

A FEASIBILITY STUDY OF RENOVATION OPTIONS

SOUTHWEST HANGAR, MILLER FIELD, STATEN ISLAND UNIT

GATEWAY NATIONAL RECREATION AREA

The photos and drawings are missing
from this report.

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FEASIBILITY STUDY OF RENOVATION OPTIONS
SOUTHWEST HANGAR, MILLER FIELD, STATEN ISLAND UNIT
GATEWAY NATIONAL RECREATION AREA

PART A

Introduction

At the time of acquisition by the National Park Service of Miller Field as part of the Gateway National Recreation Area a large group of abandoned military buildings remained on the site. Prominent among these were the two World War I period aircraft hangars originally identified as the seaplane and landplane hangars. (Southwest and Northeast Hangars, respectively).

All these buildings were in deteriorated condition at the time of acquisition, but the two hangars were by far the worse. The condition of the Northeast Hangar in particular had reached such a state of deterioration that renovation was no longer practical. This hangar was demolished in the fall of 1976 and its site converted to a paved and fenced playfield.

The Southwest Hangar, being in somewhat better condition, has been evaluated as having sufficient potential for renovation to justify an in-depth feasibility study.

This hangar occupies a prominent location adjacent to the main entrance of the Miller Field area. In this location it is a highly visible

facility of Gateway National Recreation Area, and yet because of its poor condition, it creates a constant eyesore and a public safety hazard. At the same time, the increasing public interest in recreational opportunities occasioned by National Park Service management of Miller Field has focused on the hangar as a potential indoor recreation facility. The apparent need for such facilities and the many inquiries and suggestions by local citizens have indicated that every reasonable effort should be made to carry out a renovation program for the hangar as an alternative to demolition.

General Description

This building was constructed as a seaplane hangar, located at Miller Field as part of the complex built there around 1920. It originally consisted of two bays, side by side, each measuring 110 x 160 ft. with full width lift doors on the northeast face. The hangar is framed in steel with trusses 20 feet on center supported by rows of columns on either side and at the center of the two bays. The roof is a cement fiber board supported by purlins.

In 1938-39, several additions were built by the WPA. The two story west wing was built of steel and concrete, as was the boiler room. The one story east and south wings have a slightly pitched wood roof on steel beams. Other minor additions and floor plan remodeling were done at later dates. Of these additions the largest was the parachute drying tower in the south wing adjacent to the boiler room. The others are all small sheds attached to the outside of the east and south wings. The total area of the building is now 55,660 sq. ft.

There is a concrete beacon tower in the immediate vicinity of the hangar. It is octagonal in plan and stands about 50 feet tall. Date of construction is unknown, though photographs from 1941 show the tower. Other photographs show that as late as 1924 a wooden lighthouse occupied the same site.

A large concrete paved apron is located along the northeast side of the building. Originally a concrete ramp was constructed leading upward from the ocean to the hangar apron area and provided access for the seaplanes. No significant portions of this ramp now remain.

Present Conditions

The building is in a general state of severe deterioration. The roofing over the hangar bays has disintegrated over large areas and needs complete replacement to weatherproof the structure. Some of the steel has rusted due to roof leaks, however, this is minor except for some interior columns which would require restoration treatment. The trusses remain in good condition. The roofing on the wings has major leaks.

Virtually all the window glass is broken and most of the steel sash is rusted beyond repair. All the interior finishes are ruined. Most of the partitions in the side wings have deteriorated or been vandalized beyond repair. All of the mechanical, electrical and plumbing equipment has been removed, destroyed, or has corroded away.

The parachute drying tower has been damaged by fire and should be removed for safety reasons. The other minor additions are all in the poor condition typical of the building in general.

The concrete floor throughout is in fair condition structurally, but with very poor surfaces, and should be either resurfaced, topped, or covered over with a wood floor system.

The original exterior walls between the hangar bays and the additions are in fair condition, including the walls of the corridor along the west side. The glass block windows along the east and south sides are badly damaged.

The chimney and beacon tower appear to be in relatively good condition and structurally sound.

PART B

Structural Investigation

A structural investigation by Robert Rosenwasser Associates of New York City concluded that the structural steel trusses, beams, and columns are basically in sound condition, with a few minor exceptions. They also found the existing reinforced concrete with steel roof and floor framing in the additions to be in good condition including all existing foundation systems.

Their report recommended complete replacement of the hangar bay roof decking and minor repairs to some columns, and removal of the parachute drying tower. The severe deterioration of the roofing on the one-story wings was also noted. This investigation with report was completed in May of 1976 and copies transmitted to the North Atlantic Region and Gateway National Recreation Area.

PART C

Proposals

There are three basic options being considered in this feasibility report.

The first is for a temporary stabilization of minimal scope to last 3 to 5 years. Necessary weatherproofing and structural repairs would be made. As much of the building as possible on a limited budget would be made usable for some indoor athletic activities.

The second option is for a comprehensive renovation of the building as a gymnasium, with consideration given to the historical appearance of the exterior. The exterior shape would be unchanged but considerable revision to materials would occur. Included with Option 2 is an alternate with heating omitted in the gymnasium area.

A third option which would involve more radical revisions to the existing structure and major new building additions is presented. This option follows up on the tentative usages described in the September, 1976 draft of the General Management Plan. It would provide a fully developed Beach Center with additional recreation and public spaces including a large indoor swimming pool.

The usages proposed in Options 2 and 3 represent combinations of many ideas for public recreation activities generating from discussions with the park and regional staffs. Since no Development Concept plan for Miller Field has yet been prepared, these proposals can best serve as a stimulant for such a plan.

