REPORT
RAPPORT

FUNCTIONAL REVIEW AND EVALUATION -
BUILDINGS
B. C. REGION (June 22 - 25, 1982)

DECEMBER 1982

Indian and Northern Affairs Canada
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Technical Services and Contracts
Services techniques et marchés

FUNCTIONAL REVIEW AND EVALUATION - BUILDINGS
B.C. REGION

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FUNCTIONAL REVIEW AND EVALUATION - BUILDINGS
B.C. REGION

1.0 INTRODUCTION

1.1 Objectives

The objectives of this functional review were to:

(a) Assess the effectiveness of Regional building construction and maintenance programs.
(b) Assess the appropriateness and adequacy of existing policies, standards, manuals, and guidelines. Identify requirements for additions and revisions to guidelines, manuals, and standards. Review compliance with these documents.
(c) Identify areas where the Region needs assistance.
(d) Provide the Region with background information and interpretation of current Branch studies and programs.
(e) Foster a strong link between Regional and Headquarters staff for the achievement of common objectives.

1.2 Scope

To assess existing building policies, guidelines, manuals, standards and practices as they are applied in the B.C. Region to current building projects and to evaluate their effectiveness. Recommendations are made for revisions or additions to guidelines, manuals, and standards, as well as compliance with these documents. The functional review also included site visits to current school building and housing projects.

1.3 General Procedures for Review

The procedures set out in Report EA-HQ-81-41, "Functional Review, Procedures for Reviewers" was followed in structuring the review.

1.4 Schedule

Date/Time	Events
1982-06-08 to 1982-06-21	Examination of Chehalis School Plans at H.Q.
1982-06-22	
a.m.	H.Q. team travel to Regional Office
p.m.	Briefing Regional Staff on purpose of functional review. Studying documents of projects to be reviewed.
1982-06-23	Visit to Chehalis School and Seabird Housing Project
1982-06-24	File review and interview (start) using prepared checklist as a guide. (See Appendix A.)
1982-06-25	
a.m.	Interview - completion
p.m.	Debriefing on findings and recommendations
1982-06-26	H.Q. Team return to Ottawa

1.5 Briefing and Interviews

On Tuesday, 1982-06-22 the H.Q. review team met with the Regional E&A staff to discuss final arrangements for the site visits the following day. The status and details of the projects to be visited were also discussed, as well as some general aspects of the design, construction and maintenance aspects of regional building activities, and frequently encountered problems of mutual concern and interest.

Regional staff indicated that they lack expertise in the mechanical and electrical aspects of building design, in particular for solar energy projects. They were encouraged to seek assistance from TS&C, Buildings Division when required.

Following the site visits on Wednesday, 1982-06-23, discussions continued, as well as review as required of documents for

Chehalis and Chilcotin Schools, on Thursday and Friday, 1982-06-24 and 25. The interviews concluded with a debriefing for which, unfortunately, the Director, E&A could not be present. However, several brief discussions were held with him during the visit and he was made aware of the major problems found.

Since the housing project was completely Band managed, no documents were available at the regional office.

1.6 Site Visits

On Wednesday, 1982-06-23, visits were made to the following:

a) Chehalis School;
b) Seabird Island Housing.

Chehalis School is a 9-classroom school, plus library and laboratory rooms, to serve kindergarten, elementary and high school to grade 12, all on one floor. A gymnasium is to be added later. It is situated about 80 km east of Vancouver, and is accessible by good paved road. It would be considered a "rural" location. The design was developed by a private consultant retained by the Band, with construction by general contract (lump sum). The school was 75-80% complete at the time of the visit.

Seabird Island is a recently completed (about 1 year old) housing project which consists of 9 housing units in 3 single-storey buildings, located near Chehalis. Most of the units are occupied, but the group was able to visit one vacant unit.

The group also visited a 2-storey 5-bedroom house mainly built by the Band's own contracting firm, on the same reserve. This firm has built about 30 houses so far.

Discussions were held with the Chehalis Band Manager, Mrs. A. Williams and Mr. E. Stenson, (second) Project Manager at the band office. Mr. Stenson accompanied the group to the school. The Band was happy about getting their own school and are

satisfied with it so far. However there had evidently been considerable delay in implementing the project - it was first requested 20 years ago.

It should be noted that this is the first Vote 15 project in the region, and the first with a Band's own Project Manager. Unfortunately, Regional E&A staff were only involved after a consultant was appointed and had prepared a conceptual design and project brief.

Chilcotin school was not visited due to lack of time, however the project was discussed, and documents were reviewed during interviews and subsequently at H.Q. The project consists of adding a new gym with related facilities, to an existing 6-classroom school, converting the existing multi-purpose room into 2 classrooms, providing new boilers and a complete sprinkler system. This project was executed by PWC's own staff.

Photos of Chehalis school and Seabird Island housing are attached as Appendix C and are referred to in the report as necessary.

1.7 Review Participants

a. Regional Participants

Site Visits - A. Somow, Head, Buildings Planning & Projects
- D. Duncan, Building Planning & Projects
- P. Sandland, Power Generation & Special Projects Engineer

Interview - as above, plus:
- P. Adamic, Maintenance Engineering (Part Only)
- J. Bolton, District Engineer, Williams Lake District (Part Only)
- J. Allon, Former District Engineer, Vancouver District (Part Only)

(See Regional Organization Chart, Appendix B)

b. Band Participants

Site Visit - Mrs. A. Williams, Chehalis Band Manager
- E. Stenson, Chehalis Project Manager

c. H.Q. Participants

I. Kalin (Coordinator)
G. Richards
M. Skanes

1.8 Regional Feedback

A draft of this report was forwarded to B.C. Region August 1982 for their review and comments. The Regional comments (memo of 21 October 1982) are attached as Appendix F.

ACTION BY:

2.0 FINDINGS AND RECOMMENDATIONS:

2.1 ADMINISTRATION, MANAGEMENT

(a) FINDING:

Regional E&A was not involved in the planning or administration of the Chehalis School until after an architect was selected and he had completed the conceptual design. There were certain faults with the design, as determined by both the Region at the time and HQ staff during this review. The main problem was the spread-out layout of the plan (see photos nos. 1 to 6). As a result the "perimeter to floor area ratio of this building is .18. The optimum of a school of this size would be .13. This high ratio results in a less energy efficient building" (letter of 1980-10-27, A.M. Somow to Chehalis Indian Band Project Manager). The same letter also requested that the Kindergarten have a separate cloakroom and washroom. These requested changes were not made, but the Region felt they did not warrant corrective action at that stage of the project.

RECOMMENDATION:

The Region should make every effort to become involved as early as possible in every project. Vote 15 projects should be implemented in accordance with Departmental requirements in the Technical Terms & Conditions part of each contribution arrangement. These should stipulate the requirement for professional input and review by Departmental technical staff.

REGIONAL DIRECTOR E&A

(Note: Regional E&A pointed out that this was not a typical occurrence and that they are usually involved much earlier. This situation also does not occur with Vote 10 projects where Regional E&A staff automatically assume the Project Management role).

ACTION BY:

(b) FINDING:

Although the appropriate Departmental guidelines and instructions were sent to the Chehalis Band several major requirements were not provided. These are the need for mechanical ventilation in the classrooms the library, and the provision of at least two boilers. (See Mechanical section of this report.)

RECOMMENDATION:

Plans and specifications should be reviewed at appropriate stages (see DRM 10-7/76.3.1, "Review of Submissions - Preliminary Design and Outline Specifications for Building Projects", and DRM 10-7/76.3.2, "Review of Submissions - Working Drawings and Specifications for Building Projects") by properly qualified staff. In this case review might have been necessary by a mechanical engineer. If such skill is not available in the Region, H.Q. staff could/should be requested to assist. The consultant should then be instructed, via the Band, to make the necessary corrections. — REGIONAL DIRECTOR E&A

(c) FINDING:

Formal completion evaluations were not carried out due to lack of time by available staff. This may cause problems to recur on subsequent projects which could otherwise be prevented.

RECOMMENDATION:

Formal completion evaluations are a necessary part of project management activities and should be instituted. (It is understood that evaluations are now being done.) — REGIONAL DIRECTOR E&A

(d) FINDING:

On Chilcotin school communication with PWC was somewhat inadequate and reporting slow, there was lack of continuity due to changes/re-assignment of PWC personnel. This problem has evidently occurred on other projects also, however cooperation is generally good.

ACTION BY:

RECOMMENDATION:

Such projects should be executed in accordance with DRM 10-7/33, Procedures for Implementing Projects Through Public Works Canada. — REGIONAL DIRECTOR E&A

(e) FINDING:

In the early stages of the Chilcotin school project a search was made for the plans of the existing building which was approximately 15 years old. They could not be found. However it is understood that such situations should not occur on newer projects due to new Technical Documents Management System.

RECOMMENDATION:

All documents should be stored in the new system so they can be found when required. — REGIONAL DIRECTOR E&A

(f) FINDING:

Although the Chilcotin project was completed last Fall, as-built drawings have not yet been received from PWC, although DRM 10-7/35.3 calls for their provision at time of acceptance of the project.

RECOMMENDATION:

PWC should be advised that this is not satisfactory. A request should be made to PWC to provide these at once, and that in future they should be provided as called for above. This should be called for in project specifications. — REGIONAL DIRECTOR E&A

ACTION BY:

(g) FINDING:

Cost estimates provided by PWC for the Chilcotin project kept increasing over the 14 month period indicated in the file. The first estimate given, 1979-06-14, was for $760,000. Six months later (1979-12-14) the estimate increased 7.9% to $820,000. After another 6 months it was increased a further 7.5% to $881,500 (Class "C" estimate). 2 1/2 months later (1980-08-12) it was increased again by 9% to 972,600 (Class "B" estimate) the amount of the T.B. approval, and the actual contract (Oct. 1980) was for $963,500, 26.7% higher than the first estimate above. However, it is worth noting that the contract was very close to the final estimate given.

RECOMMENDATION:

While some escalation of cost estimates is normal, PWC should be reminded of the above record and asked to improve their estimating. — REGIONAL DIRECTOR, E&A

(h) FINDING:

Cost estimates for Chehalis school building, and percentage increases were as follows:

- "D" estimate - 1979-12-19: $897,500)) 13.5%)
- "C" estimate - 1980-06-05: $1,018,500)) 8.7%)
- "B" estimate - not on file)
- "A" estimate - 1981-02-20: $1,107,000)) 48.9%))
- Tender - 1981-04-10: $1,648,568)) 49)
- "A" estimate - 1981-05-04: $1,653,000) (revised)) 13.9%)reduction;
- Contract - 1981-08-24: $1,420,156) 28.3% (negotiated) above firs "A" est.

ACTION BY:

These estimates were prepared by quantity surveyors for the consultant. Increases up to original "A" estimate were due to inflation. The large increase in tender price and revised "A" estimate was due to market conditions (scarcity of bids and sub-contractors).

RECOMMENDATION:

Estimates should better reflect existing market conditions. — REGIONAL DIRECTOR E&A

(i) FINDING:

In seeking to compare costs for these projects with the TS&C Cost Manual the following facts were discovered:

- gym costs are given in the manual for extremely large gyms only. Costs are required for more common, smaller sizes such as at Chilcotin.
- school costs are given either for elementary schools only, or secondary schools only, with large differences. Combined elementary and secondary schools, such as at Chehalis are believed to be constructed frequently and such cost data is required.

RECOMMENDATION:

TS&C Cost Manual be revised to include necessary data as indicated above. — COORDINATION SERVICES DIVISION, TS&C BRANCH

(j) FINDING:

The Project Control Chart used on both projects by B.C. regional is a very good feature (See Appendix "D") taken from DRM 10-7/34.2. It summarizes on one page in chart form at the beginning of the project, the main milestones of a building project, their intended completion dates, all district and regional offices involved in each milestone with specific involvements indicated. The Project Manager can then tick off each action completed and the date.

ACTION BY:

RECOMMENDATION:

All regions should be encouraged to use similar charts, if not already in general use (previous functional reviews in other regions have not indicated such general use). — TECHNICAL SERVICES DIRECTORATE, TS&C BRANCH

(k) FINDING:

The multiple housing units at Seabird Island (see photos 51 to 71) and the five-bedroom house (see photos 71 to 77) were in very good condition and appeared to fulfil their functions very satisfactorily. The Band and the occupant of the latter appeared very happy with the buildings. The projects were completely executed by capable Band members with no DINA E&A input.

RECOMMENDATION:

Bands with the necessary skills should be encouraged to carry out such projects. All bands should be assisted to acquire such skills. — TRAINING STAFF, ALL REGIONS

ACTION BY:

2.2 GENERAL TECHNICAL:

(a) FINDING:

DRM standards and guidelines are not always followed by PWC. Whether or not they are followed seems to depend on the individual PWC project manager. Thus the purpose for which they were developed is not always achieved.

RECOMMENDATION:

PWC should be advised that these are to be followed in all cases. — REGIONAL DIRECTOR, E&A

(b) FINDING:

The regional staff felt that new guideline designs, resource and detail drawings would be useful for community buildings, band halls and offices, particularly for use by district offices. In regard to modification of existing material, if to be used by Bands they should be suitable for use by less technically qualified small contractors on small projects.

RECOMMENDATION:

In developing future work plans these items should be included. — BUILDINGS DIVISION

(c) FINDING:

With regard to master specifications GMS is used, DINA specifications are not. What is needed, as above, are specifications which are shorter and more suitable for smaller projects. At present contractors either do not bid or bid high for such projects.

RECOMMENDATION:

DINA master specifications for buildings should be revised, or new ones written, to meet this need. — BUILDINGS DIVISION

ACTION BY:

(d) FINDING:

In response to HQ staff query as to what support the Region would like from the Buildings Division, the answer was in post-evaluation of projects and in technical review of important projects. HQ staff advised that both were available on request.

RECOMMENDATION:

Regional staff should request such assistance where warranted, i.e. a genuine need exists, particularly in the mechanical and electrical disciplines. — REGIONAL E&A

ACTION BY:

2.3 ARCHITECTURAL

(a) FINDING:

The school at Chehalis is a very pleasing building aesthetically (see photos), however a number of practical aspects of the design were ignored or overlooked, as mentioned elsewhere in this report, e.g. energy efficiency of plan, lack of ventilation in classrooms, etc. Two examples illustrated by change orders are as follows.

a) Change order 14 for $3,558 involved relocating the sprinkler main behind a special "ventilated" bulkhead at the library, outside the main wall of the building (see photo no. 28), together with a heating line to protect it. This was necessary due to a conflict between the intended route for the main and a beam. There is some danger of both lines freezing in case of a prolonged failure of the heating system, partly due to inadequate insulation of the bulkhead.

b) Change order 18 for $2,445 was for "trimming of roof trusses" due to settlement during erection. Although this work was covered in the specifications the contractor had not included it and was allowed an extra.

RECOMMENDATION:

Better and more stringent review of the plans and specifications during design, and of change orders during construction, should be carried out, particularly as regards mechanical and electrical work. As indicated elsewhere, where necessary, headquarters assistance should be sought when and as required. Where a change is due to consultant error (as in a) above) consideration should be given to having the consultant share the resultant cost. Where a contractor has made an error in his bid (as in b) above), this should normally be his own responsibility.

REGIONAL DIRECTOR E&A

ACTION BY:

(b) FINDING:

The gym addition at Chilcotin was built using a pre-engineered metal building. Such buildings often have problems in continuity of vapor barriers and thermal breaks in insulation. These factors are of more concern in colder climates, but are also of some concern here. In this case space was lost due to the need to provide a furred-out dado in front of the "columns" in order to avoid bumping into them during games, etc. One advantage of metric dimensioning was also lost (or excessive precision used) in that the bays are dimensioned as 6021 mm, with overall length of 25,079 mm.

RECOMMENDATION:

Pre-engineered buildings for schools should not be used without over-riding reasons of cost and/or schedule, which are often questionable. This applies particularly in colder climates. In metric dimensioning rounded numbers should be used. PWC-BC should be advised.

REGIONAL E&A; BC AND OTHER REGIONS

(c) FINDING:

The changing rooms at Chilcotin are not very close to the gym. One of the stair railings at the new Lobby is 600 mm away from the right side wall, which both wastes part of the stairway and restricts its use.

RECOMMENDATION:

PWC should be advised of these factors and asked to use better planning in future projects. Such factors should also be caught during design reviews.

REGIONAL E&A

(d) FINDING:

The quality of architectural drawings for Chilcotin school is generally low and they are difficult to read. On both projects the quality of the specifications is not first class with errors, inconsistencies between drawings and specifications and duplication of data on drawings and in specifications. Some examples are:

ACTION BY:

Chilcotin: Section 9590 - gym floor sleepers to be fir; drawing A11, pine or fir; pads 10 mm rubber compressible to 1.5 mm (?!) vs. 6 mm PVC. The wall base covering the expansion space of the floor is molded rubber which can be damaged, metal would be more satisfactory.

- Section 7213 calls for "blanket" mineral wool insulation while drawings show batts between studs. RSI values are given here and drawings show thicknesses, RSI 4.9 (R30), 200 mm (8") vs. 250 mm (10") on drawings.

- Section 7830 calls for floor hatches of aluminum plate with extruded frames in art. 2.2; and prime paint for steel in art. 2.1, para. 6.

- Section 8710, calls for bifold doors and for cremone bolts; neither are required according to the drawings.

- Section 9511, Acoustic Tile, in art. 2.1 polyethylene film is specified, but no indication is given why or where this is required.

- In the Finish Schedule there are two "V" floor finishes, "varnish" and "vinyl or rubber".

- Section 13126, art. 2.1 calls for fiberglass batt insulation for walls; art. 3.2 calls for application with adhesive; there is no application specified for polystyrene roof insulation.

- Detail AD3 bound into specification shows games lines in Imperial while all other documents are metric.

- larger scale plan on drawing A8 shows a skylight, but no size is given. The specification (Section 7811) gives the size, the materials are specified twice in 2 different articles. It refers to section 6100 for the curb, but this is not specified there. No details are shown of the skylight and it does not appear on the sections or elevations.

ACTION BY:

Chehalis: "Scope" clauses are used in the specification, some very detailed, e.g. 9F, Painting. The latter lists some self-evident exclusions, i.e. glass and chrome are not to be painted. Current good specification writing practice is not to use scope clauses because of the danger of omissions.

- Section 9B calls for a one-hour fire resistance rating for gypsum wall board. Gypsum board alone does not have such a rating, only complete assemblies, i.e. walls or floors have such ratings.

- Section 6A duplicates data, e.g. it calls for "Domtar No. 15 Asphalt Felt ...". and "Domtar asphalt primer ...", "Manufacturer Domtar Construction Materials Ltd."

- Section 6A also refers to the 1977 National Building Code although the specification is dated January 1981.

- In details roof deck and blocking are shown as preservative treated. This is not necessary and is a considerable needless expense.

- Section 2A calls for sand fill below asphalt, the drawings indicate gravel.

- Section 6B calls for 3/4" x 7 1/8" wood siding, and gives metric lumber sizes as (e.g.) 75 x 300 mm and 150 x 150 mm. The latter are direct metric equivalents of the imperial nominal sizes rather than the actual sizes required by correct metric practice.

