

003447

**CURRAGH RESOURCES INC.  
FARO, YUKON**

**VENTILATING STUDY  
MILL CONTROL ROOM, OFFICES AND LUNCHROOMS**

**OCTOBER 1990**

**KILBORN PROJECT S348-29**

**KILBORN (SASKATCHEWAN) LTD.  
357 THIRD AVENUE SOUTH  
SASKATOON, SASKATCHEWAN  
S7K 1M6**

# KILBORN

October 30, 1990

CURRAGH RESOURCES INC.  
Box 1000  
Faro, Yukon  
Y0B 1K0

ATTENTION: MR. E. BEAUMONT  
MANAGER OF PROCESSING

Gentlemen:

REFERENCE: CURRAGH RESOURCES INC.  
VENTILATING STUDY  
KILBORN PROJECT S348-29

We are pleased to submit our report titled "Ventilating Study, Mill Control Room, Offices and Lunchrooms".

The report provides the estimated capital costs for improving the existing ventilating systems in the mill control room, offices and lunchrooms. The project capital cost has been estimated to be \$445,000 Canadian.

We trust you will find everything in order. If you have any questions or comments, please contact us. We look forward to assisting you further on this project.

Yours truly,



A. F. Banks, P.Eng.  
Vice President of Mining  
and Metallurgy

MS/eb

Enclosures

cc C. Benner, Curragh Resources Inc., Toronto  
J. B. Mitchell, Kilborn Limited, Toronto  
J. A. Wells, Kilborn Limited, Toronto  
W. Weymark, Curragh Resources Inc., Faro

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**CURRAGH RESOURCES INC.  
FARO, YUKON  
VENTILATING STUDY  
MILL CONTROL ROOM, OFFICES AND LUNCHROOMS**

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**CURRAGH RESOURCES INC.  
FARO, YUKON  
VENTILATING STUDY  
MILL CONTROL ROOM, OFFICES AND LUNCHROOMS**

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1.0 INTRODUCTION

## 1.0 INTRODUCTION

Kilborn (Saskatchewan) Ltd. (Kilborn) was requested to study and prepare capital cost estimates to improve the existing ventilating systems for the following areas in Curragh's Faro concentrator:

- ° The control room and the adjacent offices and lunchrooms.
- ° The mill offices and lunchroom.

Capital cost estimates with a degree of accuracy of plus or minus 20 percent have been prepared for the following:

- ° Phase I - The mill control room.
- ° Phase II - The mill offices and lunchroom complex.
- ° Phase III - The offices and lunchrooms adjacent to the control room.

2.0 SUMMARY

## 2.0 SUMMARY

### 2.1 KEY FINDINGS

The following observations were made of the existing ventilating system:

- ° There is a buildup of dust in all the ductwork.
- ° There is a buildup of dust inside the existing air handling units.
- ° The dampers on the existing air handling units have been disconnected and coils have been removed.
- ° There is an inadequate supply of air to pressurize the areas being ventilated.
- ° There is inadequate sealing of the areas being ventilated.

## 2.2 RECOMMENDATIONS

In order to provide adequate ventilating air, the following action is required:

- ° Clean the existing ductwork.
- ° Clean and recondition the existing air handling units.
- ° Provide additional ductwork to properly distribute the air.
- ° Provide additional air handling units and ductwork.
- ° Institute regular maintenance on all units.

### 2.3 CAPITAL COSTS

Table 2.1 summarizes the estimated capital costs for improving the existing ventilating systems. The estimated capital cost of \$445,000 in fourth-quarter 1990 Canadian dollars includes modifications, cleaning and reconditioning of ventilating equipment, and new ventilating equipment, as well as construction indirect costs, engineering, procurement, construction management and a contingency allowance.

The estimated capital costs do not include owner costs, working capital or escalation beyond the fourth quarter of 1990.

The capital costs have been estimated with an accuracy of plus or minus 20 percent.