Option 1: Temporary Stabilization

The primary goal of this option is to provide temporary stabilization. Some mild weather usage of the interior space could be provided for restricted numbers of the public. One hangar bay would be provided with minimal lighting for evening recreation use. Any sanitary facilities required would be portable units.

Work under this option would be restricted almost completely to structural and weatherproofing repairs. Some amount of safety features and minimal finishings are also included. All work recommended in the structural investigation would be performed, with some minor additions. The roof deck over the hangar bays would be completely replaced, and the rusting columns scaled, repainted, and re-fireproofed. The fire damaged drying tower should be removed.

Minor alterations would be made to the fence around the building to improve circulation and security. All windows would be boarded over--those in the monitors and upper hangar doors with a heavy gauge, clear plastic to allow natural lighting. Doors to be used would be repaired or replaced with proper panic hardware, those not to be used would be barricaded. Some parts of the stucco walls would be sprayed with waterproofing. All new roofing and storm drain systems would be installed over the hangar bay areas. The roofing over the additions would be repaired where necessary to prevent further water damage to structural elements, but not replaced. Install permanent rigid insulation of minimum thickness over hangar bays in order to provide a proper substrate for the new roofing.

The roof trusses would be cleaned of rust and spot painted. All interior doors leading to the side wings would be barricaded to prevent public access to those spaces. The concrete floor and walls should receive minor repairs to remove protrusions and fill holes; complete resurfacing of the floor is not practical at this stage.

Bring in new electrical service to existing transformer room. Install new, temporary lighting in one bay only and minimal exterior lighting for maintenance needs. Provide minimal ventilation equipment which could be kept as part of a more complete system when permanent rehabilitation is done. Install minimal fire detection equipment at key spots within the building.

This work would make available the two hangar bays for public use. The remainder of the building would be unused and in such condition, there would be a strong temptation for vandalism. Sturdy wooden barricades would be required to prevent break-ins.

Toilet facilities would have to be provided by portable toilets set up near the building; their cost is not included in this study. This would contribute to the barren, temporary atmosphere that would permeate the building until further rehabilitation could be done. That, combined with the minimal facilities and complete lack of equipment, would discourage use and limit enjoyment of the building.

This option has the advantage of falling within the range of current funding and providing some minimal indoor recreational facilities in a relatively short time. The work of Option 1 would complete the first

stage of permanent roofing repairs necessary to proceed with later programs of the scope of Options 2 or 3.

Because of the continuing deterioration of the building that has been observed during the preparation of this report, the need for stabilization is becoming more urgent with each passing month. Delays in accomplishing repairs beyond the winters of 1977 or '78 may result in irreversible damage to the remaining steel structure and masonry components.

Option 2: Complete Renovation

This option would provide a long-term, complete renovation resulting in full usage of all the existing interior space. A primary feature of this proposal is the retaining of the present building shape and general architectural features. Interior recreational usages would require revisions to the window and door treatment of the exterior walls and extensive remodeling of the building interior. All structural framing elements would be retained. Many of the primary masonry and concrete walls--both interior and exterior--could also be retained but with much restoration required.

The site requires landscaping, removing of deteriorated paving, and installation of new walks and drives. Exterior lighting should also be provided. The drying tower and small leantos would be removed.

All existing roofing must be replaced, including the roof deck over all but the west wing and mechanical room. Extensive repairs to and/or replacement of the roof drainage system would also be required.

All doors and windows and accompanying hardware must be replaced. The new doors must have appropriate panic hardware. The new windows should be provided with not less than double glazing for insulation. Windows in the hangar doors and monitors would be replaced with insulated aluminum siding to eliminate glare from the playing courts and to reduce heat loss from the attic space. The aluminum sash would recall the appearance of former extensive areas of window glass.

Most exterior walls would have to be replaced or extensively rebuilt. Portions would require concrete block walls with a stucco finish and other areas would be mineral fiber board to match the stucco. All new walls would be insulated to meet current energy conservation standards.

Virtually all interior partitions within the additions must be demolished. These would be replaced to create the following spaces:

In the west wing the main lobby is shown located in a central position providing direct access to the west gym, lockers, and second floor activities. Located in the south wing would be such support areas to the activities of both gyms as the first aid room, food, concession, mechanical and storage spaces. Provisions would be made for an emergency exit directly from each gym floor through the south wing. The doorways connecting the west and east gym floors would be enlarged.

In the east wing, beginning at the north end, would be the support areas for the east gym including the secondary lobby, restrooms, locker rooms, exercise room, and more storage space.

The second floor of the west wing would be divided into offices and meeting rooms with ample use of folding partitions. A central lounge with snack vending machines would allow visitor observation of the west gym floor.

Most of the new partitions in these spaces would be wood studs with drywall finishes. In areas of heavy traffic, the wall surfaces would be concrete block with a heavy duty, easily cleanable, paint finish.

The existing concrete floor could be used throughout as a base for new finished floors. These would be wood in the gym spaces, ceramic tile in the locker rooms and restrooms, and vinyl tile elsewhere.

New ceilings of gypsum board or acoustic tile would be installed in all spaces except storage areas. The ceiling in the gym area would be located at the bottom line of the roof trusses. This would leave a clearance of 20 feet, the desirable minimum for indoor ball court games. This ceiling level would also be the point of primary insulation, to save the need of heating the upper portions of the original hangar bays.