RECOMMENDATION:

Such obvious errors should be picked up in reviews of working drawings and specifications. The above illustrates that it is not sufficient to follow GMS format. GMS philosophy and practice (which includes normal good specification writing practice) also must be followed. PWC should be advised and requested to improve in future.

REGIONAL E&A

ACTION BY:

(e) FINDING:

Counter in Chehalis Store Room 120 and vanities in washrooms have no splashbacks (see drawings A9, A10, D7/13 and photos Nos. 32 and 33). However detail 10 on drawing A10 calls for a splashback in the Store Room.

RECOMMENDATION:

It is normal good practice for such counters to have splashbacks. Their absence will cause dirty and unsanitary conditions from water splashed over the tops during use, when they are washed, and from general use. Such omissions should be pointed out during document reviews. The Band should be advised and at least in the Store Room the contractor should be instructed to provide the splashback at no charge.

REGIONAL E&A

ACTION BY:

2.4 MECHANICAL

FINDINGS:

(a) Chehalis School

The material and workmanship employed on the project is good and the consultant's design has been adhered to.

The rambling layout of the building has necessitated above-average runs of piping for the plumbing roughing-in, the hydronic heating system and the fire sprinkler system. A more compact building design would have resulted in lower installation costs for mechanical services and lower annual heating fuel costs (due to reduced exterior wall area exposed to outside temperatures).

No provision was made in the design to extend mechanical services to the proposed future gymnasium, although discussions with the mechanical consultant during the post inspection interviews indicated that the capacity of the domestic water heating equipment (both conventional and solar) was selected with this in mind.

The present hot water demand is estimated at 700 liters per days. The propane gas fired water heater can heat 795 liters of water per hour.

The solar domestic water heater (which was designed for this project but has not yet been tendered or installed) has 26 solar panels and is capable of heating 1000 liters of water per day. Following discussions with Mr. Sandland, we were advised that the region would retender the solar project using a standard package solar system to provide approximately 40% of the present daily hot water requirements. If the gymnasium is built at a later date, consideration will be given at that time to installing a separate solar water heater package to meet anticipated load requirements. (See regional letter July 6/82, Appendix E.)

The space accommodation standards DRM 10-7/83.3.4 clause 5.3 para 4, requires that two heating boilers be installed for space heating. Only one was

ACTION BY:

provided. (See photo No. 39.) The building is located in a temperate climatic zone and a boiler outage for a period of several hours could be tolerated. A prolonged outage might require emergency action.

None of the seven classrooms nor the large library were provided with mechanical ventilation, as required in DRM 10-7/83.3.4 para 5.4. The possibility of overheating and poor ventilation for a large percentage of the school term in these areas was brought to the mechanical consultant's attention during the interviews. (This is particularly possible due to large cupolas which will act as heat sinks (see photos Nos. 21 to 23). He agreed that this could occur and that mechnical ventilation should have been provided. He further stated that the consulting architect had requested him to delete these systems for economic reasons. The Region advised that they will ask the architect for a design proposal for the required ventilation systems.

(b) Chilcotin School

As only a plan review was carried out for this project, the quality of material and workmanship provided cannot be evaluated.

The design of the mechanical systems is in keeping with current design practices, with the exception of the gymnasium ventilation system which uses boiler water in the fresh air heating coil rather than anti-freeze. Although the safety shut down controls provided should reduce the possibility of coil freeze-up, they do not eliminate this hazard.

The solar domestic water heater has 52 solar panels with a total net surface area of 82.68 m^2 producing an average daily hot water supply in excess of 2000 liters. The daily estimted hot water consumption is 800 to 1000 liters. Solar systems are normally sized for from 40% to 60% of the average daily hot water consumption. If this had been done, a system having approximately 15 solar panels with a total net surface area of 24 m^2 would have been provided.

ACTION BY:

Mr. Sandland has discussed the matter with PWC and they have confirmed that the system is oversized. Mr. Richards has recommended to Mr. Sandland that consideration be given to incorporating changes in the solar system to permit the surplus energy to be used for space heating. This possibility will be examined when a consultant is engaged to study energy conservation retrofit proposals under the E.M.R. energy conservation retrofit program.

RECOMMENDATIONS:

It is recommended that consultants' terms of reference for all future projects include copies of all appropriate sections of DRM 10-7/87: "Space Conditioning in Buildings", with specific emphasis on DRM 10-7/87.2.4: "Space Conditioning Systems for Buildings" describing the degree of technology to be supplied for a specific building type and size. — REGIONAL E&A

It is further recommended that these guidelines be used by regional staff, as a technical evaluation standard when reviewing the consultants mechanical systems designs at the various production stages. — REGIONAL E&A

ACTION BY:

2.5 ELECTRICAL

(a) FINDING:

The drawings for Chehalis School have a number of discrepancies the consultant missed in his review. These will not affect the quality of the installation, being obvious to the electrical sub-contractor. If not corrected on the as-built drawings however some confusion could arise for O&M staff in the training and familiarization process. These are: (1) fire alarm riser diagram symbols shown for manual stations and bells are interchanged, with respect to the drawing symbol schedule for these devices; (2) the feeder to panel 'C' shown on drawing E-1 as 3 of No. 4 R90, should read 3 of No. 3 R90; and (3) corridor lighting control refers to panel L-1, this should presumably read panel B.

RECOMMENDATION:

It is recommended that the Region advise the consultant of these corrections and ensure that they are made on the as-built drawings. — REGIONAL E&A

(b) FINDING:

The drawings and specifications for Chilcotin School extension provided as an "in-house" design by P.W.C. regional office were quite satisfactory, and no errors were found. The G.M.S. format was used. A riser diagram of the intrusion alarm and fire alarm systems was not provided.

RECOMMENDATION:

It is recommended that the Region ensure that P.W.C. include the riser diagrams on the as-built drawings. — REGIONAL E&A

(c) FINDING:

At Chehalis School the space provided as an electrical "closet" for electrical service entrance and distribution equipment is very crowded and

ACTION BY:

appears inadequate for ease of extension of the electrical system in case of future expansion of the building. The installation has passed provincial inspection. (See photos Nos. 37 and 38.)

Discussion with the local Provincial Inspector indicates that they do not usually excercise the same degree of concern on "private" property as they do on "public" property with regard to future space requirements.

RECOMMENDATION:

It is recommended for future projects (with particular emphasis on Vote 15 projects) that consideration be given to adequate electrical room space with respect to ease and method of future extension of the electrical system. Regional Project Officers should stress this in their briefs to consultants, or to Band Project Managers for their consultants. DRM 10-7/83.2.2 which is scheduled for revision and updating this year should incorporate this requirement.

BUILDINGS DIVISION, TS&C BRANCH

(d) FINDING:

At Chehalis School the Intercom and Audio system does not provide two-way communication between the control centre and classrooms and offices; it provides only for one-way communication, that is, from the control center to the classrooms/offices but not the reverse, as is usual practice. The apparent reason given by the Project Manager is a particular need for "direct contact" between personnel when called and to avoid "listening in" on classroom conversation.

RECOMMENDATION:

It is realized that the client often has a legimitate preference for the operation of a given system. However it is noted that usually the standard two-way communication is more efficient in the administration of a school.

REGIONAL E&A

ACTION BY:

Where the need for an intercom/audio system can be justified, it is recommended, that the Regional Project Officer/Manager bring to the attention of future consultants and in particular those of Vote 15 projects for their clients consideration, the use of DRM 10-7/83.4.2 "Intercom and Audio Systems for Schools". It describes the basic two-way systems, including full privacy/anti-monitoring with respect to classroom conservation/activity.

(c) FINDING:

From review of the classroom lighting design for Chehalis school some concern exists regarding adequate lighting levels and uniformity. The design is unusual consisting of fluorescent single lamp strip lights but appears to be aesthetically suitable for the architectural features of the ceiling. (See photos Nos. 35 and 36.) Furthermore all fluorescent ballasts are specified as 'A' sound rated, but the high-output 800 ma version of the strip-lights installed have a 'B' sound rated ballast which may be unsatisfactory (too noisy) for such use. A light meter was taken to the site but the incomplete installation of the lighting did not permit energizing the lamps, so no reading could be taken.

RECOMMENDATION:

It was recommended that the Regional Project Engineer (Power Generation and Special Projects) ensure that the electrical consultant take the neessary light meter readings to verify his design, and also assess the sound level of the ballasts to ensure that it is not objectionable. Appropriate action as necessary should be taken to rectify the potential problems, such as additional lighting and remote mounting of any offending ballasts.

REGIONAL E&A

(f) FINDING:

At Chehalis School, "Care, Operation and Start-up" instructions prescribed in GMS section 16010, item 6, were not included by the consultant. These instructions outline the responsibility of the

ACTION BY:

electrical sub-contractor to provide instructions to the "Engineer" and school O&M staff by his specialist installers of the fire alarm, intercom/audio and master clock systems (as applicable), and the electrical distribution system and controls. (It is noted that the mechanical specifications have outlined this in item 1.01.13, page 6, "Demonstration and Instructions to Owner").

RECOMMENDATION:

It is recommended that the Regional Project Officer/Manager ensure that consultants include these instructions in their electrical specifications; and for future projects appropriate Regional/District O&M staff be designated as the "Engineer" referenced above, to ensure that these instructions are carried out and effectiveness assessed in relation to any proposed or ongoing training under the Maintenance Management System for the reserve. — REGIONAL E&A

It is noted in this regard that Chehalis reserve is being used as a pilot project for the Maintenance Management System, which is to include the school. The Region has provided terms of reference to the Band, to hire a "consultant" for on-site training of O&M personnel. The foregoing discussion may be of some benefit in the actual training program and should be considered as applicable.

(g) FINDING:

No documentation could be found that the various electrical tests prescribed in the specification for both Chehalis and Chilcotin schools, have been satisfactorily performed.

RECOMMENDATION:

It is recommended that the Regional Project Manager/Officer ensure for future projects that a copy of the results of the tests, specifically outlined in GMS section 16010 items 22, 25 and 26 be placed on the regional project file. Where the "Engineer" is to witness various specified — REGIONAL E&A

ACTION BY:

tests as required above, it is recommended that this be the consulting electrical engineer for Vote 15 projects, and as P.W.C. designates for Vote 10 projects.

(h) FINDING:

A telephone conversation with the principal of Chilcotin School indicates that the contractor had provided adequate O&M instructions, and that she was satisfied with performance of the various electrical systems, except that the main fire alarm system had gone into a trouble mode. She advised that the District Maintenance Engineer from Williams Lake had arrived and was awaiting the fire equipment representative to resolve the problem.

Furthermore a detector (ionization type presumably) protecting the woodworking shop via its own small panel in the Economics area goes into alarm when the shop is used, requiring it to be silenced, and re-set after woodworking activity has ceased.

RECOMMENDATION:

It was recommended that the District Maintenance Engineer have the fire alarm representative look into this problem as well. Region to follow-up on both problems and ensure a successful solution. — DISTRICT & REGIONAL E&A

June 4, 1982

FUNCTIONAL REVIEW

BUILDINGS - SPECIALIST

B.C. REGION

TERMS OF REFERENCE

1. Objectives

The objectives of this functional review are to:

(a) Assess the effectiveness of Regional building contruction and maintenance programs.

(b) Assess the appropriateness and adequacy of existing policies, standards, manuals, and guidelines. Identify requirements for additions and revisions. Review compliance with these documents.

(c) Identify areas where the Region needs assistance.

(d) Provide the Region with background information and interpretation of current Branch studies and programs.

(e) Foster a strong link between Regional and Headquarters staff for the achievement of common objectives.

2. Scope

To assess existing building policies, guidelines, manuals, standards and practices as they are applied in the British Columbia Region to current building projects and to evaluate their effectiveness. Site visits will be included to assess delivered facilities. Recommendations may be made for revisions or additions to guidelines, manuals, and standards.

3. Procedure

The procedures as set out in Report EA-HQ-81-41 entitled "Functional Review, Procedures for Reviewers" (April 1981) will be followed in structuring the review.

The review will be scheduled to include:

a) Pre-functional review preparation:

i) Projects (Vote 15) selected in conjunction with Regional staff for review are Chehalis School and Seabird Housing Projects.

ii) The following related to the selected building project will be reviewed prior to or during the visit:

(a) relevant reports including those on feasibility and investigations,

(b) project briefs and submissions which could include PPDC, design briefs, consultant terms of reference, and T.B. submissions, and

(c) contract documents including plans, specifications, claims, etc.

b) a site visit including discussions with District and Band technical personnel;

c) interviews with technical staff and management in the regional office;

d) a review of applicable project files;

e) debriefing of regional staff; and

f) a written report.

4. Review Team

The review team will include I. Kalin (Team Leader) (architectural), M. Skanes (electrical) and G. Richards (mechanical), all of the Buildings Division, H.Q.; A. Somow and D. Duncan, and others as may be required, of the regional office.

5. Relevant Documents

The following documents will be utilized as points of reference for the review:

5.1 Project Documents

a) project files;

b) other files containing relevant information (finance, correspondence, etc.)

It should be noted that all documents and records relating to project planning (e.g. studies, reports, plans), initiation, approvals, implementation, reporting, contracting, supervision, payments, construction documentation, acceptance, and project management should be available. As well, any correspondence from bands, districts, or program units concerning any of the project stages, and/or the final product will be reviewed.

5.2 Policies, Standards, Guidelines, Systems and Procedures

The following documents will be considered during the review:

a) DRM 10-7/34.3, "Guidelines for the Preparation of a Project Brief";

b) DRM 10-7/38, "Contracting for Engineering and Architectural Consulting Services";

c) DRM 10-7/42.5, "Guidelines for the Preparation of Contribution Arrangements with Band Councils";

d) DRM 10-7/76, "Administration of the Building Design Process";

e) DRM 10-7/79, "Building Design - General";

f) DRM 10-7/80, "Building Design - Indian and Inuit Affairs";

g) DRM 10-7/83, "School Design and Construction - Indian and Inuit Affairs";

h) Other DRM 10-7's applicable to building design, construction & maintenance generally and for the facilities being examined, e.g. DRM 10-7/84, 85, 86, 87, 88 & 90;

i) Project Control System (including Project Accounting System);

j) Capital Planning Process;

k) Contribution Arrangements:

(i) Telex J.D. Nicholson/RDG's (15/7/80) re "Technical Terms and Conditions."

(ii) Letter G.Y. Sebastyan/Directors E & A (16/11/79) re: "E & A Role in Implementation of Vote 15 Capital".

(iii) Directive J.D. Nicholson/RDG's (14/3/80) re "Payments for Capital Projects Implemented under Vote 15".

(iv) Directive B.J. Vienot (J.D. Nicholson)/RDG's (4/3/80) re: "Contribution Arrangements".

(v) Letter R.J. Fournier, R.D. Brown/RDG's (12/6/79) re: "Approved Terms and Conditions, Grants and Contributions".

(vi) Letter R.J. Fournier, R.D. Brown/RDG's (19/4/79) re: Approved Terms and Conditions, Contribution Arrangements".

l) Report EA-HQ-78-136 "Recommended Standard Technical Terms and Conditions for Contribution Arrangements with Indian Bands" (June/1979);

m) T.B. Administrative Policy Manual, Chapter 148, "Cost Control of Projects" (December, 1979);

n) T.B. 1981-26 "Amplification of Policy on Cost Control of Projects";

o) Government Contract Regulations;

p) Departmental Financial Signing Authorities Manual;

q) How to Get Project Approval.

6. Methodology

The team, including a Regional representative, will conduct a site visit and interview applicable district and band personnel on the project site and if necessary in district office.

In the Regional Office, a workshop approach will be used, with Technical Services and Contracts Branch and Regional personnel working together, following the checklist attached as Appendix 'A'.

Each project will be reviewed separately, with the regional personnel who are familiar with the project.

Where time limitations and/or the complexity of the project prevents an in-depth review, a sampling process will be utilized, focussing on identified problem areas.

7. Agenda

The sequence of activities for the review is as follows:

a) Preliminary Planning: Preparation of Terms of Reference for the review, agree on tentative schedule and itinerary.

b) Review of documents: Headquarter's team will review plans and specifications for the selected project before travel to British Columbia.

c) Briefing: Headquarter's team leader and applicable Regional personnel, to discuss terms of reference, and finalize schedule.

d) Site Visit: Headquarter's team members, applicable regional, district and band personnel, to review facility and discuss requirements satisfaction, problems etc.

e) Review of Project(s): Appropriate team members, to review project files and conduct interviews with appropriate regional personnel.

f) De-Briefing: Headquarters team members, Regional Director E&A, and appropriate regional personnel, to discuss team's findings and potential recommendations; review report writing process and schedule.

g) Report: Draft report will be prepared by Branch Staff within 4 weeks after site visit. After Regional review of this draft report, a final report will be prepared and issued to the Regional Director, E&A, by the Director General, Technical Services and Contracts Branch.

8. Schedule

It is proposed to conduct the interviews and debriefing in the regional office during 22-25 June 1982 as follows*:

Date	Events
1982-06-22	a.m. H.Q. team travels to Regional Office
	p.m. Briefing Regional Staff on purpose of functional review. Studying documents of projects to be visited
1982-06-23	Visit to Chehalis School and Seabird Housing Project
1982-06-24	File review** and interview - start
1982-06-25	a.m. Interview - completion
	p.m. Debriefing on findings and recommendations
1982-06-26	H.Q. Team returns to Ottawa

Notes: * Plans and specifications, and key file documents will be reviewed at H.Q. before the trip if received in time.

** Files of at least one Vote 10, DPW Project will be reviewed.

APPENDIX "A"

FUNCTIONAL REVIEW CHECKLIST

A. Site Visit

a) From the Department's point of view: Is the facility functioning satisfactorily, and in good condition? If not, what are the causes, and how is this being dealt with?

b) Is the Band satisfied with the facility? Does it satisfy requirements? Is it what was expected/requested? Was it delivered on-schedule?

c) What was the Band's involvement in the implementation process, and was this satisfactory from their point of view? (Planning, requirements definition, design, construction, acceptance and hand over). If not, how can the process be improved?

d) What was District's involvement in the implementation process, and was this satisfactory from their point of view?

e) What do the end users like/dislike about the facility?

f) Have any major problems/defects developed in facility since hand-over?

g) What was done during construction and hand over to facilitate subsequent operation and maintenance of the facilities? (Maintenance staff training, O&M Manuals, as-constructed drawings, etc.).

h) Were any problems encountered during construction phase, with personnel, effects on other facilities (infrastructure), materials etc.?

B. Regional Office Interview

1. Project Related Questions

a. Name of project? Vote 10 or 15?

b. Cost - at project approval
- at PPDC ("C" estimate)
- estimate before tender
- contract price
- cost of additions or deletions
- final cost
- explain discrepancies

c. (i) Who originated Project Initiation Document (PID)? Did E&A have input?

(ii) When was the project manager appointed? Was he given terms of reference?

(iii) What are they?

(iv) How was design capacity established?

d. What input was obtained from:

(a) Education?
(b) Local Government?
(c) Others (lands, planning, finance, training, bands)?

e. (i) What pre-planning information was required (e.g. survey, existing plans, access, water, sewer, hydro, population surveys) and from whom?

(ii) Is there a central location to access information?

(iii) What feasibility studies were needed?

(iv) Who developed project brief and terms of reference for designers?

