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1986

REPORT ON THE USE OF A CENTRAL HEAT SOURCE
FOR THE YUKON LAW CENTRE

for:

Government of Yukon
Department of Government Services

by:

D.W. THOMSON CONSULTANTS
Whitehorse, Yukon

May, 1986

File #7861

INTRODUCTION

It has been proposed by a company known variously as Yukon Central Heating Ltd., Klondike Central Heating or Resource Intertrade Ltd., that energy from a central heating plant ("Central Heat") be used to heat the Yukon Law Centre. This report briefly outlines some of the implications to the Yukon Government of the use of energy from Central Heat. As of the time this report was being prepared, no design for the central heating system exists, therefore, many of the technical features of the system are not known.

INSTALLATION IMPLICATIONS

To prevent any problems with improper chemical treatment, the central heat system must be separated from the Law Centre heating by the use of a heat exchanger. This adds to the capital cost of the installation within the Law Centre and means that hot water from Central Heat must be at least 220°F to satisfy the demands of the Law Centre. This is probably close to the upper limit that Central Heat can deliver hot water. Any reduction in water temperature due to demand from any buildings on the system will make necessary the use of the Law Centre boilers.

The cost of piping and equipment on the Law Centre property will be significant (approximately \$25,000.00). This must be paid for either by revenues to Central Heat or by savings to the government.

When the new equipment for use of the central heat source is installed, there will be disruptions to the occupants of the building as piping must be installed through occupied spaces.

The new piping should enter the building from Wood Street as close to the boiler room as possible in order to minimize the length of piping within the Law Centre.

The energy meter should be installed on the Law Centre side of the heat exchanger to prevent the Yukon Government paying for line losses.

Routing of the piping from the parking garage to the second floor mechanical room will have to be determined.

The existing boiler room in the Law Centre has been designed only for the equipment that is presently installed there. There is very little additional space for the heat exchanger and piping. Once equipment sizes are determined, the space will have to be examined closely to see if the new equipment will fit in the boiler room. Should it not, the next most likely location will be the parking garage where it will take up some area presently used for other purposes.

INSTALLATION IMPLICATIONS - continued

For the Government to avoid any unknown costs, the design and installation of the equipment should be provided by Central Heat. This may lead to warranty problems when the two systems are tied together unless the original mechanical contractor for the building is hired to install the new equipment and piping.

Properly engineered drawings and specifications must be prepared for the installation. The design must meet the ASME B31.9 Code.

OPERATIONAL IMPLICATIONS

The central heat company has indicated they have four potential clients. Of these, the Law Centre has the largest demand (approximately 5×10^6 Btuh). Central Heat has indicated that the Sheffield Hotel has a similar demand. They also have two small potential clients. The boiler they propose to use has an output of only 4×10^6 Btuh. Consequently, it can be expected that for a large part of each winter, the demand of the Law Centre could not be satisfied from the central heat source.

The existing boiler plant in the Law Centre will be required to act as standby to the central heat source to meet the peak heating loads and to handle the load when the central heat plant is out of operation for any reason. If one or both the existing boilers are circulated with hot water, the radiation and convection losses will amount to approximately 3% of connected capacity. This will result in a 10% to 15% increase in fuel costs over what otherwise might be expected.

Should hot water not be circulated through the boilers in an attempt to reduce heat losses, they will have to be turned on manually whenever the central heat source cannot supply the total demand of all its customers. This will increase labour costs at the Law Centre.

The changeover from the central heat source to the Law Centre boilers could be done automatically, however, the cost of the controls and equipment to perform this automatic changeover would have to be included in the project cost. If this cost is to the account of the Yukon Government, it should be paid for by any energy savings. The introduction of automatic controls on the Law Centre side of the heat exchanger increases possible maintenance problems for Government staff. In addition, the introduction of hot water into the cold boilers produces a phenomenon known as thermal shock. While the type of boilers installed at the Law Centre are among the least susceptible to thermal shock of all commonly produced boilers for commercial buildings, the repeated thermal shocking of the boilers may decrease their useful life. The amount of decrease in the useful life of the boilers is not possible to predict.

OPERATIONAL IMPLICATIONS - continued

Because the boiler plant in the Law Centre will have to remain operational at all times, an operator will still have to be present to supervise the plant in accordance with the Boiler and Pressure Vessel Ordinance of the Yukon Territory. Thus, there will be no reduction in operational labour costs.

The Yukon Government maintenance staff will not have control over the chemical treatment or water temperatures on the central heat side of the heat exchanger. Therefore, maintenance of this equipment and piping should probably be the responsibility of Central Heat. This may introduce some operational difficulties when Central Heat staff need access to the building.

Consideration must be given to any serious mechanical failures (i.e. leaking of relief valves, failures of pipes) and the responsibility for the subsequent damage.

CONTRACTUAL REQUIREMENTS

No contract specifically drawn up for supplying heat to the Law Centre has been prepared by Central Heat, however, they did make available a copy of a contract (copy attached) that was intended to be used when they were preparing a plan to supply heat to the Government administration building. Central Heat has suggested that this would be the basis for a contract concerning the Law Centre.

From the point of view of the Government, this contract has a number of drawbacks. These include:

- There is no definition of "ownership" of the heating equipment. This may become important should Central Heat become bankrupt during the life of the agreement.
- Clause 1 implies that the Yukon Government is responsible for the costs of piping and equipment within the building. Without proper design drawings, this cost is unknown. If the Government is responsible for this cost, any saving generated by using energy from Central Heat will have to pay for the capital investment as well as recognize the risk that Central Heat may not fulfill their contract due to economic or technical problems.
- Clauses 5, 7 and 8 refer to oil prices that are generally applicable in the Territory. Because the Yukon Government pays for fuel at a lower rate, the suggested saving of 20% and 25% is misleading.

CONTRACTUAL REQUIREMENTS - continued

- Clause 6 contradicts the implications in Clause 1 concerning capital costs.
- Clause 10: If Central Heat own the meter, the cost of testing should be paid for by them. A better situation would be for the contract to call for annual calibration in addition to checks for suspected inaccuracy. The question of who has access to meter modifications should be addressed in the contract.
- The proposed contract does not safeguard the Government of the Yukon from a number of possibilities i.e.
 - bankruptcy of Central Heat.
 - failure of Central Heat to supply heat in sufficient annual quantities to amortize any investment by the Yukon Government.
 - forced closure of the Central Heat plant due to failure to meet emission standards.
 - liability for injury or property damage due to any of the installation within the Law Centre property.
 - access to the Law Centre by Central Heat staff.
 - disruption of government operations due to Central Heat actions.
 - security of the energy meter.
 - termination of the contract by either Central Heat or the Government of the Yukon.
 - assignment of the contract.
 - removal of equipment at the end of the contract.
 - maintenance of equipment on government property.

THIS AGREEMENT DATED THE DAY OF , A.D. 1984

BETWEEN:

YUKON CENTRAL HEATING LTD., in the City
of Whitehorse, Yukon Territory

(hereinafter called the "Heating")

OF THE FIRST PART

AND:

GOVERNMENT OF YUKON, in the City
of Whitehorse, Yukon Territory

(hereinafter called the "Customer")

OF THE SECOND PART

WHEREAS Heating is setting up a central heating plant to service the Yukon Territorial Government Administration building and library;

AND WHEREAS the parties wish to set out the terms and conditions under which this service shall be provided;

NOW THEREFORE WITNESSETH that the parties hereto hereby mutually covenant and agree as follows:

1. Heating shall pay for all capital costs including the boiler building, heating equipment, fuel handling equipment, electrical and plumbing tie-ins, and for all maintenance of the heating equipment and distribution lines up to the point at which the lines enter the Customer's buildings. All equipment maintenance and boiler surveillance will be the responsibility of Heating.
2. The Customer agrees to use this central system as their first source of heat and not to use any other heating source as long as their needs can be met by this system.
3. The heat shall be billed by use of a heat meter as described in Schedule "A" or a replacement device approved by the parties.
4. For the purpose of this calculation, oil shall be considered to have been burned at eighty percent (80%) efficiency and oil shall be deemed to have a gross calorific value of 167,500 BTU per gallon.

5. The Customer agrees to pay for heat during the first three years of the contract based on eighty percent (80%) of the 1984 of oil price of pour point -18°C as disclosed in the fourth quarter Yukon Economic Review for 1984.

6. A surcharge of 10% will be added to the monthly billing until Heating has recovered the Capital Cost plus interest associated with all installations of equipment located within the Administration Building and the Library, in particular, but not exclusively:

Heat exchangers & pumps, BTU meters, pipes, labour costs for installation.

7. The Customer agrees to pay for oil during the next four years of the contract based on eighty percent (80%) of:

- (a) the oil price as disclosed in the third quarter Yukon Economic Review for the year 1987 for the contract year beginning 1988;
- (b) the oil price as disclosed in the third quarter Yukon Economic Review for the year 1988 for the contract year beginning 1989;
- (c) the oil price as disclosed in the third quarter Yukon Economic Review for the year 1989 for the contract year beginning 1990;
- (d) the oil price as disclosed in the third quarter Yukon Economic Review for the year 1990 for the contract year beginning 1991.

