SIMONS

APPENDIX #3

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Consulting Engineers

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007355

September 21, 1990

B.C. Museum of Mining
P. O. Box 188
Britannia Beach, B.C.
V0N 1J0

Attn: Ms. Marilyn Mullan

Dear Sirs:

Subject: P.4287A - B.C. Museum of Mining
Concentrator Mill Building
Capital Cost Estimate Update

According to your directions, we have reviewed our 1982 report on the study of the Concentrator Mill Building at Britannia Beach. You asked whether the recommendation and costs outlined in this paper would be valid today.

We carried out a second inspection and determined that some further deterioration had occurred over the eight-year interim. This was of a minor nature such as further corrosion of column baseplates, more steel discoloration, (rusting) and more sheets of loose cladding.

Recently, much of the debris on the floors had been removed so that more concrete was visible. Although a detailed inspection of the concrete was not carried out, it was observed that, in general, the condition of this material can only be assessed after consultation with a materials testing firm.

cont'd. . . 2/

The order of magnitude cost estimate has been updated to reflect 1990 prices of materials and labor. We have only adjusted the second alternative (20-year minimum) as it was felt that the first alternative would no longer apply. You will notice that the construction items may be worded differently.

We sincerely hope that this information will assist you and we wish you every success on the restoration of this important landmark.

Yours very truly,

H. A. SIMONS LTD.

J. Idiens, P.Eng.

JI:ast
encl.

cc. T. Mills - c/o Parks Canada
C. Hewitt - c/o Heritage Conservation Br.

SIMONS

Construction Item	Second Alternative (20-yr Minimum)
Removal of existing cladding and windows	$ 178,000
Remvoal of existing roofing and gutters	106,000
Strengthening, repair and replacement of steel	349,000
Steel cleaning and painting	540,000
Roofing, flashings, cutters and R.W.L.	604,000
Insulated steel cladding	783,000
Thermal windows	340,000
Electrical lighting and plugs	600,000
TOTAL:	**$3,500,0000**

Province of British Columbia

Ministry of Provincial Secretary and Government Services

Heritage Conservation Branch
Parliament Buildings
Victoria
British Columbia
V8V 1X4

January 15, 1982

Mrs. Marilyn Mullan
Curator and
Secretary, Land Management Commmittee
B.C. Museum of Mining
1440 Sandhurst Place
West Vancouver, B.C.
V7S 2P3

Dear Mrs. Mullan:

Many thanks for your letter of January 7th, I am so glad the Directors have decided to zero in on the Mill Restoration project at this stage.

I confirm that the Heritage Conservation Branch will enter into a contract with an engineering consultant of your choice to study the structural stability of the building and estimate rough costs for stabilizing the structure and restoring the exterior envelope.

Our contract with the consultant should not exceed $5,000 and preferably his work should be completed by March 31st. so that we can settle his invoice before the end of the fiscal year which occurs on that date.

Based on his estimate you should be able to make an application to the B.C. Heritage Trust for funding assistance. You have the application form and I believe I sent you a copy of the Trust's programmes and guidelines from which you will see that a Trust grant is 50% of the exterior restoration and stabilization up to a maximum of $50,000, depending of course on the Director's view of the heritage significance. I'm sure you will be able to convince them!

Mr. B. Huot would have been dealing with you if your application for funds had been made under the Heritage area revitalization programme but in the case of one building, please continue to contact me.

Yours very truly,

for. Ralph Gillett
Senior Architect

RG/pmc

REPORT ON STUDY OF THE

EXISTING CONCENTRATOR MILL BUILDING

AT BRITANNIA BEACH, B.C.

PREPARED BY:

JOHN IDIENS, P.ENG.

JUNE 15, 1982

H. A. SIMONS (INTERNATIONAL) LTD.

P.6716 A

June 18, 1982

STUDY OF THE EXISTING CONCENTRATOR MILL BUILDING AT BRITANNIA BEACH, BC

TABLE OF CONTENTS

I. SCOPE AND TERMS OF REFERENCE

The purpose of this paper is to report on a study of an existing concentrator mill building to determine if it complies with current building codes for re-use as a housing for museum exhibits. The adequacy of the structure under wind, seismic and snow loading was analyzed and any necessary work required to strengthen the building is discussed. The condition of the concrete, including foundations, is briefly covered in this report. Cladding, roofing and windows are approached from two points of view. Firstly, the general condition of the building envelope in its present state is examined with respect to determining the minimum work necessary that would be required for reasons of safety and function. Secondly, the replacement of the building envelope is presented as an alternative solution. The minimum electrical requirements such as lighting and receptacles are included in the study. The condition and repair work required for the railway trestle are mentioned, because they tie into the building at the rear. Finally, two "order of magnitude" capital cost estimates are presented. The first describes the work required to provide a short-term solution, and the second outlines the work that would probably be necessary for a long-term solution.

II. DESCRIPTION OF BUILDING

The building, constructed in 1922, is situated at Britannia Beach, about forty miles north of Vancouver on the east side of Howe Sound. It measures 209 feet wide by 271 feet deep. Even though the roof appears to be very high, it is only 50 to 70 feet above the ground. Specifically, the roof consists of multiple lean-tos, each one supported by its neighbour on the uphill side. The last lean-to is tied to a braced frame at the top. In the other direction, the structure is braced at every column line. The orientation is in a northwest - southeast direction, such that the front wall of the building faces northwest.

The timber roof is supported by a structural steel framed system consisting of purlins, trusses and columns. The galvanized steel cladding is attached to steel girts, which in turn are attached to wind posts and columns. Wood sash windows are located on the north, east and west sides; however, the windows on the east side have been covered with cladding. The roofing membrane consists of asphalt shingles on every level, except the third and top level which are metal clad.

At the rear and top of the building are two railway trestles which were used to carry ore cars from the mine to the mill. The trestles consist of braced steel bents on top of which are placed timber planking and railway ties.

Miscellaneous steel platforms, conveyors, walkways, stairs and piping are situated throughout the interior of the structure. In addition, the large steel binsand tanks used in the mineral processing system still remain on the higher levels. Two overhead cranes, several monorails and an inclined tram railway are located at various locations in the building. Although some old mining equipment still remains, most of it was removed at the time the mining operation closed down in 1974.

