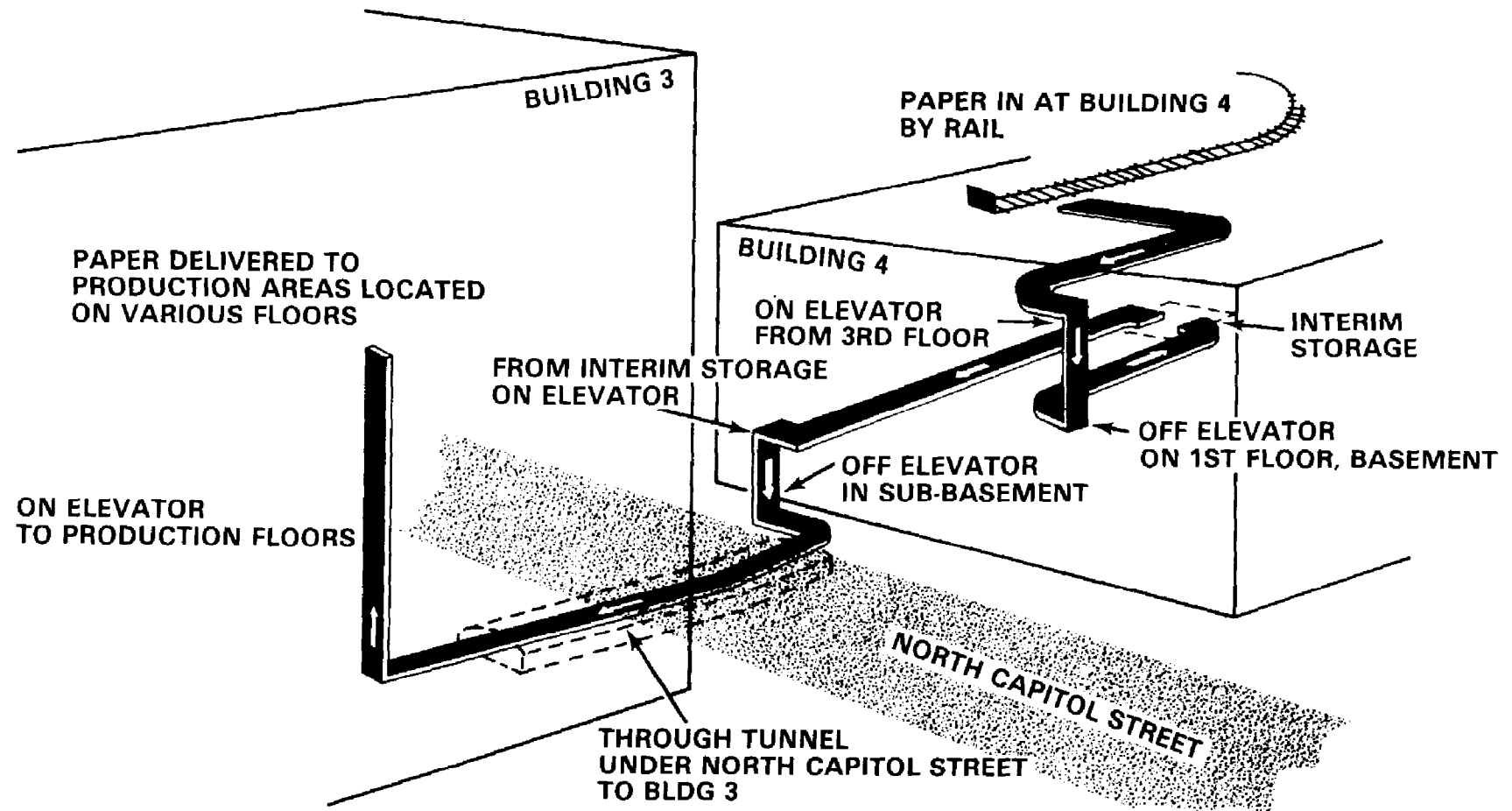
Paper received in building 4 does not require as much handling. When received on the third floor, it is moved by a forklift to an elevator, which takes it to the first floor or basement, where it is moved again by a forklift from the elevator to the storage area.

Moving paper from storage to the press and bindery divisions

Paper is used by both the press division (for printing) and the bindery division (for prepress functions, such as cutting). The movement of paper from storage to these divisions is not efficient because industrial trucks and elevators must be used and because paper has to be moved daily due to the divisions' insufficient paper staging areas.

Sheet stock, which is stored on the first floor or the basement of building 4, is moved to the press and bindery divisions in building 3. (See the diagram on p. 7.)

SHEET STOCK MOVEMENT FROM RECEIVING TO PRODUCTION



An average of 147 pallets of paper is moved daily through this route, and each pallet must be handled three times by a forklift truck. In building 4, an industrial truck driver loads the pallets on an elevator before the elevator descends to the sub-basement. In the subbasement, two truck drivers offload the pallets and transport them to the basement of building 3 through the tunnel. Then, once again, an elevator takes the paper to the appropriate floor, where it is offloaded by two more truck drivers.

We observed the transfer of 45 pallets of sheet stock from building 4 to building 3. The times required for each transfer (an average of almost four pallets) ranged from 11 to 30 minutes. The average length of time required for each transfer was about 18 minutes.

Roll paper, which is stored in the basement of building 3, is moved to the press division through two routes. Rolls going to the presses on the second floor of building 3 are lifted by an automated roll lift. Rolls going to the Congressional Record presses on the fifth floor are moved by elevators. These movements follow the sequences shown below.

Movement of Roll Paper
from Basement To Press Division

<u>By Roll lift</u>	<u>By elevators</u>
Forklift to staging area for roll lift	Forklift to elevators
Forklift onto roll lift	Elevator to fifth floor
Roll lift to second floor	Forklift to press storage/ staging areas
Forklift to press storage/ staging areas	

On the average, 48 rolls of paper are moved daily by the roll lift, and 50 rolls are moved by elevators.

We observed 17 rolls of paper being lifted from the basement to the second floor by the roll lift, and we obtained information from night production officials on roll paper transfers by the elevators. For roll lift operations, an industrial truck driver, located in the basement, staged the rolls of paper near the roll lift loading ramp, while another loaded the rolls onto the ramp. Once the rolls reached the second floor, a third truck driver carried them to the appropriate press area. This process took approximately 43 minutes, or an average of about 2.5 minutes for each roll of paper.

Concerning paper movement via the elevators, paper is transferred to the fifth floor press area in two stages. Paper moving up to the presses in the first stage is for the printing of the Federal Register, while later in the morning, the second stage of

paper movement is earmarked for the Congressional Record. Before each movement, paper is staged and prepared for transfer. This process generally involves five people and takes 1 to 2 hours. Delivery of paper from the basement to the fifth floor also requires five people and takes a total of 2 hours.

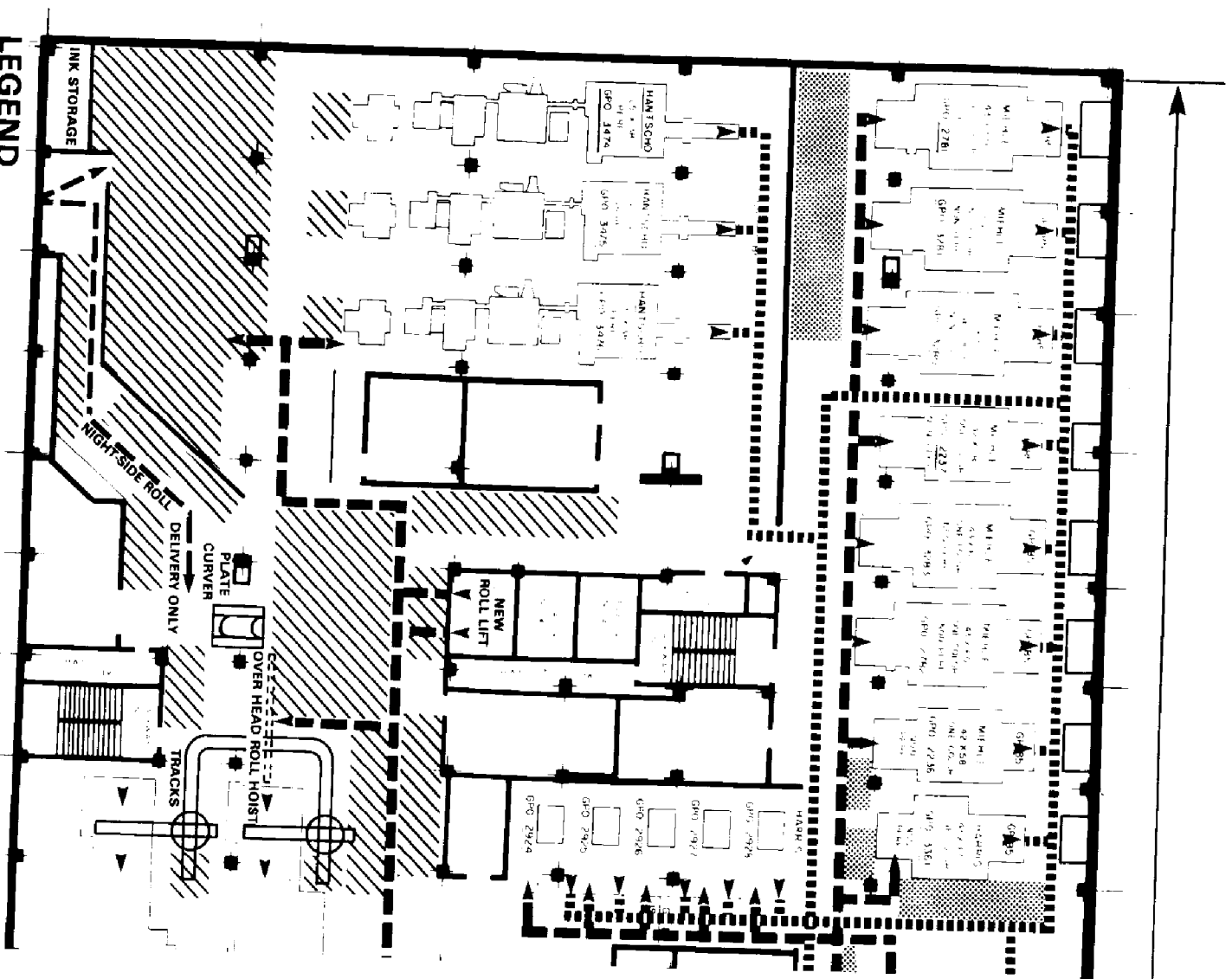
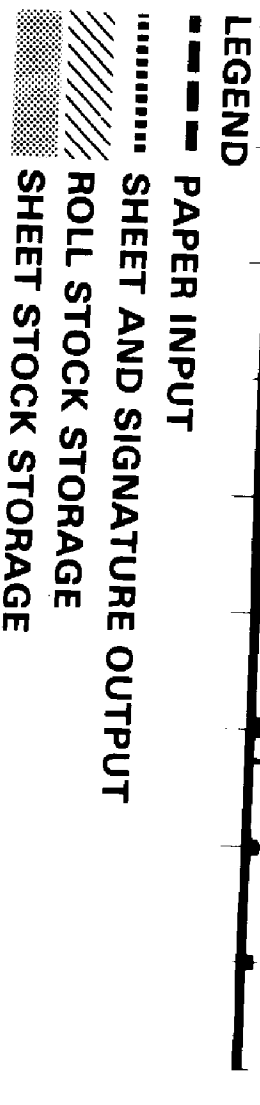
PROBLEMS IN THE PRESS DIVISION