8. The Customer agrees to pay for heat during the final three years of the contract based on seventy-five percent (75%):

- (a) of the oil price as disclosed in the fourth quarter Yukon Economic Review for the year 1991 for the contract year beginning 1992;
- (b) of the oil price as disclosed in the fourth quarter Yukon Economic Review for the year 1992 for the contract year beginning 1993
- (c) of the oil price as disclosed in the fourth quarter Yukon Economic Review for the year 1993 for the contract year beginning 1994

9. The term of this contract shall be from the _____ day of _____, 1984 to the _____ day of _____, 1994.

10. It is agreed that the Customer and Heating may have the meter checked at anytime at their own expense provided that if it is found to be inaccurate, the costs of the testing together with the costs of any repairs shall be paid for by the Customer.

11. It is agreed that if it is found to be inaccurate, no adjustments on the bill shall be made more than thirty (30) days prior to the written request for testing.

12. Heating agrees to operate the system in a proper businesslike manner and agrees to use due diligence to assure the Customer continuous service.

13. The Customer agrees to leave their existing heating system in place and to keep it properly maintained so that in the event of any difficulty with the heating system, the Customer's present system may be used on an interim base.

14. Heating shall read the meter on the last day of each month and shall bill the Customer and the Customer shall be required to pay the bill within ten (10) days. In the event the Customer fails to make the payment within ten days interest shall be added to the bill at the rate of eighteen percent (18%) per annum calculated and compounded monthly.

IN WITNESS WHEREOF the parties hereto have executed these presents the day and year first above written.

SIGNED BY)
YUKON CENTRAL HEATING LTD.)
_____)

(S E A L)

SIGNED BY)
in the presence of:)
_____)



STRATFORD

POLARIS

YUKON
BUSINESS
SERVICES

PROPOSED
PLANT
LOCATION

PROSPECTOR

WOOD ST.

JARVIS ST.

THIRD AVENUE

UNIVERSITY PERFORM. CENTRE

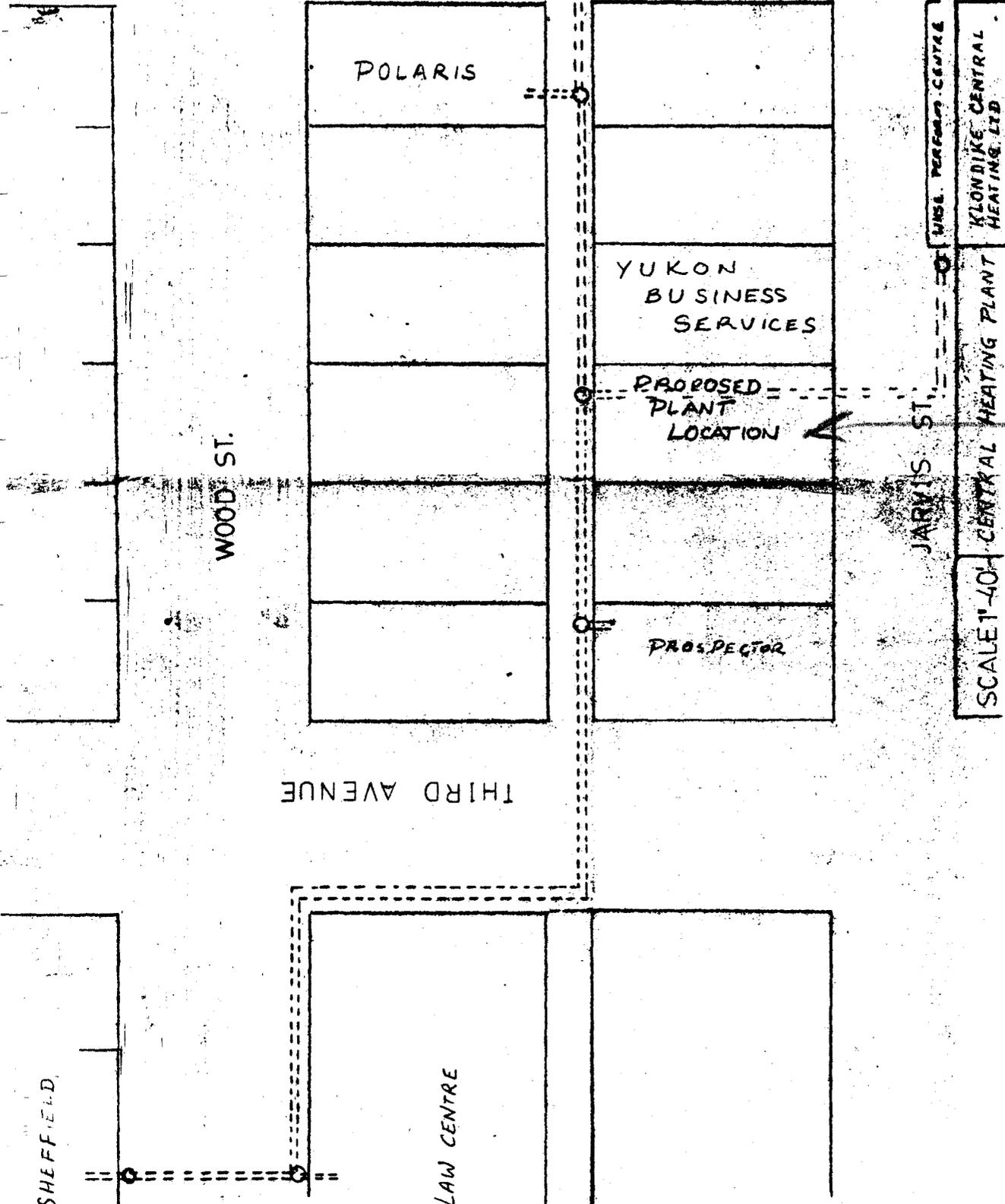
KLONDIKE CENTRAL
HEATING, LTD.

SCALE 1" = 40' CENTRAL HEATING PLANT

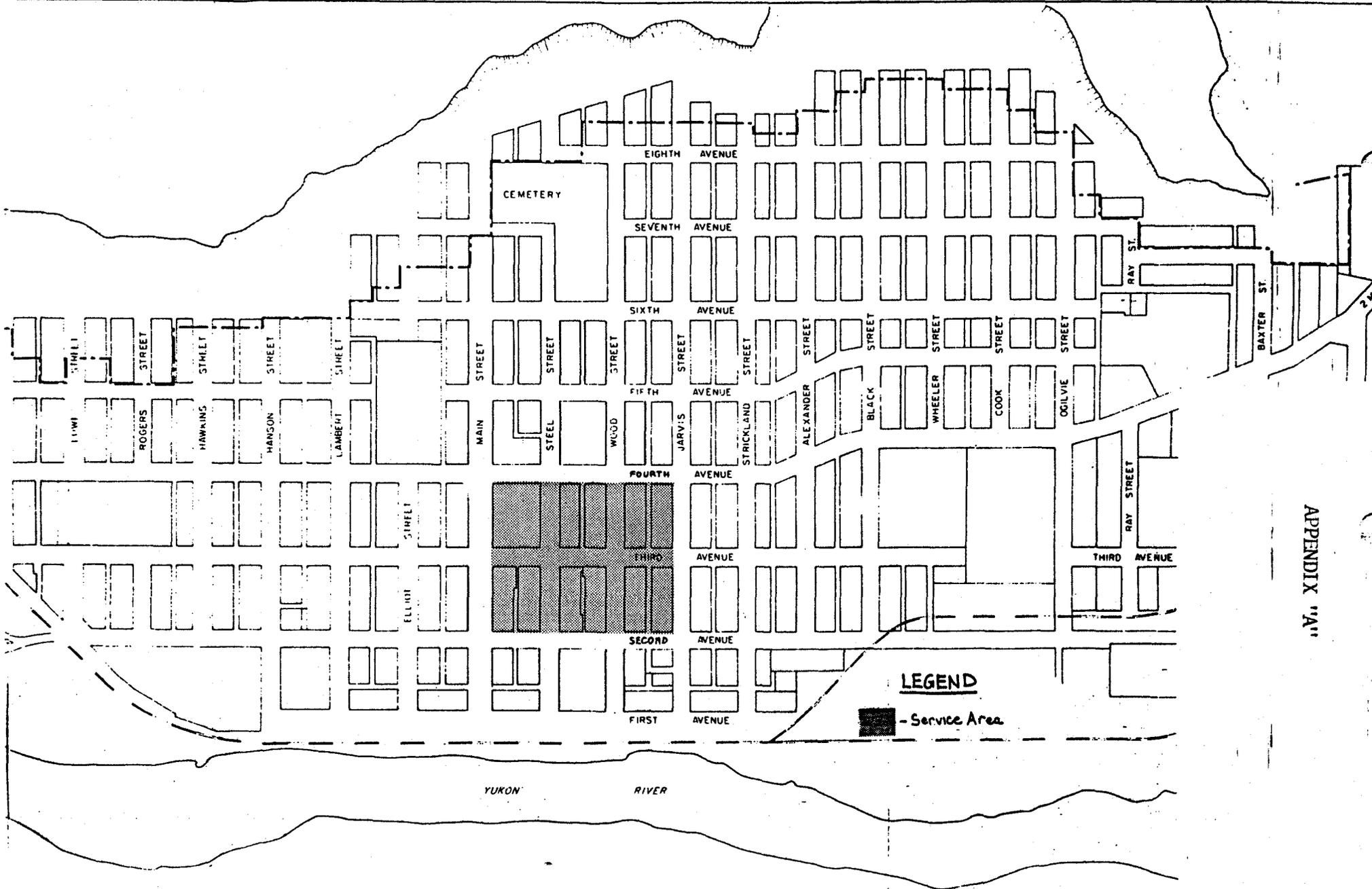
4,000,000
BTU/hr
Capex

SHEFFIELD

LAW CENTRE



APPENDIX "A"



