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FINAL CONSTRUCTION REPORT
on the
IMPROVEMENTS TO ATKINSON AIRPORT
USAID Project No. 504-12-370-023
1966-1969

for
MINISTRY OF WORKS AND HYDRAULICS
GOVERNMENT OF GUYANA

JULY 1969

DE LEUW, CATHER INTERNATIONAL INC.
CONSULTING ENGINEERS · CHICAGO

AP-44

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July 14, 1969
File 5030-00

*The Permanent Secretary
Ministry of Works and Hydraulics
Kingston
Georgetown, Guyana*

*Subject: Improvements to Atkinson Airport
US AID Project No. 504-12-370-023
US AID Loan No. 504-L-005
Final Construction Report*

Dear Sir:

In accordance with the terms of our contract with the Government of Guyana, dated February 1, 1968, we are pleased to present our Final Construction Report covering the Improvements to Atkinson Airport.

The report covers aspects of preconstruction and construction operations, including a short history of the project, with an explanation of delays encountered and comments about the major change orders.

It is appropriate that we emphasize the fact that De Leuw, Cather International's responsibilities in connection with this project date from February 1, 1968 to project completion. The portions of this report relating to the project prior to February 1, 1968, are taken from Monthly Progress Reports prepared by others and the project files that were made available to us. We received excellent cooperation from all the officials and employees of the Ministry of Works and Hydraulics. During all phases of the work with which we were involved, both Mr. R. N. Lee and Mr. A. V. France, as project coordinators, provided competent assistance whenever needed.

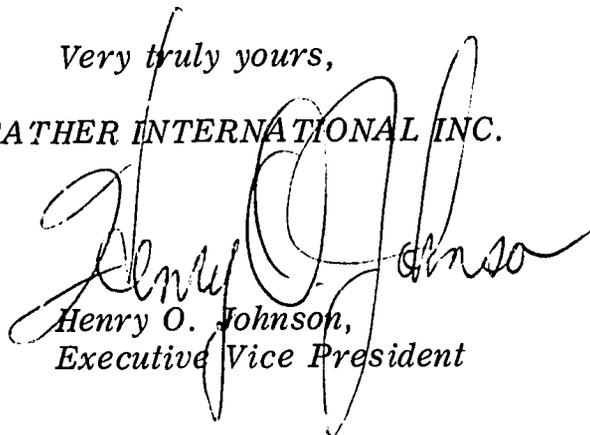
*The Permanent Secretary
Page Two
July 14, 1969*

We would like to make a particular mention of the services rendered to us and this project by Mr. Rudolph MacDonald. His talent for design was a strong influence in the aesthetic success of the terminal building expansion and modifications, and his knowledge of construction materials and details proved invaluable under the circumstances of designing and building concurrently.

We appreciated the opportunity to render technical assistance to the Government of Guyana on this project, and look forward to another opportunity to assist in your continuing development.

Very truly yours,

DE LEUW, CATER INTERNATIONAL INC.



*Henry O. Johnson,
Executive Vice President*

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*Alfred W. Shriver, Jr.,
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*David Segal,
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*Electrical Design and
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*Henry O. Johnson,
Executive Vice President*

Project Supervisor

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INTRODUCTION

Under a grant from the U.S. Agency for International Development (U.S. AID), Thomas B. Bourne Associates of Washington, D.C., was engaged by U.S. AID to provide engineering services in connection with the design and construction inspection of improvements to Atkinson Airport, Guyana.

The project was designed, tendered and a construction contract signed with B. B. McCormick and Sons, Inc., Jacksonville Beach, Florida, in June 1966. The contract documents allowed 300 calendar days for construction but extensions of this time limit were required to complete the project.

In January 1968, U.S. AID terminated the engineering contract with Thomas B. Bourne Associates.

The Government of Guyana subsequently requested De Leuw, Cather International Inc. to provide the engineering services required to complete construction inspection of the project, and for the design of certain additional improvements for which funds had been recently appropriated. De Leuw, Cather International entered into a contract with the Government of Guyana effective February 1, 1968 and assumed the construction inspection duties effective that date. Preparation of design for the additional improvements began during February.

PROJECT AREA DESCRIPTION

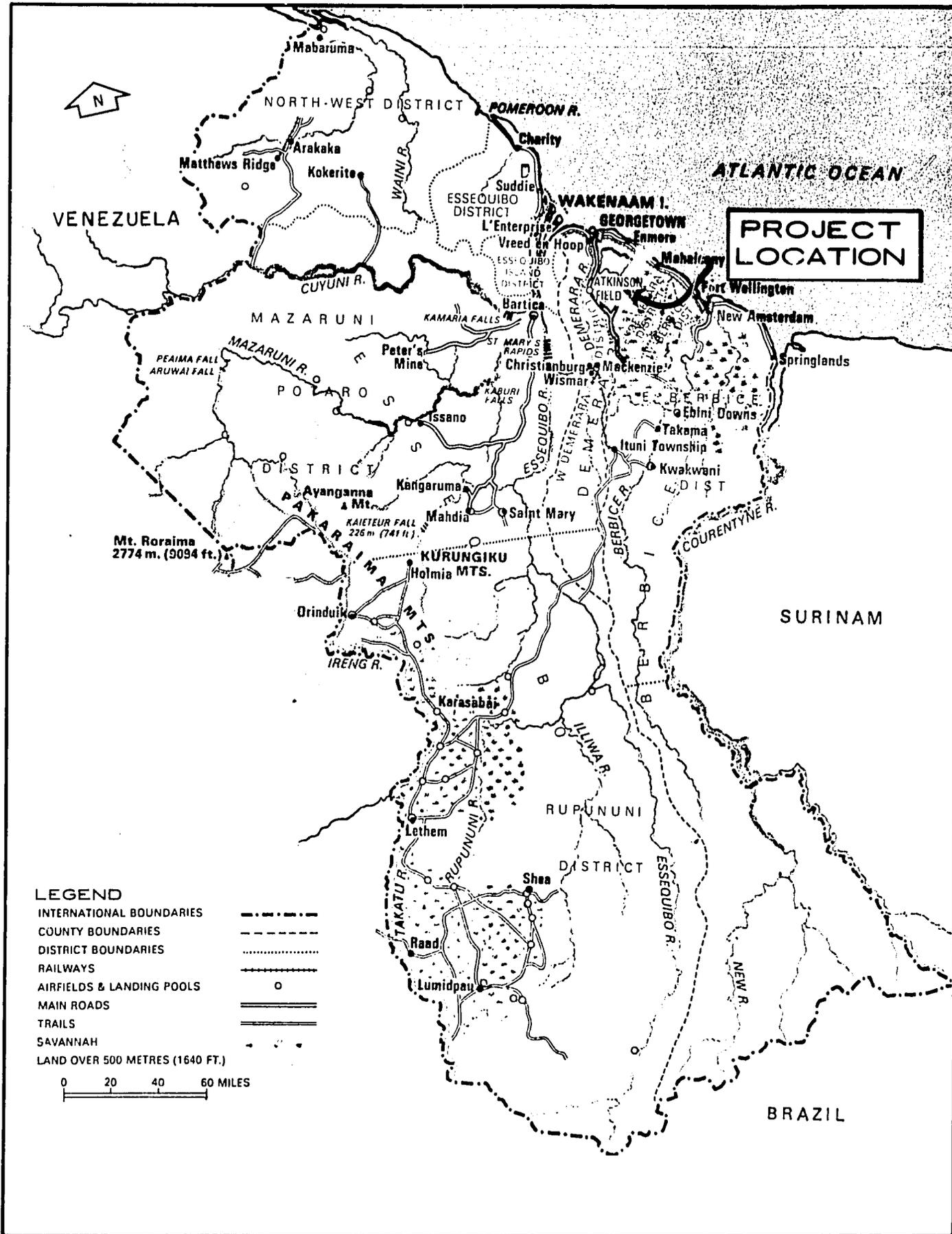
GENERAL

Atkinson Airport was originally Atkinson Field, constructed by the U.S. Army during the early days of World War II as a refueling stop for military aircraft enroute to Africa. It is approximately 24 miles south of Georgetown. See Exhibit 1.

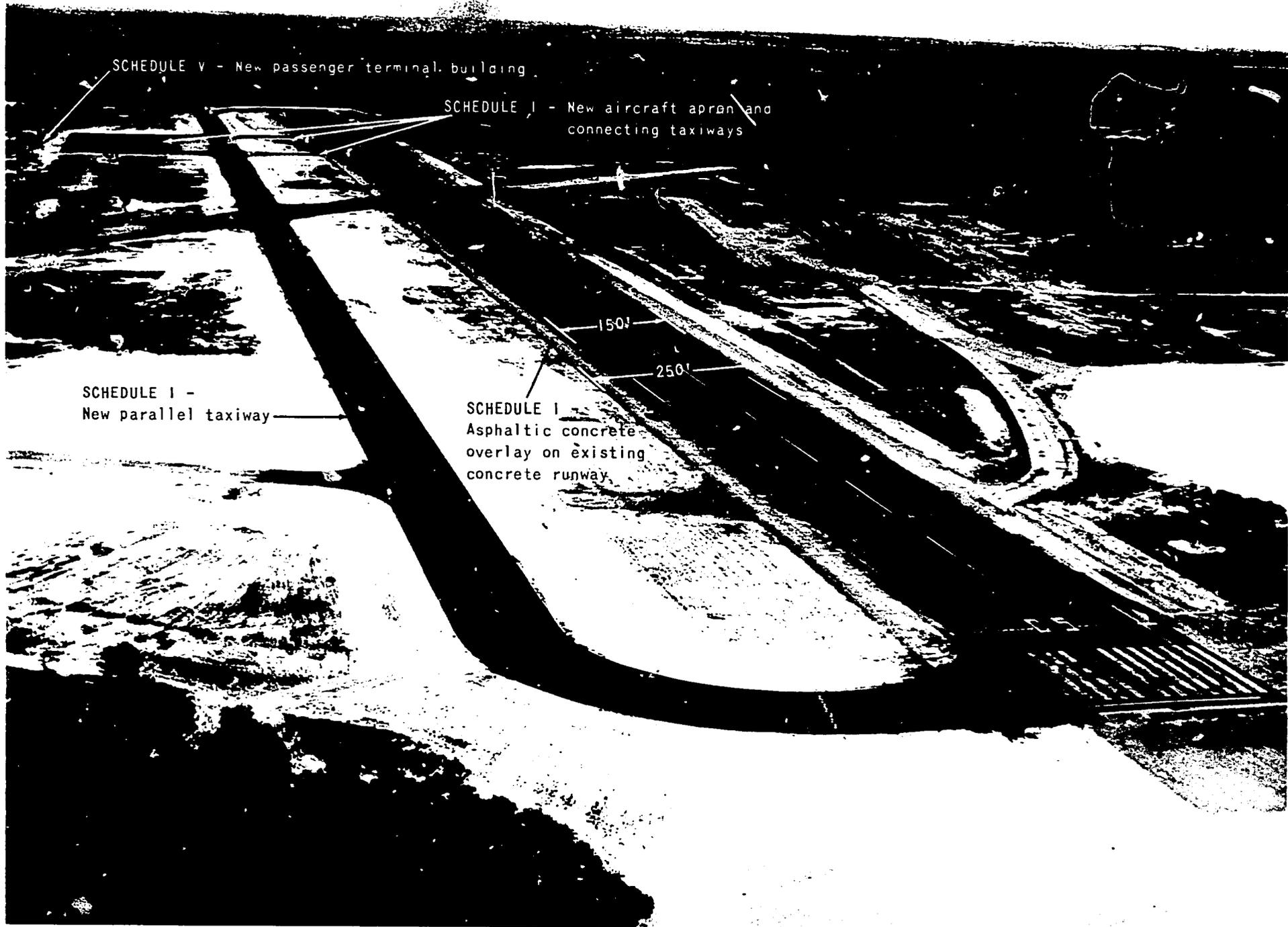
Terminal facilities for the original airport were located across the runways from the road to Georgetown (East Bank Road Extension). The site of the new international terminal is adjacent to the Georgetown road, and is thus considerably more convenient for public use.

