PROVINCE OF BRITISH COLUMBIA

Minister of Public Works

REPORT

FOR THE FISCAL YEAR

1970/71

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in right of the Province of British Columbia.
1972

To Colonel the Honourable JOHN R. NICHOLSON, P.C., O.B.E., Q.C., LL.D.,
Lieutenant-Governor of the Province of British Columbia.

MAY IT PLEASE YOUR HONOUR:

Herewith I beg respectfully to submit the Annual Report of the Department of Public Works for the fiscal year ended March 31, 1971, in compliance with the provisions of the *Public Works Act.*

W. N. CHANT
Minister of Public Works

Office of the Minister of Public Works,
Parliament Buildings, December 30, 1971.

"We must lead, not follow."

—Department of Public Works.

INDEX

	PAGE
Report of the Deputy Minister	7
Report of the Director of Design	8
Report of the Director of Construction and Maintenance	15
Report of the Co-ordinator of Maintenance	18
Report of the Co-ordinator of Construction	19
Construction Management	21
Report of the Mechanical Engineer	22
Report of the Civil Engineer	23
Underground Disposal of Effluent	24
Report of the Electrical Engineer	26
Report of the Architect-Planner	27
Report of the Chief Engineer, Safety Engineering Services Division	30
Report of the Chief Boiler Inspector	32
Report of the Inspector of Electrical Energy	35
Report of the Chief Gas Inspector	37
Report of the Comptroller of Expenditure	40
Tenders Received and Contracts Awarded for Buildings	45

REPORT OF THE DEPUTY MINISTER

The Honourable W. N. Chant,
Minister of Public Works,
Parliament Buildings,
Victoria, British Columbia.

Sir: I have the honour to submit for your consideration the Annual Report of the Department for the fiscal year ended March 31, 1971.

Elsewhere in this Report will be those from the heads of divisions. These set out work accomplished and planned, tenders let and accepted, and Departmental accounts.

Reference has been made in previous Annual Reports to the efforts and policies of the Department aimed at developing buildings and surroundings which are pleasing to the public and invite their participation and involvement. It is most gratifying to find strong evidence that this philosophy is attaining its objective.

During the year, five of our recently constructed buildings have been nominated by Chambers of Commerce, and other bodies, for awards. These were the Law Courts Buildings at Quesnel and Duncan; the residences, British Columbia Vocational School, Terrace; the Motor-vehicle Inspection Station and the Netherlands Carillon Tower at Victoria. The Quesnel Government Building won an award for having made the most significant contribution to beautification in its zone.

Support for the policy appears to be evidenced by the tremendous public response to Heritage Court. The Court and the Museum have drawn close to one million visitors during 1971.

Initial use of the Construction Management principle in construction of Government buildings has proved encouraging, sufficiently so that we will be recommending its further use where appropriate.

The need for much greater involvement in programming was mentioned in last year's Report. During the year under review this need was given greater attention, and much time has been spent in analysing programmes and requirements. It has been possible, as a result, to offer alternative plans which enable maximum cost savings to be effected.

The Department has been deeply involved in Centennial activities. We would be remiss in failing to draw attention to the highly commendable work done in the Capital and throughout the Province by our Superintendents and staff when looking after the numerous special events during this very busy period. This special mention must in no way be allowed to detract from the tribute which is due to Departmental staff generally. They have worked hard and cheerfully.

Yours respectfully,
A. E. WEBB
Deputy Minister

REPORT OF THE DIRECTOR OF DESIGN

"Research is an organized method of finding out what you are going to do when you can't keep on doing what you are doing now"—*Charles F. Kettering, Seed for Thought* 1949.

The activities connotated by the word "design" extend not only to the provision of professional services in the design of new buildings but include architectural design services associated with renovation of existing Government buildings; engineering design in the extension and initiation of primary services—sewer, water, gas, heat, and electricity; landscape design in the development of sites; the testing, assessment, and improvement of possible environmental polluting sources such as sewage plants, incinerators, and boiler plants; and the provision of professional advice to other departments, to Government, and to the public.

With particular reference to our primary role of new building design and advice relating to such service, we are very conscious that this present period of time is one of changing social values, of rapidly changing construction methods and cost relationships, of inflationary trends, and of greater sensitivity to the impact of construction programmes. This consciousness instils in all of us an even more dedicated awareness of the "trusteeship" nature of our function.

Thus, as all levels of Government endeavour to provide even more desired services, cost-benefit studies and the application of strict cost control becomes of vital importance.

There are many methods of achieving responsible cost control, but in this age of "instant" solutions one must ever be alert to the pitfalls and disadvantages which are possible between the enthusiastic claims of proponents of a particular method on the one hand and the subjective, derogatory reports by opponents on the other.

The belief that a free-market economy will provide an answer has produced the so-called "developer proposal" system. At first glance this appears to offer many benefits. When applied to building design, however, faced with not only the difficulty of specifying quality and deciding between short- and long-term cost-benefit issues, but with the enormously more demanding problem of accurately programming sociological, moral, and even spiritual issues, we believe that this system can only be considered wasteful and inefficient. The method can, however, be of value when first cost is the prime determinant, and can be so stated.

Others look to Construction Management as the answer to our construction-cost ills, and there are indeed some areas where this can be of significant value. Yet others, looking to technology to provide the solutions to our problems, hopefully examine the "Systems" approach and other forms of prefabrication.

Our own conviction is that, while these various approaches may offer assistance, there is no instant, magic formula which, if applied, will solve the problems inherent in the construction industry, in the context of today's demands. Rather, we believe that the best possibility lies in the rational application and refinement of the skills which we now possess, aided by the processes previously mentioned where applicable. The use of such skills, of course, involves a cost.

Consistent with these beliefs, the Design Division of this Department applies the principles of cost control and cost budgeting to its every endeavour.

The essence of designing to a budget is to make meaningful decisions, related to cost, at each stage of design from need to reality and only to add, subtract, or change when the cost implication of such revision is clearly understood. In order to implement cost control it is first necessary to isolate and tabulate, at the earliest

stage of development, the major cost determinants and then to critically examine each to determine its acceptability.

To develop these principles more fully, several organizational changes have been initiated—

(1) By the formation of a Programming Section to investigate need and define requirements. This includes the formulation of the spacial, environmental, proximity, and circulatory requirements necessary to satisfy that need.

(2) By the establishment of multidisciplinary teams to produce design solutions to each problem. Each team includes a quantity surveyor to provide cost information, as well as any other specialists who can contribute to the solution. The team is formed at the commencement of a project and with the requisite authority to enable it to act in determining solutions.

(3) By the reorganization of the Division from a "process" system, i.e., a rigid heirarchical, specialist-oriented system, to a much more flexible "purpose" form, with the primary objective being the job at hand. The multidisciplinary teams referred to are thus appointed on an *ad hoc* basis for each special problem. This results in a more fluid interchange of personnel.

(4) By the simplification of channels of communication, with teams being authorized to deal directly with user departments and reporting directly on their projects.

(5) By the development, in collaboration with other Governmental and private agencies, of an elemental costing system which enables much more accurate cost information to be provided at an earlier stage in the design process than has heretofore been possible.

(6) By extending the investigatory phases of design into intensive analyses of alternative approaches to each problem as conceptual and feasibility studies. Each such alternative is attended by a rational cost assessment which enables management and the project team to appreciate the implications of each decision in choosing between desirable alternatives. Such study extends to the cost analysis of programmatic statements to assist in determining value.

(7) By the intensification of a training programme, both formal and informal, to ensure that the skills being developed will be adequately backed by knowledge and continually honed on the stones of discussion and constructive criticism.

This system has been in use now for approximately 12 months, and results have been most encouraging in that a more precise determination has been shown to be possible within the range of feasible alternatives. It is recognized that such a system results in increased design costs. It is believed, however, that such increased cost is one of the finest investments this Department can make.

Cost control does *not* mean an indiscriminate cutting of all costs. It means making meaningful decisions related to cost. We believe that by spending more time in the formative stage of a project we can more accurately forecast and select these final answers which will have the most significant cost implications.

It is emphasized that the design approach being followed by this Division is not a new one but is a refinement of methods which have been followed by all rational design agencies. When our present model is further extended into the private designing sector, as has already been initiated with consultants employed by the

Department, expanded by the freshness and originality of thought which is the life blood of the private design sector, we are confident that the results will be of even greater benefit.

CONTRACTS AWARDED DURING THE 1970/71 PERIOD

The construction year was distinguished by three conditions—

(1) many continuing projects from the proceding fiscal period;

(2) the tight monetary situation; and

(3) the extensive construction lockout.

Because of these factors, new major construction awards were limited to 11 principal contracts aggregating $836,000. These approximated 48 per cent for the Department of Education, 43 per cent for the Department of Mental Health, while the remaining 9 per cent included projects for the Departments of Rehabilitation and Social Improvement and the Attorney-General.

Particulars of these contracts will be found at the end of the Report. Several projects of particular interest are mentioned here:

(1) *Nanaimo*—British Columbia Vocational School Automotive Workshop: A contract in the amount of $356,120 provided a workshop and classrooms for heavy-duty mechanics and carpentry.

(2) *New Westminster*—The Woodlands School, renovations to Wing No. 2, Centre Building: A contract in the amount of $298,792 was the third phase of the renovations to this building.

(3) *New Denver*—Sewage-treatment plant, Youth Development Centre: A contract in the amount of $20,000 provided a package pumping and sewage-treatment plant which will minimize the possibility of pollution of Slocan Lake.

PROJECTS PLANNED DURING THE 1970/71 PERIOD

Approximately 55 projects were in various stages of planning during this fiscal year under review. The major portion of these are outlined below.

DEPARTMENT OF EDUCATION

1. *Nanaimo*—British Columbia Vocational School: Planning continued on the provision of a new welding shop.

2. *Victoria*—British Columbia Vocational School: Planning continued on a Training and Feeding Cafeteria to seat approximately three hundred.

3. *Burnaby*—British Columbia Vocational School: Planning proceeded on the completion of the heavy-duty diesel mechanics workshop.

4. *Dawson Creek*—British Columbia Vocational School: Planning commenced on an addition to the Food Training Building.

DEPARTMENT OF MENTAL HEALTH

1. *Tranquille*—Tranquille School:

(*a*) A sewage aeration system was planned to reduce the possibility of pollution of Kamloops Lake.

(*b*) Planning commenced on the provision of fire escapes from the Greaves Building.

2. *Essondale*—Riverview Hospital:

(*a*) Planning commenced on Phase 2 of the renovations to West Lawn Building to improve the washroom facilities.

(*b*) Planning commenced on the conversion of the existing boiler plant from coal to natural gas. This was part of the policy to minimize pollution from stacks and to provide a more economical operation.

(*c*) Planning commenced on the revisions to Centre Lawn Building to provide occupational therapy facilities in existing space.

(*d*) Planning commenced for the provision of fire escapes to Crease Clinic and East Lawn Building.

3. *New Westminster*—The Woodlands School: Planning commenced on a complete ventilation system for the 100-bed units.

Department of the Attorney-General

1. *Victoria-Colquitz*—Vancouver Island Correctional Centre: Planning commenced on the upgrading of these facilities by the provision of a multi-use building, by the replacement of the water service, by the conversion of the existing boiler plant, and by the connection of the institution to sanitary sewer facilities. These latter two projects were part of the Department's continuing efforts to minimize pollution.

2. *Haney*—Alouette River Unit: Planning commenced on the provision of a new Administration Building to replace the present inadequate structure.

Department of Highways

1. *Victoria-Langford*—Planning commenced on the provision of a welding and fabricating shop at this establishment.

2. *Highways maintenance establishments*—Planning continued on the provision of maintenance establishments at the following locations: Vernon, New Denver, Golden, Tête Jaune Cache. This accommodation is all being planned on a modular basis, utilizing the scheme previously developed in this Department, modified as required in the light of experience gained. Evaluation studies carried out by teams after 13 months' occupancy have proved the value of this form of planning.