... 2/

III. VISUAL OBSERVATION

A) Structural Steel

The steel purlins, trusses and roof bracing are in fair to good condition. However, there appears to be very little paint left on any of the members in the building. Most surfaces are covered with a thin layer of mill scale, whereas in a few areas a thicker layer of mill scale and some rusting are present. The presence of mill scale and rusting become more apparent as one proceeds from roof to ground. The only place where excessive corrosion has taken place is at the lower 3 to 5 feet of columns, most of which are located on the lower levels. (See figure 1)

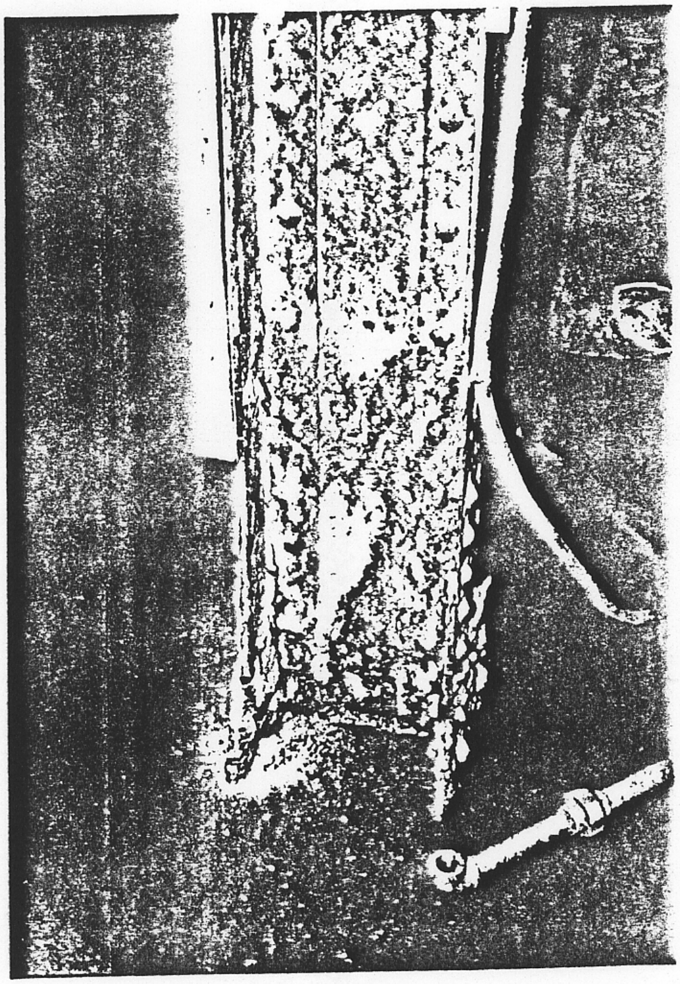

FIGURE 1

III. VISUAL OBSERVATION (cont'd)

A) Structural Steel (cont'd)

Several panels of cross bracing have been removed from the column lines. Some web members have been removed from the vertical trusses employed to stiffen the structure each side of the crane bays (see figure 2).
On the front wall three bays of wall girts have been removed in order to provide access to a building addition on the north side.

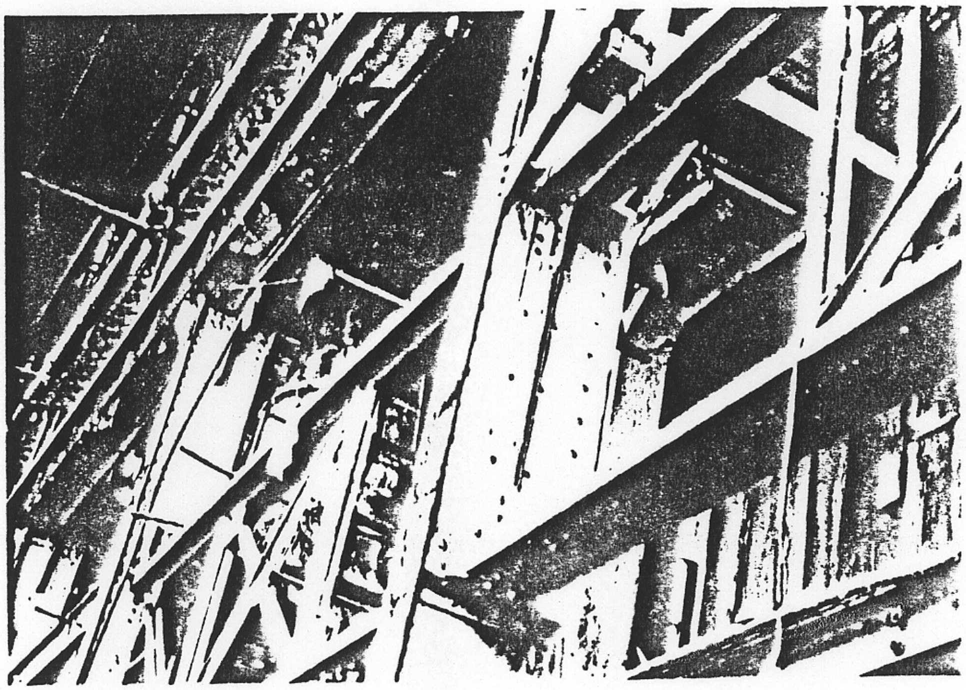

FIGURE 2

It was observed that many girts are sagging, particularly lower down on the walls. Moreover, no sag rods were in evidence on any of the walls or roofs in the building. In spite of the absence of sag rods under the roof, all the purlins appeared to be straight and normal to the roof slope.
At least one lower chord of a roof truss and one bracing strut were bent. One column had its flanges badly crimped when a cable was wrapped around it and tightened.

III. VISUAL OBSERVATION (cont'd)

B) Timber Deck and Roofing

The 2" timber decking is generally in good condition. (See figure 3) Even though certain areas were wet from the roof leaking above, no sign of significant deterioration of the wood was present. The deck is badly discoloured in certain areas, probably due to action of chemicals emitted during the mineral processing. The asphalt shingles are approximately ten years old. No close examination was made owing to the difficulty of access to the roof; however, it is clear that certain areas of roofing and/or flashings are leaking due to the presence of moisture under the timber decking. The gutters remaining on the eaves are in poor condition.