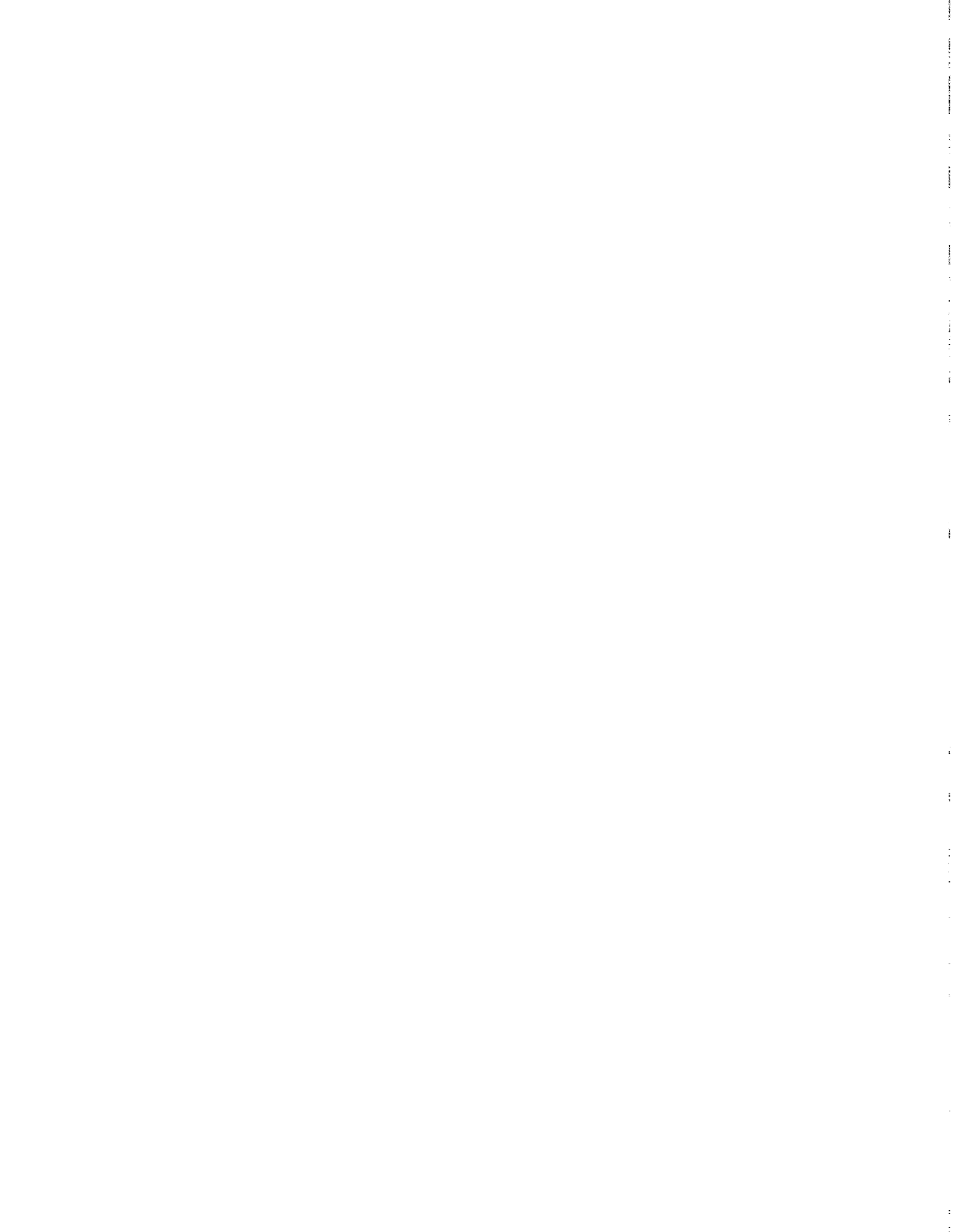
The press division is scattered throughout the main GPO plant, but the majority of the presses (43) are located on the second floor of building 3. The four Congressional Record presses are on the fifth floor of building 3, and the post card operation is in building 4.

The major building-related problems in the press division are (1) inadequate storage space, (2) equipment placement constraints, and (3) material handling delays. Although these problems create inefficiencies, we were unable to quantify most of them in terms of lost productivity or added costs. Several alternatives are available which would help reduce, if not eliminate, these inefficiencies. (See ch. 4.) The layout of the primary press area on page 11 helps to depict the problem discussed below.

[illegible]

**GOVERNMENT PRINTING OFFICE
PRESS DIVISION
SECOND FLOOR BUILDING #3**





Inadequate storage space

Storage space in the press division, as is generally the case in other divisions, is at a premium. As can be seen by the layout, the presses are fitted tightly into the press area. Press officials said that they would like additional space around the presses. We were unable, however, to identify any standards on how much space is needed for each press or to evaluate the need for the presses now on hand.

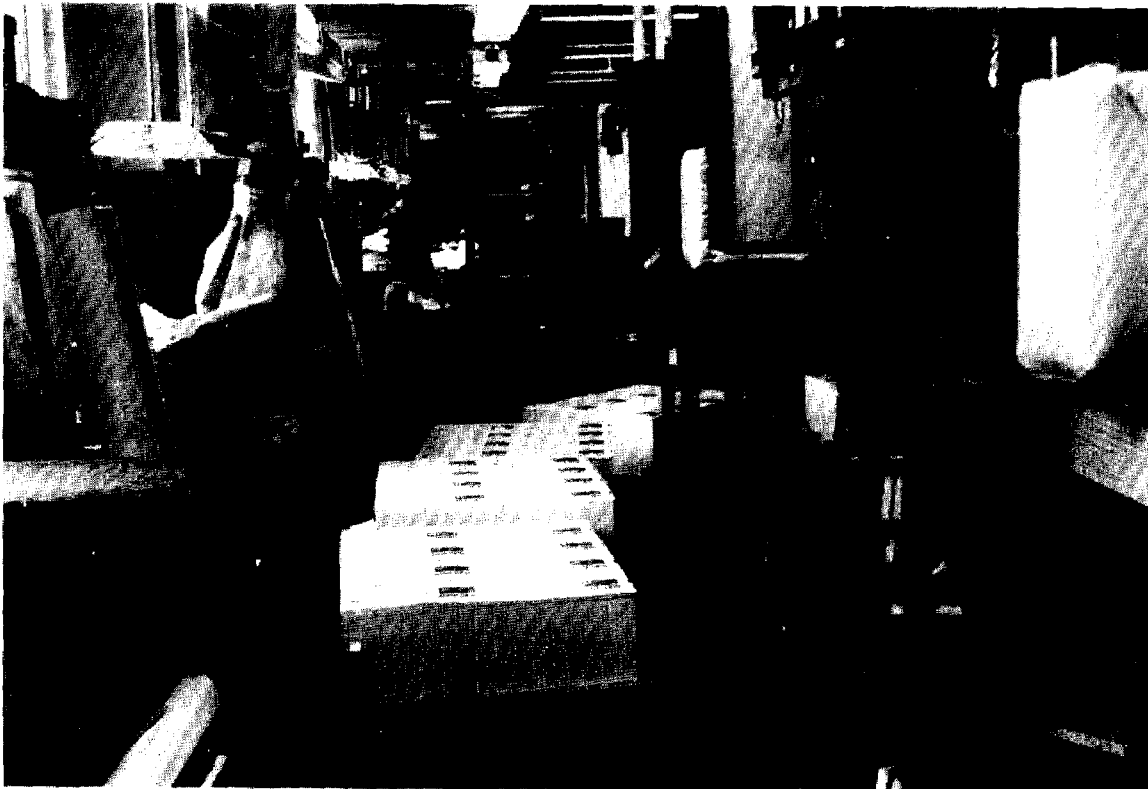
The storage space problems are summarized below.