Other Departments

1. *Nelson*—Consultants were retained to study the situation with regard to the retaining-wall adjoining the Courthouse and recommend corrective measures.

2. *Department of Recreation and Conservation*—Storage buildings: Planning continued on the provision of bait and storage buildings at Penticton, Fort St. John, and Smithers.

3. *Department of Commercial Transport*—Weigh-scale stations: Planning was initiated for the provision of weigh-scale stations at Kamloops and Golden.

4. *Essondale*—Colony Farm: Planning commenced on the provision of prefabricated dormitories for agricultural workers to enable their relocation from the existing condemned Riverside Cottage.

5. *Charlie Lake*—Mines establishment: Planning was initiated for the provision of a new building to enlarge the core storage.

6. *Provincial Government Buildings*—Planning was commenced for new Provincial Government Buildings at Nelson and Smithers. In Nelson this building is to supplement the existing Courthouse, and to centralize facilities for the public. In Smithers the facilities are intended to replace the present inadequate and antiquated

Provincial Government structure, and to form the nucleus of a new Municipal Governmental Centre in the downtown area.

7. *Creston*—Planning commenced on the provision of an Administration Building for the Wildlife Management area at this location.

8. *Prince George*—Planning was initiated on a Library Development Commission Building to house Provincial Library facilities in this area.

9. *British Columbia Building*—Elements of the Design Division participated in the Building Management Committee which was established for the management of the design and construction of this building. Advertisements were placed, interviews were held, and selections were recommended to the Policy Committee, following which engagements were entered into with both the prime consulting architects and the consulting engineers. Concurrent with this process, programmers were engaged and planning continued on the evaluation of requirements.

GENERAL

This fiscal period saw an increase in the demands by other departments for professional consultation and advice on design and cost matters, including:

Provincial Secretary—Sixty-five submissions of plans for senior citizens' housing were made covering 33 projects, and constructive criticism was given, followed be recommendations to the Provincial Secretary.

Municipal Affairs—

1. Assistance was given in evaluation and technical review of six Federal-Provincial Housing Developments under design and construct contracts.

2. The Department carried out two concept studies on similar schemes which did not come to fruition, and provided inspection services on another.

3. Full set of documents was prepared for the proposed Senior Citizens' Development under the *Strata Titles Act*.

Engineering services—The Department continued to provide specialized engineering advice on a variety of matters apart from those previously mentioned:

1. Advice to the Purchasing Commission on fuel and specialty apparatus.

2. Advice to the Liquor Control Board with reference to their building and operational proposals.

3. Advice to the Public Utilities Commission on the suitability of crematoria. Checks were made on completion and certification carried out for three in this period.

TREASURY BOARD

The work of the Cost Analysis Team on the construction and operating cost problems for the University of British Columbia Health Sciences Centre continued and provided much useful advice which resulted in considerable revision to the schemes being considered.

In conclusion it is once again my pleasure to record the dedicated and creative participation of all sections of the Design staff. Their continued cheerful and willing acceptance of the heavy loads placed upon them is, as always, in accord with the highest professional standards, and a measure of their pride in the service of the people.

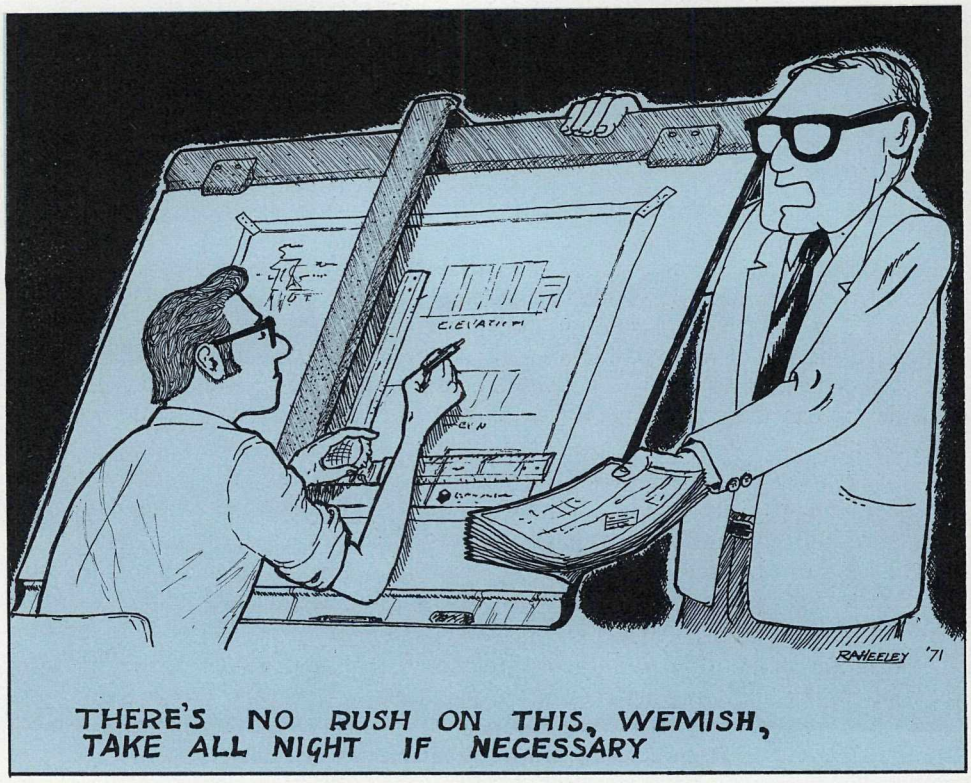
I would also record the constructive and harmonious relations which exist with Construction and Maintenance Division and field personnel and the excellence of co-operation received from the personnel of all Government departments and agencies whom it is our privilege to serve.

G. L. GILES, M.R.A.I.C., DIP.PUB.ADMIN.
Director of Design

Brooder House, Abbotsford.

Highways maintenance establishment, Vanderhoof.

Cafeteria Building, Vocational School, Kelowna.



REPORT OF THE DIRECTOR OF CONSTRUCTION AND MAINTENANCE

"When it shall be found that much is omitted, let it not be forgotten that much is performed"—*Samuel Johnson.*

As a departure from the format of previous annual reports of this Division's work, this year individual reports by both the Co-ordinator of Construction and the Co-ordinator of Maintenance are included. This report, therefore, does not attempt to recapitulate the numerous and varied interesting work performed by each Branch, but does attempt to focus attention upon the actual composition of our Maintenance Programme, and to review current trends in the management of building contracts.

It is generally accepted that buildings start to deteriorate as soon as they are constructed, but the rate of deterioration is radically affected by the materials used and by design. The maintenance of buildings can, therefore, be broken down into at least three categories—

(1) servicing;
(2) rectification;
(3) renewal.

The average citizen is probably most familiar with work required under category (1), which includes the cleaning of buildings and the replenishing of expendable supplies.

Although the quantity of service required will vary according to the extent of occupancy, seasonal changes, and other factors, the necessity to render this service will continue as long as the building remains occupied.

Category (2) is work necessitated by incorrect installation, by design modifications, and by changes to meet actual operating requirements. Work arising from this cause often occurs early in the life of a building, frequently from reallocation of accommodation, implementation of Government programmes, and normal expansion. This activity consumes a large proportion of the total labour and material resources available.

Category (3) becomes a major concern much later than the previous phases and consists of either part of total replacement of the building components which, due to use in service, have deteriorated. Although the extent of this work can be related to the use of the building and the durability of materials employed in construction, constant upgrading of safety and building codes make it mandatory to consider replacement in some instances before final breakdown could result in disruption.

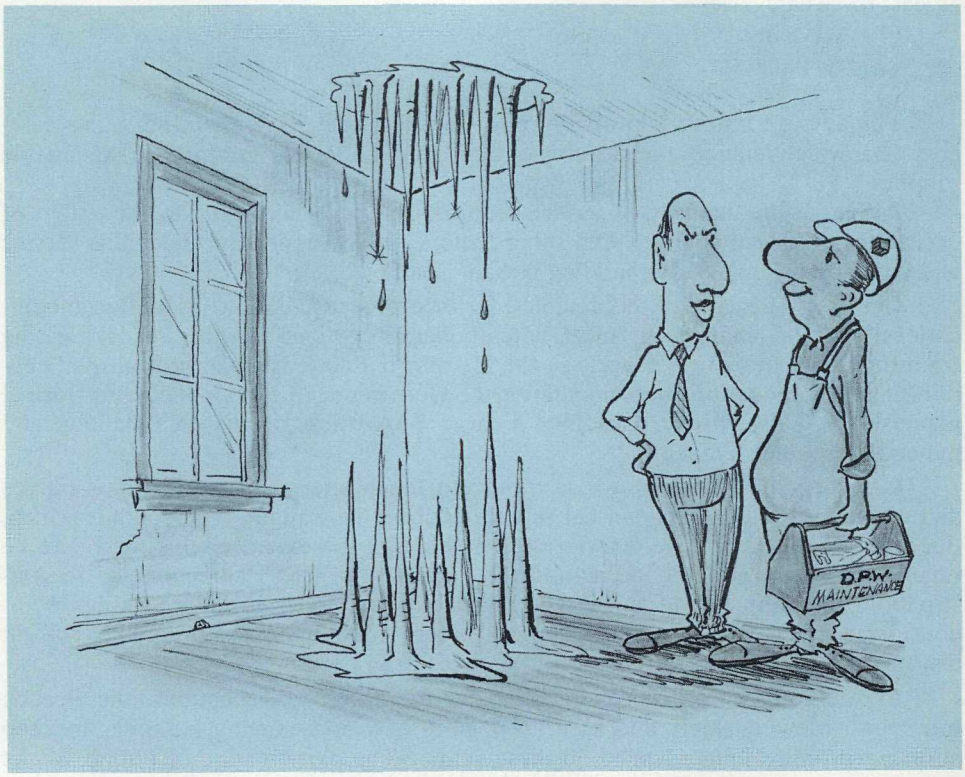
In addition to work necessitated under the above classifications, the Branch has been reviewing safety and security in both new and existing buildings to keep abreast with prevailing advances in these fields. The participation of Public Works tradesmen and their crews in setting up platforms, temporary lighting, and other special items for all types of official ceremonies continued throughout the year and will be a major item of work in the Centennial year.

A temporary slowdown in the award of new contracts was experienced during the fiscal period under review, but construction work already in progress shows an increase in volume over previous fiscal periods. As construction projects become larger and more complex, construction management, which advocates the manage-

ment of the project on behalf of the client from the initial concept through to the final completion, is of a special interest to this Branch if it is a means of ensuring a better co-ordination in the construction stages. However, management of construction, despite its importance, is only one phase of total project management. It is, however, interesting to note recent papers on the subject have suggested Government agencies and commissions are well organized and set up to run projects on this basis. Although a major advantage for adoption of project management is on the score of comprehensive cost control on large complex buildings, there is merit in some instances to the award of separate prime contracts on smaller projects to expedite completion of the works.

In conclusion, I would like to acknowledge the co-operation we have received from the Design Division and personnel in all Government departments to whom we have provided service, and last, but not least, the staff of the Division who responded so well to all demands.

STANLEY LLOYD, M.R.A.I.C., A.R.I.B.A., DIP.PUB.ADMIN.
Director of Construction and Maintenance



Never mind which are stalactites or stalagmites—Fix the roof.

Temple Building interior *before* renovations.

Temple Building interior *after* renovations.

REPORT OF THE CO-ORDINATOR OF MAINTENANCE

The responsibility for maintenance of Provincial Government buildings is taken by the Maintenance Branch of the Construction and Maintenance Division, Mr. S. Lloyd, Director.

For administrative reasons, the Province is divided into six zones, numbered 1 to 6, and with headquarters at Victoria, Burnaby, Essondale, Kamloops, Nelson, and Prince George respectively. Branch headquarters are in Victoria and constitute the offices of the Co-ordinator of Maintenance, Maintenance Architect, Maintenance Mechanical Engineer, and their staffs.