(v) Who had input, and how was the contents of the brief and terms of reference decided?

f. Timing - planning milestone dates
- actual milestone dates
- discrepancies and why
- completion schedule met?

g. At what stages were TB approvals sought? Time required? Problems? (Normally: (1) at either project approval or project brief stage (2) to hire consultants (3) at contract award (4) during construction for cost variation).

h. At what stages were approvals by band, responsibility centre manger, and director sought? (Normally: (1) Objectives (2) PPDC (3) Project brief (4) Prelim. design, and (5) 100% design completion)

Time required?

i. (i) How often was the consultant's design reviewed by E&A team and what were typical comments?

(ii) What sort of difficulties were encountered?

j. Are designs based on community plans? Were optional design solutions developed, and how were these ranked?

k) Were the appropiate levels of cost estimates made? How, and by whom? Did they include life-cycle costs? How were risks taken into account?

l) What sort of difficulties were encountered with contract award if any?

m) (i) How often and by whom was the project inpsected during construction? Type of inspection?

(ii) Were there any problems during construction?

(iii) How were they overcome?

n) At what stage was the project manager/officer appointed? Were his terms of reference spelled out and understood? Was adequate time available to carry out all required functions?

o) Were regular physical and financial reports prepared? Were they on time? What information did they contain? How were they used?

p) Was the Project Control System used? If so, was it effective? What adaptations, if any, were made and why? What was the impact on capital and/or O&M funds, and what was the effect on the schedule?

q) Were any design changes made during or after the project? If so, why? What was the impact on capital and/or O&M funds, and what was the effect on the schedule?

r) What hand-over procedures were used? What material and information was turned over to the user?

s) What deficiencies were identified on project completion? What procedures were used to correct these? Are there any outstanding deficiencies?

t) Do you do formal completion evaluations? If not, why not? If yes, review copy of evaluation.

u) Has the building fulfilled the requirements of the Program? Of the band? How was this determined?

v) Has a maintenance program been established for the building or will one be established in future? If already established, copy of the program.

w) Were the facilities visited and inspected after a period of operation? If so, what was learned about the implementation process?

x) Any other issues arising from the field trip.

2. Project Implementation (Vote 15 Projects)

a) On what basis was the decision made to implement the project under a contribution arrangement?

b) To what extent was E&A involved in project planning, cost estimating and project schedules? Developing the terms and conditions of the contribution arrangement? Assessing the Band's capabilities?

c) To what extent was the Band able to manage the project themselves, and how much support was needed from E&A?

d) Did the Band appoint a project manager? When? What was his (her) financial authority?

e) Were technical terms and conditions attached to the contribution arrangement when it was signed, or were they added later?

f) To what extent was the Band involved in developing the technical terms and conditions? Was there a project brief? How was it developed and used?

g) Were the technical terms and conditions used effectively in achieving project facilities within acceptable time, cost, quality and performance constraints?

h) Did the technical terms and conditions cover the following points?

(i) project description,
(ii) scope of work,
(iii) applicable standards,
(iv) basis of payment,
(v) financial control,
(vi) physical control,
(vii) records and project files,
(viii) cost estimates,
(ix) competent staff,
(x) project schedules/cash flow,
(xi) reviews and inspections,
(xii) contract administration, and
(xiii) O&M requirements

If omitted from the technical terms and conditions, were they included in the contribution arrangement?

i) How was the consultant's design reviewed? By whom?

j) How was site supervision carried out? By whom?

k) What site visits were made during or after construction by the Project Manager?

l) Were there any charges/deviations from the original contribution arrangement and/or technical terms and conditions? How were they handled? How did they affect the project in terms of scope, schedule, quality and/or cost?

m) Were they any delays (difficulties) in processing payments to Bands? If so, what were the problems, and how were they resolved?

3. General Questions

a. Which DRM's guidelines related to buildings are used and what are they used for:

(i) Preparing project briefs?

(ii) Writing terms of reference for engaging consultants, P.W.C.?

(iii) Guiding in-house designs?

(iv) Developing contracts?

(v) Conducting project supervision/management?

(vi) Checking adequacy of building designs?

(vii) Other?

b. With regard to giudeline drawings:

(i) Were any used? Which ones?

(ii) Were they useful?

(iii) If not, why not?

c. With regard to the development of DRM guidelines, specifications, resource and detail drawings, and guideline housing, school, and community buildings, where do you see the need for the develoment of:

(i) New material?

(ii) Modification of existing material?

d. In which area do you see the material mentioned above having the most impact:

(i) Quality of building?

(ii) Cost of building design, construction, operation, and maintenance?

(iii) Technology transfer and update?

(iv) Other areas?

e. (i) Do you use the Government Master spec? When? If not - why not?

(ii) Long or short form?

(iii) What problems did you encounter in its use?

f. Which federal/provincial/municipal codes are applied to building designs, construction, and maintenance?

g. Are new buildings turned over to the clients/occupants with a briefing, as-built drawings, O&M manuals, etc.?

4. When and to what degree is training given to staff who are respsonsible for building O&M? Who identifies need?

5. (a) What is the most frequent building maintenance problem?

(b) Most costly?

(c) How are these problems dealt with?

6. To what degree has a formal O.&M. program been set up for buildings?

7. Are there particular problems associated with the construction of buildings in remote areas:

(a) Transportation?
(b) Design suitability?
(c) Labour and material?
(d) Operation and maintenance?

8. Do the design criteria for buildings cover energy conservation aspects including:

(a) Energy budget?

(b) The use of solar energy?
To what degree?
Standard?

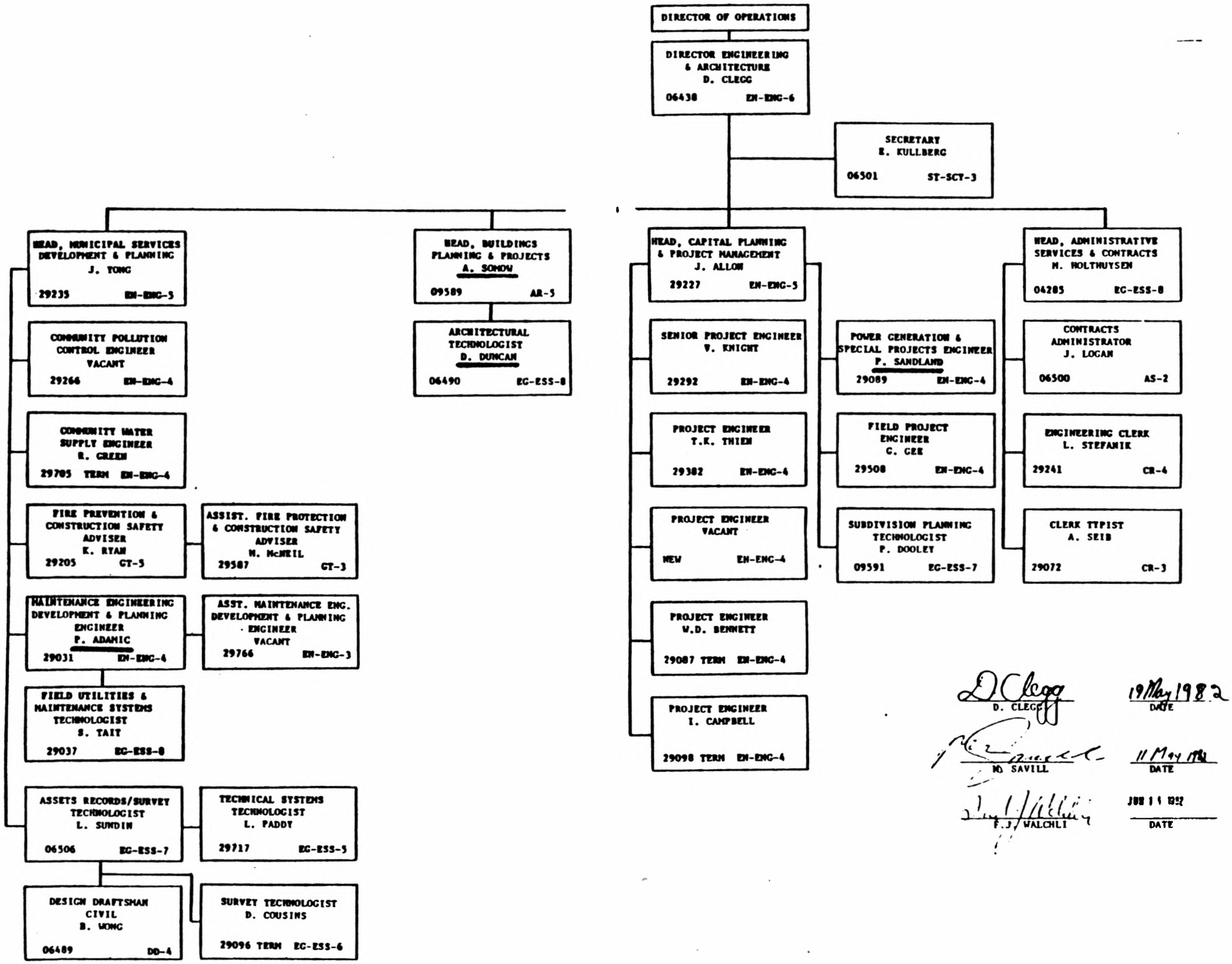
(c) Other?

(d) Typical example?

9. In what other areas not mentioned earlier can Buildings Division staff provide support to the B.C. Region?

APPENDIX "B"

B.C. REGION - ENG & ARCH ORGANIZATION



APPENDIX "C"

CHEHALIS
SCHOOL

1.

2.

GENERAL

EXTERIOR

VIEWS

3.

APPENDIX "C"
CHEHALIS
SCHOOL

4.

5.

GENERAL

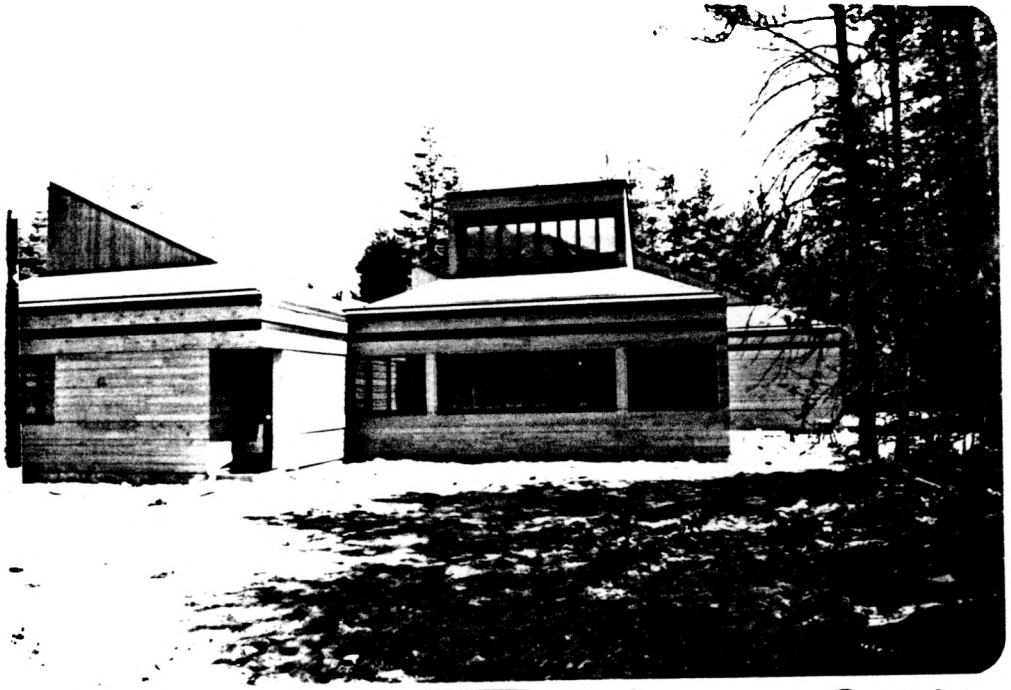
EXTERIOR

VIEWS

6.

APPENDIX "C"

CHEHALIS
SCHOOL



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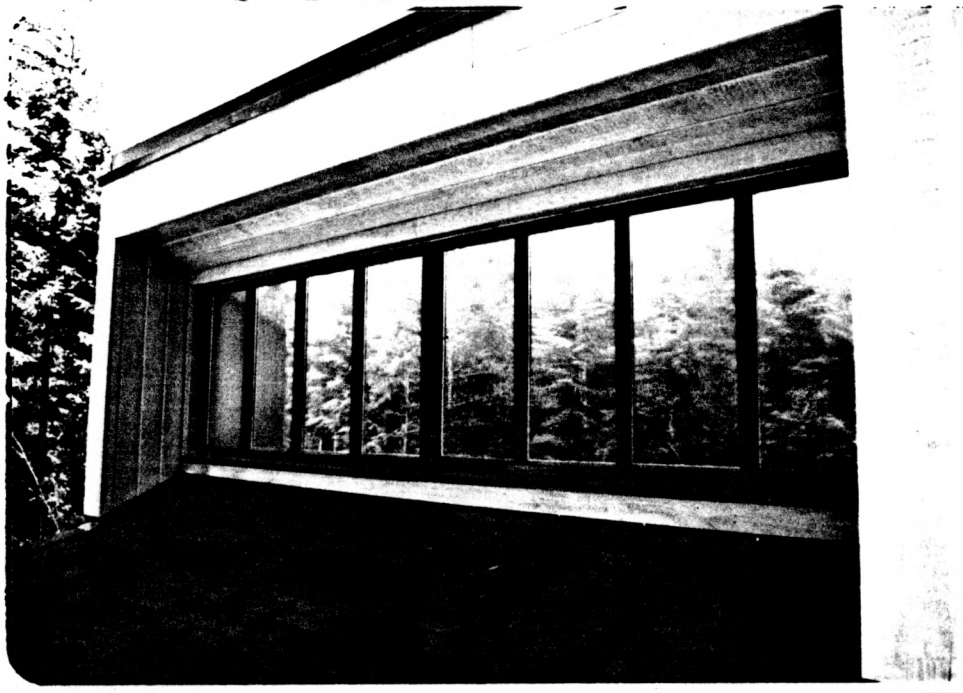
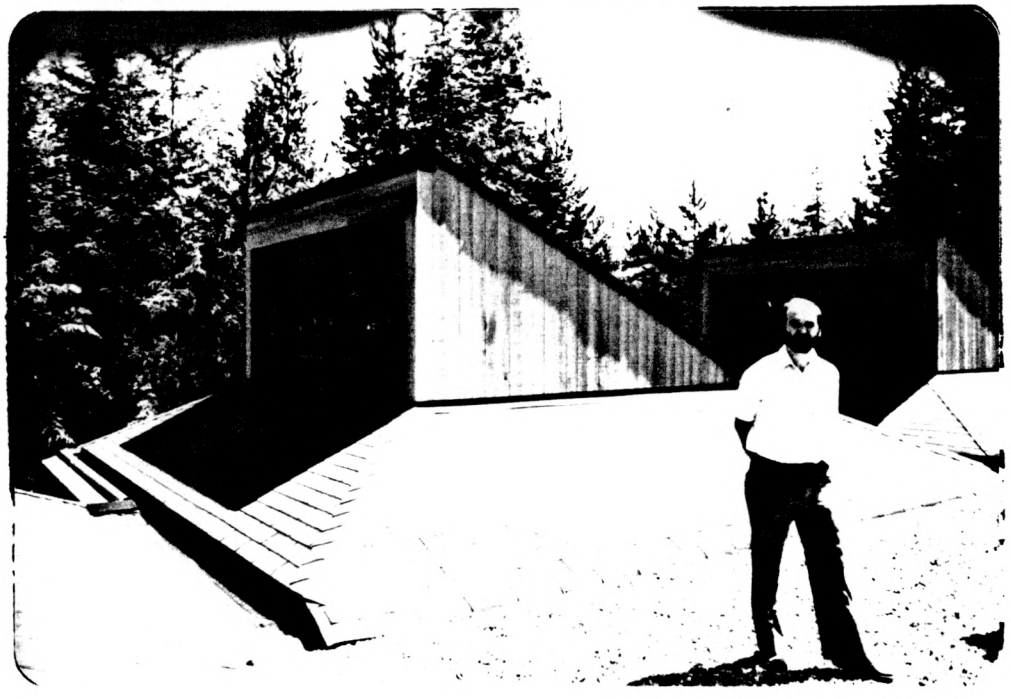


CUPOLA

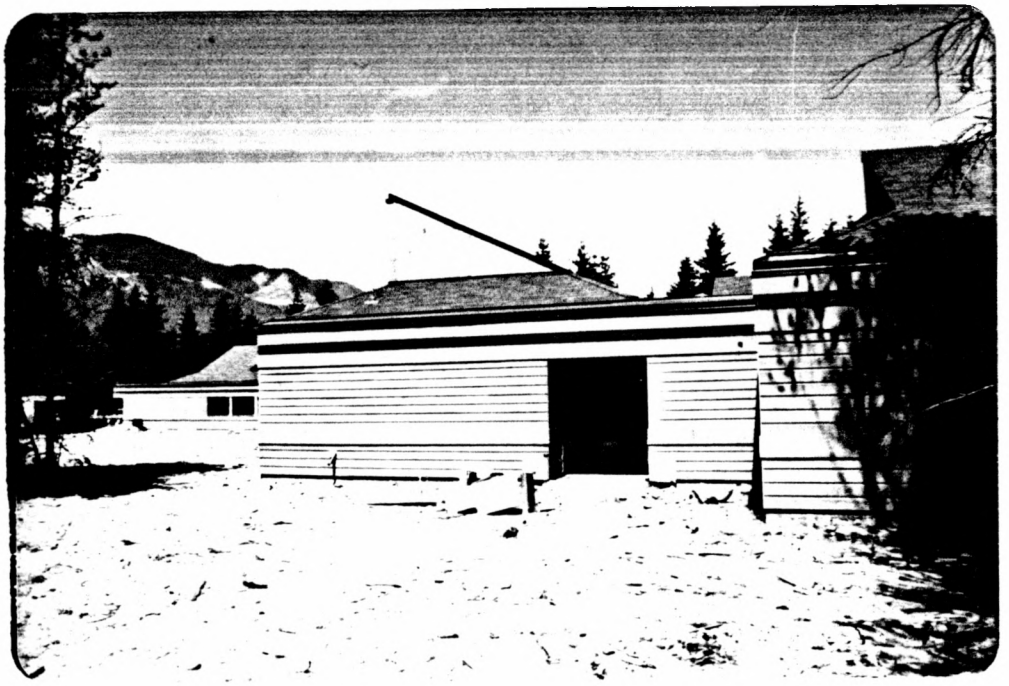
DETAILS

8.



9.