Other work required includes remodeling stairs, installation of an elevator to the second floor for handicapped patrons, new railings for the mezzanine, and installation of various athletic equipment and portable bleacher seating.

An entire new hot water heating system would be required. This would include boilers, piping, convectors, fan coil units, fuel storage and controls. Ventilation fans and ducts would have to be installed to meet the fresh air requirements for gym activities. Provisions are included for optional air conditioning of the meeting rooms and offices.

All plumbing must be completely replaced and new fixtures installed including a sizable domestic hot water system. A fire sprinkler system would be installed at all floor areas and the attic space. In addition, there would be included hose cabinets, fire extinguishers, external fire hydrants, and a fire detection system.

The electrical system will require complete replacement, including new service, wiring, light fixtures, and power for mechanical equipment.

This Option No. 2 makes optimum use of the existing structure's available floor space for athletic activities. There is some awkwardness in the floor plan to the "wrap around" configuration of the side wings. There is also some inefficiency resulting from the attempt to squeeze playing courts into an existing space rather than designing the space around the courts.

Option 2A: Alternate to the Complete Renovation

As an alternative to the complete renovation for Option 2 as just discussed, an evaluation is included for the omission of all heating in the hangar bays and operating these areas as gymnasiums only during mild weather periods. Only the minimum ventilation air required would be operated and temperatures in the gyms would be allowed to fall to just above freezing during the coldest winter weather.

Considerable savings in initial construction costs and in yearly operating costs could be obtained with this alternate. Such items as insulation, ceiling work, flooring, heating systems, and electrical wiring could be greatly reduced. In addition, a considerable differential in costs would show up in the yearly maintenance and fuel costs, which would occur.

It would be anticipated that all facilities shown in the basic Option 2 in the adjoining wings such as locker rooms, meeting rooms, food concessions, etc., would be retained. Those facilities would be fully heated and operated year around.

Option 3: Beach Center (Replacement of Hangar)

This option is intended to provide maximum facilities for indoor athletics in the event that Options 1 and 2 are found impracticable or insufficient. It assumes that no historic accuracy is necessary in rehabilitating that part of the existing structure which is to be retained. The design proposed maintains portions of the existing hangar structure but only as secondary elements to the new facilities.

The structural elements of the existing hangars and the west wing would be retained. All walls, roofs and mechanical systems would be replaced. The east and south wings would be completely removed and the east hangar bay would be re-roofed but left open, without walls, to be used as covered play-space. The original brick chimney would be removed but the beacon tower remain.

The west hangar bay would be re-roofed and enclosed to create a gymnasium and wood flooring would be installed. The adjoining west wing would be partitioned to contain public toilets, offices, first aid station, exercise room and storage space on the first floor and meeting rooms on the second floor. New mechanical and electrical systems would be installed throughout.

A core area would be added to the north end of the existing building. This would include a new main lobby and central circulation area, mechanical room, supply room, and one locker/shower complex on the first floor. The second floor, which would connect with the second floor of the existing hangar west wing, would contain the cafeteria and the second locker/shower complex. The two separate locker rooms permit one to be used only for the swimming pool and one for all other, non-aquatic sports.

West of the core area would be a new open-space structure that could be used as a sports arena with a seating capacity of about 1400 or, with the bleachers folded out of the way, as a multi-use gymnasium. An exercise space and team locker rooms are also included.

North of the core area is another separate wing containing the indoor year-around swimming pool. This would be an olympic size pool (75' by 165') with a diving ell (40' by 45'). A wading or spray pool for young children is also included. Space for movable bleachers would allow public viewing of swimming meets.

All the new construction would be of masonry curtain walls with steel framing. Long span roofs (arena and pool) would utilize steel trusses. Other shorter span roofs and floors would use spans of twin-tee precast concrete. Masonry walls would be used where possible in the remodeling of the existing hangar; lightweight metal sheathing used elsewhere.

This option has the advantage over the others of providing greatly increased space specifically designed for the intended use. It contains the same gym space plus the outdoor, covered area, more exercise rooms, the pool facilities, and increased locker room capacity. It would also have a more inviting atmosphere due to the new central lobby and the varied architectural spaces available.

The design shown has the further advantage of being adaptable to phased construction. The remodeling program combining the existing hangar space with the new core area could be a first phase with the arena and pool construction each in later phases.

This option obviously involves very high levels of construction costs as well as operating costs. It would require a large operating and maintenance staff to carry on a proper recreational program. It does, however, present a realistic approach to the combination of indoor recreation with the "beach center" idea and represents fairly the scope of future funds and management requirements that would be involved.

PART D

Preliminary Cost Estimates

The cost estimates are by necessity based on assumptions of kinds and quantities of work which may eventually be greatly changed.

Each item in the construction cost estimate includes the mark-up for General Contractors overhead and profit. Including this mark-up in each cost item rather than as a total addition at the bottom line allows more convenient evaluation of various combinations of items.

An attempt is made to estimate very tentatively the cost of special furnishings such as exhibitry work, displays, furniture, etc. Also included are estimates of costs of equipment operated by concessionaires although these items may later be furnished separately from the construction cost fund.

The cost contingency included at the end of each estimate provides for those items of work which cannot now be foreseen but which would still fall within the assumed scope of work.

All costs, construction and operating, are based on present (1977) indexes. For current planning, these figures should be escalated to anticipate rising costs at the current rate of inflation of building costs.

The operating costs are presented because of the unusually large size and heavy usage of the options studied. Operating costs for these buildings will be significantly high in relation to those at many other National Park Service facilities.