- Presses need staging space for placing paper so that they can run continuously without waiting for more paper. But, none of the presses have adequate staging space. As a result, paper is placed along the aisles or in small areas in front of the presses. (See photograph below.) Crowded conditions therefore exist which, to some degree, could affect productivity.



SOURCE: GOVERNMENT PRINTING OFFICE
TYPICAL AISLE IN THE PRESSROOM. NOTE THE LACK OF ROOM FOR INDUSTRIAL TRUCKS AND THE MOVEMENT OF MATERIAL.

--Space is necessary to store raw material and printed products when a higher priority job bumps the work in process and to store printed products that must remain before going to the next production process. Again, the only storage available is along the aisles and around the presses, which causes considerable congestion (see photograph below.) Work in process can be moved to space available on other floors, but then the elevator waiting time becomes a problem. (See p. 16.)



SOURCE: GOVERNMENT PRINTING OFFICE

WORK IN PROCESS AWAITING NEXT OPERATION (PRESS AREA).

Equipment placement constraints

The GPO buildings pose a number of constraints to positioning and installing the larger presses. First, the floor-load capacities in buildings 1 and 3 are not sufficient for the heavier presses. Although building 3 floors require less additional

reinforcement than those in building 1, the cost involved is still significant. For example, GPO recently installed two offset web presses which weigh about 106 tons each. The cost to reinforce the floor area for these presses was \$152,000.

Second, the buildings have limited overhead clearance and do not have enough space between columns. Therefore, GPO is restricted in the type of presses it can use. Although the low overhead clearance does not affect productivity, it does present a safety hazard to press operators who must walk on narrow platforms, work in cramped spaces, and duck under low overhead equipment. (See photograph below.) According to a printing plant consulting engineer, a minimum of 2 feet of clearance is desirable.



SOURCE: GOVERNMENT PRINTING OFFICE
VIEW BETWEEN THE TWO GROUP 88 PRESSES. NOTE THE LIMITED OVERHEAD CLEARANCE.

The last constraint relates to installing new presses. Because of their size and the fact that they are to be located above ground level, the presses must be lifted by crane, and an opening must be made in the outer wall of the building for them to enter. This is a time-consuming and expensive way to install or rearrange equipment.

Material handling delays

Material movement within the press division consists of placing paper on the presses and moving the printed products away from the press area. Insufficient storage space and close proximity of one press to another frustrate movement within the division. As can be seen on the press room layout on page 11, the distance between paper storage areas and the presses can sometimes be great.

Material handling between the press and the bindery divisions is a major stumbling block. The products of the presses (signatures 1/ and flat sheets) are moved on pallets to the bindery locations on the third, fourth, and fifth floors by industrial trucks and three centrally located elevators. If the Congressional Record is running late, it gets priority use of one of these elevators. This can delay moving other finished work to the bindery. As a result, pallets sometimes backup in the aisles and around the presses, and time can be lost in waiting for elevators. In observing the work flow we found:

--At one point, 17 pallets of paper were backed up. The reasons for this backup were (1) one elevator was out of commission, (2) one elevator was being used to move the Congressional Record from the fifth floor to shipping, and (3) the third elevator was being used by building management personnel. Although no presses were forced to stop operating, three were surrounded by pallets and had no place to put additional output, and raw material staged for use was hemmed in by the pallets.

--A GPO industrial engineer, whom we worked with made a time study of the three elevators the press division used. According to the study, 20 trips were made during 1 day, and the average waiting time for these elevators was 5-1/2 minutes. However, the waiting time in the morning was longer; on two trips it was more than 25 minutes. The reasons for this delay were that one elevator was out of commission and another was being used by the bindery division.

INEFFICIENCIES IN THE BINDERY DIVISION

The bindery division, located in three buildings and on four floors, is divided into the following sections.

1/A signature is a group of folded pages (normally there are 16 pages to a signature.)

- The pamphlet section, which produces temporary paper covered products, such as congressional hearings, occupies the fourth floors of buildings 1 and 2. The Congressional Record bindery is also under this section and is located on the fifth floor of building 3.
- The book section, located on the third floor of building 3, produces handmade and adhesive bound books.
- The blank section performs nonbook and nonmagazine functions, such as producing passports, pads, and forms and cutting, punching, drilling, and perforating paper. This section is on the third floor of building 1, and the first floor of building 3.

The primary problems identified in the bindery division concern material movement and crowded conditions. These problems are not, however, entirely building related.

Material movement problems

Material movement within the bindery division is of major importance because of the large volume of material that is handled. In the first half of fiscal year 1980, the bindery division handled over 53,000 pallets of printed products, which represent about 87.7 million signatures. The division performs about 38 different types of jobs, each of which constitutes a different combination of the various bindery operations.

Most of the material movement within this division is between the various steps in a given operation, rather than between floors. The number of times a pallet must be moved depends on what needs to be done on a specific job. Such movement is not as efficient as possible because production operations in the pamphlet and book sections are not in line and because most moves require industrial trucks. In addition, elevators are needed to move unfinished products between floors and to move finished products to shipping.

The layouts of the pamphlet and book sections are on pages 19 and 21. These layouts show the work flow process for each section. As can be seen, each pallet must be handled and moved several times by industrial trucks. The distances the pallets have to be moved vary, but can be lengthy, and at times, backtracking is necessary. During the first half of fiscal year 1980, 4,968 pallets were moved through the general paths shown in the pamphlet section, and 18,880 pallets were moved through the paths shown in the book section. Bindery officials consider work flow their major problem. However, this problem is not entirely related to the building and can be largely corrected in the current facility. (See p. 29.)

Material also has to be moved to and from storage within the bindery division. Although such movement does not necessarily require elevators, it does require industrial trucks, and it adds to

the number of times and the distances that products must be moved. In addition, the bindery division depends on elevators to move unfinished products from one floor to another, such as from the pamphlet or book section to the blank section, and to move finished products to shipping. During the first half of fiscal year 1980, over 24,000 pallets were moved from one floor to another. When elevators must be used, time is generally lost (as evidenced by the time study results on p. 16) which results in decreased productivity.

Crowded conditions

The narrow passageways and lack of proper staging areas for printed flat sheets and signatures create productivity and safety problems for the bindery division. Passageways, which are about 4 feet wide, are used for both employee and industrial truck traffic. This situation is not only unsafe for employees, but it is also unsuitable for two-way truck traffic. According to a material handling textbook, the desirable width of passageways is 10 to 12 feet.

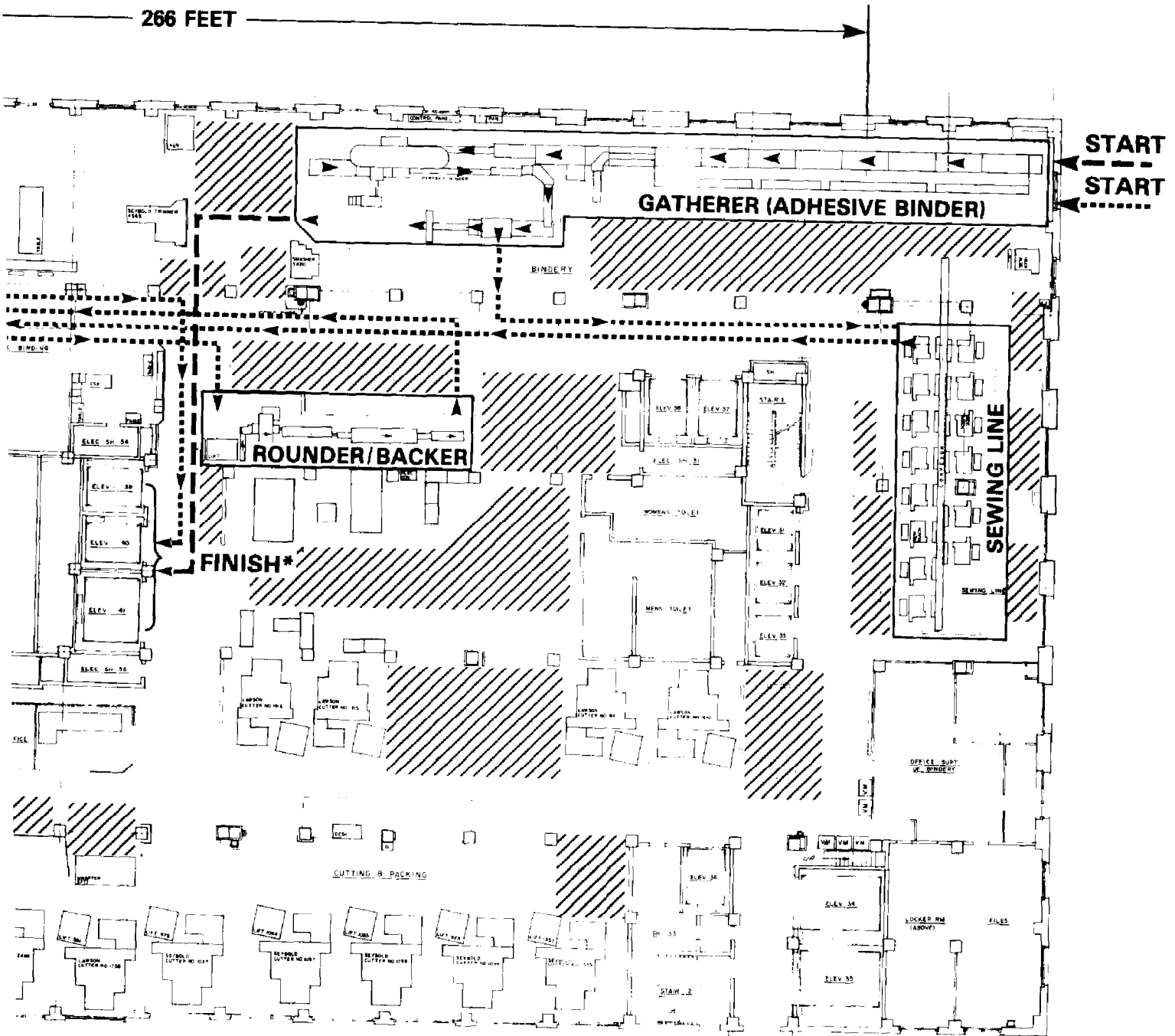
The insufficient work staging areas around machinery cause further congestion along the narrow passageways, which are already crowded with machinery, tables, and pallets of work in process (see following photograph). The crowded conditions can also be seen in the layouts on pages 19 and 21.