APPENDIX "C"
CHEHALIS
SCHOOL



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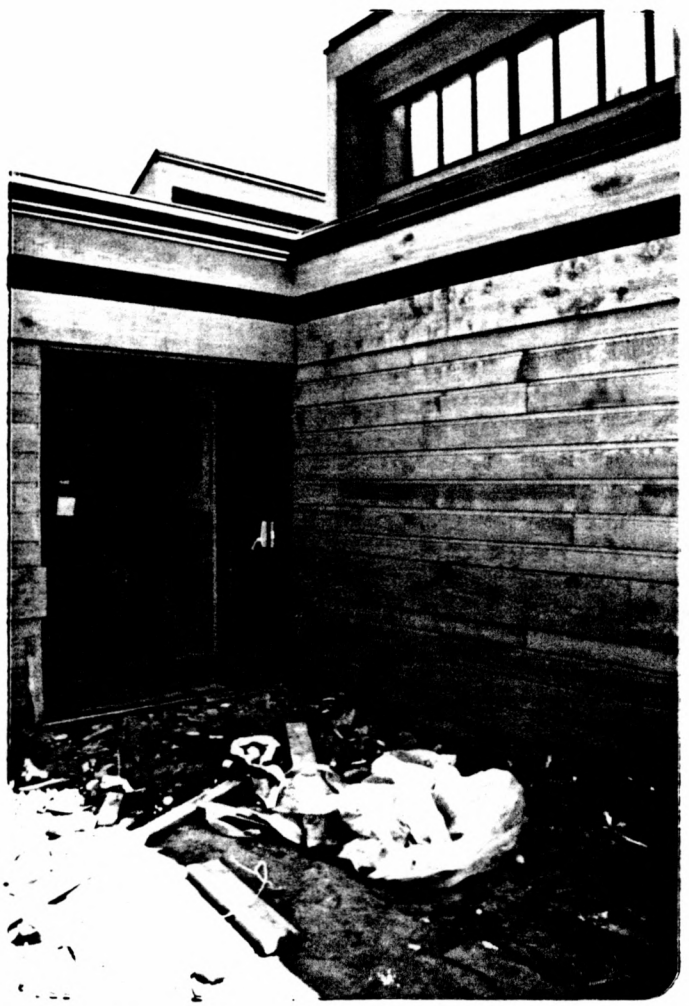

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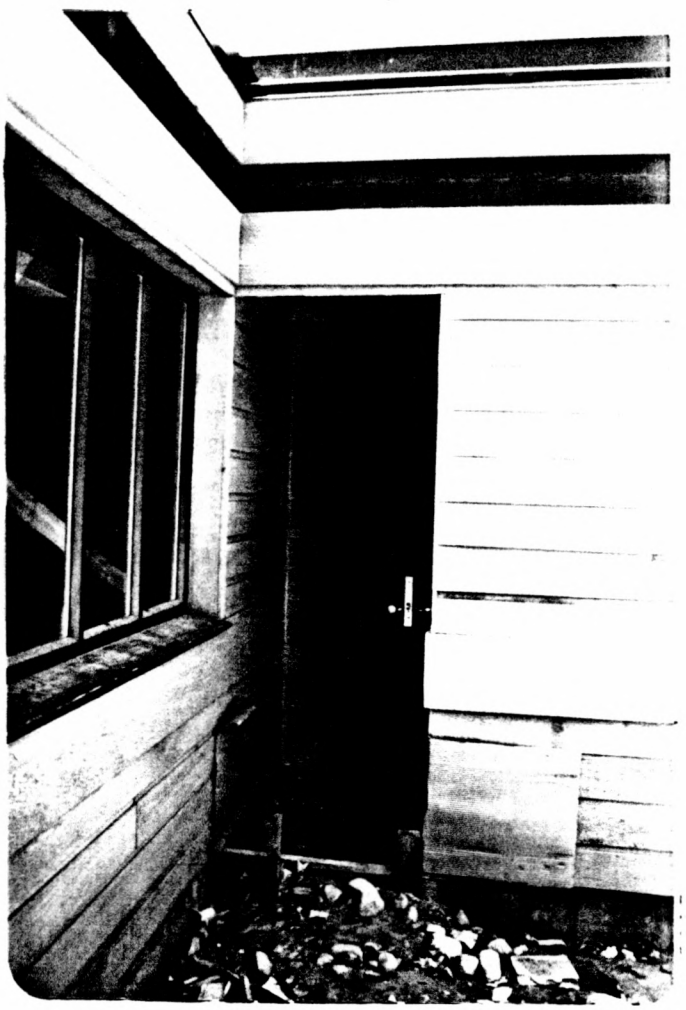
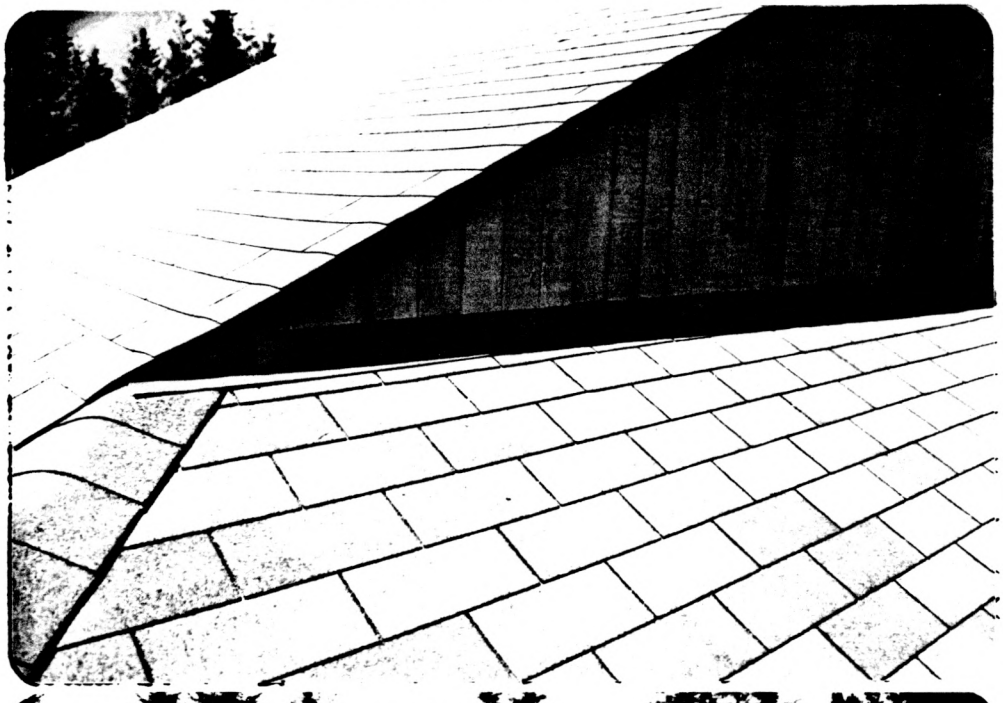


12.

EXTERIOR DOORS

13.



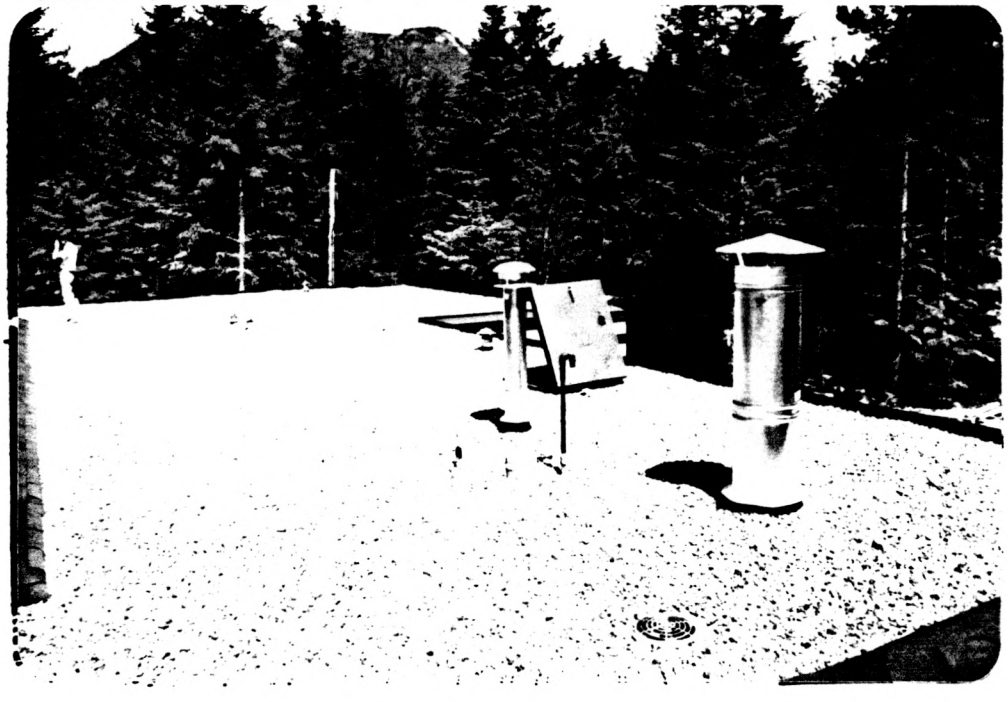
14.

GENERAL

VIEWS

OF

ROOF



15.

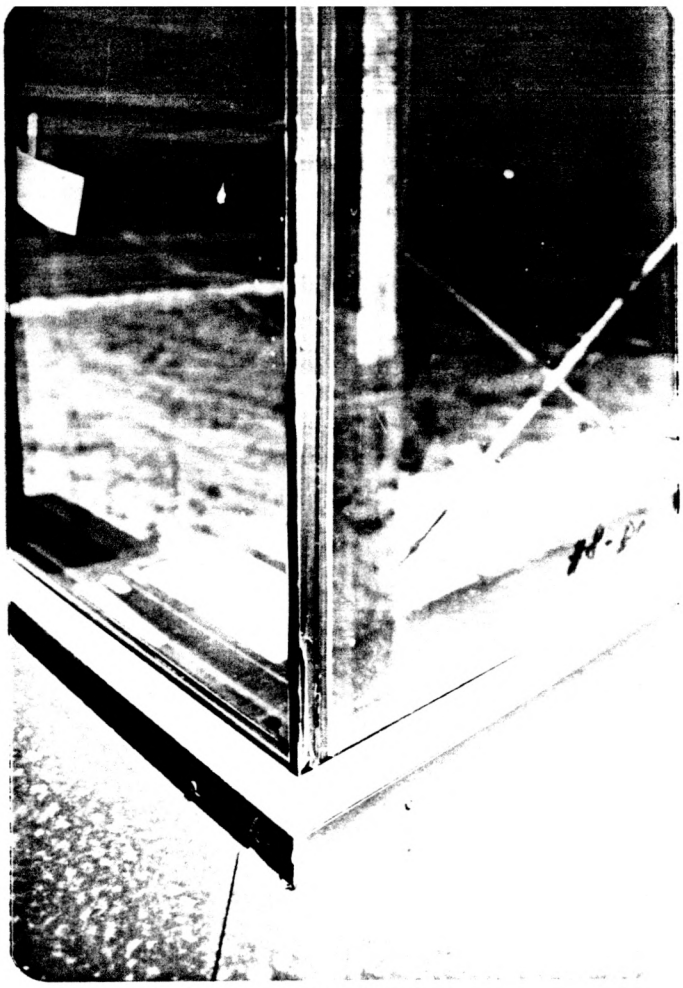
APPENDIX "C"

CHEHALIS
SCHOOL

16. ROOF

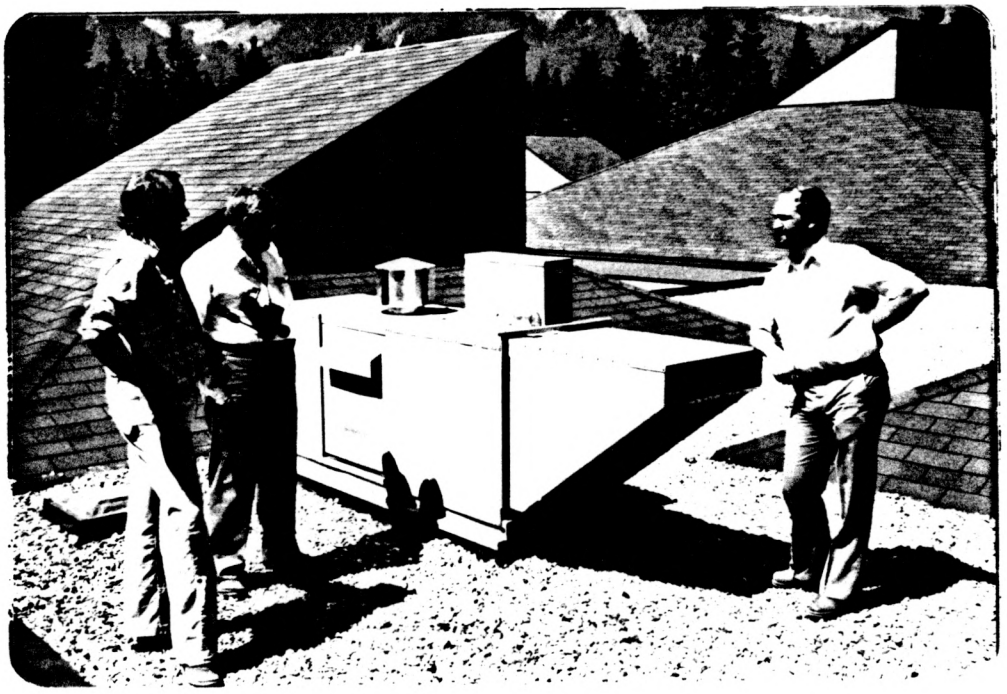
17. SCUPPER DETAILS

18. ROOF SCUPPER

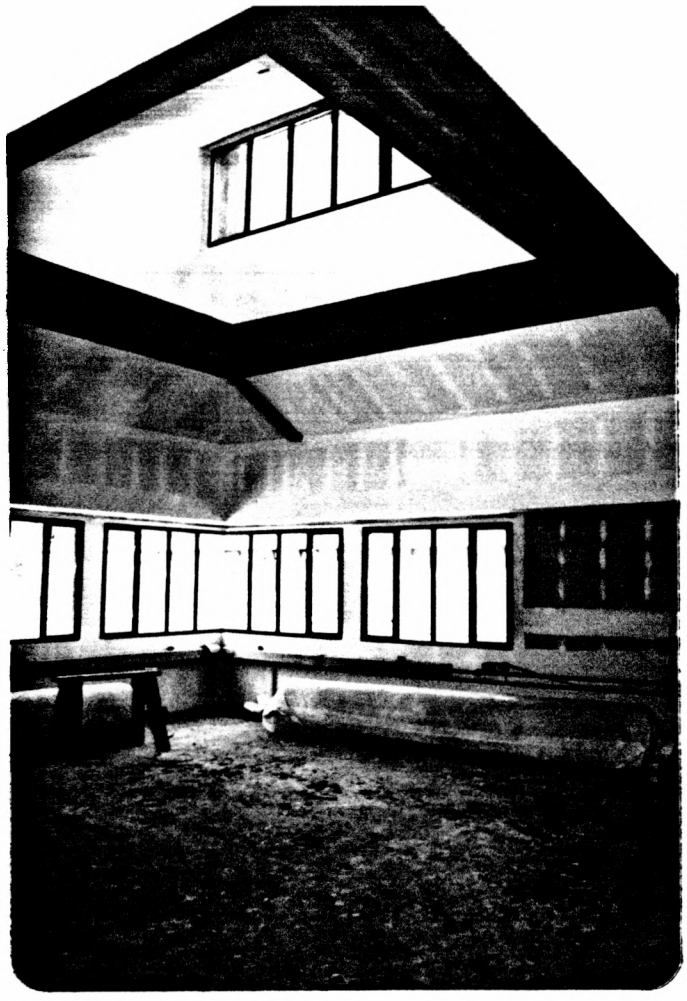


19. GLASS-TO-GLASS CORNER

APPENDIX "C"



20. AIR HANDLING UNIT

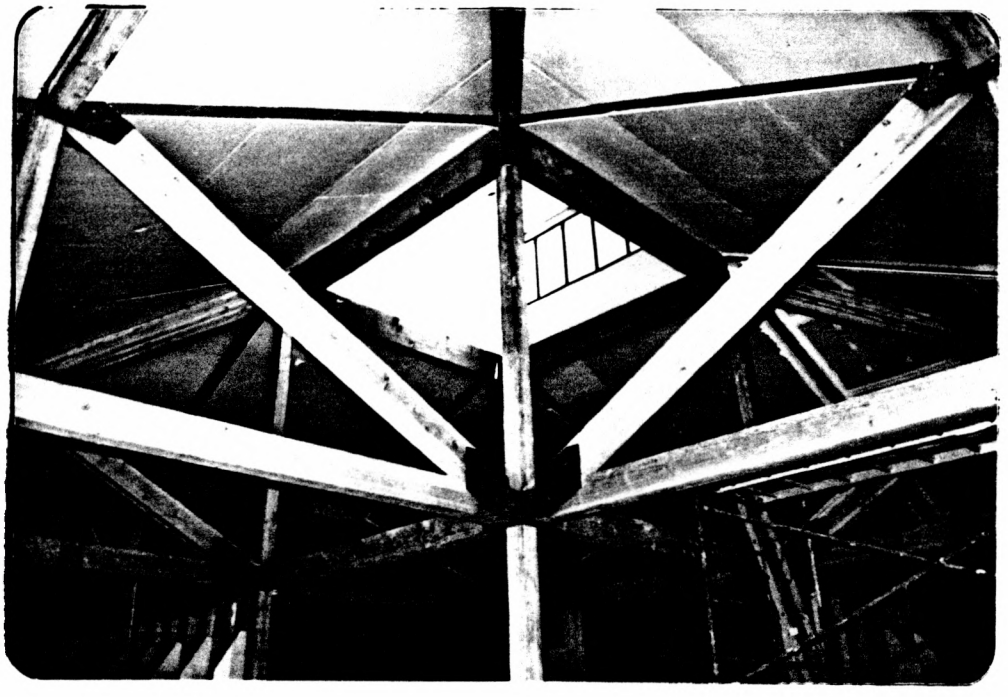


21.

22.