**TABLE 2.1**  
**VENTILATING STUDY**  
**CAPITAL COST ESTIMATE**  
**SUMMARY**

DESCRIPTION	ESTIMATED CAPITAL COSTS			Total
	Control Room	Mill Offices & Lunchroom Complex	Offices & Lunchrooms Adjacent to the Control Room	
Seal Control Room	\$ 15,000	\$ --	\$ --	\$ 15,000
Clean Air Handling Units and Ductwork	5,000	5,000	5,000	15,000
Recondition Air Handling Units	--	--	6,000	6,000
New Ventilating Equipment	<u>45,000</u>	<u>120,000</u>	<u>94,000</u>	<u>259,000</u>
<b>Total Direct Cost</b>	<u>65,000</u>	<u>125,000</u>	<u>105,000</u>	<u>295,000</u>
Construction Indirect Cost	1,500	2,500	2,000	6,000
Engineering	23,000	31,000	26,000	80,000
Procurement and Construction Management	<u>1,500</u>	<u>2,500</u>	<u>2,000</u>	<u>6,000<sup>(1)</sup></u>
<b>Total Indirect Cost</b>	<u>26,000</u>	<u>36,000</u>	<u>30,000</u>	<u>92,000</u>
<b>Contingency</b>	<u>14,000</u>	<u>24,000</u>	<u>20,000</u>	<u>58,000</u>
<b>Total Estimated Capital Costs</b>	<u>\$105,000</u>	<u>\$185,000</u>	<u>\$155,000</u>	<u>\$445,000</u>
Estimated Capital Cost Accuracy	± 20%	± 20%	± 20%	± 20%

*\$36,000  
operating*

(1) By Curragh

3.0 DISCUSSION

### 3.0 DISCUSSION

#### 3.1 CONTROL ROOM, ADJACENT OFFICES AND LUNCHROOMS VENTILATING SYSTEMS

##### 3.1.1 Present System

Three air handling units are used for ventilating the control room, adjacent offices and lunchrooms. The air intakes of these units are connected to the supply air plenum of the makeup air unit 1823. Each air handling unit has two water coils, one for heating using high temperature hot water and one for cooling using fresh water.

The performance of the makeup air unit has been drastically reduced by blanking off one of the two discharge openings.

Due to lack of information, the design capacity of the three air handling units is difficult to establish. Field measurements indicate that these units are delivering between 1,600 to 2,000 CFM which amounts to approximately 10 air changes per hour for the rooms they are ventilating. In a plant environment with a high level of nuisance dust and poor sealing of the rooms, 10 air changes per hour is not adequate. Also during a visual inspection of these areas the following observations were made:

- ° The air handling units lack proper maintenance. There is an accumulation of dust inside the units and on the heating and cooling coils.
- ° Some damper actuators are broken. The unit drive guards are not in place.
- ° The ductwork leaks.

- ° The supply air distribution to individual areas is very poor.
- ° There is a lack of grilles and dampers for supply air outlets, preventing the control of air flow.
- ° Some areas have no air supply.
- ° Offices, particularly the control room, are not properly sealed; parts of the ceilings are removed, doors are kept open and there is no pressurization.
- ° Pressure relief dampers have been removed.

### 3.1.2 Recommendations

To improve the ventilation, the control room, adjacent offices and lunchrooms will be divided into five zones. Two new air handling units along with the three existing units will individually provide ventilating air to each zone (see Appendix A). The control room will have a new independent ventilating system with a capacity of 1,650 CFM (20 air changes per hour) and all other areas will have 15 air changes per hour.

To distribute the required air volumes to different areas, the existing ductwork will be modified and new ductwork will be installed. Each supply air grille will have a control damper for adjustment of air volumes.

The additional capacity of makeup air unit 1823 that is currently unused will provide the supply air for the two new air handling units and will also provide some additional air to MCC Room 3 via existing ductwork. This will ensure complete use of the capacity of this unit and improve ventilation in the MCC room.

To achieve pressurization in the control room, the following will be required:

- ° Seal the room by closing openings in the walls and ceiling.
- ° Seal door openings.
- ° Refurbish ceiling.

The above recommendations assume that the three existing air handling units can provide the makeup air at the original design capacity. It is recommended that a major effort be undertaken to recondition these three units.