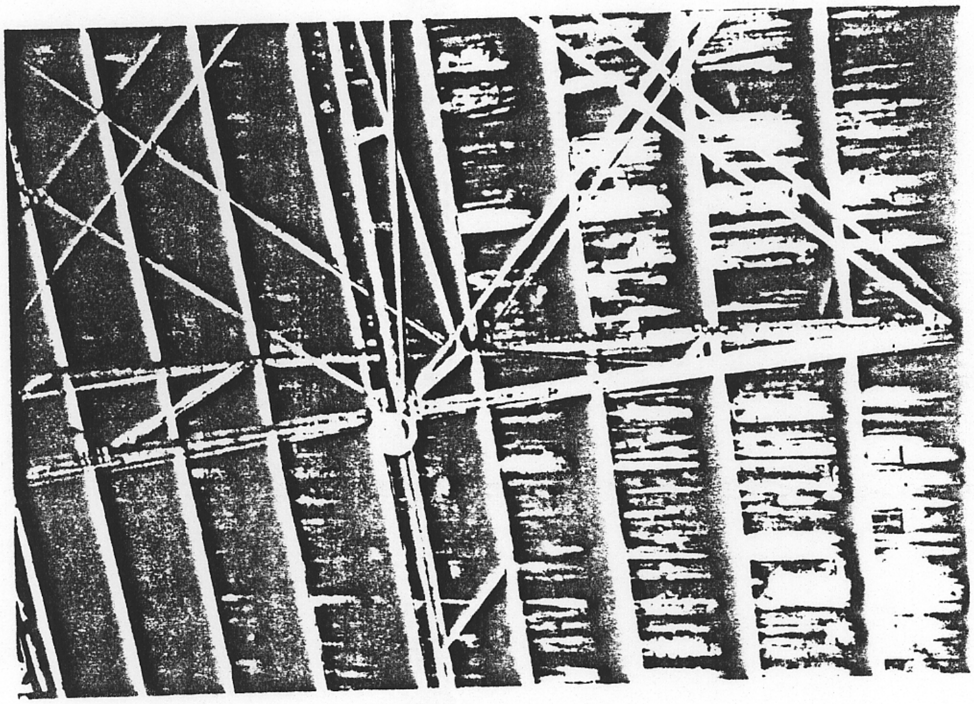

FIGURE 3

C) Cladding and Windows

The steel siding is in generally poor condition. (See figures 4 & 5) In many areas, particularly lower down on the walls, the cladding has completely rusted through. In other areas, it has been removed. Although it is very difficult to estimate, it was observed that approximately 40 percent of the cladding was loose or poorly attached to the supports. On the rear wall of the building, a light gauge layer of aluminum cladding has been placed over the original steel cladding. The condition of this secondary cladding is not much better than the original envelope.

Many of the window panes are cracked or broken. The wood sash is in fair condition, and the joints between the wood frame and cladding are generally not weather-tight.