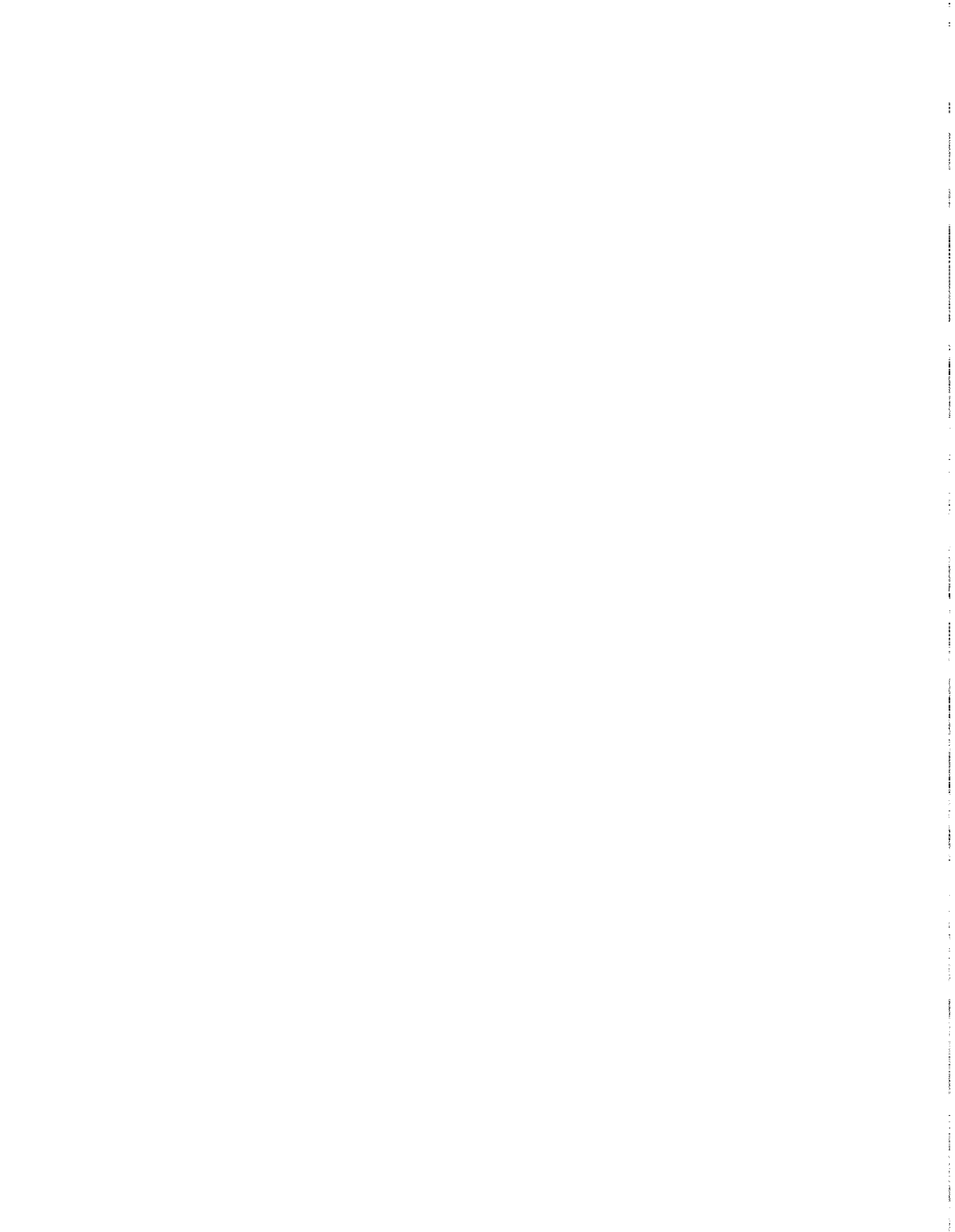
SOURCE: GOVERNMENT PRINTING OFFICE

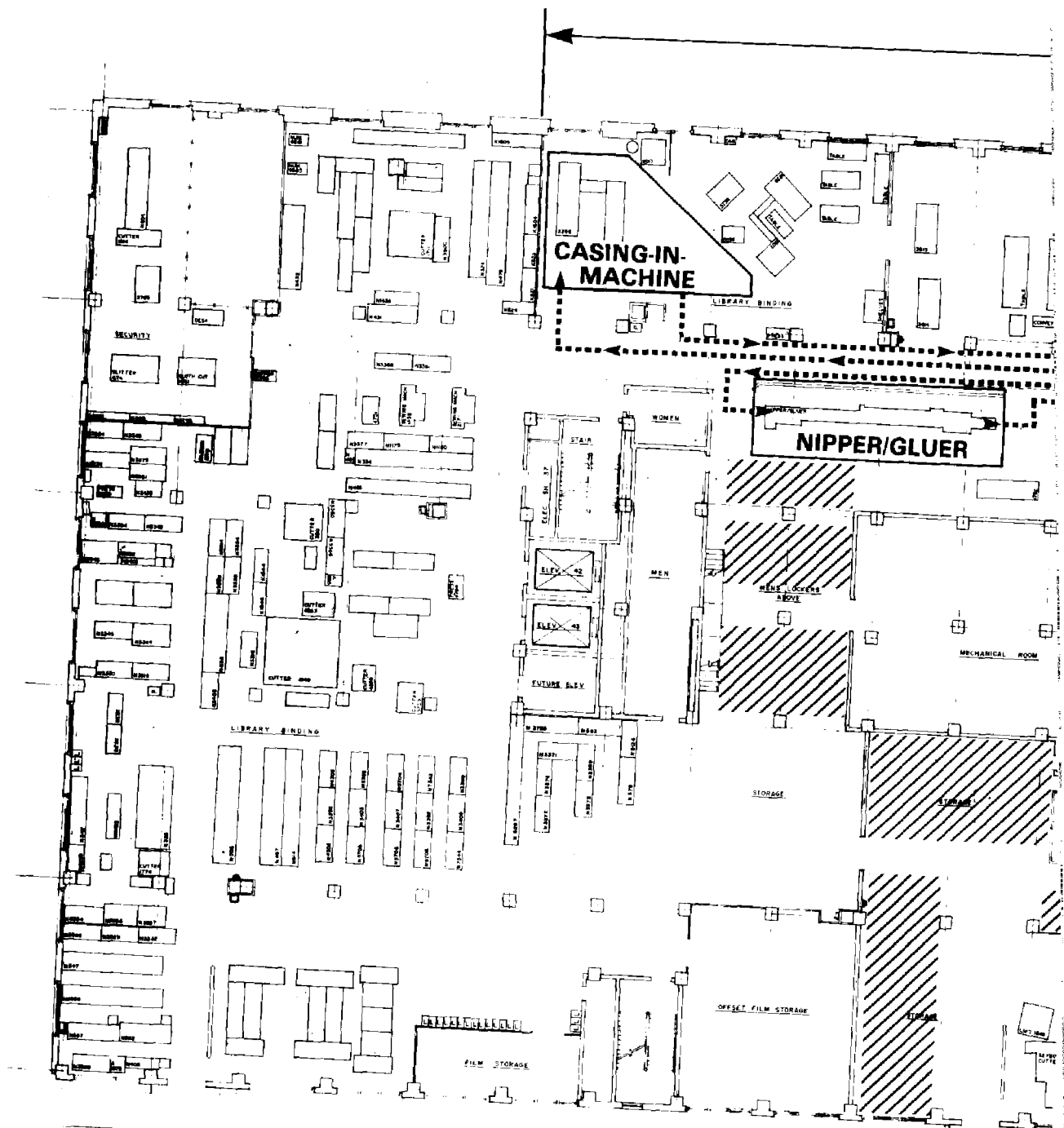
EXAMPLE OF CROWDED CONDITIONS IN THE BINDERY. TEMPORARY STORAGE FOR TWO BINDERY OPERATIONS.