The distribution of Maintenance personnel by trades among the six zones was as follows:

Trade	Zone 1, Victoria	Zone 2, Burnaby	Zone 3, Essondale	Zone 4, Kamloops	Zone 5, Nelson	Zone 6, Prince George	Total
Janitors	193	97	21	35	33	59	438
Stationary engineers	30	62	56	37	6	27	218
Carpenters	18	12	15	8	5	5	63
Painters	16	10	21	10	4	6	67
Electricians	14	7	17	5	1	2	46
Plumbers	10	6	13	5	0	2	36
Labourers	40	22	18	5	6	11	102
Gardeners	15	4	12	14	0	5	50
Fire-fighters	0	0	11	7	0	0	18
Drivers	5	5	11	2	0	0	23
Watchmen	9	5	0	9	3	0	26
Office staff	5	8	9	5	4	4	35
Plasterers	6	0	7	3	0	0	16

Total Maintenance personnel, 1,138.

Maintenance Expenditures by Zones, 1970/71

	Zone 1, Victoria	Zone 2, Burnaby	Zone 3, Essondale	Zone 4, Kamloops	Zone 5, Nelson	Zone 6, Prince George
	$	$	$	$	$	$
Salaries and wages	2,294,351.03	1,596,537.58	1,614,280.15	1,051,745.37	359,643.54	747,846.35
Heat, light, power, and water	519,384.57	663,365.38	847,486.64	337,480.44	89,459.84	262,770.20
Maintenance of buildings	364,372.08	496,171.34	383,752.07	157,908.40	88,251.32	183,467.32
Maintenance of mechanical equipment	3,153.45	8,073.19	2,638.13	6,298.02	632.98	10,369.83
Totals	3,181,261.13	2,764,147.49	2,848,156.99	1,553,372.23	537,987.68	1,204,453.70

Branch Headquarters staff in Victoria were fully occupied in preparing drawings and specifications for renovation work to Provincial Government buildings, landscape maintenance, and janitorial services. Tenders were invited for 107 jobs during the year, varying cost from a few hundred dollars to $46,980 for renovations to the Admitting Area, Oakalla Prison (Project 39-B-70).

During the fiscal period, new buildings costing approximately $4,500,000 were accepted from contractors as substantially complete, and maintenance responsibility assumed by the Branch. As the construction of Provincial Government buildings continues at an accelerating rate, staff increases to operate and maintain them must also continue. While some economies of scale are possible, in general it is apparent that more buildings require more people to operate them and more money to maintain them. The Maintenance Branch is, therefore, preparing to assume a more important role financially in the Public Works Department.

HARRY GREIG, B.A.S.C., P.ENG., DIP.PUB.ADMIN.
Co-ordinator of Maintenance

REPORT OF THE CO-ORDINATOR OF CONSTRUCTION

This Branch is responsible for the overseeing of construction of Government buildings throughout the Province, and employs, in addition to the Headquarters staff, 17 Project Inspectors. Four of these are specialists in the mechanical, electrical, and landscaping disciplines. Their task is to ensure that the specifications and standards as laid down are adhered to.

In addition to the ever-increasing sophistication of materials and equipment, with the consequent need for comprehensive inspection, it is found that the settling of contract disputes and difficulties ensuing from firms going out of business during contracts places a heavier burden upon the Branch.

A training course for Project Inspectors in surveying and some aspects of mechanical engineering was organized. We must express our appreciation for an excellent presentation by the Senior Mechanical Engineer and his staff. The course was very successful and well received by all concerned.

During the year, progress payment and invoicing procedures were refined, which now results in payments to contractors being made more expeditiously than before.

The system of holding pre-job meetings with contractors prior to commencing work was found to be successful. At this meeting, procedures are reviewed with the contractor, covering such items as progress payments, communication, change orders, shop and "as built" drawings, site instructions, and regular site meetings.

During the year the following samples of major projects were completed and accepted, showing the scope and diversity of the projects which were supervised by our staff:

Glendale Hospital, Victoria.
Provincial Building, Duncan.
Multipurpose Centre, BCIT, Burnaby.
Alterations to Centre Building, The Woodlands School, New Westminster.
Cafeteria and Dormitories, British Columbia Vocational School, Terrace.
Courthouse, Williams Lake.
Cafeteria, British Columbia Vocational School, Kelowna.
Highways establishments, Salmon Arm, Quesnel, Williams Lake.
Motor-vehicle Inspection Station, Burnaby.
Reroofing North Lawn Building, Riverview Hospital, Essondale.
Renovations to West Lawn Building, Riverview Hospital, Essondale.

A four-month construction lockout during the year created a difficult situation with respect to security and completion of these projects and other work in progress.

A large number of minor projects were also supervised, including:

Renovations to the East Wing, Parliament Buildings.
Renovations, Vancouver Courthouse.
Renovations, Vernon Courthouse.
Underground services, Colquitz, Vancouver Island Unit.
Computer installation, Liquor Control Board, Vancouver.
Site works, British Columbia Vocational School, Prince George.
Revisions to Eric Martin Institute, Victoria.

In conclusion, the staff of the Construction Branch wish to express their appreciation to the Design Division for their co-operation during the year.

D. GREY, DIP.PUB.ADMIN.
Co-ordinator of Construction

West Lawn interior, Essondale, *before* renovations.

West Lawn interior, Essondale, *after* renovations.

CONSTRUCTION MANAGEMENT

The "traditional method" has been used for many years by public and private bodies in contracting for construction work to be done. By this is meant the system whereby an owner selects and determines a requirement, arranges for a detailed design to meet that requirement, and then by competitive tenders selects a contractor and pays him a stipulated sum for the work done.

Under the traditional approach, the three most interested parties are the owner, the architect (or engineer), and the contractor. Ideally, these should work together, each contributing the maximum input, to bring the project to a sound conclusion. Unfortunately, this does not always happen. The general contractor, for one, does not become involved until the design and specifications are finished. He, therefore, has no opportunity to offer his expertise. All he can do is to pare his price to the limit in hopes of getting the job. Even the consultants are robbed, by their own fee structure, of some incentive to save the owner cost. There is, whether overt or otherwise, a conflict of interest involved.

However, whatever imperfections may be imputed to it, the method has served a need very well. The competitive nature of bidding, for example, has been tried by the hot fire of experience, has been proven of real value and needs to be retained. The method should not be, and indeed is not in this writing, sold short. Rather, a method should be sought which will use the strengths, but also strengthen the weaknesses, of what time has proved to be good. Construction Management offers a solution.

It is necessary first to define what *is* Construction Management, and, perhaps, what it is not. *Construction* Management is not *Project* Management. The two are different. Project Management is the comprehensive management of all aspects of a project from conception to completion. It is a service used by those "owners" who do not normally have "in house" construction expertise and must, consequently, engage a professional service. Construction Management is the management of that part of the total project which is concerned with actual construction. It is appropriate to the public sector, as the "in house" expertise is normally present. Instead of a profit percentage, the general contractor (construction manager) is engaged, as a professional, for a fee.

An integral part of Construction Management is that it is a team approach. The basic premise is that the owner, the consultant, and the general contractor (construction manager) for a team rather than acting independently or, as sometimes happens, at "arms length." It would seem almost unnecessary to remark that the three pools of expertise pulling together should produce a better end result.

All the foregoing in no way diminishes the competitive factors inherent in the tender system. On the contrary, all work is tendered with contractors submitting bids to the project team, but having their work co-ordinated and managed by the construction manager.

Other basic advantages are:

(1) Total project time can be saved. Design and construction may proceed at the same time and in sequence.

(2) There is greater flexibility if requirements should change. There is also a saving of cost in the pricing of extras.

(3) "Time is money." Among other savings brought about by the shortened time factor are lessened interest charges for capital financing, earlier use of the finished premises, and some lessening of inflationary trends—often discounted ahead of time under conventional methods.

(4) A more precise definition and understanding of objectives is achieved, there is a single office responsibility, and time and cost control systems are more effectively used.

Probably no single method is the panacea for all ills. However, Construction Management appears to offer considerable improvement. It should be given a thorough trial.

REPORT OF THE MECHANICAL ENGINEER

"According to the theory of aerodynamics, as may be readily demonstrated through wind-tunnel experiments, the bumblebee is unable to fly. This is because the size, weight, and shape of his body in relation to the total wingspread make flying impossible.

"But the bumblebee, being ignorant of these scientific truths, goes ahead and flies anyway—and makes a little honey every day"—*sign in a General Motors Corporation plant.*

This year marks the end of an era. Use of coal for fuel in domestic and small plants has become not only inconvenient when compared with other fuels available but uneconomic as well. Over the last decade the Department has converted most of the small heating plants to either natural gas, where it was available, or light fuel-oil. The convenience, cleanliness, and the reduction of the attendant problems have been excellent.

However, in the largest plant operated by the Department, at the Riverview Hospital, Essondale, we have been well set up to handle coal as a fuel. Up to last year it has been the most economic fuel to use. However, the use of coal is attended by a reduceable level of pollution.

The declining domestic market for coal and the increased costs of producing it have virtually closed most small coal mines in British Columbia. These two factors have also combined to make the cost of heat in the form of coal more expensive than either natural gas or fuel-oil.

Engineering studies, detailed plans, and specifications have been completed this year for conversion of the Essondale plant, and money has been made available to carry out the work.

It is the sad end of an era, but ironic, too, in that more coal is being mined in British Columbia than ever before, but for overseas shipments, while the domestic market has shrunk to its lowest point.

It is also an oddity, in that British Columbia is one of the very few places in the world where an abundance of basic energy sources abound, where electric power, natural gas, fuel-oil, and wood fuel have competed with each other in the available market.

This Branch of the Design Division has participated in most of the capital projects described elsewhere in this Report.

W. E. MILLS, B.A.SC., P.ENG., DIP.PUB.ADMIN.
Senior Mechanical Engineer

REPORT OF THE CIVIL ENGINEER

"Don't, like the cat, try to get more out of an experience than there is in it. The cat, having sat upon a hot stove lid will not sit upon a hot stove lid again. Nor upon a cold stove lid"—*Mark Twain.*

The Civil Engineering Division spent a busy year on many varied projects listed elsewhere in the Annual Report. The Landscaping Section of our Division is involved in producing plans for landscaping on most Government buildings. Probably one of the most rewarding projects was the design of playgrounds for children with special problems, i.e., mental retardation, deaf and (or) blind, and problem children. Due to the special problems involved, the standard parks or school playgrounds are unsuitable. Consequently, much research and consultation with supervisory staff was required in the design of these facilities.

It is essential that the interest of a problem child is stimulated to a far greater extent than a normal child. This requirement has been met with the inclusion of new and novel types of equipment and games.

A large contract was completed in 1969, at Jericho Hill School for the Deaf and the Blind, Vancouver, comprising playing-fields, tennis courts, running track swings, and standard and specialized playground equipment. One of the unusual pieces of playground equipment specially designed for this school was a large wooden pyramid. The pyramid is designed with numerous holes—slides and facilities for climbing and hiding. Due to the configuration, blind children are able to find their way around easily and soon become very expert in its use.

Specially textured surfaces are located at strategic locations, such as stairs, etc., to warn blind children of dangers ahead.

Another landscaping feature of the Blind School is a "fragrant" garden, composed of plants and herbs which blind children can smell and locate by themselves.

The forces associated with wind play a very important part in structural design, especially in the case of larger buildings. Wind pressures are classified according to probabilities of occurrence and height of structure, gust pressures, and the shape of the structure. For example, the velocity pressure used in the design of cladding for a building is usually based on the probability of being exceeded once in 10 years.

For all other structural members of a building the pressure used is that based on the probability of being exceeded once in 30 years. The exception to the above is a building essential to postdisaster services which is based on a probability of being exceeded once in 100 years. All the above values are multiplied by an exposure and shape factor; for example, the wind pressure per square foot on a building of 60 storys in height is approximately twice that of a building one story in height.