III. VISUAL OBSERVATION (cont'd)

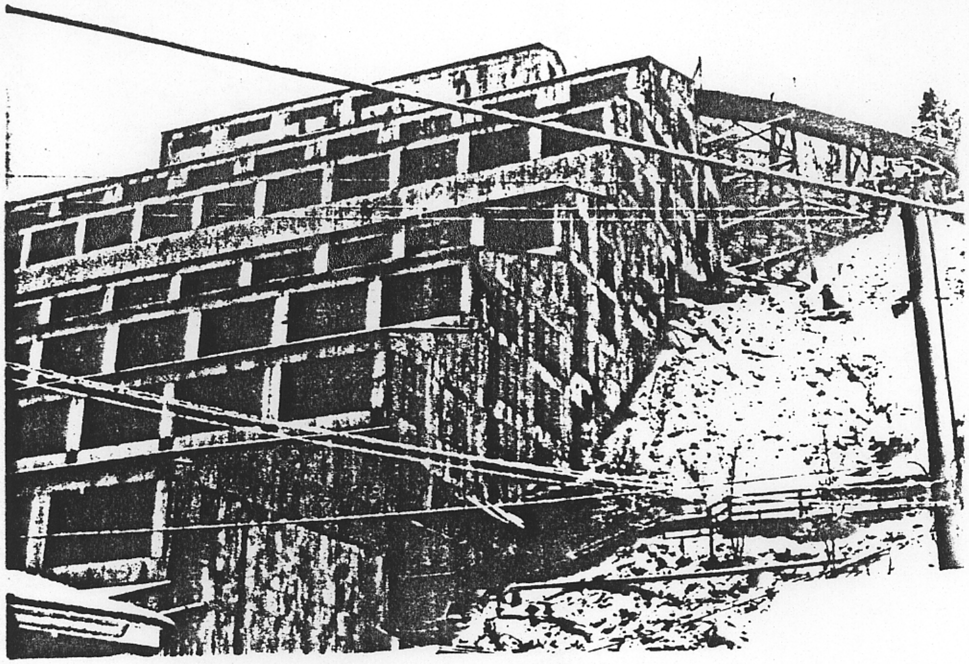

FIGURE 4

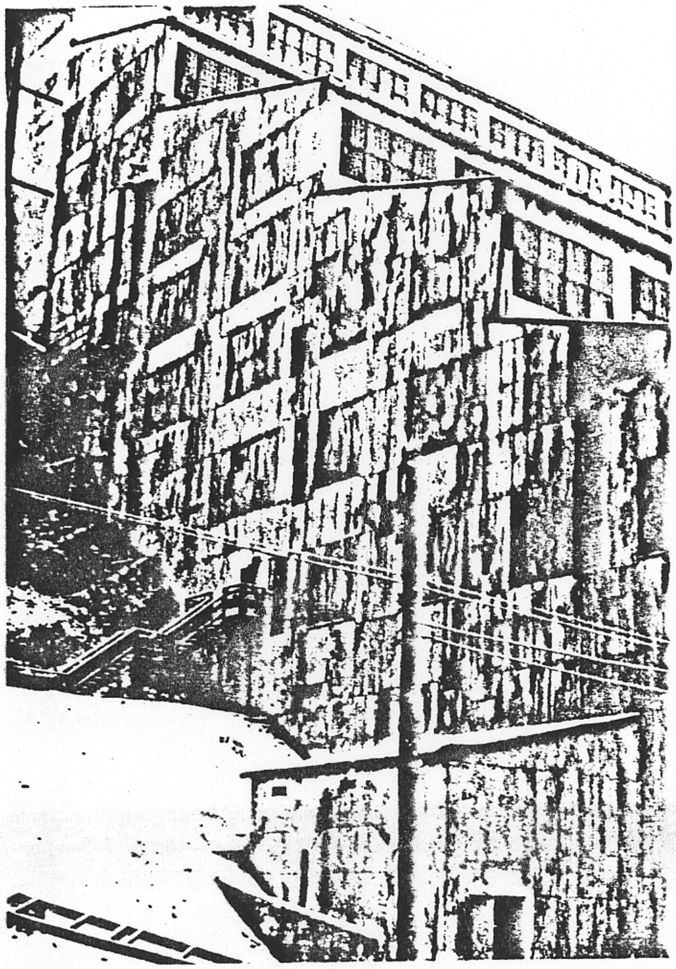

FIGURE 5

III. VISUAL OBSERVATION (cont'd)

D) Foundation and Floor Slabs

The building foundations could not be inspected in detail because in most cases they were not readily accessible. However, where it was possible to view the footings, the condition of the concrete appears to be sound. Many concrete columns (see figure 6) were inspected and found to be in good condition.

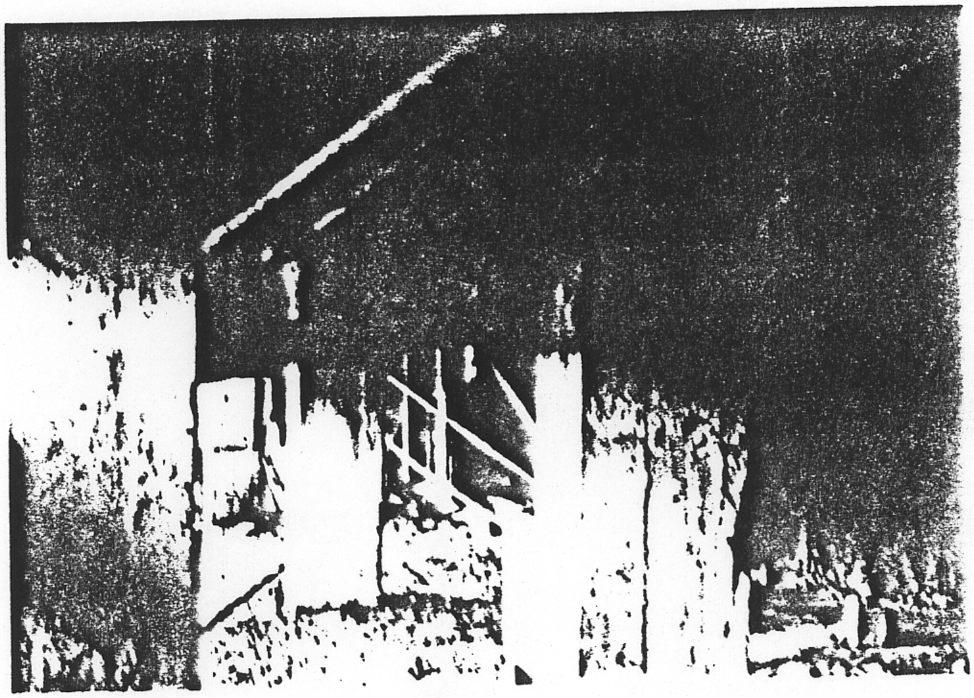

FIGURE 6

Owing to the dirt and debris, it was virtually impossible to see the top surface of the concrete floors, curbs or trenches. However, some of the floors could be seen from the underside and the condition of the concrete in these areas appears good. Further comments regarding the possibility of re-use of the existing concrete structures should form part of a later study when the needs of the building interior have been determined.

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III. VISUAL OBSERVATION (cont'd)

E) Railway Trestle

The steel supports which have been recently painted appear to be in fairly good condition (see figure 7). On the southwest trestle, however, some of the bracing has been bent. Furthermore, mine tailings have been deposited around the steel columns, thereby limiting the column inspection to the portion above grade. The timber decking and railway ties showed some deterioration. In addition, the decking was loose and many planks have been displaced or removed.

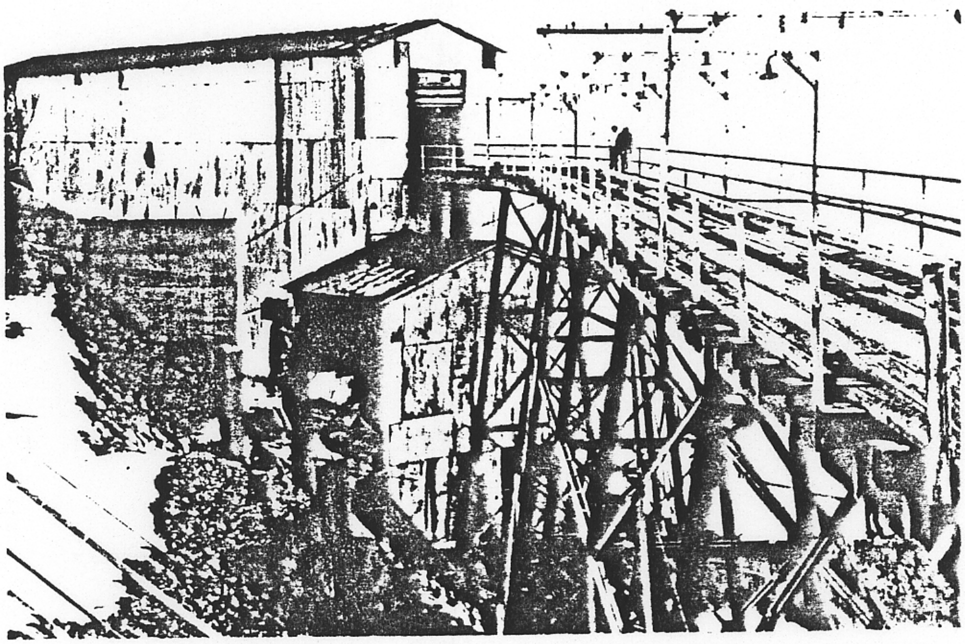

FIGURE 7

F) Electrical

The present condition of the panels, wiring and fixtures is very poor. It would appear that all the electrical work remaining in the building belongs to the original electrical installation. Many panels have been removed, while others have been ripped off the columns. Old wiring is poorly attached, ripped apart or just lying unattached on the ground. Practically, all the main service, including switchgear, splitter boxes, meters and main panels have been removed.