266 FEET



GOVERNMENT PRINTING OFFICE BINDERY DIVISION THIRD FLOOR BUILDING #3





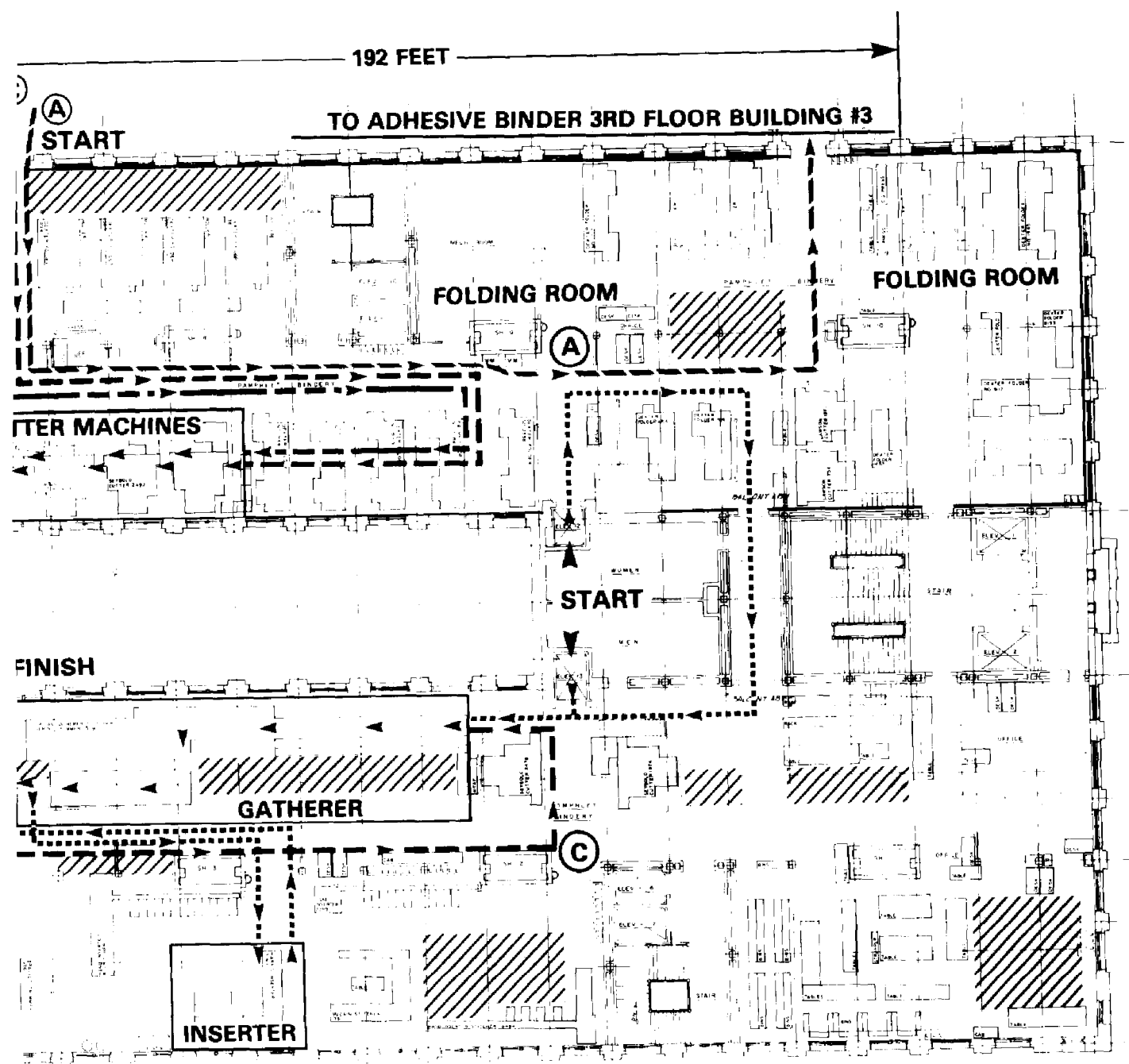
LEGEND

.....<..... PRODUCT FLOW (ADHESIVE BOUND)

- - -< - - - PRODUCT FLOW (SEWN PRODUCTS)

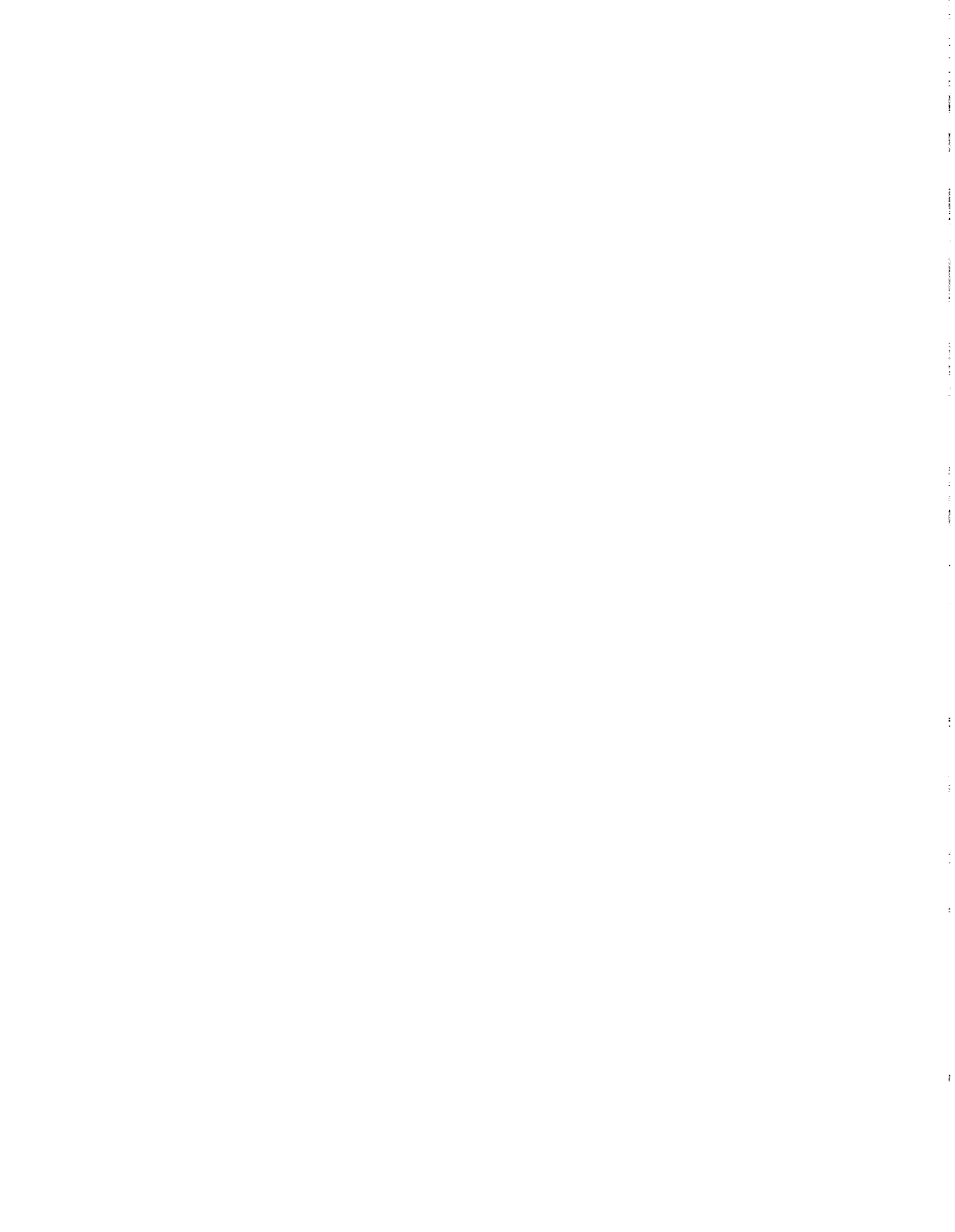
*ELEVATORS #39, #40, #41 USED FOR SHIPPING