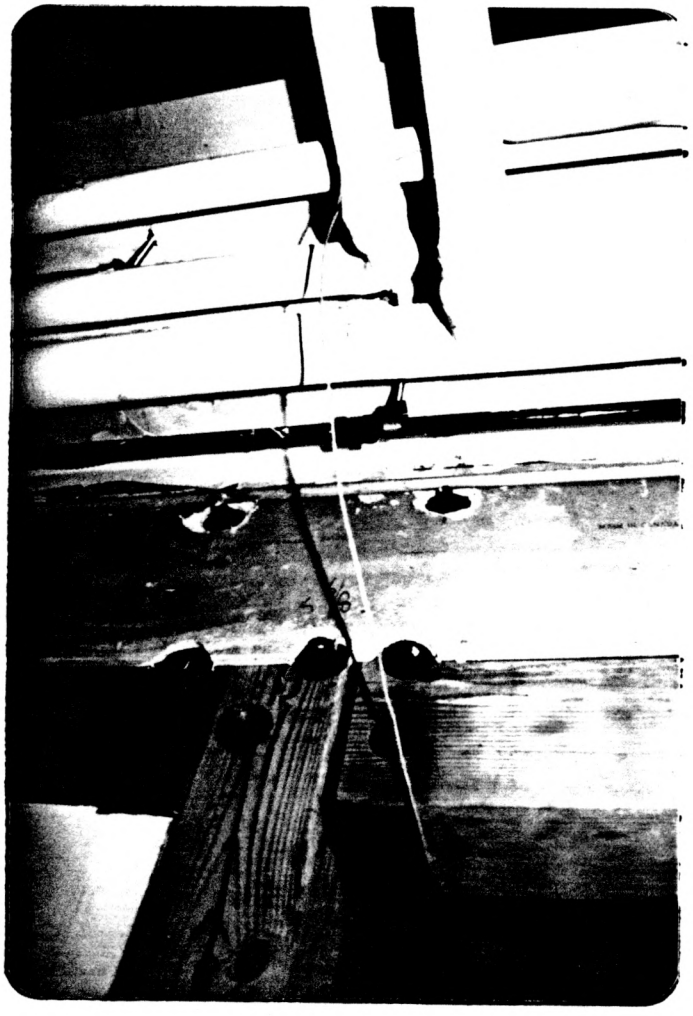
INTERIOR OF CUPOLAS

APPENDIX "C"

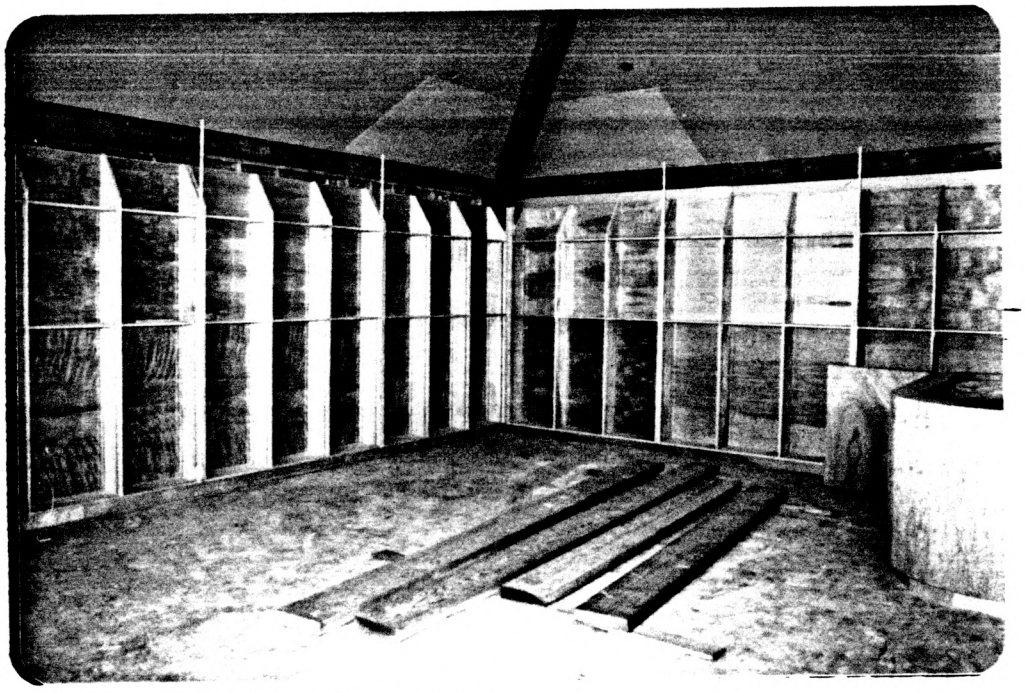


23. ROOF TRUSSES

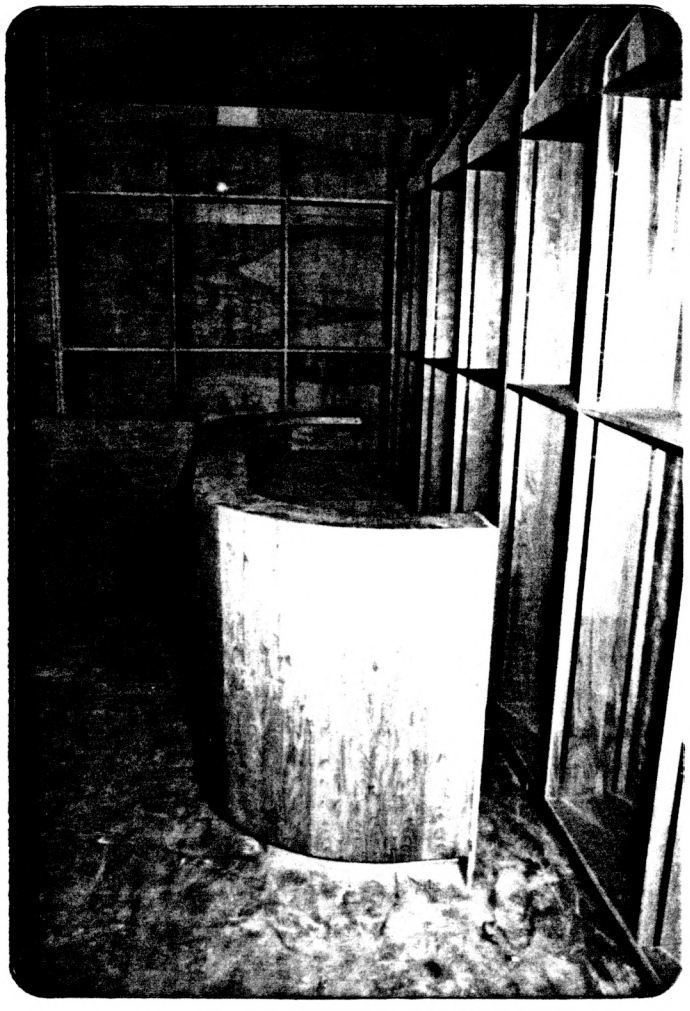
24. ROOF TRUSSES



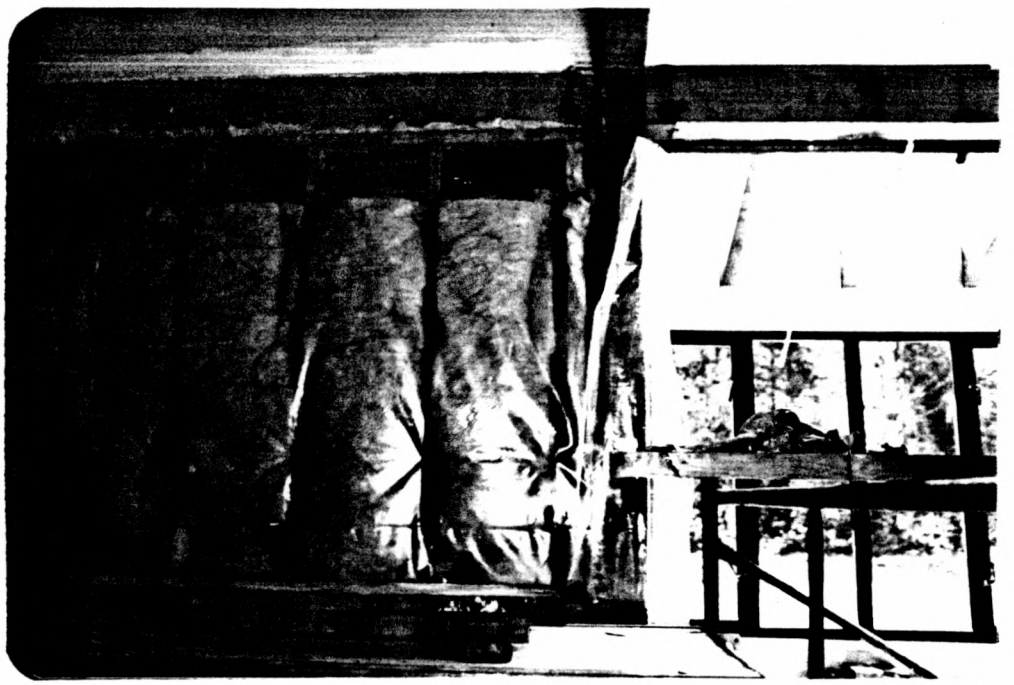
25. BEAM/COLUMN CONNECTION



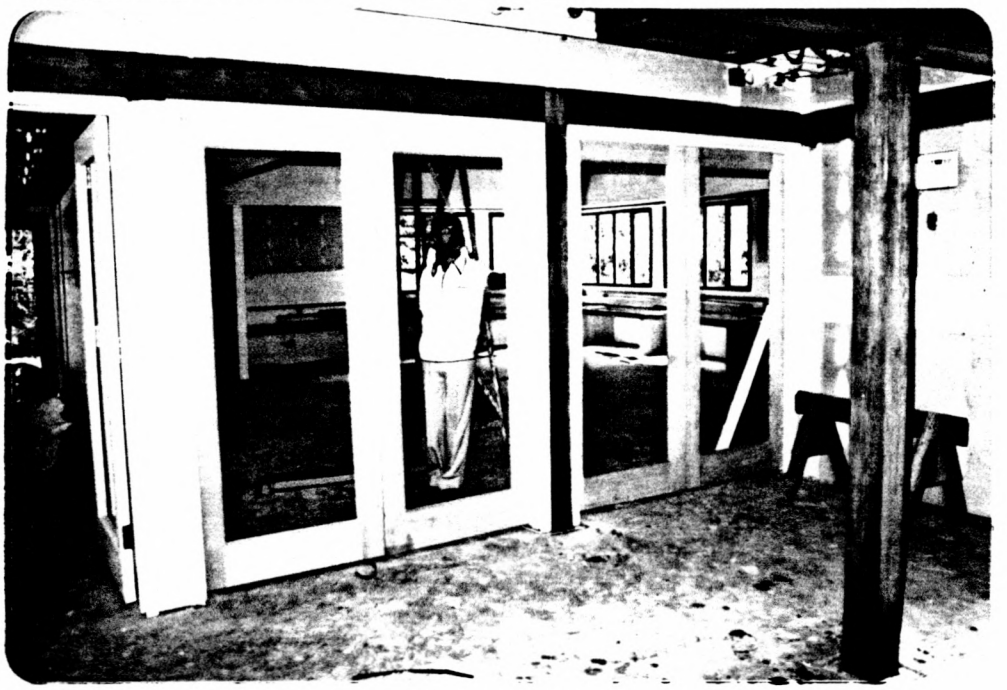
26. LIBRARY SHELVING



27. LIBRARY COUNTER (not in position)

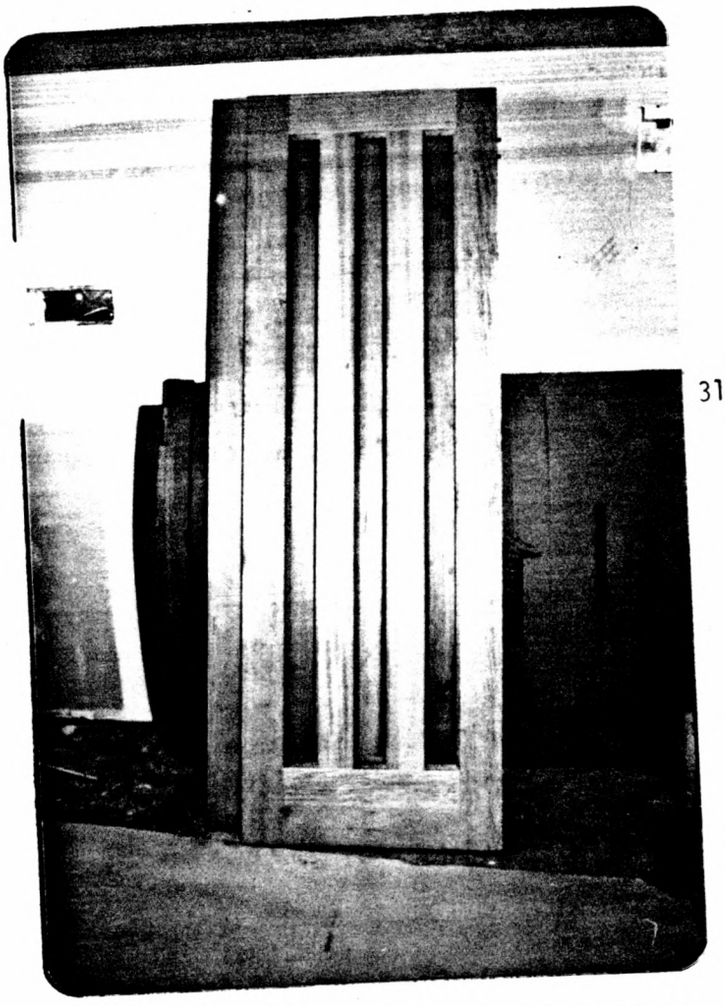


28. VENTING TO BULKHEAD CONCEALING SPRINKLER MAIN

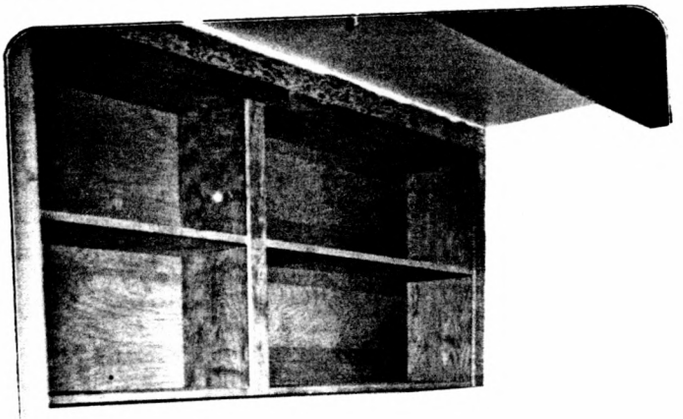


29. TYPICAL CLASSROOM DOORS

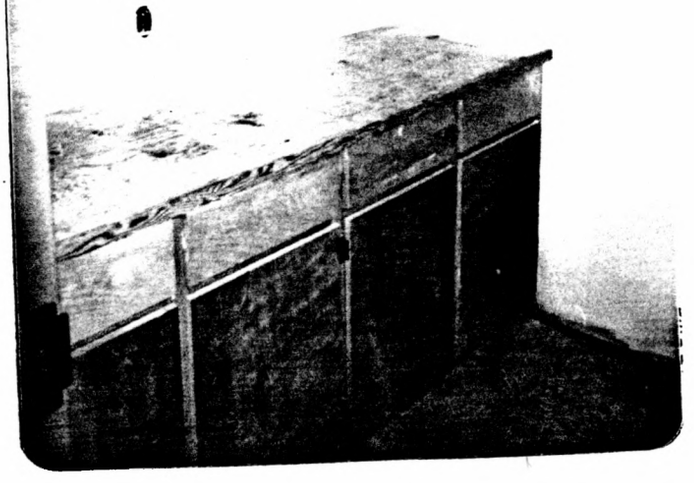
30. LIBRARY WORKROOM COUNTER



31. EXTERIOR DOORS-



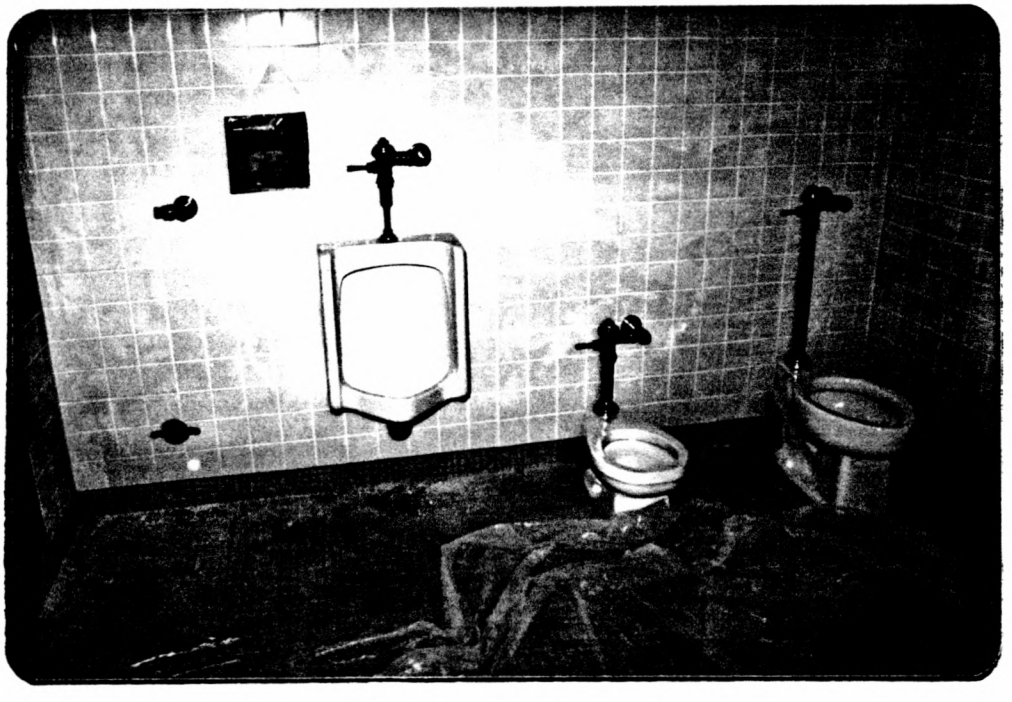
32. STORE ROOM 120



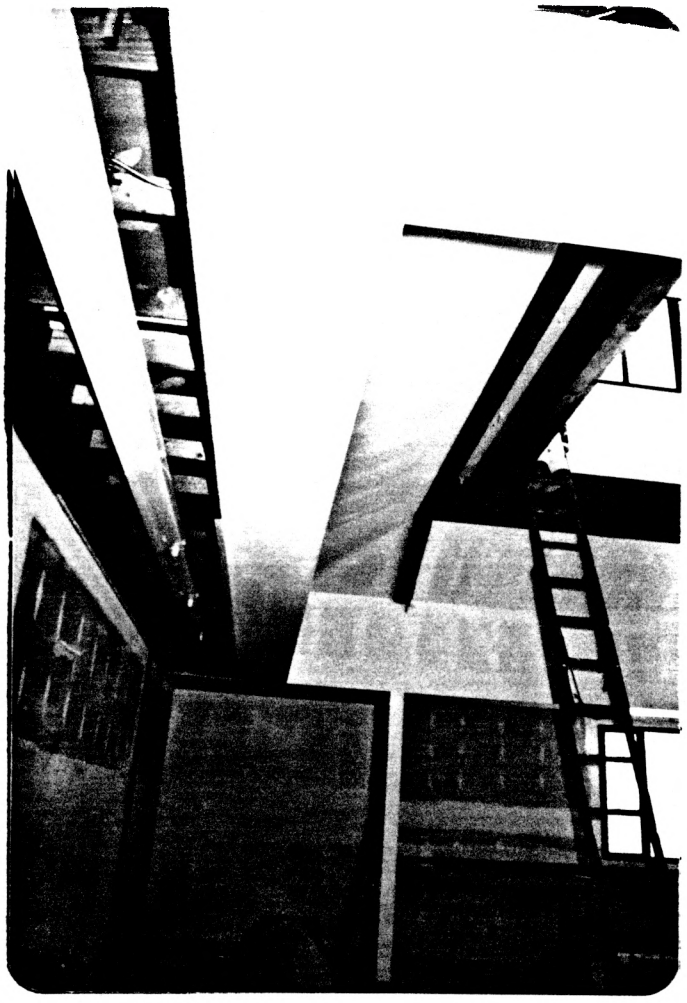
APPENDIX "C"