The shape and location of the building plays an important part in determining the wind pressures—positive and negative. Practically all tall buildings are now analysed by wind-tunnel model test.

J. R. SIMPSON, P.ENG.
Senior Civil Engineer

UNDERGROUND DISPOSAL OF EFFLUENT

The Department has had initial success with the disposal of sewage effluent underground. This new method is sufficiently promising to encourage the use of it elsewhere, and a similar installation is being put down at the New Denver Youth Centre.

In 1967, disused surplus equipment from the sewage-treatment plant at BCIT, in Burnaby, was installed at the Alouette River Unit to replace over-used septic tanks which were unsatisfactory. The installation, completed in 1968, provided the Alouette Unit with an extended aeration disposal system, results of which can now be assessed.

The unit is located on the bank of the South Alouette River, which connects Alouette Lake with the Pitt River. The unit serves a population of about 150 people, and an estimated 15,000 gallons of sewage a day must be dealt with.

Some consideration was given to pumping the unit sewage into the Haney Correctional Centre treatment plant, but this plan was abandoned and the existing one implemented after ground percolation tests indicated the feasibility of underground effluent disposal. Although this method was not common practice, the Pollution Control Board agreed with the study results and granted a permit in 1967.

The new installation consists of a comminutor, an extended-aeration treatment plant, a chlorine contact chamber, a dosing chamber, and a subsurface disposal field.

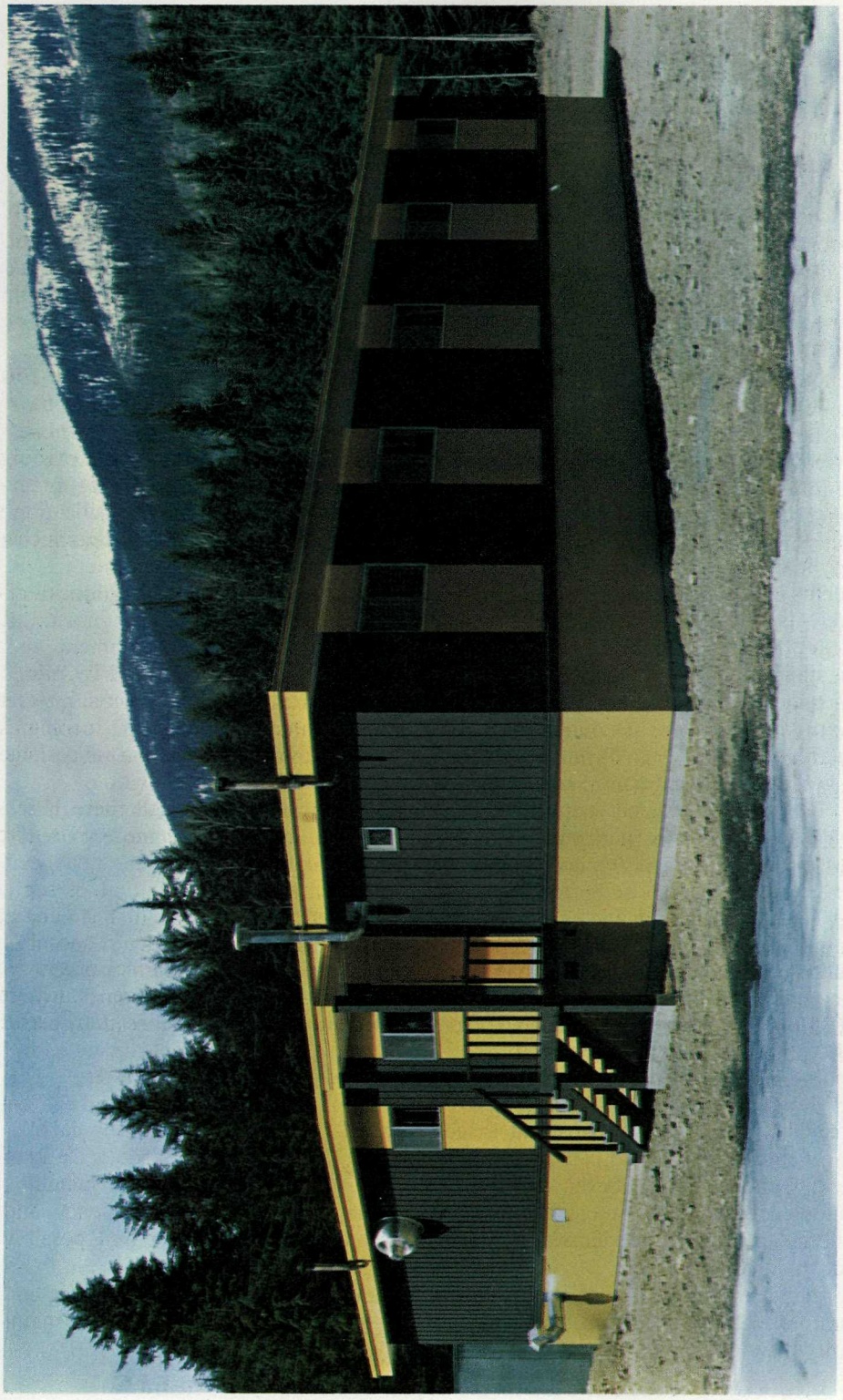
The disposal field covers approximately one-quarter of an acre, and is divided into four equal parts which can be alternately used in various combinations, present practice being to use two sections at once, then to alternate daily. No problems have been encountered so far, and there is no evidence of deterioration or seepage along the riverbank, 400 feet away.

Knowledge of such an installation is not extensive, but it is felt there is less deterioration than in traditional septic tank disposal, and that the more extensive oxidization retards coating which tends to reduce percolation rate.

At the Alouette River Unit, aeration disposal area is equal to that of septic tank method, although the Department of Health agrees that only 50 per cent of this area is required. This, it is felt, is a favourable factor for aeration disposal.

The Department is responsible for design and operation of a number of sewage systems at various Government institutions, and current policy, after study of individual facilities, favours discharge of effluent into, or onto, the ground, rather than infiltrate any existing water system.

Several other plants are now being considered for similar treatment.



Department of Highways Maintenance Camp, Trout Lake.

REPORT OF THE ELECTRICAL ENGINEER

"Sales resistance is the triumph of mind over patter"—*Anon.*

The work load carried by Branch personnel continued at a high level as a large number of projects of various size and complexity was completed. The increased emphasis on programming prior to the design stage results in an increase in work requirement for more senior personnel, in spite of some reduction in numbers of new projects undertaken. Also, a larger proportion of the work was undertaken by the Branch personnel rather than by outside consultants. This is in keeping with the policy that fluctuations in work load be counteracted by the employment of consultants, permitting a stable staff to be developed to a highly skilled level.

In addition to the many other projects, this Branch has begun a project for the improvement of fire-alarm systems in Government buildings. Designs have been produced and work is under way for modernizing the fire-alarm systems in Riverview Hospital, Tranquille School, The Woodlands School, Jericho Hill School, Pearson Hospital, and BCIT. A project for power-factor correction in many locations is under way, and this will improve the efficiency of energy utilization, thus decreasing costs. Another cost-reducing project now being investigated is the consolidation of many separate Hydro services in the Government Precinct, in order to improve efficiency and take advantage of the new rate for large blocks of power.

In the electrical industry the trend continues toward the development and utilization of equipment which can be installed complete rather than piece by piece. This matches the trend toward factory assembly which is apparent throughout the construction industry. In lighting, a significant development has been the increased availability of the very efficient high-pressure sodium lamp. In many applications this golden light will be used instead of the greenish mercury vapour light.

During the year, personnel of this Branch have continually worked with the electrical maintenance personnel throughout the Province. The interdependency between design and maintenance is so close that this association has been beneficial in every way.

Telephone systems and equipment throughout the Province continue to increase in numbers with the increase in buildings, personnel, and services. Emphasis remains on cost control, and this has permitted a large increase in telephone service at relatively small additional cost. The Parliament Buildings' switchboard, which in 1951 had two positions, and in 1961 had six, was this year increased from 11 to 12 positions. In its present form it has reached its maximum capacity, and planning is now under way to replace it with radically new equipment. The "Telpak" intercity network has been augmented, and now includes 35 lines to Vancouver, six each to Kamloops and Prince George, five to Nanaimo, four each to Nelson and Kelowna, and two each to Abbotsford, Courtenay, Cranbrook, Dawson Creek, Duncan, Port Alberni, and Terrace. At present all the Telpak switching is handled by the Parliament Building's operators, but to improve efficiency and economy, planning is under way to include switching in Vancouver and possibly other major centres.

The Department is particularly fortunate in that the telephone supervisors and operators, without exception, are thoroughly capable and responsible and are maintaining their image of cheerful courtesy and efficiency.

J. B. HALL, C.D., B.A.SC., P.ENG., M.E.I.C.
Senior Electrical Engineer

REPORT OF THE ARCHITECT-PLANNER

"Those who expect to reap the blessings of freedom must, like men, undergo the fatigue of supporting it"—*Thomas Paine.*

In anticipation of the British Columbia Building programme getting under way in the Centennial year, much preparatory work had to be carried out in connection with agreements with the City of Vancouver, consolidation of the site, and investigation of underground services prior to rerouting and cost-sharing.

With an increase in requests for Courthouses throughout the Province, time and effort have been expanded in the search for suitable sites. As has been so often expressed in these Annual Reports, land is a precious resource, and sometimes extremely difficult to purchase in urban areas.

In the large building programme now being undertaken, sites have also been located for motor-vehicle inspection stations, Departmental laboratories, weigh-scale stations, educational, health, and welfare buildings.

In many cases, only by having the support of the Administration have we been able to supply Crown sites suitable for the intended development. We often compete with a constant demand for land grants for other purposes.

Three important projects took place during the past year, certainly as far as this Division is concerned. A new Curriculum Resources Branch, with trackage and trucking facilities, has been built in Victoria designed to the client's projected demand over the next two decades. Yard-sites and services building for the Department have been purchased in Nanaimo. In Victoria, the acquisition of the former HBC warehouse property of 4½ acres of land, and 1½ acres of building was a highlight.

The demand for space comes from all sectors of Government activity. Mention should be made of the need for the Legislative function. While some relief of inadequacy has been achieved, there is, nevertheless, a continuing need for planning in order that this important role may be given its correct recognition.

No mention of space needs would be complete without drawing special attention to the Legislative Precinct. Under instruction from our superiors, we have periodically reviewed the needs of the various departments. It is interesting to examine the reports of 10 years ago wherein estimates were made of conditions which might be expected today, 10 years later. Those estimates, considered a little extravagant, have since proved to be conservative. The situation is now such that only a major expansion will offer relief.

Other responsibilities carried out by this Division such as leasing, appraisals, legal agreements, easements, rights-of-way, exchange of lands with Crown authorities, continue to demand much time and effort.

The steady increase in tempo of activity within British Columbia is too evident to need emphasis. This acceleration is naturally felt in Government work and specifically in the work of this Division. It will, in fact has, become necessary to review the organization of the Division and of its role in the total effort of the Department of Public Works. Fortunately, our superiors are alert to the situation.

An excellent rapport pertains with all departments of Government, and a constant communication is maintained with Municipal Councils, Regional Boards, and Town Planning Commissions.