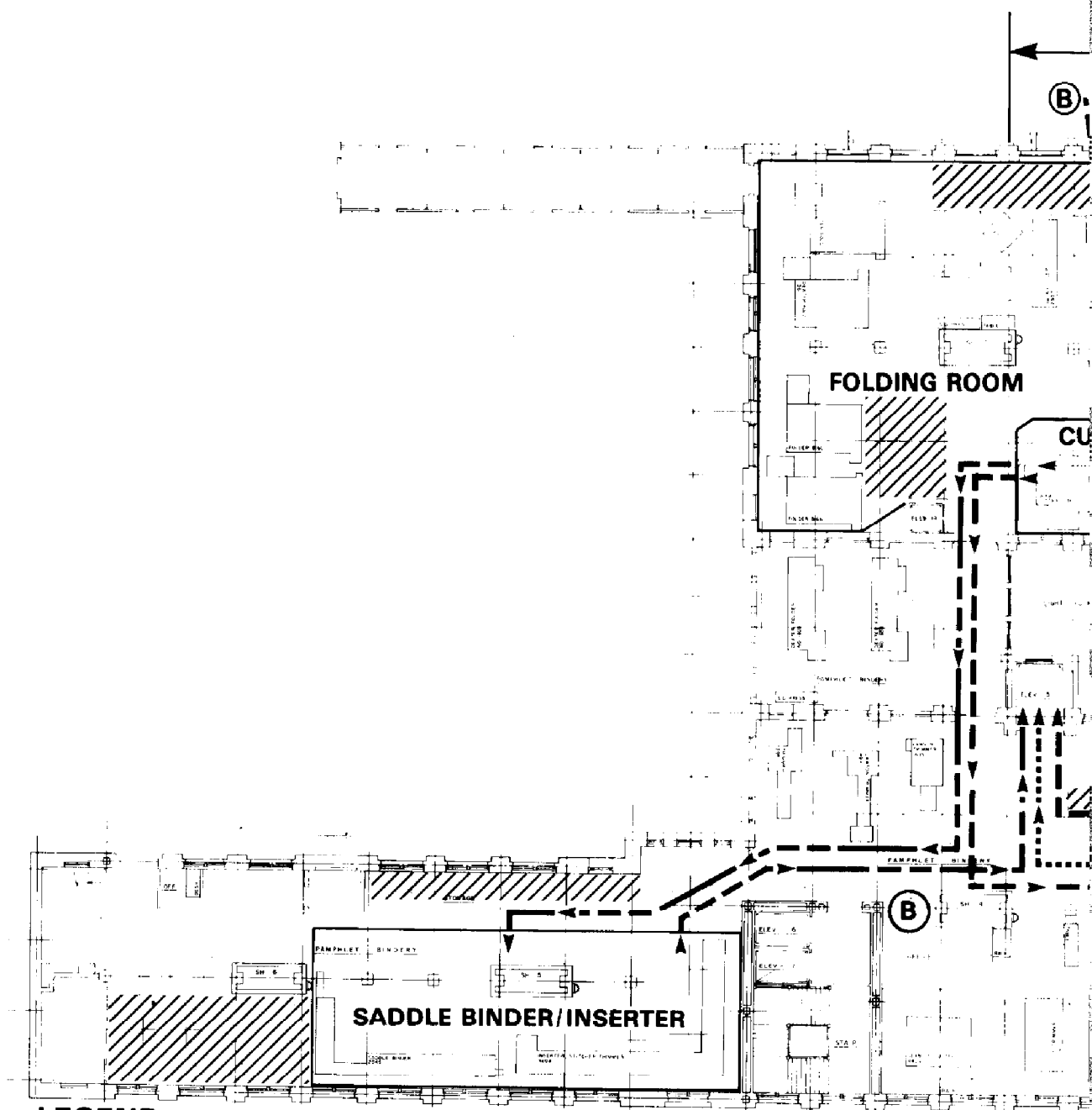
TEMPORARY STORAGE



GOVERNMENT PRINTING OFFICE **BINDERY DIVISION** **FOURTH FLOOR BUILDING #1**

SHIPPING





LEGEND

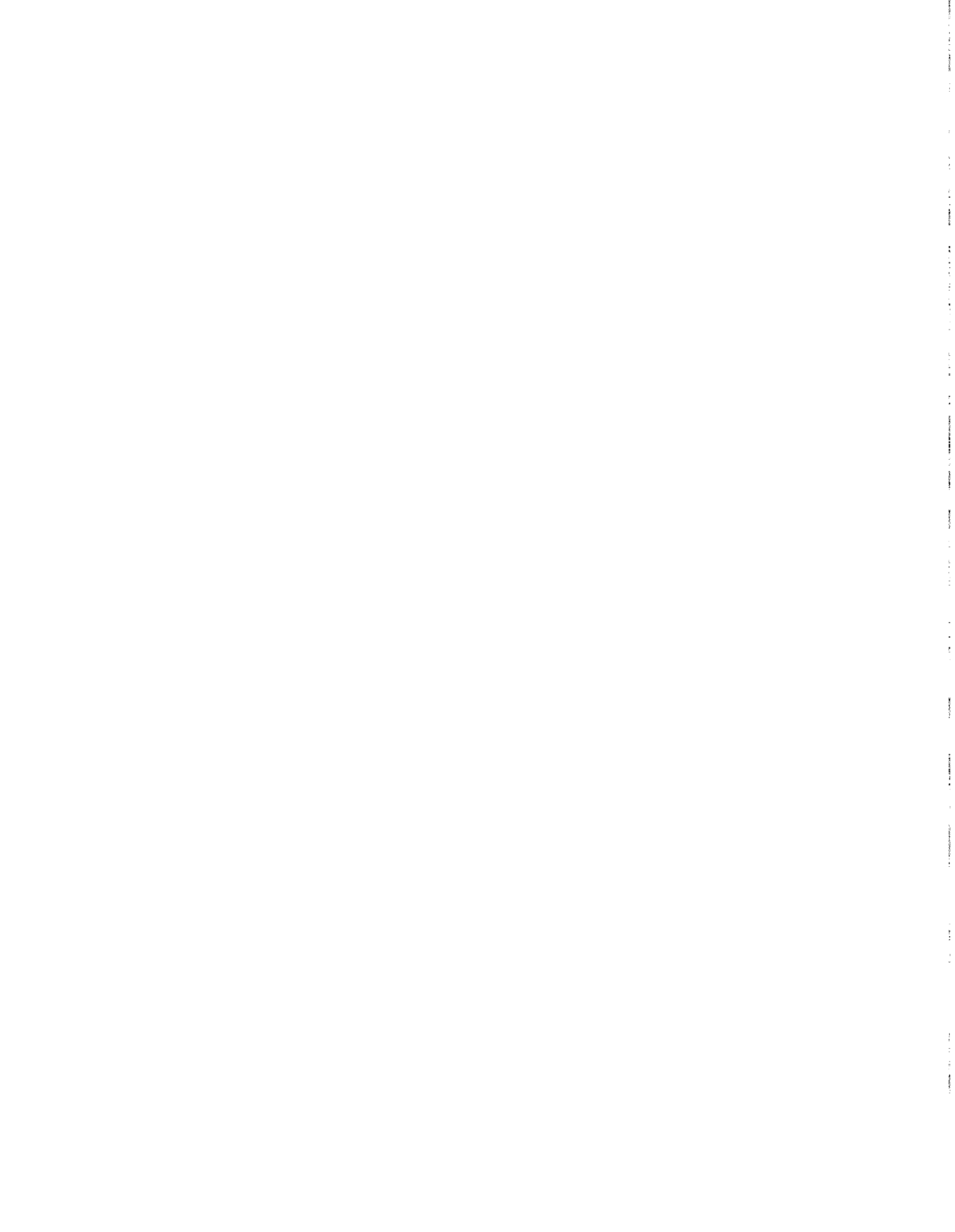
..... WEB SIGNATURE WORK FLOW PROCESS

FLAT SHEET WORK FLOW PROCESS

THERE ARE 3 POSSIBLE ROUTES:

- (A) ----- FOLDING ROOM → ADHESIVE BINDER → SHIPPING
- (B) ----- FOLDING ROOM → SADDLE BINDER / INSERTER →
- (C) ----- FOLDING ROOM → GATHERER → SHIPPING

////// TEMPORARY STORAGE



CONCLUSIONS

Many of the inefficiencies in GPO's manufacturing operations are related to the current complex. Material handling and movement, in particular, are cumbersome. The primary reasons for this problem follow.

- Insufficient paper storage space at the main plant necessitates leasing a warehouse located about 15 miles away from the plant. Therefore, raw material has to be received and handled twice.
- Because the main plant consists of multistory buildings, elevators and industrial trucks must be used to move material.
- The number of times material must be hauled and handled between storage and shipping and the distances between areas are excessive. A single movement can take as long as 30 minutes, even without problems.

Movement inefficiencies are compounded when key elevators are not working or when the daily Congressional Record is running late.

Other problems related to the GPO buildings affect productivity, employee safety, and operating flexibility. For example:

- The press and bindery divisions do not have enough storage space for staging paper, so the aisles and the areas around machinery are crowded.
- Limited floor-load capacities and overhead clearances restrict equipment placement and cause added expenses.
- Installing a new press is expensive and difficult because an opening must be cut in the building wall and the press must be lifted by crane through the opening.

The problems and inefficiencies described in this chapter can be improved in several ways. However, before a solution is selected, the following questions should be answered:

- Would the cost of land in Washington, D.C., negate the savings that would flow from eliminating lease costs for outside storage and the related handling and transportation costs?
- Would the costs of installing automated material handling devices outweigh the savings in manpower?

--Would a single floor plant be more efficient than a multi-storied plant?

These are just a few of the questions that would have to be answered in the cost-benefit analysis recommended on page 32.

CHAPTER 3

COSTS WHICH CANNOT BE AVOIDED

WITH CONTINUED USE OF THE CURRENT FACILITIES

Due to the age and physical limitations of the current GPO facility, certain major costs are unavoidable if GPO continues to use the facility. The costs cover leased warehouse, office, and miscellaneous storage space and major building repairs and renovation. 1/

COST OF LEASED SPACE

As of June 30, 1981, GPO was leasing over 900,000 square feet of warehouse, office, and storage space at a cost of about \$2.6 million, as shown below.

