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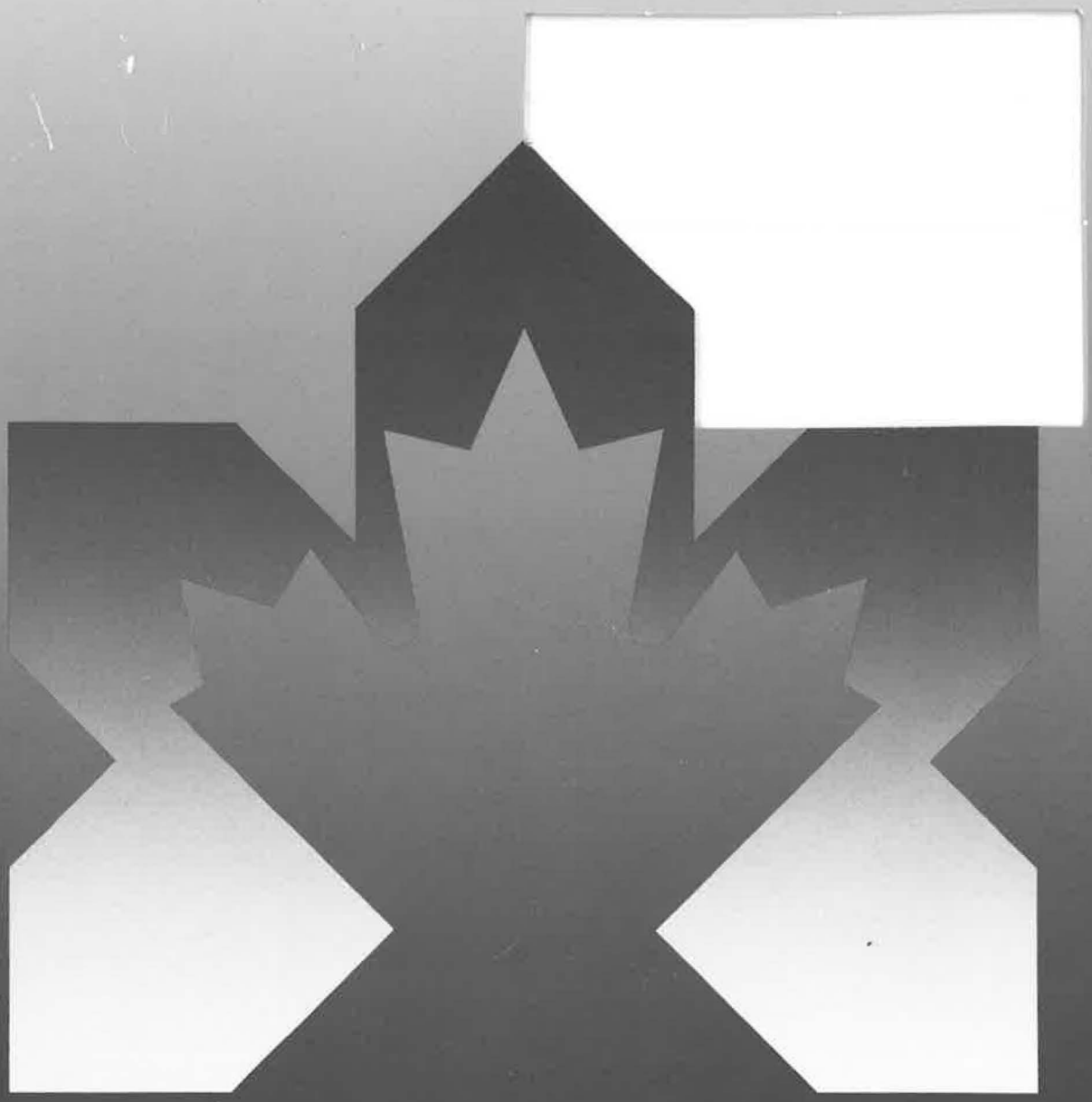

Canada

APPENDIX "D"

AKLAVIK PASSIVE VENTILATION DEMONSTRATION

STATUS REPORT

PHASE I REPORT

FOR THE

NORTHWEST TERRITORIES HOUSING CORPORATION VENTILATION SYSTEM PROJECT

for
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Canada Mortgage and Housing Corporation

by
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Yellowknife, NWT

August, 1988

TABLE OF CONTENTS

List of Illustrations

NORTHWEST TERRITORIES HOUSING CORPORATION
VENTILATION SYSTEM PROJECT REPORT

BACKGROUND AND ISSUES

For the past number of years the Northwest Territories Housing Corporation has been ventilating the houses built by them with a system designed by their department. As of yet, though, this system has not been tested to ascertain whether or not this system adequately maintains the prescribed strandards of air quality.