GEOLOGY AND SOILS

The airport lies near the limit of the geomorphological zone known as the White Sand Series, which begins approximately 22 miles south of Georgetown. This series consists primarily of white uncompact pure quartz sand. It represents coastal or estuarine deposits, probably laid down on top of an eroded piedmont alluvial plain in shallow water during late Tertiary times, thereby forming the inner edge of the coastal plain.



IMPROVEMENTS TO ATKINSON AIRPORT
 GUYANA
PROJECT LOCATION MAP
 DELEUW, CATHER INTERNATIONAL INC.



SCHEDULE V - New passenger terminal building

SCHEDULE I - New aircraft apron and connecting taxiways

SCHEDULE I - New parallel taxiway

SCHEDULE I - Asphaltic concrete overlay on existing concrete runway

150'

250'

PRECONSTRUCTION HISTORY

DESIGN PHASE

The design of Atkinson Airport improvements prepared by Thomas B. Bourne Associates was divided into five basic construction schedules referred to as Schedules I through V.

Schedule I included all the civil engineering work required to overlay the existing concrete main runway with asphaltic concrete; add a parallel taxiway and aircraft apron of the same material; and all the site work required around the new terminal building, including the auto parking lot. See Exhibit 2.

Schedule II included installation of new runway and taxiway lighting with modern intensity control for the runway lighting.

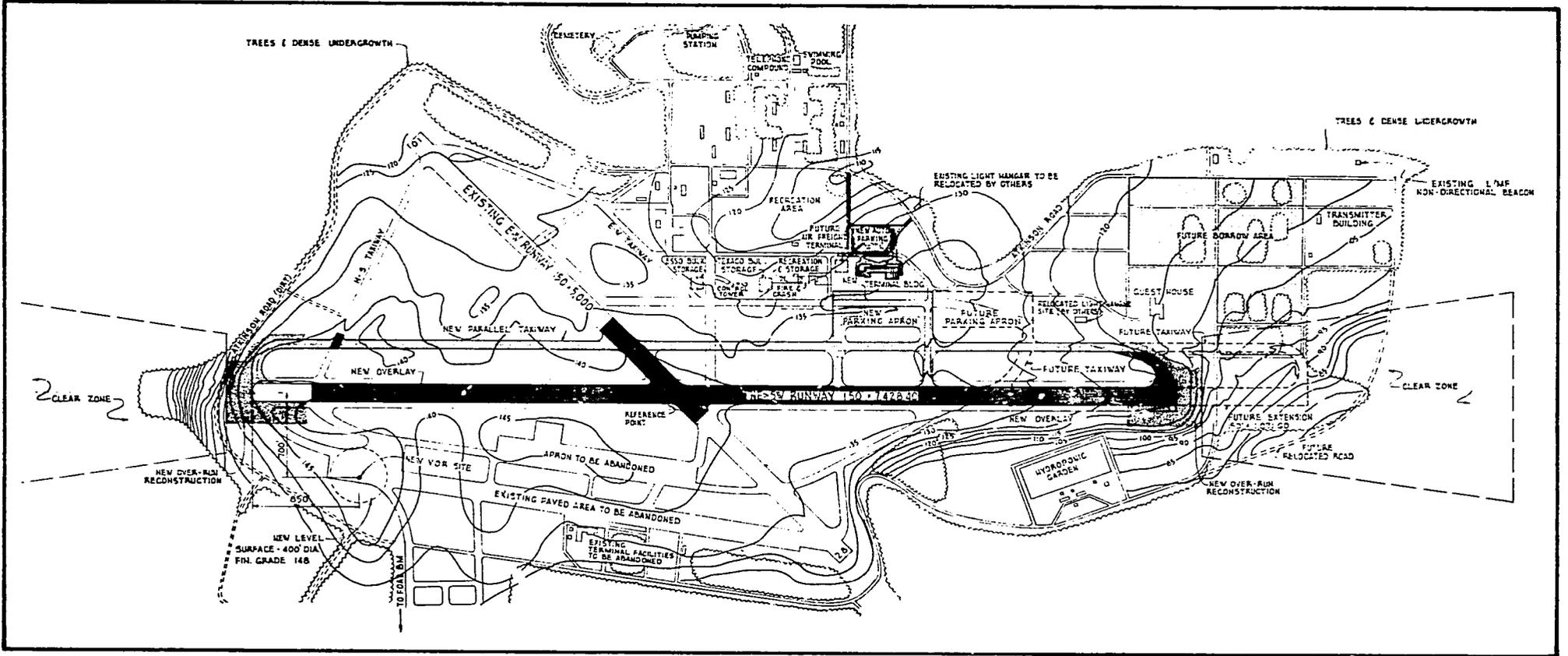
Schedule III included installation of a new emergency generator system for the airfield lighting and communications equipment.

Schedule IV included the installation of Guyana's first VHF omnidirectional radio range station, commonly called the VOR station.

Schedule V included all other work related to the construction of a new international passenger terminal building.

CONSTRUCTION BIDDING

Designs and contract documents were completed and the project advertised for bids May 1965.



IMPROVEMENTS TO ATKINSON AIRPORT
GUYANA
PROJECT AREA SITE PLAN
DE LEUW, CATHER INTERNATIONAL INC.

Bids on the original five construction schedules were opened January 11, 1966. Since the bids received were well above the funds available for the project, the bids were rejected. The Engineer then revised the design to reduce the cost of the project and it was re-bid on May 10, 1966. The low bid submitted by B. B. McCormick and Sons was U.S. \$1,785,212.50 plus Guyana \$771,592.50. Although the U.S. AID grant provided only U.S. \$1,388,000.00 for construction, the Government of Guyana agreed to furnish the additional funds necessary to meet the low bid amount and a contract with B. B. McCormick and Sons, Inc. was signed on June 27, 1966. Notice to Proceed was issued to the Contractor on the same date.

THE FINAL CONSTRUCTION REPORT

CONSTRUCTION HISTORY

Since De Leuw, Cather International's responsibilities in connection with the project date from February 1, 1968 approximately 18 months after the start of construction, we have separated the Final Construction Report into two parts. The report on Part I covers activities on the project from August 1966 to February 1, 1968 and was compiled from Monthly Progress Reports prepared by Thomas B. Bourne Associates, the project files made available to De Leuw, Cather International Inc., and visual inspection of the works at the time we assumed the engineering responsibility for the remainder of the project.

Part I - Work Completed Prior to February 1, 1968

Although the terms of the contract required that construction begin by July 27, 1966, work on the project did not actually start until August 18, 1966. The Ross Corporation, subsequently approved as a Subcontractor, began erecting the Contractor's temporary buildings on that date.

On September 1, 1966, a subcontract was awarded to the Ross Corporation by B. B. McCormick and Sons, Inc., for the work included in Schedules II, III, IV and V of the contract documents. During September and October no progress was made on any pay item of the contract, either by the prime Contractor or by the Subcontractor.

In mid-November, McCormick personnel arrived on the job site and assumed responsibility for all operations. On November 18, 1966, the subcontract with the Ross Corporation was terminated by mutual consent. See Table 1.

SCHEDULE V - November 1, 1966 -
Terminal building batterboards only



SCHEDULE v December 15, 1966 -
Terminal building columns, beams,
and foundation walls under way



SCHEDULE I - November 1, 1966 -
Site of aircraft apron, connecting
taxiways and new parallel taxiway
with main runway in background -
runway overlay yet to begin

SCHEDULE I - January 3, 1967 -
Aircraft apron, connecting taxiways
and new parallel taxiway clearing,
and rough grading under way





SCHEDULE I - April 1, 1967 - Aircraft apron, connecting taxiways and northeast end of new parallel taxiway graded and ready for mixed-in-place base operation to begin



SCHEDULE I - April 1, 1967 - Southwest end of new parallel taxiway with mixed-in-place base started

TABLE 1

CONTRACTOR'S AVERAGE PERSONNEL PER QUARTER

1966		1967				1968		
<u>Sept.</u>	<u>Dec.</u>	<u>Mar.</u>	<u>June</u>	<u>Sept.</u>	<u>Dec.</u>	<u>Mar.</u>	<u>June</u>	<u>Sept.</u>
11	39	103	130	143	108	49	26	46

By the end of December 1966, there was still no significant progress on any item of the contract, but enough had been completed on Schedule V (the terminal building) that the first request for payment was approved.