	<u>Square feet</u>	<u>Annual lease cost</u>
Superintendent of Documents:		
Laurel warehouses I and II, Laurel, Md.	406,000	\$1,007,104
Eisenhower warehouse, Alexandria, Va.	102,000	377,148
Farrington warehouse, Fairfax, Va.	100,000	180,000
Office space:		
Union Center Plaza, Washington, D.C.	59,000	482,781
Materials management:		
Springbelt warehouse, Springfield, Va.	<u>250,000</u>	<u>550,000</u>
Total	<u>917,000</u>	<u>\$2,597,033</u>

1/Other costs which are not directly related to building space requirements, such as personnel and utility costs and the cost of damaged materials, are not discussed in this report. These costs, and the extent to which they could be avoided, should be addressed in the cost-benefit analysis which we recommend in chapter 4.

Close to two-thirds of the leased space is used for the storage and shipping operations of the Superintendent of Documents. It is not necessary that these operations be collocated with the manufacturing operations. However, this becomes an important consideration in determining space requirements when the various alternatives for improving the manufacturing operations are analyzed. (See ch. 4.) Paper is stored at the Springbelt warehouse, as discussed previously, to be used for printing operations. Additionally, paper is stored there for executive agency printing operations, for which GPO is the paper purchaser. The remaining leased space is used for data systems and public documents offices and for miscellaneous storage space.

GPO must lease these facilities because of the space limitations at its main facility. Although the main complex has some empty floor space, the space is not sufficient or properly configured to house documents operations or paper supplies.

COST OF MAJOR REPAIRS AND RENOVATION

As was previously mentioned, the buildings in the main GPO complex range in age from 42 to 78 years. Buildings of this age will need major repairs and renovations so that GPO (1) can continue to perform its manufacturing functions and (2) can alleviate safety hazards that presently exist in the complex.

GPO has a long list of repair and renovation projects planned for the next few years. Some of the projects were delayed in anticipation of a new facility but are gradually being completed as the uncertainty over the status of a new facility continues. Examples of major building renovation projects scheduled for fiscal years 1981-83 include elevator replacement and refurbishment, roof replacement, and window replacement.

Since the buildings in the GPO complex were built many years ago, they do not contain all the safety features that might be expected in a modern industrial plant. However, GPO has made some major expenditures on safety-related projects and has scheduled such projects as modernizing the fire communication and alarm system, installing pollution control equipment, and re-establishing firewall integrity between buildings 1 and 3.

Estimated costs for all major projects designed to enhance both the physical structure and the safety of GPO facilities total

about \$12 million for fiscal years 1981-83, an average of \$4 million a year. A list of the major projects scheduled follows. 1/

Refurbish and/or replace elevators (note a)	\$4,000,000
Modernize fire communication and alarm system	1,700,000
Replace windows of bldgs. 1, 2, and 3	1,500,000
Replace roofs on bldgs. 1,2,3, and 4 (note a)	1,000,000
Renovate and remodel restrooms (note a)	564,000
Install pollution control equipment	500,000
Paint exterior paintable surfaces of bldgs. 1,2, and 3	400,000
Replace sidewalk on North Capitol St.	250,000
Bring utility shafts into compliance with codes	200,000
Remove and replace deteriorated concrete in bldg. 1, fifth floor	180,000
Install new substation in bldg. 4	145,000
Remove support structure in bldg. 1	105,000
Re-establish firewall integrity in bldgs. 1 and 3 (note a)	100,000

a/Multiyear project; projected costs beyond fiscal year 1983 are not included.

1/Includes projects estimated to cost \$100,000 or more; costs are rounded to the nearest \$1,000. These projects account for over 80 percent of the amount estimated to be budgeted for structural and safety-related repairs and renovations for fiscal years 1981-83.

CONCLUSIONS

Leasing additional facilities is likely to be necessary as long as the current GPO facilities are used. It should again be noted, however, that a large part of the leased space is used for the operations of the Superintendent of Documents; GPO's printing and binding operations are not helped or hindered by locating the documents operations away from the main complex. The only leased facility directly related to GPO's manufacturing operations is the Springbelt warehouse, which stores roll paper. Location of the paper supply 15 miles from the main complex will continue to require transportation time and expenses that would not be necessary if the main facilities had enough storage space.

Renovation expenses are to be expected for buildings the age of GPO's. Many of the renovation projects entail one-time expenses, while others will not have to be repeated for several years. Despite the extent of these renovations, GPO will still be left with an aged, multistory, and multibuilding facility which will probably require numerous repairs and additional renovation in the future.

While costs such as these may not in themselves justify a new facility, now estimated to cost over \$220 million, they are factors which should be considered in doing a cost-benefit analysis.

CHAPTER 4

ALTERNATIVES NEED TO BE CONSIDERED

As shown in chapter 2, GPO's manufacturing operations are not very efficient. In addition, costs are being incurred now and will continue to be incurred, as discussed in chapter 3, as long as GPO continues its operations in the current facilities.

Recognizing the need to improve its manufacturing operations, GPO has concluded that the solution is to relocate its operations into a new facility. This conclusion, however, was reached without the benefit of a detailed cost-benefit analysis. In addition, building a new facility is only one alternative; other alternatives include redesigning or expanding the existing facilities. Appendix II summarizes the pros and cons of each of these alternatives.

REDESIGN THE EXISTING FACILITIES

Over the past several years, the prospect of building a new facility has caused GPO to drag its feet in attempting to modernize and improve the current facilities. More recently, as the prospect of building a new facility has diminished, GPO has made and is planning improvements to its current facilities.

The major improvements that can be made in the current facilities are related mostly to material handling and movement. Some of the material handling problems we found could be alleviated by installing automated material handling devices, such as conveyor systems and lifts for moving material between floors. (An automated pallet lift is similar to an elevator except that it functions without an operator and automatically accepts and discharges pallets of material on the appropriate floor.) Using these devices, GPO could reduce both its personnel costs and its reliance on elevators and industrial trucks. The recently installed roll lift and the roll drop are examples of improved material handling devices.

The bindery division is another area where improvements could be made. As discussed in chapter 2, the division's primary problem is the inefficient work flow. This problem is not entirely building related and, as evidenced by two proposals by the GPO engineering section, can be largely corrected. Under these proposals, bindery equipment would be better aligned between certain operations. This, along with the installation of automated material handling equipment, would reduce material handling and personnel requirements. According to estimates, implementing one of the proposals could eliminate the movement of over 14,000 pallets in a 6-month period.

Possible improvements in the existing facilities, however, are limited. Material would still have to be stored in Springbelt

and be shipped to the main plant. Paper would still have to be moved long distances from storage to the press and bindery divisions and, even if lifts were installed, would still have to be handled two or three times. In addition, such problems as limited space, equipment placement constraints, and unavoidable costs would still be present.

EXPAND THE EXISTING FACILITIES

In the early 1960s, GPO considered expanding its facilities by building a four-story and basement building to the rear of building three. GPO abandoned the idea in 1963 and began exploring the possibility of a new facility. The reasons given for this change were:

- The original plan of four stories and a basement would not provide sufficient space; another four stories were deemed necessary. However, the National Capital Planning Commission and the Redevelopment Land Agency ruled against constructing an eight-story building.
- GPO studies concluded that a one-story operation would be more suitable than a multistory operation. It was felt that expansion of the current site would perpetuate the uneconomical vertical movement of paper from the storage areas to the press and bindery divisions and to the shipping section.

Since 1963 the idea of expanding the current facilities has surfaced from time to time, as the prospect of building a new facility has diminished. Expansions considered have ranged from a two-story to a five-story annex. A properly designed annex would improve, if not eliminate, many of the problems noted in chapter 2, but its impact would depend on its size. The following is a summary of the advantages of building an annex.

- The work flow would be improved because there would be room for an in-line production operation (such as from press to bindery to shipping) on the same floor. Automated systems to move the product from one operation to the next could enhance such an improvement.
- The bindery and press divisions would have adequate storage and staging space for paper.
- Automated lifts would be used when needed to move paper or printed products between floors.
- There would be extra room, depending on the size of the annex, for those functions being done in leased facilities.

--Equipment placement would not be a problem because ceiling heights and floor-load capacities could be sufficient where needed.

However, certain problem areas would remain, such as the unavoidable repair and maintenance costs for the current facilities.

To expand, GPO must purchase land that is contiguous to its current complex. GPO has requested purchasing authority from the appropriate congressional committees. The D.C. Government, which owns the land, has offered GPO the option to buy it. There is a possibility that if GPO does not exercise this option, the land could be sold to another party.

BUILD A NEW FACILITY

For two decades, the Congress has considered building a new facility to house GPO. This alternative would consolidate all operations currently in the main complex and in the leased facilities into one building. If properly designed, the new plant would eliminate all the building-related inefficiencies found at the present site. The major argument against a new building is the cost which is estimated at over \$220 million.

Several studies have examined various relocation proposals and space requirements for a new printing plant. The relocation site under current consideration is located in the New York Avenue industrial corridor, adjacent to the Metro Rhode Island Avenue Station. This proposal, supported by the General Services Administration in its 1978 study of the feasibility of and need for constructing a new plant, also has the backing of the local government, the planning commission, and interest groups.

PAST STUDIES LACK COST-BENEFIT ANALYSIS

We examined studies and congressional testimony on the various alternatives to the present GPO facilities. While some of these documents described some alternatives and contained cost estimates of selected building improvements and/or construction, we found no evidence that a detailed study had ever been done to compare the alternatives from a cost-benefit perspective. A cost-benefit analysis of all alternatives is a necessary step to be taken in determining which alternative should be selected.

CONCLUSIONS

For several years, GPO has been uncertain about the future of its facilities. Realizing that its operations have inefficiencies, GPO has considered various alternatives which, to varying degrees, would improve the efficiency of GPO's manufacturing operations.