PRELIMINARY COST ESTIMATE
SOUTHWEST HANGAR, MILLER FIELD
FEASIBILITY STUDY

OPTION 1

	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Division 2 - Site work</u>				
Clear and grub	20,000	SF	\$.20	\$ 4,000
Site drainage - earth fill	600	LF	3.30	1,980
Remodel fence (new gates, etc.)	Lump Sum	LS	---	4,400
<u>Division 3 - Concrete</u>				
Remove C.A. plank roof - complete	37,760	SF	.70	26,430
Replace fireproofing on cols.	Lump Sum	LS	---	5,000
<u>Division 5 - Metals</u>				
Pipe railing - temporary	220	LF	5.00	1,100
Mtl. roof deck	37,760	SF	1.50	56,640
Sub-purlins	37,760	SF	.42	15,860
<u>Division 6 - Wood and Plastics</u>				
Remove wd. tower	Lump sum	LS	---	1,000
Repair roof where tower removed	150	SF	7.00	1,050
Miscellaneous barricades	1,000	SF	1.00	1,000
<u>Division 7 - Thermal and Moisture Protection</u>				
Remove roofing - 2nd story roof	5,050	SF	.30	1,520
Built-up roofing (w/minimal insulation)	37,760	SF	2.20	83,070
Spray W.P. stucco walls	4,600	SF	.50	2,300
Gutters and D. S. (roof area)	27,830	SF	.20	5,570
Flashing	2,000	LF	2.30	4,600
Calking and sealants	Lump sum	LS	---	6,000

OPTION 1 (cont.)

	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Total Cost</u>
<u>Division 8 - Doors & Windows</u>				
Replace exterior doors & hdw.	3	EA	\$ 500.00	\$ 1,500
Repair o.h. door	1	EA	1,000.00	1,000
Replace sliding hangar doors	4	EA	500.00	2,000
w/panic doors (small opngs.)				
Board up interior doors	2,000	SF	1.50	3,000
Board up windows - plywood	14,200	SF	2.00	28,400
Clear plastic over sash in	6,700	SF	1.50	10,050
monitors & hangar doors				
<u>Division 9 - Finishes</u>				
New stucco - ext. (temporary)	3,000	SF	1.50	4,500
Repair plaster - interior walls	2,000	SF	2.00	4,000
(temporary protection)				
Clean up, patch conc. flr.	32,200	SF	.25	8,800
Paint walls - (temporary)	17,900	SF	.60	10,740
Gym floor striping - (temporary)	17,400	SF	.13	2,250
Paint exterior barricades	17,360	SF	1.00	17,360
<u>Division 15 - Mechanical</u>				
Temporary vent fans	10,000	CFM	.60	6,000
Roof drains and leaders	27,830	SF	.36	10,000
<u>Division 16 - Electrical</u>				
Fire detection (temporary)	Lump sum	LS	---	5,000
Temp. lighting and wiring	22,000	SF	.50	11,000
				\$347,120
Contingency (10%)				<u>34,880</u>
Totals				\$382,000

Note: Operating costs for Option 1 are not estimated because of the temporary nature of the work and the low level of public use anticipated.

PRELIMINARY COST ESTIMATE
SOUTHWEST HANGAR, MILLER FIELD
FEASIBILITY STUDY

	Quantity		Unit	Unit Cost	Total Cost	
	Option 2A	Option 2B			Option 2A	Option 2B
<u>Division 2 - Site work</u>						
Demolish old asphalt	10,000		SF	1.30	13,000	
Clear and grub	71,600		SF	.20	14,320	
Fill and grade	460		CY	1.00	460	
Asphalt drive	4,300		SF	1.50	6,450	
Site drainage	420		LF	3.30	1,390	
Curbs	320		LF	7.00	2,240	
Concrete walks	2,600		SF	2.00	5,200	
Remove 8' chain link fence	1,100		LF	.70	770	
Remodel fence (new gates, etc.)	--		LS	--	--	
Exterior lighting	Lump sum		LS	--	10,000	
Lawns	77,300		SF	.30	23,190	
Trees	18		EA	100	1,800	
<u>Division 3 - Concrete</u>						
Remove C.A. plank roof-complete	37,760		SF	.70	26,430	
Remove stairways	120		SF	3.00	360	
Cut hole in floor for new stairs	72		SF	7.00	500	
Replace fireproofing on cols.	Lump sum		LS	--	2,500	
Resurface concrete floor	10,360		SF	3.00	31,080	
4" topping on mtl. roof dock	7,800		SF	.75	5,850	
<u>Division 4 - Masonry</u>						
Remove block and/or tile walls	14,000		SF	2.20	30,800	
Remove block, tile walls ext.	4,100		SF	2.20	9,020	
Add 8" CMU walls ext.	4,100		SF	3.50	14,350	
Add 8" CMU walls	8,800		SF	3.50	30,800	