Once the air handling units have been reconditioned, it will be necessary to keep them in good running condition by:

- ° Performing regular maintenance and checkups.
- ° Changing filters every month or as required.
- ° Caulking and sealing damaged ductwork.
- ° Vacuum cleaning ductwork and air handling units at least twice a year.
- ° Balancing each system at the beginning of summer and in winter.

### 3.2 MILL OFFICES AND LUNCHROOM COMPLEX VENTILATING SYSTEM

#### 3.2.1 Present System

The air conditioning unit 1987 is designed to provide ventilating requirements to the second floor mill office areas. The design data shown on Drawing 400-4705-3 Rev. 4 and Climatair specification 78-007-116-R2 are as follows:

Supply Air:	2,800 CFM
Return Air:	2,500 CFM
Fresh Air Intake:	230 CFM
Heating:	Glycol-water 240°F
Cooling:	Water 45°F

During the winter months, the additional heating requirements are met by 50 percent glycol-water heating system via radiant heaters.

Ninety percent of the ventilating air is recirculated. The office areas are not pressurized to prevent infiltration of dust. The coal storage and handling is nearby, and the wind carries the coal dust into the offices, particularly through the air intake opening located at the southwest corner of the building. The air intake cowl is missing.

The situation has been worsened by airborne dirt on the west and south sides of the building, particularly from the dumping of fly-ash near the building.

The ventilating of the first floor mill area office and lunchroom is provided by air conditioning unit 1989.

The design data shown on Drawing 400-4704-3 Rev. 2 and Climatair specification are as follows:

Supply air:	4,100 CFM
Return air:	3,500 CFM
Exhaust air (washrooms):	660 CFM
Heating:	Glycol-water 240°F
Cooling:	Water 45°F

The same glycol-water heating system which is providing winter heating for the second floor is also providing additional heating in this area. In the washrooms, two fan-forced heaters are installed for heating.

The problem with the ventilating system of this area is similar to that of the second floor, there is very little fresh air intake, no pressurization, and the air intake cowl is missing.

The glycol-water radiant heating system is doing very little or nothing. The finned tube baseboard heaters are broken or missing and in some rooms they are covered with wood.

Maintenance of the existing air conditioning units is poor. The units have dust buildup inside, the filters are dirty and the ductwork has dust buildup. Some areas have very little air flow and others have none.

### 3.2.2 Recommendations

The following is recommended to improve the heating and ventilating in the mill offices and lunchroom complex:

- ° Improve the efficiency of the existing units by:
  - Reconditioning the air conditioning units and changing filters.

- Vacuum cleaning the ductwork and units.
- Seal ductwork leakages.
- Clean and adjust supply air diffusers and install new diffusers where required.
- Seal openings for the back draft dampers to the mill and to outside.
- Adjust ductwork dampers.
- ° Install a new air handling unit with a capacity of 3,000 CFM to improve ventilating air and pressurize both floor areas. To install the unit, the following will be required:
  - Extend the platform in the stairwell on the second floor to cover the whole bay to accommodate the air handling unit.
  - Locate an air intake cowl in the north wall.
- ° Install new ductwork and accessories for proper distribution of supply air and modify existing ductwork.
- ° Install two pressure relief dampers to release air into the mill area.
- ° Install a door between the upper floor mill landing stair door (east side) and the hallway to isolate the office areas from mill and to minimize the dust flow from the grinding area.
- ° Balance the system for proper air distribution.

- ° Perform regular maintenance on all the units.
- ° Install new finned tube baseboard heaters at all windows on the outside wall.

4.0 CAPITAL COSTS

## 4.0 CAPITAL COSTS

### 4.1 GENERAL

Tables 4.1, 4.2, 4.3 and 4.4 summarize the estimated capital costs for improving the existing ventilating systems.

The estimated capital cost of \$445,000 in fourth-quarter 1990 Canadian dollars includes the following:

- ° Sealing of control room.
- ° Cleaning of existing air handling units and ductwork.
- ° New ventilating equipment and ductwork.
- ° Construction indirect costs.
- ° Engineering.
- ° Procurement and construction management.
- ° Contingency.