APPENDIX "A"

← →
HEATED SIDE

HEATING SIDE

CENTRAL HEAT

220 Heating Side

Heated Side

200°F

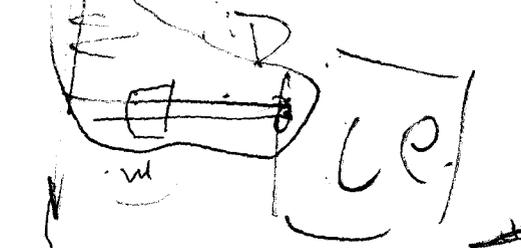
LAW CENTRE

12
4

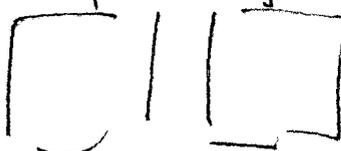
A B

200

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5 x 10" Blk

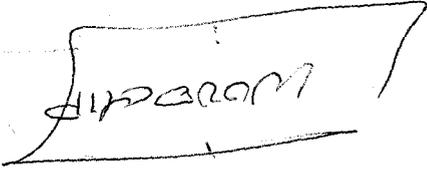
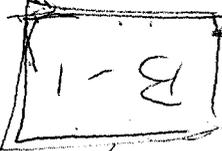
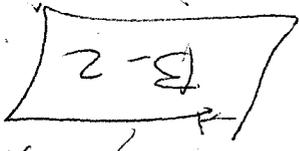
180

50F

195
190°F

195°
200

200°F
200



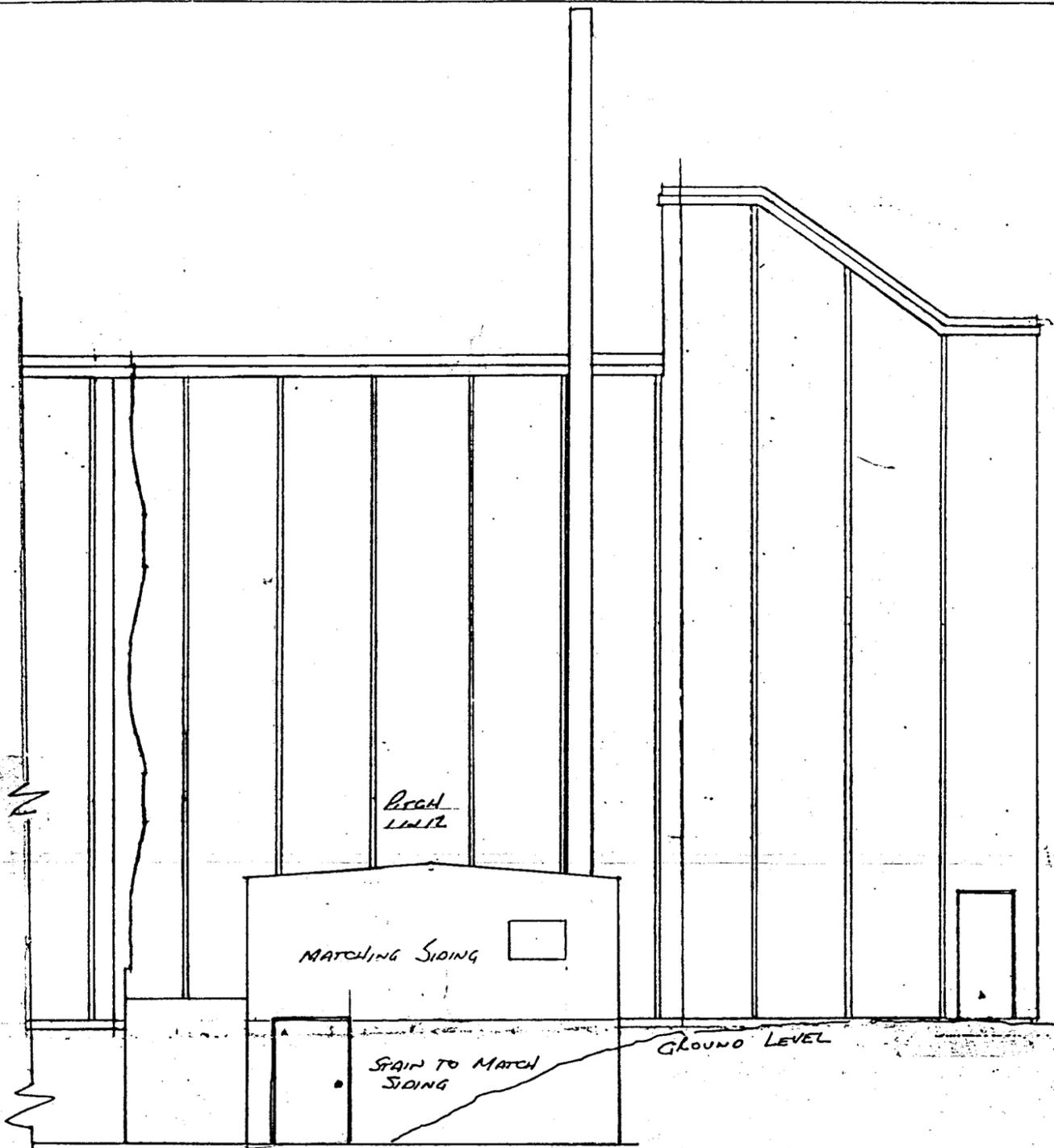
3 x 10"

3 x 10"

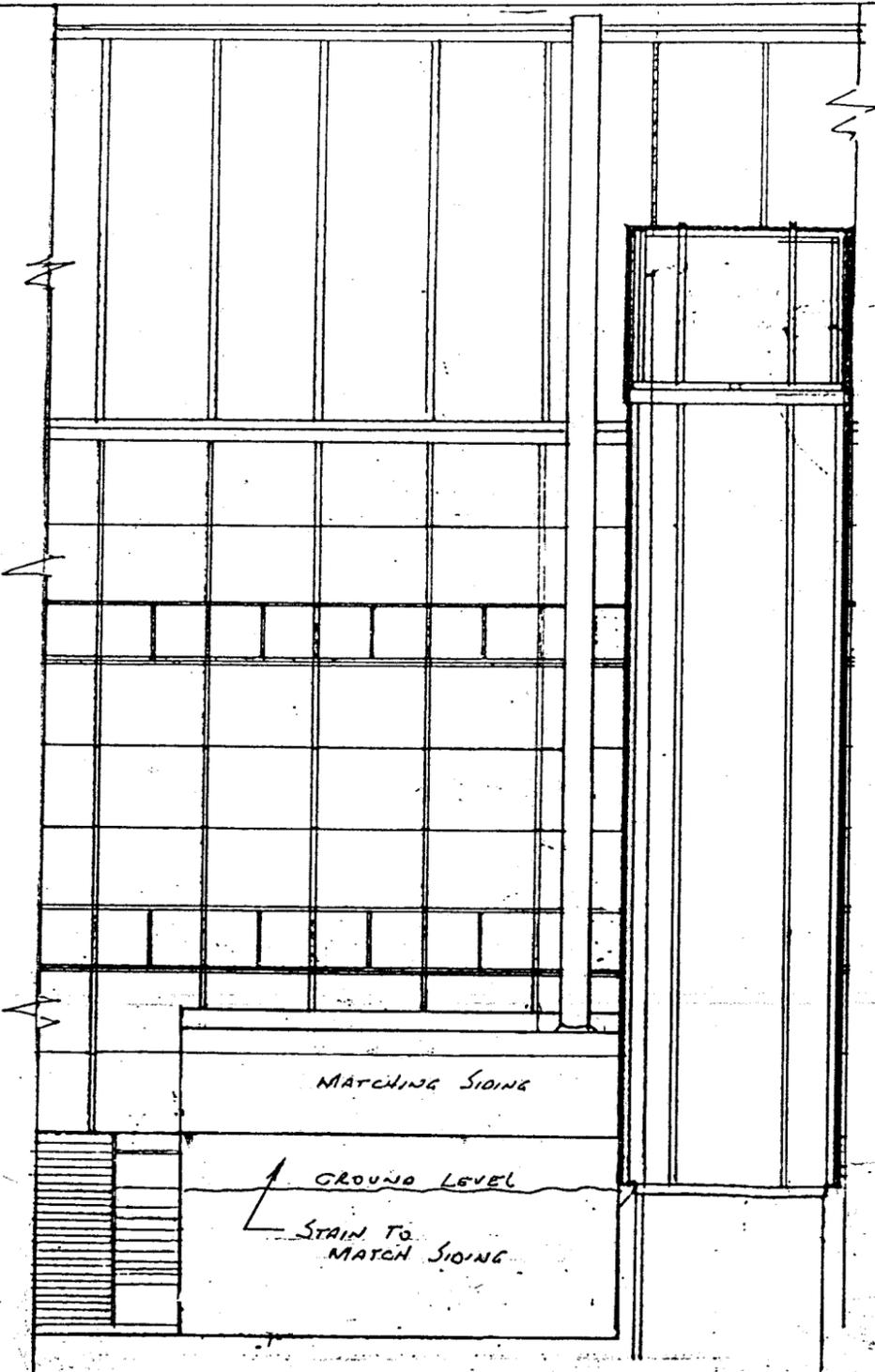
3 x 10"

NOTES

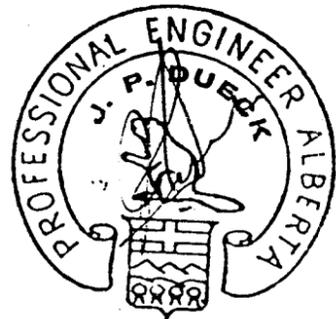
1. Replace 48" length of 14" duct with 20" X 12" duct lined with 2" accoustic insulation.
2. Provide new 10" X 6" duct lined with 2" accoustic insulation.
3. Provide new accoustic flexible connection to diffuser.
4. Remove existing duct.
5. Provide new balance damper.