	Quantity		Unit	Unit Cost	Total Cost	
	Option 2A	Option 2B			Option 2A	Option 2B
Division 5 - Metals						
Clean and repair trusses	40,000		SF	.45	18,000	
Remove stairs	Lump sum		LS	--	500	
Balcony railing	220		LF	11.00	2,420	
Pipe railing	--		LF	10.00	--	
New stairs	160		SF	6.00	960	
Mtl. roof deck	.47,690		SF	1.50	71,540	
Sub-purlins	37,760		SF	.42	15,860	
Furr over hangar doors	7,600		SF	.42	3,200	
Furring at ceiling level	35,200		SF	.42	14,780	
Furring at hangar walls	7,300		SF	.42	3,070	
Division 6 - Wood and Plastics						
Remove wd. bm. and plank roof	9,670		SF	.15	1,450	
Remove lean-tos	2,700		CF	.15	400	
Remove wd. tower	2,000		CF	.20	400	
Repair roof where tower removed	--		SF	7.00	--	
Stud partitions	8,240		SF	3.00	24,720	
Furr out walls	10,700	17,700	SF	1.00	10,700	17,700
Cabinets and shelves	200		LF	100.00	20,000	
Division 7 - Thermal and Moisture Protection						
Remove roofing - 2nd story roof	5,050		SF	.30	1,520	
Remove stucco and lath siding	7,300		SF	.60	4,380	
Built-up roofing w/insulation	52,060		SF	2.20	114,530	
Spray W.P. stucco walls	--		SF	.50	--	
Mineral fiber siding	7,300	4,740	SF	1.20	8,760	5,760
Anodized Al. siding	6,700		SF	1.50	10,050	
Gutters and D.S. (roof area)	39,920		SF	.20	7,980	
Flashing	3,000		LF	2.30	6,900	
Insulate walls, 3-1/2"	14,000		SF	.60	8,400	
Insulate ceiling, 10"	35,200	--	SF	.75	26,400	--

	Quantity		Unit	Unit Cost	Total Cost	
	Option 2A	Option 2B			Option 2A	Option 2B
<u>Division 8 - Doors & Windows</u>						
Remove garage doors	1		EA	200	200	
Replace exterior doors & hdw.	7		EA	500	3,500	
New exterior doors & hdw.	31		EA	500	15,500	
Replace interior doors & hdw.	17		EA	250	4,250	
New interior doors & hdw.	41		EA	200	8,200	
Repair o.h. door	--		EA	1,000	--	
Replace sliding hangar doors w/panic doors	--		EA	500	--	
Board up interior doors	--		EA	20.00	--	
Remove windows	5,800		SF	1.00	5,800	
Remove gls. blk. int. windows	5,400		SF	.50	2,700	
Board-up windows	--		SF	1.00	--	
New dbl. glazed windows	4,400		SF	12.00	52,800	
Clear plastic over sash in monitors & hangar doors	--		SF	1.50	--	
New windows in monitors	--	2,560	SF	10.00	--	25,600
<u>Division 9 - Finishes</u>						
Remove asphalt tile and wd. sleepers	10,760		SF	.16	1,720	
New stucco - ext.	8,000		SF	2.10	16,800	
Repair plaster - interior walls	8,000		SF	2.00	16,000	
Gyp. bd. walls	9,800		SF	.60	5,880	
Vinyl gyp. db. walls	19,200	26,200	SF	.70	13,440	18,340
Gyp. bd. ceil.	9,500		SF	.70	6,650	
Ceramic tile flrs.	5,600		SF	3.30	18,480	
Ceramic tile walls	8,900		SF	3.50	31,150	
Suspended acoust. ceil.	44,400	--	SF	1.90	84,360	--
Wd. gym. flr. on sleepers	34,700	--	SF	3.58	124,230	--
Resil. tile flr.	9,100		SF	1.10	10,010	
Clean up, patch conc. flr.	9,000	--	SF	.25	2,250	
Paint walls	41,000		SF	.60	24,600	
Paint ceiling	20,000		SF	.70	14,000	
Paint trusses	40,000		SF	.16	6,400	
Gym floor striping	34,700		SF	.13	4,500	
Resil. gym flr. on asphalt	--	17,600	SF	3.25	--	67,200
Asphalt finish flr.	--	17,600	SF	1.50	--	26,400

	Quantity		Unit	Unit Cost	Total Cost	
	Option 2A	Option 2B			Option 2A	Option 2B
<u>Division 10 - Specialities</u>						
Chalk bd. and tack bds.						
Toilet partitions	Lump sum		LS	--	1,000	
Signs	32		EA	200	6,400	
Lockers	Lump sum		LS	--	1,160	
Folding partitions	376		EA	22	8,270	
Scales, weighing	810		SF	7.50	6,080	
Telephone booths	3		EA	250	750	
Toilet accessories	2		EA	900	1,800	
	Lump sum		LS	--	7,420	
<u>Division 11 - Equipment</u>						
Vending machines (all concession)						
Food service (concession for public events)	Lump sum		LS	--	--	
Athletic:						
free standing goals	Lump sum		LS	--	15,000	
volleyball nets	12		EA	1,000	12,000	
Balls	6		EA	30	180	
Gymnastic & weights equip. (per item)	Lump sum		LS	--	2,000	
Floor mats	13		EA	1,000	13,000	
Wall mats	7,400		SF	2.50	18,500	
Miscellaneous equipment	800		SF	3.50	2,800	
Scoreboard - electric	Lump sum		LS	--	5,000	
	Lump sum		LS	--	1,000	
<u>Division 12 - Furnishings</u>						
Office						
Meeting rooms	280		SF	6.00	1,680	
Locker room benches	3,700		SF	10.00	37,000	
Telescoping bleachers	194		LF	7.50	1,450	
	1,000		Persons	16	16,000	
<u>Division 14 - Conveying Systems</u>						
Elevator - 5'x7' -C.H.	Lump sum		LS	--	20,000	