The request for payment at the end of January 1967 included work on items in Schedules I, IV and V of the contract. Work on Schedule II began during February, but it was June 1967 before work on Schedule III began.

The contract time of 300 calendar days expired on May 23, 1967, and beginning with the monthly payment estimate for May, liquidated damages of U. S. \$500.00 per day were deducted from each monthly payment estimate submitted by the Contractor.

The asphaltic concrete overlay on the main runway (Schedule I) was completed during August 1967, and the runway was opened to international jet traffic. Schedules II (runway and taxiway lighting) and IV (VOR facilities) were also substantially complete by the end of August 1967.

Work on installation of emergency generator system and communications equipment (Schedule III) progressed during September 1967, with the arrival of the new generator.

In early October 1967, it was disclosed by the Engineers laboratory tests that the mixed-in-place base course in the taxiway and aircraft apron did not comply with current FAA pavement design criteria. Although no stop order was issued to the Contractor, he elected to suspend operations until the problems relating to the mixed-in-place base material had been solved.

SCHEDULE I - May 30, 1967 -
Partially graded and aerated mixed-
in-place base of new parallel taxi-
way looking southwest from a point
adjacent to the new aircraft apron



SCHEDULE II - May 30, 1967 -
Installation of new taxiway lights
and backfilling the trench dug to
receive the direct burial cable



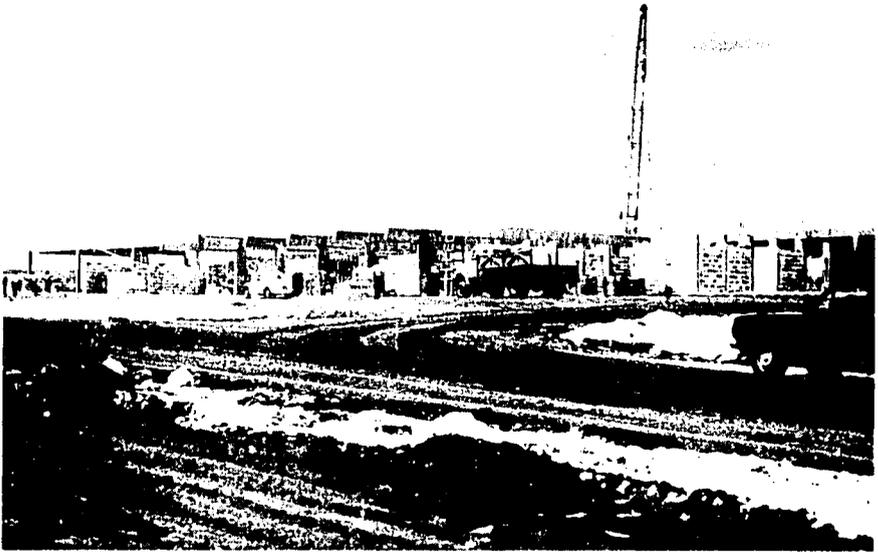
SCHEDULE I - May 30, 1967 -
Mixed-in-place base for the aircraft
apron being aerated

SCHEDULE V - May 30, 1967 -
Terminal building - Forming of con-
crete frame continues; concrete
block masonry is under way



SCHEDULE I - May 30, 1967 -
Mixed-in-place base of auto parking
lot and terminal building access
roads being aerated

SCHEDULE V - May 30, 1967 -
Northwest (front) view of terminal
building - column dowels for roof
structure visible and masonry
work continuing



SCHEDULE V - May 30, 1967 -
Southwest end of terminal building -
upper floor frame and slab placed;
column dowels for roof structure
visible

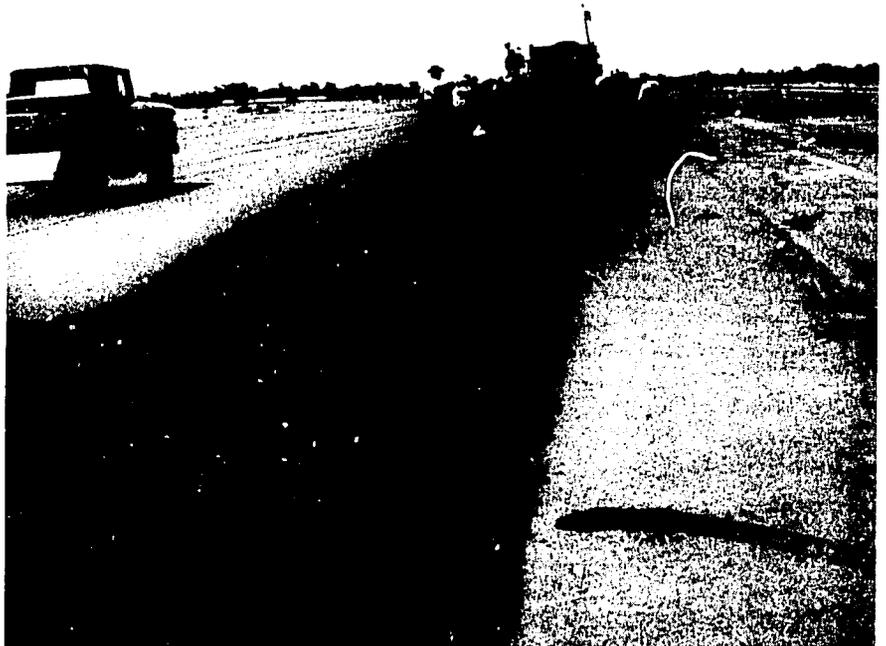
SCHEDULE V - May 30, 1967 -
Northeast end of terminal building -
forming continues for concrete beams
to support roof structure; placement
of reinforcing steel and electrical
conduit for suspended slab over
basement is in progress





SCHEDULE I - July 31, 1967 -
Final grading and compaction of mixed-in-place base for auto parking lot and terminal building access roads under way

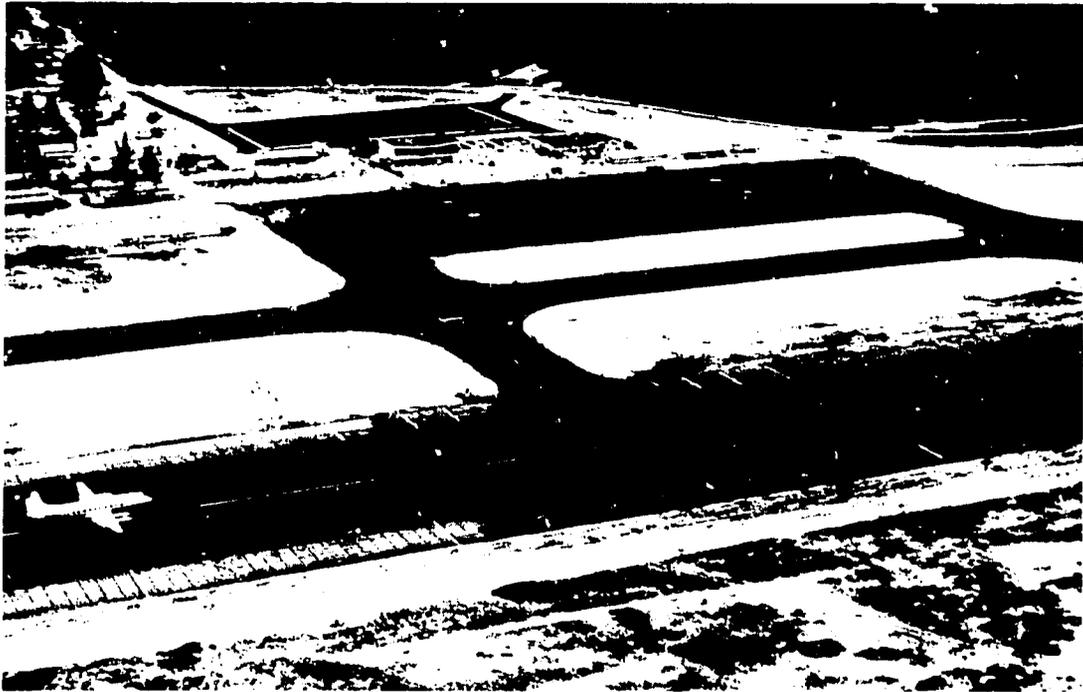
SCHEDULE V - July 31, 1967 -
Forming continues for concrete roof framing over Upper Floor with exterior masonry following closely behind



SCHEDULE I - July 31, 1967 -
Asphaltic concrete surface course of main runway overlay in progress; Plaw Knox paving machine visible with loaded asphalt truck behind

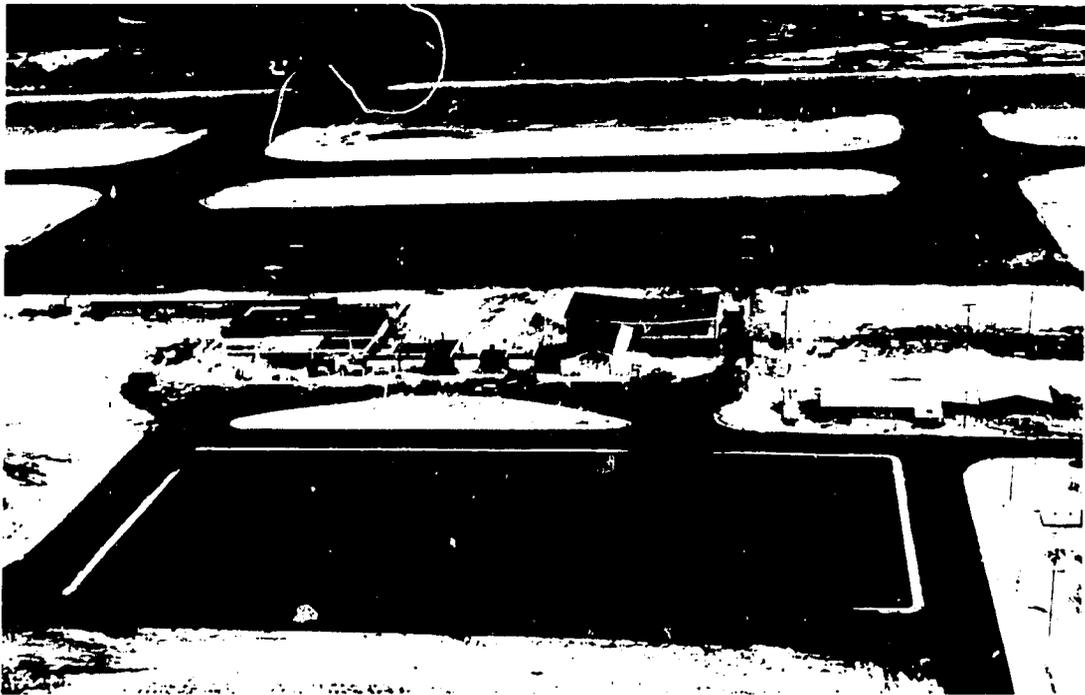


SCHEDULE I - July 31, 1967 -
View of the aircraft apron mixed-in-place base with the refueling lines from the Texaco storage tanks visible



