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KILBORN

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K. M. DEWAR, B.Sc., P.ENG., PRESIDENT

November 18, 1970

Mr. W. S. Hegler
Vice-President, Engineering
Canadian Javelin Limited
Suite 1201, 100 Bronson Avenue
Ottawa 4, Ontario

Dear Sir:

We are enclosing twenty copies of our Capital and Operating Cost Estimate. This is, for convenience, submitted as two volumes with the second volume containing the drawings upon which the estimates are based.

These costs are complete to build and operate the facilities at Julian Lake, Star-O'Keefe and the Seven Islands area, which results in a production of 12,000,000 long tons per year of indurated pellets. Canadian Javelin's charges and interest on the capital have been left for inclusion by Canadian Javelin.

The capital costs are based on present day prices with escalation provided for the construction period. Operating costs utilize the present Wabush labour contract escalated to 1974.

Pelletizing plant costs from both Dravo and Allis-Chalmers have been considered. Data used for the capital estimates have been based on Allis-Chalmers as it has been received in a more detailed and complete form. The choice of supplier would be resolved during the preliminary engineering phase of the project.

The capital costs are based on the enclosed drawings, criteria and scope, and any significant change from these may result in changes in cost.

May we express our appreciation of your request to prepare these estimates which we trust provide you with the information that you require. If you have any questions concerning these estimates we would be pleased to discuss them with you.

KILBORN

Should you wish us to accompany your staff for discussions with prospective customers, we would be pleased to do so at your convenience.

Respectfully submitted

K. M. Dewar

KMD:jp
Encls.

CANADIAN JAVELIN LIMITED

JULIAN AND STAR-O'KEEFE

IRON ORES

VOLUME 1

COST ESTIMATES

Prepared and submitted by:

KILBORN ENGINEERING LTD.
Consulting Engineers
36 Park Lawn Road
Toronto 18, Ontario

Date: November 12, 1970

VOLUME 1 - INDEX

CANADIAN JAVELIN LIMITED

INTRODUCTION

Canadian Javelin Limited requested Kilborn Engineering Ltd. to revise and update existing capital and operating costs on the Julian orebody. Simultaneously, an additional estimate is to be made for the Star-O'Keefe property in the Mt. Wright area of Quebec. The pelletizing plant is to be located in the Seven Islands area, and is to convert all production from both properties to pellets.

These estimates are to be based on a production of 9,000,000 LTPY and 3,000,000 LTPY of concentrate from Julian and Star-O'Keefe respectively.

Concentrate transportation from both mines is to be via pipeline to the Seven Islands area. This then necessitates regrinding of concentrate at the mine sites, and pelletizing of all 12,000,000 LTPY of concentrate prior to ocean shipment.

Simultaneously with the preceding, ShelPac Research and Development Ltd. are preparing a feasibility study of the pipeline transportation, and C. D. Howe Company Limited are preparing estimates for the pellet storage, dock and shiploading facilities.

SCOPE

Included in this estimate are all capital costs required to take the Julian and Star-O'Keefe properties from their present status to the production of 9,000,000 LTPY and 3,000,000 LTPY respectively of ground concentrate. These concentrates will be delivered by pump to a primary surge and pumping station at each property in a state suitable for pipeline transportation.

This includes all development, mining, concentrating, housing and service costs at these properties.

A capital estimate is also included for a pelletizing plant and services, a central administration building and housing in the Seven Islands area. This plant will receive slurry from the pipeline and surge facility, and deliver pellets for stockpiling, reclaiming and shiploading by others.

Direct operating costs are also included for the facilities described in the capital estimate.

The items included in this capital and operating cost estimate are more fully described under the pertinent summary and detailed sections of this report.

Sufficient service and administration facilities are included for the pipeline and dock operations. In addition, senior administration

and maintenance personnel are included in the Seven Islands area for the pellet storage, reclaim and shiploading operations.

The following costs are specifically excluded from this report:

1. Capital and operating costs of the pipeline and pumping stations.

2. Capital and operating costs of the pipeline feed and discharge surge facilities, emergency discharge storage and reclaim system.

3. Capital and operating costs of the pellet storage and reclaim facilities, and dock and shiploading facilities.

4. All railroad rolling stock, except the used yard locomotive at Julian.

5. All land acquisition and costs.

6. Owner's charges and fees.

7. Head office fees during operation.

8. All legal fees, royalties and licences, except for a 32¢/long ton for each of the Newfoundland government and Nalco for all production from Julian. This is included under operating costs.

9. Interest charges during construction.

SUMMARY - CAPITAL COSTS

The capital cost requirements for the Julian, Star-O'Keefe and Seven Islands areas, as defined in the scope, are as follows:

Julian	$140,487,000
Star-O'Keefe	$ 89,479,000
Seven Islands	$104,293,000
Total	$334,259,000

The following items are noted regarding these estimates:

1. Costs are based on present day prices with an escalation allowance included in Area 100.

2. Large unit sizes of equipment are used but all are presently operational.

3. Single housing and townsite development are included in the capital estimate. Other townsite items are considered to be mortgaged and are included as an operating cost.

4. Test work on the orebodies has indicated that an acceptable 65.4% Fe minimum concentrate can be readily obtained. This is particularly true utilizing three stages of spirals as included in this estimate. It is not anticipated that further pilot plant work will be required for the concentrators.

5. A pilot plant should be run to more closely define the requirements of the regrind and screen classification circuit based on the pipeline requirements. Material from this can also be used to check the thickening and filtering characteristics of the finely ground material for the pellet plant design.

   This may not require a pilot plant on the property. A quantity of specular hematite concentrate from a neighbouring mine (Wabush) can be shipped to a commercial test facility. These criteria can then be established quickly at a minimum of cost.

6. Start-up capital includes all labour costs and 50% of material and supplies cost for a six month period.

7. Pellet plant costs were based on prices received from Allis-Chalmers and Dravo, and are based on recent quotations by them on a similar unit in the Seven Islands area.

CAPITAL COST SUMMARY - JULIAN

Area	Description	Cost	Total
100	General		
	A. Preconstruction	$ 1,035,000	
	B. Construction Overheads	28,420,000	$29,455,000
120	Mine		
	A. Pit Preparation	3,430,000	
	B. Initial Pit Equipment	13,759,000	17,189,000
130	Crushing Plant		
	A. Building	722,000	
	B. Equipment	4,076,000	4,798,000
140	Ore Storage		
	A. Building	892,000	
	B. Equipment	1,926,000	2,818,000
150	Concentrator		
	A. Building	9,264,000	
	B. Equipment	19,154,000	28,418,000
160	Tailings Disposal		
	A. Building	64,000	
	B. Equipment	2,363,000	2,427,000
170	Service Building		
	A. Building	3,862,000	
	B. Equipment	1,196,000	5,058,000
180	Mine Building and Surface Mobile		
	A. Building	60,000	
	B. Surface Mobile	622,000	682,000
190	Office Building		
	A. Building	629,000	
	B. Equipment	100,000	729,000
200	Water Supply System		
	A. Building	170,000	
	B. Equipment	981,000	1,151,000
210	Electrical Distribution		
	A. Building (included in equipment)		
	B. Equipment	7,023,000	7,023,000

Area	Description	Cost	Total
220	Fire Protection System		
	A. Building (not required)		
	B. Equipment	$ 165,000	$ 165,000
230	Heating System		
	A. Building	420,000	
	B. Equipment	1,253,000	1,673,000
240	Sewage Disposal System		
	A. Building	45,000	
	B. Equipment	45,000	90,000
250	Roads and Yards		5,740,000
260	Construction Camp		
	A. Building	1,248,000	
	B. Equipment	177,000	1,425,000
280	Townsite		
	A. Building	3,743,000	
	B. Equipment	1,895,000	5,638,000
	Sub-Total		$115,387,000
	Engineering, Design, Purchasing and Construction Management		11,200,000
	Warehouse Inventory		5,000,000
	Start-up Capital		8,900,000
	TOTAL		$140,487,000
	Construction Interest		by others
	Head Office Fees (Javelin)		by others
	Land acquisitions, titles, rights-of-way, licences and legal		by others

CAPITAL COST SUMMARY - STAR-O'KEEFE

Area	Description	Cost	Total
300	General		
	A. Preconstruction	$ 930,000	
	B. Construction Overheads	16,350,000	$17,280,000
320	Mine		
	A. Pit Preparation	4,970,000	
	B. Initial Pit Equipment	10,018,000	14,988,000
330	Crushing Plant		
	A. Building	642,000	
	B. Equipment	2,749,000	3,391,000
340	Ore Storage		
	A. Building	664,000	
	B. Equipment	856,000	1,520,000
350	Concentrator		
	A. Building	4,471,000	
	B. Equipment	7,633,000	12,104,000
360	Tailings Disposal		
	A. Building	34,000	
	B. Equipment	652,000	686,000
370	Service Building		
	A. Building	1,926,000	
	B. Equipment	848,000	2,774,000
380	Mine Building and Surface Mobile		
	A. Building	60,000	
	B. Surface Mobile	699,000	759,000
390	Office Building		
	A. Building	629,000	
	B. Equipment	100,000	729,000
400	Water Supply System		
	A. Building	130,000	
	B. Equipment	637,000	767,000
410	Electrical Distribution		
	A. Building (included in equipment)		
	B. Equipment	7,023,000	7,023,000

Area	Description	Cost	Total
420	Fire Protection System		
	A. Building (not required)		
	B. Equipment	$ 165,000	$ 165,000
430	Heating System		
	A. Building	285,000	
	B. Equipment	911,000	1,196,000
440	Sewage Disposal System		
	A. Building	45,000	
	B. Equipment	45,000	90,000
450	Roads and Yards		3,640,000
460	Construction Camp		
	A. Building	1,248,000	
	B. Equipment	177,000	1,425,000
480	Townsite		
	A. Building	3,032,000	
	B. Equipment	1,895,000	4,927,000
	Sub-Total		$74,939,000
	Engineering, Design, Purchasing and Construction Management		7,100,000
	Warehouse Inventory		2,000,000
	Start-up Capital		5,440,000
	TOTAL		$89,479,000
	Construction Interest		by others
	Head Office fees (Javelin)		by others
	Land acquisitions, titles, rights-of-way, licences and legal		by others

CAPITAL COST SUMMARY - SEVEN ISLANDS

Area	Description	Cost	Total
500	General		
	A. Preconstruction	$ 110,000	
	B. Construction Overheads	1,635,000	$1,745,000
520	Pelletizing Plant		
	A. Building	28,000,000	
	B. Equipment	52,000,000	80,000,000
530	Service Building		
	A. Building	981,000	
	B. Equipment	1,357,000	2,338,000
540	Water Supply System		
	A. Building	125,000	
	B. Equipment	611,000	736,000
550	Fuel Supply		
	A. Building	170,000	
	B. Equipment	940,000	1,110,000
560	Electrical Distribution		
	A. Building (included in equipment)		
	B. Equipment	2,214,000	2,214,000
580	Fire Protection System		165,000
590	Heating System		
	A. Building	320,000	
	B. Equipment	730,000	1,050,000
600	Sewage Disposal System		
	A. Building	45,000	
	B. Equipment	45,000	90,000
610	Roads and Yards		733,000
630	Townsite		
	A. Building		423,000
640	Central Administration		
	A. Building	1,257,000	
	B. Equipment	250,000	1,507,000

Area	Description	Cost	Total
650	Office Building at Pelletizing Plant		
	A. Building	$ 416,000	
	B. Equipment	66,000	$ 482,000
	Sub-Total		$92,593,000
	* Engineering, Design, Purchasing and Construction Management		3,100,000
	Warehouse Inventory		3,000,000
	Start-up Capital		5,600,000
	TOTAL		$104,293,000
	Construction interest		by others
	Head Office fees (Javelin)		by others
	Land acquisitions, titles, rights-of-way, licences and legal		by others

* Part of this total cost is included in Area 520 Equipment.

SUMMARY - OPERATING COSTS

The total operating cost of the three plants and facilities has been calculated as follows:

	$/long ton of ore	$/long ton of concentrate
Julian	$1.13	$2.82
Star-O'Keefe	1.93	4.83
Seven Islands area	0.78	1.96
Weighted Total	$2.11	$5.28

Cost per long ton of pellets from Julian (incl. royalties)	$4.92
Cost per long ton of pellets from Star-O'Keefe (no royalties)	$6.29

The following items should be noted regarding these estimates:

1. All direct operating costs are included.

2. An allowance has been made for employment costs in Montreal and St. Johns.

3. Costs and manpower for training programs are included.

4. Operating costs for three townsites or town additions have been included, along with mortgage payments as shown in the details. Rent and other charges are consistent with the present practice in the area.

5. Wages and burdens have been extrapolated to 1974 using the existing labour contracts in the area.

6. A central administration building plus personnel has been included.

7. No capital or operating allowance has been made for additional housing after plant start-up, or for replacement of production and service vehicles during operation. It is assumed that these items will be included as an annual capital requirement in the cash flow calculations.

8. Royalty payments of 32¢ per long ton of concentrate from the Julian mine to each of the Newfoundland Government and Nalco have been included in the operating cost.

OPERATING COST SUMMARY

(¢ per long ton)

	Julian		Star-O'Keefe		Seven Islands	
	Ore	Conc't	Ore	Conc't	Ore	Conc't
Plant Administration						
Personnel	4.46	11.15	9.02	22.54	2.02	5.05
Materials and Supplies	0.93	2.31	1.52	3.80	0.74	1.85
Townsite	6.89	17.23	14.85	37.13	1.03	2.58
Mining						
Salaried staff	1.11	2.77	3.32	8.30		
Hourly rated	8.50	21.24	21.55	53.88		
Materials and supplies	19.82	49.54	35.74	89.35		
Concentrating						
Salaried	1.55	3.88	3.73	9.32		
Hourly - operating	6.46	16.14	12.37	30.92		
Hourly - maintenance	3.63	9.08	5.92	14.80		
Materials and supplies	35.89	89.73	42.92	107.30		
Pelletizing						
Salaries and wages					4.76	11.91
Materials and supplies					40.27	100.67
Services						
Salaried	1.09	2.72	2.52	6.29	0.49	1.22
Hourly	12.05	30.14	23.28	58.21	3.41	8.53
Materials and supplies	10.53	26.33	16.51	41.28	1.40	3.51
Central Administration					4.31	10.78
Royalties					19.20	48.00
Total	112.91	282.26	193.25	483.12	77.63	196.10

SCHEDULING

Enclosed is a very general construction schedule for the project. This includes Julian, Star-O'Keefe, and all facilities in the pellet plant and dock area.

The schedule is based on a January 1971 project start, and a July 1974 start-up ($3\frac{1}{2}$ years). All areas start and finish together.

The governing factor in the design and construction schedule is the pipeline transportation scheme. This necessitates simultaneous start-up of all three areas.

Pipeline tonnage flexibility probably requires production from Julian and Star-O'Keefe, or it will be a stop-start operation. Since this material is ground for pelletizing, it cannot be direct shipped and must be pelletized. The various storage and surge capacities allow only a minimum flexibility between the mining pits and the pellet storage.

	YEAR 1												YEAR 2												YEAR 3												YEAR 4											
	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D	J	F	M	A	M	J	J	A	S	O	N	D
SITE	PRELIMINARY ENGINEERING																																														
	SITE STUDIES																																														
	SITE DEVELOPMENT (INCL. TEMPORARY CAMPS)																																													
TOWNSITE	TOWNSITE DESIGN																																													
	TOWNSITE DEVELOPMENT																																													
	PERMANENT BUNKHOUSES																																													
	MARRIED ACCOMODATION																																													
SITE SERVICES AND UTILITIES	SITE SERVICES & UTILITIES DESIGN																																													
	ROAD CONSTRUCTION																																													
	RAILWAY CONSTRUCTION																																													
	POWER LINE																																													
	TEMPORARY WATER SUPPLY																																													
	PERMANENT WATER SUPPLY																																													
MINE	DRILLING																																													
	MINE DESIGN																																													
	STRIP OVERBURDEN - MINE																																													
	MINE DEVELOPMENT																																													
CRUSHER BLDG.	DESIGN CRUSHER BUILDING																																													
	CONSTRUCTION - CRUSHER BUILDING																																													
	BUILDING CLOSED-IN																																													
	START-UP																																													
CONCENTRATOR	DESIGN - CONCENTRATOR																																													
	CONSTRUCTION CONCENTRATOR BLDG.																																													
	BUILDING CLOSED-IN																																													
ADMINISTRATION BLDG.	DESIGN - ADMINISTRATION BUILDING																																													
	CONSTRUCTION - ADMINISTRATION BUILDING																																													
SERVICE COMPLEX	DESIGN SERVICE COMPLEX																																													
	CONSTRUCTION - SERVICE COMPLEX																																													
	IN USE																																													
PELLETIZING PLANT	DESIGN PELLET PLANT																																													
	CONSTRUCTION PELLET PLANT																																													

CANADIAN JAVELIN LIMITED

PROJECT SCHEDULE

KILBORN

DESIGN CRITERIA

1. General

The design criteria have been established by Canadian Javelin Limited in conjunction with Kilborn Engineering Ltd.

The plants are to be designed for pipeline transportation of ground material. This requires sufficient surge capacities to minimize pipeline shutdowns for maintenance. A further requirement is that all material for the pipeline shall pass a 200 mesh Tyler screen.

2. Product

Julian	9,000,000 LTPY of concentrate
Star-O'Keefe	3,000,000 LTPY of concentrate
Seven Islands	12,000,000 LTPY of pellets

Pellet specifications:

Size - 90% +1/8"; 80% -5/8" +3/8"

65.6% Fe	Minimum	64.5%
5.0% SiO_2	Maximum	5.5%
0.08% Mn	Maximum	0.30%
S	Maximum	0.02%
P_2O_5	Maximum	0.02%
Alumina, Lime and Magnesia	Maximum	0.50%
Moisture	Maximum	1.0%

3. Mining and Concentrating

(a) Mining	Julian	Star-O'Keefe
Operation, hrs./day	24	24
days/week	7	7
weeks/year	365	365
Long tons per year of ore	22,500,000	7,500,000
Long tons per day of ore	61,600	20,500
Long tons per year of waste	550,000	5,850,000
Long tons per day of waste	1570	16,700
Overall ore-to-waste ratio	1:0.024	1 : 0.78
Preproduction overburden removal, tons	12,000,000	16,000,000
Preproduction waste removal	0	0

(b) Concentrating		
Head assay, % Fe	34.3	32.5
Ore S.G.	3.8	3.8
Recovery	77%	77%
Ratio of concentration	2.5 : 1	2.5 : 1 (assumed)
Plant feed, LTPH	2570	860
Plant availability	85%	85%
Design rate, LTPH	3030	1010
Spirals	3 stage	3 stage

4. Administration and Services

(a) Central administration, engineering, purchasing, accounting - all at Seven Islands.

(b) Julian is the main maintenance, warehousing and storage area. Supplies will all be received by rail at Julian. An allowance has been made for trucks to haul all supplies from Julian to Star-O'Keefe.

Similarly, component repairs such as engines, drill bits, etc. will all be done centrally at Julian.

(c) All purchasing will be done from the central office, with individual mines requisitioning only.

5. Structural

Snow load	as required
Wind load	as required
Floor loads:	
Switch room roof	75 lbs/sq.ft.
Switch room floor	200 lbs./sq.ft.
Cable space	75 lbs./sq.ft.
Service floors - live load	75 lbs./sq.ft.
Screen floors - live load	100 lbs./sq.ft.
Conveyor walkways	100 lbs./ft. run 1000 lb. point load
Office area	70 lbs./sq.ft. plus partition
Storage areas	150 lbs./sq.ft.

5. Structural (Cont'd)

Structural steel: CSA G40.12 generally, and A572 Gr. 50.
Minimum thickness 1/16" on rolled sections.

Connections: Shop-welded or A325 H.T. bearing type.
Field - A325 H.T. bearing type.
Girts - A307 bolts.

Deflections:
Roof beams - $L/300$ to a max. of $1\frac{1}{2}$"
Floor beams - $L/500$
Crane runways - $L/800$
Monorail supports - $L/800$

Operating floor: M & M safety grating or similar.

Office, control room, and lay-down elevated floors:
Concrete on steel deck.

Stairs, handrail and kick plates : To accepted standards.

6. Concrete

(a) Excavation and Fill

1. All footings shall extend to rock.
2. Weak soil stratum shall be removed and replaced with weak concrete of 2000 psi or greater.
3. Backfill shall be placed after concrete has reached rated strength.
4. Backfill shall be placed in 6" to 8" layers and have a 95% minimum compaction.

6. Concrete (Cont'd)

(b) Drainage

1. 6" dia. Armco perforated asphalt coated metal drains to be placed holes down on the outside of basement walls. Minimum slope 0.5%.

2. Floor drains as required.

(c) Reinforced Concrete

1. Minimum compressive strength 3500 psi at 28 days in accordance with CSA Specifications A23-1960, A23.1 and A23.2.

2. Reinforcing steel - intermediate grade billet steel with allowable unit stress of 20,000 psi in accordance with CSA Specifications G30.1-1954 and G30.6-1954.

3. Steel to have minimum cover as follows:

Footings and unformed surfaces	3"
Formed surfaces except underside of slabs	2"
Underside of beams	$1\frac{1}{2}$"
Underside of elevated slabs	1"

4. All reinforcement to have a lap of 24 bar diameters.

5. All exposed edges to have 3/4" chamfer.

6. Reinforcing may be moved slightly as required by piping, plumbing or conduits.

7. All column bases grouted with non-shrinking grout.

6. Concrete (Cont'd)

(d) Construction Joints

1. Located as shown on drawings.

2. Those indicated as "Optional" may be used to facilitate construction.

(e) Waterproofing

All basement walls in contact with soil shall be waterproofed with two coats of asphalt emulsion. Over construction joints 18" wide strip of 8 mil glass fiber mesh shall be placed between the two emulsion coats.

DESCRIPTION

1. GENERAL

A. Preconstruction

This includes all of the site studies and engineering investigations of the various alternatives which must be completed before detailed design commences. Some of the items are as follows:

(a) Mud diamond drilling of the various orebodies to determine pit design.

(b) Aerial photography to assist in the selection of various routes for rail, road and power to Julian and the road and power line to Star-O'Keefe.

(c) Studies to determine final routing of rail, roads and powerlines.

(d) Control surveying.

(e) Soil investigation for plant and townsite areas.

(f) Site clearing.

(g) Water and tailings investigations to determine the supply of water and the disposition of tailings to avoid contamination of water courses. This must be approved by the governing bodies.

(h) Drilling of lake and river bottoms at the location of causeways and dikes. This is particularly important in the area of the orebody extensions at Julian in order to determine the method of dike construction for future mining. The tailings disposal scheme will be designed to accommodate this mining extension.

(i) Various engineering studies must be made contingent upon the final product transportation scheme and design requirements. The continuity of production and the initial start-up procedure is particularly important for successful pipeline operation. Other considerations will be the availability of services in the Wabush and Seven Islands areas which may minimize the capital requirements at the plants. These are items such as the supply and loading of explosives by C.I.L. or others, tire and other component repair services, local warehousing of small parts and hardware items.

(j) Initial camps must be constructed in order to accommodate these people during this preconstruction phase of the project.

(k) Schedules must be prepared for design, purchasing and construction in order to ensure start-up to meet sales commitments.

(l) Study on the availability of concrete aggregate and the construction of a batch plant.

(m) Study on the availability, economics and selection of fuels.

(n) Temporary camps must be investigated for the pellet plant as permanent bunkhouses are not considered.

B. Construction Overheads

This includes all costs of construction not directly included in pertinent areas. A list of these items is as follows:

Contractors'staff personnel

Mobilization

Surveying

Hoardings

Equipment rentals

Equipment purchases

Permits and inspections

Travel expenses and recruiting

Batch plant

Head office site visits

Clean-up

Protection of finished work

Temporary heat

Temporary power

Temporary water

Watchmen

Material testing

Signs

Scaffolds, staging, chutes

Photographs

Winter work premium

Overtime premium

Insurance equipment liability

Sales tax and duties - included in unit costs

Passenger vehicles

Communications

Accounting, purchasing, warehousing

Construction buildings

Office equipment, furniture, supplies

Room and board

Escalation

Contingency

2. MINING

A. JULIAN

(1) Ore Reserves

Canadian Javelin Limited have prepared the preliminary open pit drawing No. 120-F-1, contained in Volume 2, and have calculated that the following quantities will be available for mining on Julienne Lake Mineral Lands Act area:

Overburden	12,935,000 tons
Waste rock	10,170,000 tons
Indicated ore	416,663,000 tons

Indicated ore is defined as ore recoverable by open pit mining contained within the pit limits shown on the aforementioned drawing and with pit slopes taken at 45 degrees in rock and 30 degrees in overburden material. The bottom of the pit is taken to elevation 1200 ft.

In addition to the aforementioned indicated ore, 83,371,000 tons of potential ore can be recovered by open pit mining methods when pit limits extend beyond the property boundary and ore below elevation 1200 ft. is mined.

It is to be noted that 123,516,000 tons of ore, of the indicated reserves, is contained above lake level. Of this quantity, 90,000,000 tons of ore are above elevation 1775 ft. and can be recovered by open pit mining methods without the removal of

appreciable overburden, other than vegetation and a few feet of soil between and on the slopes of outcrops.

Canadian Javelin Limited have calculated that an additional 500,000,000 tons of ore are contained to the east and to the west of the Julienne Lake Mineral Lands Act area. This quantity of ore has been indicated magnetically and is contained on Lot 67 of the Labrador Mining and Exploration Lands Act area.

Ore Grade

The average grade of indicated ore is:

Iron	34.2%
Manganese	0.32%
Sulphur	$<$0.05%
Phosphorus	$<$0.05%

Ratio of Concentration

Metallurgical tests have indicated that approximately 2.5 tons of ore are required to produce a concentrate assaying 66 - 67% Fe.

(2) Mining

The mining plan has been based on the preliminary open pit layout drawing made by Canadian Javelin. It has been assumed that all overburden will be removed, prior to plant start-up, and that permanent mine roads will be built between the primary crusher and the open pit.

Sufficient ore will be exposed to allow the development of the ore-body to proceed at plant start-up.

It has been assumed that the removal of waste rock and the clean-up of the mine will proceed at a uniform rate throughout the life of the mine. This will be accomplished by the diesel-electric shovel and the fleet of 35 ton diesel trucks.

The drill size is similar to that already used in the Wabush area and a 9 7/8" bit size has been selected. If drilling tests indicate that a better economy is achieved by using a 12 1/4" dia. bit, this same drill can be specified with the larger bit.

Several combinations of shovel and truck sizes have been investigated, including the use of 20 cubic yard shovels with 200 ton rear dump trucks. Present equipment performance indicates that the greatest economy will be achieved by using 12 cubic yard electric shovels in conjunction with 100 ton diesel trucks. This combination has been used for the estimate.

The 12 cubic yard shovel is suitable for 50' bench heights.

Two-way radios have been provided for communication between shovels, drill, lube truck and pick-up trucks.

Submersible pumps have been provided for dewatering the pit after a rainfall. Additional pumps may be needed when the pit elevation is below the lake level.

Power supply to drills and shovels is via movable load centres and trailing cables.

Pit lighting is by means of floodlights mounted on permanent and movable towers.

Changehouse, office, maintenance shops, warehouse, fuel storage and dispensing facilities for mining have been located near the concentrator complex and their costs are included in other sections of the estimate.

(3) Assumed Operating Data on which Estimated Capital Costs are based

1. The pit will operate 3 shifts per day, 7 days per week, 350 days per year.

2. The average effective working time per shift is $6\frac{1}{2}$ hours. During this period the equipment will operate at 85% capacity.

3. Availability of production equipment is at 70% of the gross number of units required.

4. Production equipment is required to mine 9,000,000 x 2.5 = 22,500,000 long tons per year of ore.

5. Removal of waste rock and clean-up of the mine will be at a uniform rate.

6. The mine production rate is

$$\frac{22,500,000}{350} = 64,300 \text{ long tons per day.}$$

7. The average drilling rate for a Bucyrus Erie 60R drill, using a 9-7/8" bit, is estimated to be 40 feet per hour, with allowance for sub-drilling, lost time, etc. Assuming an average drilling pattern 25 ft. x 25 ft., each drill hole will provide approximately 41 long tons of ore per foot of hole.

Tons produced per drill per shift
$= 40 \times 41 \times 6\frac{1}{2} = 10,660$ long tons.

Drill shifts required
$$= \frac{64,300}{10,660} = 6.03.$$

Based on an availability of 70% the gross number of shifts = 8.61.

For a 3-shift operation, three electric drills are required.

In addition a mobile drilling rig and jack hammers have been provided for secondary blasting and clean-up.

8. The average production rate for a P & H 2100 BL shovel, equipped with a 12 cu.yd. dipper, is estimated at 1160 long tons per hour.

   Shovel shifts required

   $$= \frac{64,300}{1160 \times 0.85 \times 6.5} = 10.03.$$

   Based on an availability of 70% the gross number of shifts = 14.33.

   For a 3-shift operation, five electric shovels are required.

9. The average haulage rate for an M-100 Lectrahaul 100 ton capacity rear dump truck is estimated at 265 long tons per hour.

   Truck shifts required

   $$= \frac{64,300}{265 \times 0.85 \times 6.5} = 43.92.$$

   Based on an availability of 70% the gross number of shifts = 62.74.

   For a 3-shift operation, twenty-one 100-ton trucks are required.

10. One Caterpillar D-9 crawler tractor with winch and ripper, is required for clean-up at each large shovel.

    Five crawler tractors are required.

11. One 10 cu.yd. Caterpillar 992 front end loader is used for miscellaneous clean-up work in the mine.

12. One Caterpillar 834 rubber-tired tractor is used for levelling and clean-up of benches for the drilling equipment.

13. A mobile percussion drill, compressor and jack hammers are used for waste rock blasting and secondary rock breaking.

14. A blast hole sand truck and a 1-ton flat bed truck are used by the blasting crew.

15. Waste rock removal rate is proportional to the ratio between waste rock and ore.

    Waste rock removal rate

    $$= \frac{64,300 \times 10,170,000}{416,663,000} = 1,570 \text{ long tons per day.}$$

16. The average production rate for a P & H 955E diesel shovel equipped with a $2\frac{1}{2}$ cu.yd. dipper is estimated at 120 long tons per hour for waste rock.

    Shovel shifts required

    $$= \frac{1570}{120 \times 0.85 \times 6.5} = 2.37.$$

    Based on an availability of 70% the gross number of shifts = 3.39.

    For a 3-shift operation, one diesel shovel is required.

    At a later date, an additional shovel may be required for clean-up and waste rock removal.

17. The average haulage rate for a Sicard 35 ton capacity rear dump truck is estimated at 80 long tons per hour.

    Truck shifts required

    $$= \frac{1570}{80 \times 0.85 \times 6.5} = 3.55.$$

    Based on an availability of 70% the gross number of shifts = 5.07.

    For a 3-shift operation, two 35-ton trucks are required.

    Due to other clean-up operations, and making allowance for a spare truck, three 35-ton trucks have been included in the estimate.

18. A 65 ton P & H T-650 mobile crane is required for shovel maintenance.

19. An 18 ton P & H R-180 mobile crane, rubber tire mounted, is used for mining equipment maintenance.

20. Two 3 ton flat deck trucks, with Hiab hydraulic crane, are used for moving miscellaneous mining supplies and parts.

21. One lube truck is used for mine equipment lubrication and fuel supply.

22. Three Caterpillar Model 16 graders are used for road maintenance, sundry clean-up and snow removal.

23. A water truck is used for road maintenance in the dry months.

24. One Sicard BLD-5 snow blower is used for snow removal.

25. One sand truck is used for the sanding of roads in the winter.

26. Ten 1-ton pick-up trucks are used for moving mine personnel.

27. Twenty radios will be installed in shovels, drills, lube truck and pick-up trucks.

28. Sufficient pumping capacity has been provided to dewater the pit in 24 hours after a maximum one-day rainfall. Additional pumps may be needed when the pit elevation is below lake level.

29. An electric power supply to the mining equipment and pit pumping equipment has been included, together with a pit lighting system.

30. Explosives mixing, dispensing and storage facilities are assumed to be provided by the explosives supplier.

31. Common facilities for changehouse, office, maintenance shops, warehouse, fuel storage and dispensing facilities have been included at the concentrator complex.

B. STAR-O'KEEFE

(1) Ore Reserves

Canadian Javelin Limited have prepared the typical open pit layout and the Star Lake Deposit cross-sections shown on Drawings Nos. 320-F-1 and 320-F-2 contained in Volume 2. They have calculated that the following quantities will be available for mining:

Overburden	38,854,000 tons
Waste rock	118,345,000 tons
Ore	151,665,000 tons

Ore is defined as ore recoverable by open pit mining contained within the pit limits shown on the aforementioned drawings and with pit slopes taken at 52 degrees in rock and 30 degrees in overburden material. The bottom of the pit is taken to elevation 1800 ft. in most areas.

In addition to the aforementioned ore, an additional 23,380,000 tons of ore is contained in the O'Keefe Lake open pit located less than two miles to the east of the Star Lake open pit.

Star Lake typical open pit layout drawing No. 320-F-1 has been modified to show pit haulage roads and the primary crusher to the south of the deposit.

Ore Grade - Star Deposit

The average grade of ore is:

Iron	32.89%
Manganese	0.02 to 0.04%
Sulphur	0.001 to 0.002%
Phosphorus	0.02 to 0.003%

Ratio of Concentration for Star Ore

Metallurgical tests have indicated that approximately 2.5 tons of ore are required to produce a concentrate assaying 66 - 67% Fe.

(2) Mining

The mining plan has been based on the preliminary open pit layout drawing made by Canadian Javelin.

Prior to plant start-up, half the overburden will be removed and mine roads will be built between the primary crusher and the open pit. This will allow the development of the orebody to proceed at plant start-up.

It has been assumed that the removal of waste rock will proceed at a uniform rate throughout the life of the mine and will be accomplished by electric drills, shovels, and the fleet of 100-ton rear dump diesel trucks.

Clean-up of the mine will proceed at a uniform rate throughout the life of the mine. This will be accomplished by the diesel-electric shovel and the fleet of 35-ton diesel trucks. In addition, this equipment will be used to develop a drainage system around the mine workings and will also be used for removal of overburden as required.

The Star deposit is quite narrow and long. This will require the development of several faces simultaneously and, for this reason, smaller drills and shovels than those used for the Julian deposit have been specified. The 100-ton trucks are the same size as used at the Julian deposit.

The drill size is similar to that already used in several Canadian mines, and a 9-inch bit size has been selected.

10 cu.yd. electric shovels, in conjunction with 100 ton diesel-electric trucks, are used for both the mining of ore and the removal of waste rock.

The 10 cu.yd. shovel is suitable for 50 ft. bench heights.

Two-way radios have been provided for communication between shovels, drills, lube truck and pick-up trucks.

Submersible pumps have been provided for dewatering the pit after a rainfall. Additional pumps may be needed when the pit elevation is below the lake level. The arm of Tuttle Lake, adjacent to the mine workings, will be filled with waste rock and overburden. A causeway will be built over the narrow neck of Tuttle Lake to facilitate development of the western extremity of the Star orebody.

Power supply to drills and shovels is via movable load centers and trailing cables.

Pit lighting is by means of floodlights mounted on permanent and movable towers.

Changehouse, office, maintenance shops, warehouse, fuel storage and dispensing facilities for mining have been located near the concentrator complex and their costs are included in other sections of the estimate.

(3) Assumed Operating Data on which Estimated Capital Costs are based

1. The pit will operate 3 shifts per day, 7 days per week, 350 days per years.

2. The average effective working time per shift is $6\frac{1}{2}$ hours. During this period the equipment will operate at 85% capacity.

3. Availability of production equipment is at 70% of the gross number of units required.

4. Production equipment is required to mine 3,000,000 x 2.5 = 7,500,000 long tons of ore per year.

5. Removal of waste rock and clean-up of the mine will be at a uniform rate.

6. The mine production rate is

$$\frac{7,500,000}{350} = 21,400 \text{ long tons per day.}$$

7. The average drilling rate for a Bucyrus Erie 45R drill, using a 9" bit, is estimated to be 20 feet per hour, with allowance for sub-drilling, lost time, etc. Assuming an average drilling pattern 23 ft. x 23 ft., each drill hole will provide approximately 35 long tons of ore per foot of hole.

Tons produced per drill per shift
$= 20 \times 35 \times 6\frac{1}{2} = 4,550$ long tons.

Drill shifts required
$= \frac{21,400}{4,550} = 4.70.$

Based on an availability of 70%, the gross number of shifts = 6.71.

For a 3-shift operation, two electric drills are required for ore. In addition, a mobile drilling rig and jack hammers have been provided for secondary blasting and clean-up.

8. The average production rate for a P & H 1900 shovel, equipped with a 10 cu.yd. dipper, is estimated at 970 long tons per hour.

   Shovel shifts required

   $$= \frac{21,400}{970 \times 0.85 \times 6.5} = 3.99$$

   Based on an availability of 70%, the gross number of shifts = 5.70.

   For a 3-shift operation, two electric shovels are required for ore.

9. The average haulage rate for an M-100 Lectrahaul 100 ton capacity rear dump truck is estimated at 250 long tons per hour when hauling ore.

   Truck shifts required

   $$= \frac{21,400}{250 \times 0.85 \times 6.5} = 15.49$$

   Based on an availability of 70%, the gross number of shifts = 22.13.

   For a 3-shift operation, seven 100 ton trucks are required for ore haulage.

10. One Caterpillar D-8 crawler tractor, with winch and ripper, is required for clean-up at each large shovel.

    Two crawler tractors are required for ore.

11. One 10 cu.yd. Caterpillar 992 front-end loader is used for miscellaneous clean-up work in the mine.

12. One Caterpillar 834 rubber-tired tractor is used for levelling and clean-up of benches for the drilling equipment.

13. A mobile percussion drill, compressor and jack hammers, are used for clean-up and secondary rock breaking.

14. A blast hole sand truck and a 1-ton flat bed truck are used by the blasting crew.

15. Waste rock removal rate is proportional to the ratio between waste rock and ore.

    Waste rock removal rate

    $$= \frac{21,400 \times 118,345,000}{151,665,000} = 16,700 \text{ long tons per day.}$$

16. The average drilling rate for a Bucyrus Erie 45R drill, using a 9" bit, is estimated to be 20 ft. per hour, with allowance for sub-drilling, lost time, etc. Assuming an average drilling pattern 25 ft. x 25 ft., each drill hole will provide approximately 35 long tons of waste rock per foot of hole.

Tons produced per drill per shift
$= 20 \times 35 \times 6\frac{1}{2}$ $= 4,550$ long tons.

Drill shifts required
$= \frac{16,700}{4,550}$ $= 3.67.$

Based on an availability of 70%, the gross number of shifts = 5.24.

For a 3-shift operation, two electric drills are required for waste rock.

17. The average production rate for a P & H 1900 shovel, equipped with a 10 cu.yd. dipper, is estimated at 550 long tons per hour for waste rock.

Shovel shifts required
$= \frac{16,700}{550 \times 0.85 \times 6.5}$ $= 5.50.$

Based on an availability of 70%, the gross number of shifts = 7.85.

For a 3-shift operation, three electric shovels are required for waste rock.

18. The average haulage rate for an M-100 Lectrahaul 100 ton capacity rear dump truck is estimated at 240 long tons per hour when hauling waste rock.

Truck shifts required
$= \frac{16,700}{240 \times 0.85 \times 6.5}$ $= 12.59.$

Based on an availability of 70%, the gross number of shifts = 17.99.

For a 3-shift operation, six 100-ton trucks are required for waste rock haulage.

19. One Caterpillar D-8 crawler tractor, with winch and ripper, is required for clean-up at each large shovel.

Three crawler tractors are required for waste rock.

20. One P & H 955E diesel shovel, with $2\frac{1}{2}$ cu.yd. dipper, is used for pit clean-up, overburden removal and ditching, etc.

21. Two 35-ton Sicard trucks are used in conjunction with the above diesel shovel.

22. A 65-ton P & H T-650 mobile crane is required for shovel maintenance.

23. An 18-ton P & H R-180 mobile crane, rubber tire mounted, is used for mining equipment maintenance.

24. Two 3-ton flat deck trucks, with Hiab hydraulic crane, are used for moving miscellaneous mining supplies and parts.

25. One lube truck is used for mine equipment lubrication and fuel supply.

26. Two Caterpillar Model 16 graders are used for road maintenance, sundry clean-up and snow removal.

27. A water truck is used for road maintenance in the dry months.

28. One Sicard BLD-5 snow blower is used for snow removal.

29. One sand truck is used for the sanding of roads in the winter.

30. Eight 1-ton pick-up trucks are used for moving mine personnel.

31. Eighteen radios will be installed in shovels, drills, lube truck and pick-up trucks.

32. Sufficient pumping capacity has been provided to dewater the pit in 24 hours after a maximum one-day rainfall. Additional pumps may be needed when the pit elevation is below lake level.

33. An electric power supply to pit mining equipment and pit pumping equipment has been included, together with a pit lighting system.

34. Explosives mixing, dispensing and storage facilities are assumed to be provided by the explosives supplier.

35. Common facilities for changehouse, office, maintenance shops, warehouse, fuel storage and dispensing facilities, have been included at the concentrator complex.

3. CRUSHING

Crushing will be done in a single gyratory crusher located adjacent to the pit. Sufficient space is allowed for set down of components but relining and major maintenance to components will be done at the main plant. Vibrating or reciprocating feeders will be used to discharge the crusher pocket. Provision is made to add calcium chloride to the crusher discharge to minimize freezing, and for dust collection within the building.

The Julian 60" x 89" crusher has a capacity of 4500 - 5300 LTPH and is arranged for two sides dumping of ore. This crusher can handle the daily ore requirement in 12 to 14 crushing hours per day.

A 54" x 74" gyratory will be installed at Star-O'Keefe. This is for single side dumping and it has a capacity of 2400 - 3200 LTPH. This requires 7 to 9 crushing hours per day.

The crushed material discharges to a short belt and then to a high speed conveyor to the ore storage building.

The crushing and conveying system is fully controlled to minimize spillage and hold-ups.

Crane and hoists are supplied to maintain the crushing and conveying components and service the crusher feed cavity.

4. ORE STORAGE

Covered ore storage will be provided with an overhead conveyor and tripper. This will hold a total of 80,000 tons at Julian and 40,000 tons at Star-O'Keefe. Additional outside storage is also provided at one end of the building. The outside storage is reclaimed by loader and truck to a hopper feeding a reclaim conveyor belt.

Normal reclaim is via two rows of feeders and conveyor belts which discharge to an autogenous mill feed belt. The additional two reclaim belts are required to increase the live load of this storage shed.

Level controls and alarms are included, as well as the normal electrical interlocking.

5. CONCENTRATOR

A. Building

Buildings will be of structural steel and concrete and of Class A fire rating.

Walls are insulated sandwich panel with 2" of insulation between galvanized steel siding and interior liner.

Roof deck will be either asbestos cavity or "T" deck, depending on the application. The roof will be cold process built-up roofing.

Interior operating floors and stairs will, in general, be steel grating. Areas of spillage and frequent wash down, offices and control rooms and vibration sections, such as screening, will be reinforced concrete.

Building services will provide adequate lighting, consisting of fluorescent and mercury arc type. Service cranes, monorails and hoists are provided to service all process equipment. Service elevators are installed as required.

B. Primary Grinding and Classification

Primary grinding will take place in two 32 ft. dia. x 15' long autogenous mills at Julian and one 32' x 10' mill at Star-O'Keefe. Each mill will be driven by two 4000 H.P. wound rotor motors at Julian and two 2650 H.P. motors at Star-O'Keefe, for a total connected power of 3.9 KWH/long ton.

Each mill at Julian discharges to twelve 5' x 12' primary screens with a 6 - 8 mesh opening. The oversize from these screens is closed circuited by conveyor with its respective mill. Primary screen undersize from each three screens is pumped to twelve 5' x 12' secondary screens with 14 - 20 mesh openings (for a total of 96 secondary screens). Oversize from these screens joins its respective recycle system back to the mill feed. Screen undersize from each six secondary screens is pumped to one line of spirals.

This arrangement gives eight lines of primary screens and sixteen lines of secondary screens, thus reducing overall plant downtime for maintenance.

Similarly, Star-O'Keefe has eight primary screens and thirty-two secondary screens. The primary screening is divided into four lines and the secondary screening into eight lines.

C. Spiral Concentration

Three stages have been used for these plants. These are installed in a 3 : 2 : 2 ratio with rougher spirals designed for 1.4 LTPH of new feed (1.75 LTPH including circulating load), cleaners for 1.5 LTPH and recleaners 1.1 LTPH. The three stages permit considerably more flexibility in ore consistency and general operation to produce the required minimum grade of 65.6% Fe.

Rougher tails are discharged from the concentrator. Rougher middlings, cleaner tails and recleaner tails are recycled back to the rougher spiral feed pumps via dewatering cyclones. The cyclone overflow is recycled for process water additions.

The spirals will be 5-turn Humphrey Spiral Concentrators with moulded rubber-lined sections and all rubber-lined wearing surfaces. Each distributor will be fed by a single pump, and each outlet from the dividing head will feed two spirals using a two-way splitter over the spirals.

D. Regrind Circuit

Spiral concentrates are cycloned to 70 - 75% solids and discharged into agitated surge tanks (22' x 19') which contain approximately one hour's production. Cyclone overflows are thickened and the thickener underflow returned to the surge tanks. Thickener overflow is used for recycle water make-up.

Thickened slurry is pumped to the regrind mills at a controlled rate. Regrinding at Julian is in eight 16.5' dia. x 23' long ball mills (4135 H.P. each). Star-O'Keefe uses three 16.5' dia. x 21' long mills with 3700 connected H.P. each.

The grinding mills are closed circuited with two stages of Rapifine DSM screens. These units will handle 10 - 12 LTPH per linear foot of screen and will have a 0.004" opening. This is designed to make a separation at 325 mesh and, in particular, to produce a product which all passes a 200 mesh Tyler screen as a prerequisite for pipeline transportation.

The screen oversize is discharged back to the regrind mill for further size reduction.

Screen undersize is cycloned and the oversize thickened. All solids are discharged into agitated surge tanks with approximately one hour's retention time. Material is then pumped to the pipeline feeding station (by Shel Pac).

Due to the continuity requirement of pipeline transportation, provision is made to filter a portion of the spiral concentrate on a 20 ft. horizontal filter. This concentrate (approx. 200 LTPH) is then conveyed to an enclosed and heated storage pile which will contain one full day's production. Reclaim from this pile is by front-end loader and conveyor to a slurry tank which discharges to the regrind feed surge tanks.

This interim storage allows one primary grinding mill to be shut down for 48 hours for liner replacement and other maintenance, otherwise a complete plan shutdown is required as the pipeline cannot operate at 50% capacity.

E. Metallurgical Control

Automatic samplers will be installed on the feed, concentrate and tailings of each spiral line. Automatic samplers will also be used to check the final sizing of each regrind circuit.

Space is provided for sample preparation, test laboratory and assay laboratory. Close control is required to ensure that the concentrate produced meets the specification and that the particle size meets the pipeline requirements.

The final size analysis of 90-92% -325 mesh is finer than that usually required for pelletizing purposes. Normally a grind of approximately 80% -325 mesh is used.

The plant flow balances used for design are incorporated on the flowsheets.

F. Instrumentation and Control

Each plant will be controlled from a centrally located control room. This control room will contain pushbutton stations for all equipment as well as the instrumentation equipment. A computer is not included for operating control, either for supervisory or direct digital control. Either pneumatic or electronic (as applicable) analog control will be used.

Electrical equipment will be interlocked as applicable to minimize spillage and equipment damage.

6. PELLETIZING PLANT

Indurated pellets would be produced from the pipeline discharge using the standard Allis-Chalmers or Dravo-Lurgi pelletizing process.

This plant would consist of four individual lines, each capable of producing 3,000,000 LTPY of finished pellets.

Slurry would be received from the pipeline at 65-75% solids. This would be discharged to slurry retention tanks of approximately one hour capacity in the plant. An outdoor thickener is included for reclaim of material from the pond and to maintain a filter feed density of approximately 70% solids.

Slurry is pumped to six 6'-9" x 10 disc filters per line. The filter boots would be closed circuited with the surge tanks to maintain boot levels for maximum filter efficiency. The filters have a snap-blow discharge requiring 40 psig air.

Filter cake and bentonite are mixed and fed at a controlled rate to six 12 ft. x 33 ft. balling drums. These each discharge to 8 ft. x 18 ft. screens which recycle the undersize and shred and recycle the oversize by means of suitable conveyors.

Sized green balls are fed to the travelling grate via belt conveyors and a roller conveyor with suitable fines collection.

Bentonite will be received in bulk, pulverized and stored in bins. A pneumatic conveyor will be used to fill the bulk storage bins and the day bins for each balling drum. Suitable dust collection is included for the handling and mixing of the bentonite.

Green pellets will be fed into either a Dravo grate system or an Allis-Chalmers grate-kiln system. The Allis-Chalmers equipment is described in the detailed capital cost estimate. Cooled pellets are discharged out of the building for conveying to ship-loading or storage.

Suitable dust collection is included for the feed and discharge ends of the pelletizing system. Dust laden exhaust gases will be cycloned and discharged to atmosphere. Wet scrubbing of gases will be employed after the cyclones, as required.

A chip regrind mill is used to slurry rejected pellets and clean-up. This mill discharges back to the filter feed surge tank.

Suitable sumps and clean-up equipment are included.

7. TAILINGS DISPOSAL

(a) Julian

It is proposed to discharge tailings into Julienne Lake immediately east of the plant area. The lake area bounded by the rail causeway and the orebody extension will only provide three years storage to the water level. This will then build above water level at 10 feet per year.

A further consideration must be dyking and drainage of the orebody extensions under water. Initial dyke construction must be with rock fill in order to provide a stable structure. Tails retention dykes will be formed using Dorrclone buggies and discharge overflow to the interior of the dyke.

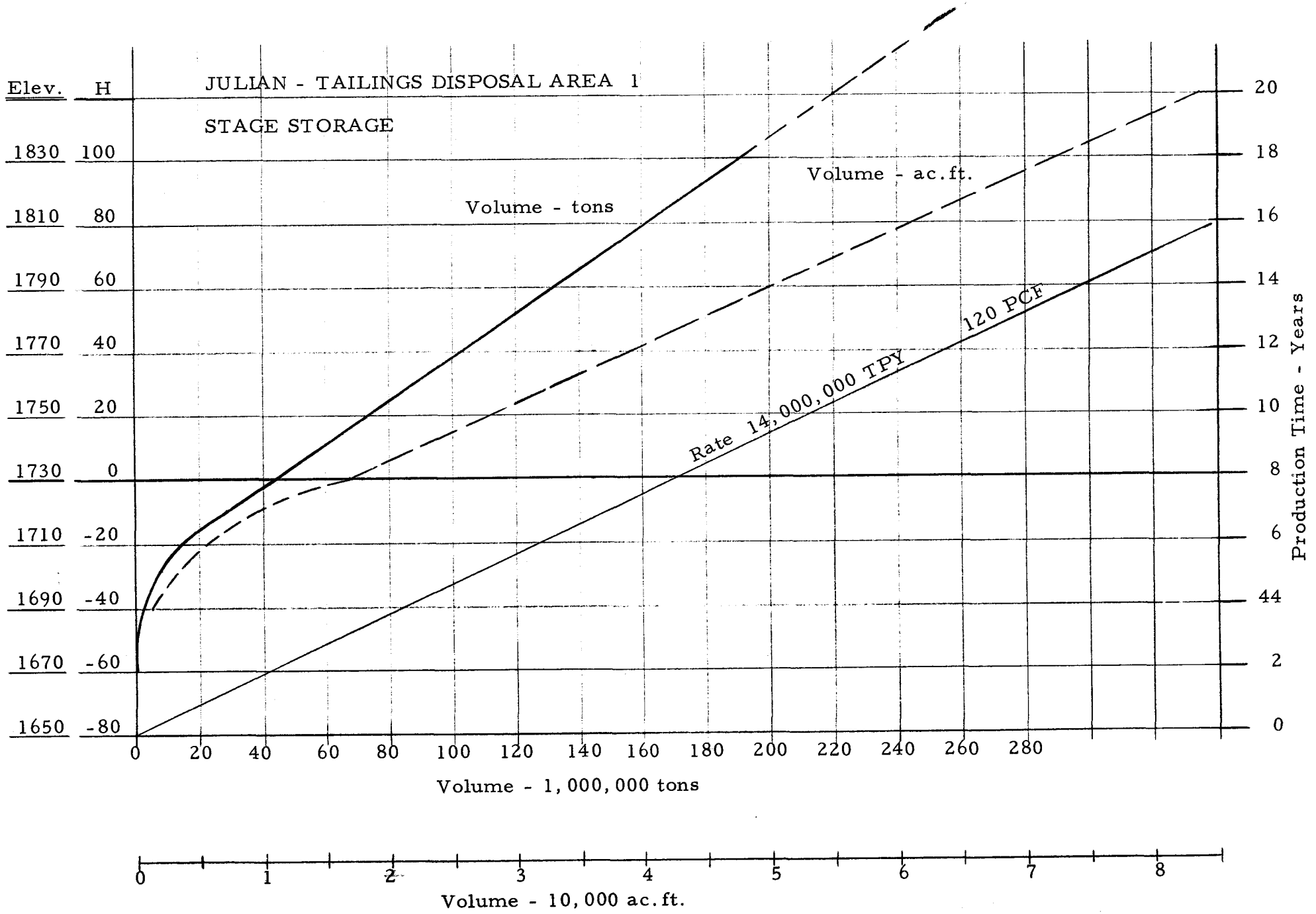
In order to accommodate tailings over a longer period it will be necessary to utilize Julienne Lake and install a diversion channel to divert Wabush Lake around the tails area. This diversion channel will require approximately 140,000 cubic yards of excavation.

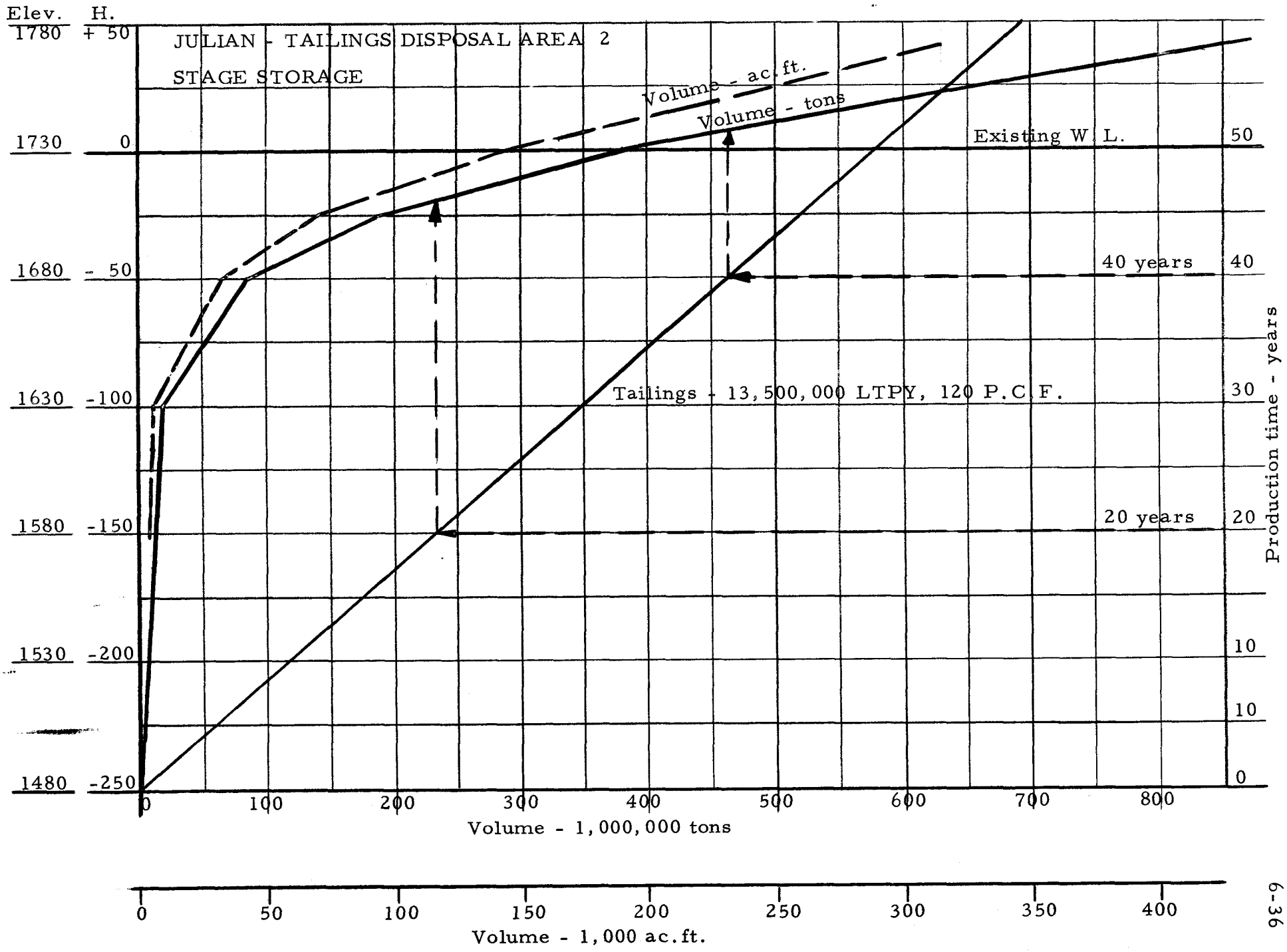
Typical stage storage curves and dyke volumes are included as a guide.