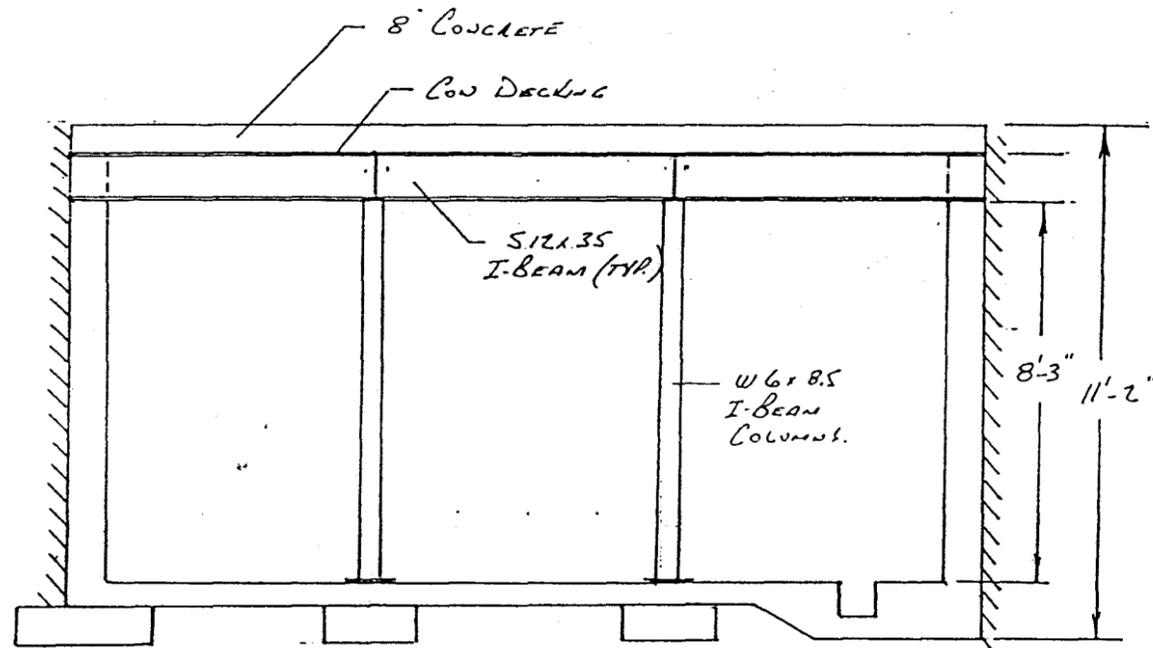
SOUTH ELEVATION



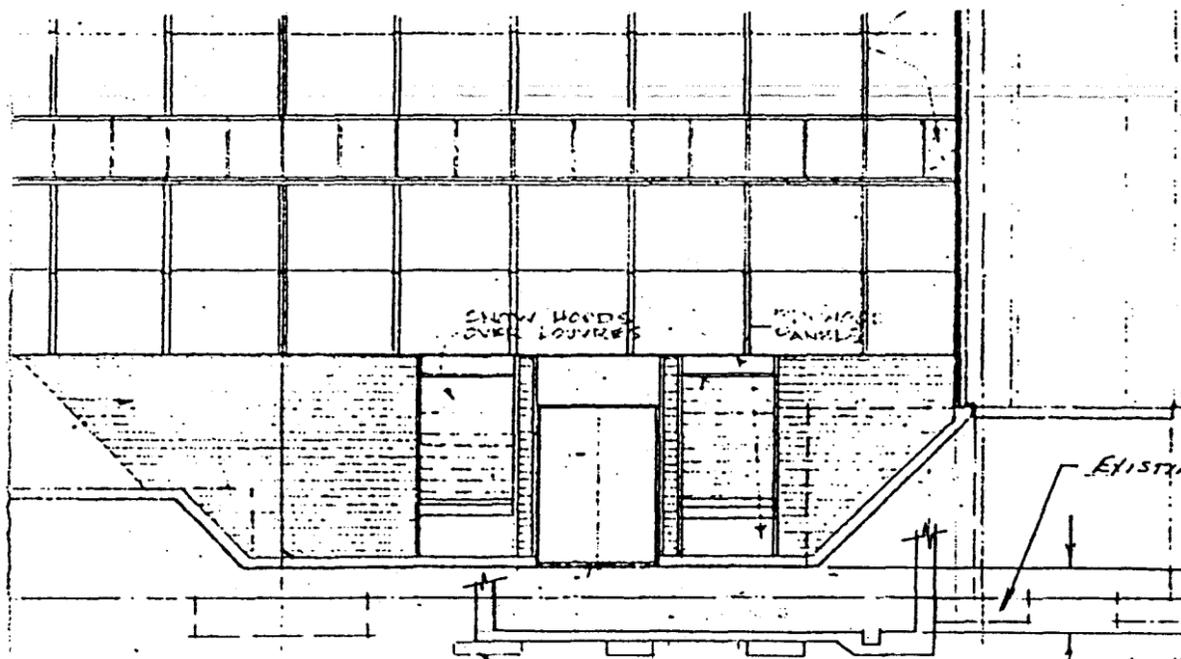
EAST ELEVATION



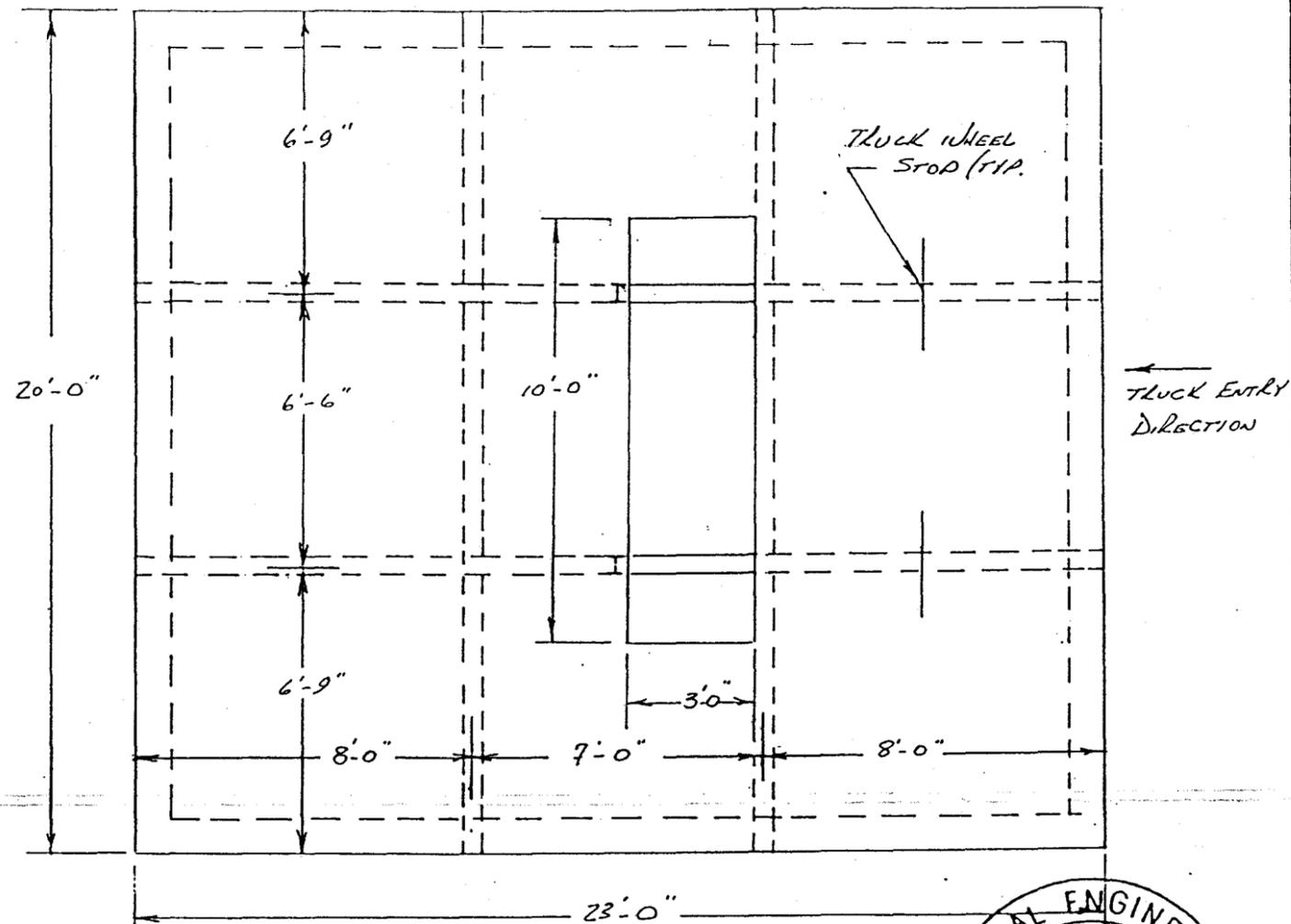
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FRACTIONAL ±	TITLE BOILER HOUSE ELEVATIONS GOVT OF YUKON ADMIN. BLDG. WHITEHORSE		
ANGULAR ±	DATE DEC 10/84	DRAWING NUMBER OC-84047-14	
		APPROVED BY	