CHEHALIS
SCHOOL

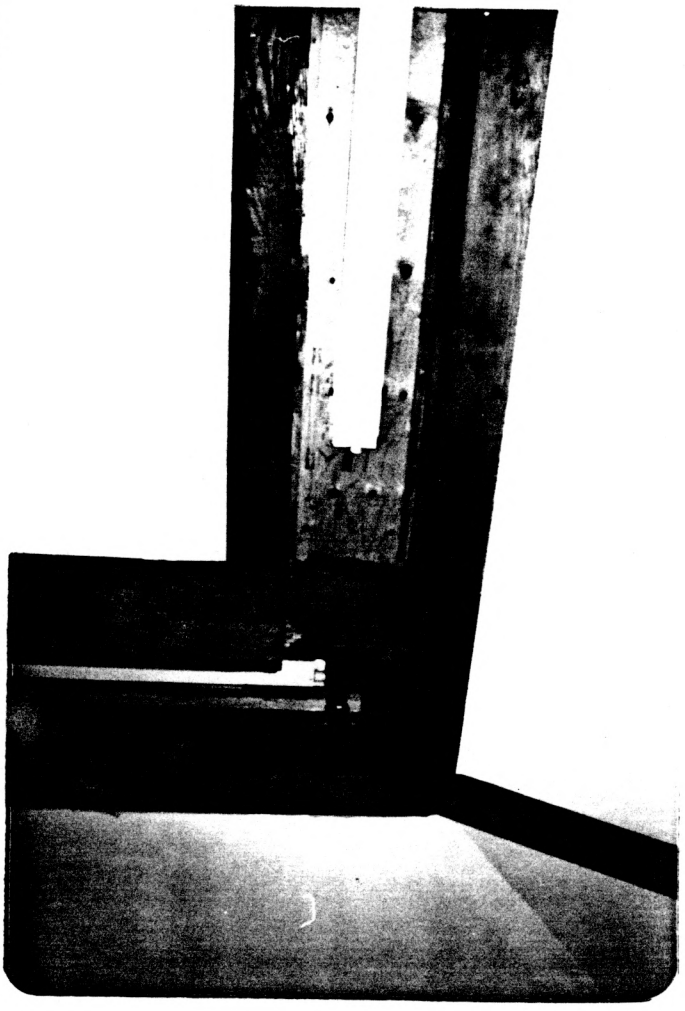
33. BOYS' WASHROOM



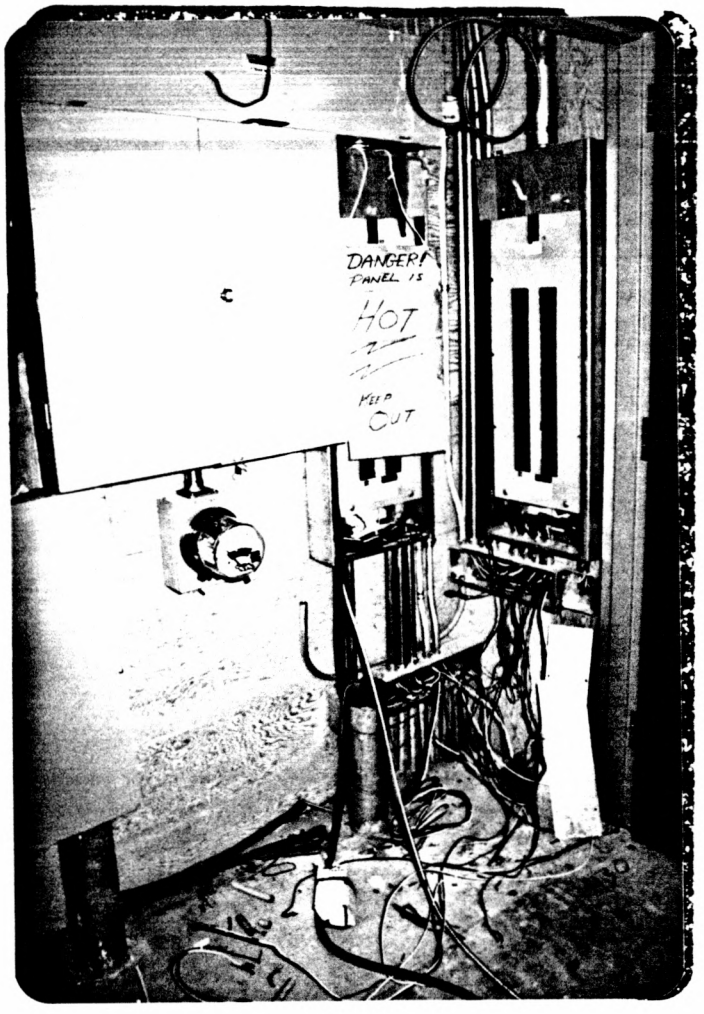
34. BOYS' WASHROOM



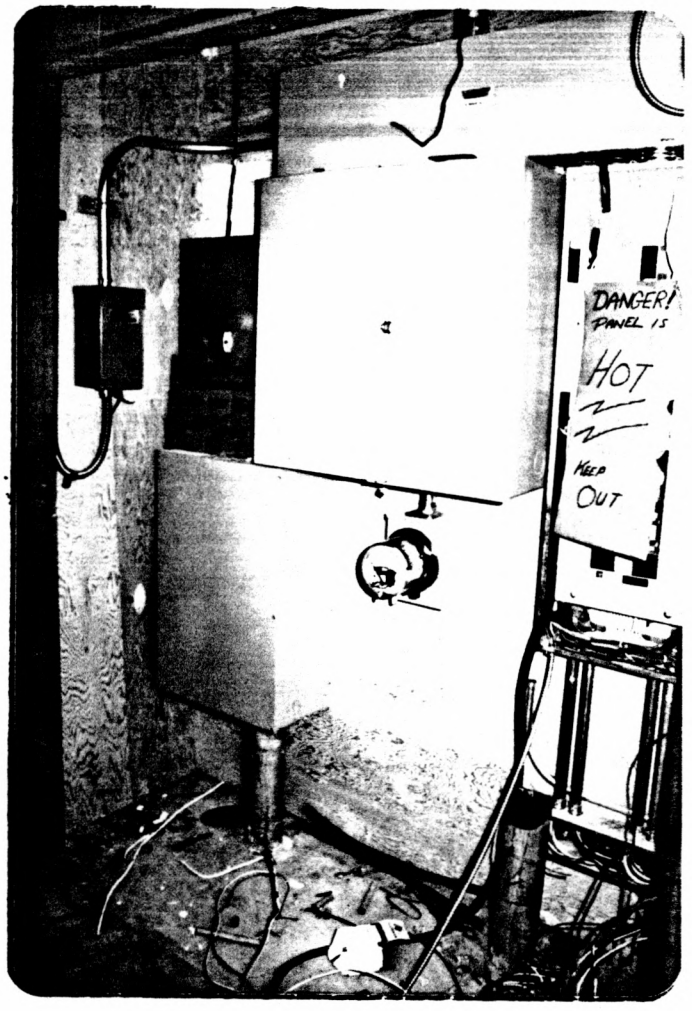
35. CEILING LIGHT TROUGHS IN CLASSROOMS



36. CEILING LIGHT TROUGHS IN CLASSROOMS



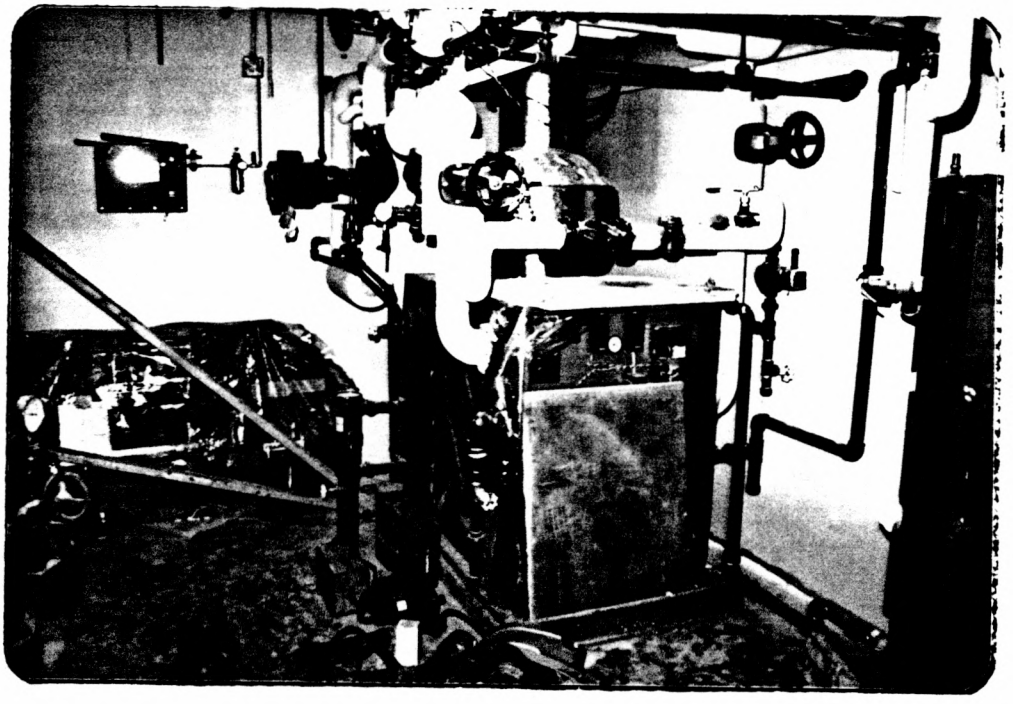
37.



38.

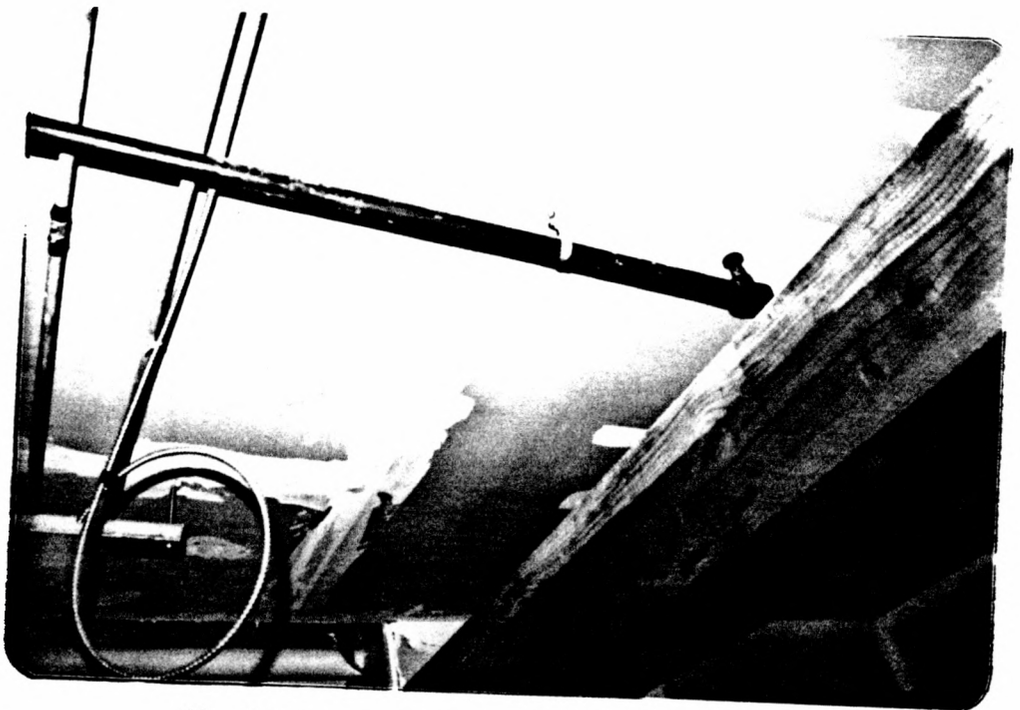
ELECTRICAL CLOSET 130

APPENDIX "C"