The estimated capital costs do not include owner costs, working capital or escalation beyond the fourth quarter of 1990.

The capital costs have been estimated with an accuracy of plus or minus 20 percent.

**TABLE 4.1**  
**VENTILATING STUDY**  
**CAPITAL COST ESTIMATE**  
**SUMMARY**

DESCRIPTION	ESTIMATED CAPITAL COSTS			
	Control Room	Mill Offices & Lunchroom Complex	Offices & Lunchrooms Adjacent to the Control Room	Total
Seal Control Room	\$ 15,000	\$ --	\$ --	\$ 15,000
Clean Air Handling Units and Ductwork	5,000	5,000	5,000	15,000
Recondition Air Handling Units	--	--	6,000	6,000
New Ventilating Equipment	<u>45,000</u>	<u>120,000</u>	<u>94,000</u>	<u>259,000</u>
<b>Total Direct Cost</b>	<u>65,000</u>	<u>125,000</u>	<u>105,000</u>	<u>295,000</u>
Construction Indirect Cost	1,500	2,500	2,000	6,000
Engineering	23,000	31,000	26,000	80,000
Procurement and Construction Management	<u>1,500</u>	<u>2,500</u>	<u>2,000</u>	<u>6,000<sup>(1)</sup></u>
<b>Total Indirect Cost</b>	<u>26,000</u>	<u>36,000</u>	<u>30,000</u>	<u>92,000</u>
Contingency	<u>14,000</u>	<u>24,000</u>	<u>20,000</u>	<u>58,000</u>
<b>Total Estimated Capital Costs</b>	<u>\$105,000</u>	<u>\$185,000</u>	<u>\$155,000</u>	<u>\$445,000</u>
Estimated Capital Cost Accuracy	± 20%	± 20%	± 20%	± 20%

(1) By Curragh

**TABLE 4.2**  
**VENTILATING STUDY**  
**CAPITAL COST ESTIMATE**  
**CONTROL ROOM**

<u>DESCRIPTION</u>	<u>ESTIMATED CAPITAL COSTS</u>
Seal Control Room	\$ 15,000
Clean Ductwork	5,000
New Air Handling Unit and Ductwork	36,000
Pipe Work	4,000
Electrical and Instrumentation	<u>5,000</u>
<b>Total Direct Cost</b>	<b><u>65,000</u></b>
Construction Indirect Costs	1,500
Engineering	23,000
Procurement and Construction Management	<u>1,500<sup>(1)</sup></u>
<b>Total Indirect Cost</b>	<b><u>26,000</u></b>
<b>Contingency</b>	<b><u>14,000</u></b>
<b>TOTAL ESTIMATED CAPITAL COSTS</b>	<b><u>\$105,000</u></b>

(1) By Curragh

**TABLE 4.3**  
**VENTILATING STUDY**  
**CAPITAL COST ESTIMATE**  
**MILL OFFICES AND LUNCHROOM COMPLEX**

<u>DESCRIPTION</u>	<u>ESTIMATED CAPITAL COSTS</u>
Extend Platform	\$ 10,000
Clean Air Handling Units and Ductwork	5,000
New Air Handling Unit and Ductwork	80,000
Baseboard Heaters	5,000
Pipe Work	10,000
Electrical and Instrumentation	<u>15,000</u>
<b>Total Direct Cost</b>	<b><u>125,000</u></b>
Construction Indirect Costs	2,500
Engineering	31,000
Procurement and Construction Management	<u>2,500<sup>(1)</sup></u>
<b>Total Indirect Cost</b>	<b><u>36,000</u></b>
<b>Contingency</b>	<b><u>24,000</u></b>
<b>TOTAL ESTIMATED CAPITAL COSTS</b>	<b><u>\$185,000</u></b>

(1) By Curragh

**TABLE 4.4**  
**VENTILATING STUDY**  
**CAPITAL COST ESTIMATE**  
**OFFICES AND LUNCHROOMS ADJCENT TO THE CONTROL ROOM**