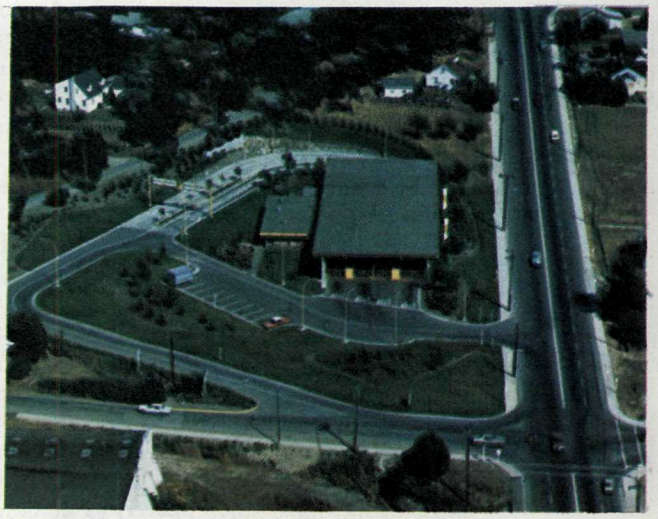
W. D. LOUGHER-GOODEY, F.R.T.P., M.T.P.I.C., M.I.F.L.A.,
F.I.L.A., M.A.S.P.O., A.I. STRUCT.ENG.

FIVE PUBLIC WORKS PROJEC

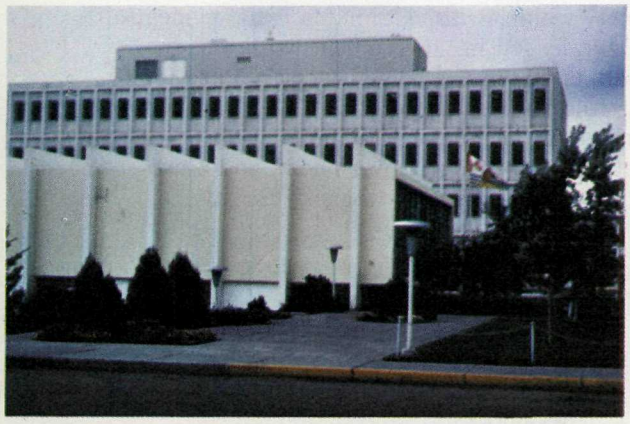
NOMINATED FOR AWARDS

Law Courts and Tower, Duncan.

Dormitories, Vocational School, Terrace.

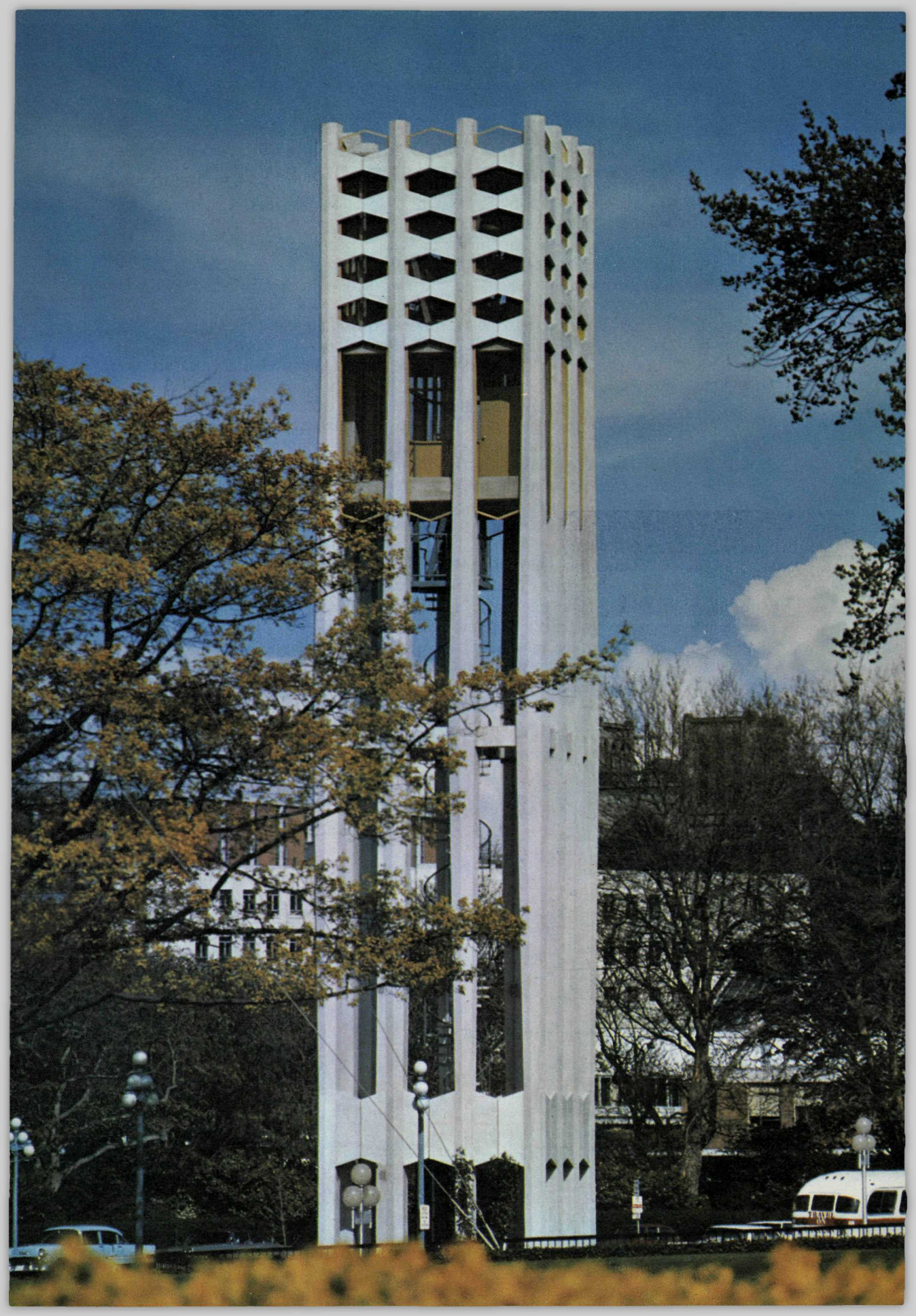


Motor-vehicle Inspection Station, Victoria.



Provincial Government Building, Quesnel.

Carillon Tower, Vict



REPORT OF THE CHIEF ENGINEER, SAFETY ENGINEERING SERVICES DIVISION

On the 17th of July 1970 the "Safety Inspection Services Agreement" was signed by the Honourable W. N. Chant, Minister of Public Works, and the Honourable B. Mackasy, Minister of Labour for the Government of Canada.

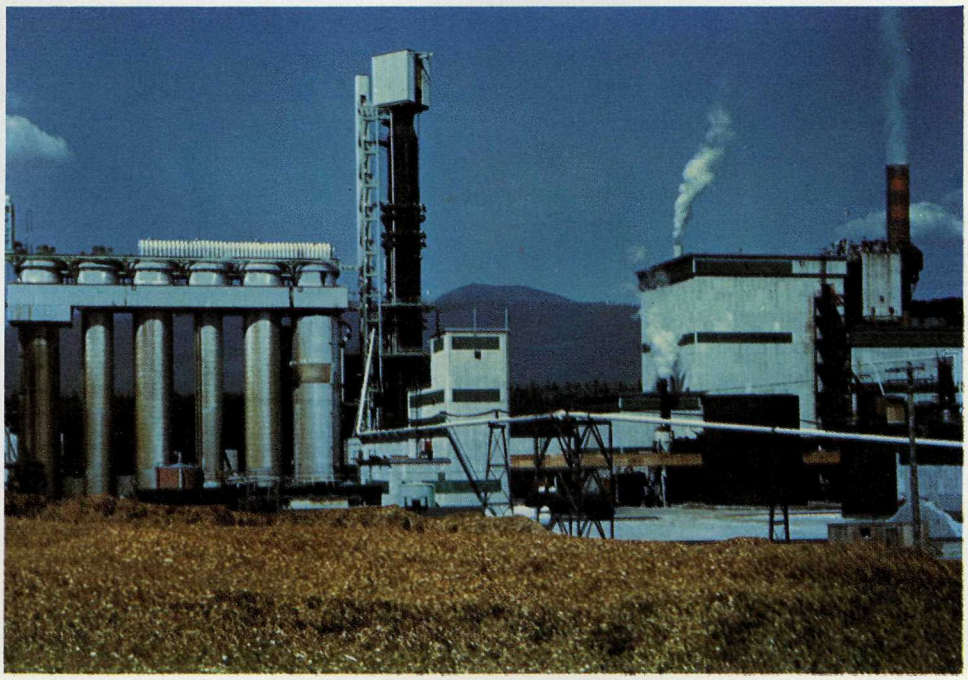
This agreement was executed pursuant to the Canada Labour (Safety) Code. In effect this agreement has extended the jurisdiction of the Safety Engineering Services Division into those areas which were previously solely under the jurisdiction of the Federal Government. It has also ensured that in those areas where there was some doubt as to whether the installations were under the Provincial or Federal jurisdiction, that the installations will be inspected as the two authorities are now combined into one enforcing agency.

All Inspectors of this Division have been designated as Safety Officers under the Canada *Labour (Safety) Act*. Therefore, the installation of boilers, pressure vessels, electrical equipment, and gas equipment in grain elevators, flour-mills, radio and television stations, banks, aerodromes, harbour boards, lighthouses, and Federal buildings are now to be inspected by Inspectors of this Division. This extra work will require some increase in the number of Inspectors, but the cost of these positions will be offset by fees paid by the Government of Canada for the services of the Inspectors.

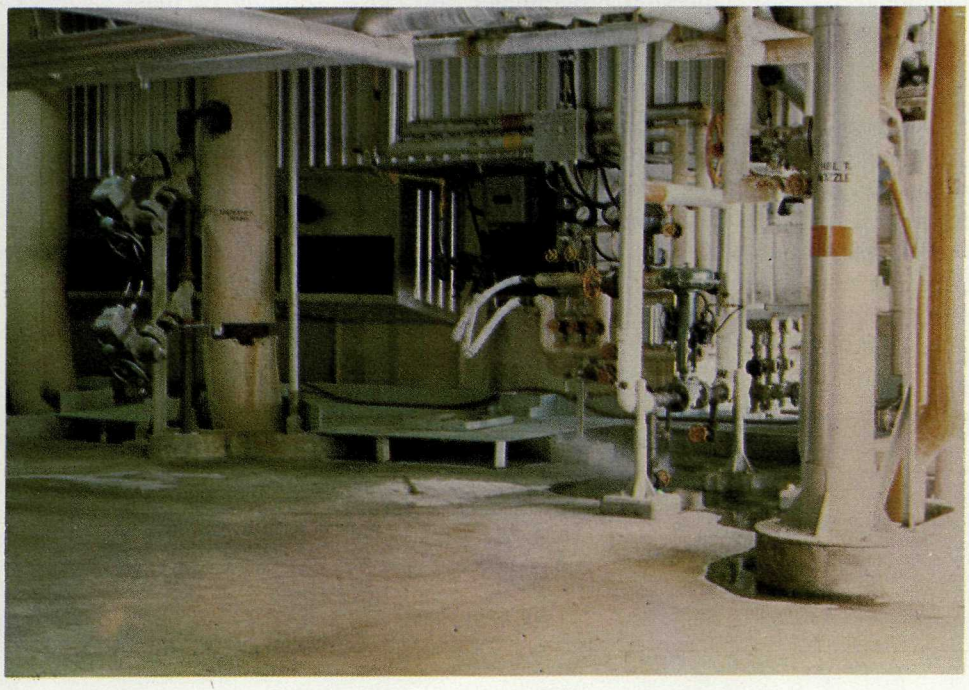
Much study and consideration has been given to the methods and reconstructing of each Branch in order that a better and more economical service can be dispensed to industry and the public in this Province. Some initial changes have been made, but the full effect will not be felt until next year.

Many Inspectors are now qualified in a second technology, and the use of these dual technologists is saving time and money and giving the public a faster service. Further studies will be done in the coming year in respect to the reorganization of the Division.

A. G. KANEEN, P.ENG.
Chief Engineer



Typical digester and steam plant of a pulp and paper mill, inspected by our Safety Engineering Services Division.



Typical emergency drain valves in use in pulp-mills, inspected by our Safety Engineering Services Division.