The present scheme is to discharge tailings by launder to a pumping station. From this pumping station, ten SRL pumps will distribute tailings via pipelines to Dorrclone buggies or the tailings area.

An alternate scheme would be to cyclone and thicken tailings and pump a considerably lesser volume.

The economics of each scheme must be investigated in detail simultaneously with the overall water study and long range mining plans. A prerequisite of this study is drilling along all proposed dykes in order to determine silt and rock contours for more accurate retention dam design and stability.

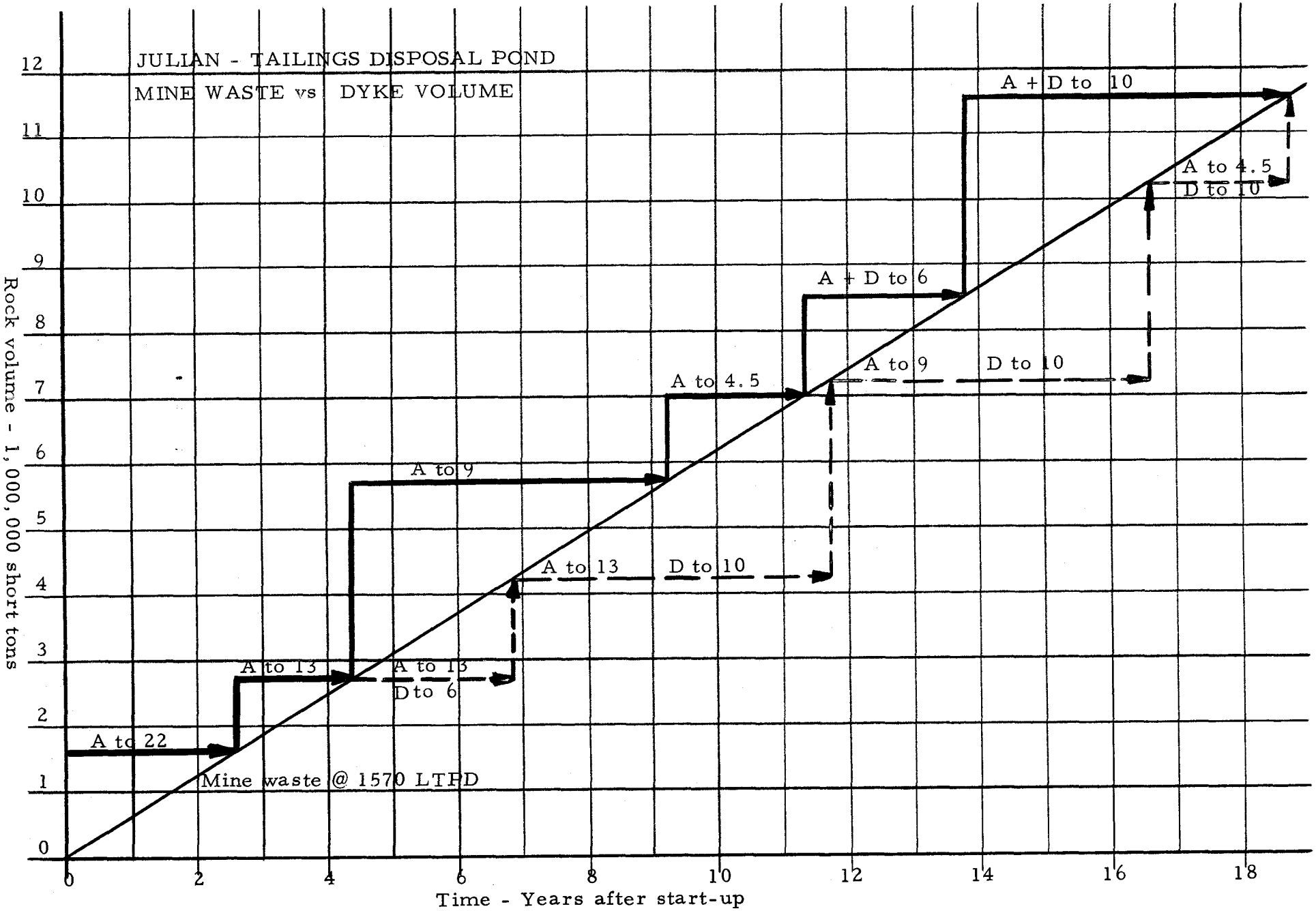

JULIAN - TAILINGS DISPOSAL AREA 1
STAGE STORAGE
Elev.
H
1830 100
1810 80
1790 60
1770 40
1750 20
1730 0
1710 -20
1690 -40
1670 -60
1650 -80
Volume - tons
Volume - ac.ft.
Rate 14,000,000 TPY
120 PCF
20
18
16
14
12
10
8
6
44
2
0
Production Time - Years
0 20 40 60 80 100 120 140 160 180 200 220 240 260 280
Volume - 1,000,000 tons
0 1 2 3 4 5 6 7 8
Volume - 10,000 ac.ft.

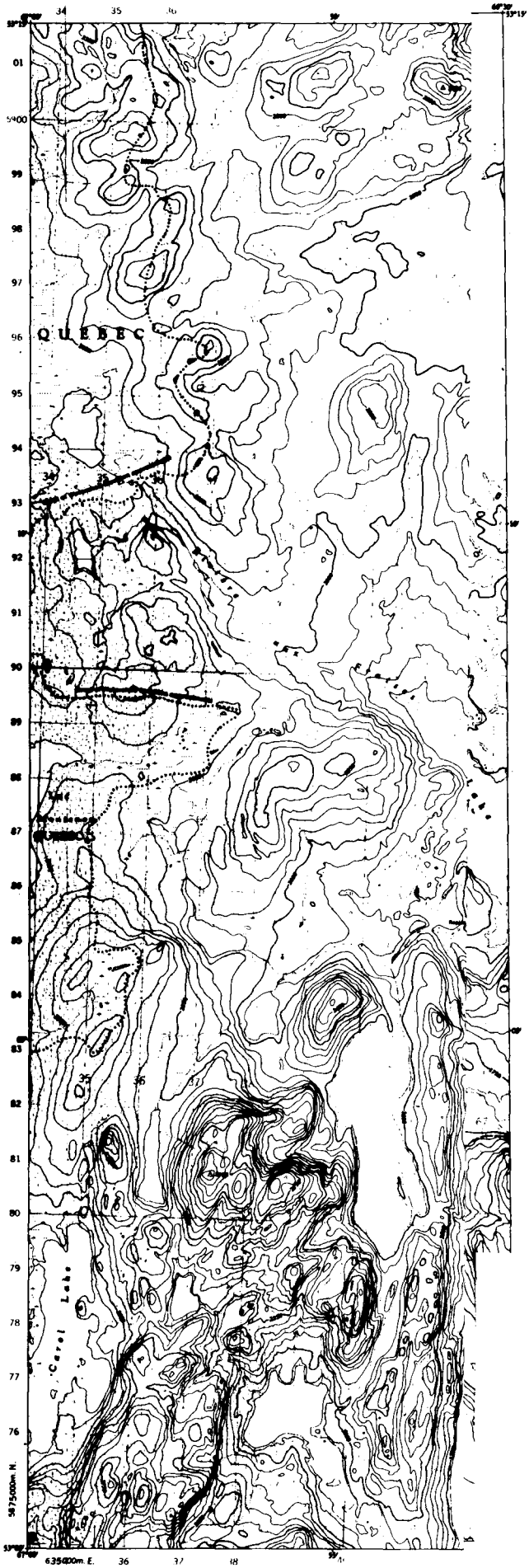

Elev.
H.
1780
+ 50
JULIAN - TAILINGS DISPOSAL AREA 2
STAGE STORAGE
Volume - ac.ft.
Volume - tons
1730
0
Existing W. L.
50
1680
- 50
40 years
40
1630
-100
Tailings - 13,500,000 LTPY, 120 P.C.F.
30
1580
-150
20 years
20
1530
-200
10
10
1480
-250
0
0
100
200
300
400
500
600
700
800
Volume - 1,000,000 tons
Production time - years
0
50
100
150
200
250
300
350
400
Volume - 1,000 ac.ft.

SUMMARY

Dyke	Top Elev. (ft.)	Dyke Vol. 1000 Tons	Filter Vol. 1000 Tons	Total Vol. 1000 Tons
A	1740	6,300	1,260	7,560
B	1740	77	30	107
C	1740	2,860	600	3,460
D	1740	3,370*	637*	4,007
E	1750	400	130	530
F	1750	nil	nil	nil
Total		13,007	2,657	15,664

* Dykes A & D are common for 2200'.
Dyke A figures include 440 M. Tons Dyke
and 120 M. Tons filter material from Dyke D.


JULIAN - TAILINGS DISPOSAL POND
MINE WASTE vs DYKE VOLUME
A + D to 10
A to 4.5
D to 10
A + D to 6
A to 9
D to 10
A to 4.5
A to 9
A to 13
D to 10
A to 13
A to 13
D to 6
A to 22
Mine waste @ 1570 LTPD
Rock volume - 1,000,000 short tons
Time - Years after start-up
0
1
2
3
4
5
6
7
8
9
10
11
12
0
2
4
6
8
10
12
14
16
18



SCALE = 1 : 50,000

1 0 1 2 3 MILES

0 3000 12000 FEET

CANADIAN JAVELIN LIMITED

JULIAN LAKE NEWFOUNDLAND

TAILINGS DISPOSAL DISPOSAL AREA AND DYKES LOCATION PLAN

KILBORN

160 - F1

(b) Star-O'Keefe

It is assumed that the tailings will be discharged to an impounding area to the northeast of the plant, probably into Star Lake. Cyclone buggies will be used to build impounding dykes.

As at Julian, an economic study is required to evaluate thickening prior to pumping.

A detailed investigation is required of the area to determine water flows and availability, and also to determine a final tailings area to avoid contamination of watercourses.

(c) Seven Islands

There will be no tailings discharged from the pellet plant. Water from the pipeline will be pumped to a clarification pond and overflowed into the watercourse.

8. SERVICES

The services complex is attached to the concentrator in order to fully utilize its facilities, avoid duplication of facilities, and to minimize the cost of services distribution. The service facilities which predominately service the concentrator are adjacent to it. These include instrument repair, electrical repair, machine shop, plate shop, and a portion of the warehouse. Vehicle repair is at the end of this complex, nearest the mine. Items included in this complex are as follows:

Electrical repairs

Instrument repairs

Machine shop

Plate shop

Welding shop

Component repairs

Vehicle washing

Lubrication area

Tire repair area

Tractor, truck and other heavy equipment maintenance

Motor repairs

Motor test bed

Plumbing shop

Warehouse

Personnel change room

Supervisors change room

Offices for service personnel

Lunch room

Conference and lecture rooms

First aid and safety.

The warehouse at Julian will receive all materials for both Julian and Star-O'Keefe. Shipments will be made by truck to Star-O'Keefe.

Similarly the Julian service facilities will perform most component repairs, including motor repairs and testing. This minimizes the capital requirement at Star-O'Keefe and concentrates these specialized service personnel where they can be best utilized.

The mining equipment at Star-O'Keefe is only slightly less than at Julian (68% of the capital cost). As a result the vehicular repair area is not proportionately smaller than Julian.

The warehouse, component repair, machine shop, electrical shop, instrument repair and office areas are considerably smaller at Star-O'Keefe, as component repairs will be done at Julian. Change-rooms are proportional to the employee requirements.

A small service complex, similar to Star O'Keefe, is included for the pellet plant and dock at Seven Islands. The garage and automotive portion will be quite small as only surface mobile equipment is required. Local suppliers will be used as much as possible to minimize warehousing and other facilities.

9. MISCELLANEOUS BUILDINGS

The various buildings, apart from the crusher, concentrator, powerhouse, service and administration, are as follows:

(a) Fresh water pumphouse - included under "Water".

(b) Process water pumphouse - included under "Water".

(c) Tailings pumping station - included under "Tailings".

(d) Fuel unloading and dispensing - included under "Fuel".

(e) Small buildings skid mounted at the pit - included here.

(f) Powder house for high explosives - included here.

(g) Gate house - This is not deemed necessary at this time and the security personnel are accommodated in the administration building.

(h) Cold warehouse - This will be used during construction and is included under "Construction overheads".

(i) Dock fuel unloading and dispensing.

10. SURFACE MOBILE

This includes all mobile equipment purchased by the company other than that included under "Mining".

The items are detailed in the capital cost section of this report.

11. ADMINISTRATION BUILDING

This is a separate building adjacent to the service building and connected with a passageway. This building houses all administrative and supervisory personnel. Included are the following:

Management

Mine Supervision

Mill Supervision

Plant Supervision

Engineering offices

Geological offices

Print room

Personnel

Employee training

Accounting

Payroll

Warehouse supervision

Purchasing agent

Lunchrooms

Conference and training room

Communications and traffic

Vault

The majority of these people will duplicated at Julian, Star-O'Keefe and the pellet plant, as the distance precludes common administrative and supervisory personnel.

A central administration building with all senior corporate personnel is located in the Seven Islands area. These people will direct the overall administration and contractual agreements for all three operating areas.

12. WATER SUPPLY, FIRE PROTECTION AND PLANT SEWAGE DISPOSAL

(a) Julian

Process water make-up will be obtained from Wabush Lake to the west of the plant area. Seven vertical pumps will be supplied complete with pumphouse, intake structures and service access. These pumps will discharge directly to the concentrator distribution system via a 72" wood stave pipeline.

Approximately 50% of the process water requirements are recovered by means of dewatering cyclones and recycled internally.

Fresh water will be obtained from the south arm of Julienne Lake. The railway causeway will contain a spillway which will elevate this section of the lake. This avoids contamination from the tailings disposal area.

A detailed study of the water system is required to determine water supply to this fresh water area.

Fresh water will be pumped via vertical pumps to an elevated 200,000 gal. storage tank. This will supply the fire protection system, potable water system via suitable water treatment facilities, cooling waters, pump glands and other items requiring clean fresh water.

Fire protection will be provided from the reserved portion of the water tank. A buried fire main with hydrants will be used. Wherever practical, fire mains will be installed inside buildings with hydrants projecting through the outside wall.

Conveyorways and offices will have a fire sprinkler system.

(b) Star-O'Keefe

Process water will be taken from Tuttle Lake and delivered to the plant site. In general, the water supply and fire protection will be similar to that proposed for Julian.

Sewage disposal from the concentrator, service and administration buildings will be by means of a packaged aerator system. The effluent is then chlorinated and discharged to the lake.

(c) Seven Islands

The exact location of the plant is not known. A sum of money has been allocated for a water supply system for potable, fire and cooling water. Further investigation may show that the pipeline water can be used for cooling, thus minimizing the supply from outside sources.

A packaged sewage treatment system will be used.

13. ELECTRICAL

(a) Julian and Star-O'Keefe

Electricity will be supplied to Julian by the Twin Falls Power Company from the Generating Station at Twin Falls. It has been assumed that power would be supplied from the Wabush transformer station. This will entail construction of about 20 miles of 115 KV overhead line. This would be a single circuit on wood poles. As a purchaser of power, Canadian Javelin will probably recover the cost of building the line as a rebate on their power bill over a period of years.

The Quebec Hydro will supply power to Star-O'Keefe from the high tension system in the area. About 18 miles of 315 KV overhead line is included from the transformer station near Mt. Wright.

The plant transformer station would consist of an outdoor galvanized steel structure with main circuit breaker and switching for three main power transformers at Julian (two at Star-O'Keefe). Each transformer at Julian would be rated 30 MVA (20 MVA at Star-O'Keefe), and would be provided with cooling fans, so that on loss of one transformer the total estimated demand of 60 MVA (18 MVA at Star-O'Keefe) could be carried by the remaining transformers and still provide sufficient capacity for all future anticipated plant

expansion. A switchroom, which could be separated from the plant, would be provided to house the 13.8 KV switchgear. From this switchroom, power would be distributed to the concentrator and other areas.

Main distribution would be at 13.8 KV with simple radial feeds to loads. Load centers would be provided double-ended, with low voltage tie breakers, and 13.8 KV system would be sized so that loss of one 13.8 KV cable feeder would not shut down the plant. Where remote locations, such as pump houses, must be served with power, 13.8 KV wood pole overhead lines would be constructed.

Large motor drives would be supplied directly at 13.8 KV. One motor only would be switched on each breaker, the breaker then acting as a motor starter. Large motor drives for mills have been assumed as being wound rotor, with liquid rheostats.

Drives for motors 300 to 2000 H.P. would be 4.16 KV, supplied through step-down transformers at each location.

Power for small motors (1 - 250 H.P.) and for distribution to service buildings would be 600 volt, supplied through step-down load centers sized as required for each area.

Motor control centers and motor starters for the concentrator would be located in a central location in clean ventilated switchrooms.

For other areas, switchrooms would be located in the buildings as required, in clean areas, and also ventilated.

Wiring to motors and controls would be either in interlocked armoured cables (Teck cable, with PVC jacket overall) or steel wire armoured cables, as required, run on galvanized steel racks. All wiring devices would be in watertight and dust tight enclosures, wherever required. All junction and terminal boxes would be of the cast type.

Standby power would be supplied directly to the 13.8 KV bus to supply standby loads in all areas, as required. On loss of Hydro power, the standby diesel unit would start automatically, switch off non-essential loads, and switch onto the 13.8 KV bus. Indication of standby would be provided by means of lights in each area.

Process control panels would be provided in all areas in clean, well lighted control rooms. Graphic layouts would be provided where required. Also, control of remote pumps and crusher equipment would be from the central control panel.

High bay lighting would be by means of mercury vapour fixtures, with some incandescent provided for standby lighting.

Low bay lighting, and lighting in offices, change rooms, and all such areas would be fluorescent.

Welding receptacles and convenience receptacles would be provided for all areas.

The pit distribution would be supplied from the local substation at the crusher station. Two circuits would be provided at 4.16 KV, with portable contactor sleds for switching the shovels, and four small portable power centers to provide power and switching for drills and pit dewatering pumps.

Lighting circuits for pit lighting would be supplied from small portable plug-in power centers supplied from the 4.16 KV distribution.

All wiring in the pit would be by means of neoprene jacketted trailing cables, equipped with plugs and receptacles.

All equipment in the pit would be supplied from resistance grounded wye connected transformers with low ground current, ground check wire in all 4.16 KV cables, to provide a high degree of safety from electrical shock.

Townsite power would be supplied directly from the 115 KV incoming line at Julian, and from the 13.8 KV bus at Star-O'Keefe, with separate substation consisting of two transformers, each rated 3000 KVA, metering, and 4.16 KV switchgear. Power would be distributed at 4.16 KV underground by means of concentric neutral cable to pad-mounted distribution centers, where

small transformers would provide low voltage power to homes or apartments. Large buildings, such as shopping centers and schools, would be supplied at 4.16 KV.

In an emergency, one 3000 KVA transformer could supply all power required for the townsite.

An allowance has been made for telephone service to the site.

Because of the remote location, some spare equipment has been included.

An allowance has been made for supplying temporary power during the construction stage.

Electric heating would be used in some instances at remote buildings where cost of running heating pipelines would be prohibitive.

(b) Seven Islands

Electricity will be supplied by Quebec Hydro from their high tension system located near Pointe Noir. It has been assumed that power will be supplied from the existing overhead line. This will entail construction of about five miles of 161 KV overhead line. This would be single circuit on wood pole structures. As a purchaser of power, Canadian Javelin will probably recover the line cost as

a rebate on their power bill over a period of years.

The plant transformer station would consist of an outdoor galvanized steel structure with main circuit breaker and switching for three main transformers. Each transformer would be rated 15 MVA and would be provided with cooling fans so that on loss of one transformer the total estimated demand of 30 MVA could be carried by two remaining transformers and still provide sufficient capacity for all future anticipated plant expansion. A switchroom would be provided to house the main 13.8 KV and other low voltage distribution equipment. From this switchroom, power would be distributed to the pelletizing plant, ship loader, pumphouse, service buildings and other small buildings.

Standby power would be supplied directly to the 13.8 KV bus from a diesel generator to supply standby loads in all areas, as required. On loss of Hydro power, the standby unit would start automatically.

An allowance has been made for temporary power, telephone service, and radio communication system to provide ship-to-shore communication and radio communication between Wabush and Seven Islands.

14. HEATING SYSTEM

(a) Powerhouse

The powerhouse is separate from the concentrating and service complex. A tunnel connects them to carry all service lines.

The powerhouse contains three 40 MBTU boilers, fired by heating oil at the mines and Bunker C at the pellet plant. All water conditioning equipment is also located here.

A standby diesel generator and service and instrument air compressors are contained in the same building.

Steam will be distributed to heat all buildings except the pumphouses, crusher house and isolated buildings associated with the mining operation.

Steam heat will also be supplied to the water tower and outdoor thickeners, to be used particularly during shut-down periods.

(b) Fuel Oil

Fuel oil storage tanks and unloading equipment are installed to handle rail car shipments of diesel oil and heating oil for mine use.

Normally, Bunker C oil would be used for the heating plant, but it is presently unavailable and may not be available in the near future.

Diesel oil will be distributed to dispensing stations at the pit and service building.

Gasoline will be supplied from the depot at Labrador City to a normal buried tank for dispensing to the company vehicles.

Present prices from Imperial Oil are:

F.O.B. their depot at	Seven Islands (¢ per gallon)	Labrador City (¢ per gallon)
Gasoline	25	30
Diesel Oil	23	28
Heating Oil	20	25
Bunker C	*12	-

* If available

Fuel consumptions are estimated as follows (Imperial gals./year)

	Julian	Star-O'Keefe	Pellet Plant
Production trucks	1,410,000	850,000	-
Other diesel equipment	520,000	310,000	70,000
Gasoline	150,000	75,000	75,000
Heating	8,100,000	4,050,000	2,450,000

Storage Capacity installed:

	Julian	Star O'Keefe	Pellet Plant
Diesel oil	2 x 10,000 bbls.	2 x 5,000 bbls.	12,500 gal.
Heating oil	2 x 20,000 bbls.	2 x 10,000 bbls.	-
Bunker C	-	-	3 x 100,000 bbls.
Gasoline	12,500 gal.	12,500 gal.	12,500 gal.

15. ROADS, YARDS, PARKING LOTS AND FENCING

(a) General

The main access road from Wabush to Julian will be upgraded to all-weather highway standards and paved. A distance of 24 miles has been considered.

It is assumed that an all-weather road will be built from Wabush to Mt. Wright. An allowance has been made only for an additional 25 miles from Mt. Wright to the Star-O'Keefe property.

The roads connecting Julian and Star-O'Keefe must be to all-weather highway standards as all equipment and supplies are to be trucked from Julian or Wabush.

Plant and mine roads and plant yards are included. These will be of gravel construction with suitable drainage.

An allowance is made for parking lots at Julian and Star-O'Keefe. These will have electric plug-ins for each car.

A small amount of fencing has been included but the entire plant area has not been enclosed.

An allowance has been made for roads, yards, fencing and parking at both the pellet plant and central administration building.

(b) Railway (Julian)

The railway will be installed for construction and operating supplies. There will be no shipments from the property.

The proposed route would commence at mile 24 of the Wabush Railroad, follow the west side of the southwest arm of Shabogamo Lake, and cross Julienne Lake to the plant site on a causeway to be built.

Plant site tracks will be installed for unloading into the warehouse, bulk fuel unloading, car storage and bypass tracks.

All supplies for both Julian and Star-O'Keefe would be delivered to Julian and trucked as required to Star-O'Keefe.

Approximately 11 miles of railroad plus plant trackage are allowed for in this estimate.

The exact route of this railroad will be determined during the preliminary engineering phase of the project.

(c) Causeway (Julian)

This is a permanent rockfill causeway which will carry the railroad and a service road. A spillway is incorporated in order to maintain a higher elevation on the fresh water side of the causeway. This will avoid contamination from the tailings area.

16. TOWNSITE

The total accommodation included in this estimate is as follows:

Type	Construction	After Start-up
Julian		
Preconstruction Bunkhouses	200	-
Single staff house	36	36
Town houses	192	192
Permanent bunkhouses	360	360
Bunkhouses	720	
converted to apartments		84
Single dwellings	50	50
Total	1,558	722
Star O'Keefe		
Preconstruction Bunkhouses	200	-
Single staff house	36	36
Town houses	100	100
Permanent bunkhouses	216	216
Bunkhouses	480	
converted to apartments		56
Single dwellings	50	50
Total	1,082	458

The total housing requirement may be less than the number of employees. Most of the clerks, typists and stenographers are considered to be married to other employees.

Seven Islands

The townsite construction will be as an addition to Port Cartier or Seven Islands. The following units are included for completion at plant start-up:

Single houses	50
Multiple houses	48
Apartments	84
Single staff	36
Total	218

There is no allowance for single personnel other than the staff house. A total employment of 353 administration and pellet plant, plus 50 for the dock, is estimated for this area.

The buildings in the townsite have been planned to permit the maximum use of modular construction and prefabrication of building components to permit ease in erection with semi-skilled workers and outside work reduced to a minimum. The buildings, exclusive of the community centre and school, are of wood construction utilizing prefabricated stress skin plywood panels insulated as required. The preliminary plans have been developed utilizing four foot wide panels with the length to suit. The panels in general conform to the recommendations for panel construction for northern housing[1] with further improvements incorporated from more recent experience in northern construction.

The plywood for the panels is a minimum 5/16" thick for exterior walls, 3/8" thick for wearing surfaces, and 1/4" thick for interior walls. The panels are designed to withstand the superimposed loads, including the snow loads and winds, recommended for the location[2].

The exterior exposed surfaces of the plywood, except floors, are to be Crezon coated to facilitate painting. All joints between panels are covered by wood battens with a neoprene gasket and sealant.

[1] Prefabrication in Northern Housing,
National Research Council Publication NRC 6059

[2] Supplement to the Building Code for the North,
National Research Council Publication NRC 10368

The roofs of the buildings are flat and consist of the stress skin panels with a neoprene-hypalon roofing system. This roofing system may be shop applied except for the hypalon finish coats which are field applied. The joints between the roof panels are taped and covered with fiberglass before applying the neoprene-hypalon system.

The main building groupings within the townsite are:

- Residential - Single Family
- Residential - Multiple Family
- Residential - Single People
- School
- Medical Centre
- Community Centre

A brief description of the main building features in each grouping follows.

Residential - Single Family

These would be purchased as precut units and shipped to the property. They would be erected on poured concrete foundations as scheduled.

Prefabricated or semi-prefabricated units would not be used due to the difficulty of shipping them to the site.

Site fabrication would be kept to an absolute minimum due to the higher cost of labour.

Residential - Multiple Family

The family residential unit consists of twenty-four townhouse units with a capacity of eight families each, or a total of 192 families. Each townhouse is two storeys high, in addition has a full basement, and contains the following:

Description	No.	Area (sq.ft.) Per Unit	Total
2-Bedroom Apartment	1	1,152	1,152
3-Bedroom Apartment	6	1,276	7,632
4-Bedroom Apartment	1	1,492	1,492
Corridors		1,080	1,080
Total			11,356

Each dwelling unit is completely self-contained with access from a central corridor. The first floor is utilized for day-time activities, with the bedrooms located on the second floor. Recreation room and laundry are in the basement.

Walls between units are insulated for sound.

Residential - Single People

The facilities for single persons include the following:

1 Staff House

5 Bunkhouses

3 Apartment blocks

1 Cafeteria

Staff House: The staff house provides single room accommodation with shared bathrooms for junior staff and private bathrooms for senior staff. It is expandable to house up to 36 persons.

Bunkhouses: Bunkhouses provide accommodation for 72 men in single rooms with communal washroom facilities. Bunkhouses are two-storey stressed skin, plywood panel construction as proposed for the townhouses.

Apartment Blocks: Apartment blocks are designed to be converted to 2-bedroom apartment units after serving initially for construction camp accommodation. Three storeys high, they are of concrete block, open web steel joist and 2" steel deck with concrete infill construction. Each block houses 240 men, 2 men per room. Washroom facilities are shared. After conversion, each block offers twenty-eight 2-bedroom suites without any structural change to the buildings.

Cafeteria: The permanent cafeteria serves 560 people per sitting. Two dining areas each seat 260 persons and a staff dining room seats 40 persons. Food preparation facilities are included.

School

The school is designed for 300 students. The total area is 19,600 square feet, or approximately 65 square feet per student. The building may be divided into ten classrooms plus kindergarten and gymnasium facilities. However, with frequent turnover in personnel and students, consideration should be given to an "open" type classroom for a portion of the building.

The building superstructure is a structural steel frame with insulated metal walls and roof. The ground floor is concrete slab on grade.

Medical Centre

A medical centre is proposed as a small unit providing minimum services for emergencies since complete medical facilities are available in Wabush.

Community Centre

The community centre is the hub of the townsite and has been planned to incorporate the essential commercial facilities inter-mixed with large activity and recreational areas and generous spaces for movement of people.

The plans for the community centre have been developed to include:

- hotel with dining room and twelve double rooms
- liquor lounge and tavern
- community hall
- cinema
- library
- general store
- bank
- municipal office, including post office
- beauty salon and barber shop
- drug store
- curling rink (attached)
- swimming pool (attached)

The total area of the community centre is approximately 51,000 square feet, exclusive of the swimming pool and curling rink.

The foundations and ground floor for the centre are of concrete. The superstructure is metal insulated walls and roof with a steel space frame roof structure. The roof consists of eight 70 ft. by 70 ft. sections made up of standard members on a five foot grid. Each roof section is supported at four points.

The inherent advantages of the space frame include:

- standard sections and components for framing members
- may be pre-assembled on the ground using semi-skilled workers
- minimum of support points
- independent of interior walls and partitions for vertical support
- flexibility to adjust to differential settlement
- adequate space for installation of ventilation ducts, pipes, services, etc. between framing members
- minimum height from ground floor to roof level.

Curling Rink

The curling rink contains four sheets of natural ice and is attached to the community centre. The building is constructed on top of a thick gravel pad placed on top of the existing ground. The building is a prefabricated metal structure with minimum insulation.

A locker room and observation lounge are incorporated as part of the curling rink.

Swimming Pool

The swimming pool is approximately 40 feet by 80 feet and incorporates a complete installation for water filtration and purification. Separate dressing and washroom facilities are provided for people utilizing the pool. The pool proper may consist of steel, fiberglass or concrete. The building superstructure is a structural steel frame with insulated metal walls and roof.

Sewage Treatment Plant

The sewage from the townsite flows by gravity or is pumped to the sewage treatment plant which is located on Marble Point. The plant is of the extended aeration type which will permit expansion as conditions warrant with a minimum change and expense. The process portion of the plant may be purchased as a packaged unit.

The plant is housed in a building of the usual stress skin plywood construction on wood or steel piled foundations.

The effluent from the plant is chlorinated and discharged directly to the lake. If freezing of the effluent is a problem, an insulated outfall line may have to be installed to the point of discharge into the lake.

Water Supply

Water will be supplied to the town at Julian and Star-O'Keefe by a pumphouse and treatment station. Water distribution is via buried lines.

Miscellaneous

No allowance is included in the estimate for an incinerator for disposal of garbage. Instead it is assumed that garbage will be collected on a bi-weekly basis and placed in a sanitary land fill where it may be burned or covered as weather and other conditions permit.

17. ENGINEERING, DESIGN, PURCHASING AND CONSTRUCTION MANAGEMENT

These include all detailed design and supervisory costs from concept to plant start-up. They do not include the owner's costs and fees and the cost of permanent personnel located at the property who are not directly chargeable to construction.

Included are the following:

Engineering

Detailed design

Bills of materials

Specifications

Contract documents

Purchasing

Expediting

Construction warehousing

Cost control

Scheduling

Construction contract negotiations

Construction site management and supervision

Start-up assistance

The above items are all included in any "turn-key" pricing.

18. WAREHOUSE INVENTORY

An allocation of funds is included in this area. This is assumed to be available at start-up and does not include purchases consumed during the construction period.

19. START-UP CAPITAL

This is included as a capital requirement from start-up until money is received from the sale of concentrate. Six months operating cost has been used as the basis of this requirement.

AREA 100 - GENERAL

A. Preconstruction

Aerial Photography	$ 20,000	
Ground Surveys	50,000	
Soil Investigation	40,000	
Water and Tailings Study	20,000	
Railway Investigation	20,000	
Power Investigation	15,000	
Preliminary Engineering	200,000	
Scheduling	30,000	
Orebody Mud Drilling	600,000	
Lake Body Drilling	40,000	
Total for A. Preconstruction		$1,035,000

B. Construction Overheads

Personnel - Contractor Staff	500,000
Mobilization	100,000
Surveying	100,000
Hoarding	100,000
Temporary Buildings	200,000
Temporary Services	300,000
Permits, Inspections	100,000
Travel Expenses and Recruiting	300,000
Site Visits - Head Office	300,000
Clean-up Final	50,000
Protection of Finished Work	50,000
Temporary Heat	400,000
Pumping	50,000

B. Construction Overheads (cont'd)		
Temporary Roads	$ 50,000	
Watchman	100,000	
Testing Materials	50,000	
Signs, Photographs	20,000	
Scaffolding, Staging, Chutes	150,000	
Snow Removal, Road Maintenance	300,000	
Winter Work	2,000,000	
Premium Time	5,000,000	
Insurance	350,000	
Bonds	150,000	
Passenger Vehicles-incl. Fuel	400,000	
Accounting, Warehousing, Purchasing	1,000,000	
Safety, Security, Fire Protection	100,000	
Office Equipment Supplies	200,000	
Air Freight	500,000	
Room and Board	2,000,000	
Escalation	7,000,000	
Contingency	6,500,000	
Total for B. Construction Overheads		$28,420,000
TOTAL FOR AREA 100		$29,455,000

AREA 120 - MINE

A. Pit Preparation		
Overburden removal	$3,230,000	
Mine Roads	200,000	
Total for A. Pit Preparation		$ 3,430,000
B. Initial Pit Equipment		
3 - Bucyrus Erie 60R electric drills	$1,060,000	
5 - 12 cu. yd. P & H 2100 BL electric shovels	4,220,000	
21 - 100 ton Lectrahaul M-100 rear dump trucks	5,060,000	
5 - Caterpillar D9 crawler tractors	740,000	
1 - 10 cu. yd. Caterpillar 992 front-end loader	190,000	
1 - Caterpillar 834 rubber tired tractor	105,000	
1 - Percussion drill truck with 600 cfm compressor	32,000	
1 - 350 cfm Portable Compressor	15,000	
5 - Jackhammers	5,000	
1 - Blasthole sand truck	30,000	
1 - 1 ton Flat-bed truck for blast crew	5,000	
1 - $2\frac{1}{2}$ cu. yd. P & H 955E diesel shovel	171,000	
3 - 35 ton Sicard rear dump trucks	282,000	
1 - 65 ton P & H T-650 mobile crane	170,000	
1 - 18 ton P & H R-180 mobile crane	79,000	
2 - 3 ton Flat deck trucks with Hiab	23,000	

B. Initial Pit Equipment (cont'd)		
1 - Lube Truck	$ 12,000	
3 - Caterpillar Model 16 graders	337,000	
1 - Water truck	30,000	
1 - Sicard BLD-5 snow blower	65,000	
1 - Sand truck	25,000	
10 - 1 ton Pick-up trucks	35,000	
20 - Radios	20,000	
Pit pumps and piping	150,000	
Electric power supply to mining equipment	287,000	
Electric power supply to pit dewatering equipment	25,000	
Pit lighting system	20,000	
Small tools and miscellaneous equipment	100,000	
Freight	466,000	
Total for B. Initial Pit Equipment		$13,759,000
TOTAL FOR AREA 120		$17,189,000

AREA 130 - CRUSHING PLANT

A. Building

Excavation 17,000 c.y. @ $4.00	$ 68,000
Backfill - Earth 11,000 c.y. @ $5.00	55,000
Backfill - Granular 600 c.y. @ $8.00	4,800
Fill - Ramp	9,500
Concrete - Building Foundation 340 c.y. @ $100.00	34,000
Concrete - Equipment Foundation 3,400 c.y. @ $100.00	340,000
Concrete - Wall, Pier 60 c.y. @ $110.00	6,600
Concrete - Slab on Grade 240 c.y. @ $90.00	21,600
Structural Steel 100 T @ $750.00	75,000
Miscellaneous Steel 40 T @ $900.00	36,000
Roofing 5,800 s.f. @ $2.50	14,500
Siding 15,000 s.f. @ $2.20	33,000
Mechanical Services 6,000 s.f. @ $4.00	24,000
Freight 1,700 T included in prices	
Electrical - included in Area 210	
Total for A. Building	$722,000

B. Equipment		
1 - 60" x 89" Gyratory Crusher	$ 741,500	
1 - Bag Type Dust Collector 20,000 CFM	54,800	
2 - 48" x 120" Hydra Stroke Feeders	60,700	
1 - Calc. Chloride Bin - 50 Ton Capacity 10' dia. x 10'	2,300	
1 - Cal. Chloride Discharge Feeder - 24" x 36"	1,800	
1 - Belt Conveyor - 84" x 400'	245,400	
1 - Belt Conveyor - 72" x 3,300'	1,740,700	
1 lot - Chutes & Miscellaneous Support Steel	25,600	
1 - Crane - 120/25 Ton E. O. C.	145,600	
1 - Eccentric Removal Trolley	11,900	
1 lot - Hoisting Mech. for Hinged Rail Support (for Eccentric Trolley)	1,200	
1 lot - Hinged Rail Support (for Eccentric Removal)	2,500	
1 - 4" Sump Pump	4,500	
1 - 12 ton Hydraulic Rock Grapple	37,400	
1 - Service Compressor	1,500	
Installation - Equipment	998,600	
Freight - 1,700 T included in prices		
Electrical included in Area 210		
Total for B. Equipment		$4,076,000
TOTAL FOR AREA 130		$4,798,000

B. Equipment (cont'd)

2 - 60" Autogenous Mill Feed Belt Scales	$ 28,000	
1 lot - Chutes & Miscellaneous Support Steel	24,500	
Installation - Equipment	512,200	
Freight 800 T included in prices		
Electrical included in Area 210		
Total for B. Equipment		$1,926,000
TOTAL FOR AREA 140		$2,818,000

AREA 140 - ORE STORAGE

A. Building

Excavation 35,000 c.y. @ $3.00	$105,000	
Backfill - Earth 10,000 c.y. @ $4.00	40,000	
Backfill - Granular 3,000 c.y. @ $6.00	18,000	
Concrete - Footing 300 c.y. @ $100.00	30,000	
Concrete - Slab on Grade 1,400 c.y. @ $90.00	126,000	
Concrete - Tunnels 2,600 c.y. @ $110.00	286,000	
Structural Steel 260 T @ $750.00	195,000	
Siding 92,000 s.f. @ $1.00	92,000	
Freight 1,800 T included in prices		
Electrical included in Area 210		
Total For A. Building		$892,000

B. Equipment

1 - Belt Conveyor - 84" x 530' long	$325,000	
24 - Vibrating Feeders - 48" x 72"	143,300	
4 - Reclaim Belt Conveyors 60" x 230'	395,000	
2 - Reclaim Horizontal Transfer Conveyors - 60' x 130'	111,600	
2 - Autogenous Mill Feed Conveyor 60" x 450'	386,400	

AREA 150 - CONCENTRATOR

A. Building

1. Grinding

Excavation 7,000 c.y. @ $4.00	$ 28,000	
Backfill - Earth 4,000 c.y. @ $5.00	20,000	
Backfill - Granular 1,500 c.y. @ $8.00	12,000	
Concrete - Building Foundation 200 c.y. @ $100.00	20,000	
Concrete - Slab on Grade 1,050 c.y. @ $90.00	94,500	
Concrete - Elevated Slab 1,150 c.y. @ $120.00	138,000	
Concrete - Equipment Foundation 1,900 c.y. @ $100.00	190,000	
Structural Steel 1,100 T @ $750.00	825,000	
Miscellaneous Steel 120 T @ $900.00	108,000	
Siding 58,000 s.f. @ $2.20	127,600	
Roofing 25,000 s.f. @ $2.50	62,500	
Mechanical Services 38,000 s.f. @ $4.00	152,000	
Freight 2,800 T included in prices		
Electrical included in Area 210		
Total for 1. Grinding		$1,777,600

2. Screening

Excavation 10,000 c.y. @ $4.00	$ 40,000	
Backfill - Earth 6,000 c.y. @ $5.00	30,000	
Backfill - Granular 2,000 c.y. @ $8.00	16,000	
Concrete - Foundations 200 c.y. @ $100.00	20,000	
Concrete - Walls, Piers 1,400 c.y. @ $110.00	154,000	
Concrete - Slab on Grade 750 c.y. @ $90.00	67,500	
Concrete - Elevated Slab 700 c.y. @ $120.00	84,000	
Concrete - Equipment Foundations 350 c.y. @ $100.00	35,000	
Structural Steel 850 T @ $250.00	637,500	
Miscellaneous Steel 120T @ $900.00	99,000	
Siding 21,000 s.f. @ $2.20	46,000	
Roofing 22,000 s.f. @ $2.50	55,000	
Miscellaneous Architectural	20,000	
Mechanical Services 22,000 s.f. @ $4.00	88,000	
Freight included in prices 2,000 T		
Electrical included in Area 210		
Total for 2. Screening		$1,392,000

3. Separating

Excavation 15,000 c.y. @ $4.00	$ 60,000	
Backfill - Earth 8,000 c.y. @ $5.00	40,000	
Backfill - Granular 4,000 c.y. @ $8.00	32,000	
Concrete - Foundations 1,150 c.y. @ $100.00	115,000	
Concrete - Slab on Grade 1,800 c.y. @ $90.00	162,000	
Concrete - Elevated Slab 3,700 c.y. @ $120.00	444,000	
Concrete - Equipment Foundations 1,250 c.y. @ $100.00	125,000	
Structural Steel 1,550 T @ $750.00	1,162,500	
Miscellaneous Steel 150 T @ $900.00	135,000	
Siding 23,000 s.f. @ $2.20	50,600	
Roofing 45,000 s.f. @ $2.50	112,500	
Miscellaneous Architectural	20,000	
Mechanical Services 45,000 s.f. @ $4.00	180,000	
Freight 4,500 T included in prices		
Electrical included in Area 210		
Total for 3. Separation		$2,638,600

4. Regrinding

Excavation 7,000 c.y. @ $4.00	$ 28,000	
Backfill - Earth 2,500 c.y. @ $5.00	12,500	
Backfill - Granular 2,000 c.y. @ $8.00	16,000	
Concrete - Foundations 700 c.y. @ $100.00	70,000	
Concrete - Slab on Grade 1,600 c.y. @ $90.00	144,000	
Structural Steel 900 T @ $750.00	675,000	
Miscellaneous Steel 100 T @ $900.00	90,000	
Siding 35,000 s.f. @ $2.20	77,000	
Roofing 42,000 s.f. @ $2.50	105,000	
Miscellaneous Architectural	20,000	
Mechanical Services 42,000 s.f. @ $4.00	168,000	
Freight 2,000 T included in prices		
Electrical included in Area 210		
Total for 4. Regrinding		$1,405,500

5. Transfer House and Galleries		
Transfer House 250,000 c.f. @ $1.00	$250,000	
Galleries 600 l.f. @ $250.00	150,000	
Tunnels 1,000 l.f. @ $400.00	400,000	
Total for 5. Transfer House and Galleries		$ 800,000
6. Concentrate Storage		
Excavation 6,500 c.y. @ $4.00	26,000	
Backfill 1,000 c.y. @ $5.00	5,000	
Granular Fill 1,500 c.y. @ $8.00	12,000	
Concrete - Footing, Wall, Pier 520 c.y. @ $110.00	57,200	
Concrete - Slab on Ground 3,600 c.y. @ $90.00	324,000	
Structural Steel 680 T @ $650.00	442,000	
Miscellaneous Steel 70 T @ $900.00	63,000	
Siding - Insulated 42,000 s.f. @ $2.20	92,400	
Roofing 32,000 s.f. @ $2.50	80,000	
Miscellaneous Architectural	20,700	
Mechanical Services 32,000 s.f. @ $4.00	128,000	
Freight 2,500 T included in prices		
Electrical included in Area 210		
Total for 6. Concentrate Storage		$1,250,300
TOTAL FOR A. BUILDING		$9,264,000

B. Equipment

1. Grinding and Screening

1 - Crane 75/5	$ 115,400	
2 - Belt Conveyors - 30" x 70' Primary Screen O.S.	23,600	
4 - Belt Conveyors - 30" x 70' Secondary Screen O.S.	47,100	
2 - Belt Conveyors - 30" x 300' O.S. from Primary and Secondary Screens	88,300	
2 - Belt Conveyors - 36" x 35' Screen O.S. to Autogenous Mill Feed Conveyor	13,700	
2 - Belt Conveyors - 30" x 155' Upper Secondary Screen O.S. Transfer to O.S. from Primary and Secondary Screen	45,600	
2 - Autogenous Grinding Mills 32' dia. x 15'	2,273,600	
24 - Primary Screens - 5' x 12' Single Deck	146,400	
96 - Secondary Screens - 5' x 12' Single Deck	585,600	
10 - 12 Way Distributors	52,800	
24 - Slurry Pump Boxes	58,800	
8 - 12" x 10" Slurry Pumps	74,900	
1 lot - Chutes and Miscellaneous Support Steel	487,500	
16 - 12" x 10" Slurry Pumps	164,700	
Installation - Equipment	873,000	
Process Piping	240,000	
Instrumentation	20,000	
Freight 3,200 T included in prices		
Electrical included in Area 210		
Total for 1. Grinding and Screening		$5,311,000

2. Separation	
2,016 - Rougher Spirals	$1,756,000
2,016 - Sets of Accessories for Spirals	183,500
1,344 - Cleaner Spirals	1,170,600
1,344 - Sets of Accessories for Spirals	122,300
1,344 - Recleaner Spirals	1,170,600
1,344 - Sets of Accessories for Spirals	98,000
1 lot - Foreign Exchange Spirals	80,800
1 lot - Frt. to Montreal Spirals	169,400
64 - D 20 LB Krebs Cyclones	167,700
16 sets - Overflow and Underflow Launders	38,700
16 - 4 Way Manifold for Cyclone Feed	19,500
16 - 12" x 10" Clean Spiral Feed Pumps	141,600
16 - Mids Cyclone Feed Pumps - 14" x 12"	192,000
32 - Pump Boxes - R. L.	79,300
32 - Krebs D 10 B Cyclones	36,400
2 - Double Pump Boxes	7,400
4 - 12" x 10" Slurry Pumps	54,400
2 - 2-Way Distribution Boxes	4,700
2 - Tech Taylor Valves - 18"	11,600
2 - Cyclone Feed Manifold - 16 outlets 7' dia. x 2' R. L.	2,800
Installation - Equipment	795,500
Process Piping	500,000
Instrumentation	52,200
Freight 1,940 T included in costs	
Electrical included in Area 210	
Total for 2. Separation	$6,855,000

3. Dewatering and Regrinding

16 - Pump Boxes	$ 39,500
1 - 16' dia. x 16' Tank Concentrate Repulper	3,200
1 - Agitator	9,200
8 - Regrind Mills - 16'-6" dia. x 23' long	3,561,200
1 - 100' dia. Thickener	85,400
2 - 150' dia. Thickener	292,800
16 - D 20 B Krebs Cyclones	42,400
8 - Discharge Launders for Krebs Cyclone	9,900
4 - 2-Way Distributors	7,800
2 - 3-Way Distributors	4,300
2 - 4-Way Distributors	4,700
1 - 20' Horizontal Filter	54,000
1 - Vacuum Pump - 10,700 CFM	65,000
1 - Filtrate Receiver Tank	1,200
1 - Moisture Trap Tank	1,200
1 - Seal Tank	1,000
1 - Filtrate Pump - 3 x 3	1,200
1 - 75 ton/5 ton E. O. C. Crane	94,800
8 - Surge Tanks - 22' dia. x 19'	46,200
8 - Agitators	74,100
16 - DSM Screens 8 - Feed Boxes 8 - Repulper Launders	712,100
1 - 24" x 330' Tripper Conveyor - Concentrate Storage	61,300
1 - 24" x 210 l. f. Concentrate Storage Conveyor	25,700
1 - Support Steel	5,000
64 - Automatic Samplers	77,400
1 lot - Test Lab and Sample Equipment	25,000
1 lot - Assay Lab Equipment Allowance	60,000

3. Dewatering and Regrinding (cont'd)		
1 - Ball Charging System	$ 94,500	
4 - Pump Regrind Feed - 10 x 8	27,200	
1 - Pump - 100' Thick U. F. - 5 x 4	2,500	
1 - Pump - 100' Thick O. F. - 8 x 6	5,300	
2 - Pump - 150' Thick U. F. - 5 x 4	5,000	
2 - Pump - 150' Thick O. F. - 8 x 6	10,500	
1 - Concentrate Recirculator - 10 x 8	7,000	
8 - Pump (DSM) Thru-Flow - 8 x 6	42,000	
8 - Pump Regrind Discharge - 8 x 6	36,400	
4 - Pump Discharge to Pipeline - 8 x 6	18,200	
8 - Sump Pumps - 4"	35,500	
Installation - Equipment	773,000	
Process Piping	325,000	
Instrumentation	75,300	
Freight 3,100 T included in prices		
Electrical included in Area 210		
Total for 3. Dewatering and Regrinding		$6,873,000

4. Concentrate Storage		
1 - 30" x 250' Concentrate Reclaim Conveyor	$ 61,000	
1 - 30" Belt Scale	7,200	
6 - 30" x 60" Vibrating Feeders	17,900	
1 - Chutes & Miscellaneous Support Steel	8,600	
Installation - Equipment	20,300	
Freight included in prices		
Electrical included in Area 210		
Total for 4. Concentrate Storage		$ 115,000
Total for B. Equipment		$19,154,000
TOTAL FOR AREA 150		$28,418,000

AREA 160 - TAILINGS DISPOSAL

A. Building

3000 s.f. @ $20.00	$60,000	
Concrete base, tailings sump tank	4,000	
Total for A. Building		$ 64,000

B. Equipment

10 - 14" x 12" SRL-C tailings pumps	166,400	
7 - Goulds reclaim water pumps, 16" x 18"	166,800	
35,000 ft. - 16" Victaulic pipe	511,500	
1 lot - Rubber lining	350,000	
3500' x 25' wide Right-of-way or bedding for tails lines	35,000	
1 - Reclaim water W.S. tank, 230,000 US gal.	28,600	
4 - Cyclone buggies for dyke construction	142,600	
1 - Tailings sump, 200,000 gals.	28,100	
Installation - equipment	783,000	
Process piping	1,000	
Instrumentation	150,000	
Freight - 2200 tons - included in prices	-	
Electrical included in Area 210	-	
Total for B. Equipment		2,363,000
TOTAL FOR AREA 160		$2,427,000

AREA 170 - SERVICE BUILDING

A. Building

Excavation 30,000 c.y. @ $4.00	$ 120,000	
Backfill - Earth 15,000 c.y. @ $5.00	75,000	
Backfill - Granular	5,000	
Concrete - Foundation 900 c.y. @ $100.00	90,000	
Concrete - Slab on Grade 3,000 c.y. @ $90.00	270,000	
Concrete - Elevated Slab 2,900 c.y. @ $120.00	348,000	
Concrete - Equipment Foundation 100 c.y. @ $100.00	10,000	
Structural Steel 1,600 T @ $750.00	1,200,000	
Miscellaneous Steel 200 T @ $900.00	180,000	
Roofing 150,000 s.f. @ $2.50	375,000	
Flooring	60,000	
Siding 45,000 s.f. @ $2.20	99,000	
Interior Partitions 90,000 s.f. @ $2.00	180,000	
Ceiling	60,000	
Doors and Windows	100,000	
Miscellaneous Architectural	30,000	
Mechanical Services 220,000 s.f. @ $3.00	660,000	
Freight 5,000 T included in prices		
Electrical included in Area 210		
Total for A. Building		$3,862,000

B. Equipment

1. General

Office Furniture and Equipment	$ 30,000	
1 - Bridge Crane 25 T	50,000	
2 - Bridge Cranes 15 T	52,000	
4 - Bridge Cranes 5 T	29,000	
Fork Lift Trucks	15,000	
Shelving and Office Equipment	50,000	
Installation	35,000	
Lockers	30,000	
Freight 41 T included in prices		
Electrical included in Area 210		
Total for 1. General		$ 291,000

2. Machine Shop

Drill Press - 24 in.	$ 8,400
Radial Drill - 5 ft.	2,400
Pedestal Grinder	2,700
Power Hacksaw - 10 in. Cap.	12,000
Bandsaw	13,200
Plate Roll	9,600
Ironworker	6,000
Shaper - 32 in.	19,200
Milling Machine	16,800
12 in. Lathe - 12 ft.	33,600
20 in. Lathe - 12 ft.	43,200
Portable Scale - 0-1,000 lbs.	3,000
200 Ton Press	7,200
Bench Grinder	1,200
28 in. Shaper	6,000

2. Machine Shop (cont'd)		
Bench Drill	$ 10,000	
Threading Machine 6	24,000	
Portable Threading Machine	3,000	
Screw Press	2,400	
Belt Vulcanizer	12,000	
Portable Oxy-Acet Welding	22,000	
Small Equipment	42,000	
Office Equipment	46,000	
Benches	42,000	
5 Ton Crane	6,000	
15 Ton Crane	30,000	
15 Ton Crane	26,500	
Forge Hammer - 200 Ton	12,000	
Small Tools	10,600	
Installation	20,000	
Freight 160 T included in prices		
Electrical included in Area 210		
Total for 2. Machine Shop		$ 493,000

3. Garage		
Truck Lift	$ 18,000	
Compressor	7,200	
50 Ton Jacks-4	12,000	
Tire Changing Equipment	22,000	
Lube Unit	24,000	
Steam Cleaner	10,000	
Small Tools	62,000	

3. Garage (cont'd)		
Balancing Unit	$ 9,600	
Grease Guns, Portable Lube System	40,000	
Truck Wash Equipment	12,000	
Analyser	2,400	
Vulcanizer	10,000	
Gas Distribution	10,000	
Installation	10,800	
Freight 80 T included in costs		
Electrical included in Area 210		
Total for 3. Garage		$ 250,000
4. Electric Shop		
Test Equipment	$ 32,000	
Portable Welders 2-400 Amp	10,000	
Small Tools	32,000	
Instrument Repairs	30,000	
Office Furniture and Equipment	10,000	
Installation	8,000	
Freight 40 T included in prices		
Electrical included in Area 210		
Total for 4. Electric Shop		$ 122,000
5. Carpenter Shop - Equipment		
Allowance	$ 40,000	
Total for 5. Carpenter Shop-Equipment		$ 40,000
TOTAL FOR B. EQUIPMENT		$1,196,000
TOTAL FOR AREA 170		$5,058,000

AREA 180 - MINE BUILDING AND SURFACE MOBILE

A. Building		
Powder Sheds	$ 10,000	
Miscellaneous Storage	50,000	
Total for A. Building		$ 60,000
B. Surface Mobile		
3/4 T Pick-up Trucks 15 @ $4,000.00	$ 60,000	
3 T Flatbed Trucks 3 @ $5,000.00	15,000	
1/3 c.y. Backhoe 1 @ $20,000.00	20,000	
3/4 c.y. Backhoe	55,000	
12 T Crane 2 @ $60,000.00	120,000	
Diesel Locomotive (used)	50,000	
Tank Truck (oil)	9,000	
Lowbed c/w Tractor	45,000	
$2\frac{1}{2}$ c.y. Front End Loader	42,000	
5 T Trucks	50,000	
Muskeg Buggy 2 @ $10,000	20,000	
Personnel Carrier (Bombardier) 2 @ $8,000.00	16,000	
Ski-Doos 4 @ $1,250.00	5,000	
Automobiles 15 @ $4,000	60,000	

B. Surface Mobile (cont'd)		
Fork Lift Truck 2 @ $5,000.00	$ 10,000	
Carry-All 3 @ $5,000.00	15,000	
Bus - 35 Passenger 3 @ $10,000.00	30,000	
Total for B. Surface Mobile		$622,000
TOTAL FOR AREA 180		$682,000

AREA 190 - OFFICE BUILDING

A. Building

Excavation 2,600 c.y. @ $4.00	$ 10,400	
Backfill 1,500 c.y. @ $5.00	7,500	
Concrete - Foundation 200 c.y. @ $100.00	20,000	
Concrete - Slab on Grade 300 c.y. @ $90.00	27,000	
Concrete - Elevated Slab 500 c.y. @ $120.00	60,000	
Structural Steel 150 T @ $750.00	112,500	
Miscellaneous Steel 15 T @ $900.00	13,500	
Roofing 12,000 s.f. @ $2.50	30,000	
Flooring	20,000	
Ceiling	20,000	
Interior Partitions 33,000 s.f. @ $2.00	66,000	
Doors and Windows	20,700	
Siding 12,000 s.f. @ $2.20	26,400	
Miscellaneous Arch.	20,000	
Services 35,000 s.f. @ $5.00	175,000	
Freight included in prices		
Electrical included in Area 210		
Total for A. Building		$629,000

B. Equipment		
Allowance	$100,000	
Total for B. Equipment		$100,000
TOTAL FOR AREA 190		$729,000

AREA 200 - WATER SUPPLY SYSTEM

A. Building

Process 4,000 s.f. @ $20.00	$ 80,000	
Potable 2,000 s.f. @ $20.00	40,000	
Inlet Structure - Process	10,000	
Inlet Structure - Potable	5,000	
Concrete Base Potable Water Tank	5,000	
Bed for Process Water Line	20,000	
Bed for Potable Water Line	10,000	
Total for A. Building		$ 170,000

B. Equipment

7 - Process Vertical Water Pumps	209,400	
2 - Vertical Potable Water Pumps	13,300	
1 - 200,000 Imp. Gal. Elevated Water Tank	84,000	
Water Treatment for Potable Water	5,000	
3,500 ft. - 72" Woodstave Water Line	508,300	
5,700 ft. - 16" W.S. Potable Water Line	88,900	
2,000 ft. insulation	22,800	
Installation - Equipment	47,300	
Instrumentation	2,000	
Freight included in prices		
Electrical included in Area 210		
Total for B. Equipment		$ 981,000

TOTAL FOR AREA 200	$1,151,000

AREA 210 - ELECTRICAL DISTRIBUTION

A. Building

Included in Equipment.