ELEVATION - SCALE 1/4



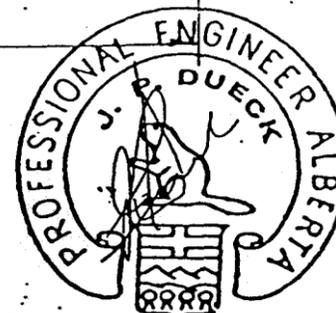
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TIE-UP TO EXISTING BLDG. SCALE 1/8



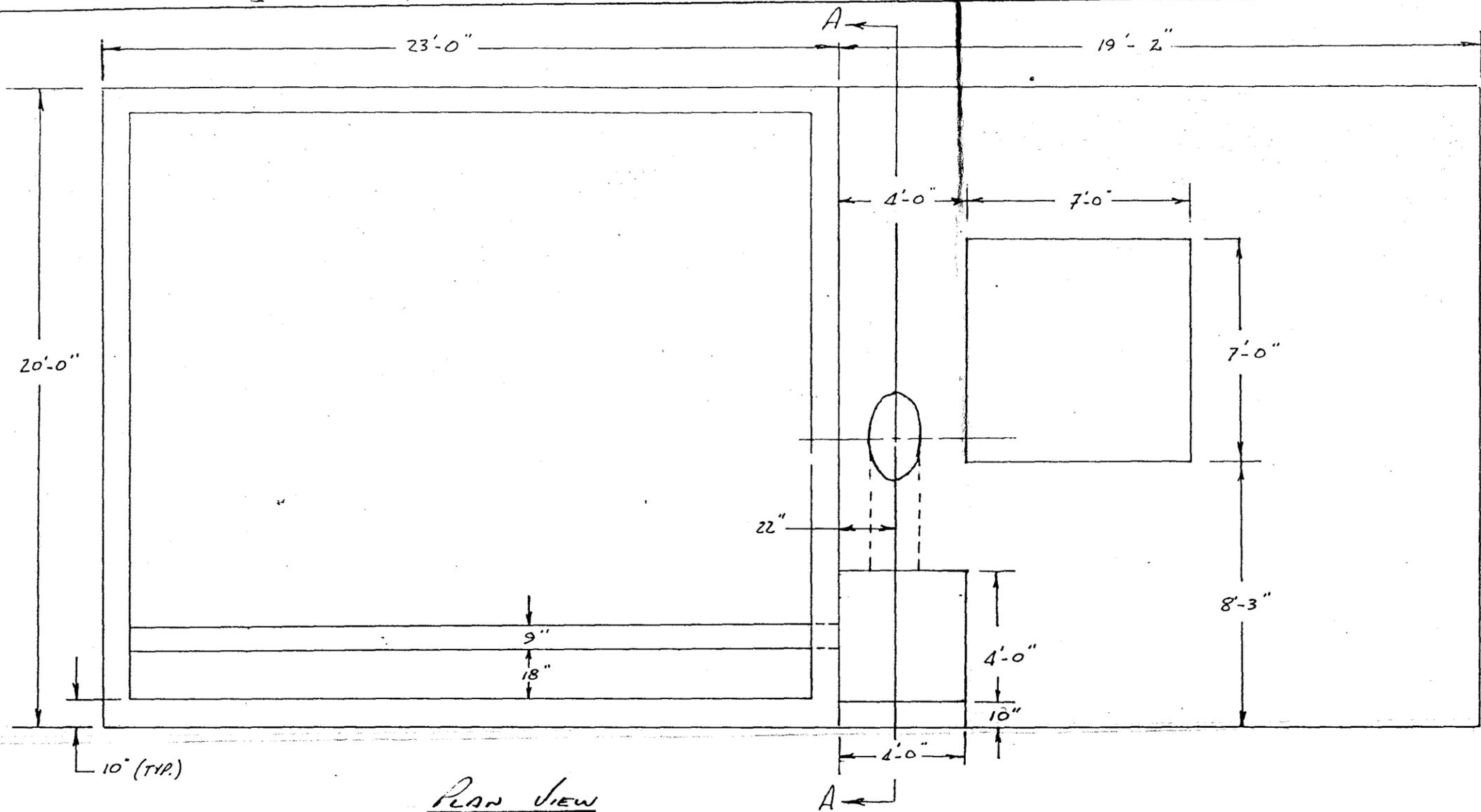
CITY OF WHITEHORSE
PLANS ACCEPTED

AS BEING CONSISTENT WITH CITY BUILDING AND ZONING BYLAWS, SUBJECT TO THE NOTES AS INDICATED ON THE PLANS AND/OR IN A COVERING LETTER AND SUBJECT TO INSPECTION AND TESTS AS REQUIRED.

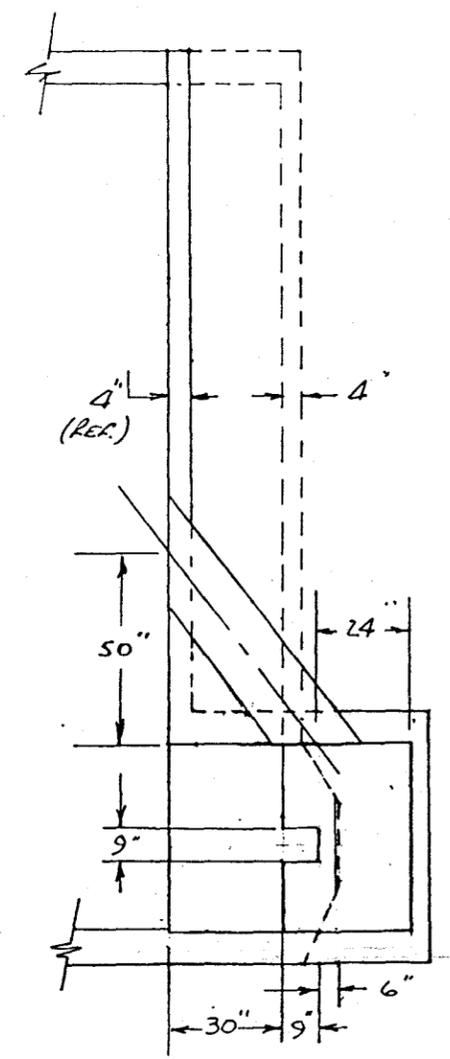
PERMIT NO. 5807 LETTER YES NO
DATE OF ISSUE Dec 11 1984
By *D. Blaker*
Project *White Horse Local Level*



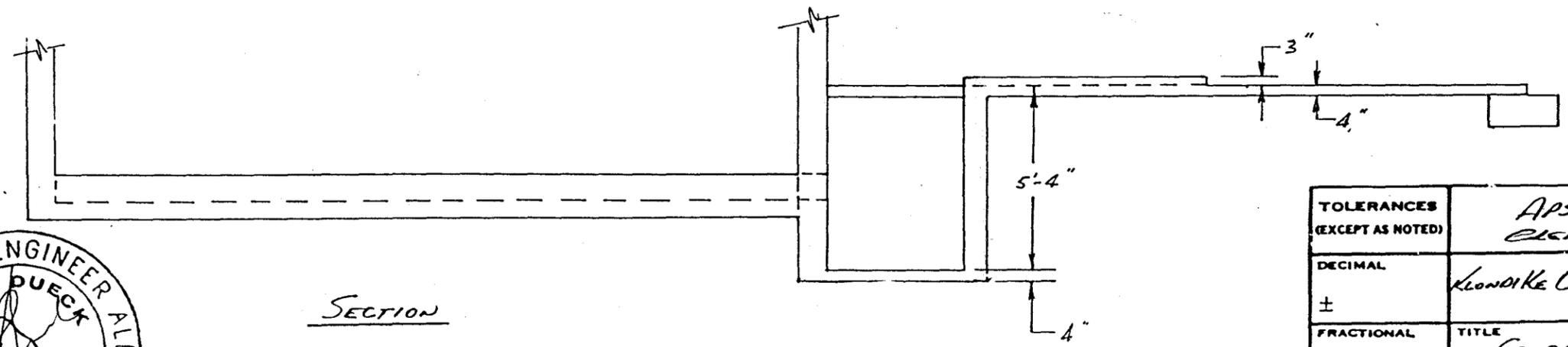
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FRACTIONAL	TITLE CLIP STORAGE BUNKER GOVT OF YUKON ADM. BLDG. - (1) WHITEHORSE	APPROVED BY	
ANGULAR	DATE DEC. 10/84	DRAWING NUMBER OC-84047-8	