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IV. LOADING STUDY

In order to determine the structural adequacy of the building structure, it was necessary to arrive at realistic wind, seismic and snow loads for the Britannia Beach area. Wind loading governs over seismic loading for this structure, and wind loading data is readily available from the National Building Code.

Snow loading was much more difficult to determine because of two important factors. The first factor is the possibility of snow blowing up against the wall between any lower and upper roof, and the second, the possibility of snow sliding off an upper roof onto a lower roof. It is possible that neither of these points were considered in the original design. These two potential problems are discussed separately below.

A) Drifting Snow

If the snow drifting was applied exactly according to the code, then many members in the roof structure would be overstressed and costly roof strengthening would be required. However, it is felt that the drifting coefficients are too conservative for B.C. coastal areas. Discussions with Mr. R. Berry of the Canadian Climate Centre of Environment Canada indicate that a more rational approach to snow drifting is to separate the rain component from the total snow load and to consider only the drifting of dry snow. Furthermore, it is felt that the drifting factor as specified in the code, could be somewhat reduced for the Britannia Beach area, mainly because of the low probability of high winds when the snow is actually falling. This snow loading modification formed the basis of the structural analysis in this report.

B) Sliding Snow

The possibility of snow sliding depends on at least four conditions: Orientation of the roof surface, slope of roof surface, type of roofing material and the amount of insulation in the roof itself. In the case of the mill building, the first two conditions are unchangeable. The asphalt shingle roofing in place at present, provides excellent resistance to sliding because of its high frictional resistance and uneven surface. Below the roofing there is no insulation, except the insulation value of the roof deck itself. During the sixty year life of the building, the warm air below the roof probably melted much of the snow, such that a mass of snow large enough to start sliding, was never realized. The addition of insulation could change this situation and the undesirable possibility of sliding cannot totally be excluded.

IV. LOADING STUDY (cont'd)

B) Sliding Snow (cont'd)

It is felt that the roof in its present composition of asphalt shingles and no insulation will not cause snow to slide and this assumption was used in the analysis. However, should the roofing membrane be changed or insulation added, then the possibility of sliding snow must be considered. Some structural steel members would then be overstressed and would have to be strengthened at extra cost. Alternately, snow buffers or guards could be installed at every roof level, the cost of which has not been included in this report.

V. RECOMMENDATIONS

A) STRUCTURAL STEEL

1. General Assumption

Because of the limited scope of the report, it has not been possible to do a detailed structural analysis of every part of the structure. However, it would seem reasonable to assume that members requiring strengthening in one area would also have to be strengthened in other similar areas. For example, it has been assumed that if the truss at level 5 could satisfactorily carry current snow loads, then all trusses will perform at least as well. This is a reasonable approach since the truss at level 5 would probably be the most heavily loaded. A similar approach was made with the columns and bracing.

2. Strengthening Required

a) Roof purlin connections:

The purlin connections will not safely carry the increased snow loads due to drifting or sliding in a direction parallel with the roof slope. The upper 3 to 4 purlin clips should be supported against excessive bending, either by blocking or sag rods tied back to the columns. (See figure 8 - following page)

b) End wall wind posts:

Current codes call for wind posts to be designed for suction as well as pressure, a fact that was probably not considered in the original design. The interior flanges of all the wind posts should be laterally stiffened against buckling. This can be accomplished by providing short struts at regular intervals between the column flange and the girts. (See figure 9 - following page)

c) Roof bracing:

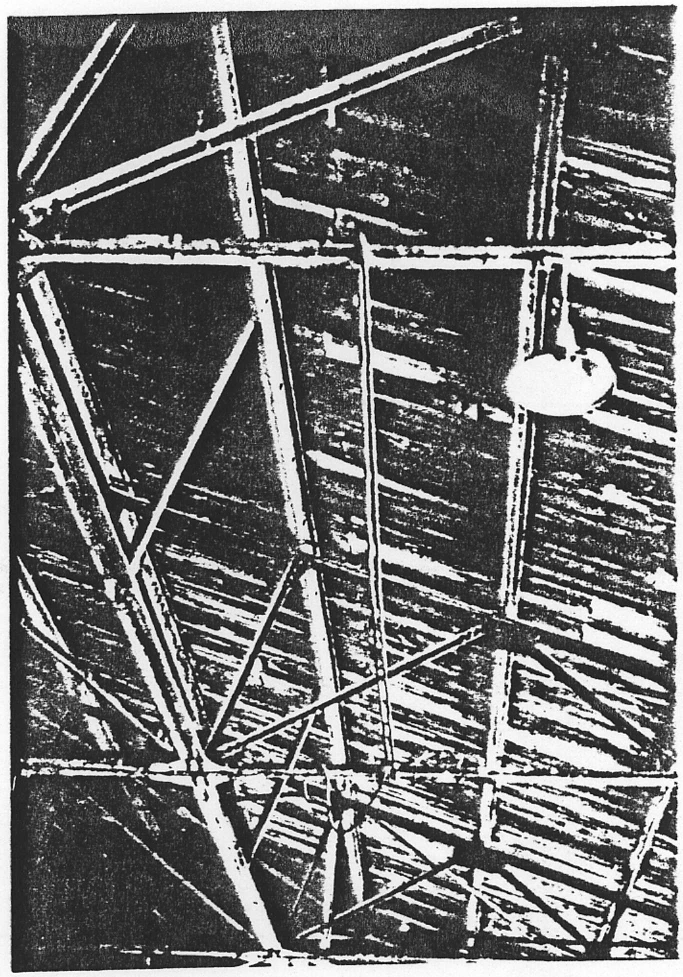
Three panels in the plane of the lower chord just above the monorail in the 48-foot bay do not have any bracing. The reason the bracing was omitted in these areas is not clear. Bracing should be added in these panels in order that the wind loads can be carried more directly to the braced column lines.