B. Equipment

Incoming service	$700,000	
Outdoor substation	425,000	
Panels and switchgear	2,283,000	
Main distribution feeders	398,000	
Lighting	658,000	
Power wiring, control and tray	1,708,000	
Electrical heating	22,000	
Grounding	46,000	
Spare equipment	65,000	
Townsite	595,000	
Freight - 820 tons @ $150.00	123,000	
Total for B. Equipment		$7,023,000
TOTAL FOR AREA 210		$7,023,000

AREA 220 - FIRE PROTECTION SYSTEM

A. Building

Not Required

B. Equipment

Piping	$150,000	
Hydrants	15,000	
Total for B. Equipment		$165,000
TOTAL FOR AREA 220		$165,000

AREA 230 - HEATING SYSTEM

A. Building

Powerhouse 300,000 s.f. @ $1.00	$300,000	
Foundations for Fuel Tanks	100,000	
Unloading Platform	20,000	
Total for A. Building		$420,000

B. Equipment

Cranes	$ 30,000	
3 - Boilers	198,000	
3 - Exhaust Stacks	22,000	
Pumps - Boiler	21,000	
Tanks, Receivers	14,000	
De-aerator	15,000	
2 - Compressor 300 CFM-Plant Air	60,000	
Compressor 200 CFM-Instrument Air	19,000	
Fans	5,000	
Support Steel	5,000	
Filter	3,000	
Piping	245,000	
Insulation	10,000	
Diesel Storage Tanks	100,000	
Gasoline Storage Tank	6,000	
Heating Oil Storage Tanks	160,000	
Unloading Pumps	20,000	
Installation - Powerhouse	320,000	
Freight 600 T included in prices		
Electrical included in Area 210		
Total for B. Equipment		$1,253,000
TOTAL FOR AREA 230		$1,673,000

AREA 240 - SEWAGE DISPOSAL SYSTEM

A. Building		
2,000 s.f. @ $20.00	$40,000	
Manholes	5,000	
Total for A. Building		$45,000
B. Equipment		
Piping	$40,000	
Chlorinator	5,000	
Total for B. Equipment		$45,000
TOTAL FOR AREA 240		$90,000

AREA 250 - ROADS AND YARDS

Clear and Level Site 1,000 Acres @ $300.00	$ 300,000	
Parking 200,000 s.f. @ $2.00	400,000	
Roads on Site 6 miles @ $30,000	180,000	
Drainage	50,000	
Railway on Site	300,000	
Communications on Site	50,000	
Communications off Site	100,000	
Causeway 360,000 c.y. @ $2.00	720,000	
Tailings Dam 55,000 c.y. @ $2.00	110,000	
Road off Site 18 miles @ $60,000	1,080,000	
Railway off Site 12 miles @ $200,000	2,400,000	
Spillway	50,000	
TOTAL FOR AREA 250		$5,740,000

AREA 260 - CONSTRUCTION CAMP

A. Building

Fill and level site	$100,000	
Temporary roads	100,000	
Temporary drainage	25,000	
Construction yard	15,000	
4 - 50-man sleep trailers	200,000	
300-man Kitchen, 150-man Dining	250,000	
2 - Oil storage buildings, 20' x 40'	40,000	
1 - Recreation trailer	40,000	
1 - Garage, 40' x 100'	40,000	
2 - Office trailers, 10' x 32'	12,000	
1 - First Aid trailer, 10' x 32'	6,000	
1 - Warehouse building, 40' x 100'	40,000	
1 - Carpenter Shop, 40' x 100'	40,000	
1 - Trades building, 40' x 100'	40,000	
Temporary water and sewerage	100,000	
Temporary power	150,000	
Temporary communications	50,000	
Total for A. Building		$1,248,000

B. Equipment

4 - 5000 gal. Oil tanks	12,000
Recreation	20,000
Garage	35,000
Office	10,000
First Aid supplies	10,000
Warehouse bins, shelves	5,000

Area 260 (Cont'd)

Carpenter Shop	$ 35,000	
Trades	50,000	
Total for B. Equipment		$ 177,000
TOTAL FOR AREA 260		$1,425,000

AREA 280 - TOWNSITE

A. Building

1. Apartment - 3 Required

Building 22,000 s.f. @ $15.00	$990,000	
Services 22,000 s.f. @ $5.00	330,000	
Furnishings 84 @ $1,000.00	84,000	
Freight 2,100 T included in prices		
Electrical included in Area 210		
Total for 1. Apartment		$1,404,000

2. Bunkhouses - 5 Required

Sitework	50,000	
Foundation	150,000	
Framing, Siding, Decking	600,000	
Roofing	60,000	
Doors and Windows	100,000	
Painting and Finishing	110,000	
Services	500,000	
Furnishings	200,000	
Freight 2,600 T included in prices		
Electrical included in Area 210		
Total for 2. Bunkhouses		$1,770,000

3. Cafeteria and Food Preparation		
Sitework	$ 15,000	
Foundation	90,000	
Framing, Siding, Decking	330,000	
Roofing	30,000	
Doors and Windows	15,000	
Painting and Finishing	60,000	
Services	120,000	
Furnishings	150,000	
Freight 1,200 T included in prices		
Electrical included in Area 210		
Total for 3. Cafeteria and Food Preparation		$ 810,000

4. Commercial	
Sitework	$ 20,000
Foundation	800,000
Structural Steel	800,000
Steel Floor Deck	200,000
Insulation to Floor	50,000
Concrete - Elevated Slab	200,000
Steel Roof Deck	60,000
Roofing	130,000
Siding	200,000
Floor Tile	30,000
Acoustic Tile	70,000
Doors, Windows	30,000
Lockers	15,000
Skylights	6,000

4. Commercial (cont'd)		
Painting and Finishing	$ 34,000	
Vault	16,000	
Store Fronts	60,000	
Millwork	60,000	
Pool Heating Equipment	11,000	
Plumbing and Drainage	200,000	
Heating and Ventilation	300,000	
Fire Protection		
Furnishings	400,000	
Freight 5,600 T included in prices		
Electrical included in Area 210		
Total for 4. Commercial		$3,752,000

5. Emergency Power - 2 Required		
Sitework and Foundation	15,000	
Framing, Siding, Decking	60,000	
Services	15,000	
Freight 70T included in prices		
Electrical included in Area 210		
Total for 5. Emergency Power		$ 90,000

6. Firehouse		
Building 4,000 s.f. @ $20.000	$ 80,000	
Services 4,000 s.f. @ $5.00	20,000	
Furnishings 4,000 s.f. @ $3.00	12,000	
Equipment - 1 lot	10,000	
Freight 150 T included in prices		
Electrical included in Area 210		
Total for 6. Firehouse		$122,000
7. Hospital		
Allowance	$100,000	
Total for 7. Hospital		$100,000
8. School		
Sitework	$ 5,000	
Foundation	120,000	
Structural Steel	200,000	
Concrete - Floor	40,000	
Steel Floor Deck	50,000	
Steel Roof Deck	20,000	
Roofing	40,000	
Siding	80,000	
Painting and Finishing	50,000	
Doors and Windows	5,000	
Millwork	15,000	
Plumbing and Drainage	45,000	

8. School (cont'd)		
Heating and Ventilation	$ 65,000	
Sprinklers	15,000	
Furnishing	140,000	
Freight 1200 T included in prices		
Electrical included in Area 210		
Total for 8. School		$ 890,000
9. Sewage Treatment Plant		
Sitework	2,000	
Foundation	30,000	
Structural Steel	30,000	
Concrete Floor	10,000	
Metal Building - Insulated	50,000	
Services	20,000	
Freight 200 T included in prices		
Electrical included in Area 210		
Total for 9. Sewage Treatment Plant		$ 142,000
10. Sitework		
Clear and Level Site 1,000 acres @ $300.00	300,000	
Roads 7 miles @ $30,000	210,000	
Parking Lots 200,000 s.f. @ $2.00	400,000	
Parks	50,000	
Total for 10. Sitework		$ 960,000

11. Staff House		
Sitework	$ 5,000	
Foundation	20,000	
Framing, Siding, Decking	70,000	
Doors and Windows	7,000	
Roofing	10,000	
Painting, Finishing	10,000	
Stairs	5,000	
Plumbing and Drainage	20,000	
Heating and Ventilation	30,000	
Sprinkler	6,000	
Furnishings	20,000	
Freight 300 T included in prices		
Electrical included in Area 210		
Total for 11. Staff House		$ 203,000
12. Town Houses - 24 Required		
Sitework	120,000	
Foundation	360,000	
Framing, Siding, Decking	1,440,000	
Doors and Windows	240,000	
Stairs	120,000	
Painting and Finishing	240,000	
Plumbing and Drainage	480,000	
Heating and Ventilation	720,000	
Roofing	360,000	
Sprinkler System	150,000	
Furnishing	200,000	
Freight 6,600 T included in prices		
Electrical included in Area 210		
Total for 12. Town Houses		4,430,000

13. Houses - 50 Required

Structure 1,400 s.f. @ $15.00	$1,050,000	
Services 1,400 s.f. @ $5.00	350,000	
Furnishings	75,000	
Freight 2,200 T included in costs		
Electrical included in Area 210		
Total for 13. Houses		$ 1,475,000
Total For Buildings		$16,148,000

Mortgaged

Apartments, Commercial Emergency Power, Firehouse, Hospital, School, Sewage Treatment, Townhouses, Houses - $12,405,000

Capitalized

Bunkhouses, Cafeteria and Food Preparation, Sitework, Staff House - $3,743,000

TOTAL FOR A. BUILDING $ 3,743,000

B. Equipment

1. General

Cafeteria	$270,000	
Emergency Power Generators	75,000	
2 Fire Trucks	50,000	
2 Ambulances	30,000	
Sewage Treatment	100,000	
Total for 1. General		$ 525,000

2. Townsite Services

1 - 200,000 Imp. Gal. Elevated Water Tank	84,000	
Foundation for Water Tank	5,000	
Water Treatment Equipment	5,000	
1,000' - 16" Woodstave Line	16,000	
1,000' - Insulation for Woodstave Line	11,000	
2 - 1500 CFM Vertical Potable Water Pumps	14,000	
30,000' - Buried Water Lines	360,000	
60 - Fire Hydrants	30,000	
30,000' - Sewer Lines	360,000	
Installation	740,000	
Total for 2. Townsite Services		$1,625,000
Total for Equipment		$2,150,000

Mortgaged

Emergency Power Generators, 2
Fire Trucks, 2 Ambulances,
Sewage Treatment - $255,000

Capitalized

Cafeteria, Townsite Services -
$1,895,000

TOTAL FOR B. EQUIPMENT	$1,895,000
TOTAL FOR AREA 280	$5,638,000

AREA 300 - GENERAL

A. Preconstruction

Aerial Photography	$ 30,000	
Ground Surveys	40,000	
Soil Investigation	40,000	
Water and Tailings Study	20,000	
Power Investigation	40,000	
Preliminary Engineering	100,000	
Scheduling	20,000	
Orebody Mud Drilling	600,000	
Lake Body Drilling	40,000	
Total for A. Preconstruction		$ 930,000

B. Construction Overheads

Personnel - Contractor Staff	250,000
Mobilization	50,000
Surveying	50,000
Hoarding	50,000
Temporary Buildings	100,000
Temporary Services	300,000
Permits, Inspections	50,000
Travel Expenses and Recruiting	150,000
Site Visits - Head Office	150,000
Clean-up Final	30,000
Protection of Finished Work	30,000
Temporary Heat	200,000
Pumping	30,000

B. Construction Overheads (cont'd)

Temporary Roads	30,000	
Watchman	60,000	
Testing Materials	30,000	
Signs, Photographs	10,000	
Scaffolding, Staging, Chutes	80,000	
Snow Removal, Road Maintenance	170,000	
Winter Work	1,100,000	
Premium Time	3,000,000	
Insurance	200,000	
Bonds	80,000	
Passenger Vehicles-incl. Fuel	250,000	
Accounting, Warehousing, Purchasing	600,000	
Safety, Security, Fire Protection	60,000	
Office Equipment Supplies	120,000	
Air Freight	300,000	
Room and Board	1,200,000	
Escalation	3,800,000	
Contingency	4,000,000	
Total for B. Construction Overheads		$16,350,000
TOTAL FOR AREA 300		$17,280,000

AREA 320 - MINES

A. Pit Preparation		
Overburden removal	$ 4,860,000	
Mine roads	110,000	
Total for A. Pit Preparation		$ 4,970,000
B. Initial Pit Equipment		
2 - Bucyrus Erie 45R electric drills for ore	$ 510,000	
2 - 10 cu. yd. P & H 1900 electric shovels for ore	1,270,000	
7 - 100 ton Lectrahaul M-100 rear dump trucks for ore	1,690,000	
2 - Caterpillar D8 crawler tractors for ore	177,000	
1 - 10 cu. yd. Caterpillar 992 front end loader	190,000	
1 - Caterpillar 834 rubber tired tractor	105,000	
1 - Percussion drill truck with 600 cfm compressor	32,000	
1 - 350 cfm Portable compressor	15,000	
5 - Jackhammers	5,000	
1 - Blast-hole sand truck	30,000	
1 - 1-ton flat bed truck for blast crew	5,000	
2 - Bucyrus Erie 45R electric drills for waste rock	510,000	
3 - 10 cu. yd. P & H 1900 electric shovels for waste rock	1,900,000	
6 - 100 ton Lectrahaul M-100 rear dump trucks for waste rock	1,450,000	

B. Initial Pit Equipment (cont'd)

3 - Caterpillar D8 crawler tractors for waste rock	$ 266,000	
1 - 2½ cu. yd. P & H 955E diesel shovel	171,000	
2 - 35 ton Sicard rear dump trucks	188,000	
1 - 65 ton P & H T-650 mobile crane	170,000	
1 - 18 ton P & H R-180 mobile crane	79,000	
2 - 3 ton Flat deck trucks with Hiab	23,000	
1 - Lube truck	12,000	
2 - Caterpillar Model 16 graders	225,000	
1 - Water truck	30,000	
1 - Sicard BLD-5 snow blower	65,000	
1 - Sand truck	25,000	
8 - 1 ton Pick-up trucks	28,000	
18 - Radios	18,000	
Pit pumps and piping	140,000	
Electric power supply to mining equipment	221,000	
Electric power supply to dewatering equipment	20,000	
Pit lighting system	20,000	
Small tools and miscellaneous equipment	75,000	
Freight	353,000	
Total for B. Initial Pit Equipment		$10,018,000
TOTAL FOR AREA 320		$14,988,000

AREA 330 - CRUSHING PLANT

A. Building

Excavation 16,000 c.y. @ $4.00	$ 64,000	
Backfill - Earth 10,000 c.y. @ $5.00	50,000	
Backfill - Granular 550 c.y. @ $8.00	4,400	
Fill - Ramp	9,100	
Concrete - Building Foundation 300 c.y. @ $100.00	30,000	
Concrete - Equipment Foundation 3,000 c.y. @ $100.00	300,000	
Concrete - Wall, Pier 60 c.y. @ $110.00	6,600	
Concrete - Slab on Grade 220 c.y. @ $90.00	19,800	
Structural Steel 90 T @ $750.00	67,500	
Miscellaneous Steel 30 T @ $900.00	27,000	
Roofing 5,200 s.f. @ $2.50	13,000	
Siding 13,000 s.f. @ $2.20	28,600	
Mechanical Services 5,500 s.f. @ $4.00	22,000	
Freight 1,500 T included in prices		
Electrical - included in Area 410		
Total for A. Building		$642,000

B. Equipment		
1 - 54" x 74" Gyratory Crusher	$ 454,700	
1 - Bag Type Dust Collector 20,000 CFM	54,800	
2 - 48" x 120" Hydra Stroke Feeders	60,700	
1 - Calc. Chloride Bin - 50 Ton Capacity 10' dia. x 10'	2,300	
1 - Cal. Chloride Discharge Feeder - 24" x 36"	1,800	
1 - Belt Conveyor - 72" x 400'	211,800	
1 - Belt Conveyor - 60" x 3,000'	1,274,700	
1 lot - Chutes & Miscellaneous Support Steel	25,600	
1 - Crane - 120/25 Ton E.O.C.	145,600	
1 - Eccentric Removal Trolley	11,900	
1 lot - Hoisting Mech. for Hinged Rail Support (for Eccentric Trolley)	1,200	
1 lot - Hinged Rail Support (for Eccentric Removal)	2,500	
1 - 4" Sump Pump	4,500	
1 - 12 ton Hydraulic Rock Grapple	37,400	
1 - Service Compressor	1,500	
Installation - Equipment	458,000	
Freight - 1,500 T included in prices		
Electrical included in Area 410		
Total for B. Equipment		$2,749,000
TOTAL FOR AREA 330		$3,391,000

AREA 340 - ORE STORAGE

A. Building

Excavation 26,000 c.y. @ $3.00	$ 78,000	
Backfill - Earth 7,500 c.y. @ $4.00	30,000	
Backfill - Granular 2,250 c.y. @ $6.00	13,500	
Concrete - Footing 230 c.y. @ $100.00	23,000	
Concrete - Slab on Grade 1,100 c.y. @ $90.00	99,000	
Concrete - Tunnels 1,900 c.y. @ $110.00	209,000	
Structural Steel 190 T @ $750.00	142,500	
Siding 69,000 s.f. @ $1.00	69,000	
Freight 1,400 T included in prices		
Electrical included in Area 410		
Total for A. Building		$664,000

B. Equipment

1 - Belt Conveyor - 72" x 530' long	280,600
12 - Vibrating Feeders - 48" x 72"	71,700
2 - Reclaim Belt Conveyors 48" x 230'	136,100
1 - Reclaim Horizontal Transfer Conveyors - 48" x 130'	38,400
1 - Autogenous Mill Feed Conveyor 48" x 450'	133,000

B. Equipment (cont'd)		
1 - 48" Autogenous Mill Feed Belt Scales	$ 6,800	
1 lot - Chutes & Miscellaneous Support Steel	9,500	
Installation - Equipment	179,900	
Freight 400 T included in prices		
Electrical included in Area 410		
Total for B. Equipment		856,000
TOTAL FOR AREA 340		$1,520,000

AREA 350 - CONCENTRATOR

A. Building

1. Grinding

Excavation 3,500 c.y. @ $4.00	$ 14,000	
Backfill - Earth 2,000 c.y. @ $5.00	10,000	
Backfill - Granular 750 c.y. @ $8.00	6,000	
Concrete - Building Foundation 100 c.y. @ $100.00	10,000	
Concrete - Slab on Grade 500 c.y. @ $90.00	45,000	
Concrete - Elevated Slab 600 c.y. @ $120.00	72,000	
Concrete - Equipment Foundation 950 c.y. @ $100.00	95,000	
Structural Steel 550 T @ $750.00	412,500	
Miscellaneous Steel 60 T @ $900.00	54,000	
Siding 29,000 s.f. @ $2.20	63,800	
Roofing 13,000 s.f. @ $2.50	32,500	
Mechanical Services 19,000 s.f. @ $4.00	76,000	
Freight 1,400 T included in prices		
Electrical included in Area 410		
Total for 1. Grinding		$890,800

2. Screening

Excavation 4,000 c.y. @ $4.00	$ 16,000	
Backfill - Earth 2,400 c.y. @ $5.00	12,000	
Backfill - Granular 800 c.y. @ $8.00	6,400	
Concrete - Foundations 80 c.y. @ $100.00	8,000	
Concrete - Walls, Piers 550 c.y. @ $110.00	60,500	
Concrete - Slab on Grade 300 c.y. @ $90.00	27,000	
Concrete - Elevated Slab 280 c.y. @ $120.00	33,600	
Concrete - Equipment Foundations 150 c.y. @ $100.00	15,000	
Structural Steel 350 T @ $750.00	262,500	
Miscellaneous Steel 50 T @ $900.00	45,000	
Siding 10,000 s.f. @ $2.20	22,000	
Roofing 11,000 s.f. @ $2.50	27,500	
Miscellaneous Architectural	8,000	
Mechanical Services 11,000 s.f. @ $4.00	44,000	
Freight included in prices 1,000 T		
Electrical included in Area 410		
Total for 2. Screening		$587,500

3. Separating

Excavation 6,000 c.y. @ $4.00	$ 24,000	
Backfill - Earth 3,200 c.y. @ $5.00	16,000	
Backfill - Granular 1,600 c.y. @ $8.00	12,800	
Concrete - Foundations 460 c.y. @ $100.00	46,000	
Concrete - Slab on Grade 520 c.y. @ $90.00	46,800	
Concrete - Elevated Slab 1,500 c.y. @ $120.00	180,000	
Concrete - Equipment Foundations 500 c.y. @ $100.00	50,000	
Structural Steel 620 T @ $750.00	465,000	
Miscellaneous Steel 60 T @ $900.00	54,000	
Siding 10,000 s.f. @ $2.20	22,000	
Roofing 20,000 s.f. @ $2.50	50,000	
Miscellaneous Architectural	8,000	
Mechanical Services 20,000 s.f. @ $4.00	80,000	
Freight 1,800 T included in prices		
Electrical included in Area 410		
Total for 3. Separation		$1,054,600

4. Regrinding

Excavation 2,800 c.y. @ $4.00	$ 11,200	
Backfill - Earth 1,000 c.y. @ $5.00	5,000	
Backfill - Granular 800 c.y. @ $8.00	6,400	
Concrete - Foundations 280 c.y. @ $100.00	28,000	
Concrete - Slab on Grade 640 c.y. @ $90.00	57,600	
Structural Steel 360 T @ $750.00	270,000	
Miscellaneous Steel 40 T @ $900.00	36,000	
Siding 15,000 s.f. @ $2.20	33,000	
Roofing 18,000 s.f. @ $2.50	45,000	
Miscellaneous Architectural	8,000	
Mechanical Services 18,000 s.f. @ $4.00	72,000	
Freight 800 T included in prices		
Electrical included in Area 410		
Total for 4. Regrinding		$572,200

5. Transfer House and Galleries		
Transfer House 150,000 c.f. @ $1.00	$150,000	
Galleries 300 l.f. @ $250.00	75,000	
Tunnels 500 l.f.. @ $400.00	200,000	
Total for 5. Transfer House and Galleries		425,000
6. Concentrate Storage		
Excavation 5,000 c.y. @ $4.00	20,000	
Backfill 700 c.y. @ $5.00	3,500	
Granular Fill 1,100 c.y. @ $8.00	8,800	
Concrete - Footing, Wall, Pier 390 c.y. @ $110.00	42,900	
Concrete - Slab on Ground 2,700 c.y. @ $90.00	243,000	
Structural Steel 510 T @ $650.00	331,500	
Miscellaneous Steel 50 T @ $900.00	45,000	
Siding - Insulated 32,000 s.f. @ $2.20	70,400	
Roofing 24,000 s.f. @ $2.50	60,000	
Miscellaneous Architectural	19,800	
Mechanical Services 24,000 s.f. @ $4.00	96,000	
Freight 1,200 T included in prices		
Electrical included in Area 210		
Total for 6. Concentrate Storage		940,900
TOTAL FOR A. BUILDING		$4,471,000

B. Equipment

1. Grinding and Screening

1 - Crane 75/5	$ 115,400
1 - Belt Conveyors - 30" x 70' Primary Screen O.S.	11,800
2 - Belt Conveyors - 30" x 70' Secondary Screen O.S.	23,500
1 - Belt Conveyors - 30" x 300' O.S. from Primary and Secondary Screens	44,200
1 - Belt Conveyors - 36" x 35' Screen O.S. to Autogenous Mill Feed Conveyor	6,900
1 - Belt Conveyor - 30" x 155' Upper Secondary Screen O.S. Transfer to O.S. from Primary and Secondary Screen	22,800
1 - Autogenous Grinding Mills 30' dia. x 10'	1,031,000
8 - Primary Screens - 5' x 12' Single Deck	48,800
32 - Secondary Screens - 5' x 12' Single Deck	195,200
4 - 8 Way Distributors	20,000
12 - Slurry Pump Boxes	29,400
4 - 8" x 6" Slurry Pumps	23,200
1 lot - Chutes and Miscellaneous Support Steel	168,000
8 - 8" x 6" Slurry Pumps	50,400
Installation - Equipment	292,000
Process Piping	80,000
Instrumentation	10,000
Freight 1,300 T included in prices	
Electrical included in Area 410	
Total for 1. Grinding and Screening	$2,172,600

2. Separation		
672 - Rougher Spirals	$585,900	
672 - Sets of Accessories for Spirals	61,000	
448 - Cleaner Spirals	390,600	
448 - Sets of Accessories for Spirals	40,700	
448 - Recleaner Spirals	390,600	
448 - Sets of Accessories for Spirals	32,600	
1 lot - Foreign Exchange Spirals	25,000	
1 lot - Frt. to Montreal Spirals	62,500	
24 - D 20 LB Krebs Cyclones	63,400	
8 sets - Overflow and Underflow Launders	18,800	
8 - 3-Way Manifold for Cyclone Feed	7,800	
8 - 12" x 10" Clean Spiral Feed Pumps	70,800	
8 - Mids Cyclone Feed Pumps-14" x 12"	96,000	
16 - Pump Boxes - R. L.	39,700	
12 - Krebs D 10 B Cyclones	13,800	
1 - Double Pump Boxes	3,700	
2 - 12" x 10" Slurry Pumps	27,200	
1 - 2-Way Distribution Boxes	2,400	
1 - Tech Taylor Valves - 18"	5,800	
1 - Cyclone Feed Manifold - 16 outlets 7' dia. x 2' R. L.	1,400	
Installation - Equipment	300,000	
Process Piping	200,000	
Instrumentation	20,000	
Freight 900 T included in costs		
Electrical included in Area 410		
Total for 2. Separation		$2,459,700

3. Dewatering and Regrinding

16 - Pump Boxes	$ 14,800
1 - 16' dia. x 16' Tank Concentrate Repulper	3,200
1 - Agitator	9,200
3 - Regrind Mills - 16'-6" dia. x 21' long	1,221,000
1 - 60' dia. Thickener	49,000
1 - 130' dia. Thickener	113,200
6 - D 20 B Krebs Cyclones	15,900
3 - Discharge Launders for Krebs Cyclone	3,500
2 - 2-Way Distributors	3,700
2 - 3-Way Distributors	4,300
1 - 20' Horizontal Filter	54,000
1 - Vacuum Pump - 10,700 CFM	65,000
1 - Filtrate Receiver Tank	1,200
1 - Moisture Trap Tank	1,200
1 - Seal Tank	1,000
1 - Filtrate Pump - 3 x 3	1,200
1 - 75 ton/5 ton E. O. C. Crane	94,800
2 - Surge Tanks - 22' dia. x 19'	11,600
2 - Agitators	18,500
3 - DSM Screens and 8 Feed Boxes 6 - Feed Boxes 6 - Repulper Launders	267,100
1 - 24" x 330' Tripper Conveyor - Concentrate Storage	61,300
1 - 24" x 210 l. f. Concentrate Storage Conveyor	25,700
1 - Support Steel	5,000
32 - Automatic Samplers	38,700
1 lot - Test Lab and Sample Equipment	25,000
1 lot - Assay Lab Equipment Allowance	60,000

3. Dewatering and Regrinding (cont'd)		
1 - Ball Charging System	$ 59,300	
2 - Pump Regrind Feed - 10 x 8	13,600	
1 - Pump - 60' Thick U. F. - 5 x 4	2,500	
1 - Pump - 60' Thick O. F. - 8 x 6	5,300	
1 - Pump -130' Thick U. F. - 5 x 4	2,500	
1 - Pump -130' Thick O. F. - 8 x 6	5,300	
1 - Concentrate Recirculator - 10 x 8	7,000	
3 - Pump (DSM) Thru-Flow - 8 x 6	15,800	
3 - Pump Regrind Discharge - 8 x 6	13,700	
2 - Pump Discharge to Pipeline-8 x 6	9,100	
8 - Sump Pumps - 4"	35,500	
Installation - Equipment	375,800	
Process Piping	140,000	
Instrumentation	31,500	
Freight 1,500 T included in prices		
Electrical included in Area 410		
Total for 3. Dewatering and Regrinding		$2,886,000

4. Concentrate Storage		
1 - 30" x 250' Concentrate Reclaim Conveyor	$ 61,000	
1 - 30" Belt Scale	7,200	
6 - 30" x 60" Vibrating Feeders	17,900	
1 - Chutes & Miscellaneous Support Steel	8,600	
Installation - Equipment	20,000	
Freight included in prices 100T		
Electrical included in Area 410		
Total for 4. Concentrate Storage		$ 115,000
TOTAL FOR B. EQUIPMENT		$ 7,633,000
TOTAL FOR AREA 350		$12,104,000

AREA 360 - TAILINGS DISPOSAL

A. Building		
1,500 s.f. @ $20.00	$ 60,000	
Concrete base, tailings sump tank	4,000	
Total for A. Building		$ 34,000
B. Equipment		
4 - 14" x 12" SRL-C tailings pumps	65,400	
3 - Goulds reclaim water pumps 16" x 18"	71,500	
8,300 ft. - 16" Victaulic pipe	191,400	
1 lot - Rubber lining	130,000	
2,000' x 25' wide Right-of-way or bedding for tails lines	20,000	
1 - Reclaim water W.S. Tank, 100,000 US gal.	13,300	
2 - Cyclone buggies for dyke construction	46,400	
1 - Tailings sump	15,000	
Installation - Equipment	28,000	
Process Piping	1,000	
Instrumentation	70,000	
Freight - 800 T - included in prices		
Electrical included in Area 410		
Total for B. Equipment		652,000
TOTAL FOR AREA 360		$686,000

AREA 370 - SERVICE BUILDING

A. Building

Excavation 15,000 c.y. @ $4.00	$120,000	
Backfill - Earth 7,500 c.y. @ $5.00	37,500	
Backfill - Granular	2,500	
Concrete - Foundation 450 c.y. @ $100.00	45,000	
Concrete - Slab on Grade 1,500 c.y. @ $9.00	135,000	
Concrete - Elevated Slab 1,450 c.y. @ $120.00	174,000	
Concrete - Equipment Foundation 50 c.y. @ $100.00	5,000	
Structural Steel 800 T @ $750.00	600,000	
Miscellaneous Steel 100 T @ $900.00	90,000	
Roofing 75,000 s.f. @ $2.50	187,500	
Flooring	30,000	
Siding 22,500 s.f. @ $2.20	44,500	
Interior Partitions 45,000 s.f. @ $2.00	90,000	
Ceiling	30,000	
Doors and Windows	50,000	
Miscellaneous Architectural	15,000	
Mechanical Services 110,000 s.f. @ $3.00	330,000	
Freight 2,500 T included in prices		
Electrical included in Area 410		
Total for A. Building		$1,926,000

B. Equipment

1. General

Office Furniture and Equipment	$ 20,000	
1 - Bridge Crane 25 T	50,000	
1 - Bridge Cranes 15 T	26,000	
3 - Bridge Cranes 5 T	22,000	
Fork Lift Trucks	15,000	
Shelving and Office Equipment	30,000	
Installation	30,000	
Lockers	20,000	
Freight 30 T included in prices		
Electrical included in Area 410		
Total for 1. General		$213,000

2. Machine Shop

Drill Press - 24 in.	$ 8,400	
Pedestal Grinder	2,700	
Power Hacksaw - 10 in. Cap.	12,000	
Bandsaw	13,200	
Ironworker	6,000	
Shaper - 32 in.	19,200	
12 in. Lathe - 12 ft.	33,600	
Portable Scale - 0-1,000 lbs.	3,000	
200 Ton Press	7,200	
Bench Grinder	1,200	
Bench Drill	5,000	
Threading Machine 6	12,000	
Portable Threading Machine	3,000	

2. Machine Shop (cont'd)		
Screw Press	$ 2,400	
Belt Vulcanizer	12,000	
Portable Oxy-Acet Welding	11,000	
Small Equipment	21,000	
Office Equipment	23,000	
Benches	21,000	
5 Ton Crane	6,000	
15 Ton Crane	26,500	
Small Tools	7,600	
Installation	12,000	
Freight 90 T included in prices		
Electrical included in Area 410		
Total for 2. Machine Shop		$269,000

3. Garage		
Truck Lift	$ 12,000	
Compressor	7,200	
50 Ton Jacks-4	12,000	
Tire Changing Equipment	22,000	
Lube Unit	18,000	
Steam Cleaner	10,000	
Small Tools	40,000	
Balancing Unit	9,600	
Grease Guns, Portable Lube System	30,000	
Truck Wash Equipment	12,000	
Analyser	2,400	
Vulcanizer	10,000	

3. Garage (cont'd)		
Gas Distribution	$ 10,000	
Installation	8,800	
Freight 60 T included in costs		
Electrical included in Area 410		
Total for 3. Garage		$ 204,000
4. Electric Shop		
Test Equipment	$ 32,000	
Portable Welders 2-400 Amp	10,000	
Small Tools	32,000	
Instrument Repairs	30,000	
Office Furniture and Equipment	10,000	
Installation	8,000	
Freight 40 T included in prices		
Electrical included in Area 210		
Total for 4. Electric Shop		$ 122,000
5. Carpenter Shop - Equipment		
Allowance	$ 40,000	
Total for 5. Carpenter Shop-Equipment		$ 40,000
TOTAL FOR B. EQUIPMENT		$ 848,000
TOTAL FOR AREA 370		$2,774,000

AREA 380 - MINE BUILDING AND SURFACE MOBILE

A. Building		
Powder Sheds	$ 10,000	
Miscellaneous Storage	50,000	
Total for A. Building		$ 60,000
B. Surface Mobile		
3/4 T Pick-up Trucks 10 @ $4,000.00	$ 40,000	
3 T Flatbed Trucks 2 @ $5,000.00	10,000	
1/3 c.y. Backhoe 1 @ $20,000.00	20,000	
3/4 c.y. Backhoe	55,000	
12 T Crane 2 @ $60,000.00	120,000	
2 Tank Trucks (oil)	18,000	
Lowbed c/w Tractor	45,000	
$2\frac{1}{2}$ c.y. Front End Loader	42,000	
5 T Trucks	50,000	
Muskeg Buggy 2 @ $10,000	20,000	
Personnel Carrier (Bombardier) 2 @ $8,000.00	16,000	
Ski-Doos 4 @ $1,250.00	5,000	
Automobiles 10 @ $4,000	40,000	
5 Tractors	140,000	
1 - Dump Trailer	11,000	

B. Surface Mobile (cont'd)		
2 - GP Trailers	$ 17,000	
Fork Lift Truck 2 @ $5,000.00	10,000	
Carry-All 2 @ $5,000.00	10,000	
Bus - 35 Passenger 3 @ $10,000.00	30,000	
Total for B. Surface Mobile		$ 699,000
TOTAL FOR AREA 380		$ 759,000

AREA 390 - OFFICE BUILDING

A. Building

Excavation 2,600 c.y. @ $4.00	$ 10,400	
Backfill 1,500 c.y. @ $5.00	7,500	
Concrete - Foundation 200 c.y. @ $100.00	20,000	
Concrete - Slab on Grade 300 c.y. @ $90.00	27,000	
Concrete - Elevated Slab 500 c.y. @ $120.00	60,000	
Structural Steel 150 T @ $750.00	112,500	
Miscellaneous Steel 15 T @ $900.00	13,500	
Roofing 12,000 s.f. @ $2.50	30,000	
Flooring	20,000	
Ceiling	20,000	
Interior Partitions 33,000 s.f. @ $2.00	66,000	
Doors and Windows	20,700	
Siding 12,000 s.f. @ $2.20	26,400	
Miscellaneous Arch.	20,000	
Services 35,000 s.f. @ $5.00	175,000	
Freight included in prices		
Electrical included in Area 410		
Total for A. Building		$629,000

B. Equipment		
Allowance	$100,000	
Total for B. Equipment		$100,000
TOTAL FOR AREA 390		$729,000

AREA 400 - WATER SUPPLY SYSTEM

A. Building

Process 3,000 s.f. @ $20.00	$ 60,000	
Potable 1,000 s.f. @ $20.00	20,000	
Inlet Structure - Process	10,000	
Inlet Structure - Potable	5,000	
Concrete Base Potable Water Tank	5,000	
Bed for Process Water Line	20,000	
Bed for Potable Water Line	10,000	
Total for A. Building		$130,000

B. Equipment

3 - Process Vertical Water Pumps	$ 83,000	
2 - Vertical Potable Water Pumps	13,300	
1 - 200,000 Imp. Gal. Elevated Water Tank	84,000	
Water Treatment for Potable Water	5,000	
3,500 ft. - 52" Woodstave Water Line	308,000	
5,700 ft. - 16" W.S. Potable Water Line	88,900	
2,000 ft. insulation	22,800	
Installation - Equipment	30,000	
Instrumentation	2,000	
Freight included in prices 100T		
Electrical included in Area 410		
Total for B. Equipment		$637,000
TOTAL FOR AREA 200		$767,000

AREA 410 - ELECTRICAL DISTRIBUTION

A. Building

Included in Equipment

B. Equipment

Included in Equipment

B. Equipment

Incoming service	$2,700,000	
Outdoor substation	705,000	
Panels and switchgear	1,442,000	
Main distribution feeders	325,000	
Lighting	348,000	
Power wiring, control and tray	928,000	
Electrical heating	22,000	
Grounding	34,000	
Spare equipment	45,000	
Townsite	394,000	
Freight 530 T @ $150.00	80,000	
Total for B. Equipment		$7,023,000
TOTAL FOR AREA 410		$7,023,000

AREA 420 - FIRE PROTECTION SYSTEM

A. Building

Not Required

B. Equipment

Piping	$150,000	
Hydrants	15,000	
Total for B. Equipment		$165,000
TOTAL FOR AREA 220		$165,000

AREA 430 - HEATING SYSTEM

A. Building

Powerhouse 200,000 c.f. @ $1.00	$200,000	
Foundations for Fuel Tanks	70,000	
Unloading Platform	15,000	
Total for A. Building		$ 285,000

B. Equipment

Cranes	30,000	
2 - Boilers	132,000	
2 - Exhaust Stacks	14,000	
Pumps - Boiler	14,000	
Tanks, Receivers	10,000	
De-aerator	15,000	
2 - Compressor 300 CFM-Plant Air	60,000	
Compressor 200 CFM-Instrument Air	19,000	
Fans	5,000	
Support Steel	5,000	
Filter	3,000	
Piping	165,000	
Insulation	8,000	
Diesel Storage Tanks	60,000	
Gasoline Storage Tank	6,000	
Heating Oil Storage Tanks	100,000	
Unloading Pumps	15,000	
Installation - Powerhouse	250,000	
Freight 400 T included in prices		
Electrical included in Area 410		
Total for B. Equipment		911,000
TOTAL FOR AREA 230		$1,196,000

AREA 440 - SEWAGE DISPOSAL SYSTEM

A. Building		
2,000 s.f. @ $20.00	$40,000	
Manholes	5,000	
Total for A. Building		$45,000
B. Equipment		
Piping	$40,000	
Chlorinator	5,000	
Total for B. Equipment		$45,000
TOTAL FOR AREA 440		$90,000

AREA 450 - ROADS AND YARDS

Clear and Level Site 1,000 Acres @ $300.00	$ 300,000	
Parking 200,000 s.f. @ $2.00	400,000	
Roads on Site 6 miles @ $30,000	180,000	
Drainage	50,000	
Communications on Site	50,000	
Communications off Site	100,000	
Tailings Dam 55,000 c.y. @ $2.00	110,000	
Road off Site 40 miles @ $60,000	2,400,000	
Spillway	50,000	
TOTAL FOR AREA 450		$3,640,000

AREA 460 - CONSTRUCTION CAMP

A. Building

Fill and level site	$100,000	
Temporary roads	100,000	
Temporary drainage	25,000	
Construction yard	15,000	
4 - 50-man sleep trailers	200,000	
300-man Kitchen, 150-man Dining	250,000	
2 - Oil storage buildings, 20' x 40'	40,000	
1 - Recreation trailer	40,000	
1 - Garage, 40' x 100'	40,000	
2 - Office trailers, 10' x 32'	12,000	
1 - First Aid trailer, 10' x 32'	6,000	
1 - Warehouse building, 40' x 100'	40,000	
1 - Carpenter Shop, 40' x 100'	40,000	
1 - Trades building, 40' x 100'	40,000	
Temporary water and sewerage	100,000	
Temporary power	150,000	
Temporary communications	50,000	
Total for A. Building		$1,248,000

B. Equipment

4 - 5,000 gal. Oil tanks	12,000
Recreation	20,000
Garage	35,000
Office	10,000
First aid supplies	10,000
Warehouse bins, shelves	5,000

Area 460 (Cont'd)		
Carpenter Shop	$ 35,000	
Trades	50,000	
Total for B. Equipment		$ 177,000
TOTAL FOR AREA 460		$1,425,000

AREA 480 - TOWNSITE

A. Building

1. Apartment - 1 Required

Building 22,000 s.f. @ $15.00	$330,000	
Services 22,000 s.f. @ $5.00	110,000	
Furnishings 28 @ $1,000.00	28,000	
Freight 700 T included in prices		
Electrical included in Area 410		
Total for 1. Apartment		$ 468,000

2. Bunkhouses - 3 Required

Sitework	30,000	
Foundation	90,000	
Framing, Siding, Decking	360,000	
Roofing	36,000	
Doors and Windows	60,000	
Painting and Finishing	63,000	
Services	300,000	
Furnishings	120,000	
Freight 1,600 T included in prices		
Electrical included in Area 410		
Total for 2. Bunkhouses		$1,059,000

3. Cafeteria and Food Preparation		
Sitework	$ 15,000	
Foundation	90,000	
Framing, Siding, Decking	330,000	
Roofing	30,000	
Doors and Windows	15,000	
Painting and Finishing	60,000	
Services	120,000	
Furnishings	150,000	
Freight 1,200 T included in prices		
Electrical included in Area 410		
Total for 3. Cafeteria and Food Preparation		$810,000

4. Commercial	
Sitework	$ 20,000
Foundation	800,000
Structural Steel	800,000
Steel Floor Deck	200,000
Insulation to Floor	50,000
Concrete - Elevated Slab	200,000
Steel Roof Deck	60,000
Roofing	130,000
Siding	200,000
Floor Tile	30,000
Acoustic Tile	70,000
Doors, Windows	30,000
Lockers	15,000
Skylights	6,000

4. Commercial (cont'd)		
Painting and Finishing	$ 34,000	
Vault	16,000	
Store Fronts	60,000	
Millwork	60,000	
Pool Heating Equipment	11,000	
Plumbing and Drainage	200,000	
Heating and Ventilation	300,000	
Fire Protection	60,000	
Furnishings	400,000	
Freight 5,600T included in prices		
Electrical included in Area 410		
Total for 4. Commercial		$3,752,000
5. Emergency Power - 2 Required		
Sitework and Foundation	15,000	
Framing, Siding, Decking	60,000	
Services	15,000	
Freight 70T included in prices		
Electrical included in Area 210		
Total for 5. Emergency Power		$ 90,000

6. Firehouse		
Building 4,000 s.f. @ $20,000	$ 80,000	
Services 4,000 s.f. @ $5.00	20,000	
Furnishings 4,000 s.f. @ $3.00	12,000	
Equipment - 1 lot	10,000	
Freight 150 T included in prices		
Electrical included in Area 410		
Totoal for 6. Firehouse		$122,000
7. Hospital		
Allowance	$100,000	
Total for 7. Hospital		$100,000
8. School		
Sitework	$ 5,000	
Foundation	120,000	
Structural Steel	200,000	
Concrete - Floor	40,000	
Steel Floor Deck	50,000	
Steel Roof Deck	20,000	
Roofing	40,000	
Siding	80,000	
Painting and Finishing	50,000	
Doors and Windows	5,000	
Millwork	15,000	
Plumbing and Drainage	45,000	

8. School (cont'd)		
Heating and Ventilation	$ 65,000	
Sprinklers	15,000	
Furnishing	140,000	
Freight 1200 T included in prices		
Electrical included in Area 410		
Total for 8. School		$ 890,000
9. Sewage Treatment Plant		
Sitework	2,000	
Foundation	30,000	
Structural Steel	30,000	
Concrete Floor	10,000	
Metal Building - Insulated	50,000	
Services	20,000	
Freight 200 T included in prices		
Electrical included in Area 410		
Total for 9. Sewage Treatment Plant		$ 142,000
10. Sitework		
Clear and Level Site 1,000 acres @ $300.00	300,000	
Roads 7 miles @ $30,000	210,000	
Parking Lots 200,000 s.f. @ $2.00	400,000	
Parks	50,000	
Total for 10. Sitework		$ 960,000

11. Staff House		
Sitework	$ 5,000	
Foundation	20,000	
Framing, Siding, Decking	70,000	
Doors and Windows	7,000	
Roofing	10,000	
Painting, Finishing	10,000	
Stairs	5,000	
Plumbing and Drainage	20,000	
Heating and Ventilation	30,000	
Sprinkler	6,000	
Furnishings	20,000	
Freight 300 T included in prices		
Electrical included in Area 410		
Total for 11. Staff House		$ 203,000
12. Town Houses - 12 Required		
Sitework	60,000	
Foundation	190,000	
Framing, Siding, Decking	720,000	
Doors and Windows	120,000	
Stairs	60,000	
Painting and Finishing	120,000	
Plumbing and Drainage	240,000	
Heating and Ventilation	360,000	
Roofing	190,000	
Sprinkler System	75,000	
Furnishing	100,000	
Freight 6,600 T included in prices		
Electrical included in Area 410		
Total for 12. Town Houses		$2,215,000

13. Houses - 50 Required

Structure 1,400 s.f. @ $15.00	$1,050,000	
Services 1,400 s.f. @ $5.00	350,000	
Furnishings	75,000	
Freight 2,200 T included in costs		
Electrical included in Area 410		
Total for 13. Houses		$ 1,475,000
Total For Buildings		$12,286,000

Mortgaged

Apartments, Commercial Emergency Power, Fire House, Hospital, School Sewage Treatment, Townhouses, Houses - $9,254,000

Capitalized

Bunkhouses, Cafeteria and Food Preparation, Sitework, Staff House - $3,032,000

TOTAL FOR A. BUILDING	$ 3,032,000

B. Equipment

1. General

Cafeteria	$270,000	
Emergency Power Generators	75,000	
2 Fire Trucks	50,000	
2 Ambulances	30,000	
Sewage Treatment	100,000	
Total for 1. General		$ 525,000

2. Townsite Services

1 - 200,000 Imp. Gal. Elevated Water Tank	84,000	
Foundation for Water Tank	5,000	
Water Treatment Equipment	5,000	
1,000' - 16" Woodstave Line	16,000	
1,000' - Insulation for Woodstave Line	11,000	
2 - 1500 CFM Vertical Potable Water Pumps	14,000	
30,000' - Buried Water Lines	360,000	
60 - Fire Hydrants	30,000	
30,000' - Sewer Lines	360,000	
Installation	740,000	
Total for 2. Townsite Services		$1,625,000
Total for Equipment		$2,150,000

Mortgaged

Emergency Power Generators,
2 Fire Trucks, 2 Ambulances,
Sewage Treatment - $255,000

Capitalized

Cafeteria, Townsite Services
- $1,895,000

TOTAL FOR B. EQUIPMENT	$1,895,000
TOTAL FOR AREA 480	$4,927,000

AREA 500 - GENERAL

A. Preconstruction

Ground Surveys	$ 30,000	
Soil Investigation	40,000	
Preliminary Engineering	30,000	
Scheduling	10,000	
Total for A. Preconstruction		$110,000

B. Construction Overheads

Personnel - Contractor Staff	$ 25,000
Mobilization	5,000
Surveying	5,000
Hoarding	5,000
Temporary Buildings	10,000
Temporary Services	30,000
Permits, Inspections	5,000
Travel Expenses and Recruiting	15,000
Site Visits - Head Office	15,000
Clean-up Final	3,000
Protection of Finished Work	3,000
Temporary Heat	20,000
Pumping	3,000
Temporary Roads	3,000
Watchman	6,000
Testing Materials	3,000
Signs, Photographs	1,000

B. Construction Overheads (cont'd)		
Scaffolding, Staging, Chutes	$ 8,000	
Snow Removal, Road Maintenance	17,000	
Winter Work	110,000	
Premium Time	300,000	
Insurance	20,000	
Bonds	8,000	
Passenger Vehicles - incl. Fuel	25,000	
Accounting, Warehousing, Purchasing	60,000	
Safety, Security, Fire Protection	6,000	
Office Equipment Supplies	12,000	
Air Freight	30,000	
Room and Board	120,000	
Escalation	380,000	
Contingency	400,000	
Total for B. Construction Overheads		$1,635,000
TOTAL FOR AREA 500		$1,745,000

AREA 520 - PELLETIZING PLANT

A. Building

Excavation 281,000 c.y. @ $2.00/c.y.	$ 562,000	
Backfill 207,000 c.y. @ $4.00/c.y.	828,000	
Concrete 89,500 c.y. @ $100.00/c.y.	8,950,000	
Structural Steel 16,400 @ $750.00/T	12,300,000	
Cladding 1,000,000 s.f. @ $2.00/s.f.	2,000,000	
Services 840,000 s.f. @ $4.00/s.f.	3,360,000	
Total for A. Building		$28,800,000

B. Equipment

4 - Agitated Surge Tanks

4 - 6-Way Distributors

24 - 6'-9" x 10 Disc Filters

24 - Bin, Concentrate, 100 LT Capacity

24 - Vibrator, Concentrator Bin, Pneumatic

24 - Weigh Feeder, Concentrate Belt Type
42 Wide, Variable Speed Drive
Motor: 5 HP, 1750 RPM, DC

24 - Bin, Bentonite - 20 LT Capacity

24 - Additive Feeder, Bentonite
2100 lbs./Hr. Gravimetric with Star
Feeder. Motor: 3/4 HP, 1570 RPM, DC

4 - Dust Collectors, Bentonite Bins,
3,000 CFM @ 6" W.G. with Exhaust Fan.
Motor: 7-$\frac{1}{2}$ HP, 1750 RPM, AC

24 - Blender, Balling Circuit Feed, Three
Section, Six Reel Type.
Motor: (3) 20 HP, 1200 RPM, AC

B. Equipment (cont'd)

24 - Conveyor, Belt, Concentrate & Additive Blending, 36" wide x 57' long,
Motor: 3 HP, 1750 RPM, AC

4 - Dust Collector, Additive Blending Wet Type, 6000 CFM with Integral Fan.
Motor: 25 HP, 1750 RPM, AC

24 - Conveyor, Belt, Transfer 36" Wide x 20' long.
Motor: 7.5 HP, 1750 RPM, AC

24 - Conveyor, Belt, Balling Drum Feed, 36" wide x 20' long.
Motor: 7.5 HP, 1750 RPM, AC

5 - 7200 CFM Vacuum Pump and accessories

24 - Balling Drum, 12' dia. x 33' long.
Motors: 1 Drum 100 HP, 1750/885 RPM, DC
Cutter Bar 3 HP, 1750/885 RPM, DC

5 Drums 60 HP, 1200 RPM, AC
Cutter Bar 3 HP, 1750 RPM, AC

24 - Seed Screen, Balling Drum Product, 8' wide x 18' long. Two bearing type with Grizzly Extension to remove +1, -3/4 inch oversize.
Motor: Dual 25 HP AC

24 - Conveyor, Belt, Seed Screen Undersize, 108" wide x 20' long.
Motor: 7.5 HP, 1750 RPM, AC

24 - Conveyor, Belt, Recirculating, 36" wide x 55' long.
Motor: 7.5 HP, 1750 RPM, AC

8 - Conveyor, Belt, Seed Screen Oversize, 36" wide x 124' long and 107' long.
Motor: 3 HP, 1750 RPM, AC

4 - Conveyor, Belt, Oversize Collecting, 36" wide x 270' long.
Motor: 7.5 HP, 1750 RPM, AC

B. Equipment (cont'd)

4 - Shredder, Oversize Reduction.
Three Section, Six Reel Type.
Motor: (3) 20 HP, 1200 RPM, AC

4 - Conveyor, Belt, Shredded Product
Transfer - 36" wide x 20' long.
Motor: 7.5 HP, 1750 RPM, AC

24 - Conveyor, Belt, Green Ball.
36" wide x 33' long.
Motor: 3 HP, 1750 RPM, AC

8 - Conveyor, Belt, Green Ball Collecting.
36" wide x 84' long & 100' long.
Motors: 5 HP, 1750 RPM, AC

8 - Conveyor, Belt, Green Ball Reject.
36" wide x 112' long & 142' long.
Motor: 5 HP, 1750 RPM, AC

4 - Conveyor, Reciprocating Belt, Green Ball.
48" wide x 29' min. 46' max. length, 20° picking and feeding idlers, gravity type take-up, variable speed belt drive, reciprocating action of head pulley through carriage and hydraulic cylinder operated by variable-volume hydraulic pump unit. Cylinder seal flush.
Motors: 25 HP, 1750 RPM, DC
50 HP, 900 RPM, AC
$\frac{1}{2}$ HP, 1750 RPM, DC

4 - Conveyor, Belt, Grate Feed.
192" wide x 32'-6" long, 20° picking and feeding idlers.
Motor: 15 HP, 1750/437 RPM, DC

4 - Roller Conveyor, 15'-1" wide consisting of 32, 5 1/16" O.D. x 15'-1" long chrome plated stainless rollers mounted on a fabricated frame.