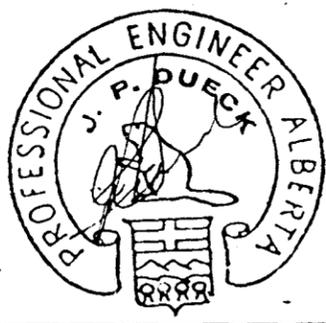
PLAN VIEW



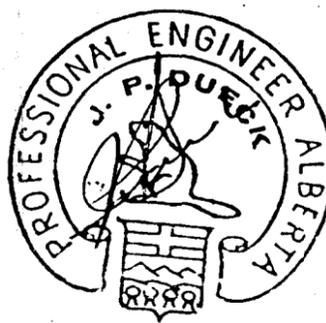
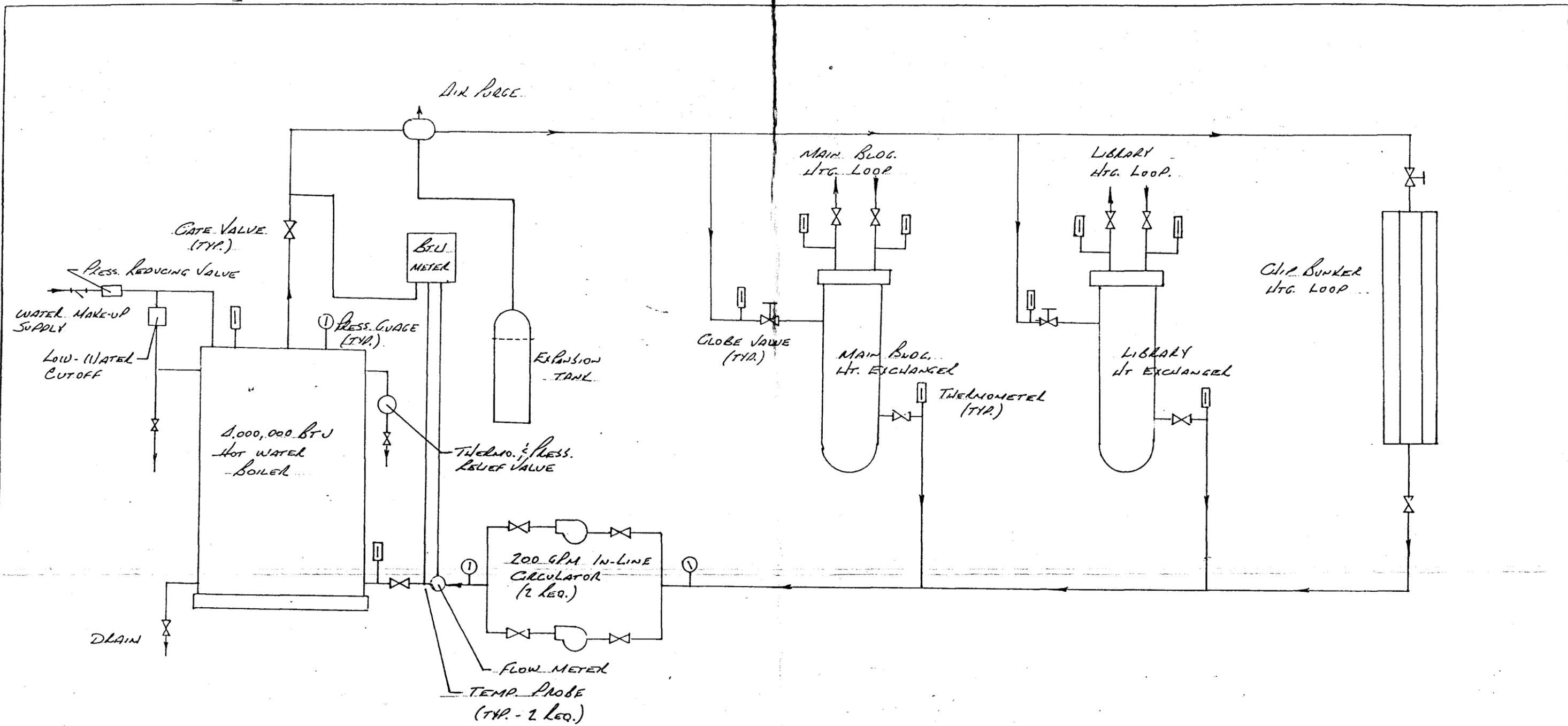
VIEW A-A.