SCHEDULE I - October 31, 1967 -
Main runway overlay complete and
operational with temporary center
line markings: aircraft apron and
taxiways remain incomplete: the
auto parking lot with access roads
is in the background

SCHEDULE V - October 31, 1967 -
The new terminal building is visible
between the aircraft apron and auto
parking lot



SCHEDULE I - October 31, 1967 -
The auto parking lot is shown in the
foreground with the aircraft apron,
taxiways and main runway beyond the
terminal building

SCHEDULE V - October 31, 1967 -
This air view of the terminal build-
ing gives a panoramic view of progress



SCHEDULE V - September 30, 1966 -
Some batterboards for terminal building in place, but layout not complete



SCHEDULE V - September 30, 1967 -
Southwest end of terminal building with concrete structure, roof framing and masonry complete; exterior stucco and interior finishes incomplete



SCHEDULE V - September 30, 1967 -
Cement plaster finish work in progress at northeast end of terminal building in an effort to complete building in minimum time once lumber for roof structure is available; roofed areas temporarily closed in to allow finish work to progress

From early October 1967 to February 1968, no significant work was performed on Schedule I. With minor exceptions, Schedule II was completed in October 1967; Schedule III was largely completed in November 1967.

The only significant work continuing in December 1967 was that being performed on the terminal building (Schedule V). This work had been progressing slowly since the beginning of the project. The survey work necessary for the building location and foundation layout began in August 1966, but the layout had not been completed by the end of September 1966. By the time McCormick relieved the Ross Corporation of responsibility for this phase of the work in mid-November 1966, no monthly payment had been approved. Subsequently, progress improved, but the problems encountered in procuring the greenheart lumber required for the building roof prevented rapid progress on this work.

The VOR station (Schedule IV) was inspected and officially accepted on behalf of the owner on January 12, 1968.

Part II - Work Performed from February 1, 1968 to Completion of Project

This part of the Final Construction Report covers the design of additional air terminal improvements and the construction inspection activities to project completion which were carried out by De Leuw, Cather International Inc.

On February 1, 1968, De Leuw, Cather International Inc., under contract to the Government of Guyana, assumed the Engineer's responsibilities for construction inspection of the remaining work at Atkinson Airport, and were authorized to begin design of the additional improvements to the terminal desired by the Government and U.S. AID.

When the construction inspection responsibility shifted to De Leuw, Cather International, the project was 85 percent complete and the Contractor, B. B. McCormick and Sons, had initiated letters of notice for claims that they valued at over U.S. \$200,000.00.

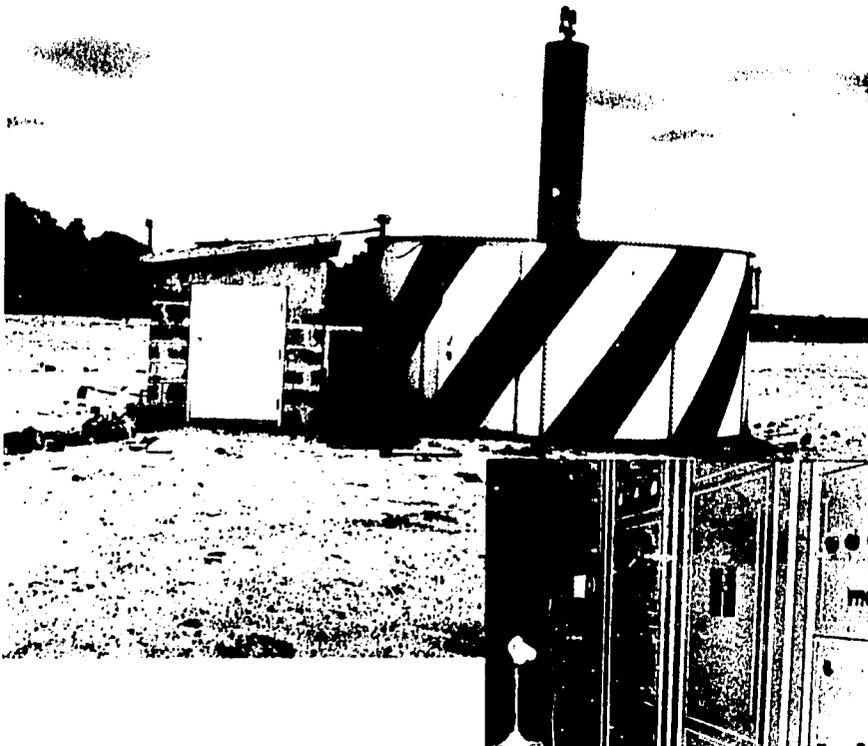
The Government of Guyana instructed the Engineer to negotiate a settlement with the Contractor for all claims related to work performed prior to February 1968.



SCHEDULE V - October 31, 1967 -
Roof structure over "in-transit" and dining areas
of terminal building under way



SCHEDULE V - October 31, 1967 -
Air view of terminal building highlighting the
progress of finish work ahead of roof cover;
temporary tarps over public area in foreground
protect freshly placed terrazzo from the fre-
quent rains, while the rough-grinding of ter-
razzo is in progress at the northeast end of the
ticket lobby (center of photograph); plywood
protection of the rough-ground terrazzo is visible
at the other end of the ticket lobby while the
installation of roof structure progresses above;
roof framing over "in-transit" and dining areas
(shown from the ground in adjacent photograph)
is apparent



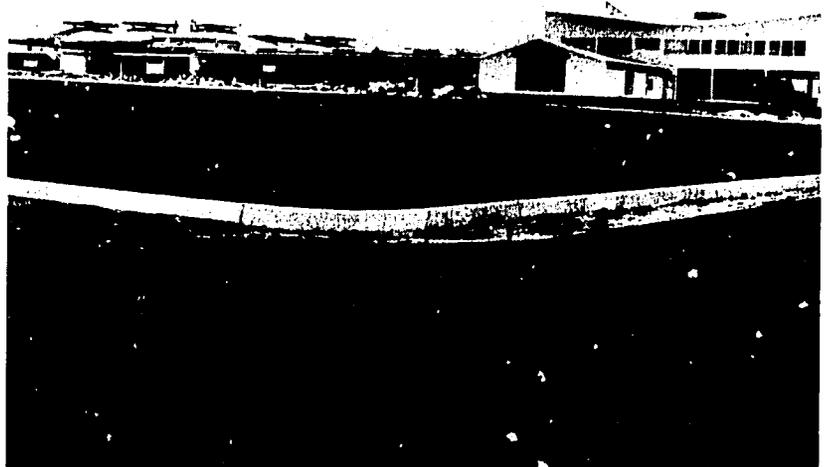
SCHEDULE IV - May 30, 1967 -
VOR shelter with emergency generator
building adjacent

SCHEDULE IV - January 3, 1968 -
VOR equipment installed inside
VOR shelter; flight test complete
and unit operational



SCHEDULE V - January 3, 1968 - Northwest (front) view of terminal building with roof structure at northeast end still incomplete and finish work continuing

SCHEDULE V - November 30, 1967 - Cathedral like ceiling of natural finish greenheart beams and roof decking covering the arrival customs area at the southwest end of the terminal building



SCHEDULE V - March 31, 1968 - Northwest (front) view of terminal building with roof structure at northeast end nearly complete and finish work well along, including glass and aluminum entrance at arrival customs area



SCHEDULE V - January 3, 1968 - Arriving passenger (southeast) view of the terminal building before aluminum and glass entrances were installed

During February and March 1968, negotiations with the Contractor were concluded that resolved all claims prior to February 1968. Included in this negotiated settlement were:

- 1. A lump sum payment to the Contractor of U.S. \$19,689.29 for all extra work and delay claims.*
- 2. An assessment against the Contractor of U.S. \$50,000.00 for engineering services.*
- 3. A time extension from May 23, 1967 to March 1, 1968 that relieved the Contractor of all assessed liquidated damages.*
- 4. Establishment of final quantities for each line item in Schedules I and II for work executed prior to February 29, 1968.*

The U.S. \$50,000.00 for engineering services was a negotiated partial reimbursement by the Contractor for the increased cost of construction inspection occasioned by the time extensions required to complete the construction.

The time extension and lump sum payment of U.S. \$19,689.29 were granted to the Contractor as a negotiated settlement of all his claims prior to February 29, 1968. With the concurrence of the Government of Guyana and U.S. AID this settlement was accepted by the Contractor and made a part of the contract by Change Order No. 10, prepared by De Leuw, Cather International Inc.

During this period, negotiations with the Contractor extended the contract time to October 31, 1968 and increased the scope of work to:

- 1. Increase by approximately two inches the thickness of asphaltic concrete on the parallel taxiway, cross taxiways and aircraft parking apron.*
- 2. Add two concrete hardstands on the aircraft parking apron.*

3. *Regrade the main runway overruns to control surface drainage.*
4. *Relocate the emergency generator building, add a fence around the VOR station and increase the amount of site clearing.*

The scope of work in De Leuw, Cather's design contract also required that there be provided:

1. *Design for expansion of the terminal building facility.*
2. *Design of a new air traffic control tower.*
3. *Design of lighting for the aircraft apron and auto parking lot.*

Each of these items required some time for design, but it was the client's desire to have all design and construction work completed by November 1968. This resulted in a crash program of design and subsequently, design and construction operations were carried on almost simultaneously.