REPORT OF THE CHIEF BOILER INSPECTOR

GENERAL

Throughout the Province there has been continual growth of plant facilities using boilers and pressure vessels. The northern districts in particular have been hard pressed to maintain acceptable levels of service. Additional plants are being built and many industries expanded their operations. District activities were studied and changes were made to improve our services, with more changes in the offing.

Totals of 3,150 new pressure vessels and 780 new boilers were put into use during the year which, along with the increased examination of plant equipment under the Federal Safety Code, resulted in 1,500 currently due boiler inspections not being done. It is noted that this backlog may be eliminated soon.

ACCIDENTS

There was one fatal accident at a gas-processing plant where two men were killed doing maintenance work on a lethal gas column. The series of human errors leading up to the accident could have been avoided if there had been proper training and supervision of the personnel involved. The necessity of clear plant procedures and in plant training programmes have been emphasized, and these are being attended to more positively. The accident again points to the need for extended vocational and apprenticeship programmes and closer scrutiny of plant facilities on our part.

OPERATIONS

Along with the expansion of pressure-plant facilities, demand for our services increased, and the whole of the staff are commended for the way in which each did his part to cope with the important things in the added work load. Total boiler examinations increased 18 per cent, engineers' certification increased 15 per cent, welders' performance qualifications increased 55 per cent, pressure vessel inspection increased over 100 per cent. Shop inspections were down by 39 per cent, and refrigeration plant certification, which takes up a minor part of our time, 57 per cent.

SUMMARY OF WORK

	1969/70	1970/71	Increase	Decrease
Total number of boilers inspected	5,729	6,770	1,041	------
Total number of engineers examined	700	805	105	------
Total number of welders' performance tests	1,901	2,956	1,055	------
Total number of pressure vessels inspected	474	1,051	577	------
Total number of shop inspections	1,340	817	------	523
Total number of refrigeration plants inspected	140	60	------	80
Total number of designs surveyed	800	824	24	------

BOILERS

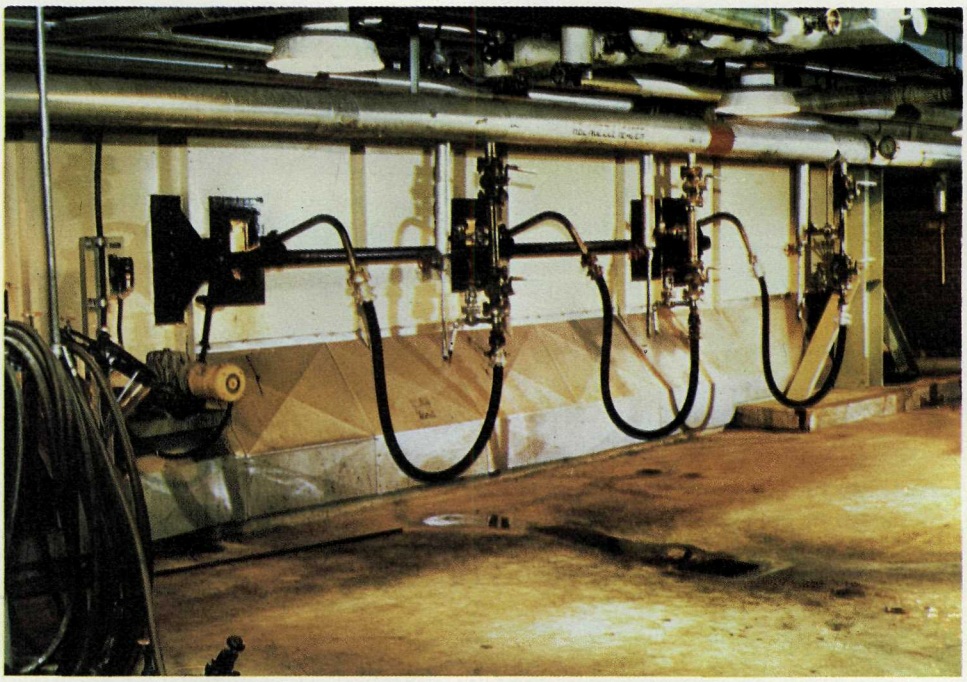
	1969/70	1970/71
Boilers with defective safety valves	17	30
Boilers with overloaded safety valves	4	21
Boilers having severe corrosion or scale	46	98
Boilers having plate defects	30	40
Boilers having tube defects	61	93
Boilers having other serious defects	16	36
Boilers having low water condition	7	8

CHEMICAL RECOVERY BOILERS

	1969/70	1970/71
Total emergency shutdowns	9	28
Total number of additional unscheduled shutdowns of a normal kind	4	10

Complete investigations were made of the accidents and incidents and full reports are on file. Recommendations to prevent recurrence of accidents and the elimination of potential hazards were made as deemed necessary.

S. SMITH, P.ENG.
Chief Inspector



Liquor-firing floor in a typical pulp-mill, inspected by our Safety Engineering Services Division.

Typical control panel for pulp-mill plants, commissioned during the year and inspected by our Safety Engineering Services Division.

REPORT OF THE INSPECTOR OF ELECTRICAL ENERGY

Despite the economic problems that beset the country during the fiscal year 1970/71, the Electrical Energy Inspection Branch experienced a year of extraordinary growth in nearly all areas.

The number of certificates of competency issued during 1970 was 26.8 per cent above that of the previous year. The number of examinations for such certificates was up 38 per cent over the previous year.

In the field of equipment approvals, applications increased 20 per cent and the number of units approved was up 119 per cent.

As a result of the addition of a Technician 3 to the Vancouver office staff, the Plans Inspection Service achieved a current position for the first time in four years. Projects examined increased 21 per cent, involving 96 per cent more drawings than for 1969/70.

Overhead-line permit applications increased 38 per cent and applications to install television equipment on power-lines were up 150 per cent.

In two areas there were decreases; permits issued were down 14 per cent and in consequence the number of projects finally approved without inspection decreased 26 per cent. The number of inspections carried out was up slightly by 1½ per cent.

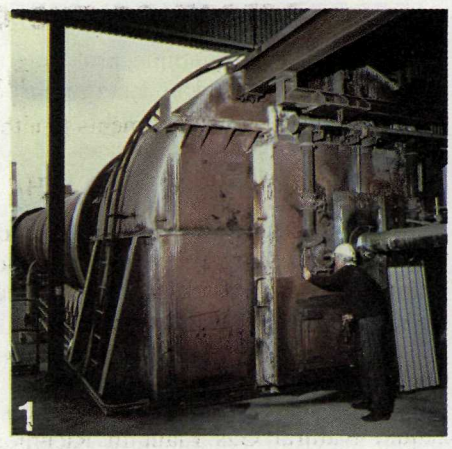
In May 1970 the Branch assumed the task of inspecting premises under the jurisdiction of the Government of Canada under the Canada Labour (Safety) Code. In July we became the electrical inspecting body for the City of Fernie.

Despite authorization to recruit our staff to full strength and to add four field inspectors, all indications point to an approaching year which will strain the resources of the Branch to their utmost.

During the fiscal year the Branch investigated 118 incidents involving 101 fires, and 16 injuries, of which six were fatal. There were also two incidents in which seven cows were killed. Of the fires, 62 were caused by electrical faults in or improper use of electrical equipment, 14 more were probably of electrical origin, 10 were very doubtful (undetermined), and 15 were not caused electrically. Ten fires involved television sets; 14 occurred in trailers.

Of the six persons who died, three were children burned in a fire of undetermined origin, which may have been caused by a small boy neglecting to turn off the power to an electric range after having used it. Two others died while carrying on tree surgery close to energized high-voltage lines. The sixth died when the boom of a machine he was operating touched an energized 7,200-volt primary line.

G. A. HARROWER, P.ENG.
Chief Electrical Inspector



1. The second of two kilns at Lafarge Canada Limited, in Richmond, completed.

2. Shows the operator's view through the sight glass.

3. Control panel for kilns.

The total gas consumption for these kilns is approximately 600,000,000 BTU/hr., or the equivalent to supply gas to 6,000 average homes during a winter season.

REPORT OF THE CHIEF GAS INSPECTOR

THE ACT

There were no amendments to either the *Gas Act* or to the pursuant regulations.

THE BRANCH

Gas inspection services are extended into Highland Valley, Elk River Valley, Cache Creek, Marguerite, and extensions to the Sparwood-Kaiser system.

The general work load of inspections remained fairly high in many areas, particularly in the Surrey-Delta area, despite a recession in the economy.

There was a 30-per-cent increase in the number of new designs checked, but the number of permits issued declined about 7 per cent.

This last year saw the completion and start-up of the British Columbia Hydro Liquid Natural Gas Plant in Richmond and the large Eurocan Pulp and Paper Plant at Kitimat.

Mr. J. F. Helme, P.Eng., joined the Gas Inspection Branch December 21, 1970, as Assistant Chief Gas Inspector.

ACCIDENTS

There were 20 incidents investigated by this Branch, of which one had resulted in a fatality. This was investigated at the request of the Coroner, and was caused by carbon monoxide poisoning in a propane-fired mobile trailer.

There were four explosions—one causing serious injury to the operator and extensive damage to the equipment; the other three caused severe damage to units involved. Poor start-up procedures and the shorting-out of safety controls were the cause of two of the explosions.

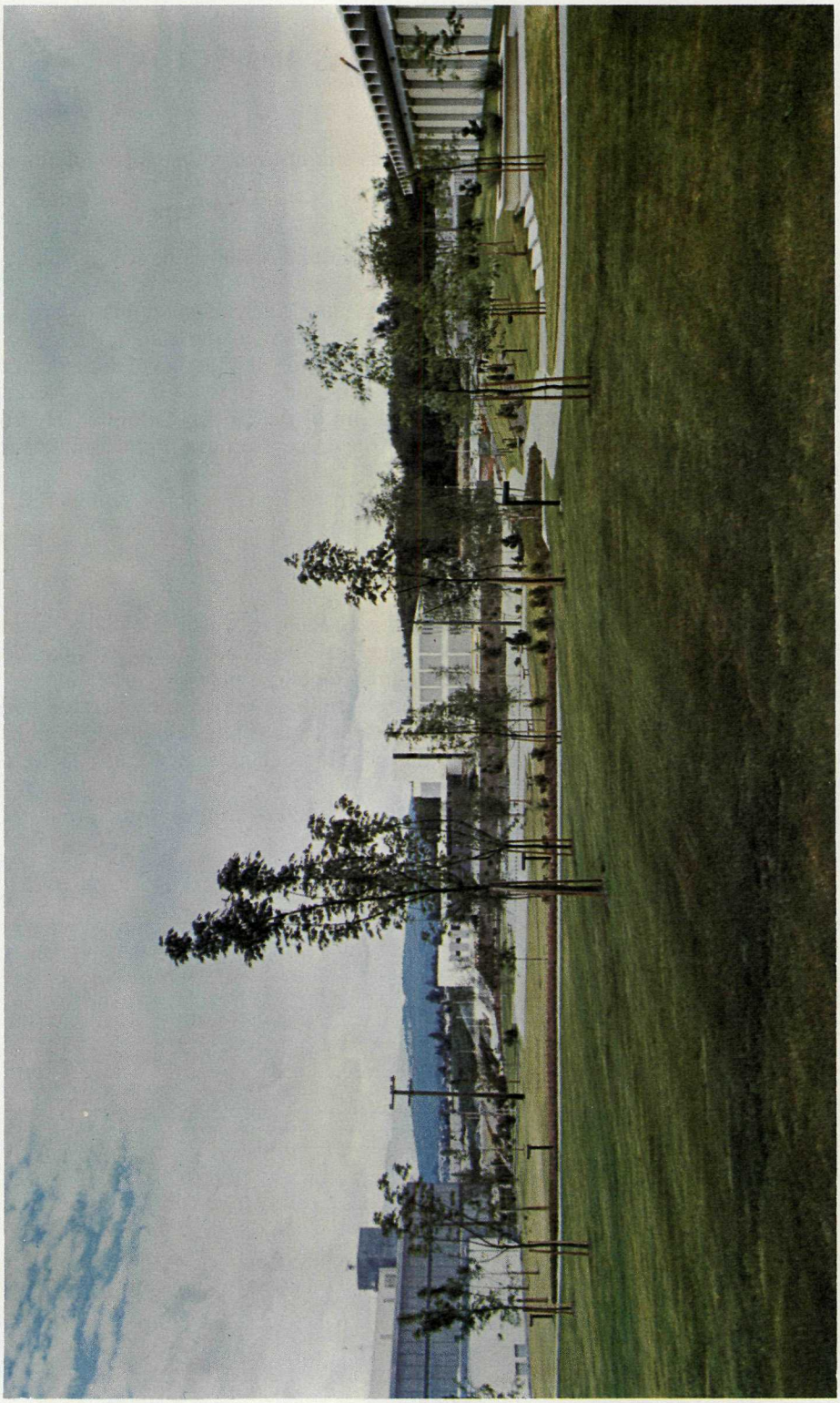
Four gas-meter sets were severly damaged and resulted in fires to the premises.