Main Drive Motors 3 HP, 1750, AC (32 off)
Reverse Roll Motor: 3 HP, 1750, AC

B. Equipment (cont'd)

4 - Conveyor, Belt, Roller Conveyor Fines.
16' wide x 12' long.
Motor: 5 HP, 1750 RPM motor.

4 - Conveyor, Belt, Fines Return.
36" wide x 78' long.
Motor: 3 HP, 1750 RPM, AC

8 - (4 standby) Pump, Balling Drum Spray and Seal Water.
Motor: 40 HP, 3500 RPM, AC

4 - Traveling Grate, Heat Recuperating, two pass, 18 windbox, 15'-0" wide x 200'-9" long, consisting of one 9 windbox downdraft preheat zone separated by a baffle wall. Refractory lined. Lubrication system is by automatic centralized control. Grate drive is by a spur gear mounted on extension of head shaft and a spur pinion mounted on low speed shaft of gear reducer. Grate speeds 62.5 to 250 inches per minute.
Motor: 75HP, 1750/437 RPM, DC

4 - Fan, Grate Structure Cooling, 22,500 CFM @ 70° F and 15" WG SP single width, single inlet & outlet, centrifugal fan.
Motor: 100 HP, 1800 RPM, AC

144 - Dust Collectors, Preheat Gas, Cyclone type in two banks, each with 9 twin cyclones, with one collecting dust hopper and double-tipping dust valve per twin.

8 - Fans, Preheat (Nos. 1A & 1B), 451,000 CFM @ 700° F and 17" WG SP. Double width, double inlet, induced draft centrifugal fan with replaceable blade liners and auxiliary turning gear drive.
Motors: 2000 HP, 880 RPM, AC
15 HP, 1800 RPM, AC

B. Equipment (cont'd)

4 - Dust Collector, Waste Gas.
Multitube type with centrifugally cast iron collection tubes.

4 - Fan, Waste Gas (No. 2), 585,000 CFM @ 250° F and 16" WG SP. Double width, double inlet, induced draft centrifugal fan with replaceable blade liners.
Motor: HP, 705 RPM, AC

4 - Dust Collector, Grate Feed End. 20,000 CFM @ 150° F and 4" WG SP. Wet type scrubber complete with fan.
Motor: 75 HP, 1800 RPM, AC

4 - Dust Collector, Grate Discharge End. 20,000 CFM @ 150° F and 4" WG SP. Wet type scrubber complete with fan.
Motor: 75 HP, 1800 RPM, AC

4 - Rotary Kiln, Heat Hardening.
22'-6" dia. x 150' long, welded steel and refractory lined with tapered feed end and two riding rings. Slope $\frac{1}{2}$" per foot.

Drive: Single spur ring-gear mounted on kiln shell driven by two spur pinions each mounted on a jackshaft and direct coupled to an extended high-speed shaft gear reducer.

Drive Motors: Dual 500 HP, DC
Auxiliary Drives: Speed reducer clutch-connected to high speed shaft on gear reducer.

Auxiliary Drive Motor: 75 HP, AC

4 - Fan, Kiln Feed End Cooling. 6,250 CFM @ 90°F and 6" WG SP. Single inlet and outlet centrifugal fan.
Motor: 15 HP, 1800 RPM, AC

4 - Fan, Kiln Discharge End Cooling. 10,500 CFM @ 90°F and 7" WG SP. Single inlet and outlet centrifugal fan.
Motor: 20 HP, 1800 RPM, AC

B. Equipment (cont'd)

4 - Fan, Kiln Motors Cooling. 5000 CFM @ 70° F and 4" WG SP single width, single inlet centrifugal fan.
Motor: 10 HP, 1800 RPM, AC

4 - Burner, Kiln Firing for heavy fuel oil complete with Suction Heaters, Circulating Pumps, Heaters, and Booster Pumps.
Motors: (2) 15 HP, 1200 RPM, AC
(2) 50 HP, 1200 RPM, AC

4 - Fan, Main Primary Air for Kiln Burner
Motor: 100 HP, 1800 RPM, AC

4 - Grizzly System, Kiln Discharge Oversize, consisting of eight internally air cooled bars spaced eight inches apart.

8 - Fans, Grizzly Cooling, 18,000 CFM, @ 70° F and 25" W. G.
Motor: 125 HP, 1750 RPM, AC

4 - Cooler, Annular type, 56'-0" mean dia. x 8'-0" wide, continuous, primary heat recuperating stage, secondary cooling stage, refractory lined.
Drive: Roller chain around rotating body is driven by two cycloidal sprockets, spur gears and gear reducers located 180° apart.
Motors: Dual 20 HP, 1750 RPM, DC
Auxiliary Drives: Thru two additional clutch couplings and gear reducers.
Motors: Dual 2 HP, 1800 RPM, AC

B. Equipment (cont'd)

8 - Fan, Cooler Supply (Nos. 3A & 3B), 281,000 CFM @ 70°F and 20" WG SP, double width, double inlet forced draft fan.
Motor: 1000 HP, 880 RPM, AC

4 - Fan, Cooler Screened Wall, 6,250 CFM @ 70° F and 18" WG SP. Single inlet and outlet, centrifugal fan.
Motor: 30 HP, 1800 RPM, AC

4 - Hopper, Cooler Discharge 100 LT Capacity with hinged access door, interior steel-rod deck grizzly and two discharge openings.

8 - Feeder, Vibrating Grizzly, Cooler Product Discharge, 48" wide x 216" long, heavy duty, low head, vibrating feeder with 24" long grizzly section.
Motor: 25 HP, 1800 RPM, AC

8 - (4 Standby) Pump, Sump Grate Area. 6" solids handling centrifugal.
Motor: 20 HP, 720 RPM, AC

4 - Classifier, Plant Clean-up Retreatment 36" spiral x 19'-3" long.
Motor: 3 HP, 1750 RPM, AC

4 - Ball Mill, Plant Clean-up Retreatment. 6' dia. x 10' long.
Motor: 200 HP, 1200 RPM, AC

8 - (4 Standby) Pumps, Slurry, Plant Retreatment. 2,000 GPM @ 80' rubber lined.
Motor: 75 HP, 1750 RPM, AC.

8 - (4 Standby) Pump, Cooler Area Sump. 6" solids handling centrifugal.
Motor: 20 HP, 720 RPM, AC

B. Equipment (cont'd)

8 - (4 Standby) Pumps, Process Water
2,000 GPM @ 160 ft.
Motor: 125 HP, 1750 RPM, AC

8 - (4 Standby) Pumps, Treated Cooling Water. 500 GPM @ 160 ft.
Motor: 40 HP, 1750 RPM, AC

4 - Heat Exchanger, Treated Cooling Water
Fixed Tube Type

1 lot - Engineering, design and start-up service for the grate kiln system

1 lot - Piping

1 lot - Electrical

1 lot - Instrumentation

1 lot - Installation

Total for B. Equipment	$52,000,000
TOTAL FOR AREA 520	$80,000,000

AREA 530 - SERVICE BUILDING

A. Building

Excavation 7,500 c.y. @ $4.00	$ 30,000	
Backfill - Earth 4,000 c.y. @ $5.00	20,000	
Backfill - Granular	3,000	
Concrete - Foundation 225 c.y. @ $100.00	22,500	
Concrete - Slab on Grade 750 c.y. @ $90.00	67,500	
Concrete - Elevated Slab 730 c.y. @ $120.00	87,600	
Concrete - Equipment Foundation 30 c.y. @ $100.00	3,000	
Structural Steel 400 T @ $750.00	300,000	
Miscellaneous Steel 50 T @ $900.00	45,000	
Roofing 38,000 s.f. @ $2.50	95,000	
Flooring	15,000	
Siding 12,000 s.f. @ $2.20	26,400	
Interior Partitions 23,000 s.f. @ $2.00	46,000	
Ceiling	15,000	
Doors and Windows	30,000	
Miscellaneous Architectural	10,000	
Mechanical Services 55,000 s.f. @ $3.00	165,000	
Freight 1,250 T included in prices		
Electrical included in Area 560		
Total for A. Building		$981,000

B. Equipment

1. General

Office Furniture and Equipment	$ 8,000	
2 - Bridge Cranes 15 T	52,000	
2 - Bridge Cranes 5 T	15,000	
Fork Lift Trucks	15,000	
Shelving and Office Equipment	15,000	
Installation	15,000	
Lockers	5,000	
Freight 10 T included in prices		
Electrical included in Area 560		
Total for 1. General		$125,000

2. Machine Shop

Drill Press - 24 in.	$ 8,400
Radial Drill - 5 ft.	2,400
Pedestal Grinder	2,700
Power Hacksaw - 10 in. Cap.	12,000
Bandsaw	13,200
Ironworker	6,000
Shaper - 32 in.	19,200
Milling Machine	16,800
2 - 12 in. Lathe - 12 ft.	67,000
20 in. Lathe - 12 ft.	43,200
Portable Scale - 0-1,000 lbs.	3,000
200 Ton Press	7,200
Bench Grinder	1,200
Threading Machine 6	24,000

2. Machine Shop (cont'd)		
Portable Threading Machine	$ 3,000	
Screw Press	2,400	
Belt Vulcanizer	12,000	
Portable Oxy-Acet Welding	22,000	
Small Equipment	42,000	
Office Equipment	46,000	
Benches	42,000	
5 Ton Crane	6,000	
Forge Hammer - 200 Ton	12,000	
Small Tools	10,600	
Installation	20,300	
Freight 140 T included in prices		
Electrical included in Area 560		
Total for 2. Machine Shop		$444,600

3. Garage		
Truck Lift	$12,000	
Compressor	7,200	
Tire Changing Equipment	6,000	
Lube Unit	8,000	
Steam Cleaner	5,000	
Small Tools	50,000	
Balancing Unit	2,000	
Grease Guns, Portable Lube System	5,000	
Truck Wash Equipment	5,000	
Analyser	2,400	
Vulcanizer	10,000	

3. Garage (cont'd)		
Gas Distribution	$ 10,000	
Installation	10,800	
Freight 40 T included in costs		
Electrical included in Area 560		
Total for 3. Garage		$133,400
4. Electric Shop		
Test Equipment	$ 32,000	
Portable Welders 2-400 Amp	10,000	
Small Tools	32,000	
Instrument Repairs	30,000	
Office Furniture and Equipment	10,000	
Installation	8,000	
Freight 40 T included in prices		
Electrical included in Area 560		
Total for 4. Electric Shop		$122,000
5. Carpenter Shop - Equipment		
Allowance	$ 40,000	
Total for 5. Carpenter Shop - Equipment		$ 40,000

6. Surface Mobile		
3/4 T Pick-up Trucks 25 @ $4,000.00	$100,000	
3 T Flatbed Trucks 3 @ $5,000.00	15,000	
1/3 c.y. Backhoe 1 @ $20,000.00	20,000	
3/4 c.y. Backhoe	55,000	
12 T Crane 1 @ $60,000.00	60,000	
2½ c.y. Front End Loader	42,000	
5 T Trucks	50,000	
Ski-Doos 4 @ $1,250.00	5,000	
Automobiles 25 @ $4,000	100,000	
Fork Lift Truck 2 @ $5,000.00	10,000	
Carry-All 1 @ $5,000.00	5,000	
Bus - 35 Passenger 3 @ $10,000.00	30,000	
Total for 6. Surface Mobile		$ 492,000
Total for B. Equipment		$1,357,000
TOTAL FOR AREA 530		$2,338,000

AREA 540 - WATER SUPPLY SYSTEM

A. Building

Process 2,000 s.f. @ $20.00	$ 40,000	
Potable 2,000 s.f. @ $20.00	40,000	
Inlet Structures	10,000	
Concrete Base Potable Water Tank	5,000	
Bed for Water Lines	30,000	
Total for A. Building		$125,000

B. Equipment

3 - Process Vertical Water Pumps	90,000	
2 - Vertical Potable Water Pumps	13,300	
1 - 200,000 Imp. Gal. Elevated Water Tank	84,000	
Water Treatment for Potable Water	5,000	
3,500 ft. - 60" Woodstave Water Line	308,000	
3,500 ft. - 16" W.S. Potable Water Line	56,000	
2,000 ft. insulation	22,700	
Installation - Equipment	30,000	
Instrumentation	2,000	
Freight included in prices 900T		
Electrical included in Area 560		
Total for B. Equipment		611,000

TOTAL FOR AREA 540	$736,000

AREA 550 - FUEL SUPPLY

A. Building		
Foundation for tanks	$150,000	
Unloading platform	20,000	
Total for A. Building		$ 170,000
B. Equipment		
Bunker Tanks	$ 80,000	
Diesel Tank	50,000	
Gasoline Tank	50,000	
Unloading Pumps	40,000	
Freight 1,100 T included in prices		
Total for B. Equipment		$ 940,000
TOTAL FOR AREA 550		$1,110,000

AREA 560 - ELECTRICAL DISTRIBUTION

A. Building

Included in Equipment.

B. Equipment

Incoming service	$300,000	
Outdoor substation	470,000	
Panels and switchgear	651,000	
Main distribution feeders	154,000	
Lighting	440,000	
Power wiring, control and tray	100,000	
Electrical heating	16,000	
Grounding	18,000	
Spare equipment	25,000	
Freight - 270 tons	40,000	
Total for B. Equipment		$2,214,000
TOTAL FOR AREA 560		$2,214,000

AREA 580 - FIRE PROTECTION SYSTEM

A. Building

Not required

B. Equipment

Piping	$150,000	
Hydrants	15,000	
Total for B. Equipment		$165,000
TOTAL FOR AREA 580		$165,000

AREA 590 - HEATING SYSTEM

A. Building

Powerhouse 200,000 c.f. @ $1.00	$200,000	
Foundations for Fuel Tanks	100,000	
Unloading Platform	20,000	
Total for A. Building		$ 320,000

B. Equipment

Cranes	$ 30,000	
2 - Boilers	132,000	
2 - Exhaust Stacks	14,000	
Pumps - Boiler	14,000	
Tanks, Receivers	10,000	
De-aerator	15,000	
2 - Compressor 300 CFM-Plant Air	60,000	
Compressor 200 CFM-Instrument Air	19,000	
Fans	5,000	
Support Steel	5,000	
Filter	3,000	
Piping	165,000	
Insulation	8,000	
Installation - Powerhouse	250,000	
Freight 250 T included in prices		
Electrical included in Area 560		
Total for B. Equipment		$ 730,000
TOTAL FOR AREA 590		$1,050,000

AREA 600 - SEWAGE DISPOSAL SYSTEM

A. Building		
2,000 s.f. @ $20.00	$40,000	
Manholes	5,000	
Total for A. Building		$45,000
B. Equipment		
Piping	$40,000	
Chlorinator	5,000	
Total for B. Equipment		$45,000
TOTAL FOR AREA 600		$90,000

AREA 610 - ROADS AND YARDS

Clear and Level Site 100 Acres @ $300.00	$ 3,000	
Parking 200,000 s.f. @ $2.00	400,000	
Roads on Site 6 miles @ $30,000	180,000	
Drainage	50,000	
Communications	100,000	
TOTAL FOR AREA 610		$733,000

AREA 630 - TOWNSITE

A. Building

1. Houses - 50 Required

Structure 1,400 s.f. @ $15.00	$1,050,000	
Services 1,400 s.f. @ $5.00	350,000	
Furnishings	75,000	
Freight 2,200 T included in costs		
Electrical included in Area 210		
Total for 1.. Houses		$1,475,000

2. Apartment - 3 Required

Building 22,000 s.f. @ $15.00	$ 990,000	
Services 22,000 s.f. @ $5.00	330,000	
Furnishings 84 @ $1,000.00	84,000	
Freight 500 T included in prices		
Electrical included in Area 210		
Total for 2. Apartment		$1,404,000

3. Town Houses - 6 Required

Sitework	$ 30,000
Foundation	90,000
Framing, Siding, Decking	360,000
Doors and Windows	60,000
Stairs	30,000
Painting and Finishing	60,000

3. Town Houses - 6 Required (cont'd)		
Plumbing and Drainage	$ 120,000	
Heating and Ventilation	180,000	
Roofing	90,000	
Sprinkler System	37,000	
Furnishing	50,000	
Freight 6,600 T included in prices		
Electrical included in Area 210		
Total for 3. Town Houses		$1,107,000

4. Staff House		
Sitework	$ 5,000	
Foundation	20,000	
Framing, Siding, Decking	70,000	
Doors and Windows	7,000	
Roofing	10,000	
Painting, Finishing	10,000	
Stairs	5,000	
Plumbing and Drainage	20,000	
Heating and Ventilation	30,000	
Sprinkler	6,000	
Furnishings	20,000	
Freight included in prices		
Electrical included in Area 210		
Total for 4. Staff House		$ 203,000

5. Sitework		
Clear and Level Site 50 acres @ $300.00	$ 15,000	
Roads 3 miles @ $30,000	90,000	
Parking Lots 50,000 s.f. @ $2.00	100,000	
Serviced Lots 100 @ $150.00	15,000	
Total for 5. Sitework		$ 220,000
Total For Buildings		$4,409,000

Mortgaged

Houses, Apartments, Townhouses - $3,986,000

Capitalized

Staff Houses, Sitework - $423,000

TOTAL FOR A. BUILDING	$ 423,000
TOTAL FOR AREA 630	$ 423,000

AREA 640 - CENTRAL ADMINISTRATION

A. Building

Excavation 5,200 c.y. @ $4.00	$ 20,800	
Backfill 3,000 c.y. @ $5.00	15,000	
Concrete - Foundation 400 c.y. @ $100.00	40,000	
Concrete - Slab on Grade 600 c.y. @ $90.00	54,000	
Concrete - Elevated Slab 1,000 c.y. @ $120.00	120,000	
Structural Steel 300 T @ $750.00	225,000	
Miscellaneous Steel 30 T @ $900.00	27,000	
Roofing 24,000 s.f. @ $2.50	60,000	
Flooring	40,400	
Ceiling	40,000	
Interior Partitions 66,000 s.f. @ $2.00	132,000	
Doors and Windows	40,000	
Siding 24,000 s.f. @ $2.20	52,800	
Miscellaneous Arch.	40,000	
Services 70,000 s.f. @ $5.00	350,000	
Freight included in prices 1,000 T		
Electrical included in Area 560		
Total for A. Building		$1,257,000

B. Equipment & Furnishings		
Allowance	$250,000	
Total for B. Equipment		$ 250,000
TOTAL FOR AREA 640		$1,507,000

AREA 650 - OFFICE BUILDING AT PELLETIZING PLANT

A. Building

Excavation 1,700 c.y. @ $4.00	$ 6,800	
Backfill 1,000 c.y. @ $5.00	5,000	
Concrete - Foundation 130 c.y. @ $100.00	13,000	
Concrete - Slab on Grade 200 c.y. @ $90.00	18,000	
Concrete - Elevated Slab 330 c.y. @ $120.00	39,600	
Structural Steel 100 T @ $750.00	75,000	
Miscellaneous Steel 10 T @ $900.00	9,000	
Roofing 8,000 s.f. @ $2.50	20,000	
Flooring	13,000	
Ceiling	13,000	
Interior Partitions 22,000 s.f. @ $2.00	44,000	
Doors and Windows	14,000	
Siding 8,000 s.f. @ $2.20	17,600	
Miscellaneous Arch.	13,000	
Services 23,000 s.f. @ $5.00	115,000	
Freight included in prices		
Electrical included in Area 210		
Total for A. Building		$416,000

B. Equipment and Furnishings		
Allowance	$66,000	
Total for B. Equipment		$ 66,000
TOTAL FOR AREA 650		$482,000

OPERATING COSTS
DETAILS
GENERAL

1. Depreciation of equipment and particularly mining and service vehicles is not included in this estimate. This should be covered by an annual capital allowance in the cash flow.

2. Labour and fringes have been escalated to 1974 using the present Wabush Mines contract.

3. Additional married housing over that described in this report is to be capitalized by others.

4. Power cost is assumed to be 5.0 mils per KWH in Labrador and 7.0 mils per KWH in Quebec.

5. The manpower quantities used include an allowance for training and apprentice programs.

6. The administrative and service personnel and facilities included at the pelletizing plant are adequate to include the product storage and ship loading functions.

Wages, holidays, bonuses, etc., have been taken from the existing contract between Wabush Mines and the United Steelworkers of America. These items have been extrapolated to 1974 for the purpose of computing this operating cost.

The following wage rates have been used:-

Category	Rate	Category	Rate
1	$3.63/hr.	11	$4.56/hr.
2	$3.72/hr.	12	$4.65/hr.
3	$3.81/hr.	13	$4.74/hr.
4	$3.90/hr.	14	$4.83/hr.
5	$4.00/hr.	15	$4.93/hr.
6	$4.09/hr.	16	$5.02/hr.
7	$4.18/hr.	17	$5.11/hr.
8	$4.27/hr.	18	$5.20/hr.
9	$4.37/hr.	19	$5.30/hr.
10	$4.47/hr.	20	$5.40/hr.

The following fringe benefits have been assumed:-

Vacation - average 3 years	7.7% of pay
Statutory holidays - 10 days	2.0% of pay
Annual vacation travel allowance	1.4% of pay
Northern allowance $25.00/mo. single) $40.00/mo. married)	4.4% of pay average
Fringe benefits - unemployment insurance, medical, pension, etc.	11.0% of pay
Overtime allowances	5.0% of pay
Total hourly rated burden	31.5%

Staff burden

Fringe benefits	11.0%
Northern allowance	5.0%
Travel allowance	2.0%
Total	18.0%

Note: Vacation, statutory holidays and overtime are considered as part of the annual salary for staff members.

JULIAN AND STAR-O'KEEFE

Administration

Item	Julian Qty.	Julian Annual Rate	Star-O'Keefe Qty.	Star-O'Keefe Annual Rate
Manager	1	$ 30,000	1	$ 30,000
General Superintendent	2	22,000	1	22,000
Chief Engineer	1	18,000	1	18,000
Engineers	2	28,000	1	14,000
Surveyors	2	19,000	2	19,000
Draftsmen	6	66,000	3	33,000
Office Manager	1	16,000	1	16,000
Accountant	1	15,000	1	15,000
Chief Payroll Clerk	1	10,000	1	10,000
Payroll Clerks	6	48,000	3	24,000
Purchasing Agent	1	13,000	1	13,000
Chief Warehouseman	1	12,000	1	12,000
Warehouse Clerks	12	108,000	8	72,000
Personnel Officer	1	12,000	1	12,000
Personnel Clerks	2	16,000	1	8,000
Training Officer	1	12,000	1	12,000
Training	2	20,000	1	10,000
Communication	4	36,000	4	36,000
Traffic	1	10,000	-	10,000
Safety	1	12,000	1	12,000
First Aid	2	12,000	1	12,000
Office Clerks	20	160,000	10	80,000
Stenos and Typists	20	144,000	10	72,000
Security Officer	1	11,000	1	11,000
Total	91	$850,000	56	$573,000
Burden (18.0%)		153,000		103,140
		$1,003,000		$676,140
Cost/LT of ore		4.458¢		9.015¢
Cost/LT of concentrate		11.15¢		22.54¢

Mining

Item	Julian Qty.	Julian Annual Rate	Star-O'Keefe Qty.	Star-O'Keefe Annual Rate
Mine Superintendent	1	$ 26,000	1	$ 26,000
General Foreman	1	18,000	1	18,000
Shift Bosses	5	60,000	5	60,000
Pit Engineers	2	35,000	2	35,000
Geologists	2	24,000	2	24,000
Draftsmen	2	22,000	2	22,000
Drill Foreman	1	13,000	1	13,000
Blasting Foreman	1	13,000	1	13,000
Total	15	$211,000	15	$211,000
Burden (18.0%)		37,980		37,980
Total		$248,980		$248,980
Cost/LT of ore		1.107¢		3.320¢
Cost/LT of concentrate		2.77¢		8.30¢

Hourly Rated

Item	Julian Qty.	Julian Rate	Julian Total/yr.	Star-O'Keefe Qty.	Star-O'Keefe Rate	Star-O'Keefe Total/yr.
Shovel Operator						
2100	16	17	$ 170,080	-	-	$ -
1900	-	-	-	16	17	170,080
955E	4	17	42,520	2	17	21,260
Drill Operator						
60R	8	11	75,840	-	-	-
45R	-	-	-	12	11	113,760
Mobile	2	7	17,380	2	7	17,380
Drill Helper	8	5	66,560	12	5	99,840
Jack Hammer	4	5	33,280	4	5	33,280
Truck Drivers						
M-100	60	11	568,800	36	11	341,280
35T	8	11	75,840	4	11	37,920
Flat bed	4	7	34,760	4	7	34,760
Sand	2	7	17,380	2	7	17,380
Lube	4	7	34,760	4	7	34,760
Water & Snow	1	7	8,690	1	7	8,690
Tractor Operators						
D-9	16	9	145,440	-		-
834	2	9	18,180	2	9	18,180
D-8	-		-	16	9	145,440
Front End Loader Operator	2	9	18,180	2	9	18,180
Crane Operator						
T650	1	12	9,670	1	12	9,670
R180	-	12	-	-	12	-
Grader Operator	3	9	27,270	2	9	18,180
Pipe Fitter	1	10	9,300	1	10	9,300
Electrician	4	10	37,200	4	10	37,200
Trades Helpers	4	5	33,280	4	5	33,280
Powdermen	1	10	9,300	1	10	9,300
	155		$1,453,710	132		$1,229,120
Burden (31.5%)			457,920			387,170
Total			$1,911,630			$1,616,290
Cost/LT of ore			8.496¢			21.550¢
Cost/LT of concentrate			21.24¢			53.88¢

Concentrator

Salaried

Item	Julian Qty.	Julian Annual Rate	Julian Total/ Yr.	Star-O'Keefe Qty.	Star-O'Keefe Annual Rate	Star-O'Keefe Total/ Yr.
Mill Superintendent	1	$ 24,000		1	$ 24,000	
Ass't. Superintendent	1	20,000		1	20,000	
General Foreman	1	18,000		1	18,000	
Metallurgist	2	30,000		1	15,000	
Shift Foreman	5	60,000		5	60,000	
Chief Assayer	1	12,000		1	12,000	
Lab Technicians	8	72,000		6	54,000	
Mill Technicians	4	36,000		2	18,000	
Clerks	3	24,000		2	16,000	
Total	26	$296,000		20	$237,000	
Burden (18%)		53,280			42,660	
Total		$349,280			$279,660	
Cost/LT of ore		1.552¢			3.729¢	
Cost/LT of concentrate		3.88¢			9.32¢	

Hourly Rated Operating

Item	Julian Qty.	Julian Rate	Julian Cost/yr.	Star-O'Keefe Qty.	Star-O'Keefe Rate	Star-O'Keefe Cost/yr.
Crusher Operator	4	6	$ 34,040	4	6	$ 34,040
Crusher Helper	4	3	31,720	4	3	31,720
Ore Storage Operator	4	4	32,440	4	4	32,440
Senior Mill Operator	4	18	43,240	4	18	43,240
Ass't. Mill Operator	4	15	41,000	4	15	41,000
Primary Grinding Operator	4	6	34,040	4	6	34,040
Primary Grinding Helper	4	3	31,720	-		-
Spiral Leaders	8	12	77,360	4	12	38,680
Spiral Operators	24	6	204,240	12	6	102,120
Thickening & Filter Operator	4	6	34,040	4	6	34,040
Secondary Grinding Operator	4	6	34,040	4	6	34,040
Secondary Grinding Helpers	4	3	31,720	-		-
Samplers	8	4	64,880	4	4	32,440
Pump Leaders	4	10	85,100	4	10	85,100
Pump Operators	8	6	68,080	4	6	34,040
Tails Pond	16	6	136,160	8	6	68,080
Laborers	16	1	120,800	8	1	60,400
Total	124		$1,104,620	76		$ 705,420
Burden (31.5%)			347,960			222,200
Total			$1,452,580			$ 927,620
Cost/LT of ore			6.456¢			12.368¢
Cost/LT of concentrate			16.14¢			30.92

Note: Ore storage bulldozing is done by regular equipment operators in mining and surface work force.

Hourly Rated Maintenance

Item	Julian Qty.	Julian Rate	Julian Cost/yr.	Star-O'Keefe Qty.	Star-O'Keefe Rate	Star-O'Keefe Cost/yr.
Millwrights	16	10	$148,800	8	10	$ 74,400
Mechanics	12	10	111,600	6	10	55,800
Riggers	4	10	37,200	2	10	18,600
Welders	2	10	18,600	2	10	18,600
Pipe Fitters	4	10	37,200	2	10	18,600
Electricians	2	10	18,600	2	10	18,600
Trades Helpers	30	5	249,600	16	5	133,120
Total	70		$621,600	38		$337,720
Burden (31.5%)			195,800			106,380
Total			$817,400			$444,100
Cost/LT of ore			3.633¢			5.921¢
Cost/LT of concentrate			9.08¢			14.80¢

Services

Supervision

Item	Julian Qty.	Julian Rate	Star-O'Keefe Qty.	Star-O'Keefe Rate
Maintenance Supervisor	1	$ 20,000	1	$ 20,000
Maintenance Engineer	1	15,000	1	15,000
Planning Engineer	2	28,000	1	14,000
Garage Foreman	1	12,000	1	12,000
Machine Shop Foreman	1	11,000	1	11,000
Plate Shop Foreman	1	11,000	-	-
Welding Foreman	1	12,000	1	12,000
Electrical Supervisor	1	15,000	1	14,000
Instrument Supervisor	1	15,000	1	14,000
Mill Maintenance Supervisor	1	15,000	1	15,000
Mill Maintenance Foreman	2	22,000	1	11,000
Stationary Engineer	1	12,000	1	12,000
Surface Foreman	1	10,000	1	10,000
Townsite Service Foreman	1	9,000	-	-
Total	16	$207,000	12	$160,000
Burden (18.0%)		37,260		28,800
Total		$244,260		$188,800
Cost/LT of ore		1.086¢		2.517¢
Cost/LT of concentrate		2.72¢		6.29¢

Hourly Rated

Item	Julian Qty.	Julian Rate	Julian Cost/yr.	Star-O'Keefe Qty.	Star-O'Keefe Rate	Star-O'Keefe Cost/yr.
Automotive						
Leaders	4	15	$ 41,000	4	15	$ 41,000
Mechanics	30	12	290,100	24	12	232,080
Helpers	10	6	85,100	6	6	51,060
Shops						
Machinists	6	12	58,020	3	12	29,010
Riggers	4	10	37,200	2	10	18,600
Mechanics	12	10	111,600	6	10	55,800
Welder Leaders	4	15	41,000	4	15	41,000
Welders	15	12	145,050	8	12	77,360
Pipe Fitters	2	10	18,600	1	10	9,300
Carpenters	2	10	18,600	1	10	9,300
Painter	1	10	9,300	1	10	9,300
Blacksmiths	2	10	18,600	1	10	9,300
Rubber Workers	4	10	37,200	2	10	18,600
Drill & Bit Repair	8	10	74,400	2	10	18,600
Mechanical Helpers	20	6	170,200	10	6	85,100
Mobile						
Mechanics	8	10	74,400	6	10	55,800
Electrical						
Electricians	10	10	93,000	6	10	55,800
Helpers	10	6	85,100	6	6	51,060
Instrument	8	12	77,360	5	12	48,350
Surface						
Equipment Operator	8	9	72,720	6	9	54,540
Truck Drivers	8	7	69,520	8	7	69,520
Laborers	30	1	226,500	15	1	113,250
Townsite						
Plumbers	2	10	18,600	1	10	9,300
Carpenters	2	10	18,600	1	10	9,300
Electrician	1	10	9,300	1	10	9,300
Painter	1	10	9,300	1	10	9,300

Hourly Rated (cont'd)

Item	Qty.	Rate	Cost/yr.	Qty.	Rate	Cost/yr.
Miscellaneous						
Boiler Attendants	4	12	$ 38,680	4	12	$ 38,680
Watchmen	8	6	68,080	8	6	68,080
Janitors	6	1	45,300	4	1	30,200
Total	230		$2,062,430	147		$1,327,890
Burden (31.5%)			649,670			418,290
Total			$2,712,100			$1,746,180
Cost/LT of ore			12.054¢			23.282¢
Cost/LT of concentrate			30.14¢			58.21¢

Materials and Expenses

	Cost/Year	
	Julian	Star-O'Keefe
Administration		
Office Supplies & Expenses	$106,000	$ 60,000
Communications	30,000	18,000
Travel Allowance (operating)	72,000	36,000
Total	$208,000	$114,000
Cost/T of ore	0.925¢	1.520¢
Cost/T of concentrate	2.31¢	3.80¢

Mining

	Julian	Star-O'Keefe
Maintenance materials and Lubricants		
Drills	$ 163,000	$ 157,000
Shovels	603,000	456,000
Trucks	1,040,000	647,000
Tractors and Loaders	104,000	74,000
Other mine equipment	406,000	346,000
Total	$2,316,000	$1,680,000
Fuel		
Trucks - Imp. gal/yr.	1,410,000	850,000
Other - Imp. gal/yr.	260,000	155,000
Total	$1,670,000	$1,005,000
Cost/year (28¢/gal)	$ 467,600	$ 281,400

Explosives

Bulk slurry explosives will be delivered by CIL and loaded at 8¢/lb. allowing 2¢/lb. for primacord and other supplies.

Using Wabush factor of 0.5 lb./T

Consumption/year (ore plus waste)	11,600,000	6,700,000
Cost/year for explosives	$1,160,000	$670,000

Power

	Julian	Star-O'Keefe
Corrected HP	4,200	2,400
Demand KW	3,000	1,600
Load Factor (Power Factor 90 plus)	0.5	0.5
KWH/year	13×10^6	7×10^6
Cost mills/KWH	5	7
Annual Cost	$65,000	$49,000
Total Mining Supplies	$4,008,600	$2,680,400
Cost/T of ore	17.816¢	35.739¢
Cost/T of concentrate	49.54¢	89.35¢

Concentrating

Supplies

	Julian	Star-O'Keefe
Crushing and Grinding Liners (0.2 lbs. /T)	$1,350,000	$ 450,000
Grinding Balls @ 4.0 lb. /T of Concentrate (balls @ 11¢/lb.)	3,960,000	1,320,000
Screen Cloth and Other Operating Supplies	840,000	510,000
Equipment Maintenance Supplies (2%)	415,000	220,000
Building Maintenance Supplies (1%)	115,000	52,000
Power (Crushing, Concentrating, Tailings and Water)		
Connected HP	82,400	28,400
Demand KW	45,700	15,700
* Load Factor (P.F. 90 plus)	0.7	0.7
KWH/year	279×10^6	115×10^6
Cost (mils/KWH)	5	7
Cost/year	1,395,000	667,000
Total Cost/Year	$8,075,000	$3,219,000
Cost/T of Ore	35.889¢	42.920¢
Cost/T of Concentrate	89.73¢	107.30¢

* Load factor is 0.5 for crushing

Services

	Julian	Star-O'Keefe
Fuel consumption for heating		
Imperial gallons/year	$7,700,000	$4,050,000
Cost/year (25¢/gal.)	$1,975,000	$1,012,500
Power		
Connected HP	800	600
Demand KW	500	400
Load Factor	0.4	0.4
KWH/year	18×10^5	14×10^5
Cost mils/KWH	5	7
Cost/year	$ 9,000	$ 10,000
Mobile fleet fuel and maintenance supplies		
Diesel consumption (gal/year)	260,000	155,000
Diesel cost/year (28¢/gal.)	$ 72,800	43,400
Gas consumption (gal./year)	150,000	75,000
Gas cost/year (30¢/gal.)	$ 45,000	$ 22,500
Maintenance parts/year	$ 45,000	$ 32,000
Building maintenance supplies (1%)	$ 102,000	$ 50,000
Equipment maintenance supplies (2%)	$ 81,000	$ 48,000
Water Treatment	$ 40,000	$ 20,000
Total Cost/Year	$2,369,800	$1,238,400
Cost/T of Ore	10.532¢	16.512¢
Cost/T of Concentrate	26.33	41.28¢

TOWNSITE

A substantial portion of the townsite cost is considered to be a mortgage. In order to ascertain the annual cost to the mine, the town is considered to be a single entity and the mine will pay all costs, over and above income, as an operating cost to the mine.

The following data has been used to evaluate these costs:-

1. Mortgage
   The mine will assume all principal and interest payments at 9% over 20 years.

2. Taxes
   Paid by the employee at 10 mils on 80% evaluation. This covers operating costs for fire, police, streets and street lighting. These items will not appear as either income or cost.

3. Services
   There is a $7.00/month per house and $3.00/month per apartment charge which covers the cost of sewage, water and garbage. In addition, apartments and businesses pay 20¢/1,000 gal. for water. These items will not appear as an income or cost.

4. Garages
   Community garages are not included. When they are, there is a $10.00/month charge which includes a free auto plug-in.

5. School
   Completely company supported.

6. Hospital

This is a clinic only and free housing and car are supplied by the company.

7. Stores

They are charged at a rate equal to the mortgage payments and operating cost.

8. Recreation Facilities

Operating costs only will be covered by fees. The mine will pay capital.

9. Single Men

Employees pay $30.00/month for room and $2.35/day for meals. An allowance of $3.00/man day is a company cost. Non-employees pay double the above.

10. Rent

An average rent of $80.00/month has been used for all married quarters.

Cost	Per Year	
	Julian	Star-O'Keefe
No. of single men	396	252
Cost at $3.00/man day	$ 433,000	$ 276,000
Mortgage for 20 years at 9%		
Total mortgage	$12,660,000	$9,509,000
Annual payments	$ 1,386,000	$1,041,000
Townsite Administration	$ 45,000	$ 35,000
School Operating	$ 240,000	$ 200,000
Sub-Total	$ 2,104,000	$1,552,000
Income		
Rental - No. of units	326	206
Annual income at $80.00/mo. average	$ 313,000	$ 198,000
Commercial rental	$ 240,000	$ 240,000
Sub-Total	$ 553,000	$ 438,000
Company cost per year	$ 1,551,000	$1,114,000
Cost/T of ore	6.893¢	14.853¢
Cost/T of concentrate	17.23¢	37.13¢

SUMMARY

	Julian		Star-O'Keefe	
	¢/T ore	¢/T conc.	¢/T ore	¢/T conc.
Administration				
- personnel	4.46	11.5	9.02	22.54
- materials & expenses	0.93	2.31	1.52	3.80
- townsite	6.89	17.23	14.85	37.13
Mine				
- salaried	1.11	2.77	3.32	8.30
- hourly rated	8.50	21.24	21.55	53.88
- materials & supplies	19.82	49.54	35.74	89.35
Concentrator				
- salaried	1.55	3.88	3.73	9.32
- hourly rated operating	6.46	16.14	12.37	30.92
- hourly rated maintenance	3.63	9.08	5.92	14.80
- materials & supplies	35.89	89.73	42.92	107.30
Services				
- salaried	1.09	2.72	2.52	6.29
- hourly rated	12.05	30.14	23.28	58.21
- materials & supplies	10.53	26.33	16.51	41.28
Total	112.91	282.26	193.25	483.12
Mining	29.43	73.55	60.61	151.53
Milling	47.53	118.83	64.94	162.34
Administration & Services	35.95	89.88	67.70	169.25
Mining (per ton of ore + waste)	28.73	71.80	34.07	85.18

OPERATING COSTS - DETAILS

SEVEN ISLANDS

A. Pelletizing Plant

Administration	Qty.	
Manager	1	$ 30,000
General Superintendent	1	22,000
Chief Engineer	1	18,000
Surveyors	2	19,000
Draftsmen	2	22,000
Office Manager	1	16,000
Accountant	1	15,000
Chief Payroll Clerk	1	10,000
Payroll Clerks	2	16,000
Purchasing Agent	1	13,000
Chief Warehouseman	1	12,000
Warehouse Clerks	5=	45,000
Personnel Officer	1	12,000
Personnel Clerk	1	8,000
Training Officer	1	12,000
Training Clerk	1	10,000
Communications	4	36,000
Traffic	1	10,000
Safety	1	12,000
First Aid	1	12,000
Security Officer	1	11,000
Clerks	10	80,000
Stenos and Typists	10	72,000
Total	51	$513,000
Burden (18.0%)		92,340
Total		$605,340
Cost/LT of ore		2.018¢
Cost/LT of pellets		5.05¢
Supplies		$120,000
Travel Allowance		72,000
Communications		30,000
		$222,000
Cost/LT of ore		0.740¢
Cost/LT of pellets		1.85¢

Services

	Qty.	Rate	Cost/year
Salaried			
Maintenance Superintendent	1		$ 20,000
Maintenance Engineer	1		15,000
Maintenance Planning Engineer	1		14,000
Electrical Supervisor	1		15,000
Instrument Supervisor	1		15,000
Shop Foreman	1		11,000
Welding Foreman	1		12,000
Surface Foreman	1		10,000
Stationary Engineer	1		12,000
Total	10		$124,000
Burden (18.0%)			$ 22,320
Total			$146,320
Cost/LT of ore			0.488¢
Cost/LT of pellets			1.22¢
Hourly Rated			
Automotive Mechanics	2	12	$ 19,340
Machinists	4	12	38,680
Mechanics	4	10	37,200
Riggers	2	10	18,600
Welders	4	12	38,680
Pipe Fitters	2	10	18,600
Plumbers	2	10	18,600
Carpenters	2	10	18,600
Painter	1	10	9,300
Electricians	4	10	37,200
Trades Helpers	16	6	136,160
Mobile Equipment Operators	6	9	54,540
Truck Drivers	6	7	52,140
Boiler Attendants	4	12	38,680
Watchmen	8	6	68,080
Janitors	3	1	22,650
Laborers	20	1	151,000
Total	90		$ 778,050

Hourly Rated (cont'd)

Total Carried Forward	$ 778,050
Burden (31.5%)	245,090
Total	$1,023,140
Cost/LT of ore	3.410¢
Cost/LT of concentrate	8.53¢

PELLETIZING PLANT

Routine operating and maintenance personnel, including supervision, are estimated by Dravo to be 120 men.

Their annual salaries and wages (including burden) are

120 x $11,910 (average from Julian concentrator)	$1,429,200
Cost/T of ore	4.764¢
Cost/T of pellets	11.91¢

Power

Connected HP	55,000
Demand KW	28,000
Load Factor	0.7
KWH/year	151×10^6
Cost mils/KWH	7
Cost/year	$1,060,000

Process Fuel

Total annual requirements of 66,000,000 gal. (800,000 BTU/L. Ton)
Assume Bunker "C" at 12¢/gal.

Annual Cost	$7,920,000

Bentonite

Total annual requirements of 84,000 tons
Assume cost of $20.00 per ton

Annual cost	$1,680,000

Other Operating Supplies	
Cost per year	$ 120,000
Equipment maintenance supplies (2%)	800,000
Building maintenance supplies (1%)	500,000
Total pellet plant cost per year	$12,080,000
Cost/T of ore	40.266¢
Cost/T of pellets	100.67¢
Services	
Power - connected HP	2,000
Demand KW	1,100
Load Factor	0.52
KWH/year	52×10^5
Cost - mils/KWH	7
Cost/year	$ 37,000
Heating fuel 2,450,000 Imp. Gal. /year Assume Bunker "C" at 12¢/gal. Heating fuel cost/year	$ 294,000
Mobile fleet fuel and maintenance supplies	50,000
Water Treatment	40,000
Total	$ 421,000
Cost/T of ore	1.403¢
Cost/T of pellets	3.51¢

B. Central Administration

Staff	Qty.	
General Manager	1	$ 35,000
Assistant General Manager	1	32,000
Administration Manager	1	20,000
Chief Accountant	1	18,000
Manager of Engineering	1	20,000
Engineers	3	42,000
Draftsmen	6	66,000
Personnel Manager	1	15,000
Employment Manager	1	15,000
Chief Purchasing Agent	1	15,000
Buyers and Expediters	4	40,000
Communications	5	45,000
Traffic	2	20,000
Sales Accounting	2	20,000
Secretaries	12	84,000
Clerks	16	128,000
Stenographers and Typists	20	144,000
Janitors	2	15,000
Watchmen	2	15,000
Sub-Total	82	$ 789,000

Supplies	$ 120,000
Travelling Expenses	100,000
Employment Costs including advertising and Montreal and St. Johns offices	200,000
Building Services and Maintenance	48,000
Communications Costs	36,000
Total	$1,293,000
Cost/T of ore	4.31¢
Cost/T of concentrate	10.78¢

TOWNSITE

All of the townsite facilities are for married employees except for the single staff house. Canadian Javelin will pay all costs over and above income from these units. The following data has been used to evaluate these costs:-

1. Mortgage
   The mine will pay all costs at an assumed 9% interest over 20 years.

2. Taxes
   General tax of 13.5 mils is assumed paid by the employee. A school tax of 26.5 mils will be paid by the mine. This equates taxation to the other properties. Taxes are based on 95% evaluation.

3. Services
   All services are covered except water at $12.00/year and garbage at $36.00/year which will be paid by the employee.

4. Recreation Facilities
   An annual cost of $100,000 is allowed to help defray operating costs of existing facilities.

5. Single Employees
   A $3.00/man day meal allowance is for staff house members.

6. Rent
   An average rent of $80.00/month has been used for married quarters.

Cost Per Year

Mortgage	
Amount	$2,526,000
Annual Payment	277,000
School Taxes	69,000
Single Men - 36 @ $3.00/day	39,000
Recreation	100,000
Sub-Total	$ 485,000
Income	
Rental - no. of units	182
Annual Income @ $80.00/month	$ 175,000
Sub-Total	$ 175,000
Company Cost/Year	$ 310,000
Cost/T of ore	1.033¢
Cost/T of concentrate	2.58¢

SUMMARY

	¢/T of ore	¢/T of pellets
A. Pelletizing Plant		
Administration		
- personnel	2.02	5.05
- materials and supplies	0.74	1.85
- townsite	1.03	2.58
Services		
- salaried	0.49	1.22
- hourly rated	3.41	8.53
- materials and supplies	1.40	3.51
Pellet Plant		
- salaries and wages	4.76	11.91
- materials and supplies	40.27	100.67
Sub-Total	54.12	135.32
B. Central Administration	4.31	10.78
Sub-Total	58.43	146.10
C. Royalty		
- Newfoundland Government 32¢/T of production from Julian	9.60	24.00
- Nalco 32¢/T of production from Julian	9.60	24.00
Total	77.63	196.10

236(128)

CANADIAN JAVELIN LIMITED

JULIAN AND STAR-O'KEEFE

IRON ORES

VOLUME 2

DRAWINGS

Prepared and submitted by:

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Date: November, 1970

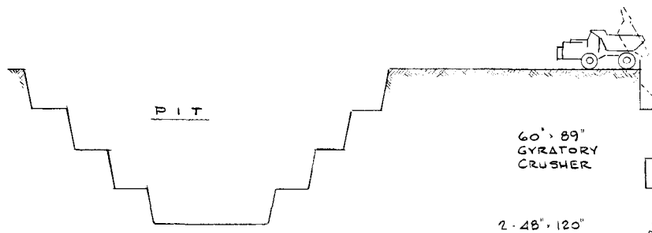
VOLUME 2 - DRAWING INDEX

Section No.		Drawing No.
13	(Cont'd)	
	Concentrator	
	- General Arrangement Floor Plan	150-F1
	- General Arrangement Section	150-F2
	Concentrator - Grinding and Screening	
	- General Arrangement Floor Plans Mills and Conveyors	151-F1
	- General Arrangement Floor Plans Pumps, Primary and Secondary Screens	151-F2
	- General Arrangement Floor Plans Secondary Screens and Distributors	151-F3
	- General Arrangement Sections	151-F4
	- Transfer House Plans	151-F5
	- Transfer House Sections	151-F6
	Concentrator - Separation	
	- General Arrangement Floor Plan Pumps	152-F1
	- General Arrangement Floor Plans Cleaner, Recleaner and Rougher Spirals	152-F2
	- General Arrangement Sections	152-F3

Section No.		Drawing No.
15	(Cont'd)	
	Bunkhouses - Floor Plans	270-F9
	Cafeteria - Floor Plan	270-F10
16	STAR-O'KEEFE LAKE - FLOWSHEETS, GENERAL PLANS AND ELECTRICAL DISTRIBUTION	
	General - Flowsheet 1 Crushing and Ore Storage	300-F1
	- Flowsheet 2 Grinding and Screening	300-F2
	- Flowsheet 3 Spiral Circuit	300-F3
	- Flowsheet 4 Concentrate Dewatering, Storage, Regrind and Thickening	300-F4
	- Flowsheet 5 Tailings and Water Systems	300-F5
	- Area Plan	300-F6
	Mine - Site Plan	320-F1
	- Sections	320-F2
	Electrical Distribution - Main Power Distribution Single Line Diagram	410-F1

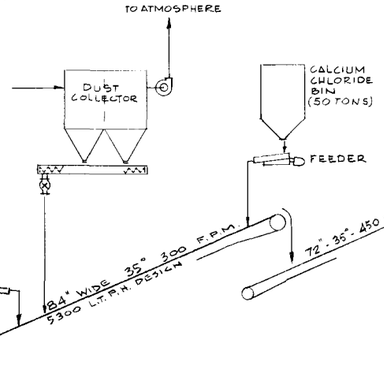
Section No.		Drawing No.
17	STAR-O'KEEFE LAKE - CONCENTRATOR	
	Concentrator - General Arrangement General Floor Plan and Sections	350-F1
18	SEVEN ISLANDS AREA - PELLET PLANT	
	General - Flowsheet 1 Filtration and Balling	500-F1
	- Flowsheet 2 Indurating and Cooling	500-F2
	Pellet Plant - General Arrangement Plan	520-F1
	- General Arrangement Section	520-F2

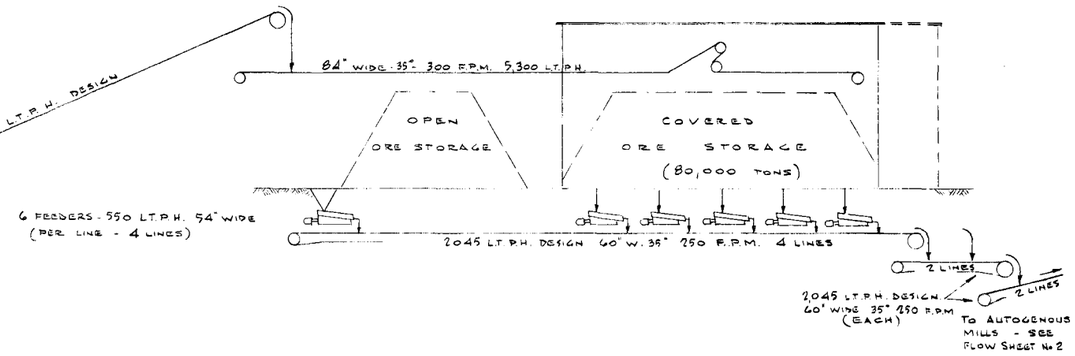
1 - 120/25 TON CRANE



60" x 89" GYRATORY CRUSHER

2 - 48" x 120" HYDRASTROKE FEEDERS





SERVICE COMPRESSOR

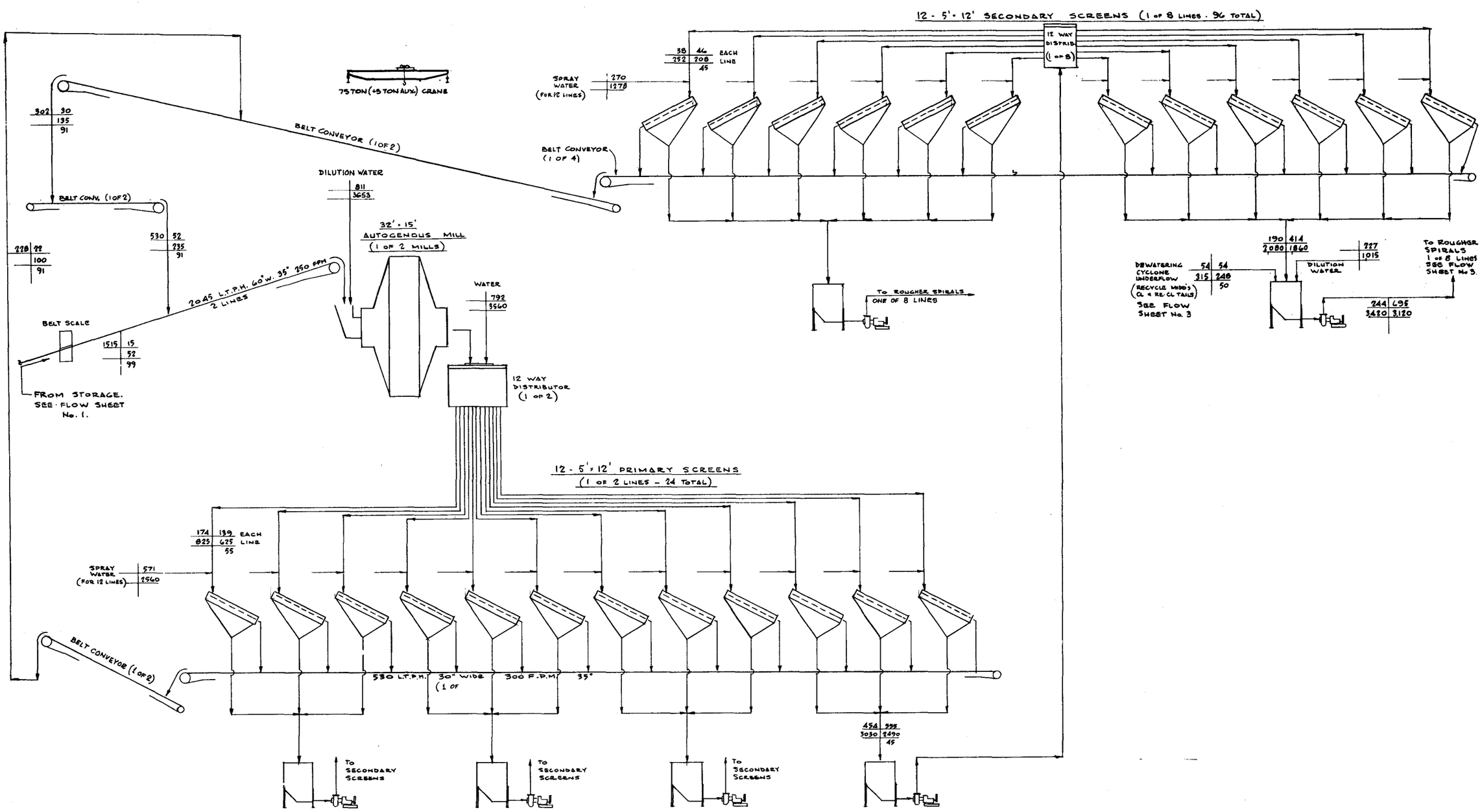
ZINC FURNACE

CANADIAN JAVELIN LIMITED

JULIAN LAKE NEWFOUNDLAND

GENERAL FLOWSHEET 1

KILBORN **100 - F1**



L.T.P.H. SOLIDS	L.T.P.H. WATER
U.S.G.P.M. SLURRY	U.S.G.P.M. WATER
	% SOLIDS

CANADIAN JAVELIN LIMITED

JULIAN LAKE NEWFOUNDLAND

GENERAL FLOWSHEET 2

KILBORN **100 - F2**

250 WASH WATER
1120

64 × 2 WAY DISTRIBUTION

64 ROUGHER SPIRALS

64 ROUGHER SPIRALS

ROUGHER CONCENTRATE

EXCESS WASH WATER

ROUGHER MIDD'S

ROUGHER TAILS

54
240

114 94
555 420
55

DILUTION WATER
312
1397

17 17
96 76
50

114 782
3640 3510
17·6

TO TAILS DISPOSAL
(1 OF 16 LINES)
SEE FLOW SHEET No.5.

FROM ROUGHER SPIRAL FEED PUMP
(1 OF 16 LINES)
SEE FLOW SHEET No. 2.

36 × 2 WAY DISTRIBUTION

40 CLEANER SPIRALS

40 CLEANER SPIRALS

EXCESS WASH WATER

CLEANER CONCENTRATE

CLEANER TAILS

TOTAL FOR BOTH LINES 18 81

93 76
453 343
55

TOTAL FOR BOTH LINES

40 RE-CLEANER SPIRALS

40 RE-CLEANER SPIRALS

RECLEANER TAILS

31 496
2250 2320
4·1

17·5 406
1850 1030
4·1

FINAL CONCENTRATE

EXCESS WASH WATER

114 459
2190 2060
20

CLEANER SPIRAL FEED PUMP
(1 OF 16 LINES)

WASH WATER 131
590

280
DISTRIBUTION WATER 1260

131 WASH WATER
590

27
96

TO RECLAIM WATER SURGE TANK
(1 OF 16 LINES)
SEE FLOW SHEET No.5.