V. RECOMMENDATIONS (cont'd)

A) STRUCTURAL STEEL (cont'd)

2. Strengthening Required (cont'd) - **Figures referring to a) and b)**

FIGURE 8



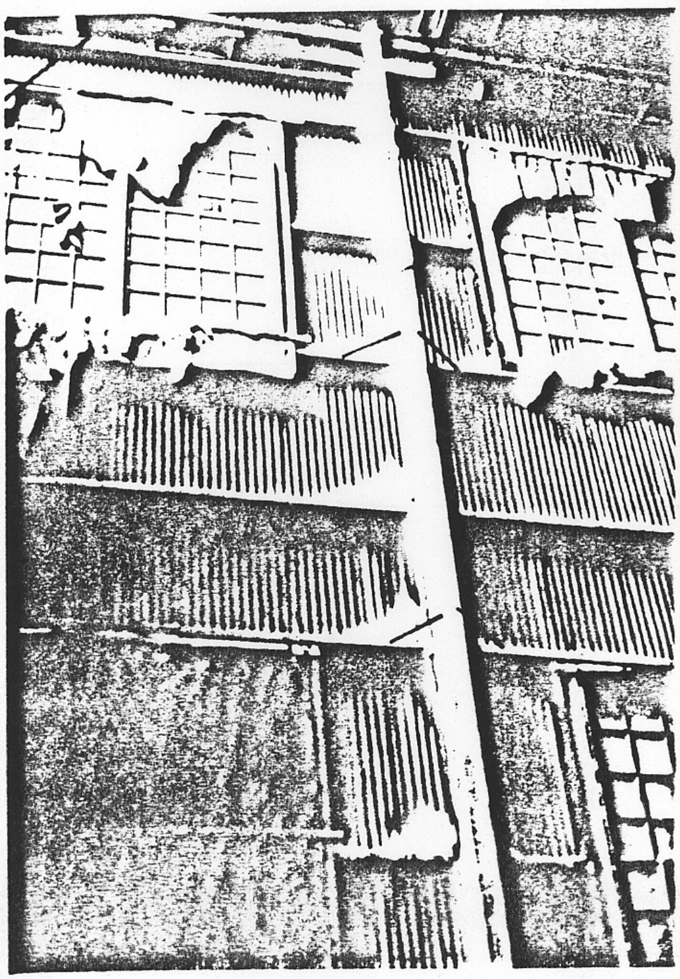


FIGURE 9

V. RECOMMENDATIONS (cont'd)

A) STRUCTURAL STEEL (cont'd)

3. Replacement of Members

All bracing members which have been removed should be replaced. This includes cross-bracing between the columns as well as web members in the vertical trusses each side of the crane bays.

Although not required for building stability, all missing girts should be replaced wherever cladding is present. The girts on the front wall, however, would not have to be replaced because they would obstruct access to the building addition on the north side.

4. Wall Sag Rods

The existing wall girts are sagging badly due to the lack of vertical support. This condition has obviously existed over a long period and it is felt that it is unnecessary to rectify it at this time. However, over the long term, with the addition of new cladding, sag rods should be installed.

5. Repair Work

It is estimated that 40 to 60 corroded column bases should be repaired. This can be accomplished by strengthening the lower portion of the column with steel. Perhaps an easier method would be to pour a concrete pedestal around the steel column to some predetermined height, depending on the extent of the corrosion. Any bent truss chord members, bracing struts and crimped column flanges should be repaired.

6. Cleaning and Painting

It is not essential that the steel be cleaned and painted right away. Because this work is very costly, it has been omitted from the short-term solution cost estimate. However, should a more permanent solution be desired, then all the steel in the building should be thoroughly cleaned and painted. Since it was difficult to assess the extent of the cleaning required, it has been assumed that all steel members would need the same amount of work.

B) EXTERIOR ENVELOPE

1. General Assumptions

The existing cladding and roofing have been in service for many years and the life remaining in these materials is limited. It has been assumed that for museum usage the walls and roof must be safe for public use and reasonably weather-tight. The recommendations for the first alternative are based on repairing the existing envelope to meet this standard. By following this approach, it is anticipated that 5 to 10 more years of use can be expected. The recommendations outlined in the second alternative involve a restorative programme which would achieve a long-term solution of at least a 20-year period.

V. RECOMMENDATIONS (cont'd)

B) EXTERIOR ENVELOPE (cont'd)

2. First Alternative (5 - 10 year life)

a) Roofing and gutters:

Assuming the asphalt shingles have been in place for 10 years, the existing roofing membrane should last another 5 - 10 years. The leaking problem can be rectified by carrying out any necessary roofing and flashing repairs. The galvanized steel roofing on the third and eighth roof levels should be replaced with asphalt shingles. All loose gutters and rain water leaders should be stripped from the eaves. It should be pointed out that these materials should be inspected by a competent roofing inspector in order to determine more precisely the life remaining in the roofing membrane.

b) Cladding:

It is estimated that 15 to 20 percent of the cladding has to be replaced in order to restore the envelope to a reasonably tight condition. The remaining cladding should be examined to determine which sheets are loose or bent. Since these sheets constitute a hazard to the public, they should be made secure by adding extra fasteners where required. It is assumed that approximately 40 percent of the sheets would have to be refastened in this way. This figure can only be verified by carrying out a more detailed inspection of all the cladding surfaces.
Painting of the existing siding is not recommended.

c) Windows:

All broken panes should be replaced. Repair work to the wood sash should only be carried out where absolutely necessary because this kind of work is very costly. The joints between sash and cladding should all be inspected and sealed where required. Painting of the wood sash is not recommended because of the high cost.

3. Second Alternative (long-term life / 20-year minimum)

a) Roofing, roof deck and gutters:

The existing asphalt shingles, corrugated roofing, flashings and gutters should be stripped off. Although the roof deck is in good condition, viewed from the underside, this would be the appropriate time to inspect the top surface of the timber decking. Should local areas of deteriorated deck be evident, this would be the time to make any necessary repairs.