The remaining incidents were of a minor nature.

SUMMARY OF WORK

	1970/71	1969/70	1968/69
Appliance certification	1,609	1,732	1,494
New designs checked	1,642	1,240	1,210
Gas Codes distributed	820	782	948
Gas-fitters' licences issued	1,994	2,000	1,719
Gas contractors' licences issued	661	700	622
Provisional licences issued	557	650	606
Gas-fitters' examinations	379	316	236
Gas-fitters' re-examinations	94	70	70
Number of gas-fitters passed examinations	232	226	120
Number of gas permits issued, municipalities	5,774	6,383	6,866
Number of gas permits issued by this Branch	15,230	17,257	14,393

W. R. MONTGOMERY, P.ENG.
Chief Inspector



Landscaping at the British Columbia Institute of Technology, Burnaby.

Vocational School, Victoria.

REPORT OF THE COMPTROLLER OF EXPENDITURE

The following pages present in detail the expenditures relating to the construction, alterations, and repairs on the various Government buildings and institutions, etc., coming under the management, charge, and direction of the Minister of Public Works.

A. E. RHODES
Comptroller of Expenditure

STATEMENT OF EXPENDITURES, FISCAL YEAR 1970/71

Administration and Maintenance Votes
(For details, *see* Public Accounts)

	$
Vote 238—Minister's Office	32,070.68
Vote 239—General Administration	361,264.62
Vote 240—Government Buildings (maintenance) (gross)	13,610,709.88
Vote 242—Rentals (gross)	2,729,143.47
Vote 243—Safety Inspection Division	1,069,311.64
Less credits—	
Items recovered from the Department of Education *re* Technical and Vocational Schools (Government Building Vote)	*2,179,089.41*
Items recovered *re* Vocational Training, Energy Board, Curriculum Resources Branch, Mediation Commission, etc. (Rental Vote)	*407,696.90*
	15,215,713.98

CAPITAL

Vote 241—Construction of Provincial buildings (*see* expenditure by building) (gross)	13,348,314.72
Less credits—	
Items recovered from the Department of Education *re* technical and vocational schools	*6,649,802.11*
	6,698,512.61

SUMMARY

Gross expenditure, Department of Public Works—	
Administration and maintenance	17,802,500.29
Capital	13,348,314.72
	31,150,815.01
Less credits—	
Maintenance	*2,586,786.31*
Capital	*6,649,802.11*
Net expenditure	21,914,226.59

VOTE 241—CONSTRUCTION OF PROVINCIAL BUILDINGS

Project No.	Description	Expenditure $
	Abbotsford—	
242-B-4	Brooder House Random Sample Poultry Testing Station	7,166.89
631-B	Fraser Valley Trout Hatchery	54,223.03
461-B-1	Alberni—Government buildings (renovations)	36,050.58
517-B-1	Allison Pass—Living accommodation (Department of Highways personnel)	2,954.87
599-B-1	Alouette River Unit, Haney—Kitchen Stores building	19,305.66
	Brannan Lake School—	
30-B-4	Special unit	5,844.71
30-B-5	Maintenance building	16,039.09
	Burnaby—	
539-B	British Columbia Youth Development Centre	85,184.57
636-B	Dairy Laboratory	35,239.03
645-B	Willingdon Avenue Telephone Exchange	1,244.92
656-B	Motor-vehicle Inspection Station	506,791.38
548-B	Charlie Lake—Alterations to Department of Mines establishment	13,402.03
661-B	Coquitlam—Remand Centre	345,047.73
705-B	Creston—Wildlife Management area, Administration Centre	14,203.53
	Dawson Creek—	
684-B	Weigh-scale station	30,009.43
707-B	Provincial Government building (consultant's fee and site investigation)	90.21
468-B-1	Duncan—Provincial buildings	203,965.16
121-B-5	Essondale—Structural alterations	76,325.50
619-B	Fernie—Government Agent's residence	3,795.81
482-B	Fort Nelson—Government Agent's residence	8,514.54
708-B	Fort St. John—Provincial Government building (consultant's fee and site investigation)	96.65
	General—	
289-B	General expenses	84,089.34
289-B-1	Wages and expenses, Casual Design staff	805,216.31
123-B-19	Haney Correctional Institution garage and maintenance shop (credit)	*932.58*
654-B	Hazelton—Ksan project (credit)	*40,824.54*
499-B	Hutda Lake—Men's Camp	2,432.00
	Jericho Hill School—	
79-B-10	Dormitory unit and development	8,987.52
79-B-13	Playing-fields and ancillary work	827.05
79-B-15	Principal's residence	82.95
10-B-56	Kamloops—Structural alterations	38,494.37
685-B	Kimberley Airport—Purchase of buildings	31,500.00
651-B	Lillooet—Purchase of property and renovations	30,397.00
640-B	Maillardville—Purchase of property and renovations	6,838.86
706-B	McBride—Purchase of property	16,590.75
648-B	Mica Creek—Highway crew accommodations, Shelter Bay, Trout Lake, and Mile 54	1,436.23
	Nelson—	
97-B-4	Courthouse retaining-wall	194.74
625-B	Employee housing	221.12
641-B	Structural alterations in Zone 5	37,421.89
519-B	New Denver—Dormitory alterations	39,329.72
	Oakalla—	
39-B-62	Roads	8,428.98
39-B-70	Central Classification Section alterations and improvements	59,968.14
39-B-73	Security	36,407.14
39-B-75	Licence Shop revisions	21,399.28
39-B-76	East Wing Unit plumbing	13,687.25
647-B	100 Mile House—Department of Highways maintenance establishment	6,612.10
31-B-9	Pearson TB. Hospital—Modifications	13,149.89
479-B	Prince George—Structural alterations in Zone 6	54,450.91
658-B	Quesnel—Department of Highways maintenance establishment	208,513.54

VOTE 241—CONSTRUCTION OF PROVINCIAL BUILDINGS—*Continued*

Project No.	Description	Expenditure $
611-B	Richmond Municipality—Motor-vehicle Inspection Station	14,471.11
	Riverview—	
5-B-102	Alterations and renovations to kitchen and staff rooms, dining-room areas	1,792.14
5-B-116	Landscaping, roads, parking, etc.	18,023.16
5-B-134	Fire-alarm systems	176.22
5-B-138	West Lawn Building, alterations	62,295.02
5-B-139	Fire escapes at Valleyview Hospital and The Woodlands School	7,759.61
5-B-140	Fire equipment	6,054.89
5-B-142	Industrial therapy storage building	14,491.81
5-B-145	North Lawn Building	45,015.42
5-B-146	Conversion of boiler plant	10,116.00
5-B-147	Cable television connections	10,881.27
659-B	Salmon Arm—Department of Highways maintenance establishment	171,909.66
24-B-10	Skeenaview Hospital alterations and renovations	34,876.13
	Tête Jaune Cache—	
655-B	Weigh scale	2,115.40
660-B	Living accommodation	18.92
	Tranquille—	
10-B-12	Water supply and sewage disposal	12,514.96
10-B-57	Renovations to fire-alarm system	5,271.91
8-B-8	Tranquille Farm—Dairy barn	4,230.50
682-B	Ucluelet—Foreman's residence	5,500.00
	Vancouver—	
89-B-3	Provincial Health Building renovations	6,666.02
408-B	Structural alterations in Zone 2	59,755.51
546-B-1	Willow Chest Centre—West elevator replacement	18.21
608-B-1	Laurel House, renovations (home for retarded children)	24,483.40
610-B	Courthouse, Courtroom facilities	35,156.59
634-B	British Columbia Building	528,351.44
649-B	Roads, paths, and parking areas	19,233.61
502-B	Vanderhoof—Department of Highways establishment	4,526.85
	Vernon—	
	Courthouse—	
604-B	Purchase and demolition of property	102.78
617-B	Elevator and alterations	19,685.69
617-B-1	Provincial buildings (landscaping)	21,991.19
	Victoria—	
211-B-1	Materials Testing Laboratory (extension)	5,391.67
292-B	Structural alterations in Zone 1	97,572.52
	Parliament Buildings—	
385-B	Parking facilities	48,355.73
536-B	New electrical distribution system	128,547.51
639-B	Legislative Chamber sound-amplifying equipment	2,217.25
690-B	Renovations to East Wing	36,457.88
464-B	Eric Martin Institute	201,267.77
486-B	British Columbia Museum and Archives Building	164,545.63
487-B	Parliament Buildings Precinct—Acquisition of property	63,690.71
492-B	Motor-vehicle Building, Data Processing Centre	478.32
518-B	Dogwood Building, 1019 Wharf Street	2,660.37
550-B	Motor-vehicle Inspection Station	1,344.28
552-B	Windermere Building purchase	20,000.00
554-B	Glendale Hospital	1,640,975.18
601-B-2	International Airport—Roof repairs to hangars	28,414.27
629-B	Windermere Building—Roofing and parapets	17,182.12
630-B	British Columbia Medical Plan Building—New ventilation systems	2,043.60
643-B	Renovations of Temple Building on Fort Street	3,154.04
683-B	Douglas Building—Renovations to Ministers' offices	16,630.15

VOTE 241—CONSTRUCTION OF PROVINCIAL BUILDINGS—*Continued*

Project No.	Description	Expenditure
		$
	Williams Lake—	
607-B-1	Courthouse	668,139.34
657-B	Department of Highways maintenance establishment	402,489.83
	The Woodlands School—	
7-B-40	Landscaping, fencing, and paving, etc.	2,030.17
7-B-48	Renovations to Centre Building	9,883.17
7-B-50	Renovations to boiler plant	10,335.29
7-B-51	Fire-alarm system	524.96
7-B-56	Renovations to Wing No. 2, Centre Building	303,287.84
614-B	Various districts—Fencing, Department of Highways yards	17,000.00
	VOCATIONAL SCHOOLS*	
	British Columbia Institute of Technology, Burnaby—	
401-B-2	Library	47,888.27
401-B-4	Alterations to (1962) building, including instrumentation and power laboratory	1,644.18
401-B-5	Underground power-distribution system	58,940.28
401-B-7	Roads and ancillary site work	36,872.82
401-B-8	Multipurpose Student Centre	786,453.01
401-B-9	Addition to Food Training Centre	3,207.53
401-B-10	Greenhouse and Animal Holding Building	1,914.84
401-B-12	Extension to culvert	103,107.48
401-B-13	Emergency power system	20,040.82
	British Columbia Vocational School, Burnaby—	
299-B-4	Industrial Laboratory	163,550.22
299-B-5	Heavy-duty diesel mechanics workshop	14,679.81
299-B-6	Alterations to existing building for installation of Curriculum Development Programme (credit)	*861.19*
507-B	Burnaby Vocational—Teacher College	27,920.67
481-B-2	British Columbia Vocational School, Dawson Creek—Auto-body shop, welding-shop, and teaching farm	11,417.05
620-B-1	British Columbia Vocational School, Kamloops—Vocational school	2,900,633.05
412-B-2	British Columbia Vocational School, Kelowna—Cafeteria and training kitchen	113,203.84
	British Columbia Vocational School, Nanaimo—	
231-B-7	Additional floor to existing classroom building	11,935.20
231-B-8	New workshop building	372,036.92
	British Columbia Vocational School, Nelson—	
429-B-1	Central receiving and stores depot	41,647.66
429-B-2	Completion and extension of parking areas	58,407.27
312-B-1	British Columbia Vocational School, Prince George—Sawmill building and conversion of existing classrooms	9,158.51
	British Columbia Vocational School, Terrace—	
407-B	Dynamometer shop in Workshop Building	10,072.01
407-B-1	Dormitory and cafeteria	401,166.81
407-B-3	Central receiving and stores depot	64,015.85
633-B	British Columbia Vocational School, Victoria—Workshop complex	96,741.51
		13,348,314.72

* Credits were received from the Department of Education to offset part of these expenditures.