The system consists of a number of fresh air inlets, depending on the house design, positioned near the ceiling. These inlets are vented to the outside by means of ducts that run down inside the wall and through the floor (see Appendix A for diagram of inlet grills). The only other ventilation equipment in the house are the bathroom and kitchen fans that are humidity controlled.

The goal of this project is exactly that as mentioned above, to find out if the present system of ventilation is effective. To do this the various variables that need to be monitored include indoor and outdoor temperatures, CO2 levels, indoor relative humidities and fan flows.

Originally the project was to test the differance between the standard system ond a modified system. The modified system was to consist of an AERECO mechanical ventilation system. The only change that would have been made to the AERECO system is that the inlet grills would be vented simularly to the standard system, through the floor instead of the walls(see Appendix B for more information on the AERECO products). This, though, had to be cancelled due to a lack of time, money and other factors.

The main benifit behind the AERECO system is the fact that the inlet and outlet grills are humidity controled. This means that if the humidity is high the grills open up to let more fresh air into the room. If it is low the opposite will occur. This ensures that ventilation occurs in only those rooms that need it. The idea is that controlling the humidity controls the air quality, a concept that has yet to be proven true in the Canadian Arctic.

The testing of this concept is in fact a sub-project of this project. By monitoring the levels of humidity and CO2 in the selected house a relationship between the two factors may be found. CO2 sensors are very delecate and expensive instruments so therefore it becomes exceedingly exdpensive to monitor air quality in buildings. If a relationship can be found then this expense can be curbed and air quality measured easierly.

PHASE I PROGESS REPORT

The man goals behind Phase I of this project are:

1. Selection of house
2. Selection of all monitoring equipment.

Selection of House

The house that has been selected for this project is a duplex in Aklavik, NWT. It is currently under construction with the framing near completion. The duplex is made up of two seperate units with a shared utility room, which is not connected to either of the two unit as it has its own entrance (see Fig. 1 for floor plan). Each unit has four inlet grills, one in each bedroom closet, each having a two inch (2") duct, and two in the hallways, one a three inch (3") duct and the other a three inch by ten inch (3" by 10") rectangular duct.

Selection of Monitoring Equipment

All monitoring equipment for this project was selected under the guidelines given to us by Robin Sinha of the Canadian Mortgage and Housing Corporation. A complete list of the equipment to be used can be found on the next page along with a breakdown of the costs and suppliers,etc.(see Fig. 1 for sensor positions).

The main sensory unit for this project is the Nova CO2 Analyser as the main goal of the project is to study the air quality of the building. The Nova will be fitted with a multiplexer so it will be able to measure a number of different areas in the house. This is done by the multiplexer switching from one sampling hose to another in succession, with a delay time of 15 to 30 minutes a number of samples can be taken. This ensures an acurate recording of the air quality, not only from one position in the house but from many points throughout the house.

To get a proper comparison of the relative humidity to CO2 a relative humidity sensor (RHz) and temperature sensor (Tz) will also be positioned at the sampling points for the CO2. These readings, though, will be sampled continuously. The other temperatures that will be taken are the temperatures of the incoming (or outgoing ?) air at each supply grill (Tva) and the outdoor temperature (To).

The other variables being monitored are the envelope pressure differential (Pd), the boiler status (Sb) and the kitchen and bathroom exhaust air velocities (Vk and Vb).

All the above sensors, except the Nova CO2 Analyser, are those that have been retrieved form the Latham Island Project and therefore are already owned by CMHC. The Sciemetrics data aquisition equipment and computer are also those retrieved from Latham Island.