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V. RECOMMENDATIONS (cont'd)

B) EXTERIOR ENVELOPE (cont'd)

3. Second Alternative (long-term life ...) (cont'd)

a) Roofing, roof deck and gutters (cont'd)

New roofing, rigid insulation, flashings, gutters and rain water leaders should be applied directly to the existing timber deck. Several different kinds of roofing and insulation are available, but for the purpose of the cost estimate an asphalt and gravel built-up roofing and 3 to 4 inches of rigid insulation have been assumed. It should be emphasized that when the type of roofing and amount of insulation have been selected, a further study should be undertaken to determine whether sliding snow could cause a structural problem (see section on loading study, sliding snow).

b) Cladding:

The existing cladding and flashings should be removed. At this time the girts should be inspected and straightened. This is best accomplished by means of sag rods which could hang from short extensions to the roof purlins.

New siding and insulation should be fastened to the existing girts. Again, several types of cladding and insulation are available, but for the purpose of the cost estimate a sandwich construction consisting of a flat sheet of aluminum, 2 inches of fibreglass insulation and a corrugated sheet of aluminum have been assumed. Cladding today is generally prepainted so that field painting is not necessary.

c) Windows:

All the existing windows should be removed, and this work would obviously be done with the cladding removal.

New metal windows should be installed in the existing framed openings. Thermal windows are recommended if there is insulation in the walls. Double-glazed, metal windows have been assumed in the cost estimate.

C) FOUNDATION AND CONCRETE

On account of increased gravity loads, due mainly to drifting snow, the foundations will carry larger loads than those used in the original design. No building foundation drawings were available at the time of writing this report. However, considering that the foundations are all founded on bedrock, as observed from the original drawing A-4059, it is highly probable that the existing building foundations will safely carry the increased loads.

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V. RECOMMENDATIONS (cont'd)

C) FOUNDATION AND CONCRETE (cont'd)

No recommendations are made at this time on existing exposed concrete structures such as the equipment foundations. These studies are outside the scope of this report and should be made when the needs of the building interior have been planned.

The floor slabs are probably structurally sound, but owing to the difficulty in being able to inspect them, a detailed assessment cannot be made at this time. It is possible that a 2 to 3 inch concrete topping over the old slab would provide an adequate future floor finish.

No allowance for any concrete work is made in the estimate.

D) RAILWAY TRESTLE

The timber decking and railway ties should be replaced if the intention is to reactivate the train system and presumably use it to carry the public. Although some of the timbers can be salvaged, it does not make economic sense to mix the old with the new considering the small quantities involved.

The exposed structural steel requires no repair work except for the bent bracing on the southwest trestle. The mine tailings under this trestle should be removed to such an extent that a detailed examination of the column bases can be made. At some future date, a decision may be made to repaint the steel for maintenance purposes although the paint at present appears to be in fairly good condition.

Since the end use of this trestle is uncertain, no allowance for upgrading is included in the cost estimate of this report.

E) ELECTRICAL

All existing electrical wiring, conduit and fixtures should be removed. New lighting, using milti-vapour or mercury fixtures, should be installed at the lower truss-chord level. The assumed illumination of this lighting is 30 foot-candles which should be adequate for general viewing by the public.

120-volt receptacles should be spotted around the perimeter of the building and on some of the columns.

For safety reasons, emergency and exit lighting would be mandatory. The cost estimate includes the lighting service from a nearby B.C. Hydro source, but does not allow for any transformer platform, underground wiring or other B.C. Hydro charges.

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VI. ORDER OF MAGNITUDE COST ESTIMATE

One of the questions that was difficult to answer was to what extent should the building be repaired. This will mainly depend on money available, the final end use of the facility and the overall desired general appearance of the building. Another important factor to be considered is the safety measures necessary for the public. It was decided that the most useful cost estimate at this point should really be two estimates - one, a minimum or short-term solution, and the other a permanent or long-life solution.

The short-term cost estimate outlines the minimum cost necessary to repair the existing facility so that it could function as a weather-tight building for museum purposes suitable for public usage. The expected life would be 5 to 10 years depending how long the roofing and cladding will last. The long-life cost estimate outlines the costs necessary to rebuild the facility with only the foundations, structural steel and timber deck being retained.

Note that both alternatives require strengthening, replacing and repair of structural steel. These costs are not the same, owing to the addition of wall sag rods in the long-term estimate.

It would be possible, of course, to arrive at many other estimates which would presumably fall between these two extremes. For example, perhaps a single layer of new cladding, or the omission of cleaning and painting the structural steel would suit the final end use of the building.

Perhaps it will be decided that only a part of the building need be required. Should only one-third of the facility be redeveloped, for example, then it would seem reasonable to assume that the cost would be approximately one-half of the amounts shown.

Before any work can be started, a major clean-up operation would be required. This work would involve significant costs which must be considered in any restoration programme. No allowance is made in this report for any clean-up or demolition costs.

Finally, the figures tabulated are order of magnitude costs only. Some of the costs are more approximate than others because of the accuracy of the assessments of each of the items. The totals represent a cost order of magnitude of plus or minus 30 percent.

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JI/jk
6/82

The following figures represent material, equipment and labour costs based on 1982 prices.

CONSTRUCTION ITEM	FIRST ALTERNATIVE (5-10 YEAR LIFE)	SECOND ALTERNATIVE (20-YEAR MINIMUM)
Steel Strengthening	$ 48,000.00	$ 101,000.00 *
Steel Replacement	24,000.00	24,000.00
Steel Repair (Column Bases)	43,000.00	43,000.00
Steel Cleaning and Painting	N.I.C.	528,000.00
Roofing and Flashings	33,000.00	436,000.00
Cladding	72,000.00	480,000.00
Windows	20,000.00	176,000.00
Electrical	110,000.00	110,000.00
TOTALS :	$350,000.00	$1,898,000.00

x 35%

2,582300

* Wall sag rods are added to the second alternative.

JI/jk
6/82

VII. STUDIES NOT INCLUDED

Because of the limited scope of our investigation, this report does not cover many other aspects of this facility. The following areas have not been discussed and any costs relating to these areas have not been allowed for in this report.