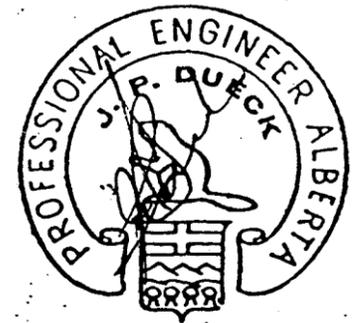
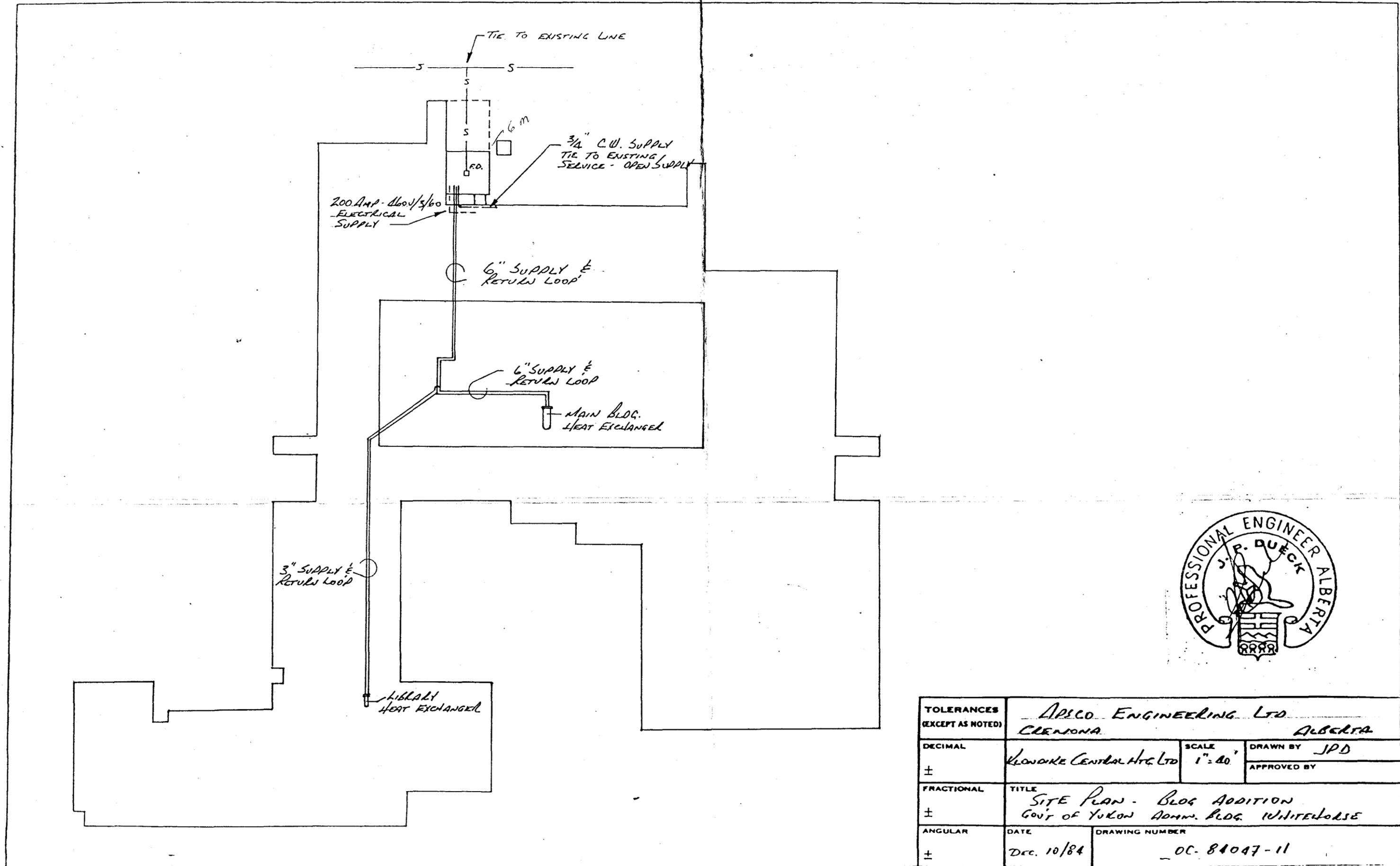
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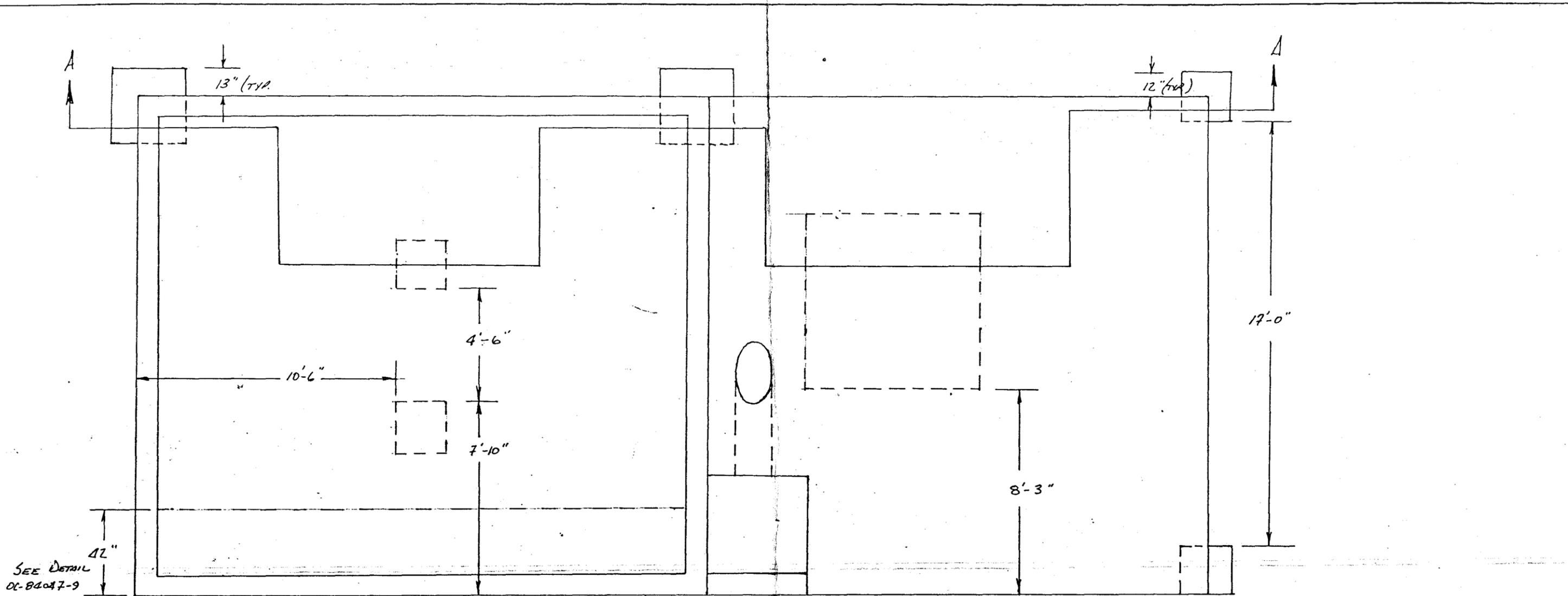
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FRACTIONAL			1/4
ANGULAR	±	DATE	DRAWING NUMBER
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		APPROVED BY	
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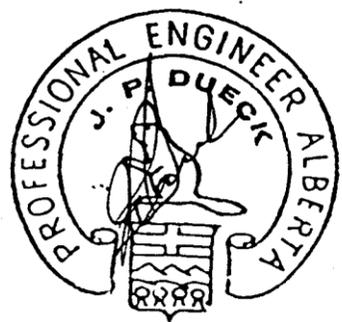
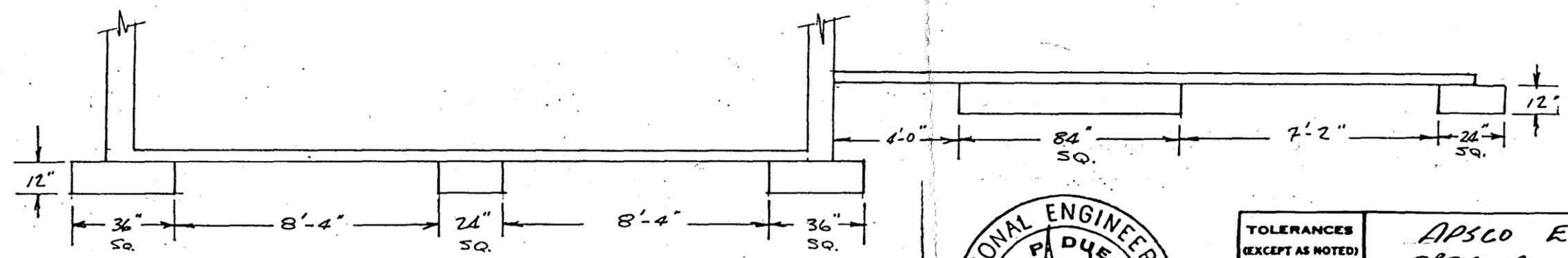
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FRACTIONAL ±	TITLE Piping Schematic GOVT OF YUKON CON. BLDG. WHITEHORSE		
ANGULAR ±	DATE Dec. 10/84	DRAWING NUMBER OC-84047-10	
		APPROVED BY	



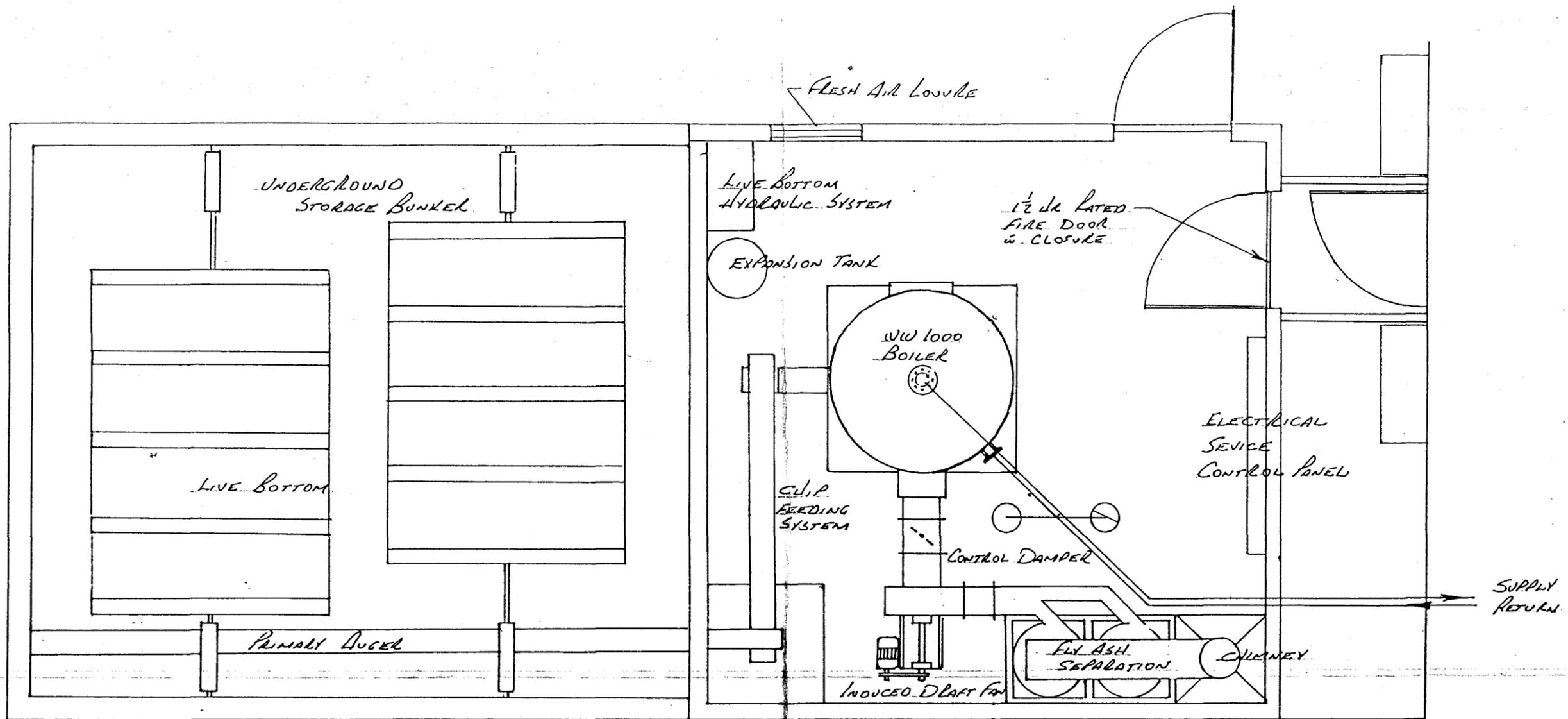
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ANGULAR ±	DATE Dec. 10/84	DRAWING NUMBER OC-84047-11	
		APPROVED BY	