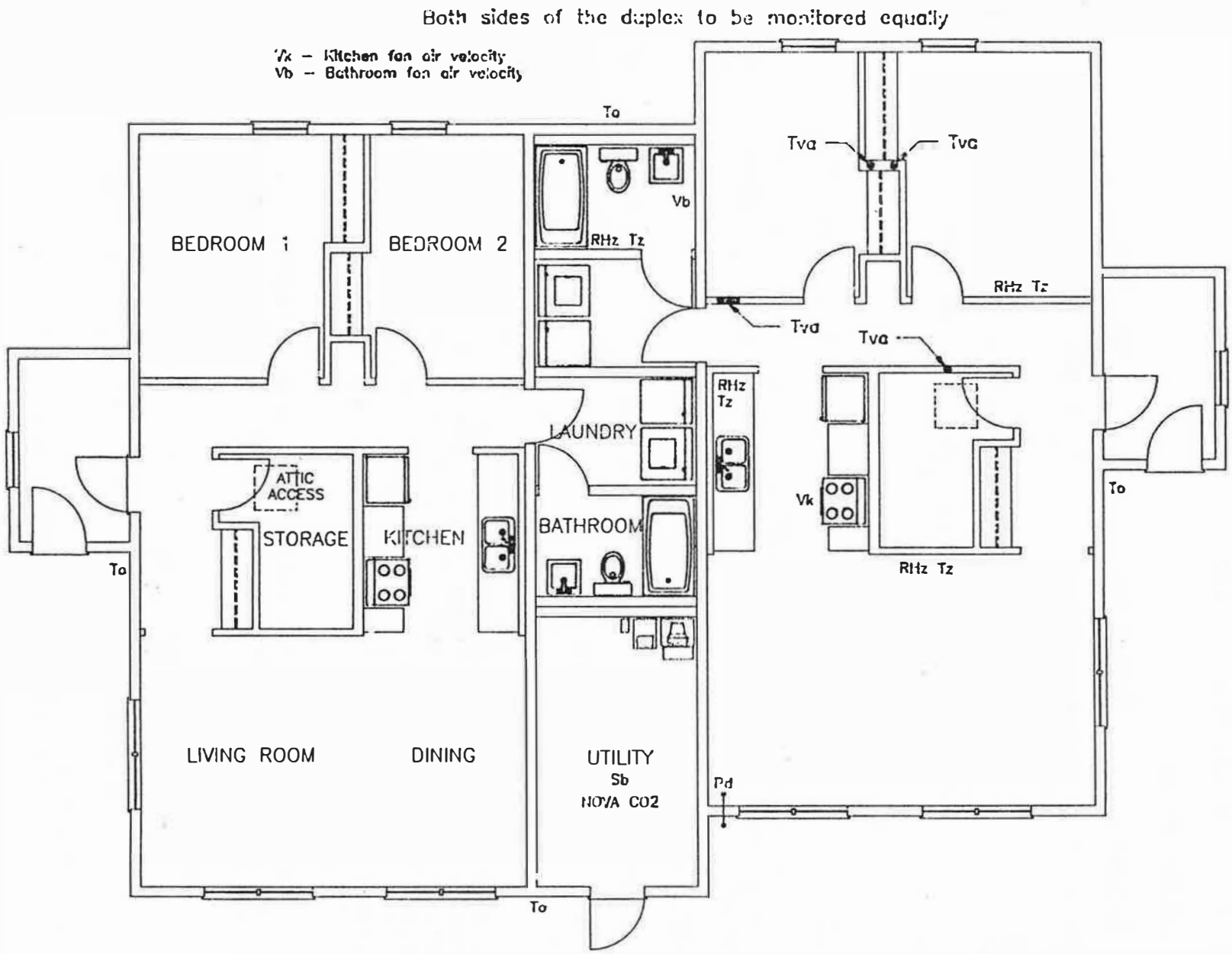

FIG. 1 AKLAVIK SENSOR POSITIONS

Codes and Inspections

No inspections will be needed for this project as none of the new equipment to be installed will have an adverse effect on the building or the heating and electrical systems.

List of Sensors

Variable to be Monitored		Sensor Type	Number
RHz + Tz	Zone Temp. and RH	Alpha Temp + RH Sensor	8
To	Outdoor Temp.	AD590	4
Tva	Inlet Vent. Air Temp.	AD590	8
Vb	Bathroom Fan Air Vel.	Anomometer	2
Vk	Kitchen Fan Air Vel.	Anomometer	2
Pd	Envelope Press. Diff.	Pressure Transducer	2
Sb	Boiler Status	Relay	1

No cost for above sensors.

CO2	House CO2 Levels	Nova + Multiplexer	1

The Nova CO2 Analyser will be supplied by CMHC but the multiplexer needs to be purchased. This will cost approximately $3000.

Detailed Plan of Phase II "Installation"

This section of the report outlines the installation of all equipment pertaining to the system monitoring of the NWTHC Ventilation System Project. The activities this includes are tabled below in the sequence that they will be completed.

This installation will be completed with two flights to Aklavik, due to the fact that the wiring is to go in before the drywalling is done and the sensors are to be installed after the construction is finished. The first trip will coincide with the installation of the moisture pins and because of the little time needed to wire the duplex all time and expenses are to be charged under the Moisture Pin Project installation costs (see Moisture Pin Project Report).