A) Miscellaneous steelwork such as platforms, bins, walkways, ladders and piping.

B) Elevated concrete work and floor slabs except that discussed in this report.

C) Electrical studies relating to areas other than basic lighting, such as cranes, winches, motors, heating, etc.

D) Inspection and assessment of any existing mechanical equipment, such as cranes, skips, etc.

E) Fire protection requirements, such as sprinklers and fire walls.

F) Safety measure requirements, such as stairs, landings, doors, exits, etc.

G) Plumbing, heating and ventilating.

H) Any other area outside the perimeter of the concentrator mill or trestle.

Obviously, many of these items would be covered in future studies when the needs of the building interior have been determined.

VIII. CONCLUSION

Several assumptions relating to snow accumulation, structural analysis and assessment of the exterior envelope have had to be made because of the limited scope of services. These assumptions must not be ignored in deriving any conclusions from the report.

It appears that the building structure is generally sound and can be used as a housing for museum exhibits providing that certain structural work is undertaken. The building envelope, on the other hand, is in fair to poor condition.

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VIII. CONCLUSION (cont'd)

Two proposals have been put forward to rectify this problem. In the first proposal, the building exterior is repaired to a minimum standard that would probably be acceptable for housing museum exhibits. In the second alternative, the exterior is essentially rebuilt to provide a long-life solution. The concrete is probably in sound condition, whereas the electrical installation remaining is considered worthless.

Detailed inspections should be carried out on the existing roofing, cladding and steel in order to assess more accurately the cost of any repair work. The concrete structures and slabs should also be inspected when the design of the interior facilities has been finalized.

The cost estimates tabulated offer two different proposals for consideration. Other proposals, falling between these two, are possible and could form the subject of a later study. It should be pointed out that the costs provided in this report are approximate only and should be used only for overall future planning of the desired facility.

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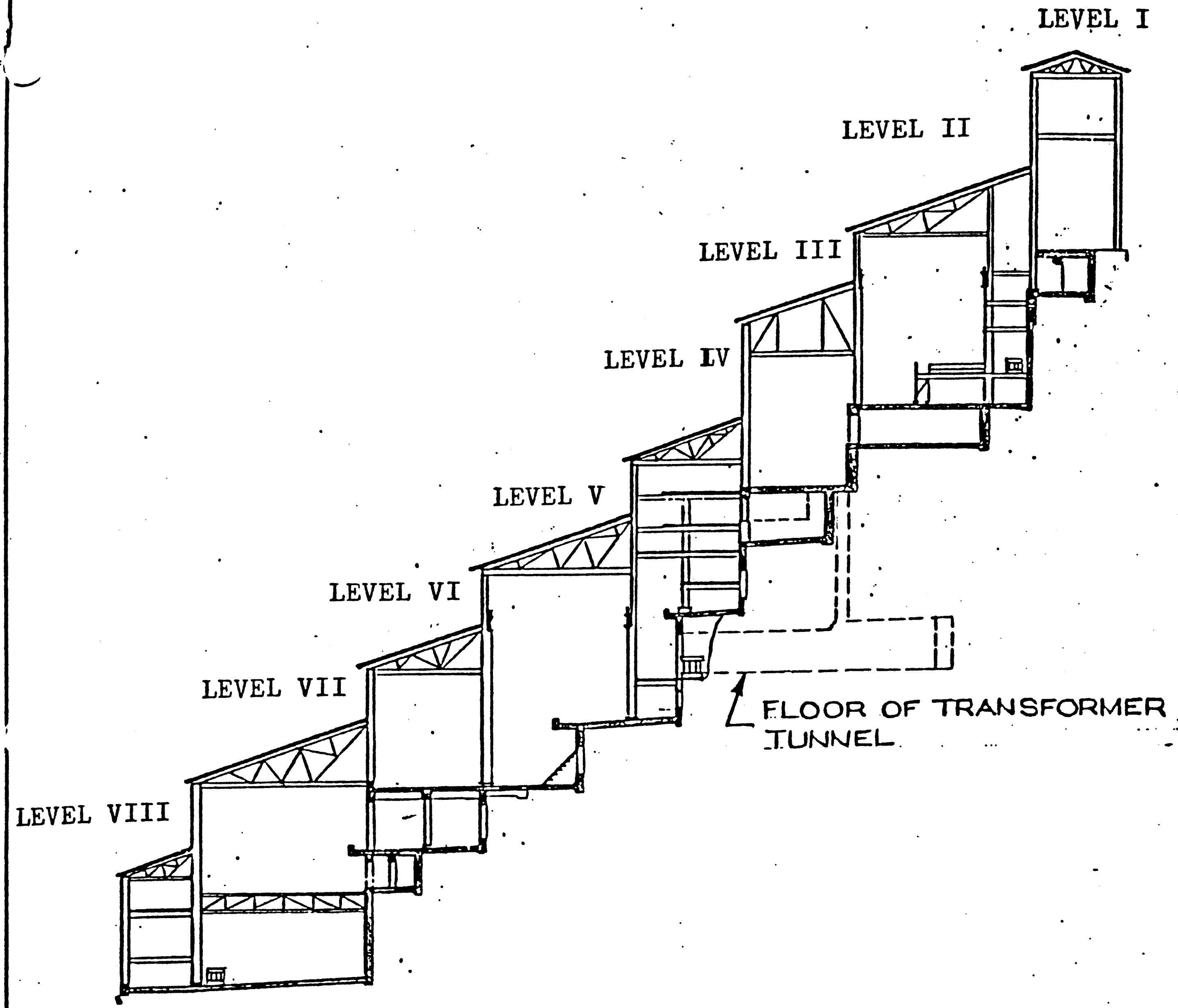

Levels of Mill determined according to roof structure (8 levels).

TITLE: SECTION THRU. BRITANNIA MILL		SECTION: GEN. LAYOUT	
KILBORN ENGINEERING (B.C.) LTD.		AREA NO:	REV. NO:
CLIENT: B.C. MUSEUM OF MINING	PROJECT NO: 7662	DRAWING NO: 7662 - SK1	
APPROVED: WP	DATE: 83·09·02		

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