71 71
430 340
50

FINAL CONCENTRATE
(1 OF 16 LINES)
SEE FLOW SHEET No.4.

55·5 919
4196 4126
5·7

MANIFOLD

TO RECLAIM WATER SURGE TANK
(1 OF 16 LINES)
SEE FLOW SHEET No.5.

804
3877

4 - D 20 LB RECLAIM DEWATERING CYCLONES
(1 OF 16 LINES)

55 55
314 249
50

TO ROUGHER SPIRAL FEED PUMP BOX
(1 OF 16 LINES)
SEE FLOW SHEET No. 2.

L.T.P.H. SOLIDS	L.T.P.H. WATER
U.S.G.P.M. SLURRY	U.S.G.P.M. WATER
	% SOLIDS

CANADIAN JAVELIN LIMITED

JULIAN LAKE NEWFOUNDLAND

GENERAL FLOWSHEET 3

KILBORN **100 · F3**

CONCENTRATE DEWATERING
16 D10B CYCLONES (1 OF 2 LINES)

FINAL CONCENTRATE (8 OF 16 LINES) SEE FLOWSHEET No. 3.

2 WAY DISTRIBUTION BOX (1 OF 2 LINES)

606 | 606
3435 | 2720
50

PUMP BOX (1 OF 2 LINES)

590 | 253
1638 | 1130
70

3 WAY DISTRIBUTOR (1 OF 2)

No. 2 LINE

AGITATED SURGE TANK (1 OF 4) (1 HR RETENTION)

REGRIND FEED PUMP

606 | 260
1683 | 1161
70

2 WAY DISTRIBUTOR (1 OF 4)

No. 2 LINE

152 | 65
421 | 290
70

FEED BOX (1 OF 8)

D.S.M SCREENS (BANK OF 8)

75 TON (+ 5 TON AUX.) CRANE

REPULP LAUNDER

WATER
109
430

D.S.M SCREENS (BANK OF 8)

OVERSIZE LAUNDER

38 | 16
103 | 72
75

WATER
204
918

190 | 285
1494 | 1280
40

REGRIND MILL 16'-6" Φ × 23' (1 OF 8)

(1 OF 8)

16 | 353
1619 | 1590
4

FILTRATE

CONCENTRATE DEWATERING THICKENER 1 ONLY @ 100 Φ

692
3118

TO RECLAIM WATER SURGE TANK SEE FLOWSHEET No 5

32 | 14
20 | 62
70

4 WAY DISTRIBUTOR (1 ONLY)

70

4 - LINES

150 Φ THICKENER (1 OF 2)

91 | 352
1712 | 1591
21

364 | 156
1224 | 700
70

1252
5624

TO RECLAIM WATER SURGE TANK

FROM No 2 THICKENER U/F

152 | 378
1819 | 1608
29

4 WAY DISTRIBUTOR (1 ONLY)

2 - D20B CYCLONES (1 OF 8)

61 | 26
172 | 117
70

No 2 LINE FROM CYCLONES

AGITATED SURGE TANK (1 OF 4) (1 HR RETENTION) 22'Φ × 19'

TO PIPELINE SYSTEM

MOISTURE TRAP

FROM No. 2 LINE

20' HORIZONTAL FILTER (1 ONLY)

RECEIVER

SEAL TANK

VACUUM PUMP

TO THICKENER

TRIPPER

29,000 TON CONCENTRATE STORAGE BUILDING

6 - 303 LT.P.H. FEEDERS

606 LT.P.H

BELT SCALE

WATER
260
1161

606 | 260
1683 | 1161
70

16' Φ × 16' REPULP TANK

500 TON BALL STORAGE

BUCKET ELEVATOR

8 - 10 TON FEED HOPPERS AND BALL FEEDERS

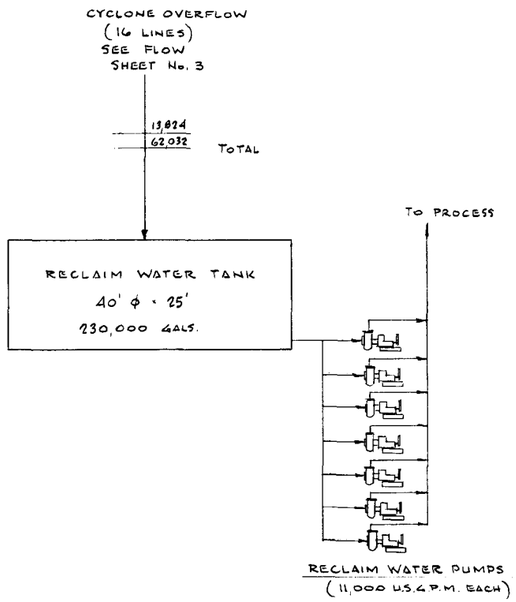
LT.P.H SOLIDS / U.S.G.P.M SLURRY | LT.P.H WATER / U.S.G.P.M WATER / % SOLIDS

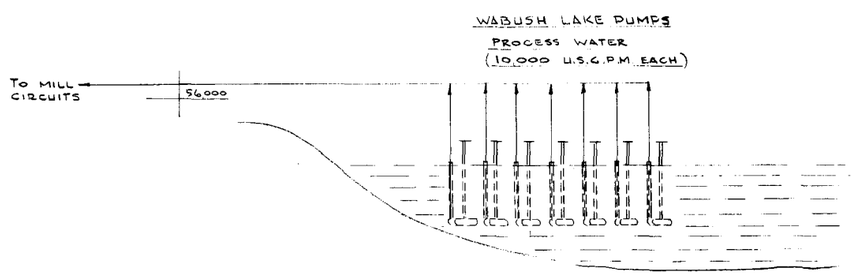
CANADIAN JAVELIN LIMITED

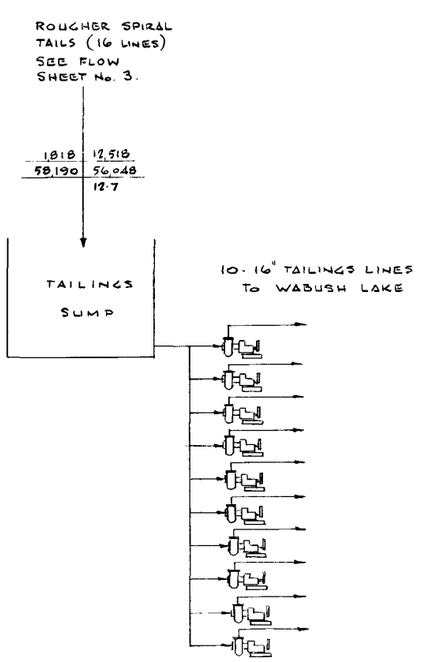
JULIAN LAKE NEWFOUNDLAND

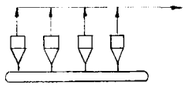
GENERAL FLOWSHEET 4

KILBORN **100 - F4**

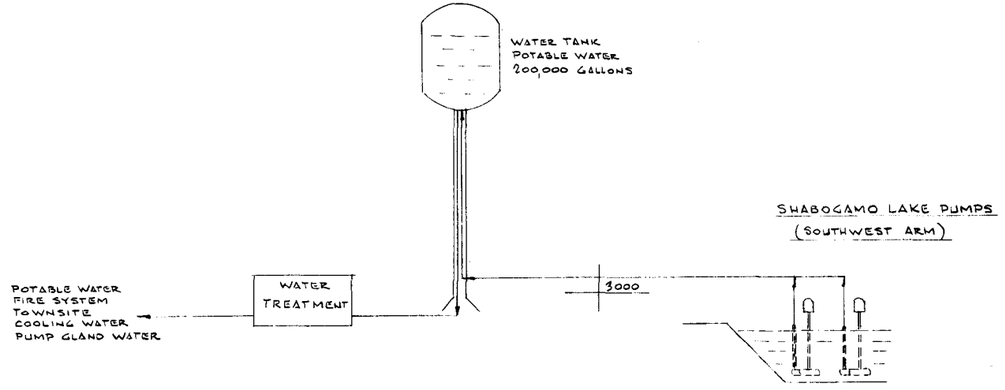








4 - CYCLONE BUGGIES
FOR DIKE CONSTRUCTION



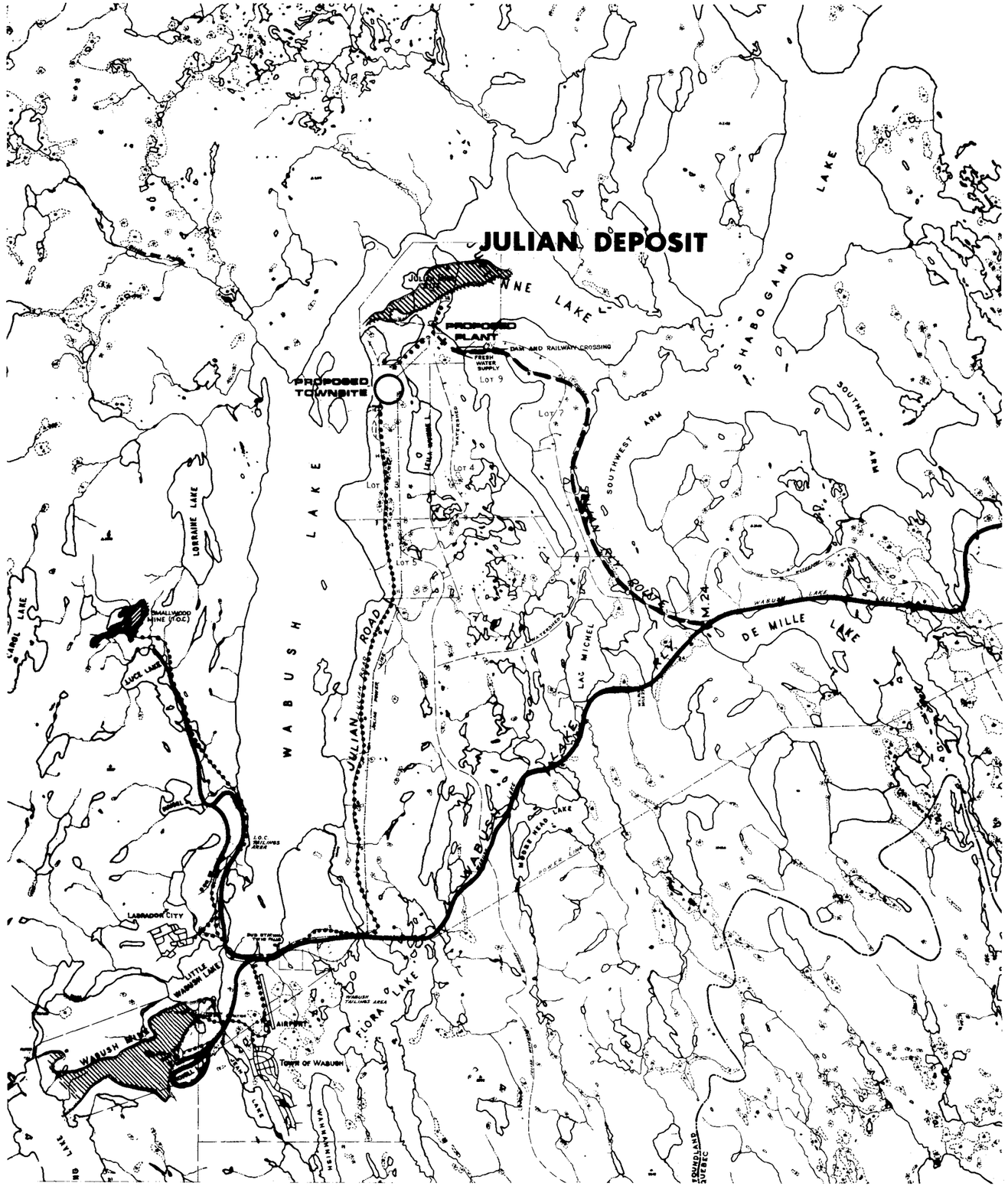
L.T.P.H. SOLIDS	L.T.P.H. WATER
U.S.G.P.M. SLURRY	U.S.G.P.M. WATER
	% SOLIDS

CANADIAN JAVELIN LIMITED

JULIAN LAKE NEWFOUNDLAND

GENERAL FLOWSHEET 5

KILBORN **100 · F5**



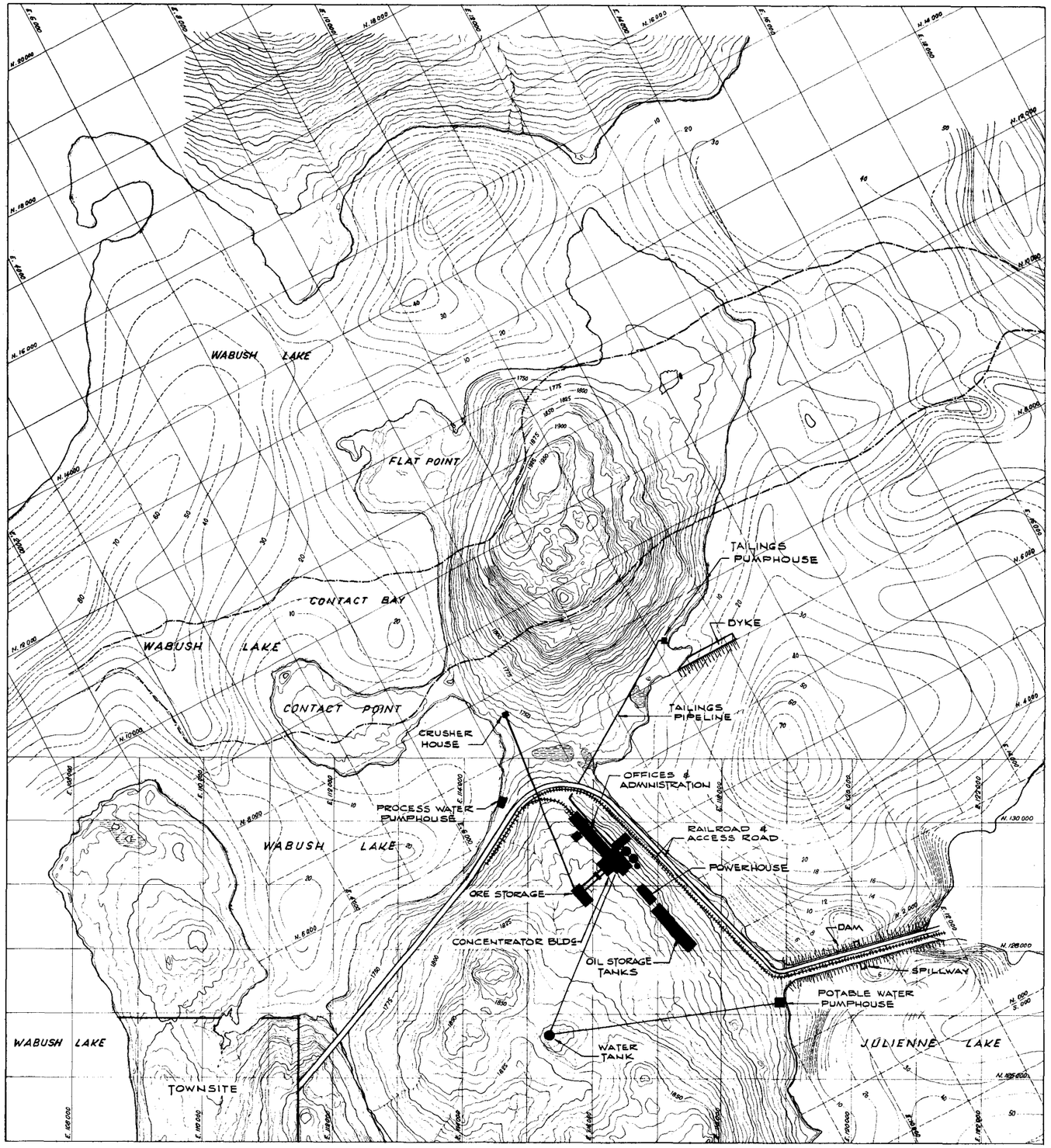
EXISTING RAILWAY
RAILWAY ROUTE
ROAD
IRON ORE DEPOSIT
TOWNSITE

CANADIAN JAVELIN LIMITED

JULIAN LAKE NEWFOUNDLAND

GENERAL AREA MAP

KILBORN **100-F6**



100 400 800
0 200 600 1000

CONTOURS AND BEARINGS SHOWN ARE TRACED FROM DRAWING SUPPLIED BY CLIENT.

CANADIAN JAVELIN LIMITED

JULIAN LAKE NEWFOUNDLAND

GENERAL AREA PLAN

KILBORN **100-F7**

CRUSHER HOUSE

WABUSH LAKE

JULIENNE LAKE

PROCESS WATER PUMPHOUSE

ADMINISTRATION BLDG.

OFFICES

CONCENTRATE STORAGE

150' ϕ THICKENER

150' ϕ THICKENER

150' ϕ THICKENER

AUTOGENOUS GRINDING

SCREENING

MAGNETIC SEPARATION

TRANSFER HOUSE

ORE STORAGE

RAILROAD & ACCESS ROAD

POWER HOUSE

OIL STORAGE TANKS

N.8000

N.131000

E.114000

N.130000

E.6000

N.6000

N.129000

N.128000

E.10000

N.6000

E.118000

N.4000

1775

1750

1800

1825

1850

10

20

30

40

50

60

70

18

16

14

12

9

8

7

6

5

4

3

2

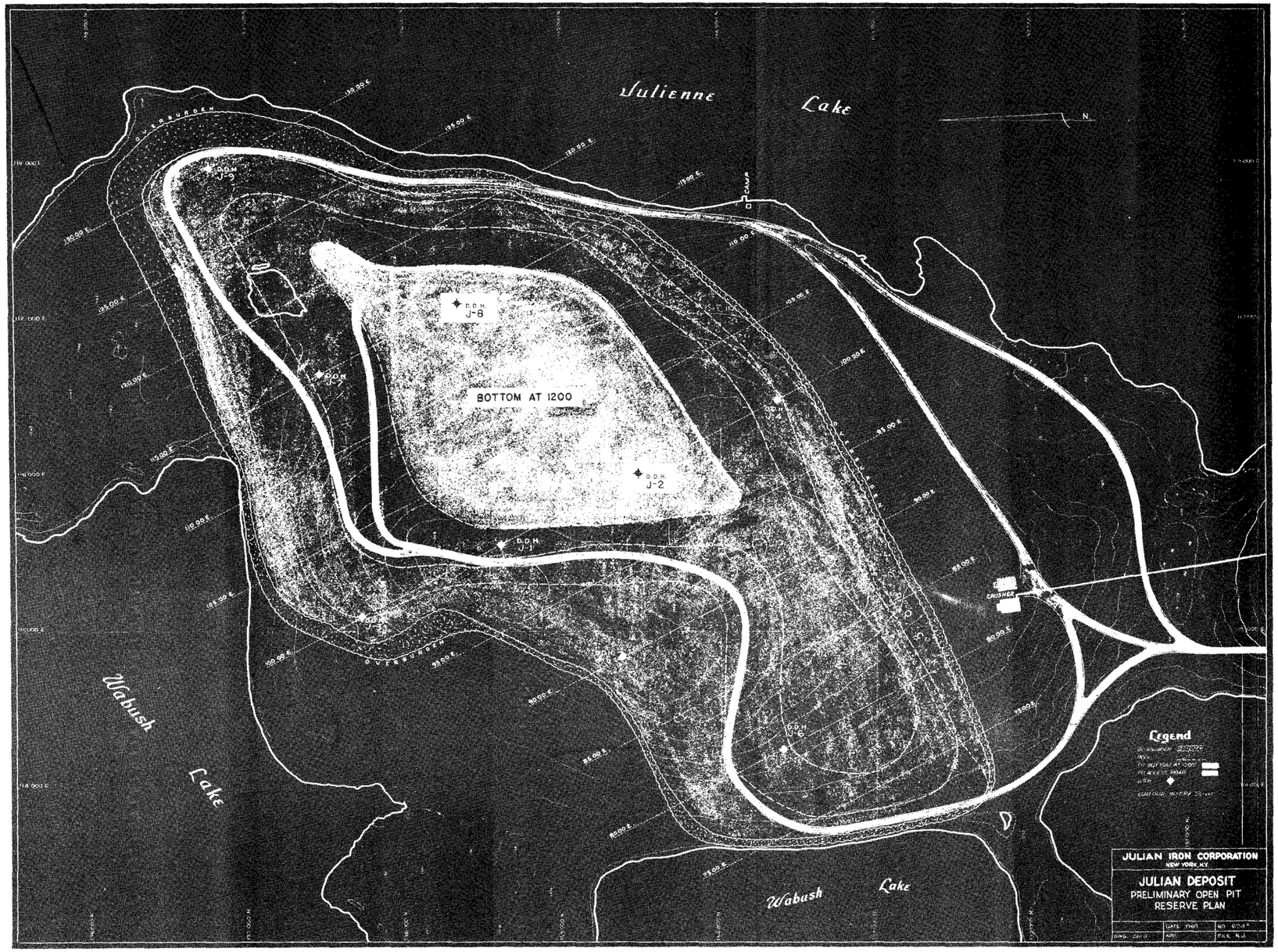
0 50 100 200 500

CANADIAN JAVELIN LIMITED

JULIAN LAKE NEWFOUNDLAND

GENERAL SITE PLAN

KILBORN 100 - F8



0 300
100 500

CANADIAN JAVELIN LIMITED

JULIAN LAKE NEWFOUNDLAND

MINE
SITE PLAN

KILBORN **120 - F1**

180 KV INCOMING LINE

TOWNSITE DISTRIBUTION

13.8 KV BUS

AUTOGENOUS MILL No. 1

REGRIND MILLS

STANDBY GENERATOR

AUTOGENOUS MILL No. 2

SURGE PROT.

O/H LINE

4160 V BUS

COOLING VAC. PUMP

WATER PUMPS AT CONCENTRATOR

WATER PUMPS AT LAKE WABUSH

M.C.C.

SERVICE BUILDING

SHABOGAMO LAKE (PORTABLE WATER PUMPS)

600V BUS

M.C.C.'S

TAILINGS PUMP HOUSE

JAW CRUSHER

TRAILING CABLE

SHOVEL 4.16 KV

PIT LIGHTING UNITS

PORTABLE LOAD-CENTRE 600V LOADS

PORTABLE LOAD-CENTRE 4000V LOADS

LEGEND OF SYMBOLS

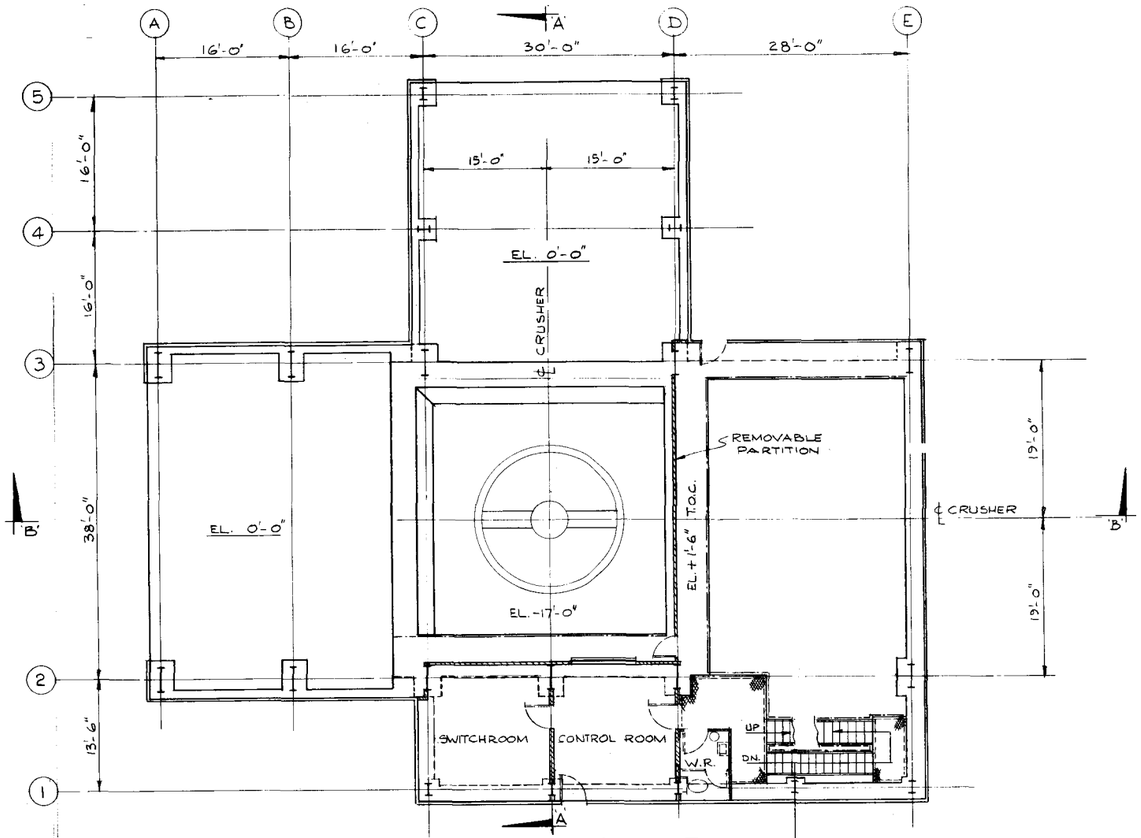
- OCB - 800 AMP - 1000 MVA INTERRUPTING CAP.
- AIR BREAK SWITCH
- DISCONNECT SWITCH
- LOAD INTERRUPTOR SWITCH
- LIGHTNING ARRESTOR - THYRITE TYPE
- H.V. BRAKOUT AIR BREAK CIRCUIT BREAKER, 2000A, 1000 MVA, INTERRUPTING CAPACITY
- 600V BRAKOUT AIR CIRCUIT BREAKER, 1600A, 50,000A INTERRUPTING CAPACITY
- POTENTIAL TRANSFORMER
- CURRENT TRANSFORMER
- 4.16 KV MOTOR STARTER
- FUSE
- RES. RESISTOR
- CAPACITOR

CANADIAN JAVELIN LIMITED

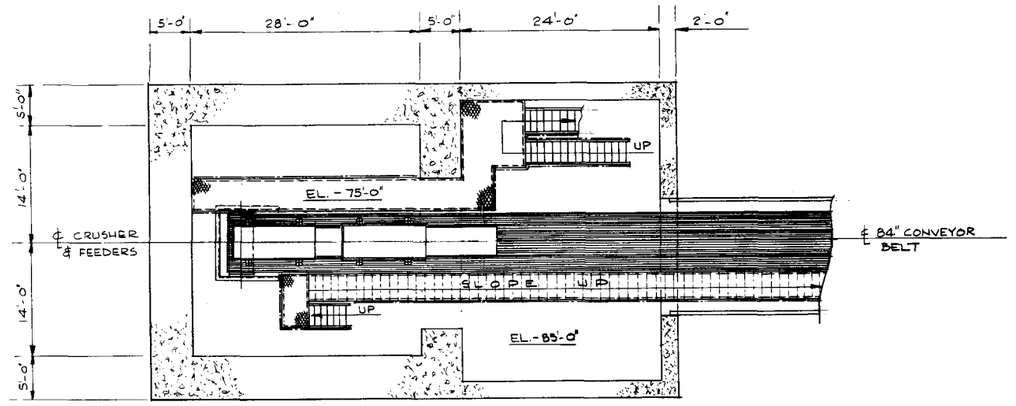
JULIAN LAKE NEWFOUNDLAND

ELECTRICAL DISTRIBUTION
MAIN POWER DISTRIBUTION
SINGLE LINE DIAGRAM

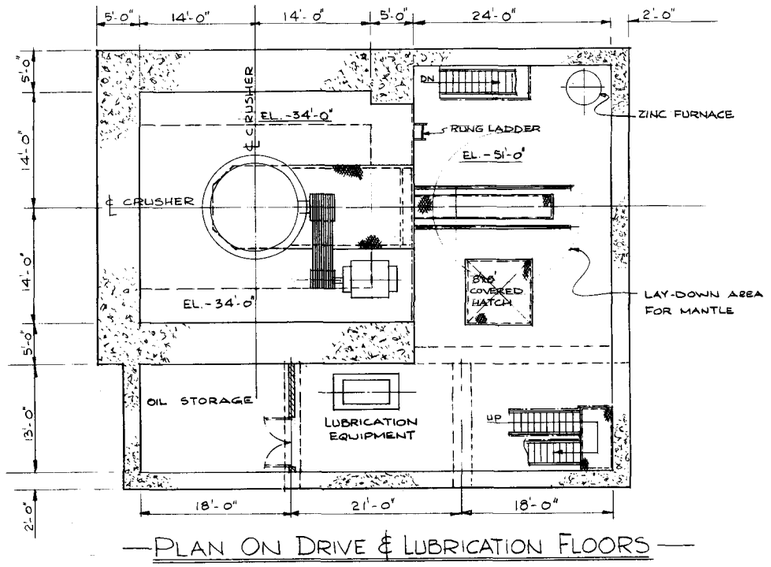
KILBORN **210 - F1**



—PLAN ON DUMP FLOOR—



—PLAN ON FEEDERS AND CONVEYOR FLOOR—



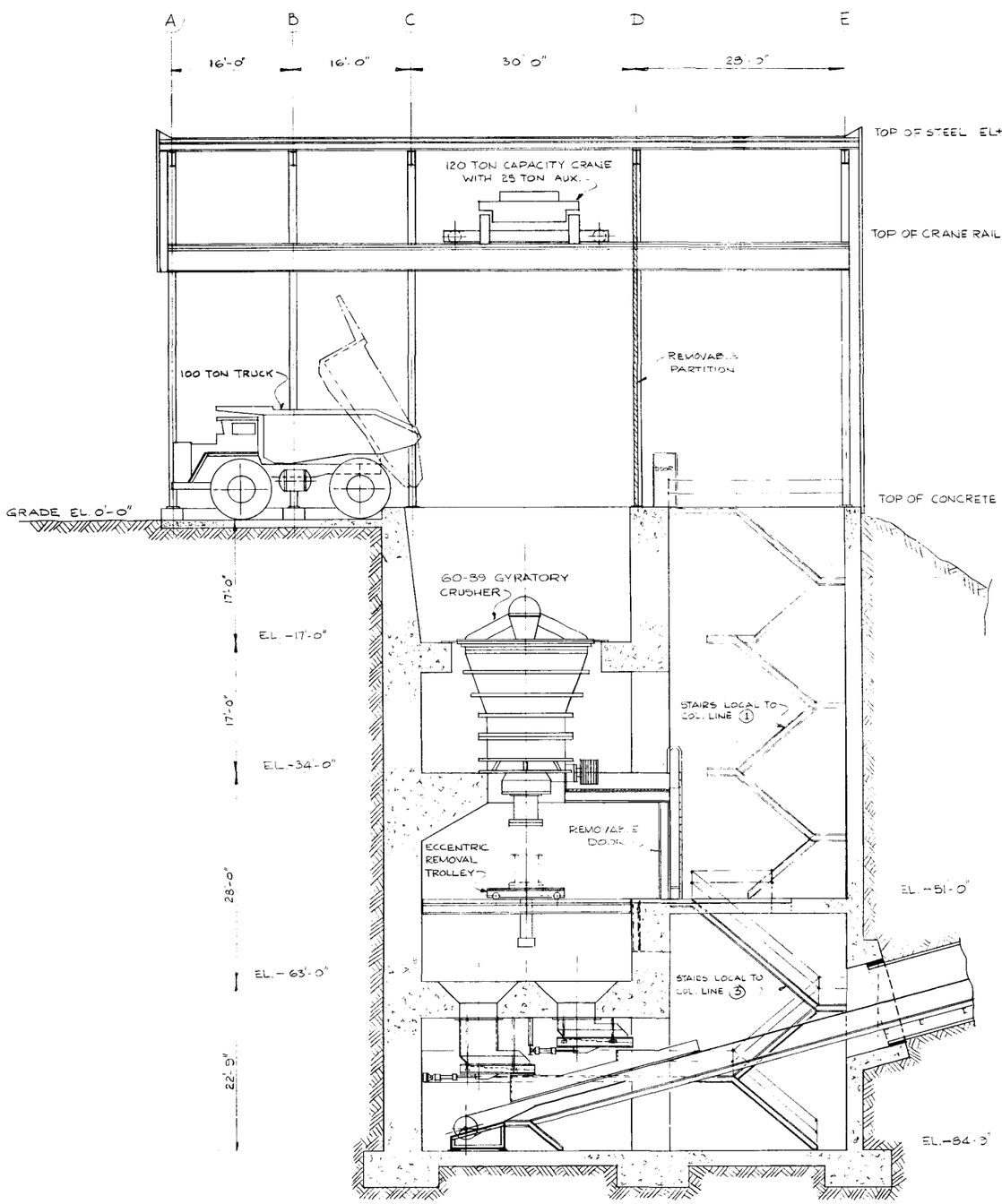
—PLAN ON DRIVE & LUBRICATION FLOORS—

CANADIAN JAVELIN LIMITED

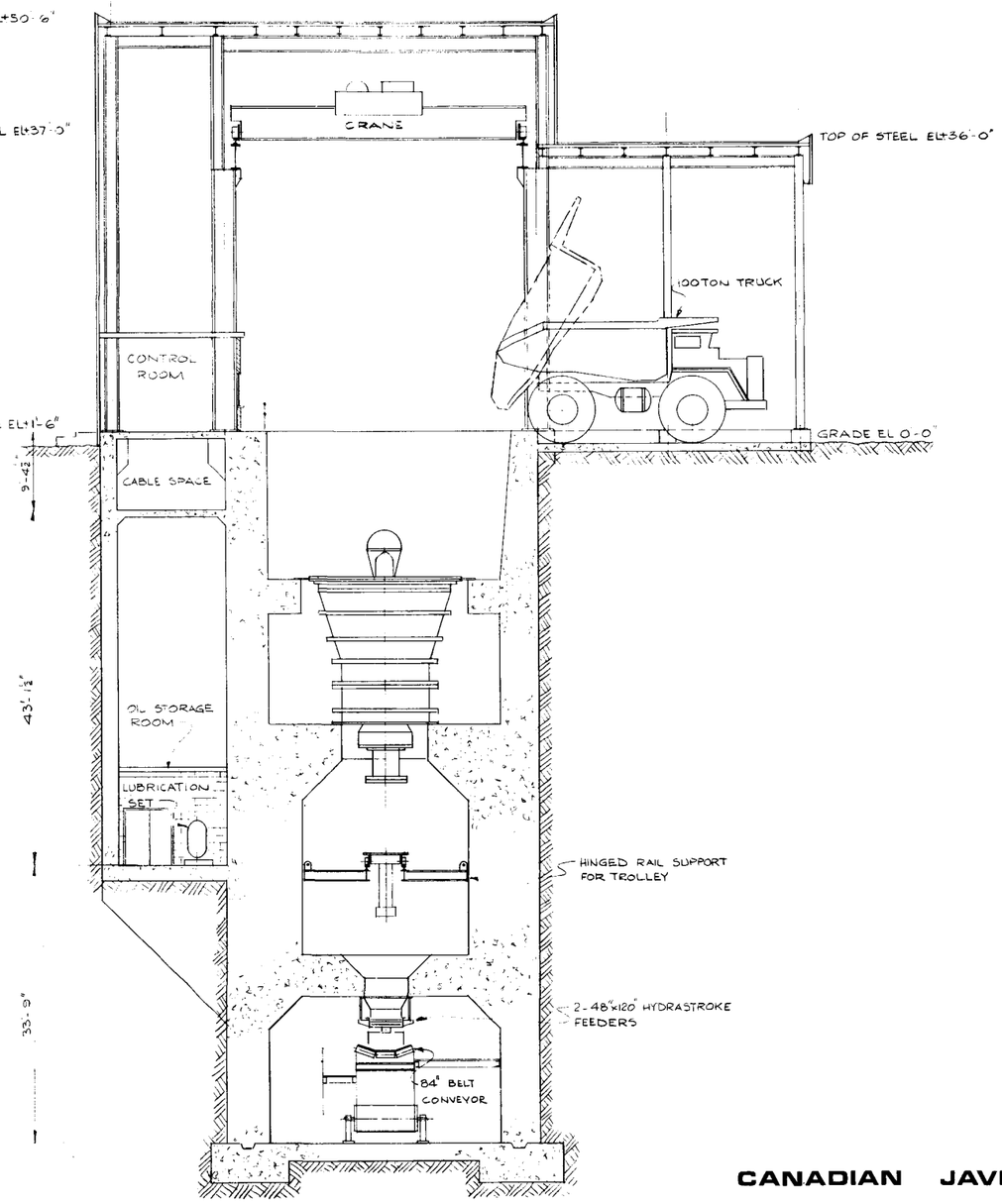
JULIAN LAKE NEWFOUNDLAND

CRUSHING PLANT
GENERAL ARRANGEMENT
FLOOR PLANS

KILBORN **130 - F1**



—SECTION 'A-A'—



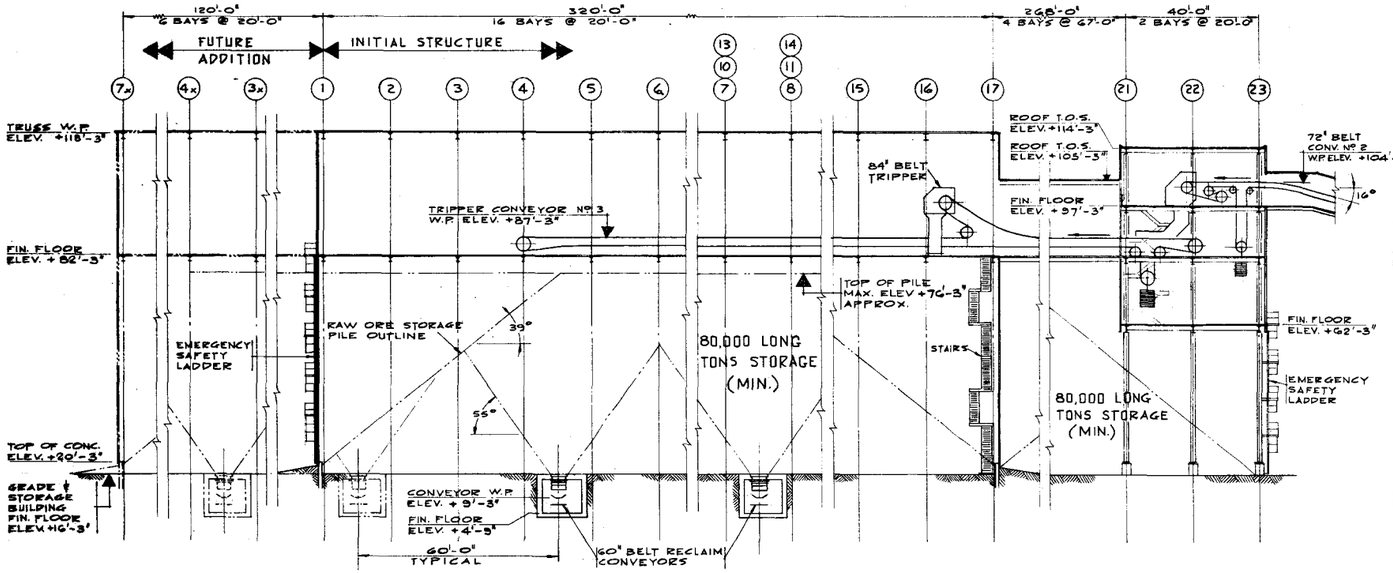
—SECTION 'B-B'—

CANADIAN JAVELIN LIMITED

JULIAN LAKE NEWFOUNDLAND

CRUSHING PLANT
GENERAL ARRANGEMENT
SECTIONS

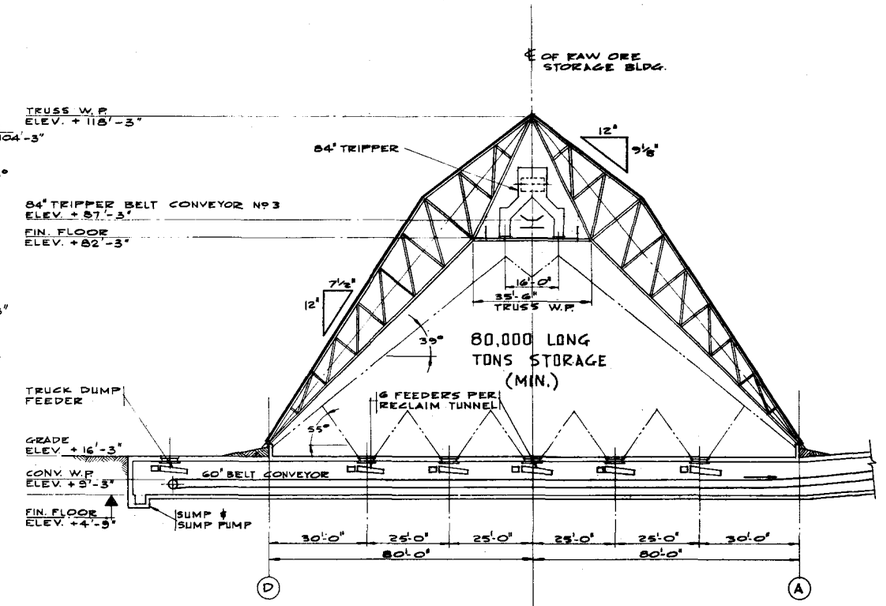
KILBORN **130 - F2**



LONGITUDINAL SECTION

SCALE : 1" = 20'-0"

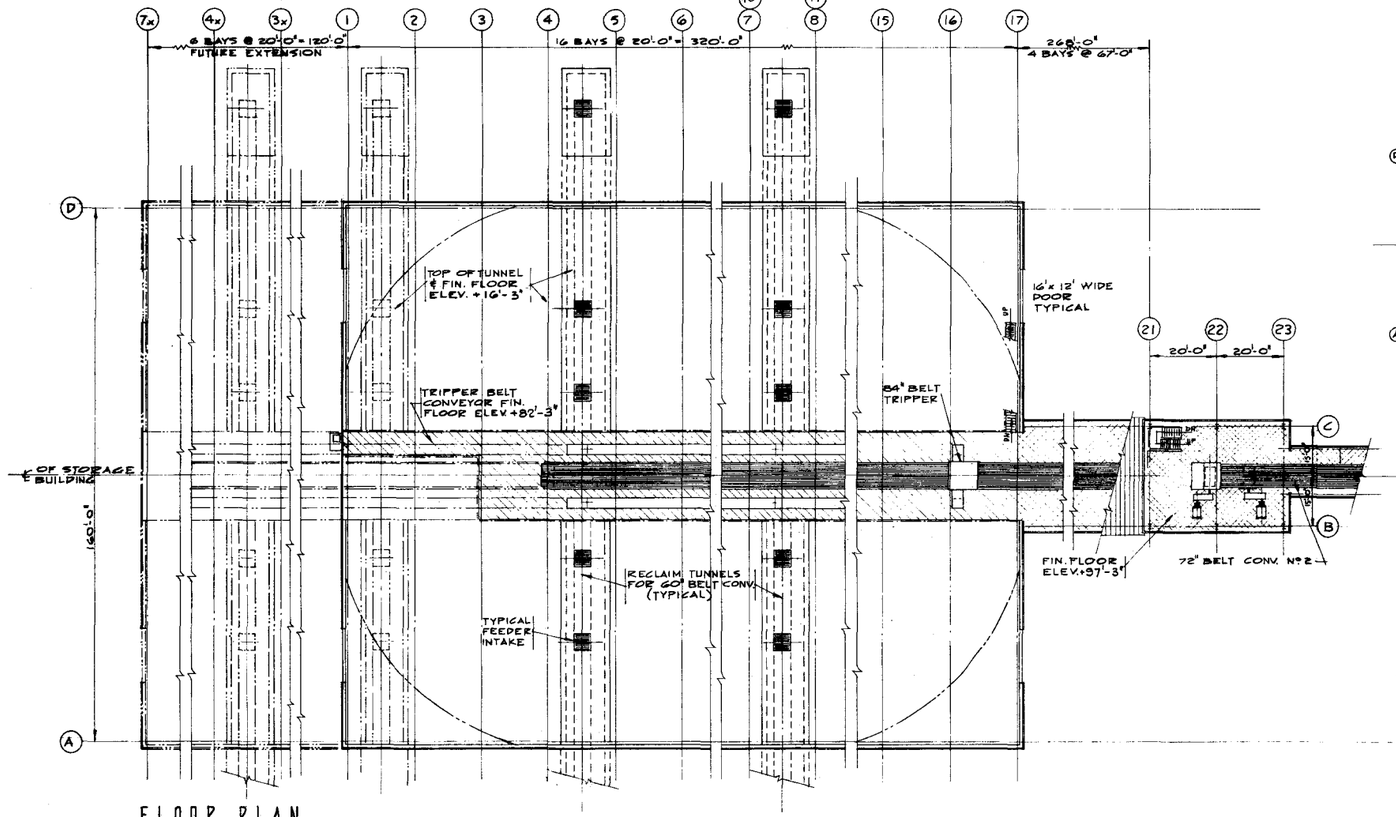
10 0 50 100



TYPICAL CROSS-SECTION

SCALE : 1" = 20'-0"

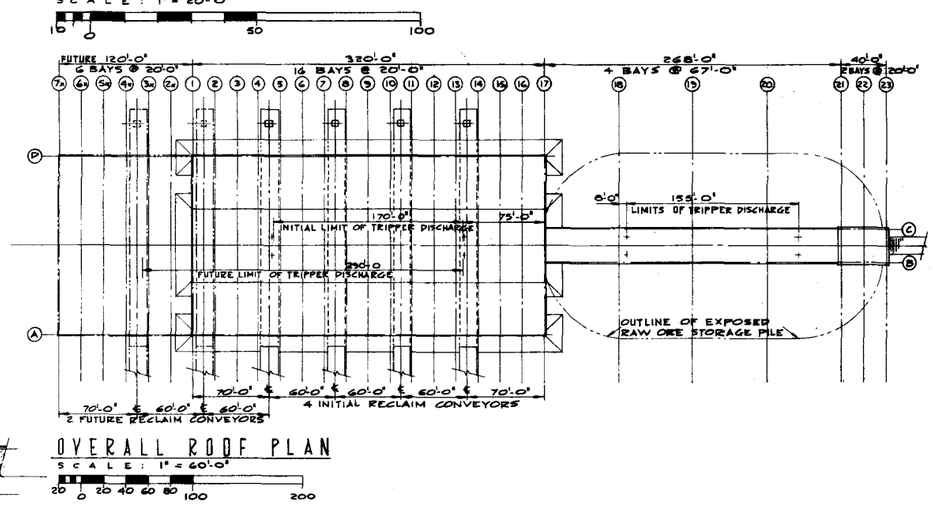
10 0 50 100



FLOOR PLAN

SCALE : 1" = 20'-0"

10 0 50 100



OVERALL ROOF PLAN

SCALE : 1" = 60'-0"

20 0 20 40 60 80 100 200

CANADIAN JAVELIN LIMITED

JULIAN LAKE NEWFOUNDLAND

ORE STORAGE
GENERAL ARRANGEMENT
PLAN & SECTIONS

KILBORN **140 - F1**

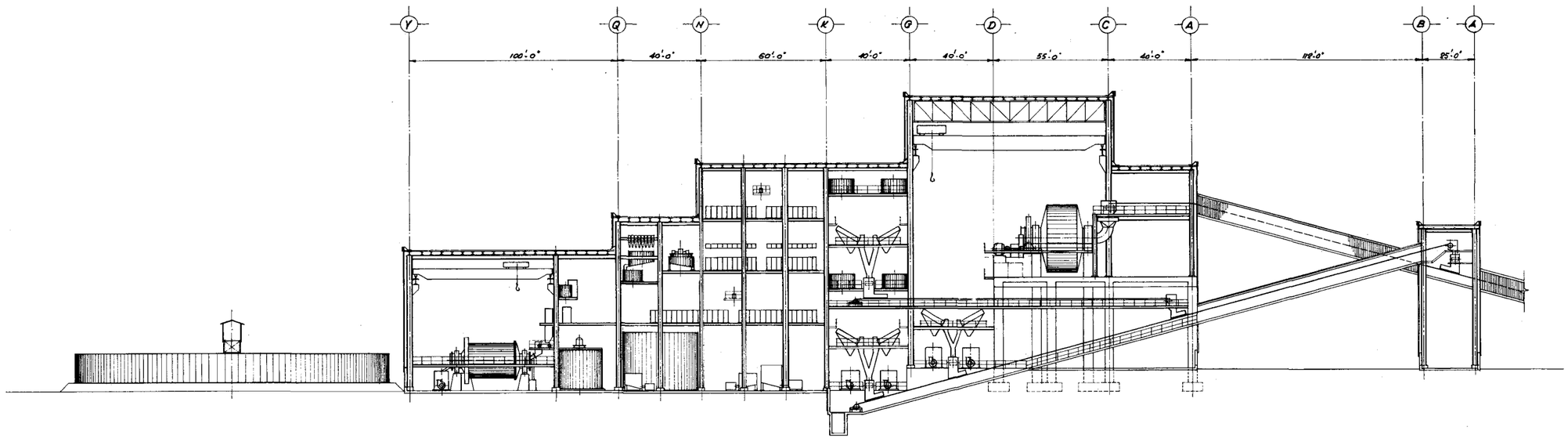
REGRINDING
100'-0"
SEPARATING
100'-0"
SECONDARY SCREENING
40'-0"
PRIMARY SCREENING
GRINDING
135'-0"
20'-0"
21
100'-0"
60'-0"
60'-0"
60'-0"
60'-0"
60'-0"
240'-0"
275'-0"
112'-0"
25'-0"
275'-0"
100'-0"
85'-0"
160'-0"
150'-0"
60'-0"
25'-0"
100'-0" DIA. THICKENER
150'-0" DIA. THICKENER
150'-0" DIA. THICKENER
CONCENTRATE STORAGE
STAIR WELL
STAIR WELL
LAYDOWN AND REPAIR
LAYDOWN AND REPAIR
TRANSFER HOUSE
ORE STORAGE
70'-0"
60'-0"
60'-0"
60'-0"
70'-0"
60'-0"
80'-0"
80'-0"
K
G
D
A
Y
Q
I

CANADIAN JAVELIN LIMITED

JULIAN LAKE NEWFOUNDLAND

CONCENTRATOR · GENERAL
GENERAL ARRANGEMENT
FLOOR PLAN

KILBORN **150 · F1**

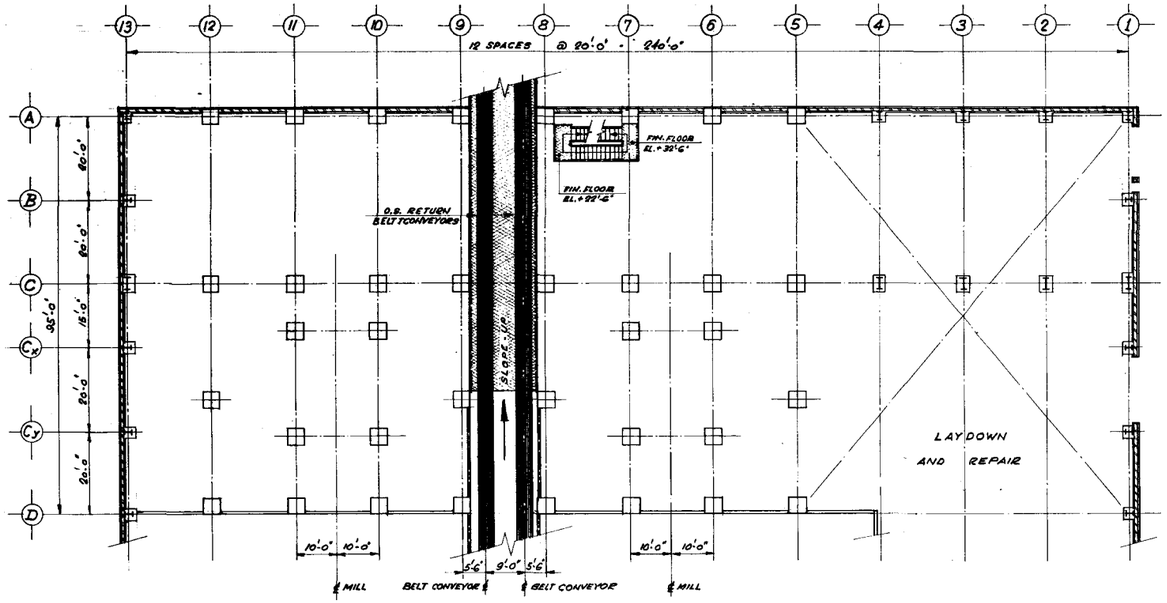


CANADIAN JAVELIN LIMITED

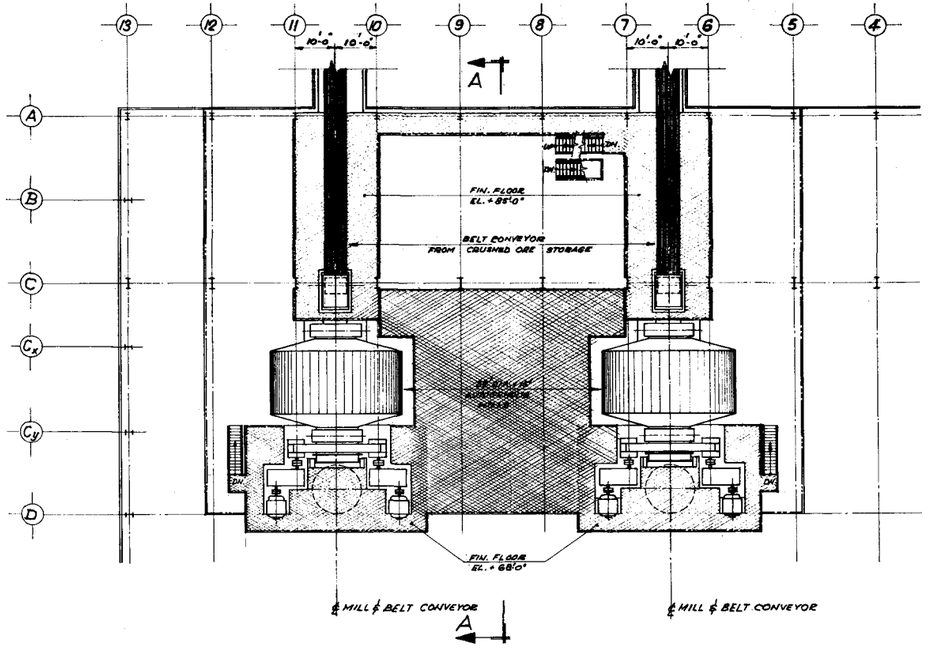
JULIAN LAKE NEWFOUNDLAND

CONCENTRATOR · GENERAL
GENERAL ARRANGEMENT
SECTION

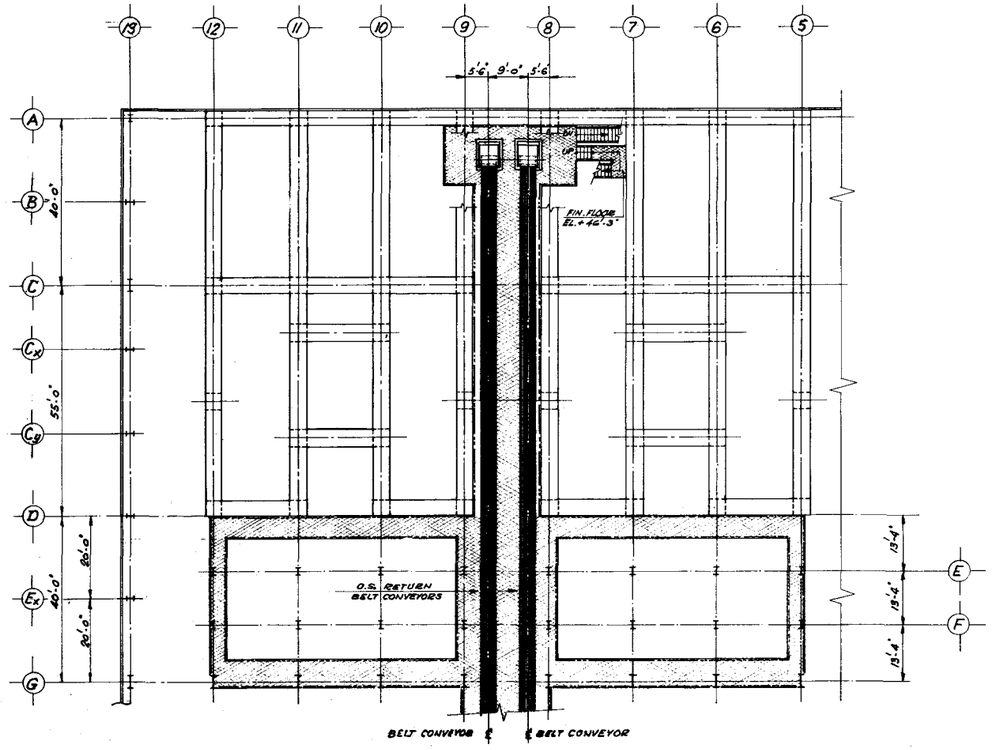
KILBORN **150 · F2**



PLAN FIN. FLOOR EL. + 11'-3" TOP. CONC.