<u>DESCRIPTION</u>	<u>ESTIMATED CAPITAL COSTS</u>
Clean Air Handling Units and Ductwork	\$ 5,000
Recondition Air Handling Units	6,000
New Air Handling Unit and Ductwork	79,000
Pipe Work	5,000
Electrical and Instrumentation	<u>10,000</u>
<b>Total Direct Cost</b>	<b><u>105,000</u></b>
Construction Indirect Costs	2,000
Engineering	26,000
Procurement and Construction Management	<u>2,000<sup>(1)</sup></u>
<b>Total Indirect Cost</b>	<b><u>30,000</u></b>
<b>Contingency</b>	<b><u>20,000</u></b>
<b>TOTAL ESTIMATED CAPITAL COSTS</b>	<b><u>\$155,000</u></b>

(1) By Curragh

## 4.2 BASIS OF ESTIMATE

The capital cost estimate is based on the following information:

- ° Visual inspection of the ventilating systems.
- ° Existing heating and ventilating drawings and specifications.
- ° Estimated quantities for ductwork, pipe work, electrical, and other materials based on Kilborn's experience and knowledge.
- ° Installed material prices based on Kilborn's experience and knowledge.
- ° Mechanical, pipe work, electrical and instrumentation equipment installed costs based on vendor quotations and Kilborn's experience and knowledge.

For purposes of this study, it has been assumed that:

- ° All equipment and materials are new except existing reconditioned air handling units.
- ° The federal sales tax is eight to ten percent on nonprocess construction materials and equipment.
- ° All costs are reported in fourth-quarter 1990 Canadian dollars.

No allowances have been made in the capital cost estimate for:

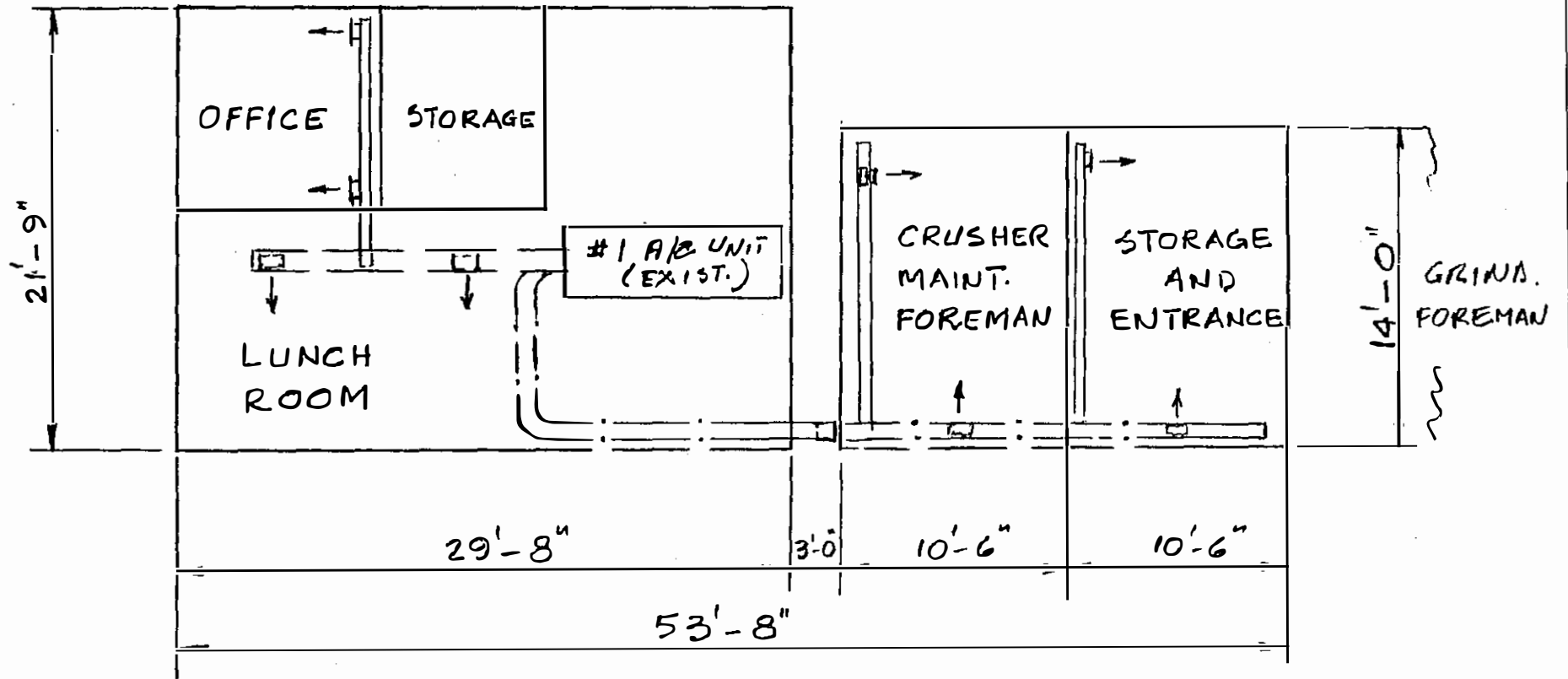
- ° The proposed goods and services tax (GST).
- ° Owner costs.