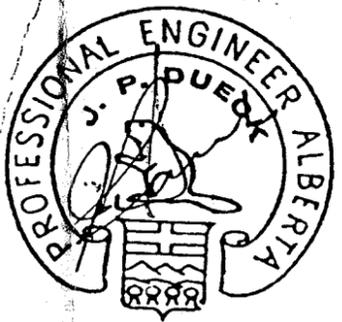
SEE DETAIL
OC-84047-9



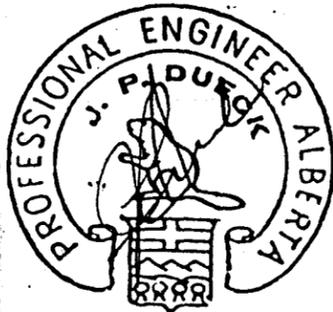
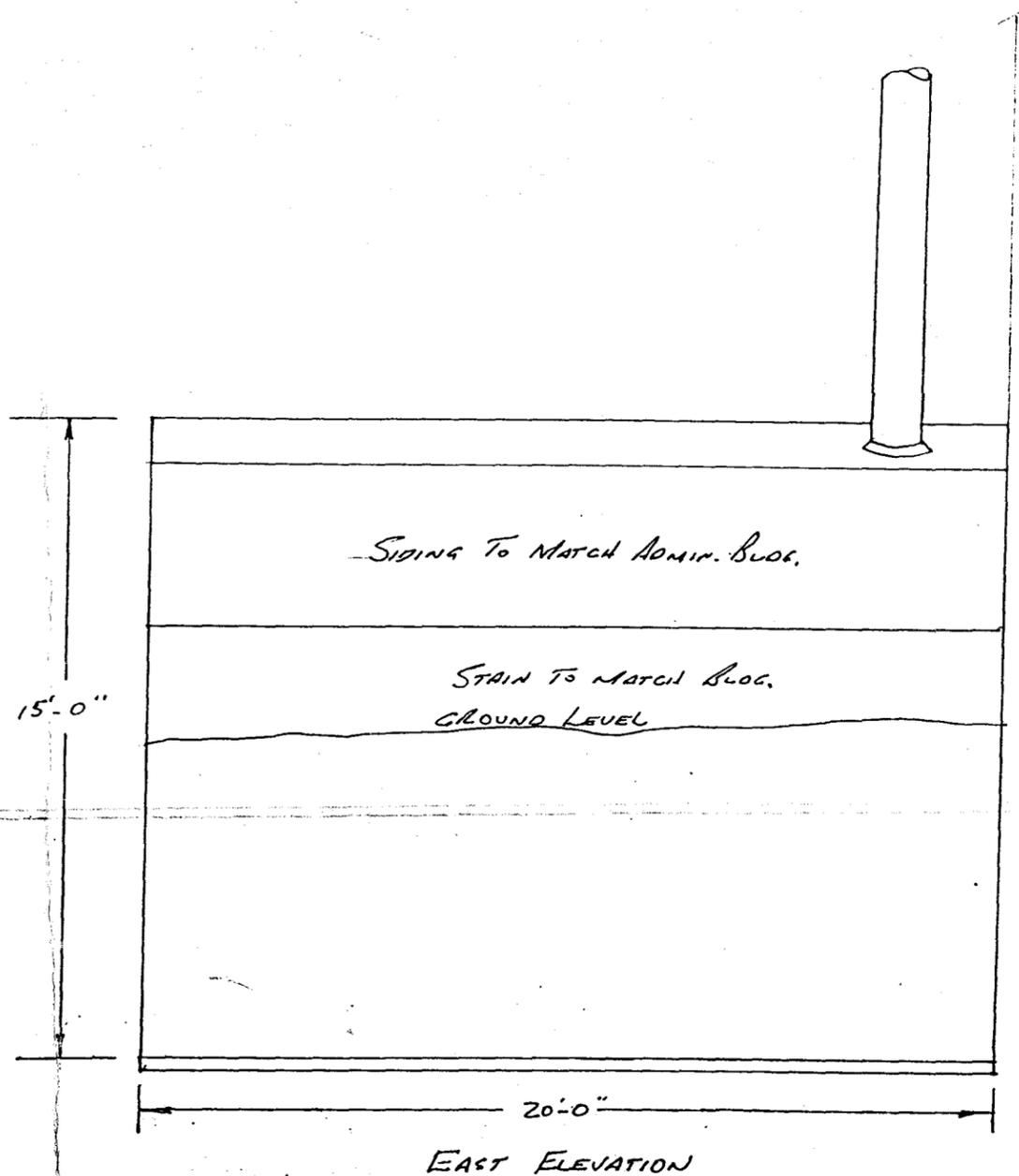
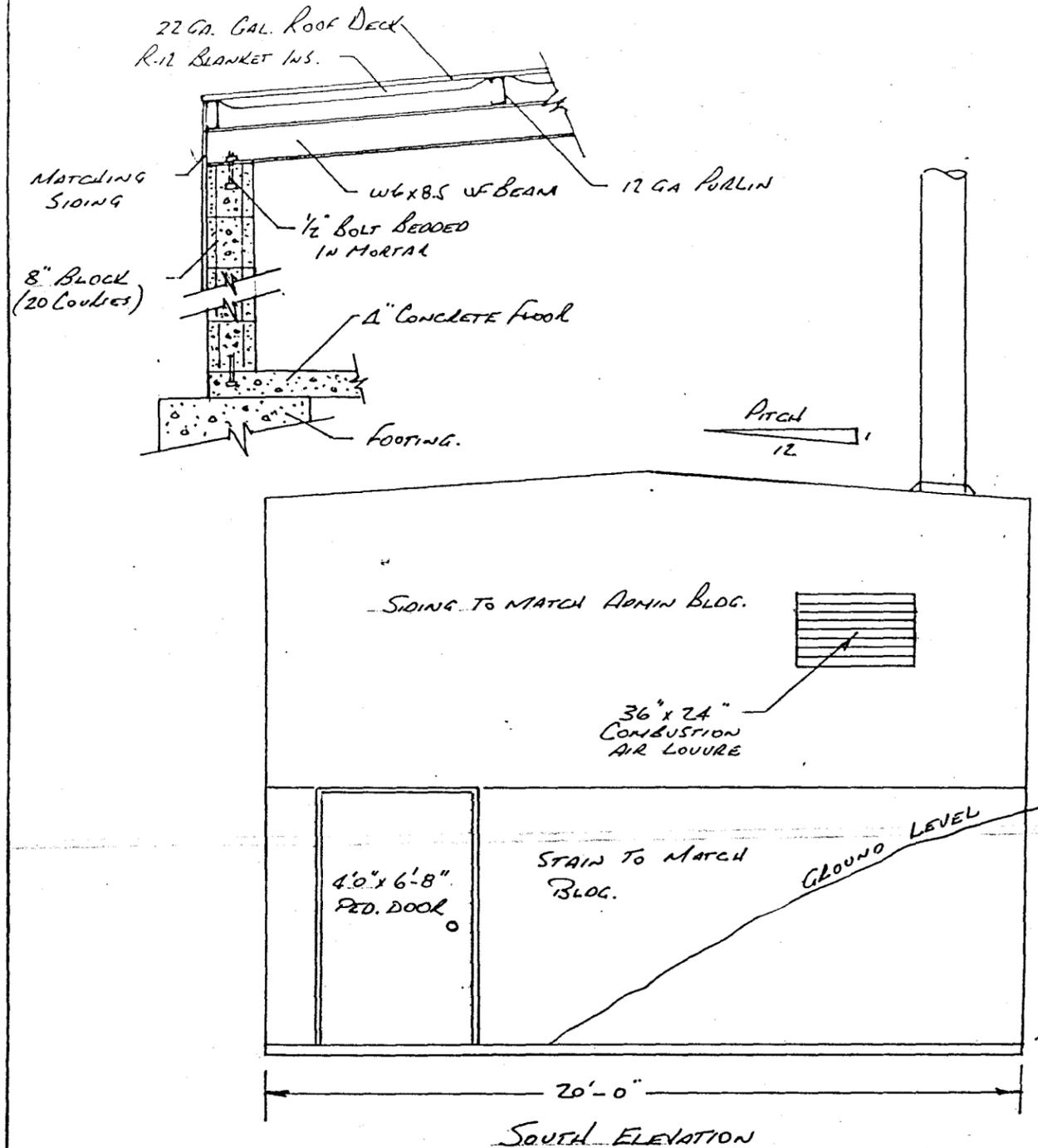
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ANGULAR ±	DATE DEC. 11/84	DRAWING NUMBER OC-84047-13	



WALL - 8" CINDER BLOCK CONSTRUCTION
 ROOF - I-BEAM JOIST
 12 GA. C PURLIN
 R-12 BLANKET INSULATION
 22 GA. GALV. DECKING



TOLERANCES (EXCEPT AS NOTED)	APSG ENGINEERING LTD. CREMONA ALBERTA		
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ANGULAR	DATE Dec. 10/84	DRAWING NUMBER OC-84047-12	
±			APPROVED BY



TOLERANCES (EXCEPT AS NOTED)		APSCO ENGINEERING LTD. CALGARY ALBERTA	
DECIMAL	±	SCALE	DRAWN BY J.P.D.
FRACTIONAL	±	1/8"	APPROVED BY
ANGULAR	±	DATE	TITLE
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		DC-84047-15	