PLAN FIN. FLOOR EL. + 55'-0" TOP CONC.



PLAN FIN. FLOOR EL. + 42'-6"

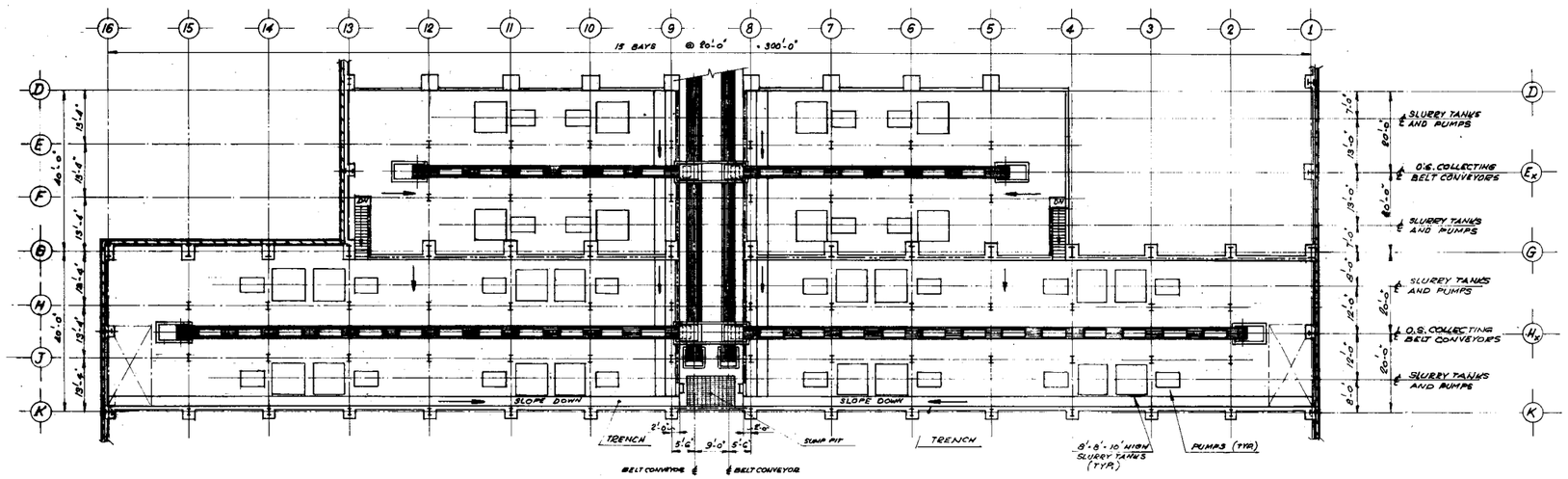
CANADIAN JAVELIN LIMITED

JULIAN LAKE NEWFOUNDLAND

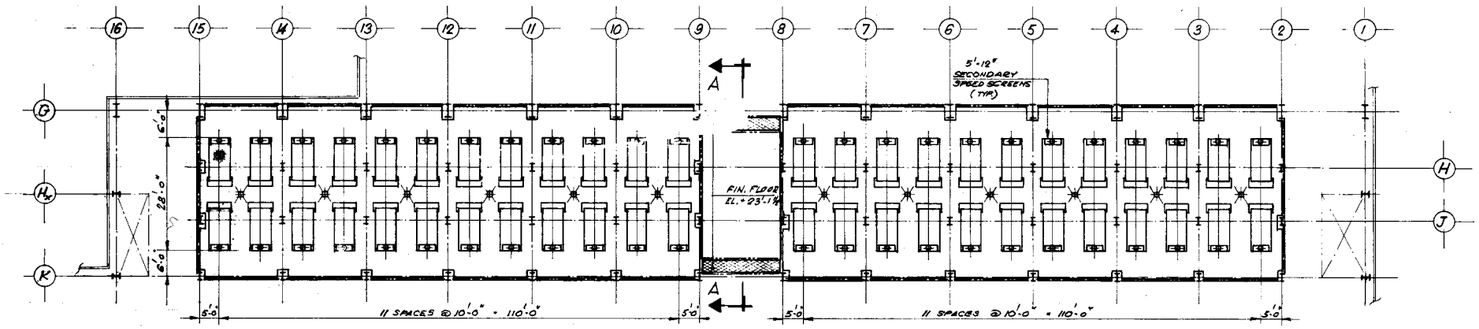
CONCENTRATOR
GRINDING & SCREENING
GENERAL ARRANGEMENT
FLOOR PLANS

KILBORN

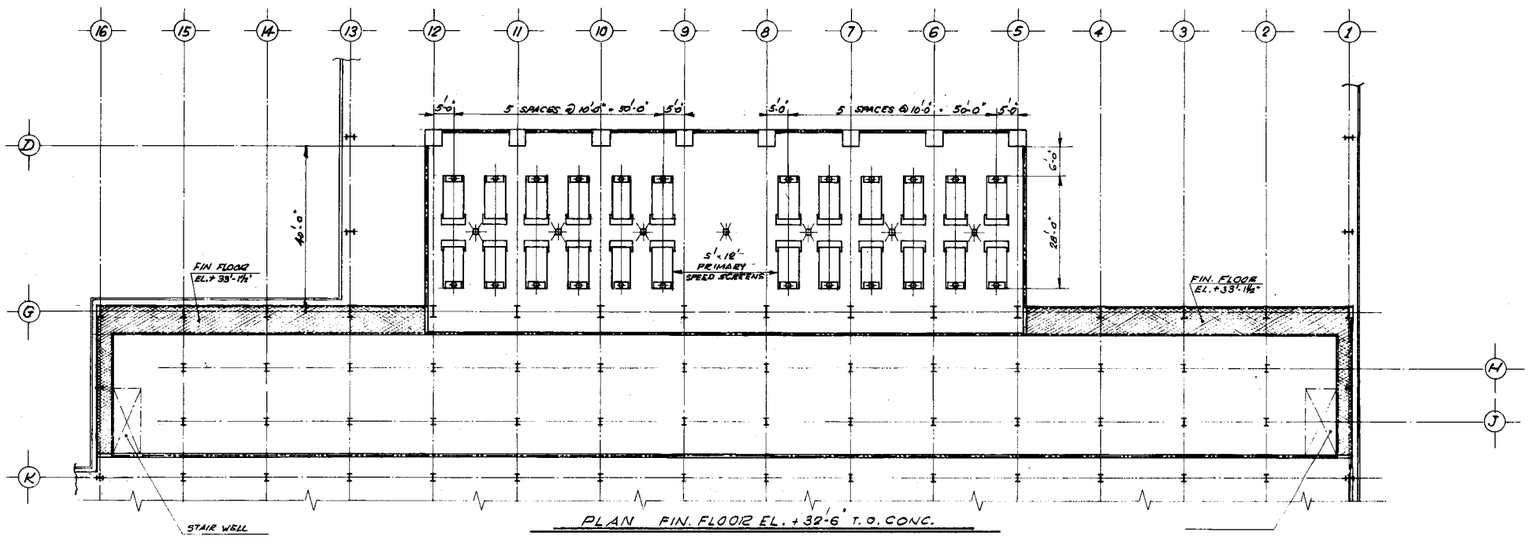
151 - F1



PLAN FIN. FLOOR EL. ± 0'-0" & + 11'-3" T.O. CONC.



PLAN FIN. FLOOR EL. + 22'-6" T.O. CONC.



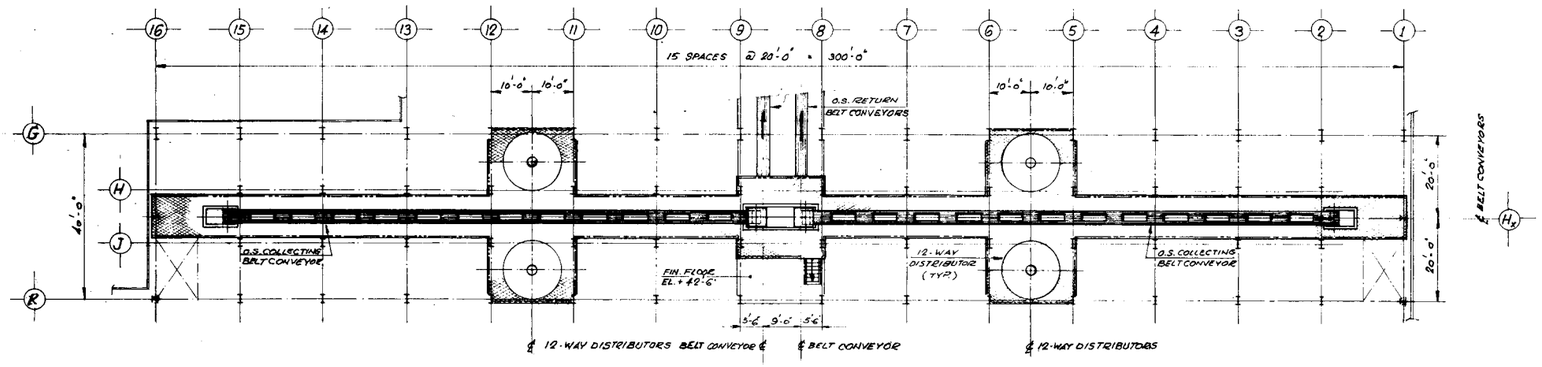
PLAN FIN. FLOOR EL. + 32'-6" T.O. CONC.

CANADIAN JAVELIN LIMITED

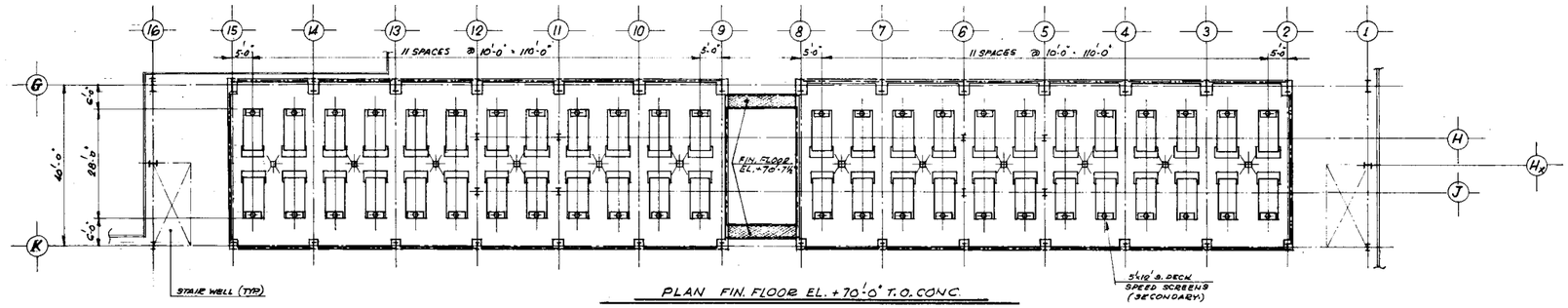
JULIAN LAKE NEWFOUNDLAND

CONCENTRATOR
GRINDING & SCREENING
GENERAL ARRANGEMENT
FLOOR PLANS

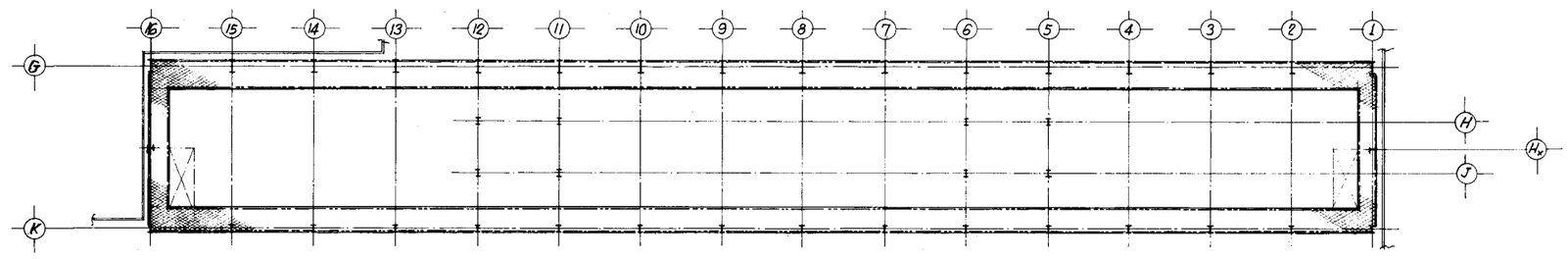
KILBORN **151 - F2**



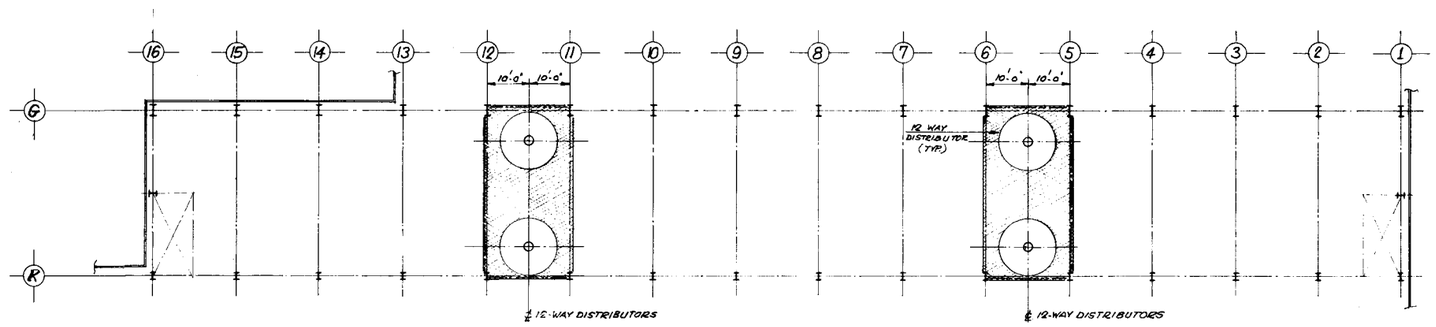
PLAN FIN. FLOOR EL. + 47'-6"



PLAN FIN. FLOOR EL. + 70'-0" T.O. CONC



PLAN FIN. FLOOR EL. +80'-0"



PLAN FIN. FLOOR EL. + 95'-0"

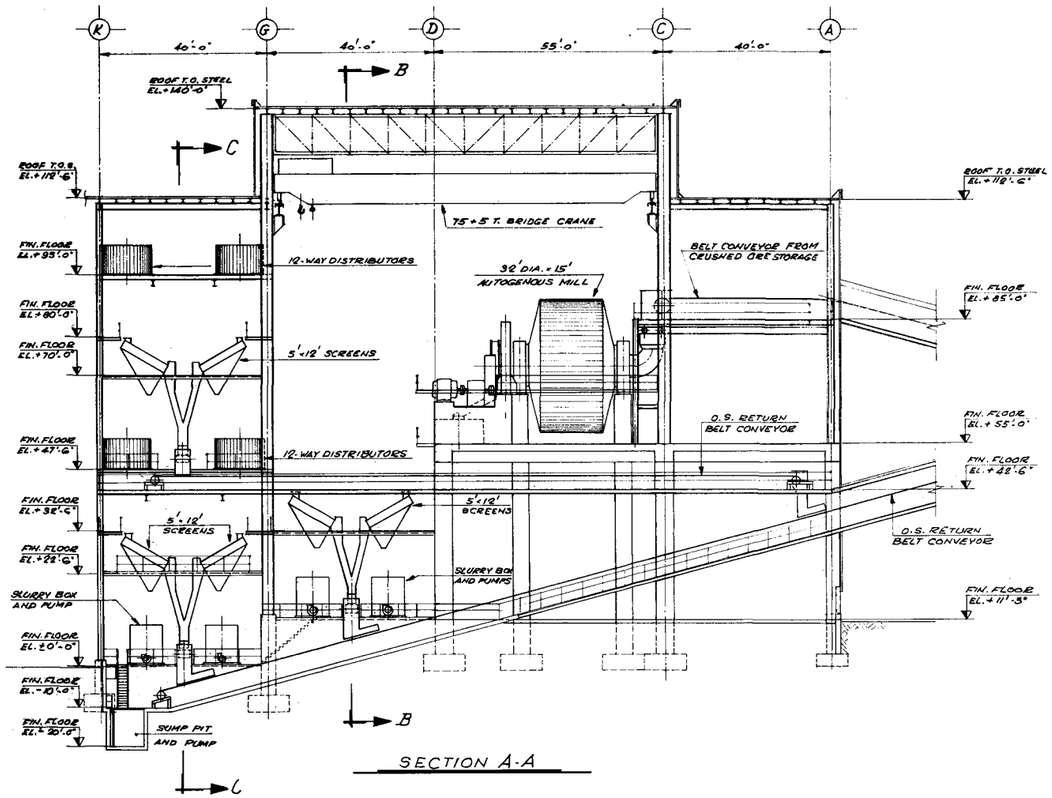
CANADIAN JAVELIN LIMITED

JULIAN LAKE NEWFOUNDLAND

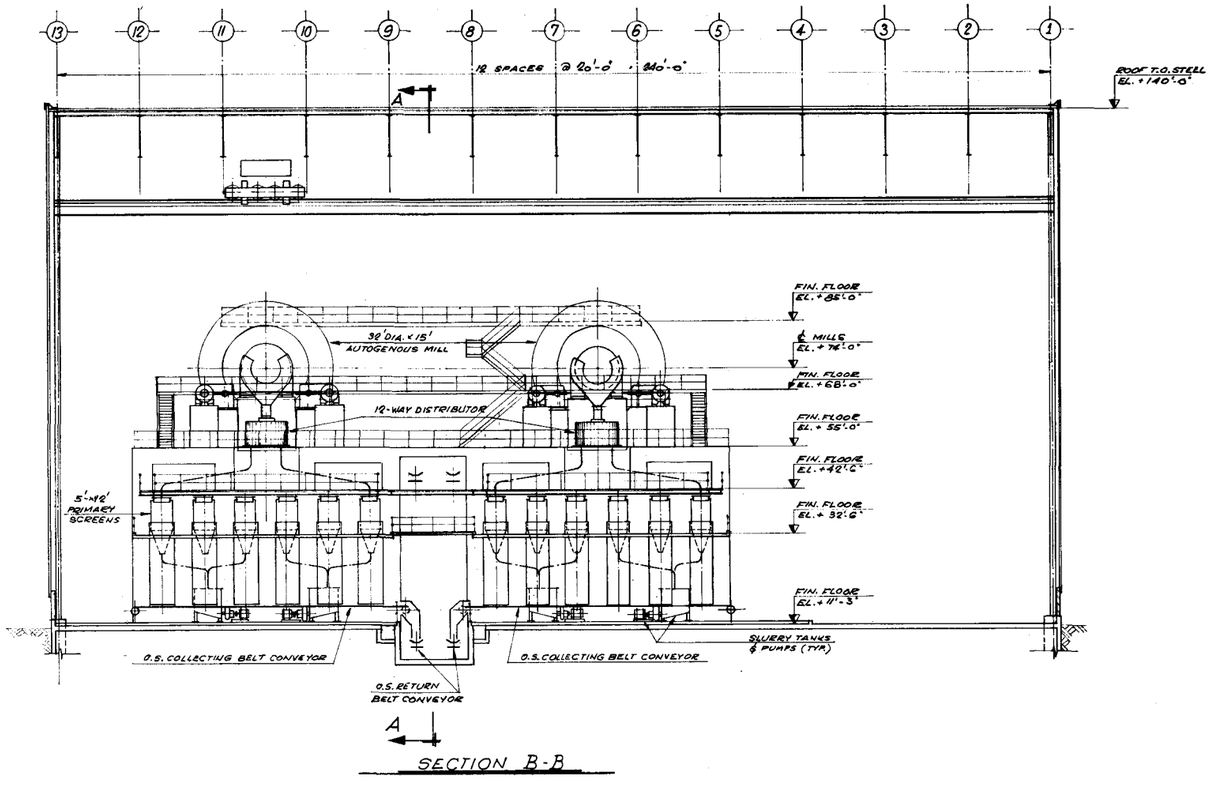
CONCENTRATOR
GRINDING & SCREENING
GENERAL ARRANGEMENT
FLOOR PLANS

KILBORN

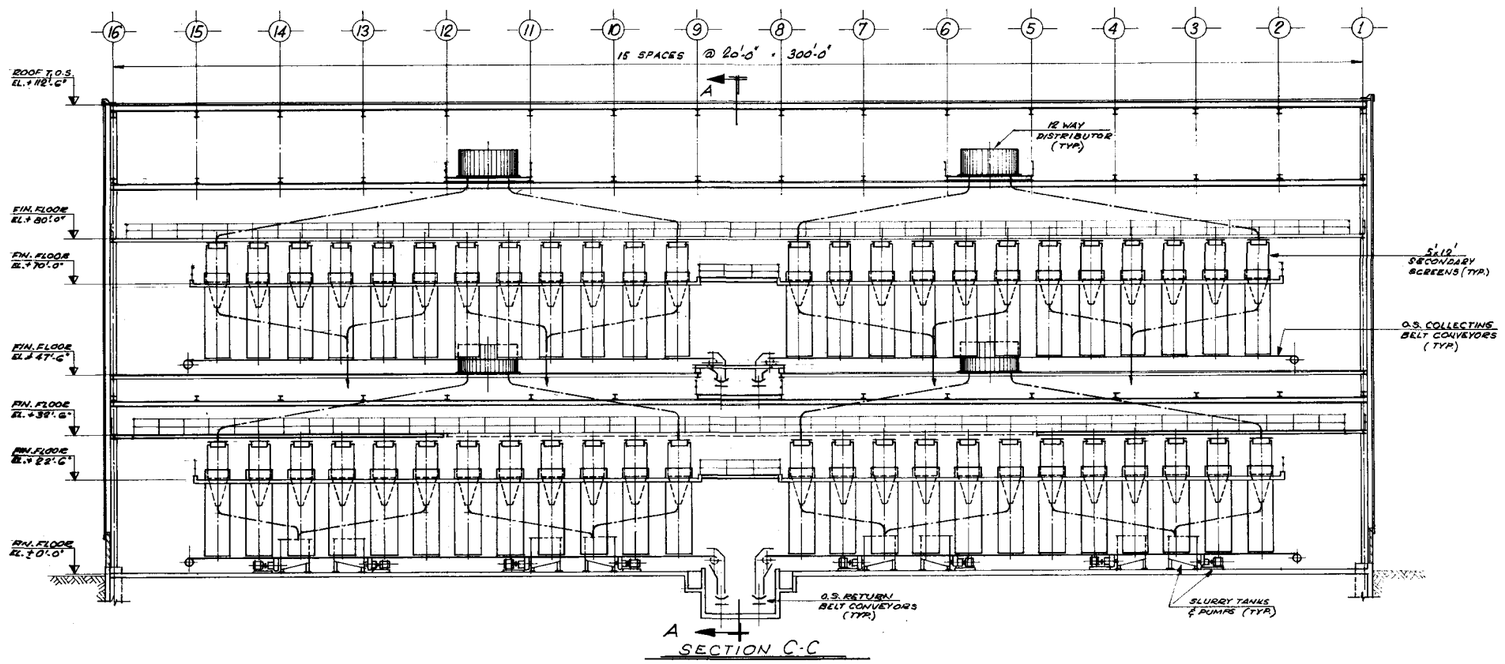
151 - F3



SECTION A-A



SECTION B-B



SECTION C-C

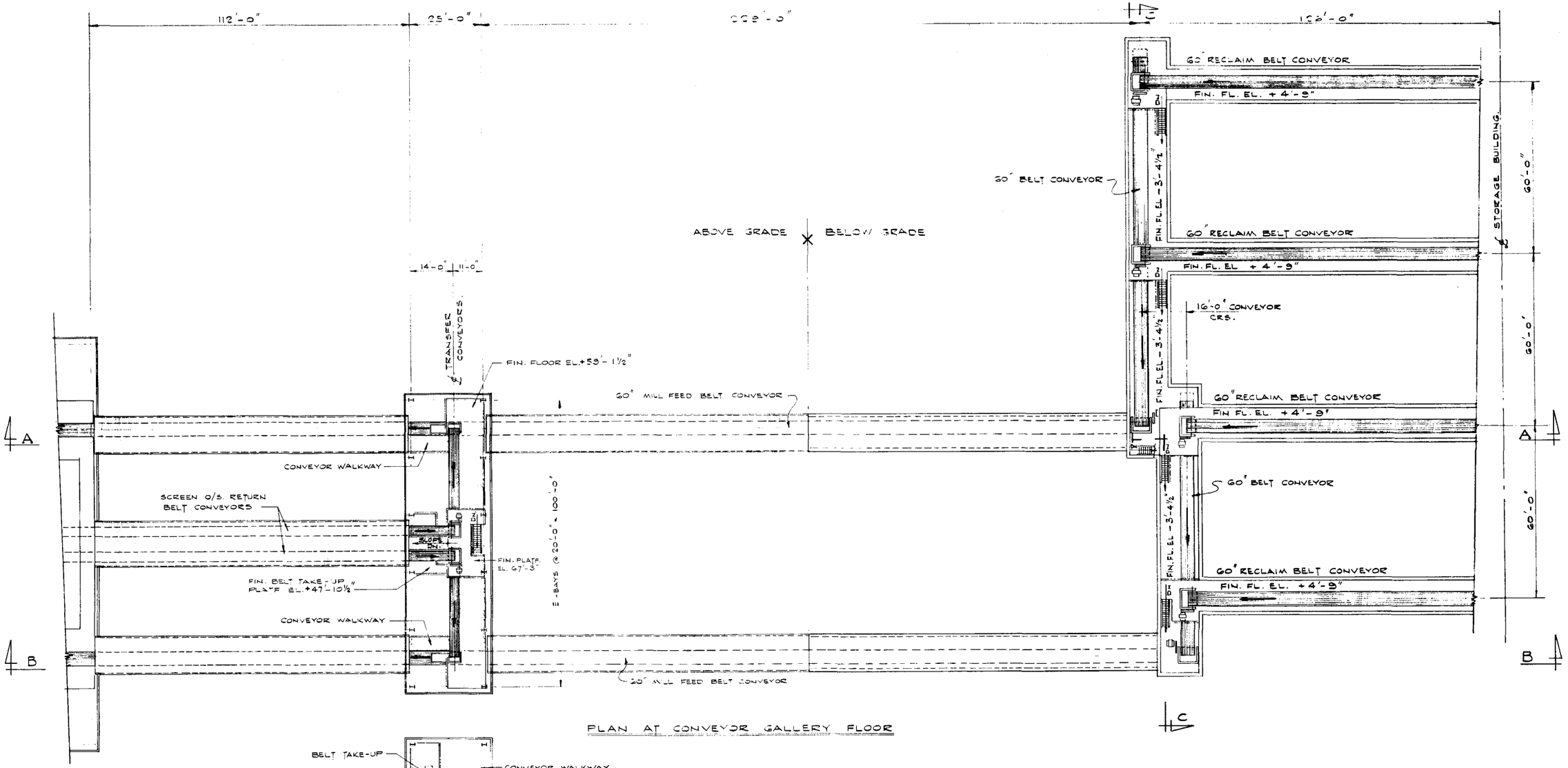
CANADIAN JAVELIN LIMITED

JULIAN LAKE NEWFOUNDLAND

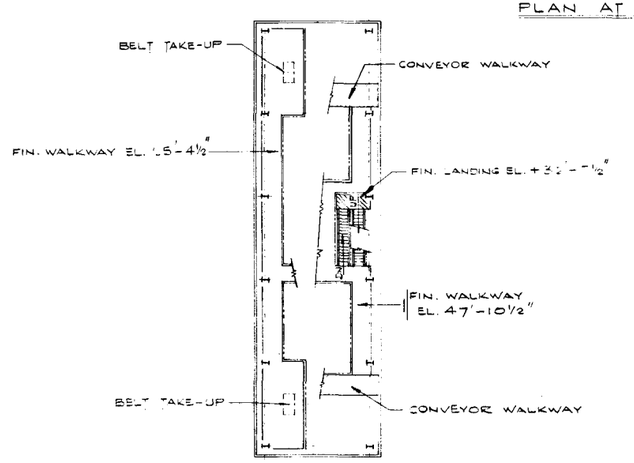
CONCENTRATOR
GRINDING & SCREENING
GENERAL ARRANGEMENT
SECTIONS

KILBORN

151-F4

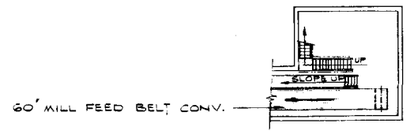


PLAN AT CONVEYOR GALLERY FLOOR



PLAN AT GROUND FLOOR

FIN. FL. EL. -15'-10½"



FIN. FL. EL. -12'-7½"

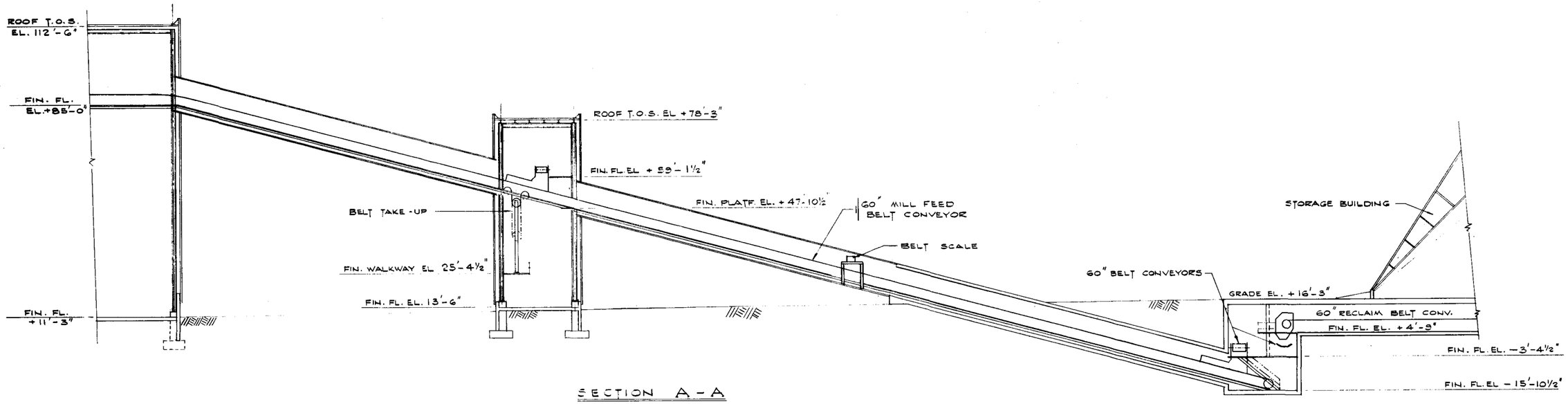
CANADIAN JAVELIN LIMITED

JULIAN LAKE NEWFOUNDLAND

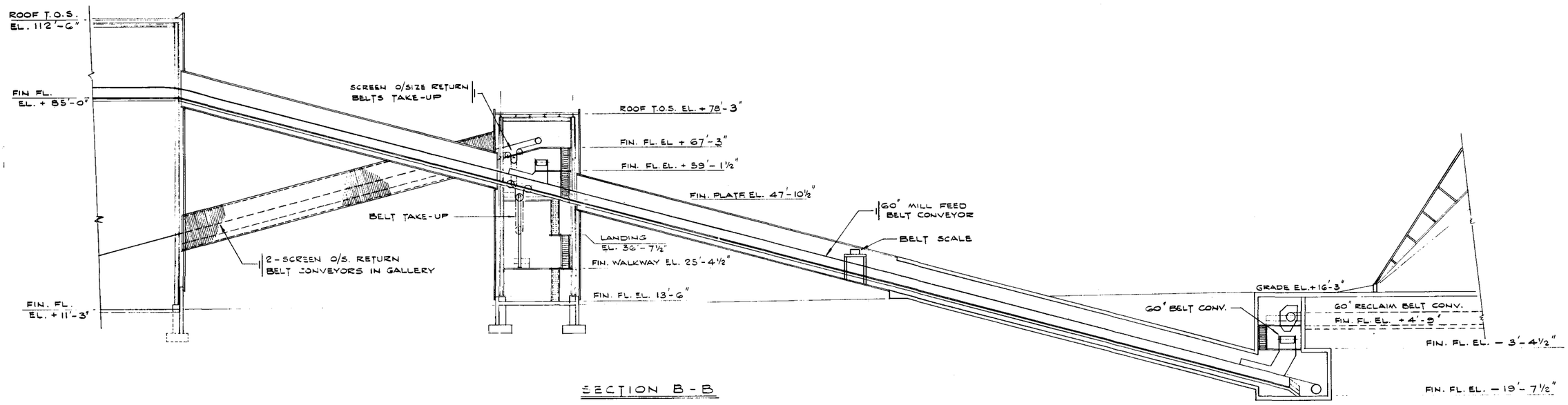
CONCENTRATOR
GRINDING & SCREENING
TRANSFER HOUSE, PLANS

KILBORN

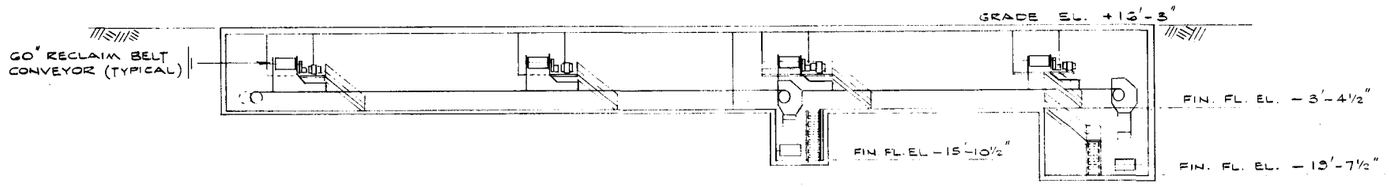
151-F5



SECTION A-A



SECTION B-B



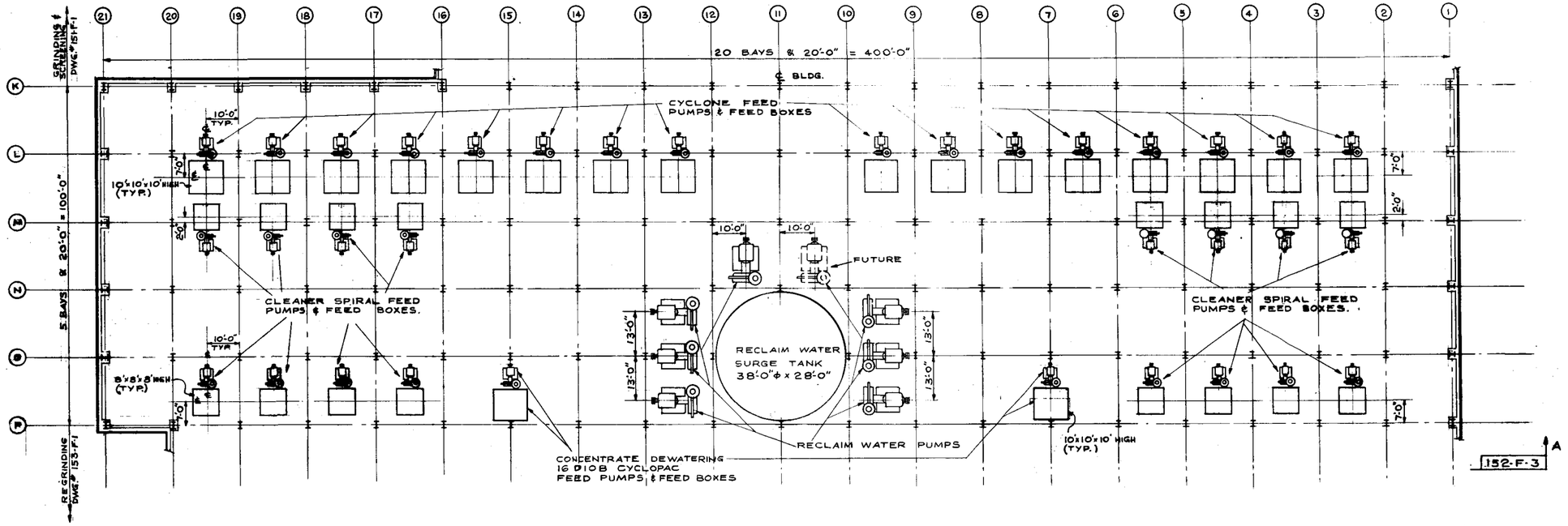
SECTION C-C

CANADIAN JAVELIN LIMITED

JULIAN LAKE NEWFOUNDLAND

CONCENTRATOR
GRINDING & SCREENING
TRANSFER HOUSE, SECTIONS

KILBORN **151 · F6**



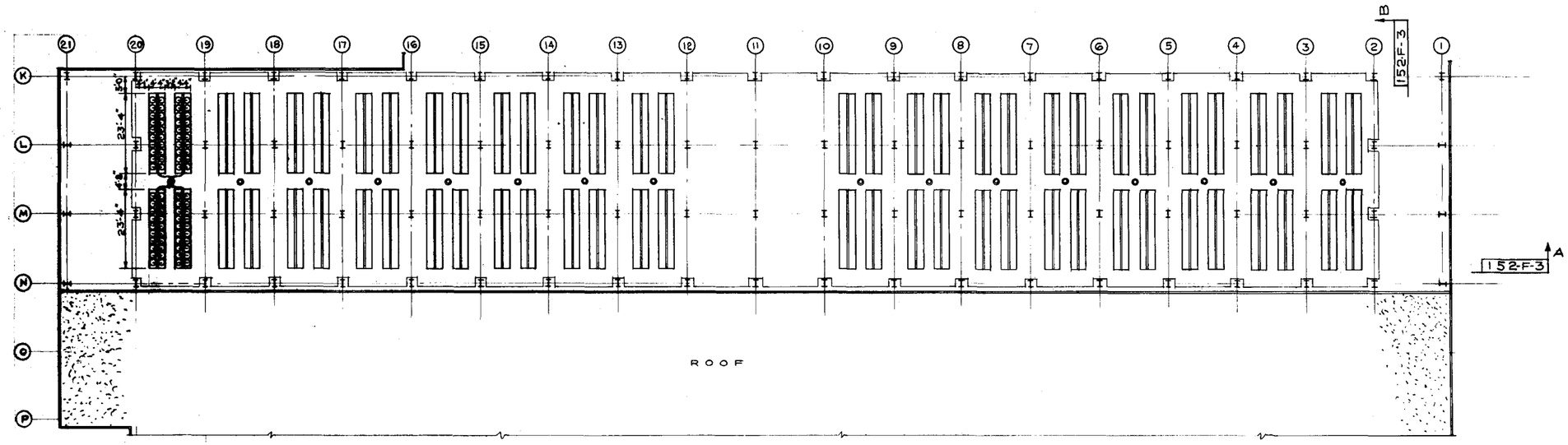
PLAN GROUND FLOOR EL.±0'-0" T.O. CONC.

CANADIAN JAVELIN LIMITED

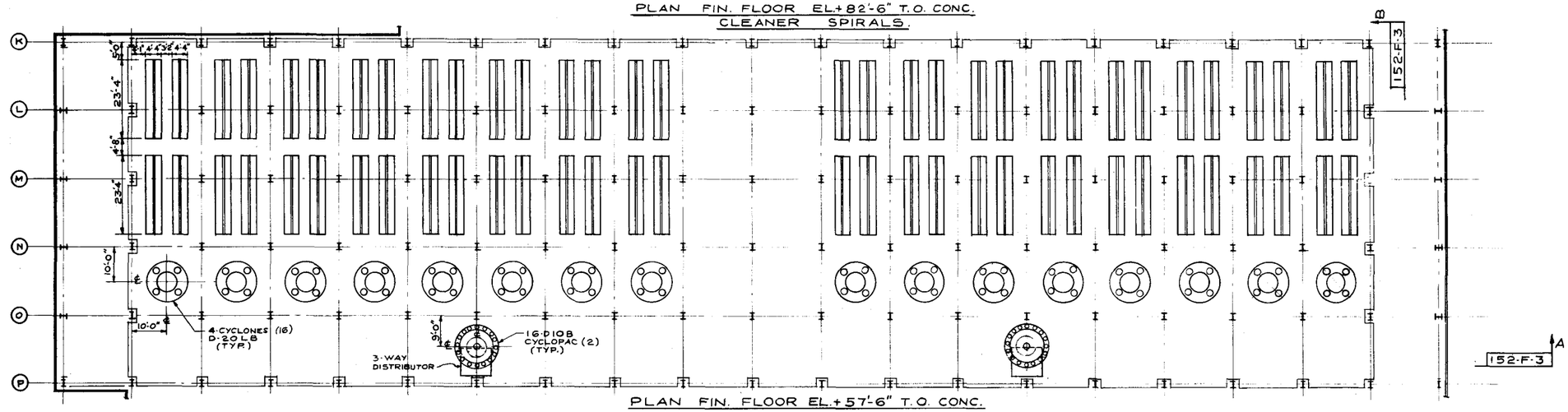
JULIAN LAKE NEWFOUNDLAND

CONCENTRATOR
SEPARATION
GENERAL ARRANGEMENT
FLOOR PLAN

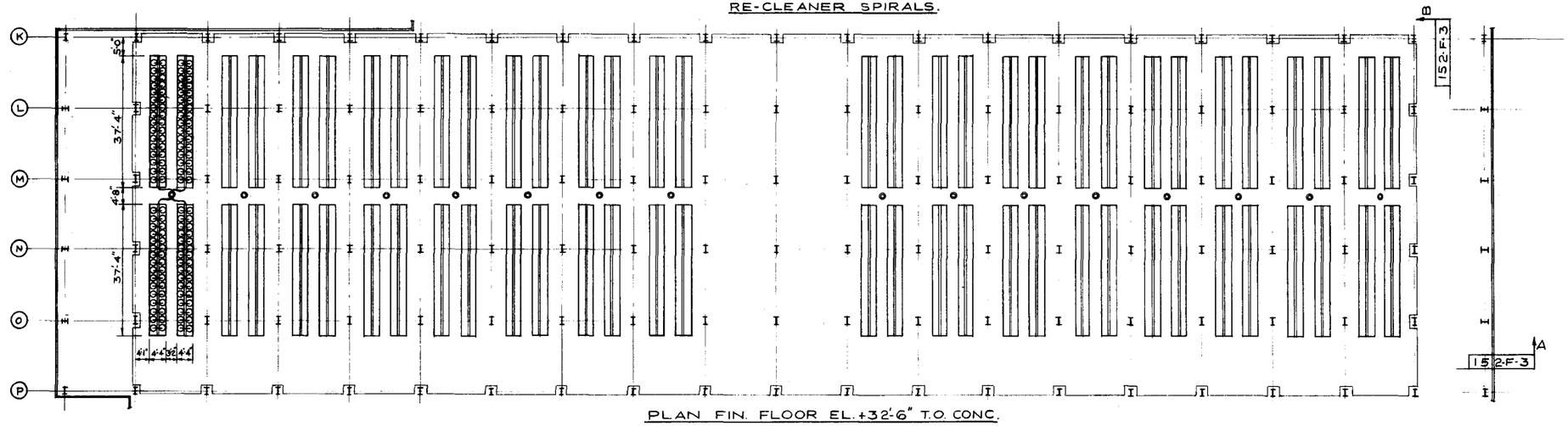
KILBORN 152 · F1



PLAN FIN. FLOOR EL.+82'-6" T.O. CONC.
CLEANER SPIRALS.



PLAN FIN. FLOOR EL.+57'-6" T.O. CONC.
RE-CLEANER SPIRALS.



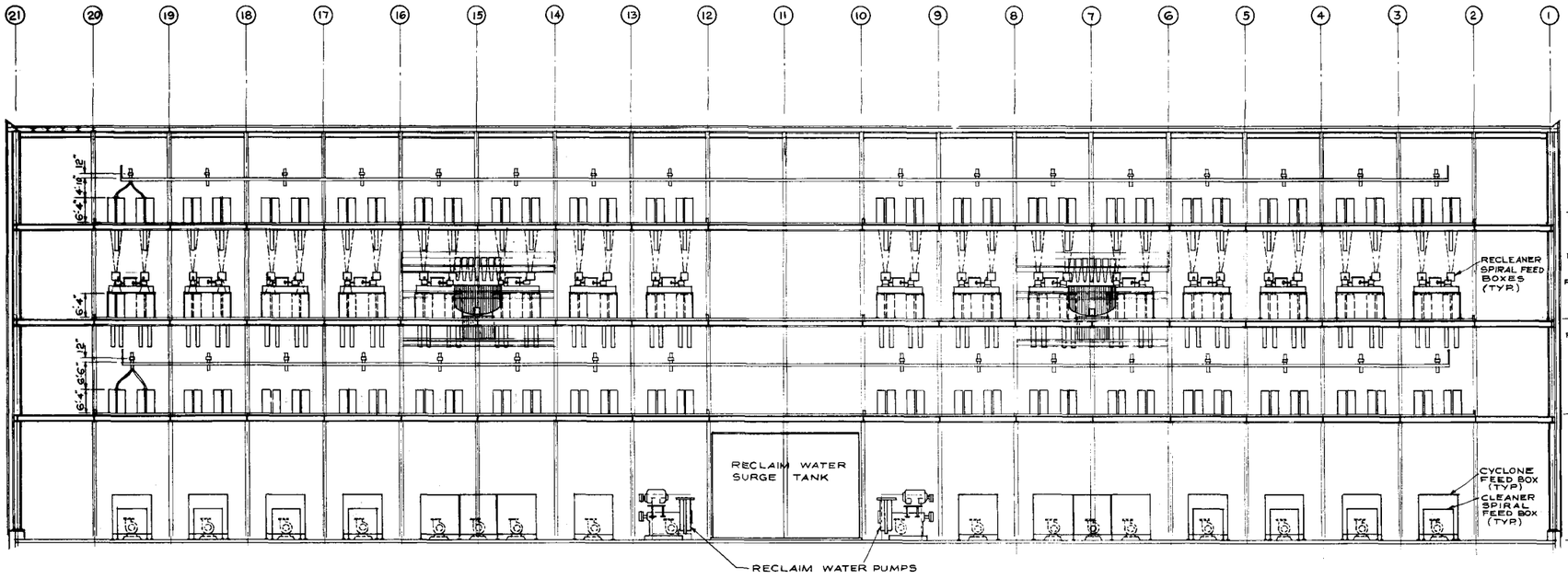
PLAN FIN. FLOOR EL.+32'-6" T.O. CONC.
ROUGHER SPIRALS.

CANADIAN JAVELIN LIMITED

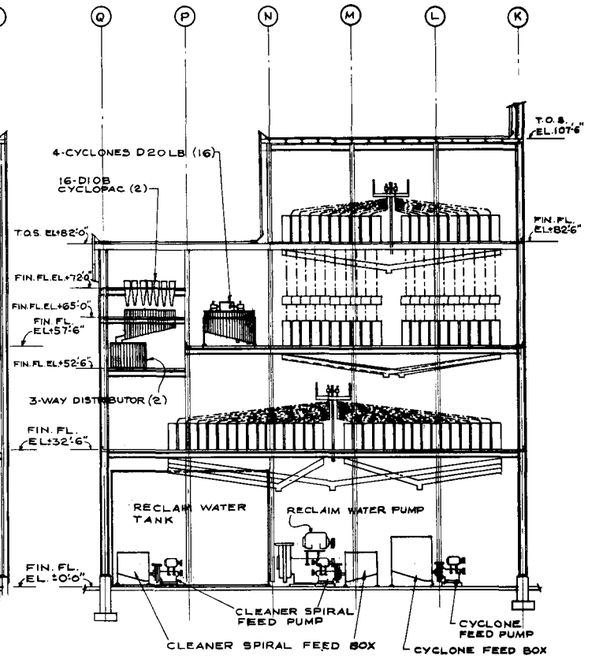
JULIAN LAKE NEWFOUNDLAND

CONCENTRATOR
SEPARATION
GENERAL ARRANGEMENT
FLOOR PLANS

KILBORN **152 - F2**



SECTION 'A-A'



SECTION 'B-B'

CANADIAN JAVELIN LIMITED

JULIAN LAKE NEWFOUNDLAND

CONCENTRATOR
SEPARATION
GENERAL ARRANGEMENT
SECTIONS

KILBORN **152 · F3**

'C' B 'A'

20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5 4 3 2 1

19 - SPACES @ 20'-0" = 380'-0"

Q U Y

30'-0"

№4 DISCH. TANK 22' DIA. X 19'

№4 FEED TANK 22' DIA. X 19'

№3 FEED TANK 22' DIA. X 19'

№3 DISCH. TANK 22' DIA. X 19'

19' DIA. HORIZ. FILTER

№2 DISCH. TANK 22' DIA. X 19'

№2 FEED TANK 22' DIA. X 19'

№1 FEED TANK 22' DIA. X 19'

№1 DISCH. TANK 22' DIA. X 19'

D.S.M. SCREENS (2 BANKS OF 8)

2 - 4 WAY DISTRIBUTORS

4 - 2 WAY DISTRIBUTORS

LAYDOWN AND REPAIR

REGRIND MILL #8 16'-6"ø x 23'

REGRIND MILL #7 16'-6"ø x 23'

REGRIND MILL #6 16'-6"ø x 23'

REGRIND MILL #5 16'-6"ø x 23'

REGRIND MILL #4 16'-6"ø x 23'

REGRIND MILL #3 16'-6"ø x 23'

REGRIND MILL #2 16'-6"ø x 23'

REGRIND MILL #1 16'-6"ø x 23'

CONCENTRATE DEWATERING THICKENER 100'-0" DIA.