If it won't roll—make it into a symbol.

TENDERS RECEIVED AND CONTRACTS AWARDED FOR BUILDINGS

"By necessity, by proclivity, and by delight, we all quote"—*Ralph W. Emerson.*

Project No.	Description of Work and Names of Tenderers	Amount	Remarks
5-B-116	*Alterations to Motor Transport Garages, Riverview Hospital, Essondale:*	$	
	Seaward Construction Co. Ltd.	30,733.00	
	Allan & Viner Construction Co. Ltd.	36,090.00	
	Elk Construction Co. Ltd.	37,000.00	
	Lickley, Johnson, Palmer Construction Ltd.	31,453.00	
	K & F Construction Ltd.	29,743.00	
	Commonwealth Construction Co. Ltd.	37,412.00	
	Corvan Construction Ltd.	37,137.00	
	A. W. Gillis Ltd.	31,722.00	Not awarded.
464-B	*Minor Revisions, Eric Martin Institute, Victoria:*		
	H. E. Fowler & Sons Ltd.	30,410.00	
	Cana Construction Co. Ltd.	28,400.00	Awarded.
539-B	*Basement Renovations, Youth Development Centre, Burnaby:*		
	Model Designed Interiors Ltd.	47,793.00	
	Gadicke Construction Co. Ltd.	54,333.00	
	A. W. Gillis Ltd.	38,772.00	
	Commonwealth Construction Co. Ltd.	37,470.00	
	Seaward Construction Co. Ltd.	33,185.00	Awarded.
	K & F Construction Ltd.	36,101.00	
5-B-148	*Alterations to Centre Lawn Building, Riverview Hospital, Essondale:*		
	Seaward Construction Co. Ltd.	61,659.00	
	K & F Construction Ltd.	59,686.00	
	Lickley, Johnson, Palmer Construction Ltd.	56,510.00	
	Commonwealth Construction Co. Ltd.	63,690.00	
	Kelsey Construction Ltd.	59,500.00	Not awarded.
507-B	*Additions to Ventilation System, Vocational Teachers Training College, Burnaby:*		
	A & A Plumbing & Heating Ltd.	22,354.00	Awarded.
	M & M Sheet Metal Works	22,860.00	
	Fred Welsh Ltd.	24,573.00	
5-B-138	*Renovations, Phase 2, West Lawn Building, Riverview Hospital, Essondale:*		
	Byers Construction Co. Ltd.	419,800.00	
	Seaward Construction Co. Ltd.	470,000.00	
	Kennett Contracting Ltd.	515,148.29	Not awarded.
536-B	*Alteration to Electrical Services, Queen's Printer Building, Victoria:*		
	Hume & Rumble Ltd.	15,480.00	
	Camosun Electric Co. Ltd.	13,446.00	
	Denford Electric Co. Ltd.	17,221.00	
	Ricketts-Sewell Electric Ltd.	14,672.00	
	Wyder Electric Co. Ltd.	13,955.00	
	Mott Electric Ltd.	15,777.00	
	Knight & Waring Co. Ltd.	15,985.00	
	Bescor Electric Ltd.	15,522.00	
	Houle Electric Ltd.	13,367.00	Awarded.
401-B-7	*Landscaping and Site Works (1970), British Columbia Institute of Technology, Burnaby:*		
	Spra-Mac Landscaping Ltd.	255,795.00	
	Stevenson Construction Co. Ltd.	215,868.00	
	Bert Murray Landscaping Ltd.	143,600.00	
	A. W. Gillis Ltd.	259,980.00	
	Jeckway Landscaping Ltd.	187,527.00	Not awarded.
10-B-56	*Steel Stack, Tranquille School, Tranquille:*		
	Tryco Steel Co. Ltd.	11,700.00	
	Dominion Bridge Co. Ltd.	26,510.00	
	Alpine Steel Ltd.	15,000.00	
	Kamsteel Engineering Ltd.	10,665.00	Awarded.
	Westeel-Rosco Ltd.	11,661.00	
	Zenith Steel Fabricators Ltd.	16,711.00	
	Barnett McQueen Co. Ltd.	14,650.00	

TENDERS RECEIVED AND CONTRACTS AWARDED—*Continued*

Project No.	Description of Work and Names of Tenderers	Amount	Remarks
554-B-1	*Sewer Connection, Vancouver Island Unit, Wilkinson Road, Saanich:*	$	
	Edco Construction Ltd.	25,950.00	
	Farmer Construction Ltd.	15,961.00	
	Chew Excavating Ltd.	18,974.00	
	A. J. Barr Ltd.	41,583.00	
	W. Campbell Ltd.	15,284.00	Awarded.
519-B	*Extension to Central Heating System, Japanese Pavilion, Youth Centre, New Denver:*		
	Nelson Heating Co. Ltd.	9,895.00	
	Boundary Electric Ltd.	9,150.00	Awarded.
385-B	*Paving Provincial Government Parking-lots, Victoria:*		
	OK Trucking Co. Ltd.	11,665.00	
	Victoria Paving Co. Ltd.	11,114.00	Awarded.
407-B-1	*Covered Way, British Columbia Vocational School, Terrace:*		
	Pine Tree Construction Co. Ltd.	17,511.00	
	Raymond Enterprises Ltd.	21,647.00	Not awarded.
----------	*Alterations to 231 Menzies Street, Victoria:*		
	Patterson Construction Ltd.	19,332.00	
	E. J. Hunter & Sons Ltd.	17,812.00	
	Moncrieff Construction Co. Ltd.	18,992.00	
	J. Bobiak Construction Co. Ltd.	16,160.00	(1)
	Bird Construction Co. Ltd.	18,890.00	
	H. E. Fowler & Sons Ltd.	16,389.00	Awarded.
	Raymond Enterprises Ltd.	22,600.00	
407-B	*Dynamometer Shop, British Columbia Vocational School, Terrace:*		
	Pine Tree Construction Co. Ltd.	21,000.00	Awarded.
	Rowgon Construction Ltd.	25,721.00	
519-B	*Package Pumping and Sewage-treatment Plant, Youth Development Centre, New Denver:*		
	Granby Installations Ltd.	29,935.00	
	Sanitherm Engineering Ltd.	27,016.00	
	West-Pac Utilities Ltd.	25,525.00	
	Seaward Construction Ltd.	21,875.00	
	Fame Construction Ltd.	20,000.00	Awarded.
10-B-12	*Sewage Aeration System, Tranquille School, Tranquille:*		
	Johanson Contracting Ltd.	12,500.00	
	Walker Contracting Ltd.	7,491.00	Awarded.
----------	*Electrical Alterations, British Columbia Medical Plan Building, Victoria:*		
	Hume & Rumble Ltd.	7,816.00	Awarded.
	Wyder Electric Co. Ltd.	8,389.61	
	Camosun Electric Co. Ltd.	8,110.00	
	Terry Sievert	8,933.00	
601-B-2	*Reroofing Hanger 2, Department of Highways, Victoria International Airport, Victoria:*		
	Hays Roofing & Sheet Metal Ltd.	29,770.00	Awarded.
	Playsted Sheet Metal Ltd.	33,400.00	
	Universal Sheet Metal Ltd.	33,337.00	
695-B	*Storage Building, Fish and Wildlife Branch, Penticton:*		
	W. H. Tayler Construction Ltd.	25,680.00	
	Berg Construction	20,800.00	Awarded.
	R. J. Bateman Construction Ltd.	20,845.00	
	Crossroads Construction Co. Ltd.	24,352.00	
	Herrick Construction Ltd.	22,700.00	
97-B-4	*Retaining-wall, Courthouse, Nelson:*		
	Creighton Construction Co. Ltd.	24,900.00	
	Paul Schwab Construction Co. Ltd.	20,740.00	
	Trowelex Concrete Contractors Ltd.	28,788.00	
	Fame Construction Ltd.	18,434.00	Awarded.
	Intermountain Industries Ltd.	18,490.00	
554-B	*Landscaping, Glendale Hospital, Victoria:*		
	G. H. Wheaton Ltd.	161,786.00	
	Cana Construction Co. Ltd.	180,500.00	
	Capital City Construction Co. Ltd.	139,400.00	Awarded.
	Farmer Construction Ltd.	173,700.00	
	Holland Landscapers Ltd.	235,404.00	

1 Withdrew bankrupt.

TENDERS RECEIVED AND CONTRACTS AWARDED—*Continued*

Project No.	Description of Work and Names of Tenderers	Amount	Remarks
231-B-10	*Electrical Distribution System, British Columbia Vocational School, Nanaimo:*	$	
	Ricketts-Sewell Electric Ltd.	152,444.00	Awarded.
	Hume & Rumble Ltd.	154,369.00	
	Camosun Electric Co. Ltd.	158,000.00	
	Mott Electric Co. Ltd.	163,621.00	
	Delmar Electric Ltd.	177,800.00	
	Flanders Installations Ltd.	180,906.00	
5-B-138	*Renovations, Phase 2, West Lawn Building, Riverview Hospital, Essondale:*		
	Ratcliffe & Sons Construction Co. Ltd.	445,000.00	Awarded.
	Burdett Construction Co. Ltd.	486,586.00	
	Seaward Construction Co. Ltd.	465,933.00	
	Gadicke Construction Co. Ltd.	462,672.00	
	Byers Construction Co. Ltd.	469,000.00	
6-B-38	*Dormitories, Colony Farm, Essondale:*		
	Fabtec Structures Ltd.	104,695.00	
	Atco (Western) Ltd.	115,960.00	
	Terrapin Modular Building Systems	94,964.00	
	Condor Construction Co. Ltd.	88,025.00	
	Mod Industries Ltd.	81,151.00	Awarded.
633-B-1	*Cafeteria Building, British Columbia Vocational School, Victoria:*		
	H. E. Fowler & Sons Ltd.	581,742.00	
	Cana Construction Co. Ltd.	582,000.00	
	Farmer Construction Ltd.	564,275.00	Awarded.
	Bird Construction Co. Ltd.	571,880.00	
	G. H. Wheaton Ltd.	570,000.00	
211-B-1	*Addition to Materials Testing Laboratory, Kingston Street, Victoria:*		
	H. E. Fowler & Sons Ltd.	39,854.00	
	K. C. Johnson Construction Ltd.	39,576,00	Awarded.
	G. H. Wheaton Ltd.	41,926.00	
	E. J. Hunter & Sons Ltd.	41,500.00	
617-B	*Renovations, Phase 3, Basement Office, Courthouse, Vernon:*		
	David Howrie Ltd.	84,554.00	
	Gustavus Construction Ltd.	65,937.00	Awarded.
539-B	*Hot-water Tanks, Youth Development Centre, Burnaby:*		
	Brookswood Plumbing & Heating Ltd.	13,300.00	
	Gordon Latham Ltd.	12,115.00	Awarded.
	Aspen Mechanical Ltd.	17,932.88	
	S. M. Fraser Ltd.	15,277.00	

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