The steps involved, during the second flight, for the installation of the monitoring equipment are shown below as a daily schedule:

Day 1
- fly Ryan Monti and Shawn Rowell to Aklavik
- meet with project officer, maintenance personal and representitives of the community to discuss plans

Day 2 and 3
- installation of sensor equipment

Day 4
- tests and checks on monitoring system
- fly back to Yellowknife

PLAN OF PHASE III "Data Colection"

The main method of data colection for this project is the Data Aquisition System, the system takes a series of reading once a minute and this data is then stored on the computer hard drive until it is downloaded to our computers. The only other data that we will be recieving is going to be the results from the dosimeter air quality tests conducted by the local Project Officer periodically.

PROJECT COST BREAKDOWN

PHASE I	Dana	Ryan	Shawn	Sec.
Project Coordination	-	-	1	-
- meet with Dick Bushal to select house				
Sensor Selection	-	-	1	-
- determine sensor layout - check stock of sensors - determine equipment to order				
Phase I Report	.5	-	2	.5
Phase I Total	**.5**	**-**	**4**	**.5**

Expenditures

- Telephone Calls.....$100
- CO2 Multiplexer.....$3,000
- Miscelaneous Equipment.....$500
- Dosimeter Kits.....$2,000

PHASE II				
Installation of Sensors	-	5	5	-
- Fly to Aklavik - Installation and testing				
Phase II Report	.5	-	1	.5
Phase II Total	**.5**	**5**	**6**	**.5**

Expenditures	Dana	Ryan	Shawn	Sec.
- Flights to Aklavik.....$1,500 - Food and Accomodations.....$1,000 - Telephone calls.....$100				
PHASE III				
Data Collection - Interviews with occupants - Data retrieval from DAS - Recalabration and inspection of equipment	-	3	3	-
Phase III Report	.5	-	1	.5
Phase III Total	**.5**	**3**	**4**	**.5**
Expenditures - Flights to Aklavik.....$1,300 - Food and Accomodations.....$400 - Telephone Calls.....$100				
PHASE IV				
Data Analysis - Analysis of air quality - Analysis of CO2 - RH levels - Summary of findings	2	2	3	-
Phase IV Report	.5	-	2	.5
Phase IV Total	**2.5**	**2**	**5**	**.5**
PHASE V				
Wrap up, Final Report, Decommision and Presentation	2	-	2	1
Phase V Total	**2**	**-**	**2**	**1**
TOTAL PROJECT MAN DAYS	**6**	**10**	**21**	**3**

BASIS OF PAYMENT

1. Fees

Professional	Firm Per Diem	Est. # of Days	Total Fees
D. Ferguson	$560	6	$3,360
S. Rowell	$315	21	$6,615
R. Monti	$490	10	$4,900
Secretarial	$210	3	$630
		Fees Total	**$15,505**

2. Expenses

a) Travel and living expenses

Phase I
- Flights to Aklavik.....$1,500
- Food and Accomodations.....$1,000

Phase II
- Flights to Aklavik.....$1,300
- Food and Accomodations.....$400

$4,200.....$4,200

b) Materials and Supplies

Phase I
- Telephone Calls.....$200

Phase II
- Telephone Calls.....$200

Phase III
- Telephone Calls.....$200

$600.....$600

c) Other Expenses

Phase I
- CO2 Multiplexer.....$3,000
- Miscellaneous Equipment.....$500
- Dosimeter Kits.....$2,000

$5,500.....$5,500

Expenses Total $10,300

3. Subcontracts — **Subcontracts Total 0000**

TOTAL PROJECT COST $25,805

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SUMMARY OF EXPENSES

This is a summary of the costs encured in all three projects as writen in the report.

1. FEES

Heating and Ventilation Project	$34,230
NWTHC Ventilation System Project	$15,505
Moisture Pin Project	$6,615
Fees Total	**$56,350**

2. EXPENSES

a) Travel and Living Expenses

Heating and Ventilation Project	$10,000	
NWTHC Ventilation System Project	$4,200	
Moisture Pin Project	$000	
	$14,200	$14,200

b) Materials and Telephone Calls

Heating and Ventilation Project	$3,700	
NWTHC Ventilation System Project	$600	
Moisture Pin Project	$600	
	$4,900	$4,900

c) Other Expenses

Heating and Ventilation Project	$27,750	
NWTHC Ventilation System Project	$5,500	
Moisture Pin Project	$700	
	$33,950	$33,950
Expenses Total		**$53,050**