60'-0"

25'-0"

150'-0" DIA. THICKENER

150'-0" DIA. THICKENER

CONCENTRATE STORAGE

SEE DRG. № 154-F1

130'-0"

160'-0"

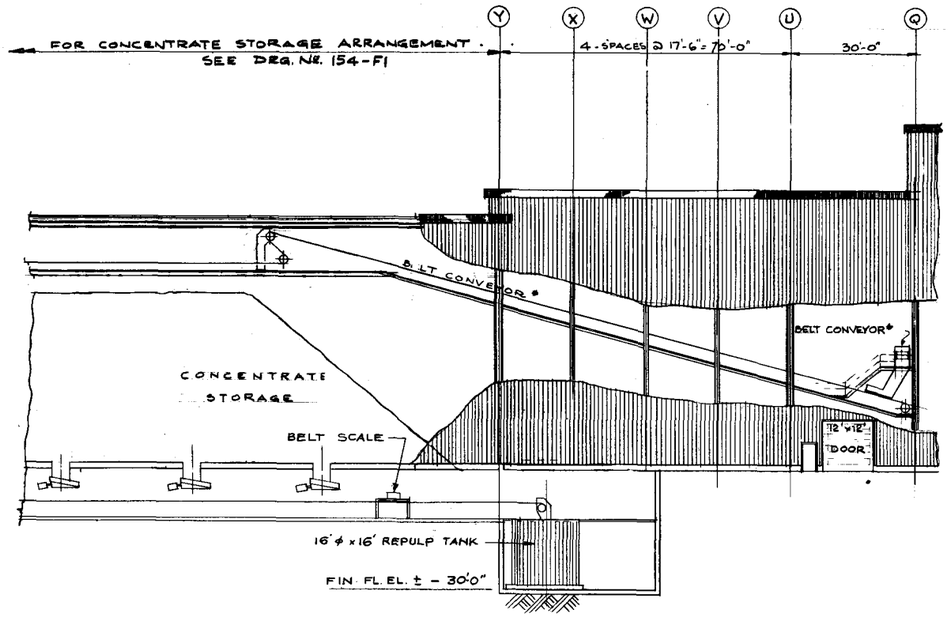
85'-0"

CANADIAN JAVELIN LIMITED

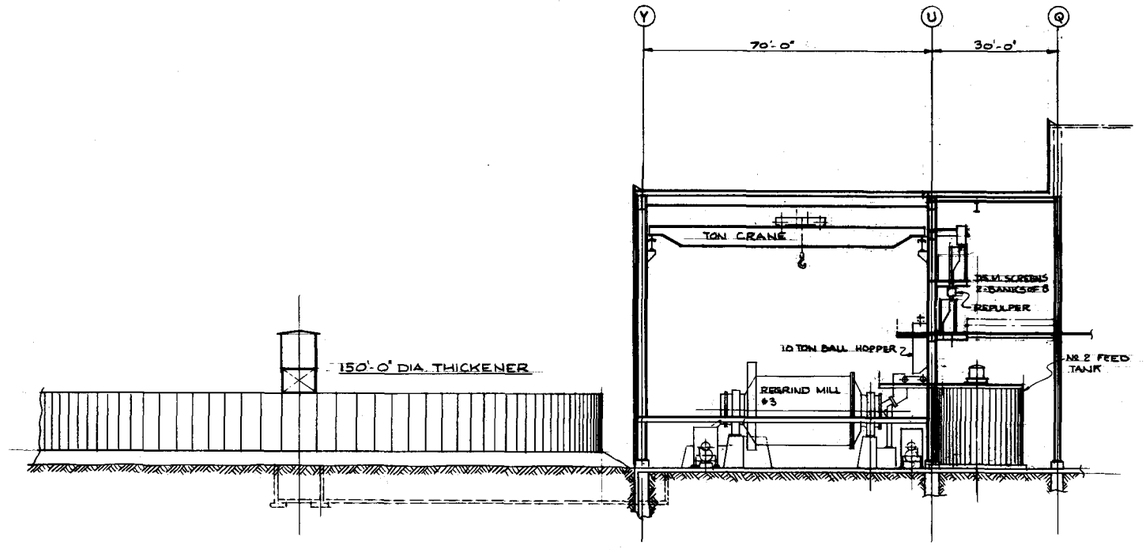
JULIAN LAKE NEWFOUNDLAND

CONCENTRATOR
DEWATERING & REGRIND
GENERAL ARRANGEMENT
FLOOR PLAN

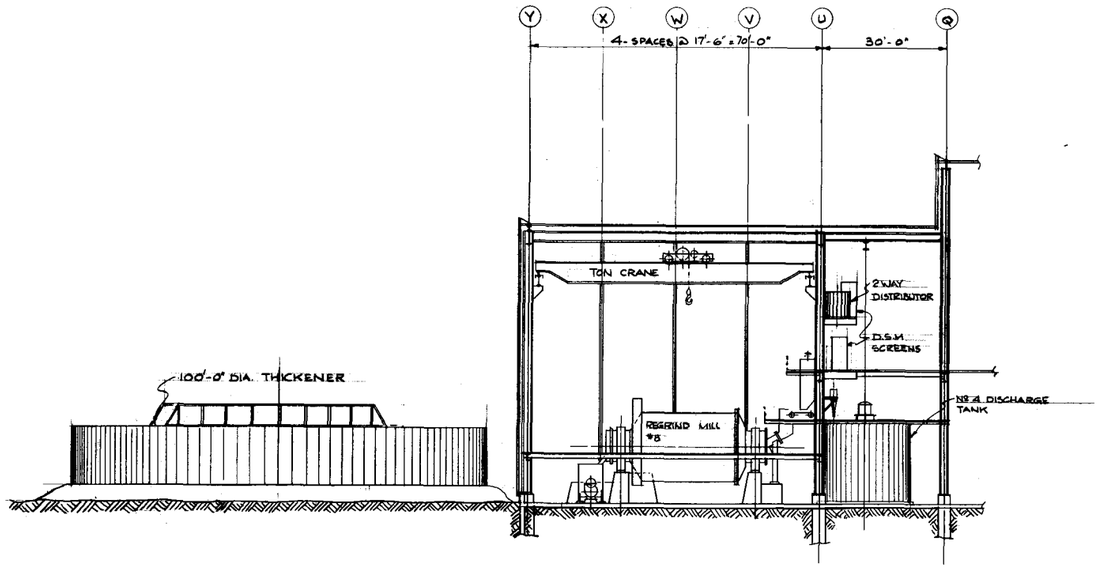
KILBORN **153 - F1**



SECTION 'A-A'



SECTION 'B-B'



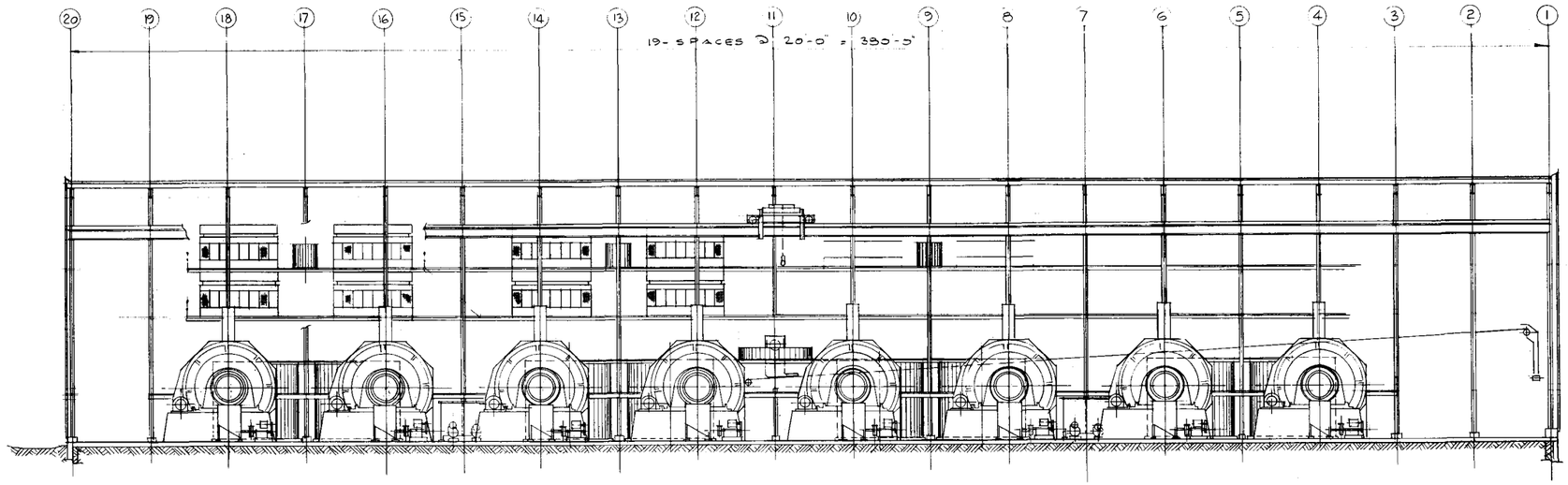
SECTION 'C-C'

CANADIAN JAVELIN LIMITED

JULIAN LAKE NEWFOUNDLAND

CONCENTRATOR
DEWATERING & REGRIND
GENERAL ARRANGEMENT
CROSS SECTIONS A-A, B-B & C-C

KILBORN **153 - F2**



— SECTION D-D —

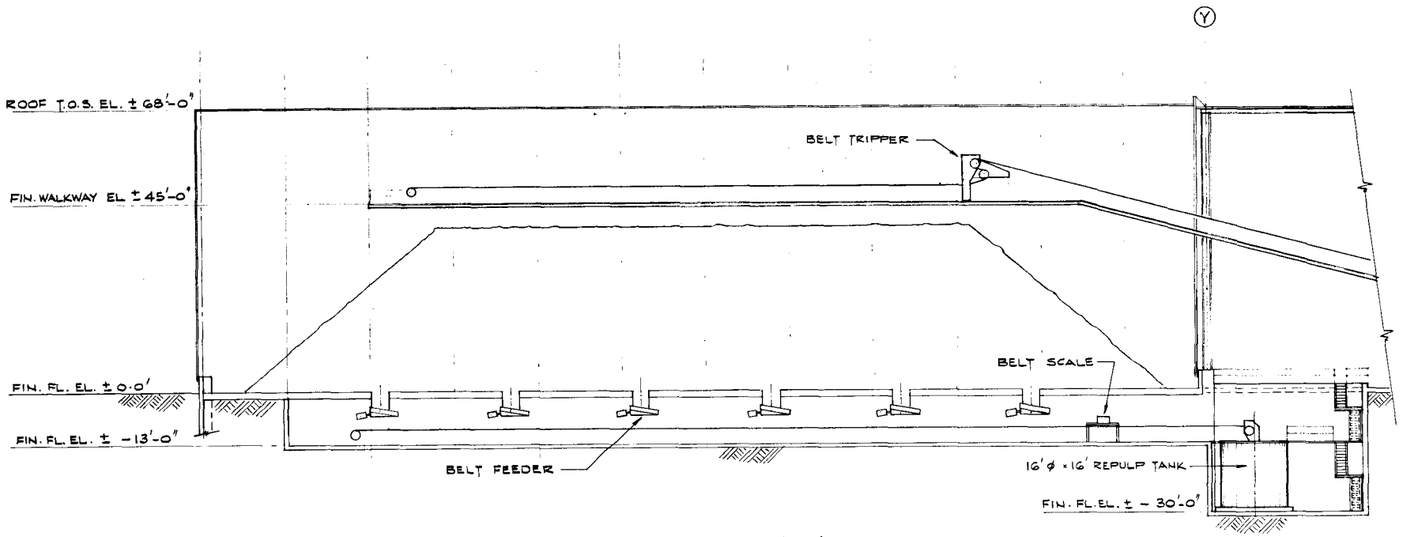
CANADIAN JAVELIN LIMITED

JULIAN LAKE NEWFOUNDLAND

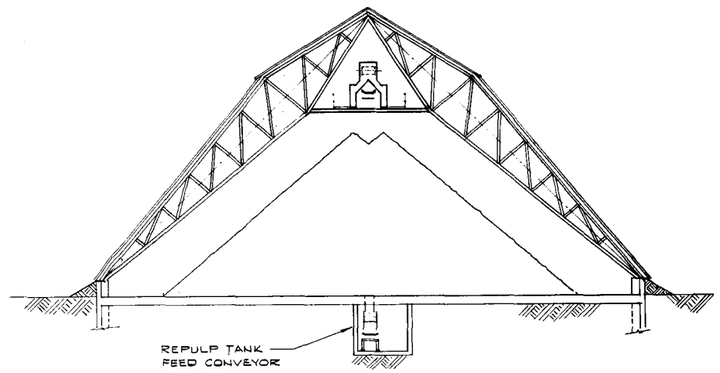
CONCENTRATOR
DEWATERING & REGRIND
GENERAL ARRANGEMENT
LONGITUDINAL SECTION D-D

KILBORN

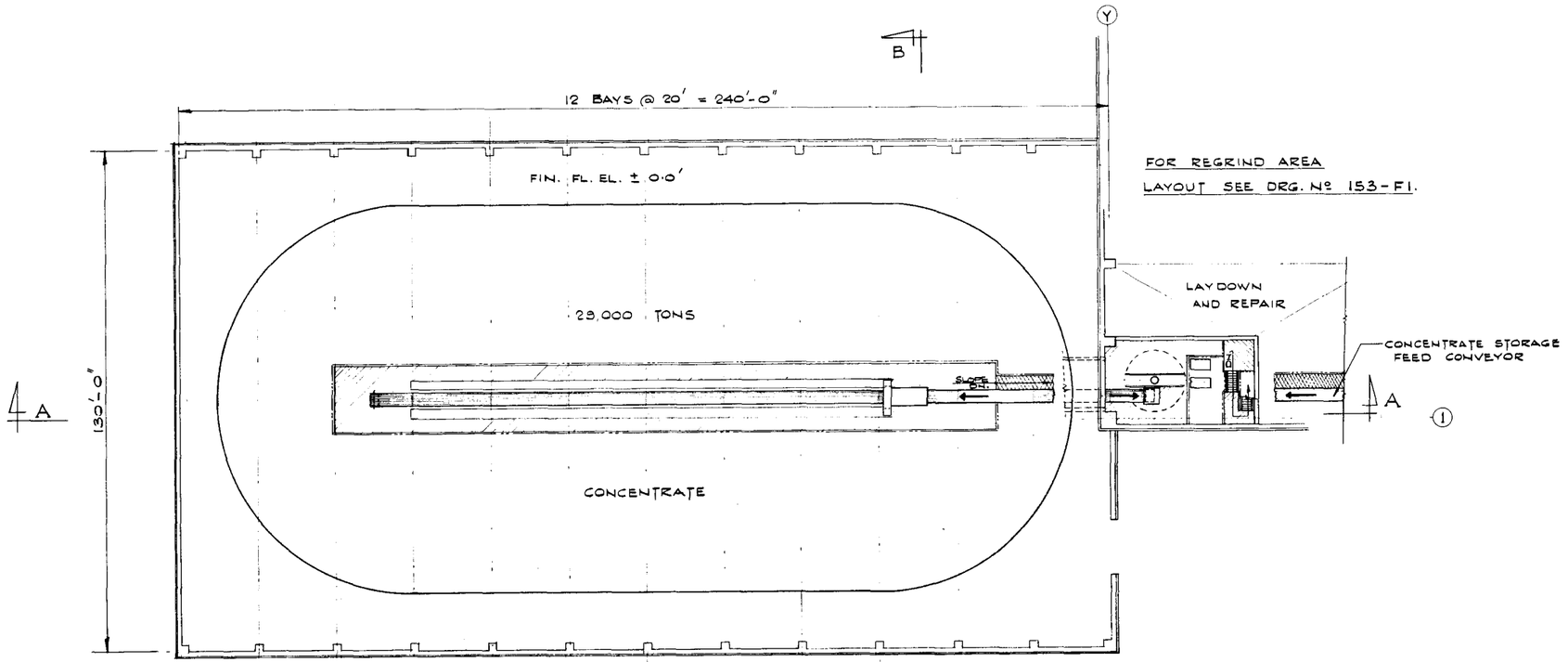
153 - F3



SECTION A-A



SECTION B-B



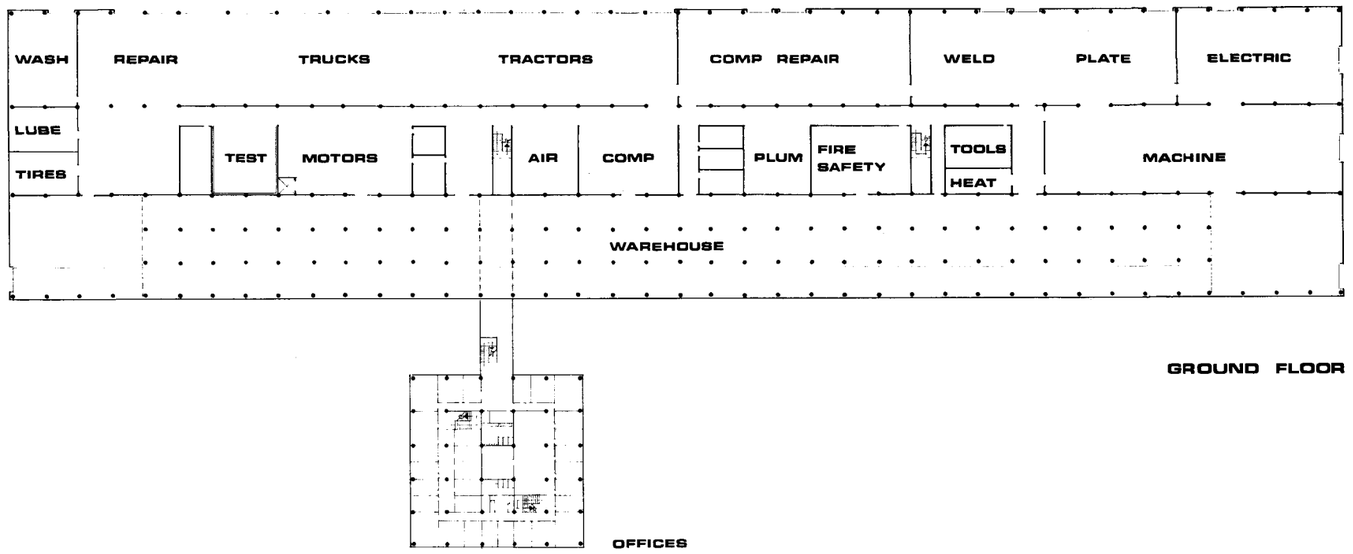
PLAN VIEW

CANADIAN JAVELIN LIMITED

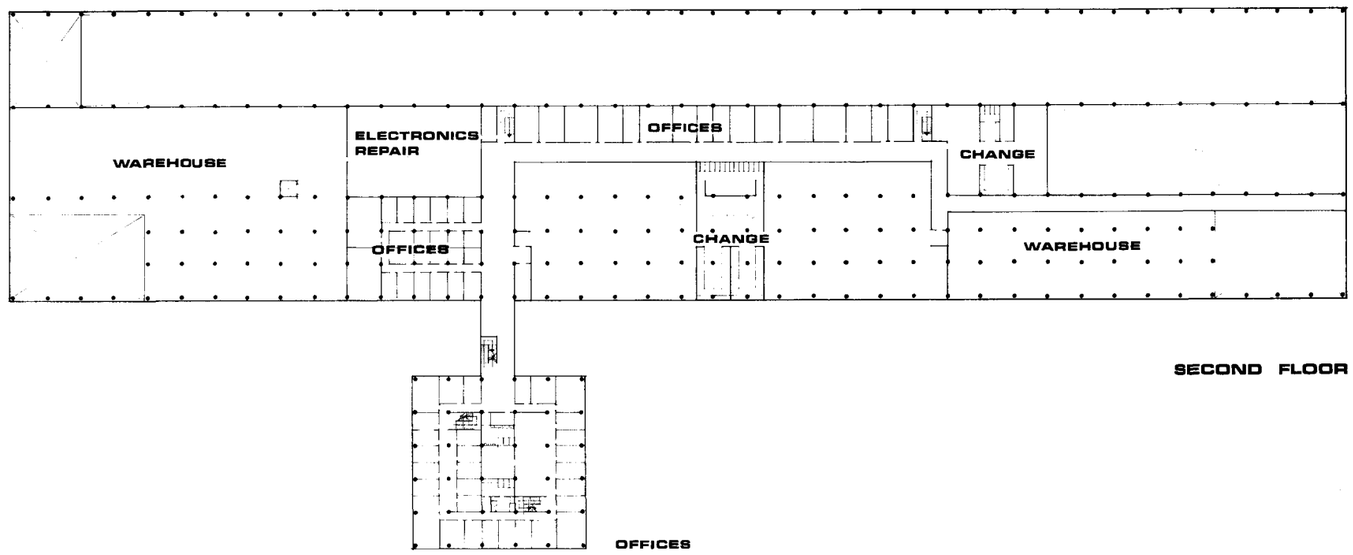
JULIAN LAKE NEWFOUNDLAND

CONCENTRATOR
CONCENTRATE STORAGE BUILDING
PLAN & SECTIONS

KILBORN **154 - F1**



GROUND FLOOR



SECOND FLOOR

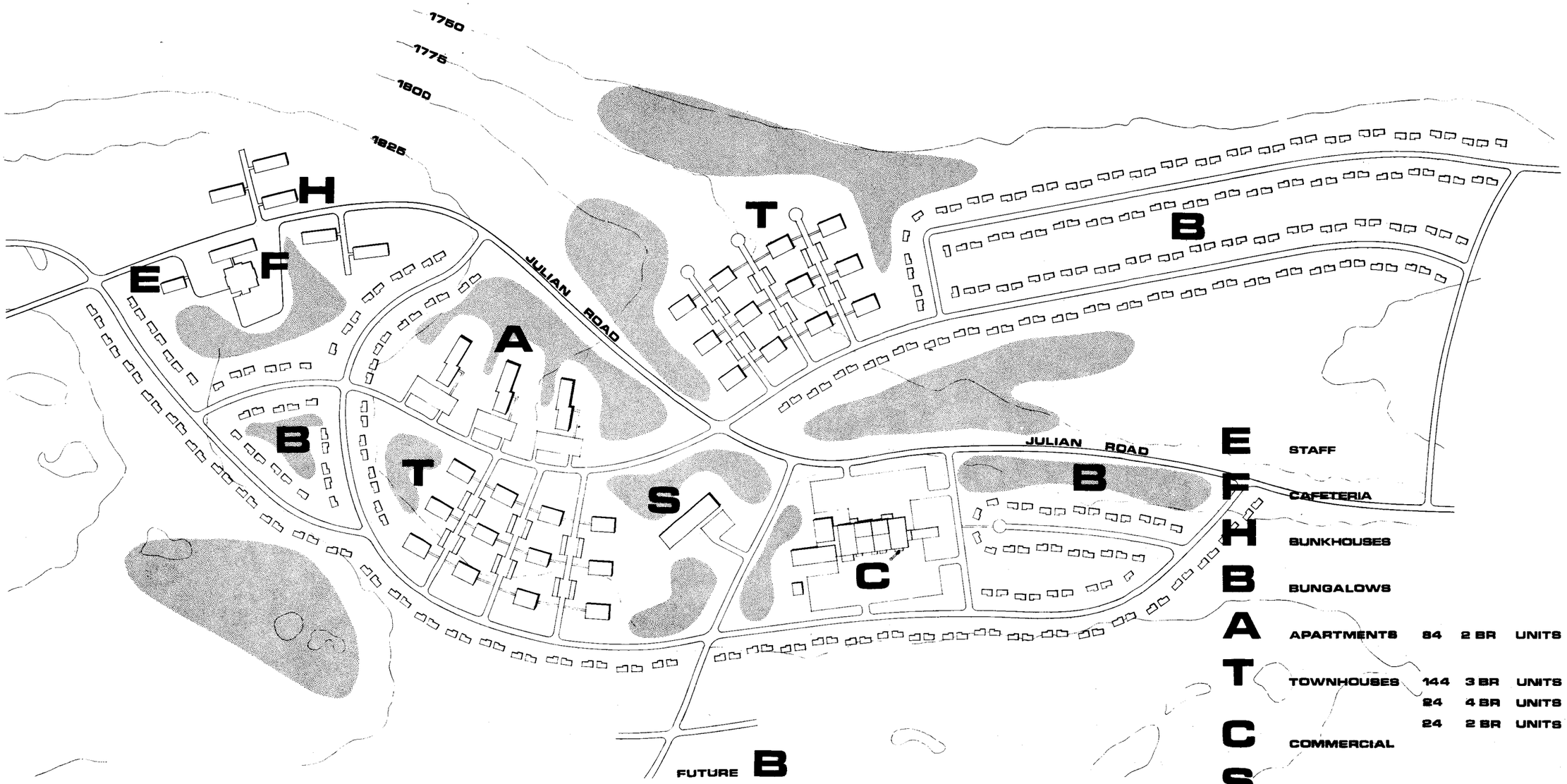
0 10 30
5 20 40

CANADIAN JAVELIN LIMITED

JULIAN LAKE NEWFOUNDLAND

SERVICE BUILDING
& GENERAL OFFICE
FLOOR PLANS

KILBORN **170 · F1**

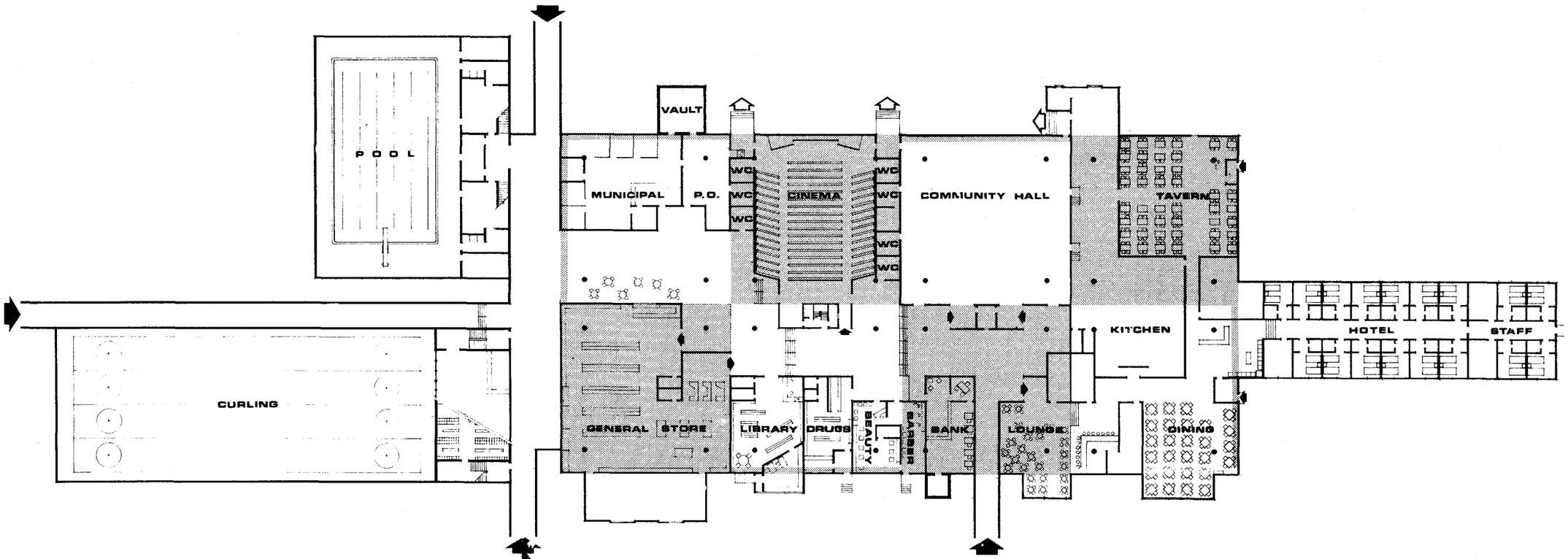


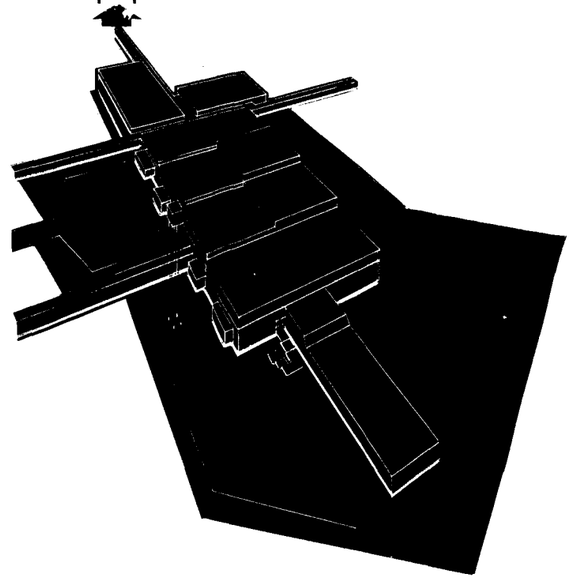
CANADIAN JAVELIN LIMITED

JULIAN LAKE NEWFOUNDLAND

TOWNSITE
GENERAL ARRANGEMENT

KILBORN **280 - F1**



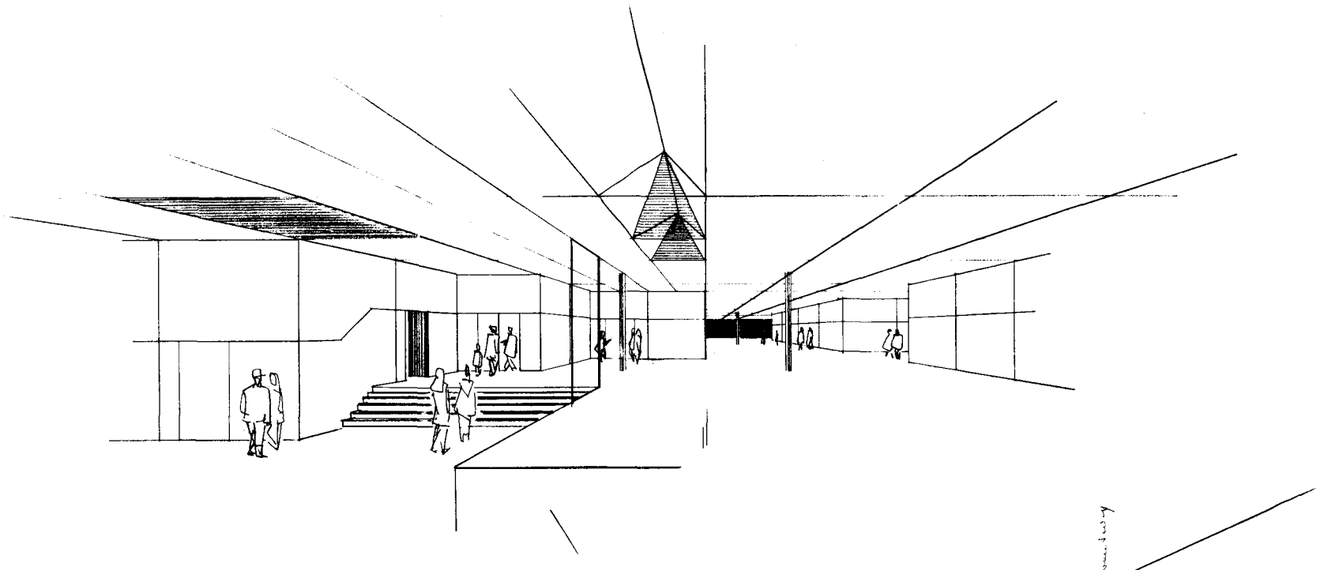


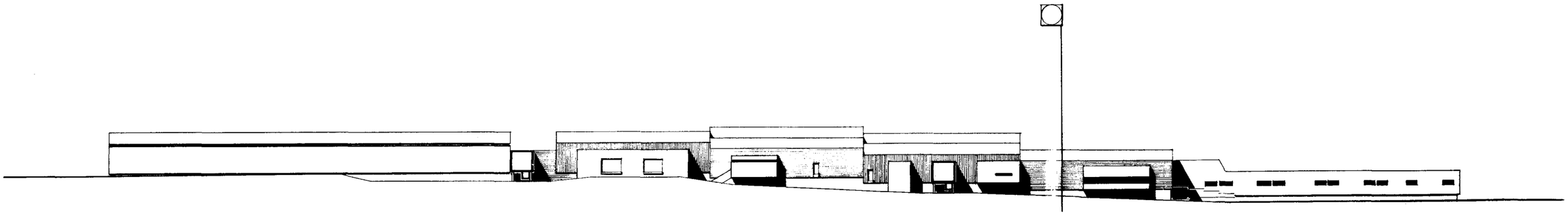
CANADIAN JAVELIN LIMITED

JULIAN LAKE NEWFOUNDLAND

COMMUNITY CENTRE
FLOOR PLAN

KILBORN **270 - F1**



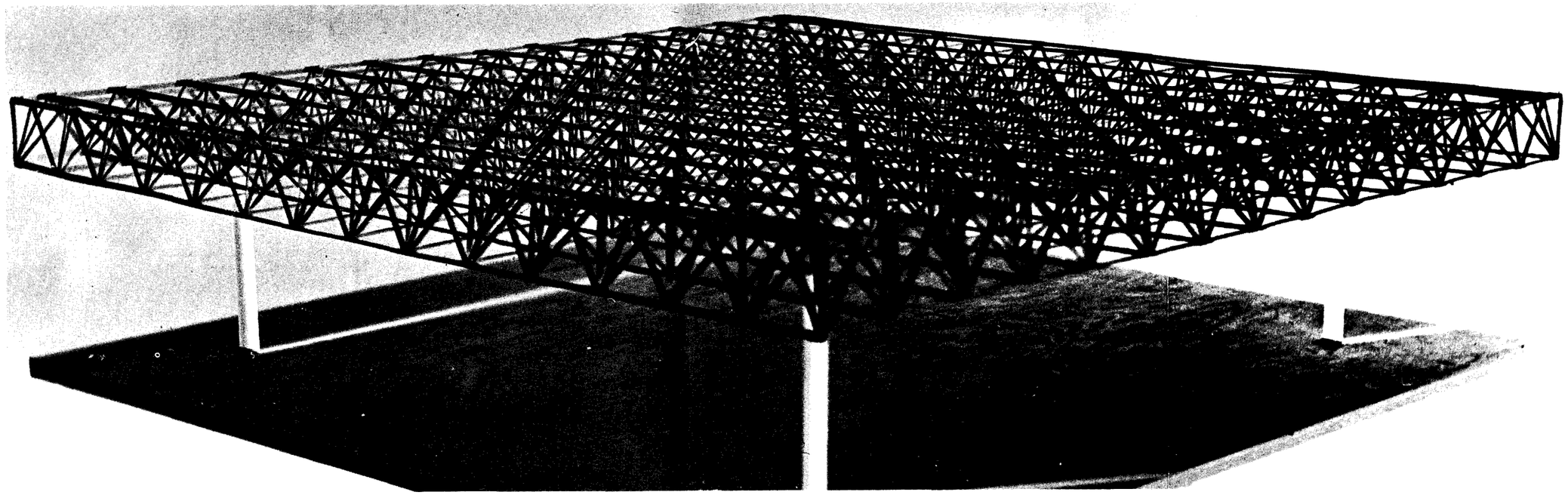


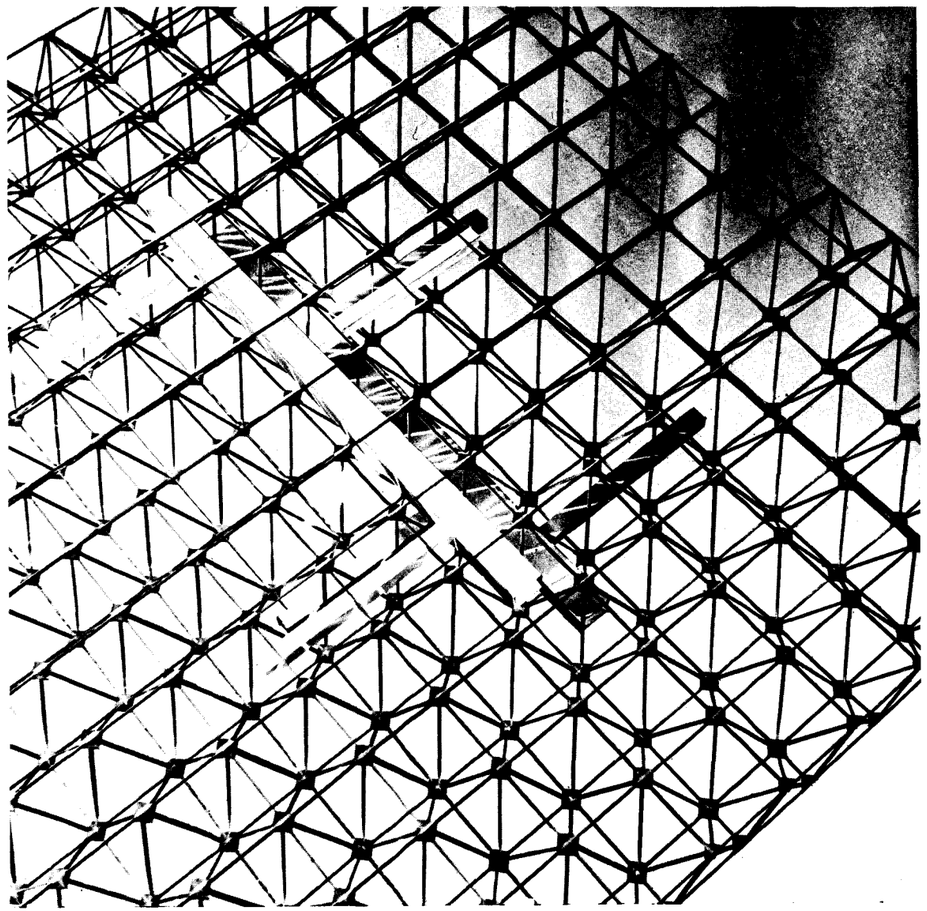
CANADIAN JAVELIN LIMITED

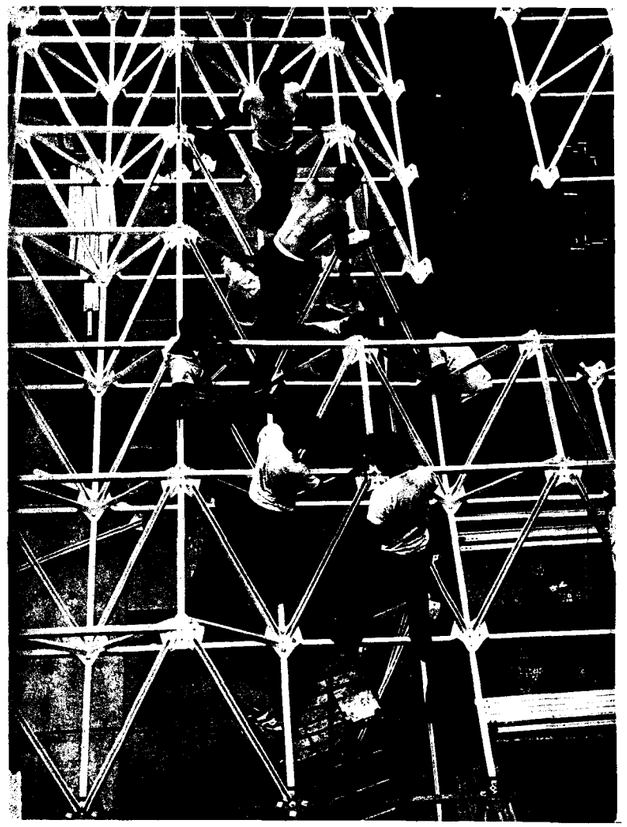
JULIAN LAKE NEWFOUNDLAND

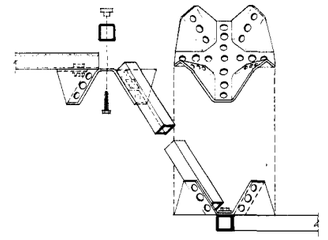
COMMUNITY CENTRE
ELEVATIONS & PERSPECTIVE

KILBORN **270 · F2**







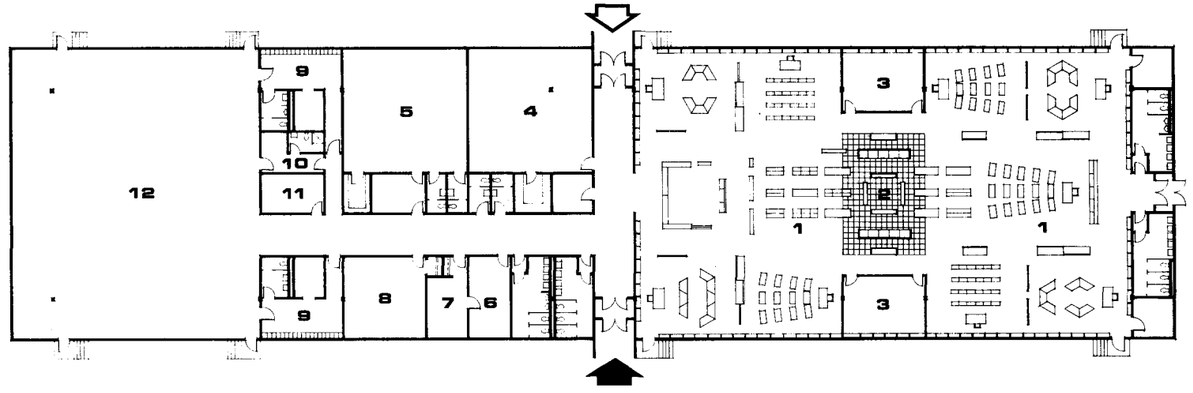


CANADIAN JAVELIN LIMITED

JULIAN LAKE NEWFOUNDLAND

COMMUNITY CENTRE
ROOF STRUCTURE

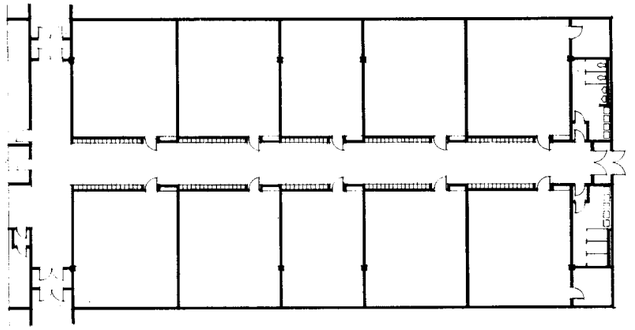
KILBORN **270 · F3**



OPEN PLAN

SCHOOL

1 TEACHING AREA
2 MATERIAL RESOURCE CENTRE
3 SEMINAR
4 MULTI-PURPOSE
5 KINDERGARTEN
6 ADMINISTRATION
7 PRINCIPAL
8 STAFF ROOM
9 CHANGE ROOM
10 INSTRUCTOR
11 HEALTH
12 GYMNASIUM



ALTERNATIVE
CLASSROOMS

CANADIAN JAVELIN LIMITED

JULIAN LAKE NEWFOUNDLAND

SCHOOL
FLOOR PLANS

KILBORN **270 · F4**

How does the physical building help you fulfil your role as principal?

Because the physical environment is nice my staff is happier and my job is easier. The environment is easier to supervise and problems show up more quickly.

I can tune in to what is going on in the school without anyone feeling that big brother is watching.

What are the major differences between the conventional corridor and closed classroom school and the open plan?

The main difference between open plan and the conventional school is the development of attitudes and an increased awareness of other human beings around you. There are fewer problems of discipline because children have an opportunity to opt out of a situation which is creating frustration for them.

Have you any other general comments?

There is only one rule of behaviour: students can talk, move around, or whatever, as long as they don't interfer with other people.

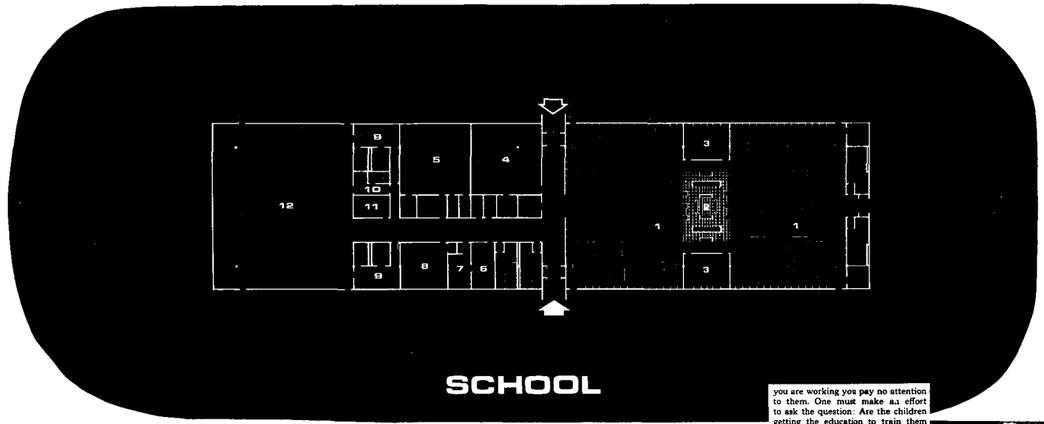
The school stresses the individual, treating students and teachers as human beings.

If a person wishes to work by himself this can be done by merely moving a partition. In other words, it wasn't as traumatic as starting with six teachers in a big room. It gave us a chance to move gradually—we thought this better for the teachers than starting with a large open space and hoping they would adjust.

It does two things very well. First, it's possible to stand at any point in the school and see what's going on in six different spaces—it's easier to grasp the school's general tone. Second, the teachers influence each other. Interesting methods of controlling classes rub off onto each other.

Teachers enjoy the society of adults and find stimulation and moral support in close association with their colleagues. When teachers are visible to one another they communicate easier.

Rapport between teacher and pupil seems better, the atmosphere is more relaxed—but not more disrespectful.



In the presence of other teachers, it is less likely a teacher would physically or verbally hurt a pupil.

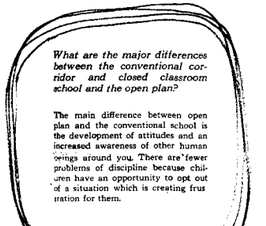
Teachers report that in an open area children appear to be more mature, self-reliant, verbal and articulate. They feel part of the school rather than part of a particular classroom.

How does the physical building help you fulfil your role as teacher?

There is more privacy in having your own offices and if we want to get away for a minute we can leave. We have more teacher contact and are not shut up with the children all day. Open plan allows us to move from one area to another.

The children seem happier and more able to express themselves. It allows us to have not just our own class of 30 children but larger groups of about 70, and the children really work with each other—not just their own classmates.

It creates a modern approach, a better atmosphere for the teachers. The students are more creative.



It gives the children a feeling of freedom, of being able to move without restrictions. There are no doors to be shut — the class is free for them to place themselves under the direction of a teacher whenever they wish to. *The atmosphere is more conducive* to learning.

What are the major differences between the conventional corridor and closed classroom school and the open plan?

The main difference between open plan and the conventional school is the development of attitudes and an increased awareness of other human beings around you. There are fewer problems of discipline because children have an opportunity to opt out of a situation which is creating frustration for them.

OPEN PLAN

It's the queerest system I've ever seen, but my son loves it — so why should I complain?

It may take another couple of generations of school kids to see whether it really works.

Don't ask me. Ask the children.

Newspaper quote: "The idea has caught on, over protests from some parents who find the change from the old system too radical."

What are major differences between the conventional school and open plan?

The biggest difference is that one has to accept an entirely different philosophy of education, and must accept that children can talk to each other when working, that small lapses in discipline considered important a generation ago must be overlooked. One must accept the idea that if three children pass your classroom when you are working you pay no attention to them. One must make an effort to ask the question: Are the children getting the education to train them for this generation? If the answer is yes, one forgets minor details that were once considered so important.

Both conventional school and open plan can use most of the same teaching methods, but in the latter their implementation is easier.

Team teaching can be carried on in a conventional school but there is a psychological hindrance to the ready passage from one group to another. Pupils must physically leave one room, cross a corridor and enter another room. The open space with all the children in one area seems to foster the idea of team teaching and does not have these psychological barriers.

In the traditional classroom the program is interrupted when the teacher is ill—in the open plan other members of the team can carry on.

Are there significant costs differences between open plan and conventional schools?

No. In a conventional school money is spent on corridors, but I don't think there is much difference.

Community programs will change in the future and will make greater demands upon the school space—the open plan can be a greater asset for the service of activities in the school district.

I think flexible space of open plan schools will make the school less likely to become obsolete.

The open plan makes it easier to use the teacher-aide and the experienced teacher-aide technician.

What are the major differences between teaching in a conventional school and in an open plan school?

There is more usable space in the open plan and it offers more variety in the method of teaching.

We can mix with other teachers and there is a greater exchange of ideas than in the conventional classroom.

It allows a more informal atmosphere —more relaxed than the conventional school. In the structured system I rarely deviated from the program but in the open plan I can branch off and pursue any topic.

Carpeting makes the open plan much quieter and you can work with groups of say 5 or 10 children. There also seems to be more wall space for pictures, etc. In the conventional school we took half the paint off the classroom wall when we took pictures down.

Children learn to isolate themselves just as in an office.

It's more difficult in the open to chastise a child.

In the conventional school I was in last year we had about 38 rooms and the principal rarely visited the far end of the school.

In a conventional school I had the very conscious feeling of entering and leaving rooms and being out in the hall. But once I am in this school I am in a *complete* school and the resource center in which I teach is just a part of it.

For inexperienced and experienced teachers, the open plan provides many opportunities for on-the-job training. New teachers can gain control, teaching and organizational techniques.

What do you like about this school?

When I need something I don't have to knock on doors.

People know who you are immediately.

You can go to other classrooms and listen.

Has kinda more to it, more teachers.

I like the covered play area.

Here we have much more freedom.

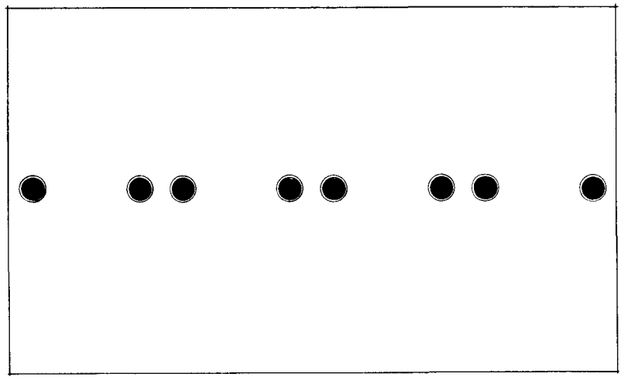
We have lots of free room and can walk around. The desks are more spacious and we have more fun with the teacher.

CANADIAN JAVELIN LIMITED

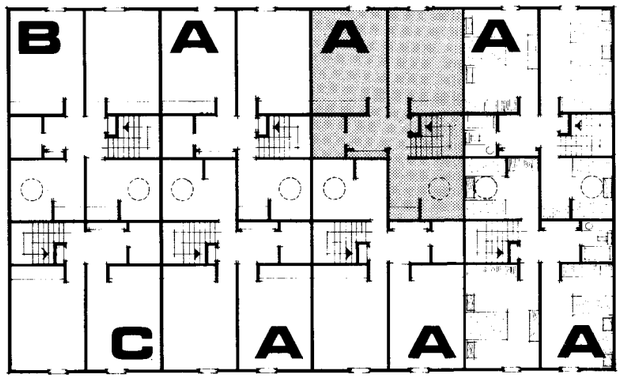
JULIAN LAKE NEWFOUNDLAND

SCHOOL COMMENTS ON THE OPEN PLAN

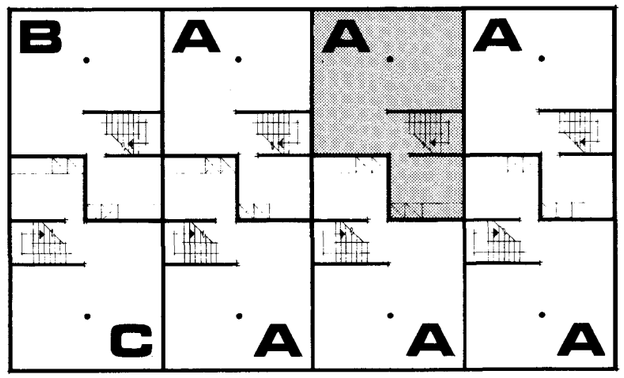
KILBORN 270 · F5



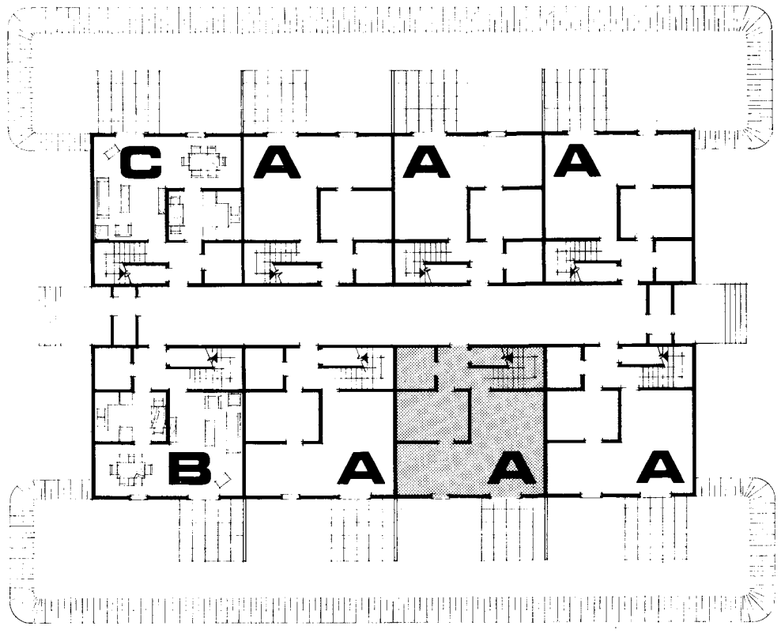
ROOF PLAN



SECOND FLOOR PLAN



BASEMENT FLOOR PLAN



FIRST FLOOR PLAN

0 10 20 30 40

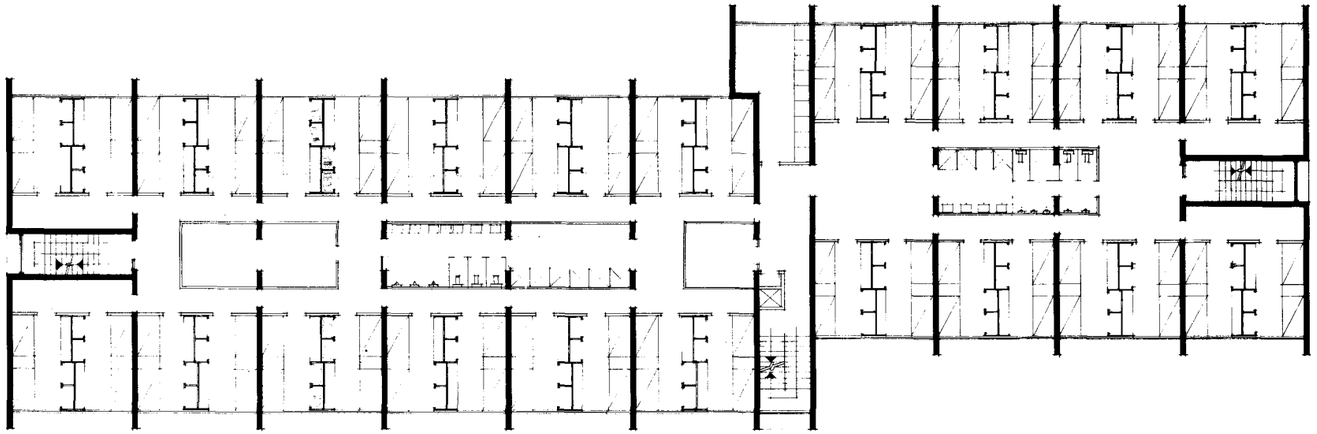
A	3 BEDROOM	1272 ø	
B	4 BEDROOM	1392 ø	
C	2 BEDROOM	1152 ø	

CANADIAN JAVELIN LIMITED

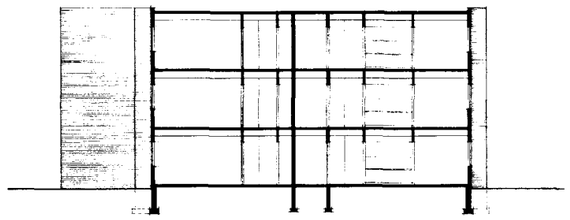
JULIAN LAKE NEWFOUNDLAND

TOWNHOUSES
FLOOR PLANS

KILBORN **270 · F6**

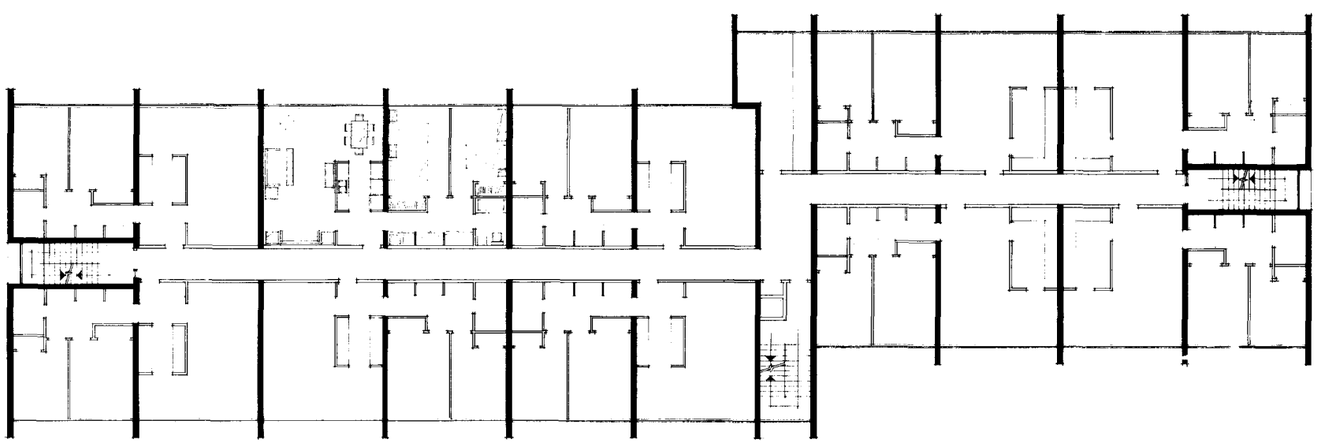


TYPICAL FLOOR PLAN
STRUCTURAL FRAME
LAYOUT FOR CAMP
(240 MEN PER BUILDING)



TYPICAL SECTION

0 10 20 30 40



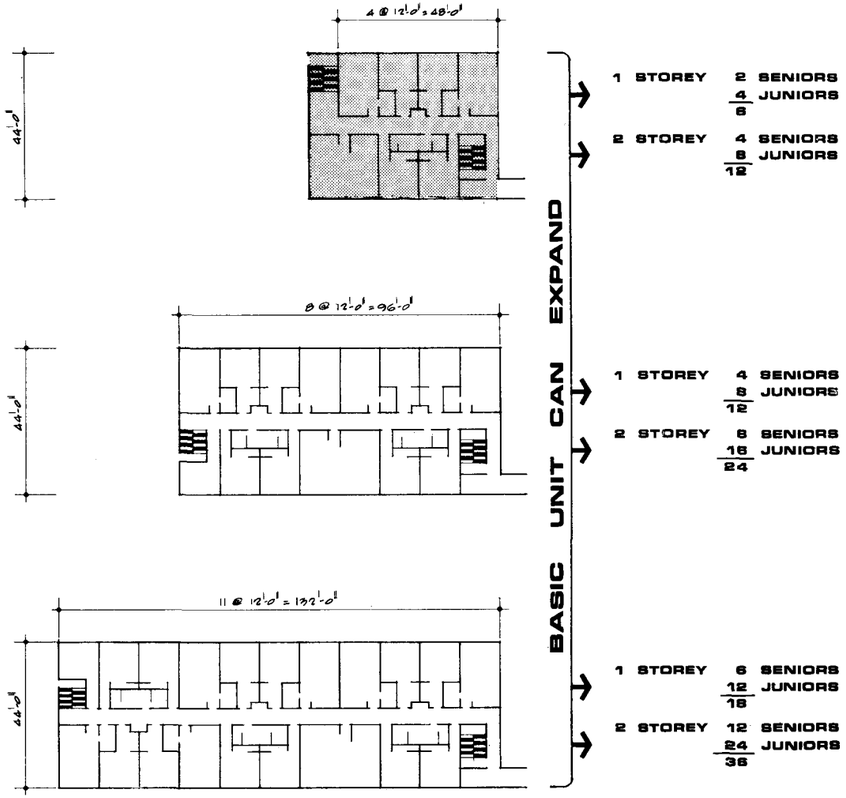
TYPICAL FLOOR PLAN
STRUCTURAL FRAME
LAYOUT FOR APARTMENTS
(28 TWO BEDROOM UNITS PER BUILDING)