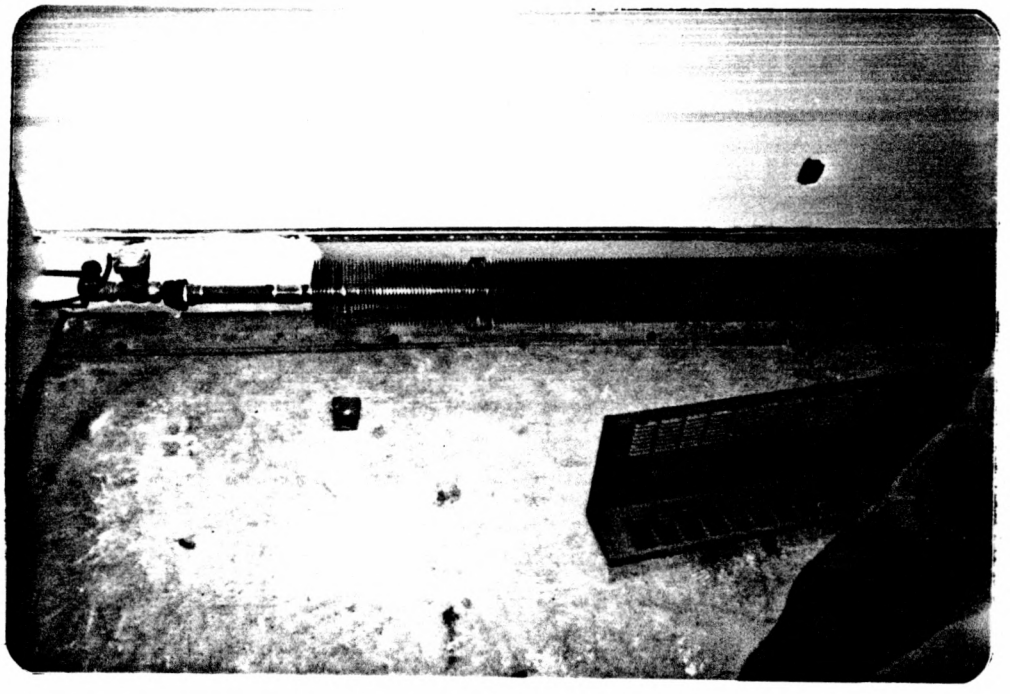


39. BOILER

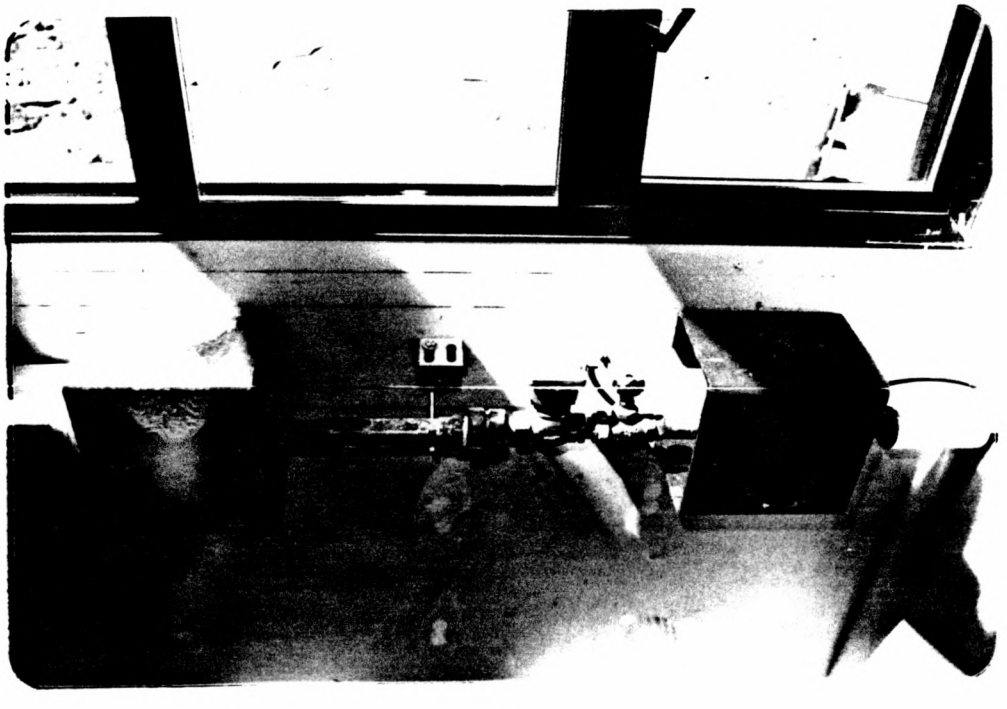
40. TELEPHONE "CLOSET"
130A



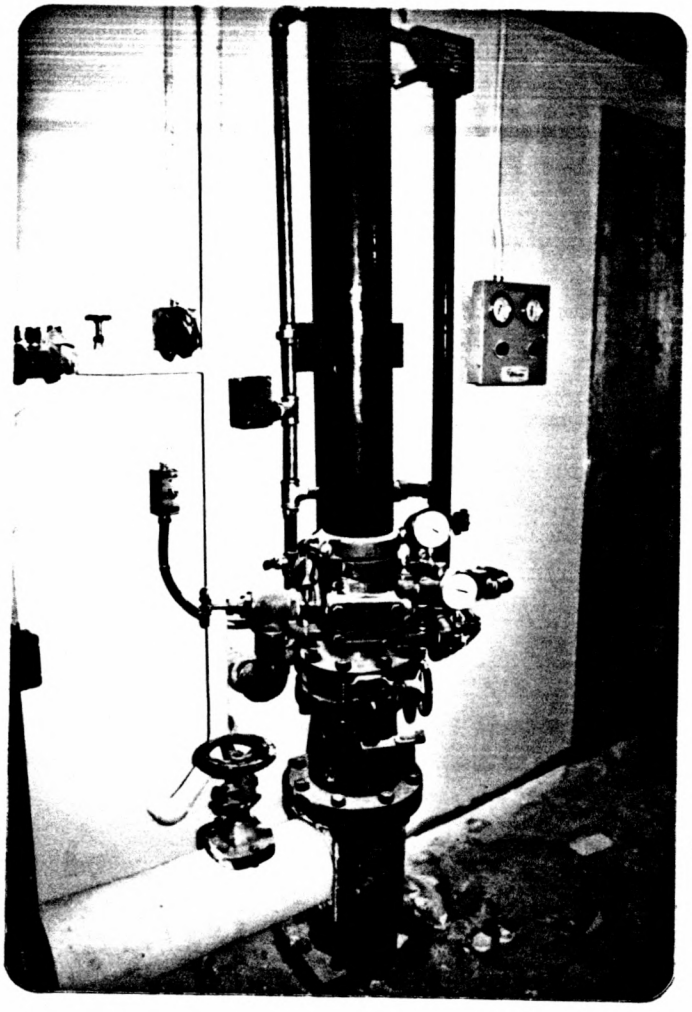
41. SPRINKLER LINE AND HEAD



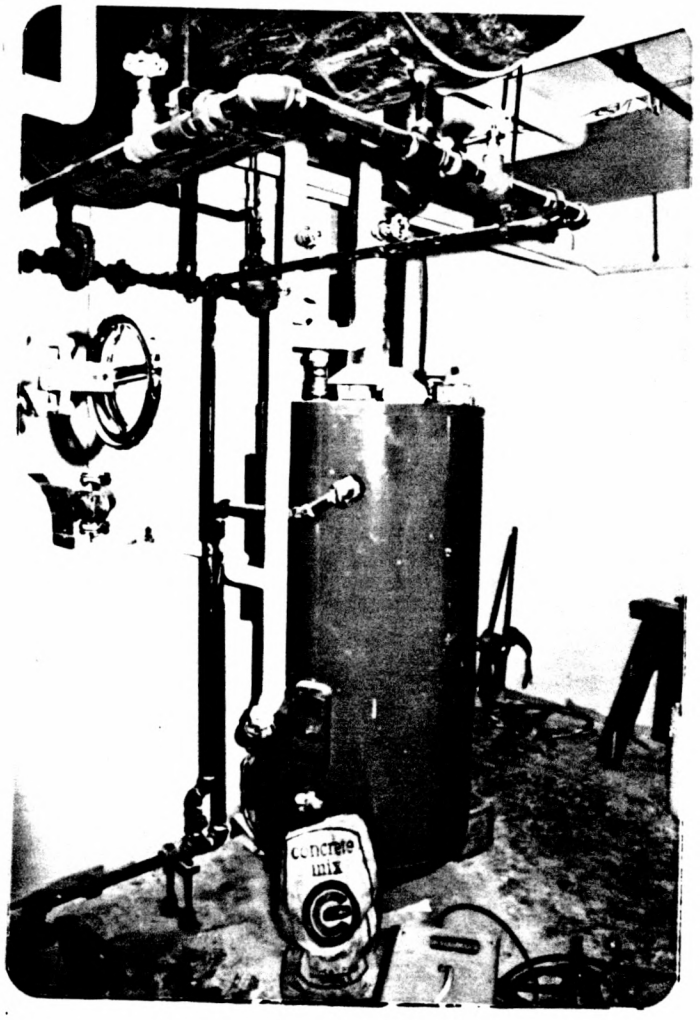
42. BASEBOARD CONVECTOR



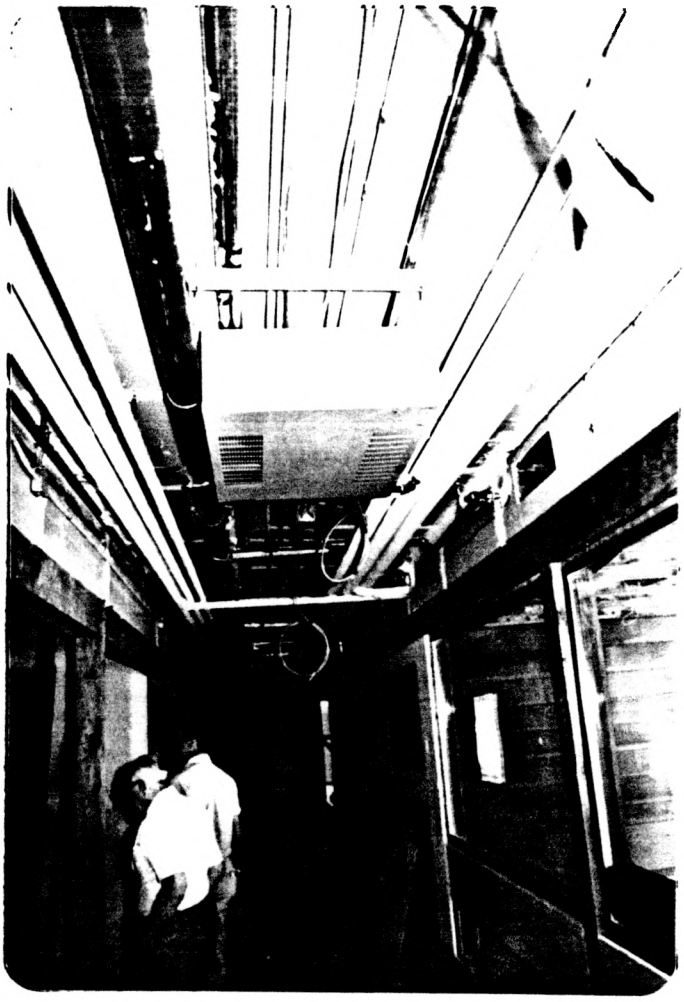
43. BRACKETS FOR COUNTERTOPS AT HEATING UNITS



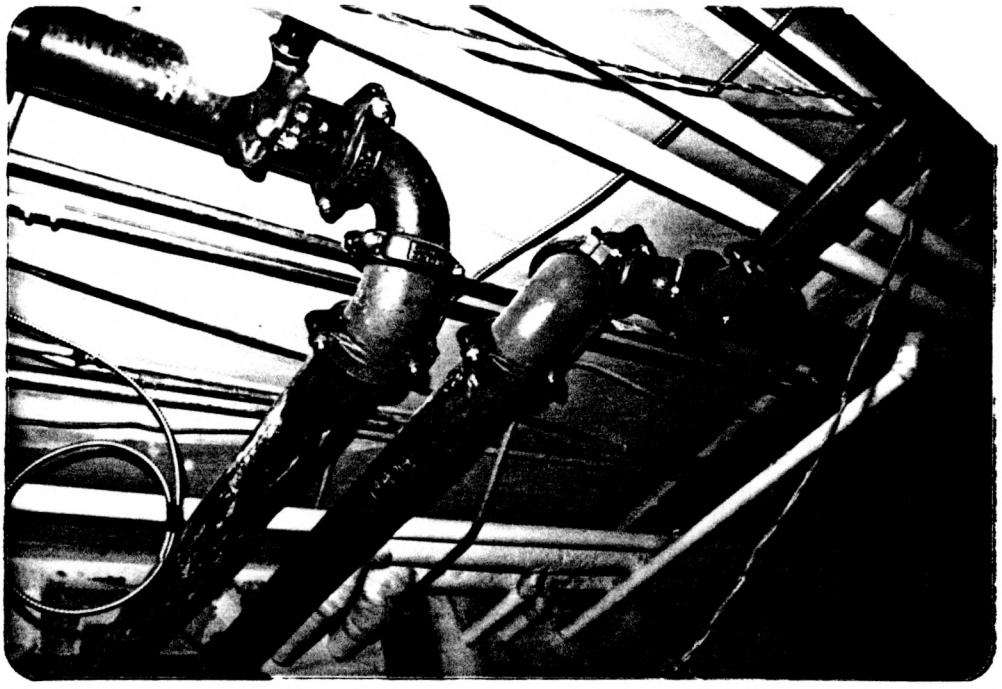
44. QUICK-OPENING VALVE TO SPRINKLER SYSTEM (in mechanical room)



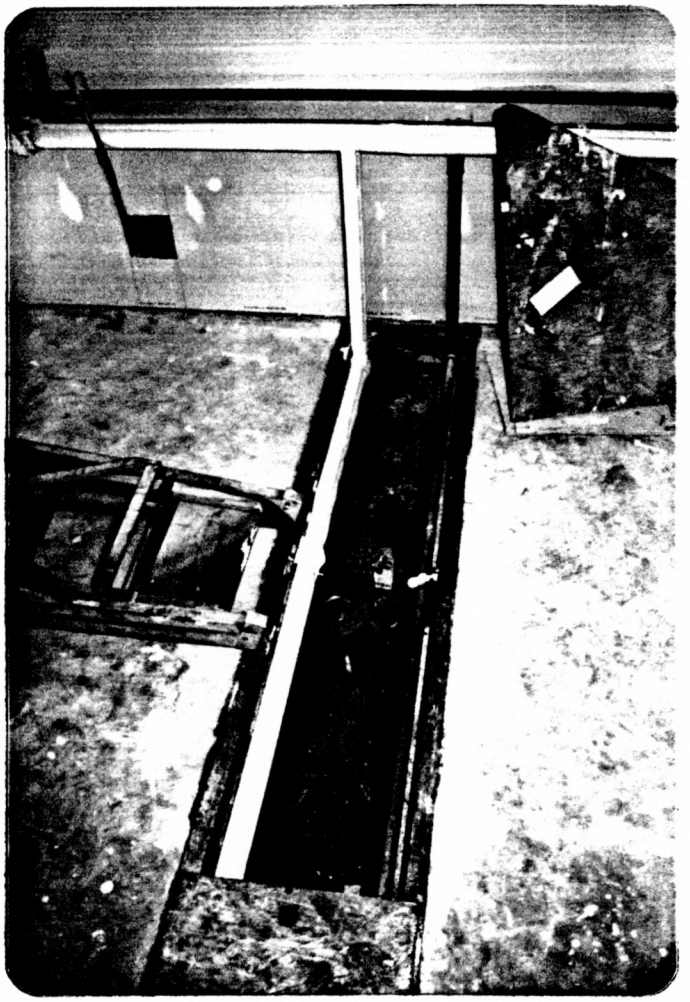
45. HOT WATER TANK IN Mechanical room



46. FORCE-FLO HEATER IN CORRIDOR CEILING



47. SPRINKLER BRANCH LINES IN CEILING



48. TRENCH IN FLOOR OF
LABORATORY

49. TEACHERAGE

50. TEACHERAGE

APPENDIX "C"

SEABIRD
ISLAND HOUSING

51.

52.

GENERAL

EXTERIOR

VIEWS

53.

APPENDIX "C"

SEABIRD
ISLAND HOUSING

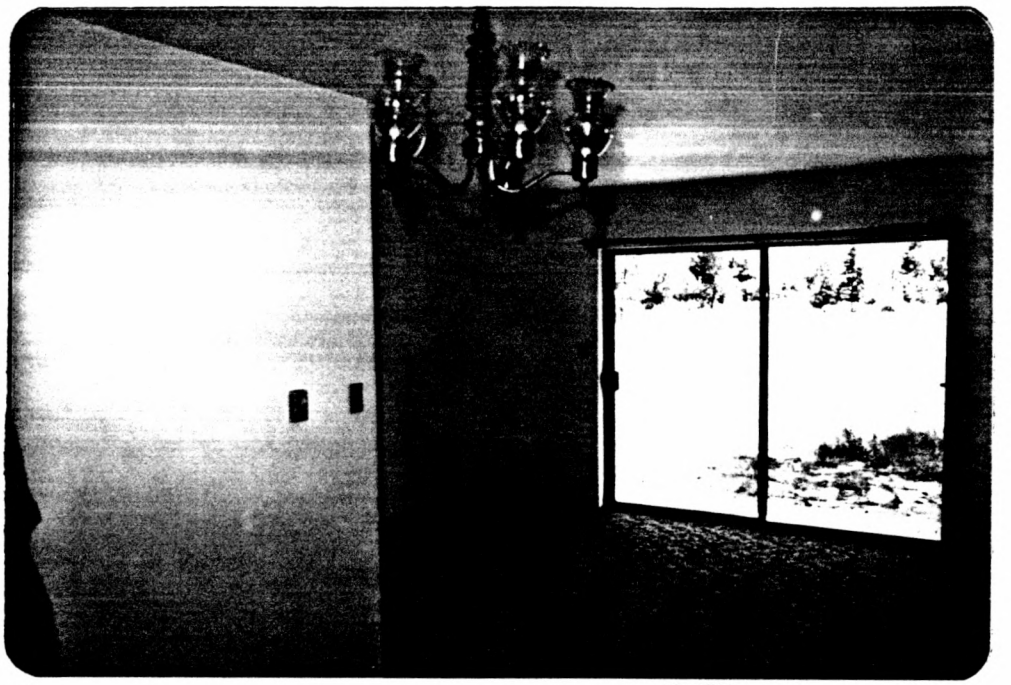
54. GENERAL

55. EXTERIOR VIEWS

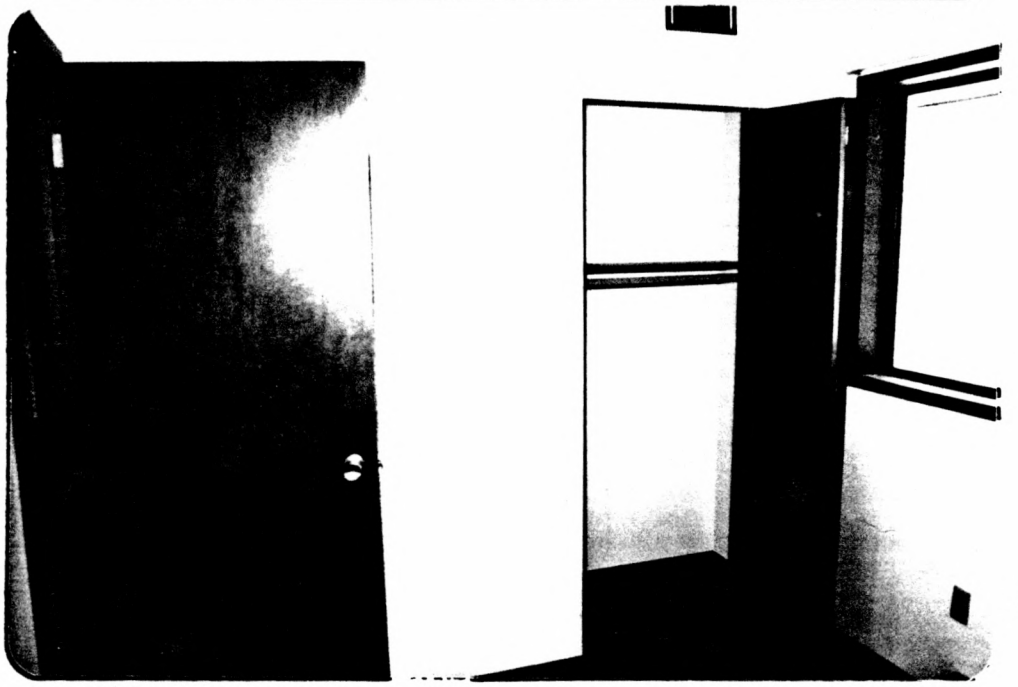
56.

APPENDIX "C"

SEABIRD
ISLAND HOUSING



57. LIVING ROOM

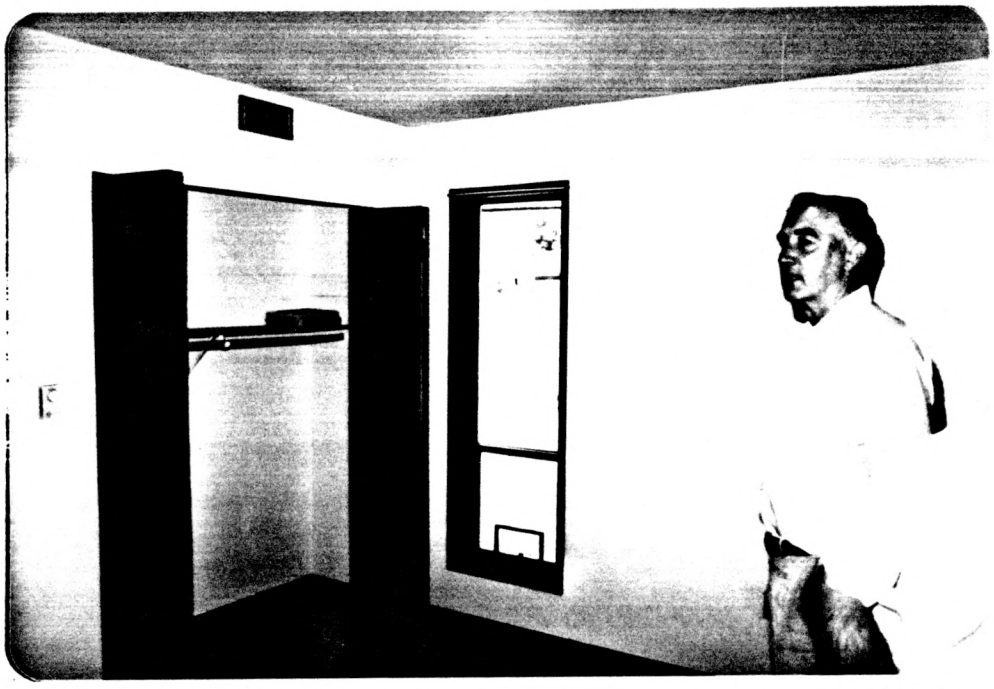


58. BEDROOM CLOSET

59. BEDROOM WINDOW WITH VISITOR

APPENDIX "C"

SEABIRD
ISLAND HOUSING



60. MASTER BEDROOM
CLOSET

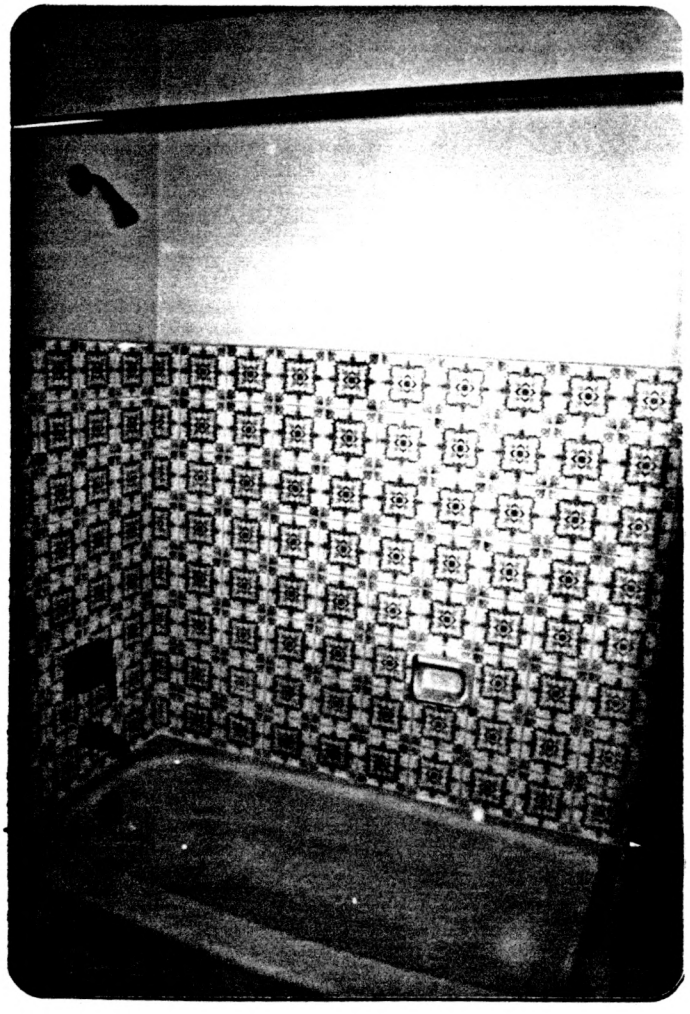
61. LIVING ROOM
ALCOVE

62. BASEBOARD CONVECTOR

APPENDIX "C"