3. SUBCONTRACTS

Heating and Ventilation Project	$34,400
NWTHC Ventilation System Project	$000
Moisture Pin Project	$41,750
Subcontracts Total	**$76,150**
TOTAL COST OF CONTRACT	**$185,550**

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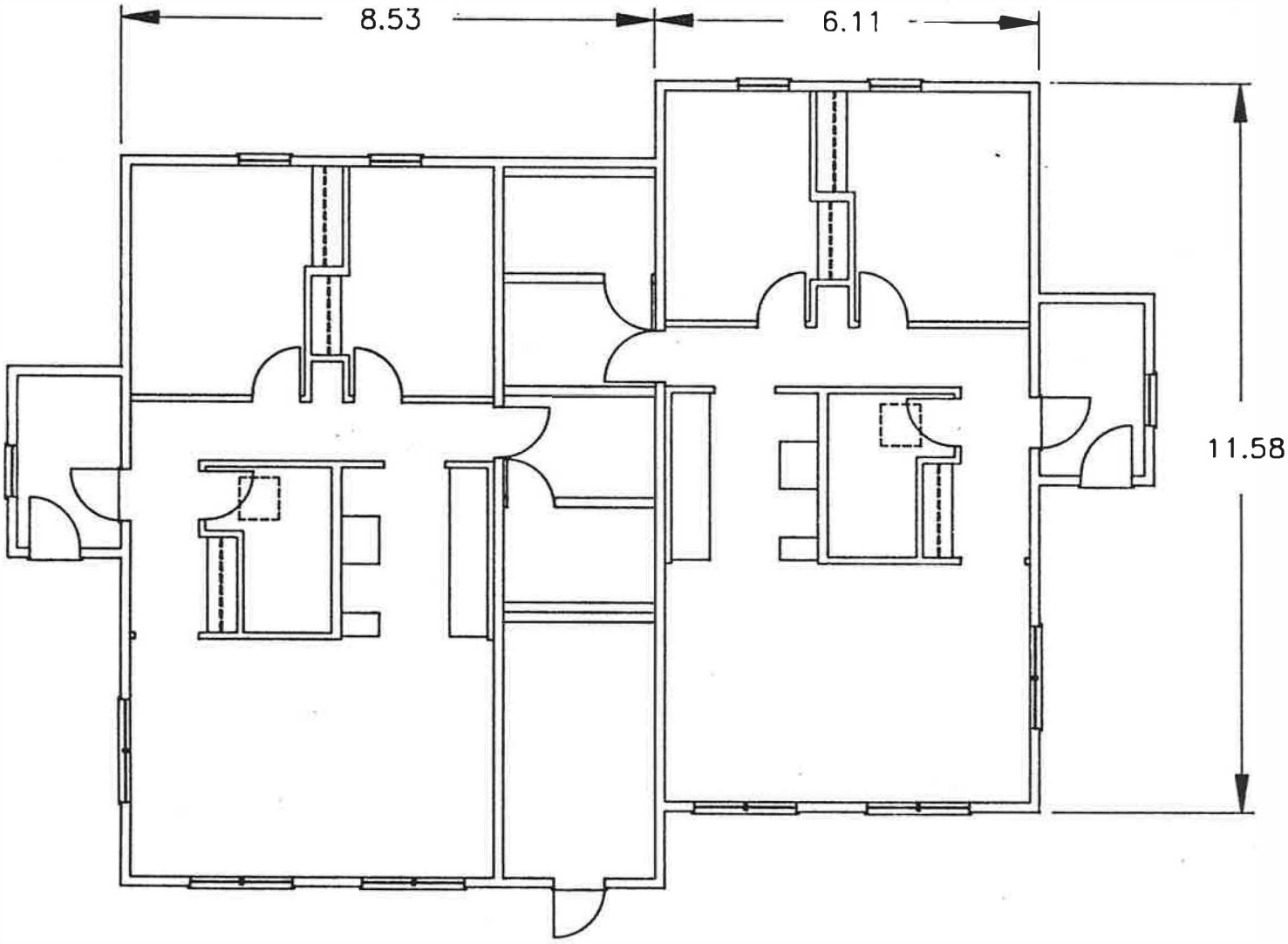
APPENDIX A

HOT-2000 Run for Aklavik Duplex

APPENDIX B

Aklavik Duplex Dimensions



All Dimensions in meters

Aklavik Duplex Dimensions