Relocation has been a prime objective of GPO, but action on this has taken too long for GPO to remain static regarding other alternatives. Decisions are needed soon so that GPO can begin to plan accordingly. If GPO is going to remain in the current complex, then it should examine the space available and determine how best to optimize it. If GPO is going to expand, then the needed land should be purchased and a plan developed on how to optimize use of the existing and added space. If GPO is going to relocate, then changes to the existing complex, to the extent possible, should be shelved.

Although past GPO studies have examined various building relocation proposals, none of these studies presented a detailed cost-benefit analysis of all the alternatives to the present facility.

RE COMMENDATIONS

We recommend that the Chairman of the Joint Committee on Printing have GPO perform a cost-benefit analysis of the various alternatives available to solve these inefficiencies in the present facilities. Once this analysis has been completed, we further recommend that the Committee obtain congressional approval for one of the alternatives. After approval has been obtained, we recommend that GPO then develop a master plan to assure that the alternative is implemented properly.

ROBERT J. HENRICKS, REPRESENTATIVE FROM CALIFORNIA,
ACTING CHAIRMAN
CLAUDORNE PELL, SENATOR FROM RHODE ISLAND,
VICE CHAIRMAN
WILLIAM L. DICKINSON, REPRESENTATIVE FROM ALABAMA
HOWARD W. CANNON, SENATOR FROM NEVADA
MARK O. MATTHELD, SENATOR FROM OREGON

GORDON ANDREW MEYER, STAFF DIRECTOR AND
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FAYE M. PADGETT, DEPUTY STAFF DIRECTOR

COMMITTEE ROOM
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WASHINGTON, D.C. 20518
PHONE 224-5271

Congress of the United States Joint Committee on Printing

February 23, 1981

Honorable Elmer B. Staats
Comptroller General of the United States
General Accounting Office
Washington, D.C.

Dear Mr. Staats:

The Joint Committee on Printing requests the General Accounting Office to conduct a study of the operations of the Government Printing Office in Washington, D.C. to:

1. Describe any operational inefficiencies in GPO that are attributable to the location, design, and age of buildings occupied by GPO.
2. Recommend any corrective action(s) or alternatives together with some advantages and disadvantages of each which you believe desirable. GAO is not expected to estimate the costs of each recommended corrective action or alternative.

Results of this study are needed for several purposes including preparation by the Joint Committee and GPO of budget estimates for future fiscal years. Therefore, we are requesting a final report be submitted not later than November 30, 1981. We would also appreciate periodic briefings as your study progresses.

In order to facilitate GAO's efforts, particularly in light of the limited period before which the final report is required, it may be helpful to provide you with some additional background information.

For many years, the Joint Committee and GPO have been planning to relocate all GPO operations in the Metropolitan Washington area into one consolidated facility. However, these plans have not yet been brought to fruition.

The old multi-story buildings now occupied by GPO have been remodeled and renovated periodically and additional space has been leased to house some of GPO's operations. With the authorization of the Joint Committee, Public Printers have, within realistic limitations but at substantial expense, modified the facilities of GPO to allow for the use of new technology and to attempt to comply with Federal occupational standards.

Despite all of these efforts, it appears to us on the Joint Committee that further improvements in the existing configuration of the physical plant may not be able to correct the inherent inefficiencies in continuing to use a multi-story building for these printing and distribution activities. The Joint Committee and Public Printer agree that among other things, the following inefficiencies exist:

- (a) a materials handling system that relies on freight elevators and industrial trucks to move materials into place for production purposes and product distribution in multi-story buildings,
- (b) limited floor-load capacities and low ceilings which prevent installation and utilization of larger, faster and more cost-efficient standard press equipment,
- (c) lack of space to accommodate in-line arrangements of production operations, and
- (d) difficulties in maintaining compliance with Federal occupational standards.

The GSA report number NDC-08200 dated July 12, 1978, made at the request of the House Committee on Public Works and Transportation, describes the above factors and other problems inherent to the present physical plant at GPO.

It would be advantageous for your staff to maintain close liaison with the Joint Committee. Therefore, I have designated the Staff Director, Mr. Drew McKay, as the Joint Committee's principal contact on all questions regarding this study.

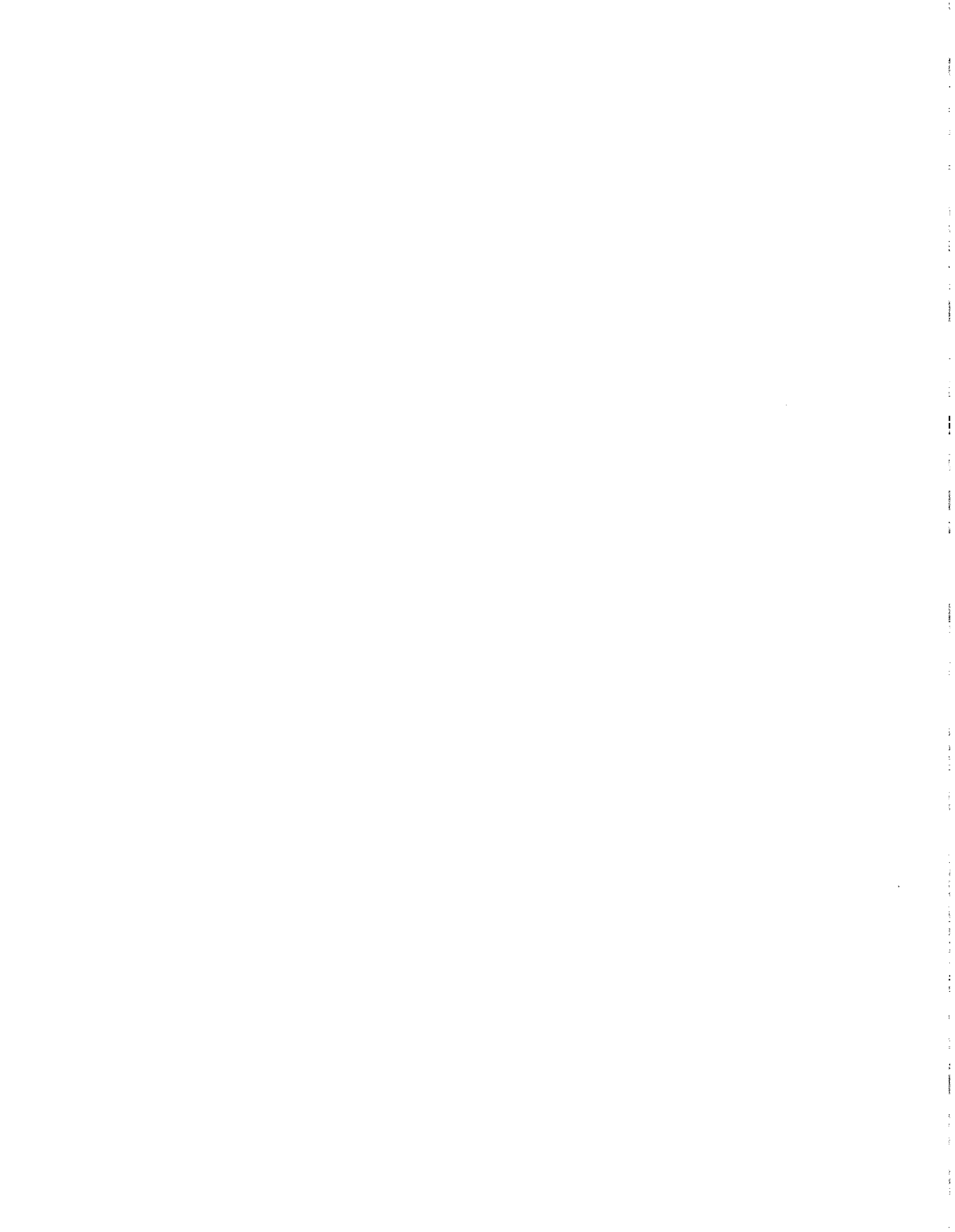
Sincerely yours,



Augustus F. Hawkins
Acting Chairman

ALTERNATIVES AND THEIR IMPACT

<u>Inefficiencies/ problems identified</u>	<u>Redesign existing facilities</u>	<u>Expand existing facilities</u>	<u>Build a new facility</u>
Movement of materials: Warehouses located 15 miles from main plant	Warehouses would still be needed	If the annex were large enough, leased warehouse space would not be needed	This alternative, if properly designed, would eliminate all building-related inefficiencies/ problems identified
Four-building multi- story complex in which movement of materials is done by industrial trucks and elevators	Problems could be lessened by using automated lifts and conveyor systems where feasible	There would still be some problems (multi- floors), but the mate- rial movement problem could almost be elim- inated by automated handling equipment and in-line production floors	
Inefficient workflow in bindery	This could be substantially improved	This problem could be eliminated	
Storage space problems: Lack of paper staging space in the press division	The need for storage space could be reduced by using efficient material move- ment and handling equipment	There would be virtually no storage space problem	
Crowded conditions in the bindery division (narrow aisles)	This could be substantially improved		
Equipment placement problems	These problems would remain	These problems would be virtually eliminated	
Unavoidable cost require- ments: Leasing of facilities Repairs and renovation	These costs would remain unchanged	The leasing cost reduc- tion would depend on the size of the annex; other costs would remain	These costs would be eliminated, but alone may not justify a new facility



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