In early February 1968, a tentative scope of work for the additional improvements to the terminal building was prepared by De Leuw, Cather International. The additional improvements included the following:

1. *Expansion of the Airlines Operations area.*
2. *Additional offices for Customs.*
3. *Additional offices for Immigration.*
4. *Expansion of the facilities for Health Officer.*
5. *Addition of an Air Traffic Control tower with provision for a structure on top of ATC cab for radar antenna.*
6. *Revisions to the assignment of Upper Floor rooms.*

7. *Expansion of the office space for Operations, ATC, Meteorology.*
8. *Expansion of toilet facilities for arriving passengers.*
9. *Provision of VIP space for airline rental.*
10. *Addition of an emergency lighting system.*
11. *Expansion of baggage claim facilities.*
12. *Increased length of ticket counter.*
13. *Expansion of the ticket lobby.*
14. *Provision for two Duty Free shops.*
15. *Addition of exterior lighting to the building and parking lot.*
16. *Additional landscaping.*
17. *Preparation of designs for a separate air cargo building.*
18. *Expansion of the air conditioning.*
19. *Addition of an elevated public observation area.*
20. *Review and possible expansion of intercommunications provisions for Airlines and Operations.*
21. *Revisions to electrical and plumbing layouts in kitchen to serve a revised equipment layout.*
22. *Additional electrical and plumbing work in the bar area.*
23. *Increase in the height of the control tower over original design height.*

24. *Addition of Department of Immigration facilities for departing passengers.*
25. *Addition of a facility for Head Tax collection.*
26. *Expansion of toilet facilities for "in-transit" passengers.*
27. *Provisions for covering the baggage handling area.*
28. *Expansion of the "in-transit" waiting area.*

The preliminary plans were approved on April 8 and working drawings were started on April 15, 1968. During the next six weeks the final drawings and specification addenda were completed and shipped to the job site.

While negotiations on claims and new work were underway, and while the design for the terminal building expansion was in progress, the Contractor completed all work under the original contract on the terminal building with the exception of those areas on which stop orders had been issued.

On receipt in mid-June 1968 of plans and specifications for the expansion, the Contractor began immediately to prepare a price for the work.

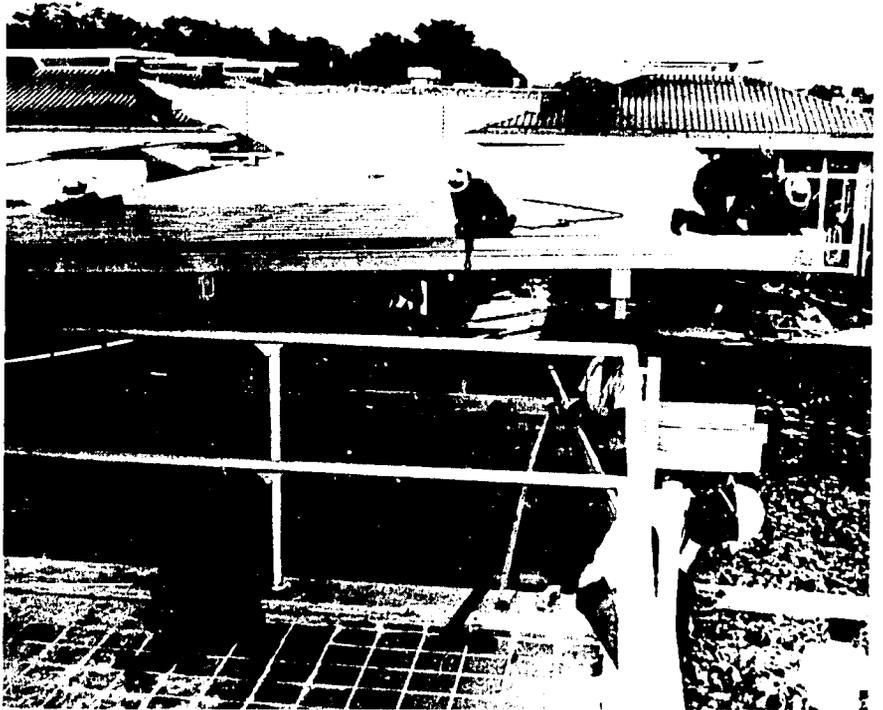
The Engineer's analysis indicated that the terminal facility, as requested and designed, would cost approximately one quarter million U.S. dollars. A tentative budget of U.S. \$120,000.00 - \$130,000.00 for construction had been established for this phase of the work but the requirements of the Government of Guyana and U.S. AID exceeded the budget. A review of the plans by the Government and the Engineer indicated that some of the items of work could be eliminated to lower the cost to U.S. \$160,000.00 - \$170,000.00 without decreasing the floor area or resulting in any serious curtailment in the facilities provided.

By mid-July, when the Contractor submitted his price for the terminal building improvements, there were only four months for construction if the project were to be complete no later than November.

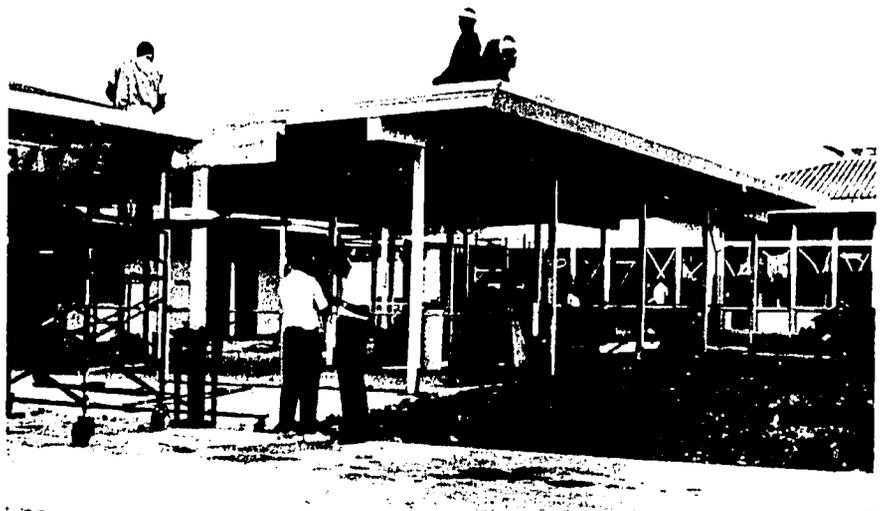
SCHEDULE V - September 30, 1968 -
South corner of terminal building
showing the arriving passenger en-
trance and the texture pattern
formed by shadows on the rain-
proof screen block used to enclose
the arrival area



SCHEDULE V - September 30, 1968 -
View of the framing operation for
cover over the arriving baggage
counter area, and the roof flashing
operation of the covered public
observation area



SCHEDULE V - September 30, 1968 -
Arriving passengers' view of the
covered public observation area



SCHEDULE V - September 30, 1968 - Northwest (front) view of ticket lobby wing, added to the contract in July 1968, thirty-one days before it was completed: roof structure complete and masonry under way



SCHEDULE V - September 30, 1968 - Northeast end of recently added ticket lobby wing accenting the 10' roof overhangs at front and rear: beams are 8 x 18 greenheart timbers spliced at mid span over 4" diameter standard pipe columns that also serve as downspouts for roof drainage

SCHEDULE I - June 30, 1968 - Finishers working under temporary cover on recently placed concrete of hardstand at southwest end of aircraft apron; mixed-in-place base around hardstand has not been fine graded



Since it would take at least five to six months to complete construction of the terminal building improvements, it was decided to reduce certain terminal requirements to provide a minimum expansion to the facility, for the lump sum of U.S. \$122,400.00 and G \$61,200.00. It was further agreed that the final design be prepared by the Engineer concurrently with construction. Because of time limitations, all design work had to be done at the job site.

On the basis of this agreement, construction began on July 15. While the Engineer prepared the foundation plan for the new work, the Contractor began demolition of some walls and partitions required by the revised plan. Placement of concrete for the footings was started on July 30 and the Supplemental Agreement that authorized this contract change was signed on July 31.

The Ministry of Works and Hydraulics provided design, drafting and supervision assistance from their Architectural and Roads Division. The Contractor organized and executed this work in what was undoubtedly his finest display of efficiency and production during the entire project. With the exception of a few "punch list" items, the terminal building work was completed on October 31.

During June and July, work was completed on the drainage control at the ends of the main runway, the concrete hardstands on the aircraft apron, and the extra work at the VOR station.

The additional paving work added by Change Order No. 11 was placed during October. Adequate stockpiles of stone had been stored to enable this work to progress rapidly and smoothly. Stability tests of the mixed-in-place base material at the aircraft apron indicated that curing had improved this material to an acceptable stability range, and it was accepted with only fine grading prior to the placement of the asphaltic concrete.

With the exception of "punch list" items, all five Schedules of the project, including added improvements, were complete by November 1, 1968. See Figure 1. The project was formally received from the Contractor by the Owner on December 7, 1968.