- ° Working capital.
- ° Escalation beyond the fourth quarter of 1990.

**APPENDIX A**

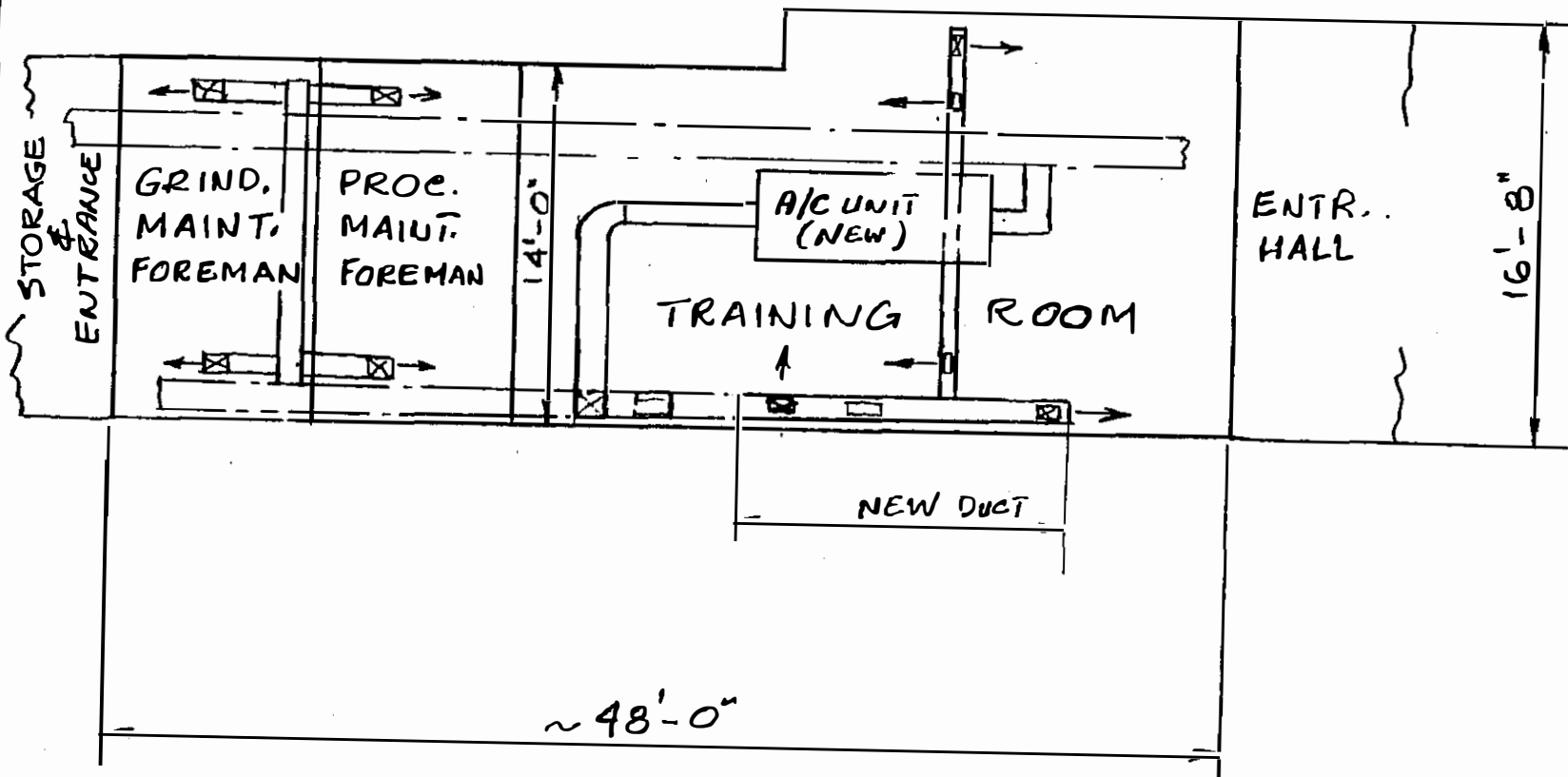