	Quantity		Unit	Total Cost	
	Option 2	Option 2A		Unit Cost	Option 2
<u>Division 15 - Mechanical</u>					
Heating - New boilers & equip. (4,400,000 BTU/hr)	Lump sum	0	LS	\$	\$
(1,084,000 BTU/hr)	0	Lump sum	LS	---	0
Heat piping and convectors	55,660	22,460	SF	2.00	111,300
H&V duct work	55,660	22,460	SF	1.50	83,500
Vent fans	40,000		CFM	.60	24,000
A/C equipment	13.5		Tons	2,000.00	27,000
A/C duct work	3,663		SF	2.00	7,330
Fuel oil storage	15,000	7,500	gal.	1.00	15,000
Dom. h.w. heaters	Lump sum		LS	---	5,000
Remove old plumbing and heating	27,720		SF	.40	11,090
New plumbing	55,670		SF	2.00	111,340
New fixtures: WC & U	26		EA	450.00	11,700
Lav	22		EA	190.00	4,180
Showers	20		EA	450.00	9,000
D.F.	8		EA	400.00	3,200
Sinks	3		EA	200.00	600
Sewer and water service	Lump sum		LS	---	8,000
Roof drains and leaders	42,130		SF	.36	15,170
Sprinklers	90,860		SF	1.50	136,290
Fire protection (ext. hydrants, H.C., F.E.)	55,660		SF	.30	16,700
<u>Division 16 - Electrical</u>					
Remove all existing wiring and fixtures	27,720		SF	.20	5,540
Complete new wiring circuits	55,660		SF	4.00	222,640
Complete new lighting	55,660		SF	1.00	55,660
Remove 2 power poles	Lump sum		LS	---	500
Bury existing overhead line	170		LF	12.00	2,040
Fire detection	55,660		SF	1.00	55,660
New service & equipment	Lump sum	Lump sum	LS	---	40,000
Intercom & loudspeaker system	Lump sum		LS	---	3,000
					30,000
Contingency (20%)				\$2,735,340	\$2,381,890
Totals				546,660	476,110
				\$3,282,000	\$2,858,000

SOUTHWEST HANGAR
OPERATING COSTS - OPTION 2

	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Estimated Annual Costs</u>
<u>Energy Costs</u>				
Fuel Oil (heating and hot water)	98,130	gal.	\$.46	\$ 45,140
Electric Power (16.5 KW)	24,880	KWH	.06	1,490
- Air conditioning equipment				
Electric Power (120 KW)	482,520	KWH	.06	28,950
- Lighting and other equipment				
<u>Other Utilities</u>				
Water and sewer	2,650	M. gal.	2.50	6,630
Telephone	Lump sum	L.S.	---	1,800
<u>Building Maintenance</u>				
Yearly upkeep, repair, replacement (average yearly cost)	55,660	SF	1.00	55,660
Janitorial Services	55,660	SF	1.00	55,660
Janitorial Supplies	55,660	SF	.50	27,830
OPTION 2: PROJECTED AVERAGE TOTAL ANNUAL COSTS:				\$223,160

SOUTHWEST HANGAR
OPERATING COSTS - OPTION 2A

<u>Energy Costs</u>				
Fuel Oil (heating and hot water)	34,820	gal.	\$.46	\$ 16,020
Electric Power (16.5 KW)	24,880	KWH	.06	1,490
- Air conditioning equipment				
Electric Power (100 KW)	402,100	KWH	.06	24,130
- Lighting and other equipment				
<u>Other Utilities</u>				
Water and sewer	1,990	M. gal.	2.50	4,980
Telephone	Lump sum	L.S.	---	1,500
<u>Building Maintenance</u>				
Yearly upkeep, repair, replacement (average yearly cost)	55,660	SF	.75	41,750
Janitorial Services	55,660	SF	.70	38,960
Janitorial Supplies	55,660	SF	.35	19,480
OPTION 2A: PROJECTED AVERAGE TOTAL ANNUAL COSTS:				\$148,310

PRELIMINARY COST ESTIMATE
SOUTHWEST HANGAR, MILLER FIELD
FEASIBILITY STUDY

OPTION 3

	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Total</u>
<u>Div. 2: Sitework</u>				
Demolish old asphalt	10,000	SF	\$ 1.30	13,000
Clear and grub	71,600	SF	.20	14,320
Backfill and grade	300	CY	1.00	300
Asphalt drive	6,500	SF	1.50	9,750
Site drainage	420	LF	3.30	1,390
Curbs	240	LF	7.00	1,680
Concrete walks	2,800	SF	2.00	5,600
Remove 8' chain link fence	1,100	LF	.70	770
Exterior lighting	Lump sum	LS	----	10,000
Landscaping	77,300	SF	.30	23,190
Trees	18	EA	100.00	1,800
Excavate for foundations and pool	5,160	CY	2.00	10,320
Demolish building wings	92,000	CF	.20	18,400
Demolish concrete apron	20,000	SF	2.60	52,000
<u>Div. 3: Concrete</u>				
Remove concrete plank roof	37,760	SF	.70	26,430
Remove stairways	240	SF	3.00	720
Replace fireproofing on columns	Lump sum	LS	----	2,500
Resurface concrete floor	26,200	SF	3.00	78,600
Foundations	280	CY	150.00	42,000
Slab on grade	48,400	SF	2.00	96,800
Floors, topping (2")	34,560	SF	1.20	41,470
Twin-tee floors and roofs (spans 30'-40')	26,440	SF	4.50	118,980
<u>Div. 4: Masonry</u>				
Remove block and/or tile walls	2,900	SF	2.20	6,380
Block and brick 15" cavity wall	38,800	SF	10.00	388,000
Block partitions (8")	21,700	SF	3.50	75,950
Remove chimney	2,160	CF	2.20	4,750
<u>Div. 5: Metals</u>				
Clean and repair trusses	40,000	SF	.45	18,000
Railings	420	LF	11.00	4,620
Stairs	630	SF	6.00	3,780
Roof deck	91,960	SF	1.50	137,940
Sub-purlins	37,760	SF	.42	15,860
Furring	13,040	SF	.42	5,480
Clean beams, columns	50,000	SF	.40	20,000
Misc. metals	Lump sum	LS	----	25,000