IMPROVEMENTS TO ATKINSON AIRPORT - GOVERNMENT OF GUYANA -

	1966						1967						
	AUG.	SEPT.	OCT.	NOV.	DEC.	JAN.	FEB.	MAR.	APR.	MAY	JUNE	JULY	AUG.
Contractor's Proposed Percent Completion - (Revised)					2.1	3.8	10.3	19.1	35.9	77.4	90.7	96.6	
Contractor's Actual Percent Completion					0.01	0.06	14.65	19.81	34.5	43.7	49.7	63.4	
Certified Payment - % Original Contract Total					0.01	0.06	13.2	17.5	31.2	43.8	43.8	55.4	

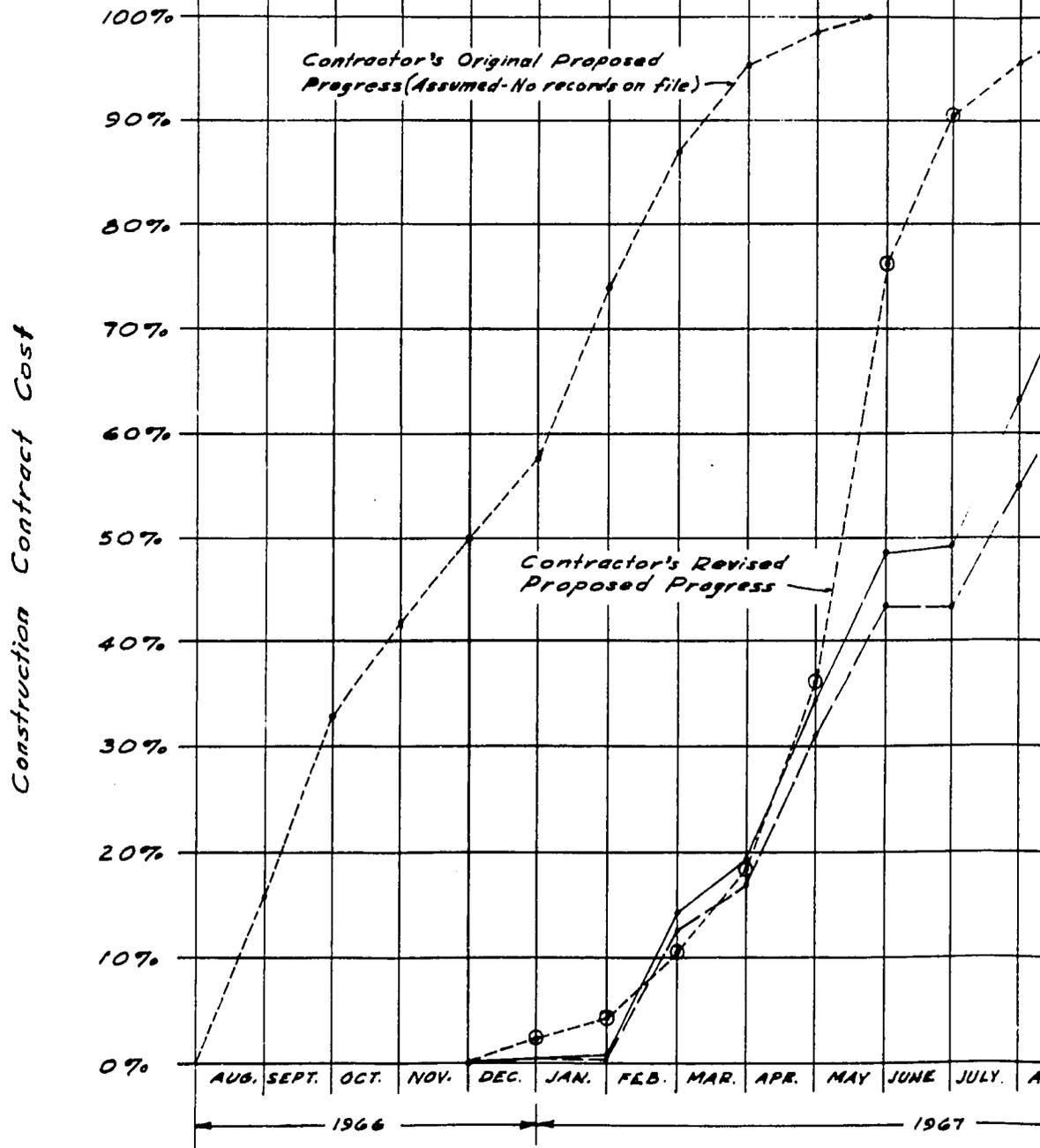
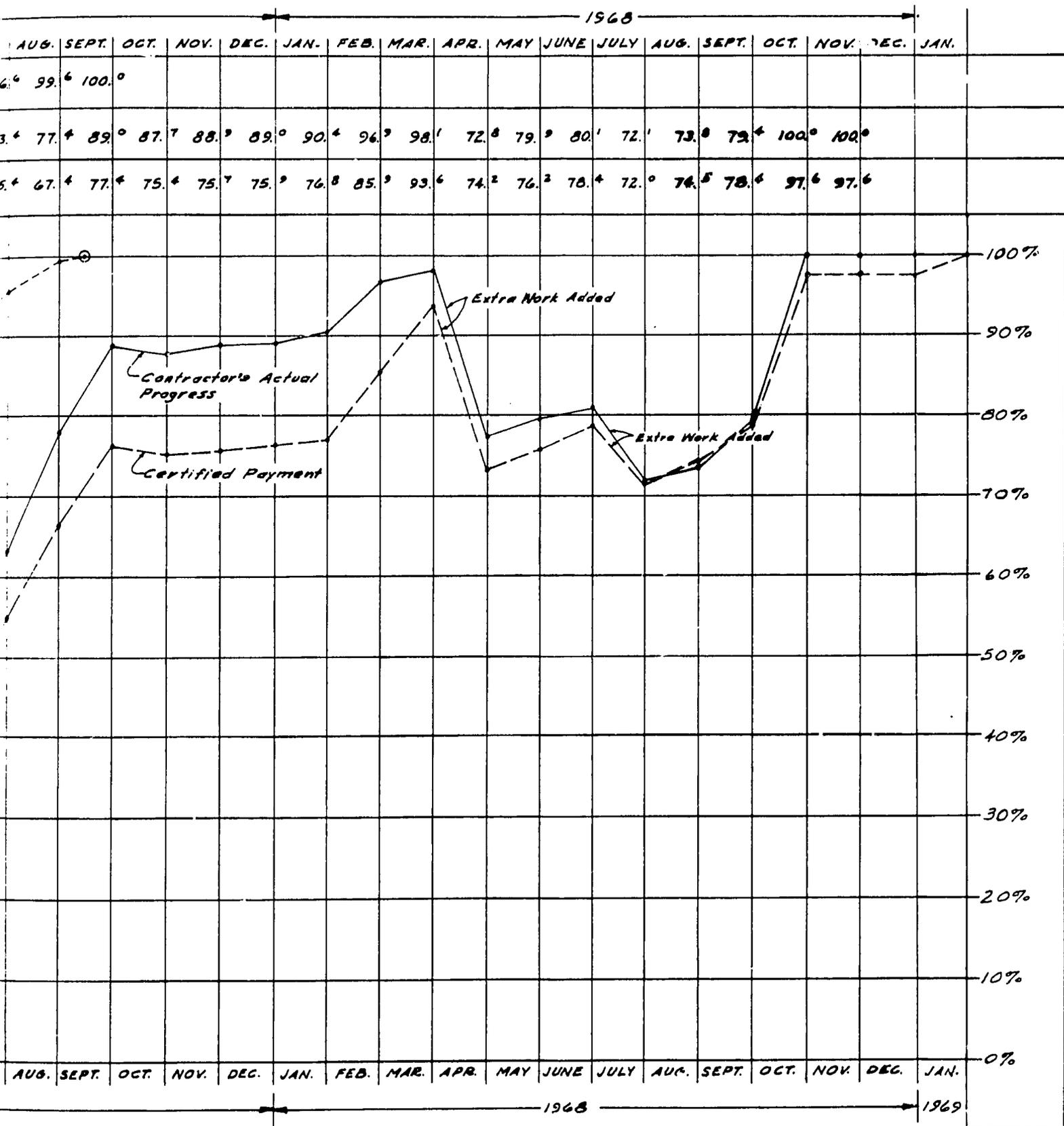


FIGURE I

- M. W. H. ROADS & BUILDINGS DIVISIONS - USAID PROJECT No. 504-12-370-023



At the conclusion of the construction project, one design item remained incomplete: the air traffic control tower. Since both runways at the airport are to remain operational, and the funds available for work on the tower were limited, it was ultimately decided that the existing ATC tower should be rehabilitated. The Ministry of Works and Hydraulics notified the Engineer in February 1969 that the Ministry would complete the work begun on this rehabilitation and the Engineer's contract was terminated under Article IV, paragraph 19.1 of the contract, effective February 28, 1969.

DELAYS IN CONSTRUCTION

Mobilization

The contract made no specific provision for the Contractor's mobilization, other than the 30-day period following Notice to Proceed. This is not considered a significant cause for delay, however, since the work for the terminal building was the most critical time item on the project, and this required only a minimal amount of construction equipment and personnel to get underway.

Non-Performance

Non-performance, and at times only partial-performance by the Contractor or his Subcontractors, were the most serious causes for delay in the completion of this project.

Initially the Contractor arranged a subcontract for four of the five Schedules of work, covering more than half of the total cost of the project. Included were Schedules II, III, IV and V, all of which involved the preparation and approval of a number of shop drawings. Normally, the preparation and submission of these shop drawings would have been completed within 60 days of the award of the contract, but over six months elapsed before most shop drawings were received. In fact, many items normally requiring shop drawings were ordered by the Contractor prior to receipt of approval of shop drawings.

The Contractor placed the material orders in December and January 1966-1967, after relieving the Subcontractor responsible for the non-performance to that date. The Contractor accepted the risk involved in ordering material before receipt of approved shop drawings in order to expedite the project.

Although the project required many imported materials, the lack of locally produced materials caused serious delays in construction. Both greenheart lumber and crushed stone proved difficult to obtain in the required size and grade.

Kiln-dried greenheart was specified for all structural lumber in the terminal building, and the controversy over the specification that lumber be seasoned to a moisture content of 15 percent or less was not resolved until over two months after the contract completion date had passed. Even then, unseasoned greenheart of the dimensions and lengths required proved hard to find. Before the last of the roof decking was delivered, the Contractor had entered into agreements with individuals holding private timber concessions to deliver rough cut and over-sized lumber to his main supplier for final sizing and dressing. The local demand for this material had grown since 1965 to exceed the local production.