ZONE - 1

LUNCH ROOM AREA



ZONE - 2

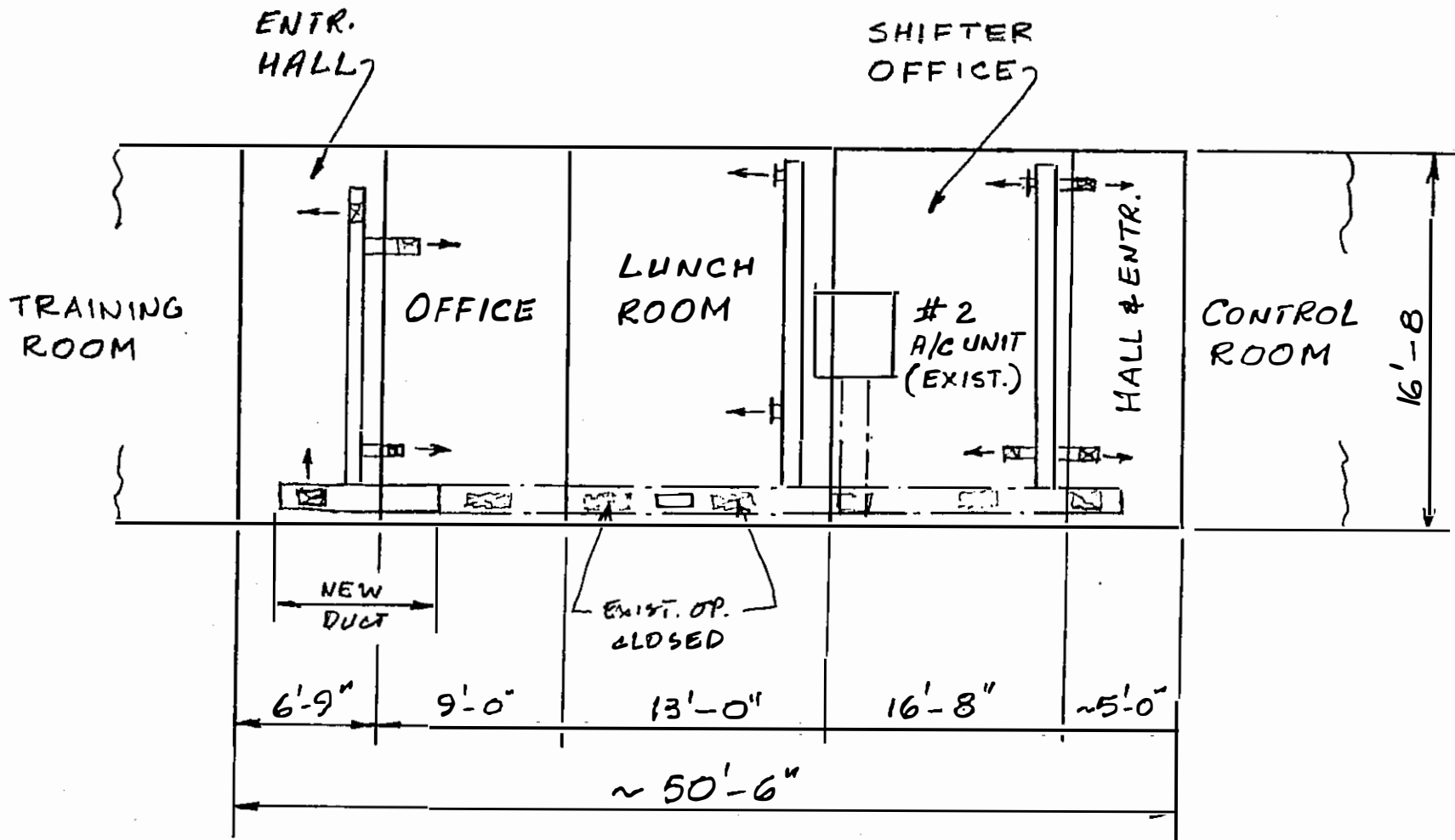
TRAINING ROOM AREA



KILBOURN

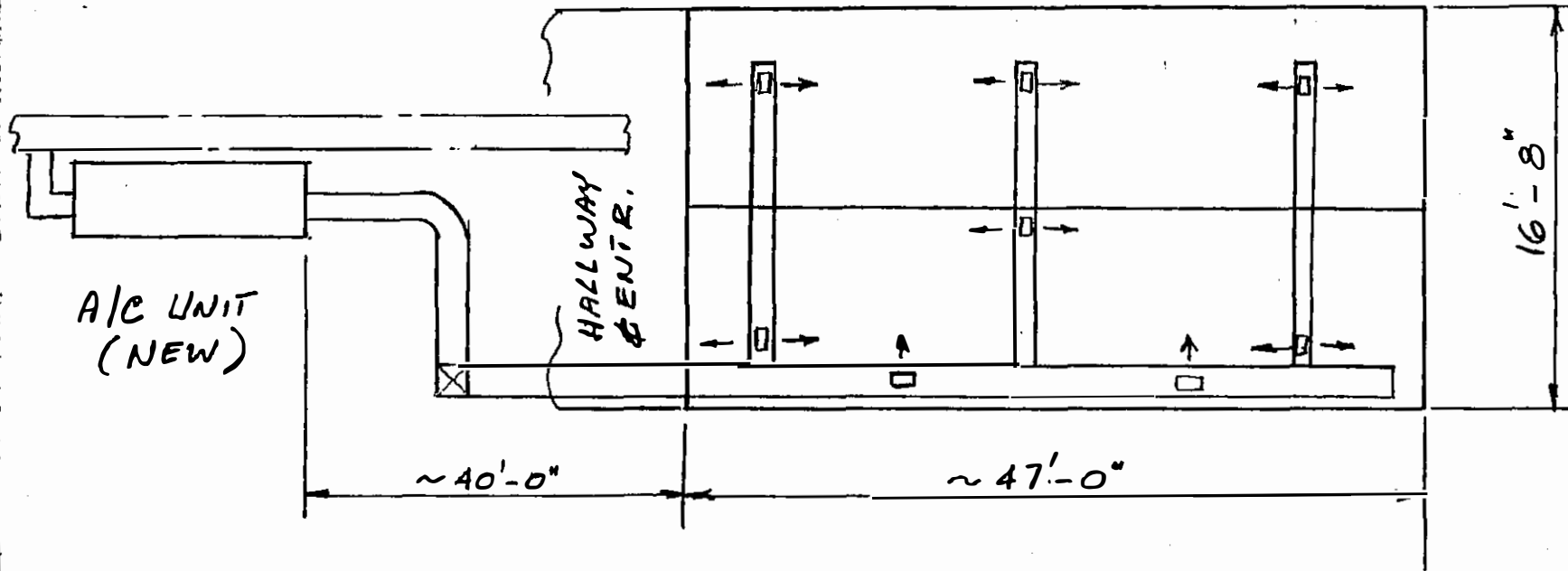
ZONE - 3

SHIFTER OFFICE & LUNCH ROOM



KILBORN

ZONE - 4  
CONTROL ROOM



ZONE - 5

ELECTRICAL ROOM (2ND FLOOR)