	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Total</u>
<u>Div. 5 (cont.)</u>				
Trusses (long span @ 14 lbs./sf)	342	Tons	930.00	318,060
Floor joists (short span @ 6 lbs./sf)	17	Tons	810.00	13,770
Structural Steel framing	354	Tons	900.00	318,700
<u>Div. 6: Wood and plastics</u>				
Stud partitions	3,850	SF	3.00	11,550
Cabinets and shelves	800	LF	40.00	32,000
Subfloor on sleepers	10,120	SF	1.50	15,180
Remove stud partitions (plastered)	7,000	SF	1.50	10,500
<u>Div. 7: Thermal and moisture protection</u>				
Remove roofing - 2nd story roof	5,050	SF	.30	1,520
Remove stucco and lath siding	6,000	SF	.60	3,600
Built-up roofing w/insulation	104,400	SF	2.20	229,680
Anodized aluminum siding	13,040	SF	1.50	19,560
Gutters and downspouts (roof area)	66,810	SF	.20	13,360
Flashing	4,600	LF	2.30	10,580
Insulate walls (3 1/2")	40,400	SF	.60	24,240
Insulate ceilings	30,000	SF	.75	22,500
<u>Div. 8: Doors and windows</u>				
Remove hangar doors	Lump sum	LS	----	3,000
Replace exterior doors and hardware	3	EA	500.00	1,500
New exterior doors and hardware	33	EA	500.00	16,500
Replace interior doors and hardware	11	EA	250.00	2,750
New interior doors and hardware	60	EA	200.00	12,000
Remove windows	2,600	SF	1.00	2,600
Remove glass block walls	1,100	SF	.50	550
Double glazed windows	7,700	SF	5.00	38,500
<u>Div. 9: Finishes</u>				
Plaster tile walls	6,400	SF	2.20	14,080
Remove asphalt tile floor and wood sleepers	10,120	SF	.16	1,620
Gypsum board walls	7,700	SF	.60	4,620
Ceramic tile floors	24,280	SF	3.30	80,130
Ceramic tile walls	1,500	SF	3.50	5,250
Suspended acoustical ceilings	93,450	SF	1.90	177,560
Resil. gym floor on asphalt	17,600	SF	3.25	67,200

	<u>Quantity</u>	<u>Unit</u>	<u>Unit</u> <u>Cost</u>	<u>Total</u>
<u>Div. 9: (cont.)</u>				
Wood gym floor on sleepers	36,980	SF	\$ 3.58	\$132,390
Resilient tile floors	10,900	SF	1.10	11,990
Paint walls	56,000	SF	.60	33,600
Paint ceilings	10,950	SF	.70	7,670
Paint old trusses	40,000	SF	.16	6,400
Gym floor stripings	32,000	SF	.13	4,160
<u>Div. 10: Specialties</u>				
Chalk and tack boards	Lump sum	SF	----	1,000
Toilet partitions	42	EA	200.00	8,400
Signs	Lump sum	LS	----	2,180
Lockers	1,276	EA	22.00	28,070
Folding partitions	710	SF	7.50	5,330
Telephone booths	3	EA	900.00	2,700
Toilet accessories	Lump sum	LS	----	9,740
<u>Div. 11: Equipment</u>				
Food preparation and service	Lump sum	LS	----	30,000
Athletic:				
Basketball goals	12	EA	1,000.00	12,000
Volleyball nets	12	EA	300.00	3,600
Gymnastic and weights	18	EA	1,000.00	18,000
equipment (per item)				
Floor mats	4,980	SF	2.50	12,450
Wall mats	3,200	SF	3.50	11,200
Misc. equipment	Lump sum	LS	----	7,000
Pool accessories	Lump sum	LS	----	3,000
Scoreboard, electric	Lump sum	LS	----	3,000
Diving boards, 1 meter	2	EA	1,200.00	2,400
Diving boards, 3 meter	1	EA	2,400.00	2,400
<u>Div. 12: Furnishings</u>				
Offices	1,300	SF	6.00	7,800
Meeting rooms	3,570	SF	10.00	35,700
Locker room benches	276	LF	7.50	2,070
Telescoping bleachers	1,400	Persons	16.00	22,400
Cafeteria	2,200	SF	10.00	22,000
<u>Div. 13: Special Construction</u>				
Swimming pools (with mech. equip.)				
Olympic with diving L	14,125	SF	50.00	706,250
Wading (30' x 40')	1,200	SF	20.00	24,000
<u>Div. 14: Conveying systems</u>				
Elevator - 5' x 7' (for handi- capped)	Lump sum	LS	----	20,000