CANADIAN JAVELIN LIMITED

JULIAN LAKE NEWFOUNDLAND

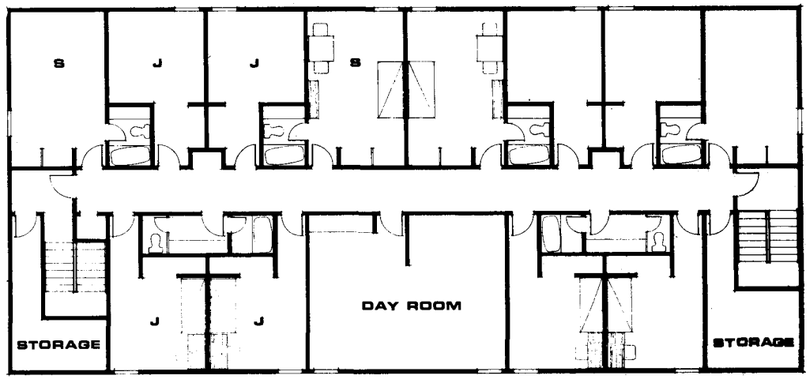
APARTMENTS
FLOOR PLANS & SECTIONS

KILBORN **270 · F7**

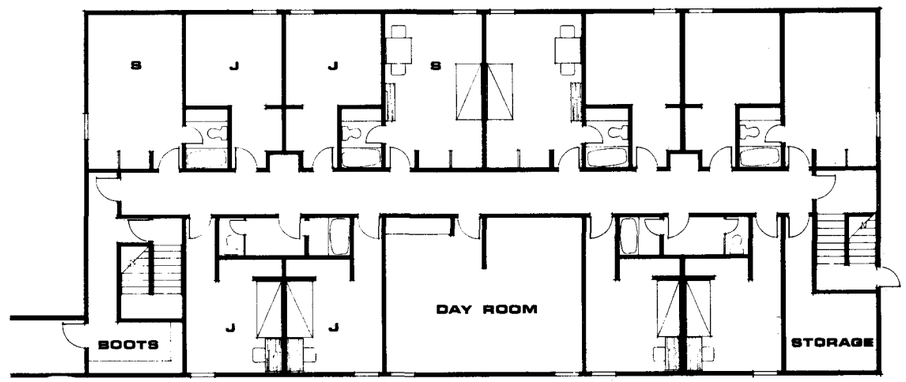


STAFF HOUSES

STAFF HOUSE



SECOND FLOOR



FIRST FLOOR

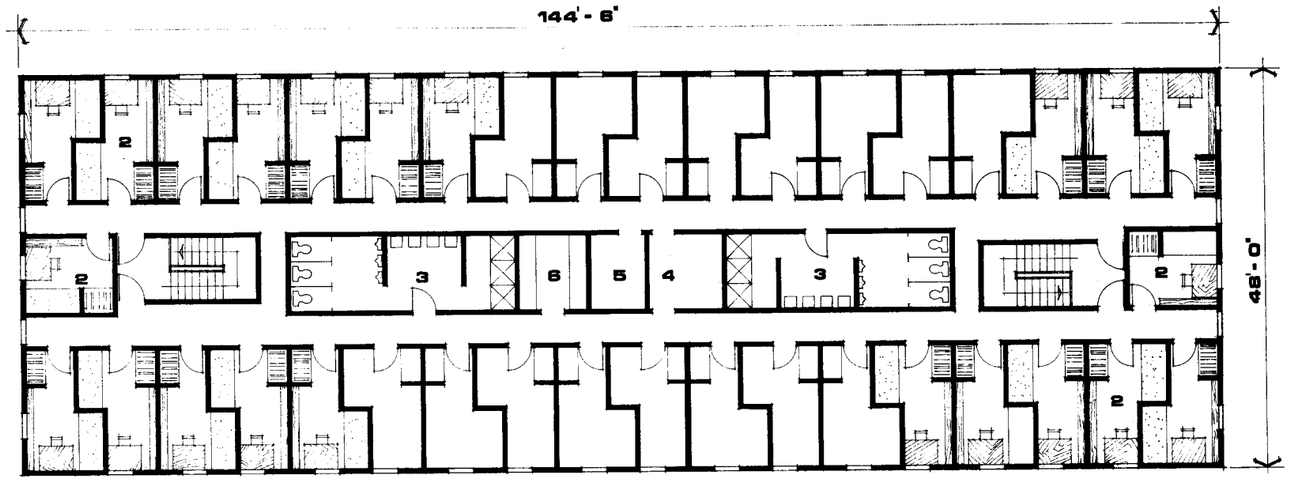
0 5 10 20 30 40

CANADIAN JAVELIN LIMITED

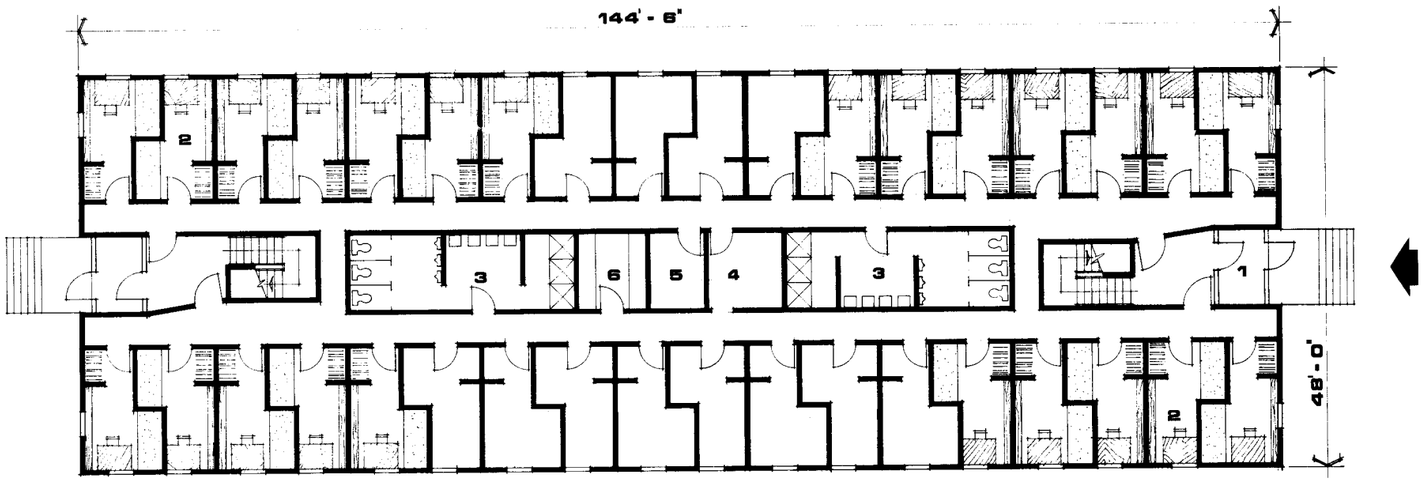
JULIAN LAKE NEWFOUNDLAND

STAFFHOUSE
FLOOR PLANS

KILBORN **270 · F8**



SECOND FLOOR



GROUND FLOOR

0 10 20 30

BUNKHOUSE
74 UNITS

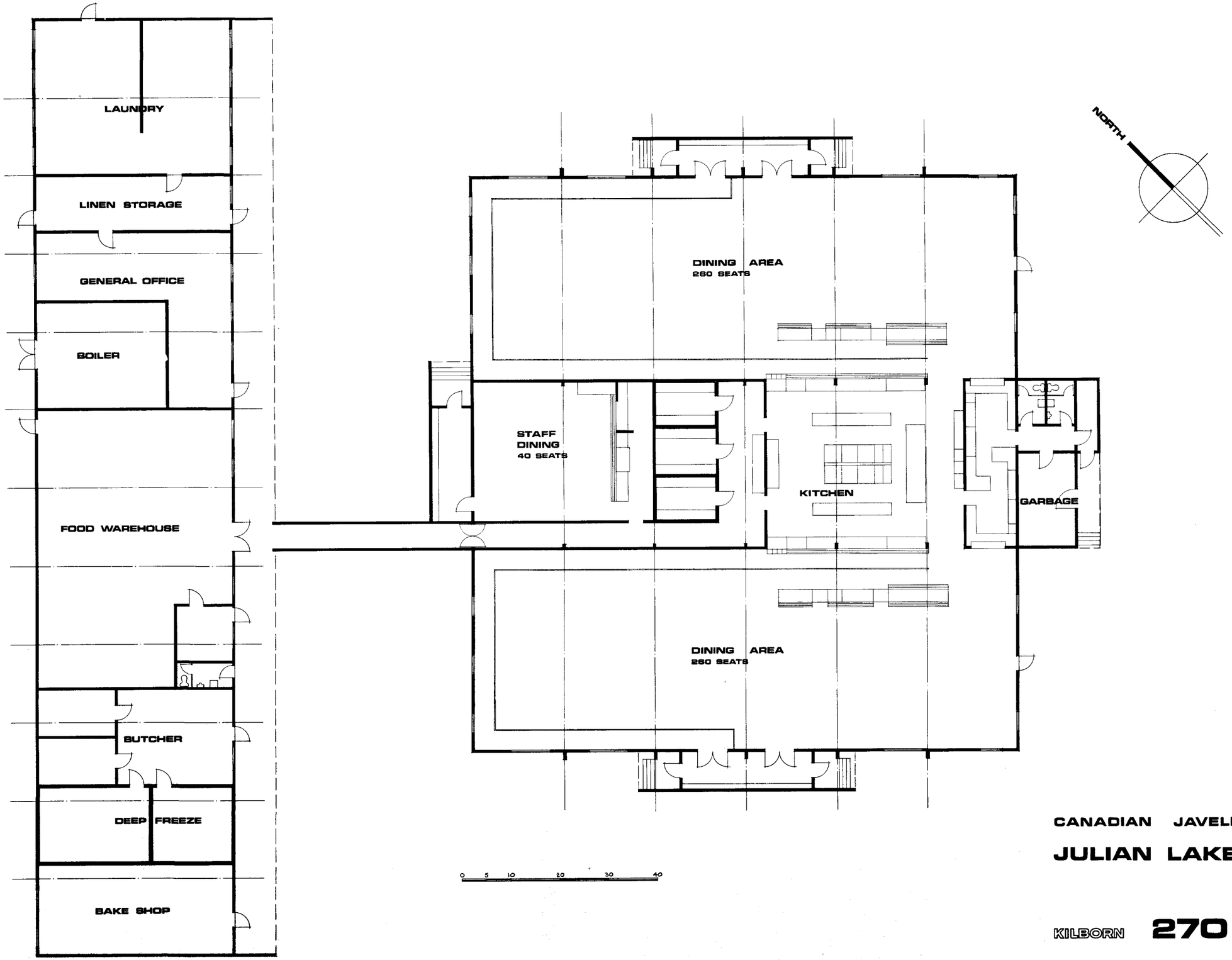
1 VESTIBULE
2 BEDROOM
3 WASHROOM
4 LAUNDRY
5 HEATER
6 STORAGE

CANADIAN JAVELIN LIMITED

JULIAN LAKE NEWFOUNDLAND

BUNKHOUSES
FLOOR PLANS

KILBORN 270 · F9

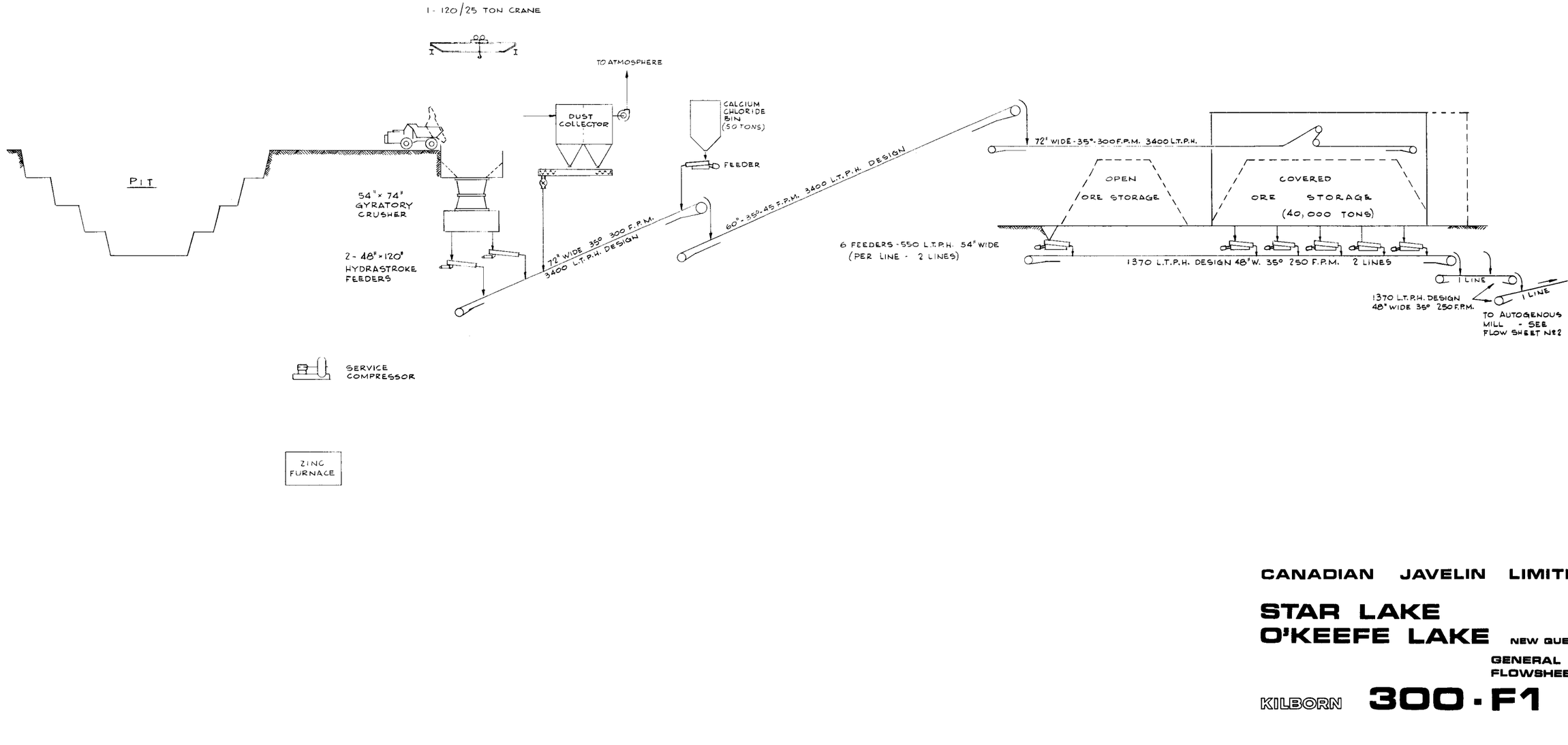


CANADIAN JAVELIN LIMITED

JULIAN LAKE NEWFOUNDLAND

CAFETERIA
FLOOR PLAN

KILBORN **270 · F10**

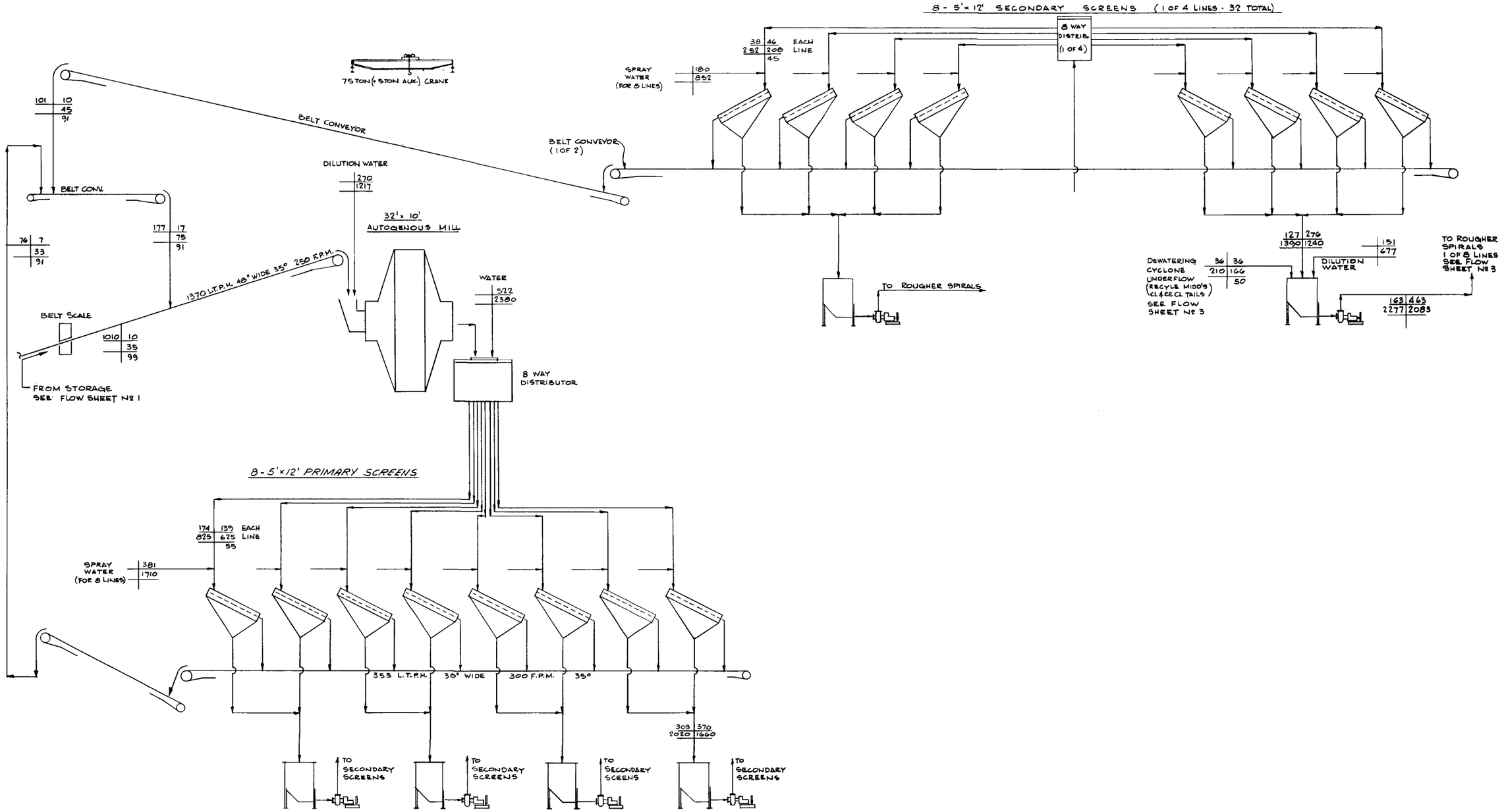


CANADIAN JAVELIN LIMITED

STAR LAKE
O'KEEFE LAKE NEW QUEBEC

GENERAL FLOWSHEET 1

KILBORN **300 - F1**



L.T.P.H. SOLIDS	L.T.P.H. WATER
U.S.G.P.M. SLURRY	U.S.G.P.M. WATER
	% SOLIDS

CANADIAN JAVELIN LIMITED

STAR LAKE
O'KEEFE LAKE NEW QUEBEC

GENENAL FLOWSHEET 2

KILBORN **300 - F2**

42 × 2 WAY DISTRIBUTION

167 | 720 WASH WATER

42 ROUGHER SPIRALS

42 ROUGHER SPIRALS

ROUGHER CONCENTRATE

EXCESS WASH WATER

ROUGHER MIDD'S

ROUGHER TAILS

36 | 160

76 | 63
370 | 280
55

DILUTION WATER
208
931

11 | 11
64 | 51
50

14 | 331
1500 | 1480
4.1

12 | 271
1230 | 1220
4.1

76 | 522
2430 | 2340
12.6

TO TAILS DISPOSAL
(1 OF 8 LINES)
SEE FLOW SHEET Nº5

FROM ROUGHER SPIRAL FEED PUMP
(1 OF 8 LINES)
SEE FLOW SHEET No. 2

CLEANER SPIRAL FEED PUMP
(1 OF 8 LINES)

28 × 2 WAY DISTRIBUTION

WASH WATER
87
394

28 CLEANER SPIRALS

28 CLEANER SPIRALS

EXCESS WASH WATER

CLEANER CONCENTRATE

CLEANER TAILS

TOTAL FOR BOTH LINES
12
54

62 | 51
303 | 229
55

TOTAL FOR BOTH LINES

167
DISTRIBUTION WATER
840

87 WASH WATER
394

28 RE-CLEANER SPIRALS

28 RE-CLEANER SPIRALS

RECLEANER TAILS

FINAL CONCENTRATE

EXCESS WASH WATER

76 | 306
1460 | 1375
20

18
64

TO RECLAIM WATER SURGE TANK
(1 OF 8 LINES)
SEE FLOW SHEET Nº5

47 | 47
287 | 227
50

FINAL CONCENTRATE
(1 OF 8 LINES)
SEE FLOW SHEET Nº4

37 | 613
2800 | 2750
5.7

MANIFOLD

3-D 20 LB RECLAIM DEWATERING CYCLONES
(1 OF 8 LINES)

TO RECLAIM WATER SURGE TANK
(1 OF 8 LINES)
SEE FLOW SHEET Nº 5

576
2590

33 | 33
210 | 166
50

TO ROUGHER SPIRAL FEED PUMP BOX
(1 OF 8 LINES)
SEE FLOW SHEET Nº 2

L.T.P.H. SOLIDS	L.T.P.H. WATER
U.S.G.P.M. SLURRY	U.S.G.P.M. WATER
	% SOLIDS

CANADIAN JAVELIN LIMITED

STAR LAKE
O'KEEFE LAKE NEW QUEBEC

GENERAL FLOWSHEET 3

KILBORN **300 · F3**

CONCENTRATE DEWATERING

12 - D 10 B CYCLONES

FINAL CONCENTRATE (8 LINES) SEE FLOWSHEET NR. 3

2 WAY DISTRIBUTION BOX

PUMP BOX

404 | 404
2290 | 1810
50

394 | 169
1090 | 750
70

3 WAY DISTRIBUTOR

№2 SURGE TANK

AGITATED SURGE TANK (1 OF 2)

REGRIND FEED PUMP

10 | 235
1080 | 1060
4

CONCENTRATE DEWATERING THICKENER 1 ONLY 55' DIA

461
399

FILTRATE

TO RECLAIM WATER SURGE TANK SEE FLOWSHEET NR 5

2 WAY DISTRIBUTOR (1 ONLY)

70

FROM №2 SURGE TANK

404 | 173
1120 | 777

3 WAY DISTRIBUTOR

№2 MILL

№3 MILL

FEED BOX (1 OF 3)

75 TON (45 TON AUX) CRANE

D.S.M. SCREENS (ASSN OF 3)

REPULP LAUNDER

WATER

135 | 58
373 | 256

D.S.M. SCREENS (ASSN OF 3)

OVERSIZE LAUNDER

№1 MILL

REGRIND MILL 16'-6" Φ x 21' (1 OF 3)

(1 OF 3)

WATER

130' DIA THICKENER (1 ONLY)

TO RECLAIM WATER SURGE TANK SEE FLOWSHEET NR 5

2 - D 20 B CYCLONES (1 OF 3)

CYCLONE U/F MILL #2

CYCLONE U/F MILL #3

2 WAY DISTRIBUTOR (1 ONLY)

TO PIPELINE SYSTEM

AGITATED SURGE TANK (1 OF 2) (1 HR RETENTION)

MOISTURE TRAP

20' HORIZONTAL FILTER (1 ONLY)

RECEIVER

SEAL TANK

VACUUM PUMP

TRIPPER

10,000 TON CONCENTRATE STORAGE BUILDING

6 - 303 L.T.P.H. FEEDERS

TO THICKENER

606 L.T.P.H.

BELT SCALE

WATER
173
777

16'Φ x 16' REPULP TANK

404 | 173
1120 | 777

200 TON BALL STORAGE

BUCKET ELEVATOR

3 - 10 TON FEED HOPPERS AND BALL FEEDERS

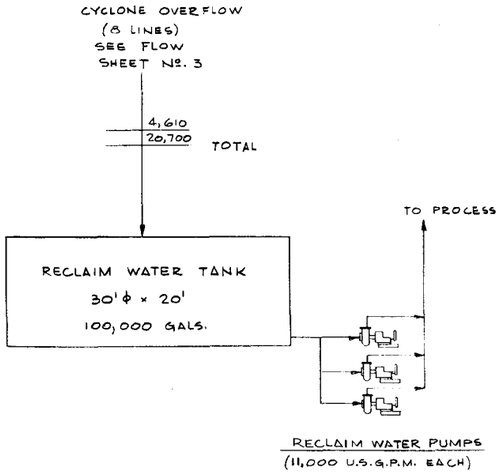
L.T.P.H. SOLIDS	L.T.P.H. WATER
U.S.G.P.M. SLURRY	U.S.G.P.M. WATER
	% SOLIDS

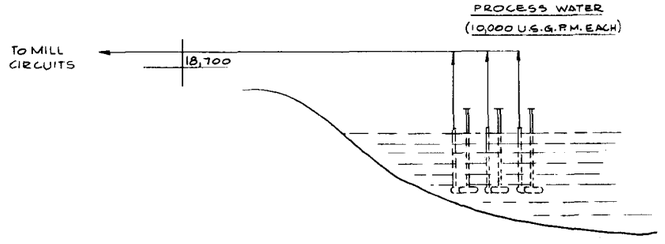
CANADIAN JAVELIN LIMITED

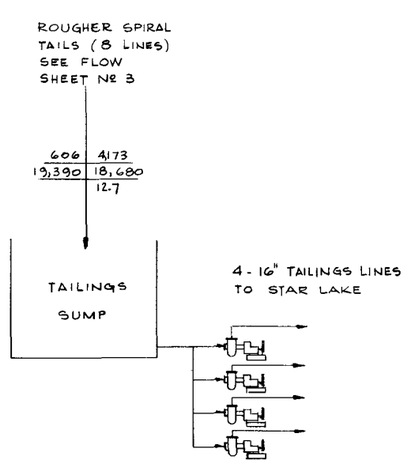
STAR LAKE
O'KEEFE LAKE NEW QUEBEC

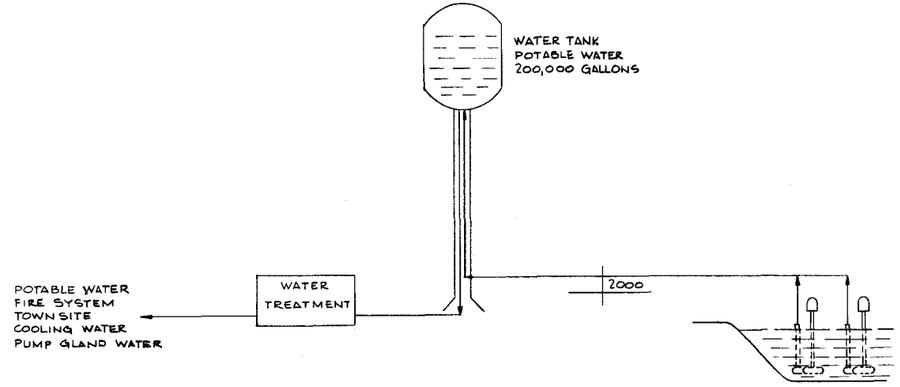
GENERAL FLOWSHEET 4

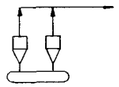
KILBORN **300 - F4**











2 CYCLONE BUGGIES
FOR DIKE CONSTRUCTION

L.T.P.H. SOLIDS	L.T.P.H. WATER
U.S.G.P.M. SLURRY	U.S.G.P.M. WATER
	% SOLIDS

CANADIAN JAVELIN LIMITED

STAR LAKE
O'KEEFE LAKE NEW QUEBEC

GENERAL FLOWSHEET 5

KILBORN **300 · F5**

STAR LAKE

TAILINGS PUMPHOUSE

TAILINGS PIPELINE

2250

2150

2250

CRUSHER HOUSE

ORE STORAGE

CONCENTRATOR BUILDING

2150

OFFICES & ADMINISTRATION

POWERHOUSE

OIL STORAGE TANKS

PROCESS WATER PUMPHOUSE

TOWNSITE

POTABLE WATER PUMPHOUSE

TUTTLE LAKE

2250

O' KEEFE LAKE

100 400 800
0 200 600 1000

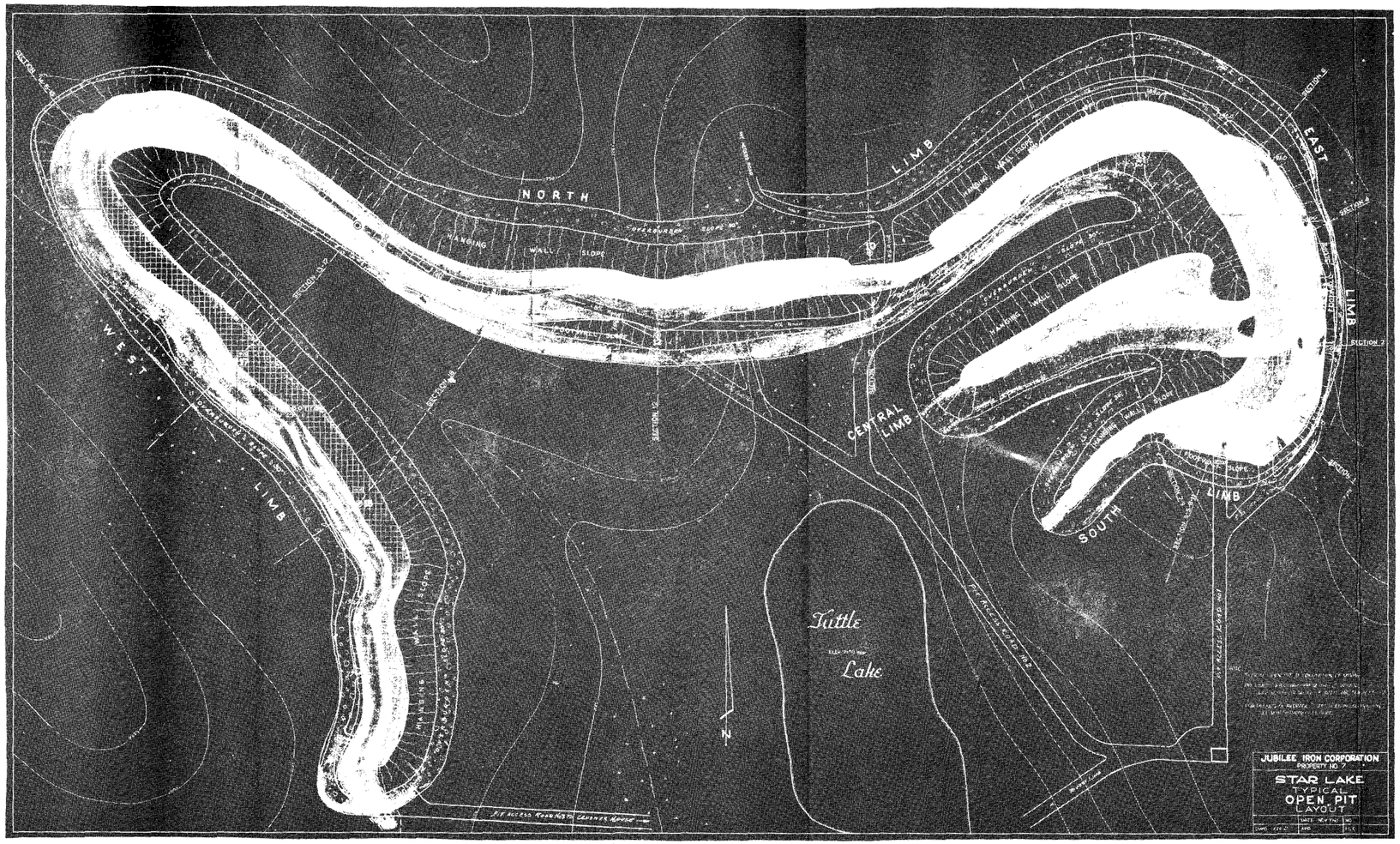
CANADIAN JAVELIN LIMITED

STAR LAKE
O'KEEFE LAKE

NEW QUEBEC

GENERAL AREA PLAN

KILBORN **300 - F6**



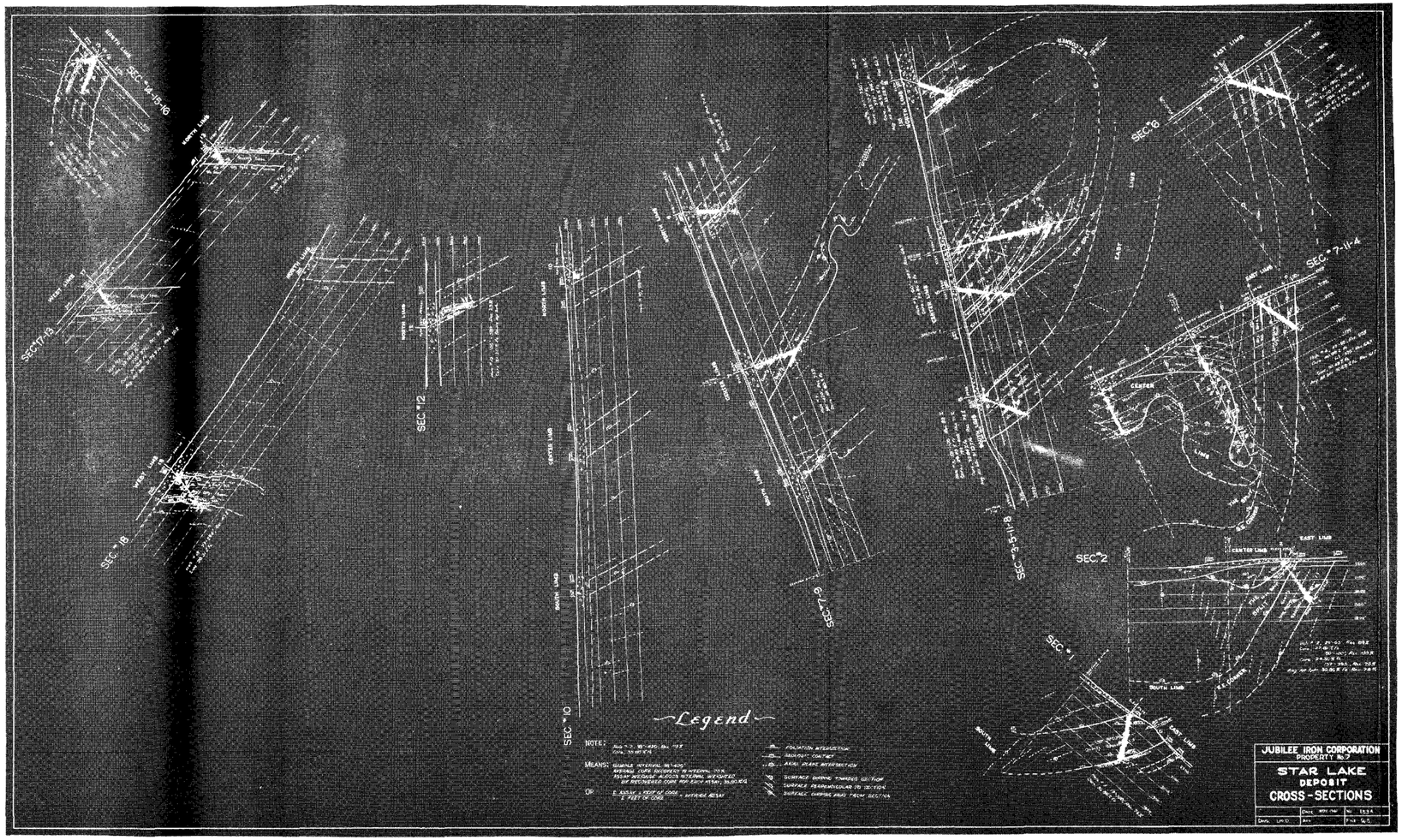
CANADIAN JAVELIN LIMITED

STAR LAKE
O'KEEFE LAKE

NEW QUEBEC

MINE
SITE PLAN

KILBORN **320 - F1**



0 300
100 500

CANADIAN JAVELIN LIMITED

STAR LAKE
O'KEEFE LAKE NEW QUEBEC

MINE SECTIONS

KILBORN **320 · F2**

INCOMING 13.8 KV. LINE

13.8 KV. BUS

O/H LINE

TOWNSITE DISTRIBUTION

REBIND MILLS

STANDBY DIESEL GENERATOR

AUTOGENOUS MILL No 1

REGRIND MILL

M.C.C.'S.

TAILINGS PUMPHOUSE

M.C.C. CRUSHER

JAW CRUSHER

WATER PUMPS AT LAKE

SERVICE BUILDING

M.C.C. LAKE (PORTABLE WATER PUMPS)

PIT LIGHTING UNITS

PORTABLE LOAD CENTRE 600 V. LOADS

SHOVEL 4.16 KV.

TRAILING CABLE

LEGEND OF SYMBOLS

- OCB - 2000 AMP - 2000 MVA. INTERRUPTING CAP.
- AIR BREAK SWITCH
- DISCONNECT SWITCH
- LOAD INTERRUPTOR SWITCH
- LIGHTNING ARRESTOR - THYRITE TYPE
- H.V. DRAWOUT AIR BREAK CIRCUIT BREAKER 1200 A. 500 MVA INTERRUPTIVE CAPACITY
- 600 V. DRAWOUT AIR BREAK CIRCUIT BREAKER 1600 A. 50,000A. INTERRUPTING CAPACITY
- POWER TRANSFORMER
- POTENTIAL TRANSFORMER
- CURRENT TRANSFORMER
- 4-16 KV. MOTOR STARTER
- FUSE
- RESISTOR
- CAPACITOR

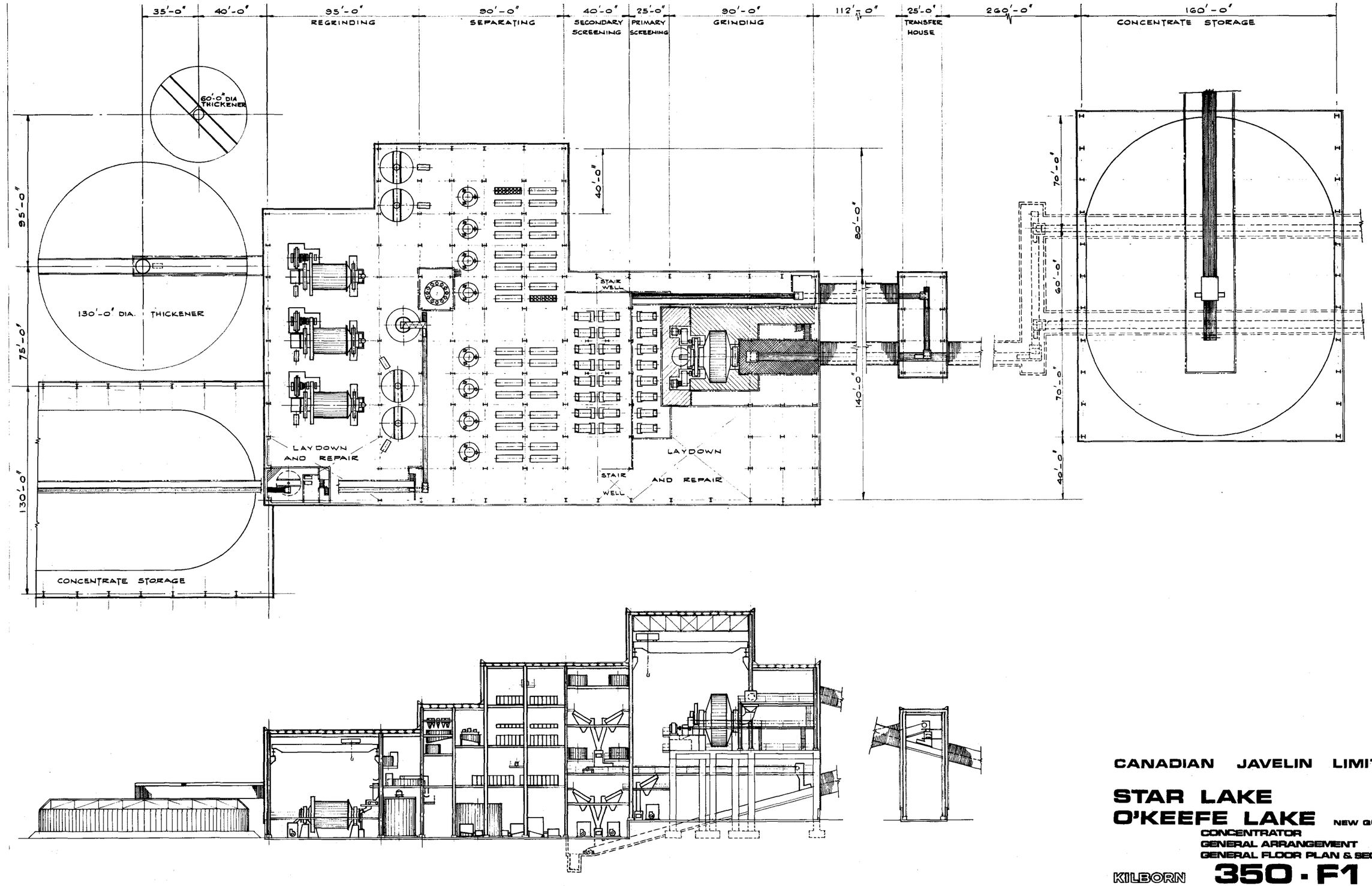
CANADIAN JAVELIN LIMITED

STAR LAKE
O'KEEFE LAKE NEW QUEBEC

ELECTRICAL DISTRIBUTION
MAIN POWER DISTRIBUTION
SINGLE LINE DIAGRAM

KILBORN

410 - F1



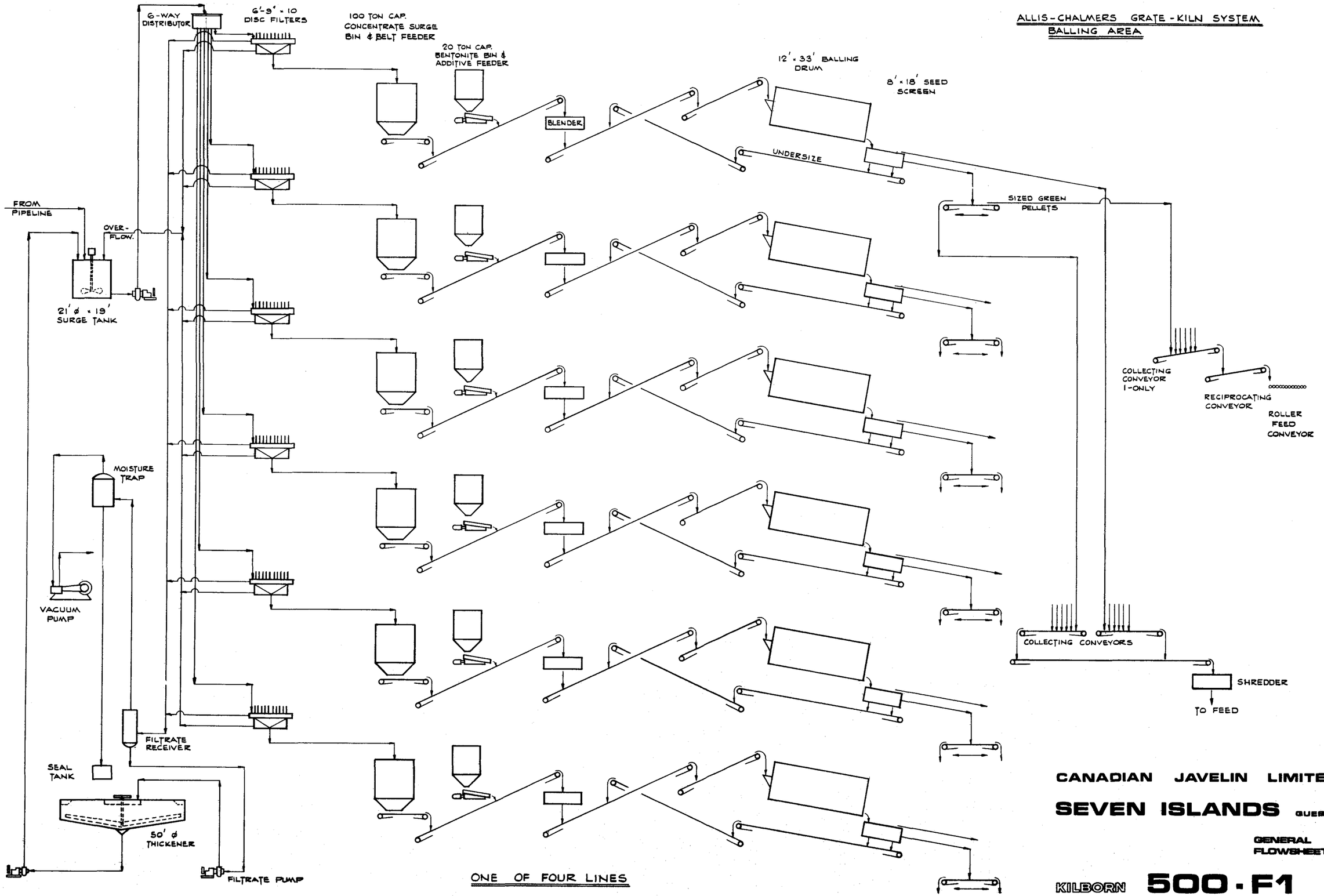
CANADIAN JAVELIN LIMITED

STAR LAKE
O'KEEFE LAKE NEW QUEBEC

CONCENTRATOR
GENERAL ARRANGEMENT
GENERAL FLOOR PLAN & SECTION

KILBORN **350 · F1**

ALLIS-CHALMERS GRATE-KILN SYSTEM
BALLING AREA



ONE OF FOUR LINES

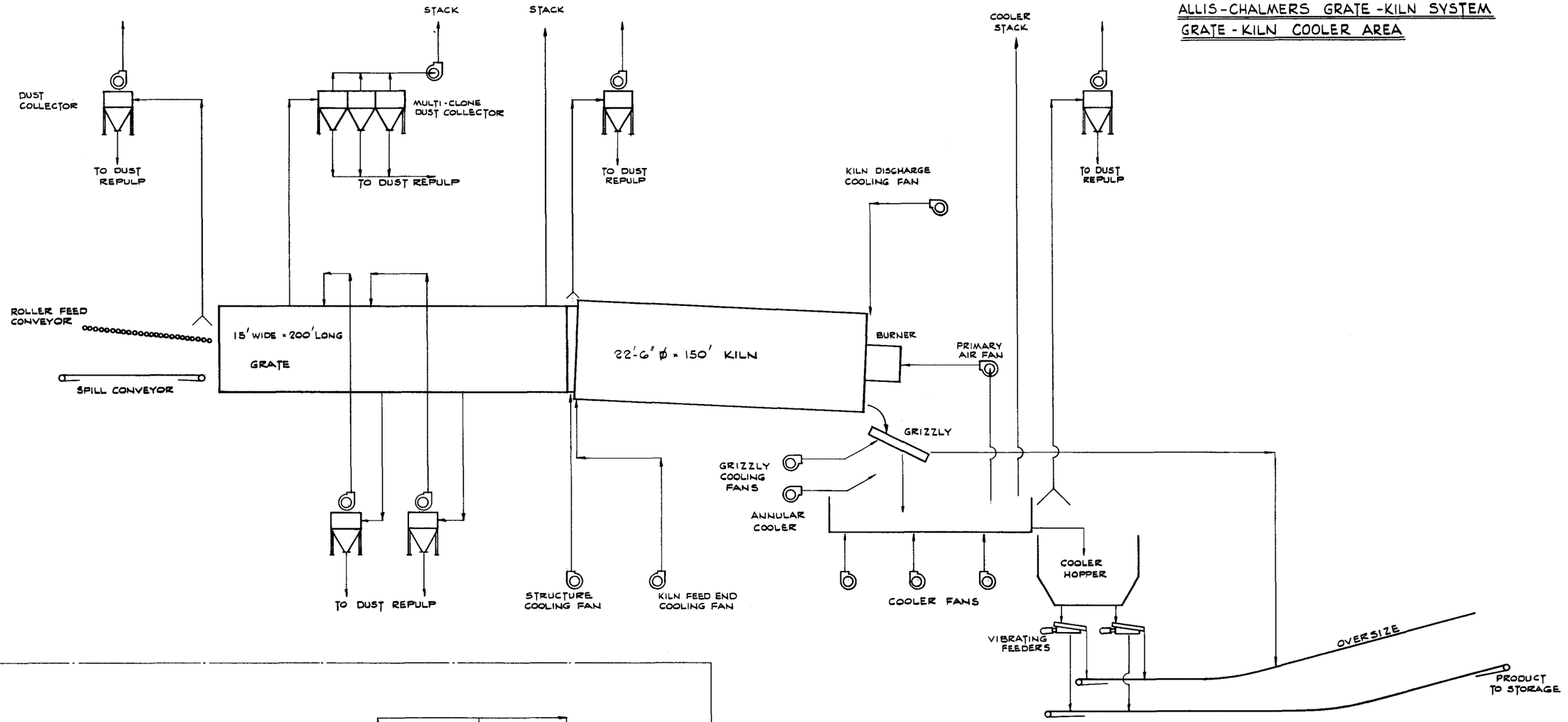
CANADIAN JAVELIN LIMITED

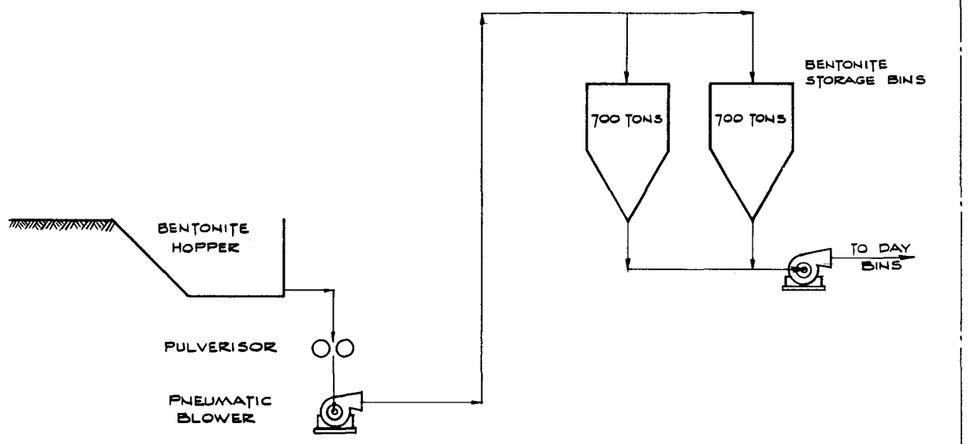
SEVEN ISLANDS QUEBEC

GENERAL FLOWSHEET 1

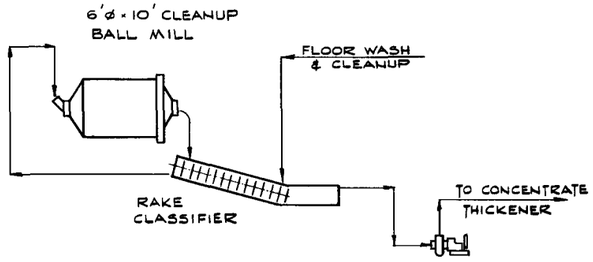
KILBORN **500-F1**

ALLIS-CHALMERS GRATE-KILN SYSTEM
GRATE-KILN COOLER AREA





ONE LINE ONLY



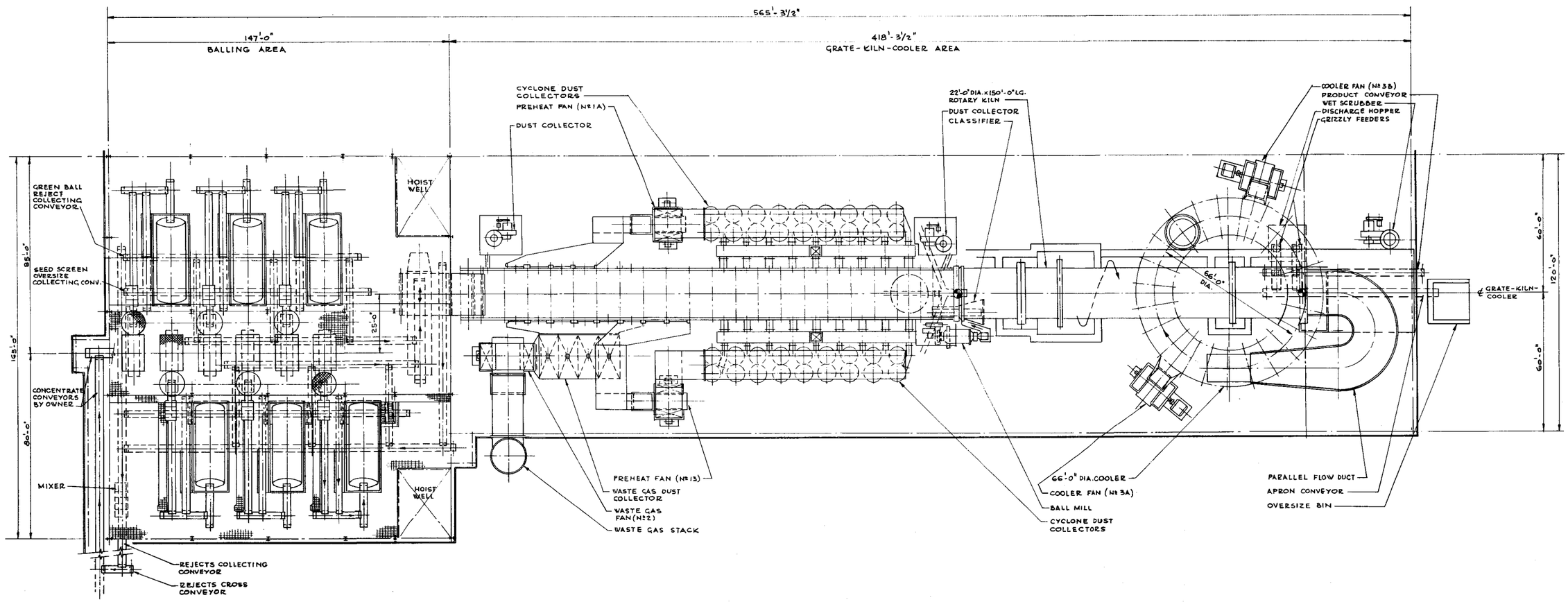
ONE OF FOUR LINES

CANADIAN JAVELIN LIMITED

SEVEN ISLANDS QUEBEC

GENERAL FLOWSHEET 2

KILBORN **500 · F2**

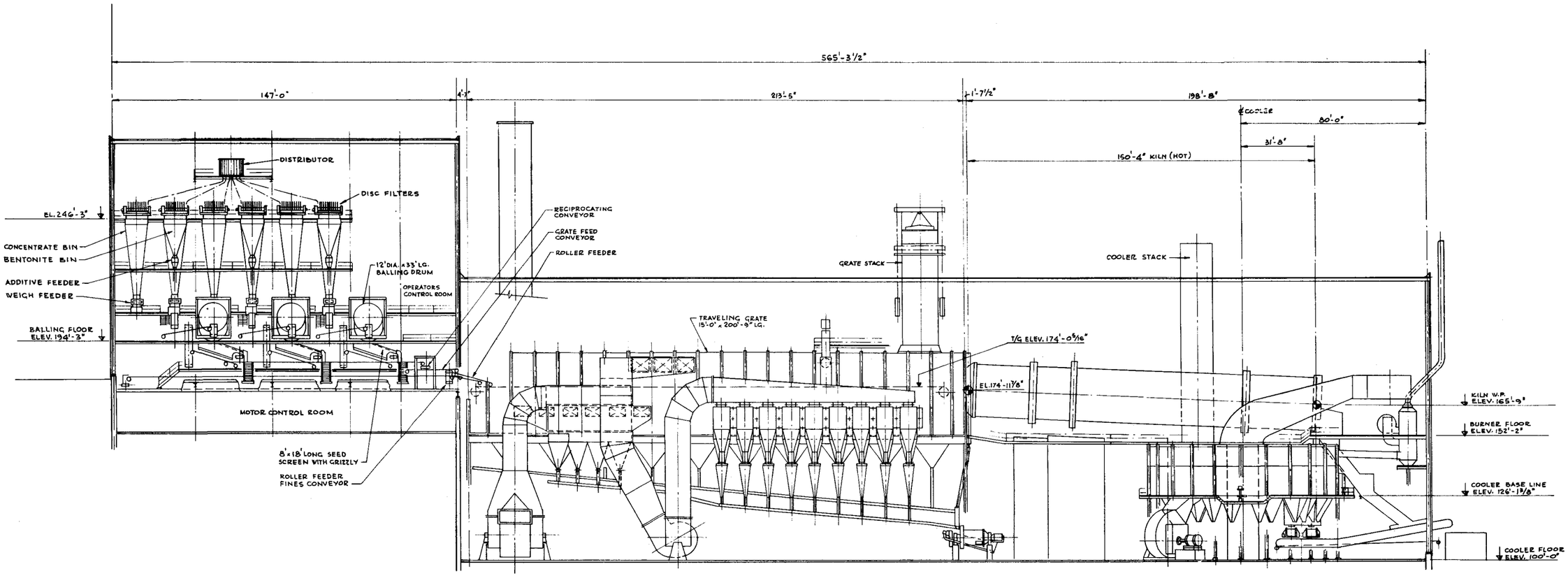


CANADIAN JAVELIN LIMITED

SEVEN ISLANDS QUEBEC

PELLETIZING PLANT
GENERAL ARRANGEMENT
PLAN

KILBORN **520 · F1**



CANADIAN JAVELIN LIMITED

SEVEN ISLANDS QUEBEC

PELLETIZING PLANT
GENERAL ARRANGEMENT
SECTION

KILBORN **520 · F2**