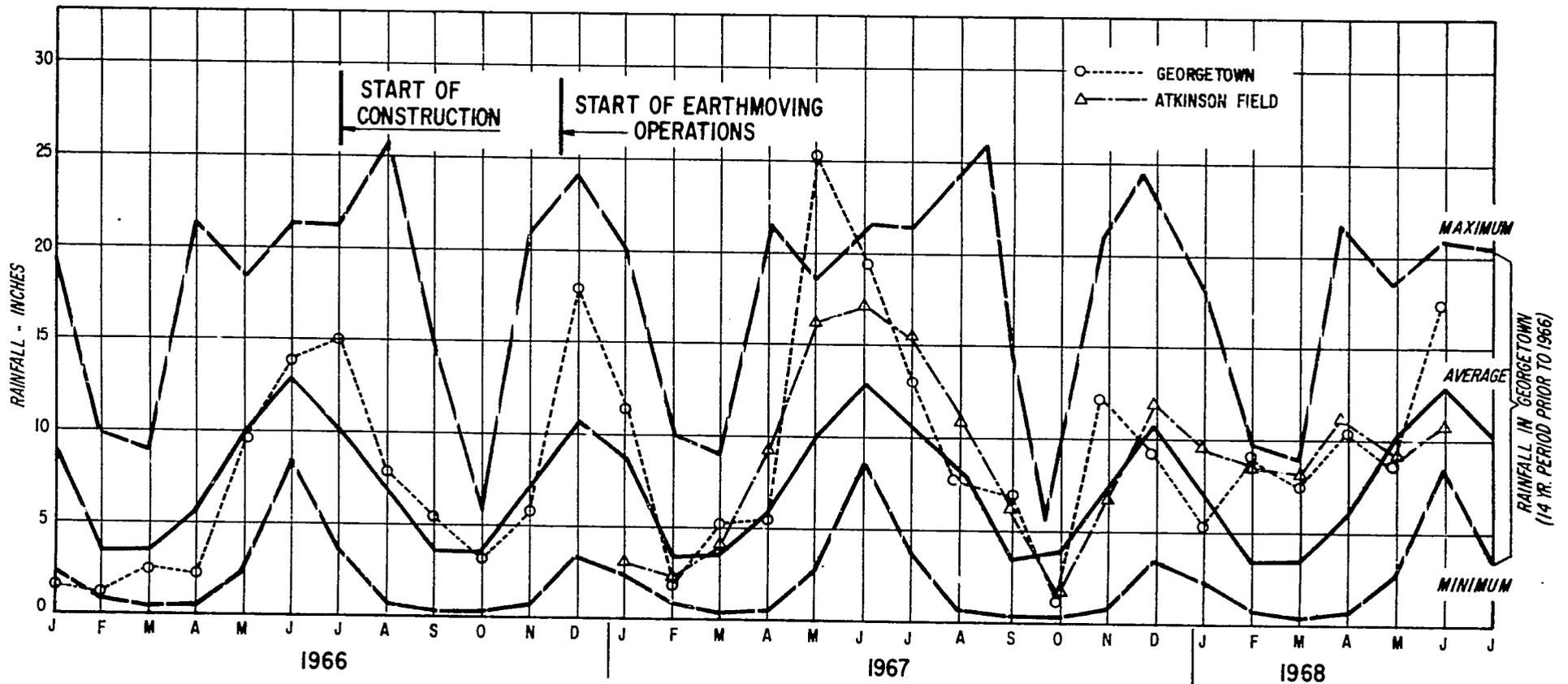
The unavailability of an adequate supply of properly graded clean stone aggregate for the asphaltic concrete was a serious problem from the standpoint of project delay before De Leuw, Cather International assumed responsibility for construction inspection. All quarries from which the material could be obtained were remote from the site, and transportation problems were persistent. These delays were harmful to the project, but construction time for the paving work was never as critical as the work on the terminal with respect to project completion deadlines.

Weather

The graph of rainfall, Figure 2, indicates that there were periods during which there was more rain than might be expected. This caused delays in the construction program and this fact was recognized in the time extensions granted to the Contractor.

Strikes

Strikes by both the Contractor's local employees and his suppliers' employees caused a series of short delays. These were usually resolved rather quickly, but they were also factors which were recognized in the time extensions granted to the Contractor.



AT GEORGETOWN:

VARIATION IN TOTAL RAINFALL FROM AUG. 1966 - JUNE 1968 = +32%

WEIGHTED AVERAGE VARIATION FROM AUG. 1966 - JUNE 1968 = +34%

WEIGHTED AVERAGE VARIATION FROM DEC. 1966 - JUNE 1968 = +64%

TOTAL PREDICTED RAINFALL FROM AUG. 1966 TO JUNE 1968 FROM 1952-65
RECORDS = 163 INCHES

TOTAL MEASURED RAINFALL FROM AUG. 1966 TO JUNE 1968 = 215 INCHES.

IMPROVEMENTS TO ATKINSON AIRPORT
RAINFALL DATA CORRELATION
DE LEUW, CATHER INTERNATIONAL INC.

CONTRACT CHANGE ORDERS

A total of 18 change orders and one supplemental agreement were prepared during construction. Thomas B. Bourne Associates prepared nine change orders, of which six were executed and three were included in later change orders. The remaining nine change orders and the supplemental agreement were prepared by De Leuw, Cather International and executed by the Owner and the Contractor.

In February 1968, shortly after De Leuw, Cather International assumed the Engineer's responsibilities, negotiations were begun to settle all claims the Contractor had filed prior to February 1968. This settlement was made a part of the contract with Change Order No. 10.

Concurrent with the negotiations that concluded when Change Order No. 10 was signed, negotiations were carried on to establish costs for the increase in paving requirements for the taxiways and aircraft apron, increased erosion control measures at the ends of the main runway, and the increase in work required under Schedule IV (VOR station). This work was added to the contract by Change Order No. 11.

The remaining change orders, Change Order Nos. 12 through 18, were of no significant influence to the project. They were the usual minor changes that most projects experience.

The Supplement Agreement, dated July 31, 1968, was a significant change to the project. Under this addition to the contract the terminal building was expanded and modified and lighting was provided for both the aircraft apron and the auto parking lot. A list of the change orders follows:

<u>Change Order</u>	<u>Guyana \$</u>	<u>U. S. \$.</u>
1 Change location of control cable for VOR		No Change
2 Change location water closet and lavatory		No Change

	<u>Change Order</u>	<u>Guyana \$</u>	<u>U. S. \$</u>
3	<i>Substitute MC-0 for MC-1 in prime coat</i>		<i>No Change</i>
4	<i>Extension of time because of strikes and new holidays</i>		<i>Not Executed See Change Order No. 10</i>
5	<i>Add conduit across runway 10-28</i>	500.00	1,200.00
6	<i>Provide spares for VOR</i>		<i>Not Executed See Change Order No. 12</i>
7	<i>Change location of power lines</i>		<i>No Change</i>
8	<i>Extension of time because of rain</i>		<i>Not Executed See Change Order No. 10</i>
9	<i>Allowed use of unseasoned greenheart lumber for lumber with least dimension over one inch and deleted requirement for Penta-Dip treatment of structural greenheart</i>	0.00	-(1,445.89)
10	<i>Granted time extension of 282 days, settled all claims through February 29, 1968, and assessed the Contractor for certain engineering costs</i>	7,875.72 0.00	15,751.43 -(50,000.00)
11	<i>Increased the paving thickness on the new taxiways and aircraft apron and added two concrete hardstands on the aircraft apron, increased the earthwork and added paving and bituminous shoulder dike to control drainage at ends of main runway,</i>	232,209.60 1,600.00	464,419.20 3,200.00

<u>Change Order</u>	<u>Guyana \$</u>	<u>U. S. \$</u>
<i>relocated VOR generator building, added a fence around the VOR shelter and increased the site clearing required adjacent to the VOR shelter</i>	4,000.00	8,000.00
12 <i>Provide spares for VOR</i>	0.00	0.00*
13 <i>Changed paint specifications and added paint</i>	1,056.00	0.00
14 <i>Changed runway marking</i>	No Change	
15 <i>Divided the lump sum amounts of Change Order Nos. 10 and 11 into U. S. and Guyana amounts on an 80-20 ratio</i>	No Change	
16 <i>Change or add 11 minor items</i>	1,830.84	3,661.68
17 <i>Changes to roof of terminal building</i>	2,855.12	5,710.28
18 <i>Deleted range hood in kitchen of terminal building and deleted automatic transfer switch shown for future emergency generator system</i>	0.00	-(3,550.00)

Supplemental Agreement

<i>Increased scope of work for terminal building with additions and modifications and added lighting for the aircraft apron and auto parking lot.</i>	61,200.00	122,400.00
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**-The cost of this Change Order was U. S. \$4,287.09, but it was paid by direct disbursement by U.S. AID/Guyana and was not shown as an increase to the Contract.*

CONTRACT COST

TOTAL BID

	<i>Guyana \$</i>	<i>U. S. \$</i>
<u><i>Schedule I</i></u>		
<i>Paving and related civil work</i>	\$ 403,485.00	\$1,008,405.00
<u><i>Schedule II</i></u>		
<i>Runway and taxiway lighting system</i>	87,557.50	154,807.50
<u><i>Schedule III</i></u>		
<i>Emergency generator</i>	13,350.00	22,000.00
<u><i>Schedule IV</i></u>		
<i>VOR station</i>	100,200.00	200,000.00
<u><i>Schedule V</i></u>		
<i>Terminal building</i>	167,000.00	400,000.00
	\$ 771,592.50	\$1,785,212.50

TOTAL NET OVERRUNS

<u><i>Schedule I</i></u>		
<i>Paving and related civil work</i>	\$ 63,012.18	\$ 133,693.95
<u><i>Schedule II</i></u>		
<i>Runway and taxiway lighting system</i>	(892.85)	(1,192.40)
	\$ 62,119.33	\$ 132,501.55

EXTRA WORK

	<u>Guyana \$</u>	<u>U. S. \$</u>
<u>Change Order No. 5</u>		
Conduit for runway lighting cable	\$ 500.00	\$ 1,200.00
<u>Change Order No. 9</u>		
Delete Penta-Dip treatment of structural greenheart	0.00	(1,445.89)
<u>Change Order No. 10</u>		
Claims prior to February 29, 1968	7,875.72	15,751.43
Reimbursement of engineering costs	0.00	(50,000.00)
<u>Change Order No. 11</u>		
Asphaltic concrete on taxiways and aircraft apron;	218,459.60	430,044.20
Concrete hardstands;	13,750.00	34,375.00
Drainage control at ends of main runway;	1,600.00	3,200.00
Fence, relocate generator building and clearing of trees for VOR station	\$ 4,000.00	\$ 8,000.00
<u>Change Order No. 13</u>		
Paint	1,056.00	0.00
<u>Change Order No. 16</u>		
Claims terminal building expansion	1,830.84	3,661.68