	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Total</u>
<u>Div. 15: Mechanical</u>				
Heating - new boilers and equipment (1,885,000 CF)	8,860,000	BTU/hr.	.04	\$354,400
Heat piping and convectors	106,560	SF	2.00	213,120
H & V ductwork	106,560	SF	1.50	159,840
Vent fans	90,000	CFM	.60	54,000
A/C equipment	28	Tons	1,500.00	42,000
A/C ductwork	6,300	SF	2.00	12,600
Fuel oil storage	30,000	Gal.	1.00	30,000
Domestic hot water heaters	Lump sum	LS	----	10,000
Remove old plumbing and heating	27,720	SF	.40	11,090
New plumbing	106,560	SF	2.00	213,120
New fixtures: WC&U	42	EA	450.00	18,900
Lavatory	32	EA	190.00	6,080
Shower	36	EA	450.00	16,200
DF	12	EA	400.00	4,800
Sink	6	EA	200.00	1,200
Sewer and water service	Lump sum	LS	----	10,000
Roof drains and leaders	37,590	SF	.36	13,530
Sprinklers, fire	80,000	SF	1.50	120,000
Fire protection, exterior	106,560	SF	.30	31,970
Pool heaters	Lump sum	LS	----	15,000
<u>Div. 16: Electrical</u>				
Remove all existing wiring and fixtures	27,720	SF	.20	5,540
New wiring circuits	106,560	SF	3.00	319,680
New lighting fixtures	124,160	SF	1.00	124,160
Remove 2 power poles	Lump sum	LS	----	500
Bury existing overhead line	170	LF	12.00	2,040
Fire detection	95,000	SF	.50	47,500
New service and equipment	Lump sum	LS	----	50,000
Intercom and loudspeakers	Lump sum	LS	----	4,000
Subtotal				\$5,838,610
Contingency (20%)				<u>1,167,390</u>
TOTALS				\$7,006,000

SOUTHWEST HANGAR - Option 3
OPERATING COSTS

	<u>Quantity</u>	<u>Unit</u>	<u>Unit Cost</u>	<u>Estimated Annual Costs</u>
<u>Energy Costs</u>				
Fuel oil (heating and hot water)	198,000	Gal.	.46	\$ 91,080
Electric Power (34.5 KW)	52,030	KWH	.06	3,120
- Air conditioning equipment				
Electric Power (150 KW)	603,150	KWH	.06	36,190
- Lighting and other equipment				
<u>Other Utilities</u>				
Water and sewer	8,000	M. gal.	2.50	20,000
Telephone	Lump sum	----	----	4,000
<u>Building Maintenance</u>				
Yearly upkeep, repair, replacement (average yearly cost)	124,160	SF	1.00	124,160
Janitorial Services	124,160	SF	1.00	124,160
Janitorial Supplies	124,160	SF	.50	62,080

PROJECTED AVERAGE TOTAL ANNUAL COSTS \$464,790

PART E

Historical Significance

Reviews of the historical significance of the hangar are currently being directed by the staff of the North Atlantic Region. These reviews are not complete and the need for more in-depth research (such as a historic structures report) has not yet been determined.

Without specific information regarding the historical significance available at the time of this study, no attempt has been made to include such factors into the proposed renovation designs. However, should the above reviews determine that historical materials and design features should be faithfully retained, additional renovation options would probably be advisable. These options would investigate the adaptive restoration approach. Interior usages would be limited to those activities which could be accomplished within a structure with exteriors restored to the original architectural materials. Those features include very large glass areas, the vertical-lift hangar doors, stucco and glass-block walls, and other materials as constructed in 1920.

PART F

Time Schedule

Option 1: Temporary Stabilization:

The probable time periods for each phase of the project are shown in periods of weeks. Review time is included in each activity. Actual dates are not assigned.

<u>Task directive</u> for the approved renovation program	6 weeks
(Selection and negotiation of Architect/Engineer firm if outside consultant services are required)	10 weeks
<u>Comprehensive Design</u>	12 weeks
<u>Final Design</u> , Drawings, Specifications	12 weeks
<u>Bidding</u> and construction contract negotiation	8 weeks

No time schedules are forecast for options 2 or 3 because of the absence of funds for a renovation project of such magnitude.

PART G

Study Participants

Jack Lovell, Architect, Denver Service Center

Gene Goldberg, Architect, Denver Service Center

Jim Wolf, Structural Engineer, Denver Service Center

Dick Case, Mechanical Engineer, Denver Service Center

Jack Kozel, Electrical Engineer, Denver Service Center

Amos Williams, Cost Estimator, Denver Service Center

Various Members of staff of:

North Atlantic Region

Gateway National Recreation Area

Gateway National Recreation Area Master Plan Team, Denver Service Center

PART H

Appendix (Index)

- Photos:
- #1, S.W. Hangar, shortly after completion, 1921.
 - #2, View facing northeast over roofs of hangar complex, about 1921.
 - #3, Construction of additions to S.W. Hangar, 1938.
(U.S. Army files)
 - #4, S.W. Hangar, north elevation, 1976.
 - #5, S.W. Hangar, exterior views, 1976.
 - #6, S.W. Hangar, interior views, 1976.

- Drawings:
- 1. Option 1, First Floor Plan
 - 2. Option 1, Elevations
 - 3. Option 2, Site Plan
 - 4. Option 2, Demolition Plans
 - 5. Option 2, First Floor Plan
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PHOTO # 4, S.W. Hangar, North
elevation, 1976.

PHOTO # 1, S.W. Hangar, shortly
after completion, 1921.

PHOTO # 2, View facing northeast
over roofs of hangar complex,
about 1921.

PHOTO # 3, Construction of additions to
S.W. Hangar, 1938. (U.S. Army files)

PHOTO # 5, S.W. Hangar,
exterior views, 1976.

PHOTO # 6, S.W. Hangar,
interior views, 1976.