EXTRA WORK--Continued

	<u>Guyana \$</u>	<u>U. S. \$</u>
<u>Change Order No. 17</u>		
<i>Aluminum roofing - terminal building</i>	2,855.12	5,710.28
<u>Change Order No. 18</u>		
<i>Delete range hood in termi- nal building and electrical switch at emergency gener- ator</i>	\$ 0.00	(3,550.00)
	<u>\$ 251,927.28</u>	<u>\$ 446,946.70</u>
FINAL CONTRACT AMOUNT	<u><u>\$1,085,639.11</u></u>	<u><u>\$2,364,660.75</u></u>

GUYANA

Ministry of Works and Hy
IMPROVEMENTS to ATKINS

PREPARED BY: DELEUW, CATHER INTERNATIONAL, INC.
PROJECT No. 503

ESTIMATE CERTIFIC

FOR WORK PERFORMED AND MATERIAL FURNISHED IN TH

ESTIMATE NO.: 29 AND FINAL

TO: B. B. McCORMICK & SONS, IN

ITEM	DESCRIPTION	UNIT	CONTRACT QUANTITY	QUANTITY PREVIOUSLY ALLOWED	QUANTITY ALLOWED THIS ESTIMATE	QUANTITY ALLOWED TO DATE	GUYANA UNIT PRICE
SCHEDULE I							
P-151	Clearing and Grubbing	Acres	5	5	0	5	1
P-152	Unclassified Excavation	C.Y.	80,000	166,466	0	166,466	
P-204 a	Mixed-in-Place Base Course	S.Y.	86,800	93,553	0	93,553	
b	Bituminous Material	Gal.	300,000	342,217	0	342,217	
P-401 a	Aggregate Bituminous Surface Course	Tons	29,000	36,239.5	392	36,631.5	
b	Aggregate Bituminous Surface Course	Tons	5,260	0	5,313	5,313	
c	Bituminous Material	Gal.	600,000	477,618	79,216	556,834	
P-602	Bituminous Prime Coat	Gal.	30,300	2,250	0	2,250	
P-603	Bituminous Tack Coat	Gal.	13,400	11,120	1,849	12,969	
P-620	Runway and Taxiway Painting	L.S.	1	90%	10%	100%	10.6
D-703	12" C.M. Pipe - Bituminous Coated	L.F.	750	729	0	729	
D-703A	8" C.M. Pipe - Galvanized	L.F.	800	580	0	580	
D-751	Concrete Inlets	Each	4	4	0	4	12
D-752	Concrete Headwalls	Each	8	8	0	8	
APPEAR	Auto Park - Access Roads	L.S.	1	95%	5%	100%	20.0
L-110 a	Two-way Underground Duct	L.F.	350	284	0	284	
b	Four-way Underground Duct	L.F.	450	636	0	636	
c	Six-way Underground Duct	L.F.	300	295	0	295	
SCHEDULE II							
L-108 a	Cable Trench	L.F.	32,750	34,600	0	34,600	
b	3KV Cable in Trench	L.F.	27,600	26,542	0	26,542	
c	3KV Cable in Duct or Conduit	L.F.	2,900	3,141	0	3,141	
d	5KV Cable in Trench	L.F.	17,700	16,262	0	16,262	
e	5KV Cable in Duct	L.F.	7,800	7,051	0	7,051	
f	Counterpoise Wire	L.F.	37,500	36,447	0	36,447	
L-109	Transformer Vault Equipment	L.S.	1	100%	0	100%	7.50
L-114	Medium Intensity Taxiway Lights	Each	184	184	0	184	1.
L-121	High Intensity Taxiway Lights	Each	87	87	0	87	2
SCHEDULE III							
S-101	Emergency Generator	L.S.	1	100%	0	100%	13.3
SCHEDULE IV							
S-102	VOR Station	L.S.	1	100%	0	100%	100.2
SCHEDULE V							
B-101	Terminal Building (G \$)	L.S.	1	99.56%	0.44%	100%	167.0
	(US \$)	L.S.	1	99.65%	1.35%	100%	

GUYANA

TABLE 2

of Works and Hydraulics

MENTS to ATKINSON AIRPORT

UNITED STATES AGENCY FOR INTERNATIONAL DEVELOPMENT
PROJECT No. 504-12-370-023
LOAN No. 504-L-005

IMATE CERTIFICATE

IAL FURNISHED IN THE CONSTRUCTION OF ATKINSON AIRPORT

ORMICK & SONS, INC.

DATE: 20 JANUARY 1969

ITY THIS DATE	QUANTITY ALLOWED TO DATE	GUYANA UNIT PRICE	GUYANA AMOUNT ALLOWED TO DATE	GUYANA AMOUNT DUE THIS ESTIMATE	U. S. UNIT PRICE	U. S. AMOUNT ALLOWED TO DATE	U. S. AMOUNT DUE THIS ESTIMATE
0	5	130.00	650.00	0.00	340.00	1,700.00	0.00
0	166,466	0.24	39,951.84	0.00	0.45	74,909.70	0.00
0	93,553	0.30	28,065.90	0.00	0.60	56,131.80	0.00
0	342,217	0.12	41,066.04	0.00	0.35	119,775.95	0.00
2	36,631.5	6.00	219,789.00	0.00	14.00	512,841.00	0.00
3	5,313	7.00	37,191.00	0.00	14.00	74,382.00	0.00
6	556,834	0.10	55,683.40	0.00	0.35	194,891.90	0.00
0	2,250	0.20	450.00	0.00	0.50	1,125.00	0.00
9	12,969	0.20	2,593.80	0.00	0.50	6,484.50	0.00
7%	100%	10,600.00	10,600.00	0.00	20,000.00	20,000.00	0.00
0	729	2.80	2,041.20	0.00	6.90	5,030.10	0.00
0	580	2.70	1,566.00	0.00	6.00	3,480.00	0.00
0	4	150.00	600.00	0.00	370.00	1,480.00	0.00
0	8	75.00	600.00	0.00	185.00	1,480.00	0.00
5%	100%	20,000.00	20,000.00	0.00	55,000.00	55,000.00	0.00
0	284	3.50	994.00	0.00	9.00	2,556.00	0.00
0	636	5.00	3,180.00	0.00	11.00	6,996.00	0.00
0	295	5.00	1,475.00	0.00	13.00	3,835.00	0.00
0	34,600	0.25	8,650.00	0.00	0.35	12,110.00	0.00
0	26,542	0.25	6,635.50	0.00	0.45	11,943.90	0.00
0	3,141	0.25	785.25	0.00	0.50	1,570.50	0.00
0	16,262	0.30	4,878.60	0.00	0.50	8,131.00	0.00
0	7,051	0.75	5,288.25	0.00	0.60	4,230.60	0.00
0	36,447	0.15	5,467.05	0.00	0.30	10,934.10	0.00
0	100%	7,500.00	7,500.00	0.00	21,000.00	21,000.00	0.00
0	184	135.00	24,840.00	0.00	235.00	43,240.00	0.00
0	87	260.00	22,620.00	0.00	465.00	40,455.00	0.00
0	100%	13,350.00	13,350.00	0.00	22,000.00	22,000.00	0.00
0	100%	100,200.00	100,200.00	0.00	200,000.00	200,000.00	0.00
7%	100%	167,000.00	167,000.00	730.00			
7%	100%				400,000.00	400,000.00	5,407.25

GUYANA

Ministry of Works and Hy
IMPROVEMENTS to ATKINSON

PREPARED BY: DELEUW, CATHER INTERNATIONAL, INC.
PROJECT NO. 5030

ESTIMATE CERTIFICATE

FOR WORK PERFORMED AND MATERIAL FURNISHED IN THE CONSTRUCTION

ESTIMATE NO.: 29 AND FINAL

TO: B. B. McCORMICK & SONS, INC.

ITEM	MATERIALS	UNIT	CONTRACT QUANTITY	MATERIAL ON GROUND LAST ESTIMATE	MATERIAL ON GROUND THIS ESTIMATE	6. U PA
	NONE					

Total Amount Allowed
Less Amount Retained
Total Net Amount Allowed

Total Allowed to Date on Contract
Less Amount Previously Paid Estimate No. 1 to 28
Amount Due this Estimate No. 29

CERTIFICATION OF CONTRACTOR

I hereby certify that subject to the governing provisions of the contract, the work performed and the materials supplied to date, as shown on this periodic cost estimate, represent the actual value of accomplishment under the terms of this contract in conformity with approved plans and specifications; that the quantities shown were properly determined and are correct; and that there has been full compliance with all labor provisions included in the contract identified above; and that liquidated damages may be charged pending formal action of time extension requests.

Date: _____

BY: _____
Pace Foster
Title: Construction Manager

ACKNOWLEDGEMENT OF OWNER

I have examined and concur in the contractor

Date: _____

DeLeuw, Cather

BY: _____
S. T. Wil
Title: Project

Total Bid US \$ 2,171,008.75
Less Reductions 94,786.40
2,076,222.35
Plus Extras 984,257.95
Adjusted Amount 3,060,480.30
Less Amount Completed 3,060,480.30
Amount to Complete 0.00

Contract Starting Date 27 JULY 1966
Actually Started 18 AUGUST 1966
Completion Time 23 MAY 1967 (300
Extensions 557 days
Adjusted Time 30 NOVEMBER 1968
Time Used 857 days - 100 %
Time Remaining 0 days - 0 %
Work Completed 100 %

RECOMMENDATIONS

The runway and taxiway are adequate for several times the present daily international traffic load, but the aircraft apron is designed to accommodate only two aircraft. The terminal building facilities are also limited, and any increase in daily traffic should be scheduled to avoid more than two aircraft on the apron concurrently.

Should the Government decide to increase the facilities to allow greater flexibility in aircraft schedules, extensions will be required to the aircraft apron, connecting taxiways and terminal building.

The air traffic control tower rehabilitation, which remained incomplete at the termination of the Engineer's contract, should be completed as early as possible. The loan agreement, under which funds are available for this work, requires that all requests for disbursements be entered prior to January 1, 1970.

Maintenance to repair erosion damage will be required continuously. The white sand soil adjacent to all paved areas is easily eroded and will undermine the paving unless the erosion is repaired. Drainage should produce no serious problem, but continuous maintenance will insure that erosion is controlled.