SEABIRD
ISLAND HOUSING

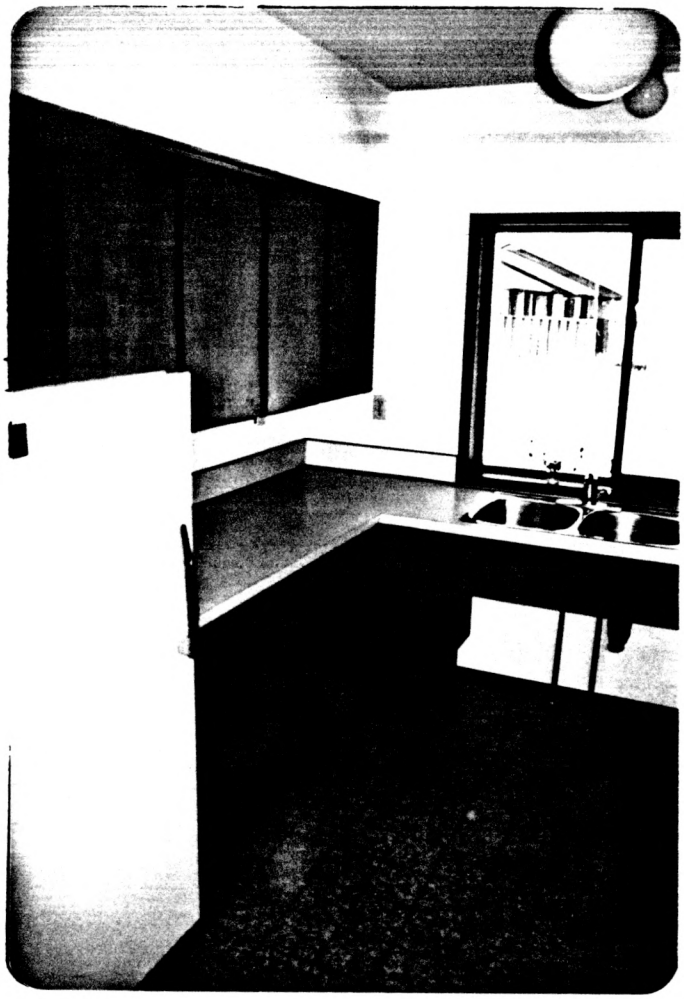
63. BATHROOM



64 . BATHROOM

APPENDIX "C"

SEABIRD
ISLAND HOUSING

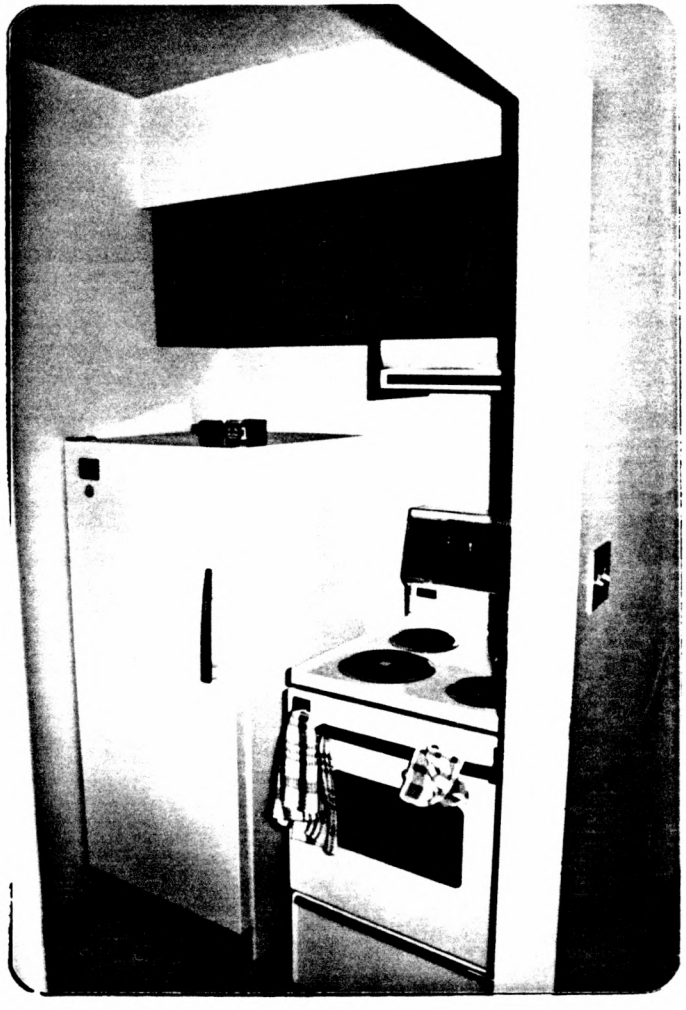


65. KITCHEN

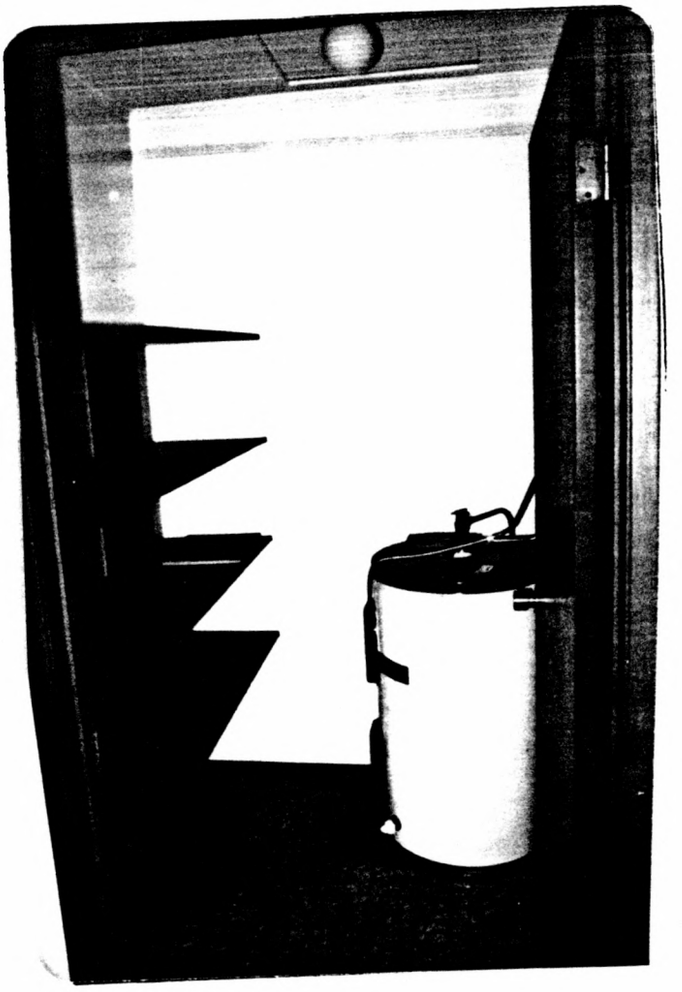
66. KITCHEN

APPENDIX "C"
SEABIRD
ISLAND HOUSING

67. KITCHENETTE IN COMMUNAL UNIT

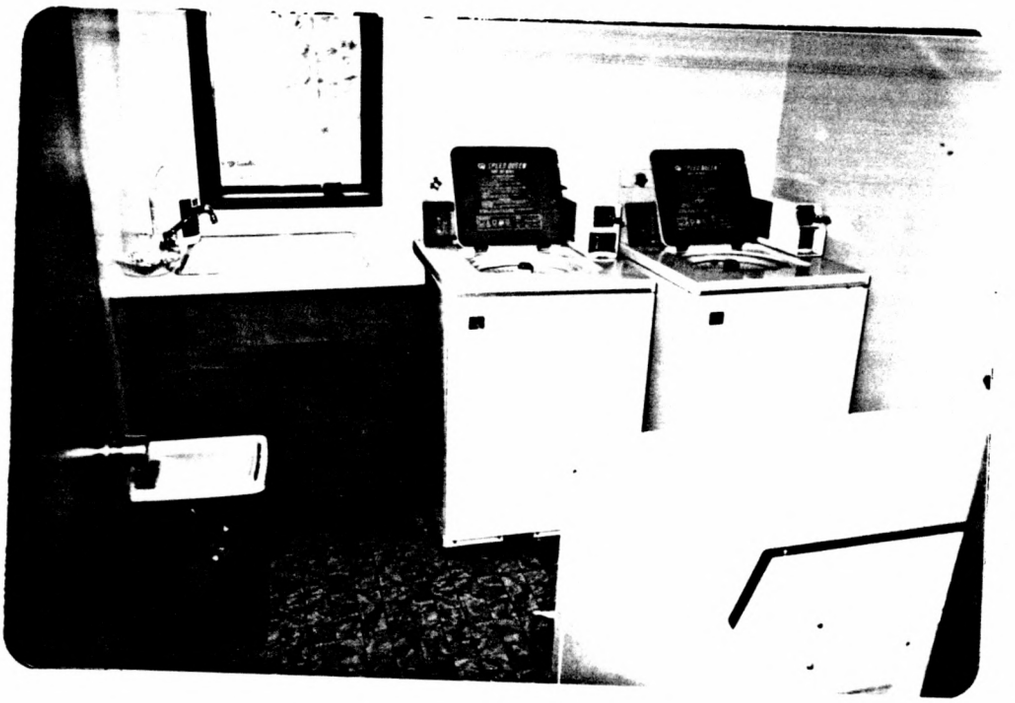


68. KITCHENETTE IN COMMUNAL UNIT



APPENDIX "C"

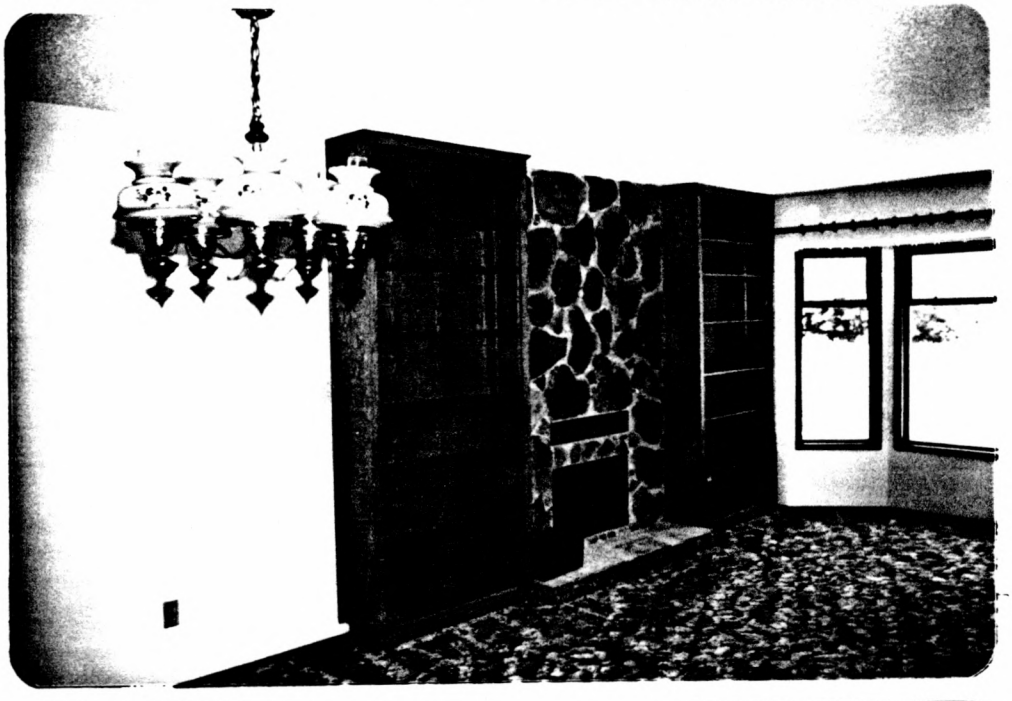
HOT WATER HEATER AND
ACCESS TO ATTIC (Above)
AND CRAWL SPACE



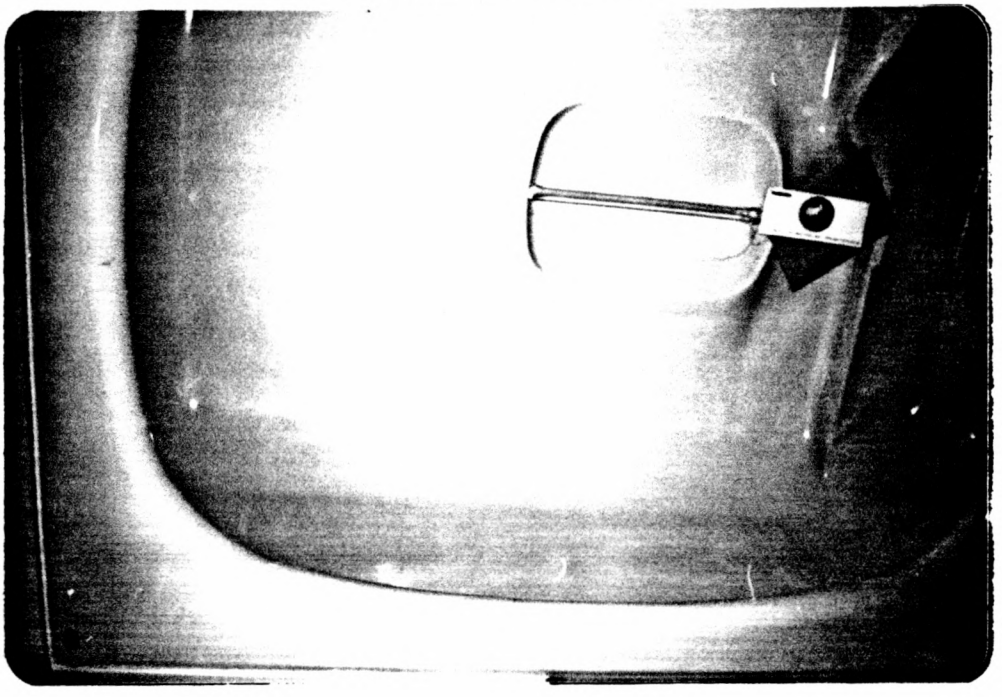
71. COMMUNAL LAUNDRY

APPENDIX "C"
SEABIRD ISLAND -
5-BEDROOM HOUSE

72.

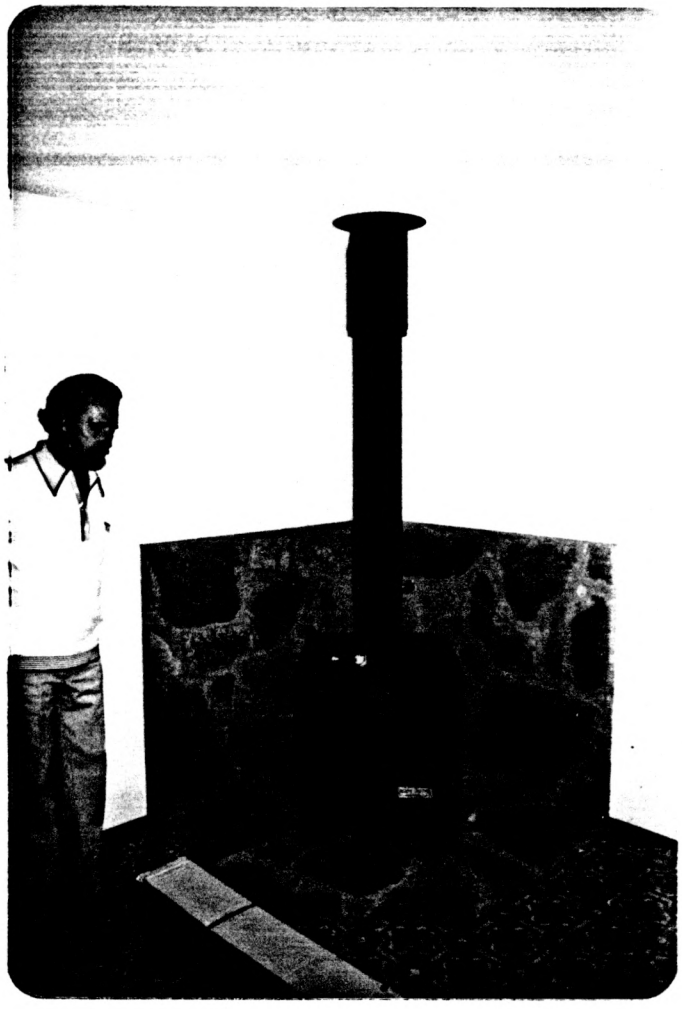


73. LIVING ROOM



74. PLASTIC BATHTUB UNI

75. KITCHEN



76. SPACE HEATER

77. UPSTAIRS BEDROOM

SEABIRD ISLAND HOUSING

APPENDIX "C"

Indian and Northern Affairs Canada / Affaires indiennes et du Nord Canada

PROJECT CONTROL CHART

Project Name: CHEHALIS COMMUNITY SCHOOL

TEC $(000): 1,600 | Program Code: 2 | Centre Manager Responsibility Cost: 9,8,7,6,1 | Band: | Project No.: 3,0,6,1,1 | Sheet: | Date: 80,03,17 (Y M D)

KEY:
- Need for involvement
- Check after involvement

BAND: CHEHALIS
R.C. Manager: T. WITT
Project Manager: S. POINT / E. STENSON

	ORIGINAL COMPLETION DATE (Y M D)	REVISED COMPLETION DATE (Y M D)	ACTUAL COMPLETION DATE (Y M D)	MILE STONE
PHASE 1 project identification			79,12,19	Project Initiated
				Objectives Approved
	80,04,15			Proposal Completed
	80,04,30		80,04,30	*Proposal Approved
PHASE 2 planning				Studies Requested
				Studies Completed
				Development Plan Completed
	80,05,31		80,05,22	Project Brief Completed
	80,06,30		80,05,29	*Project Brief Approved
PHASE 3 predesign/ design	80,09,30		80,09,30	Preliminary Design Approved
	80,10,31		80,11,19	Design Reviewed 30 %
	80,11,30			Design Reviewed 60 %
	80,12,31		81,01,15	Design Reviewed 90 %
	81,01,31		81,02,26	*Design Approved 100%
PHASE 4 construction	81,02,15		81,05,06	Tender Called
	81,03,31		81,04,10	Tender Closed
	81,04,30		81,05,12	Contract Awarded
				Day-labour Plan Approved
	81,05,15		81,08,24	Construction Started
	82,03,31			Interim Acceptance
	82,04,30			*Contract/Construction Completed
PHASE 5 evaluation	82,08,01			*Project Evaluation

	Band	District/Region	Other
Participation	✓	✓	
Approval (in writing i.e. B.C.R.)	✓	✓	
Education	✓	✓	
Local Government	✓		
Economic Development			
Lands		✓	
Planning	✓	✓	
Engineering & Architecture		✓	
Employment Programs		✓	
Finance		✓	
Training		✓	
PWGSC/Consultants		✓	
HQ/T.B. Approval		✓	

*Critical milestones used for all projects. Use remaining milestones as applicable.

REMARKS:
- T.B. SUBMISSION TO BE COMPLETED BY APRIL 15, 1980
- T.B. PROJECT APPROVAL BY MAY 30, 1980 80-06-1
- SITE INVESTIGATION & SURVEY TO BE COMPLETED JUNE 30, 1980

- BCR 6030, 1980-05-29

RAYCRAFT CONTRACTORS LTD $ 1,640,580
SOLAR COMP. $ 98,000

APPENDIX "D"

Indian and Northern Affairs Canada | Affaires indiennes et du Nord Canada

APPENDIX "E"

663430 P.C.

Vancouver, B.C. V7Y 1C1,

6 July, 1982.

Mr. J. Allon, P. Eng.,
Hd. Capital Planning &
Projects Management.

JUL 12 1 24 PM '82

Your reference

Our reference E4965-1288 (TCP)

Update on Chehalis School
Solar Retrofit Project

During the recent functional review on the Chehalis School project, I discussed the solar heating retrofit with Mr. Graham Richards (a mechanical services and solar systems specialist with DIA in Ottawa). We reviewed the plans and specifications for the school's hot water requirements in conjunction with the proposed sizing of the solar panels and have come to the conclusion that the system is grossly over-sized. This has been confirmed by discussions with the mechanical design consultant. The original sizing assumes the addition of a gymnasium which may or may not be built in the future. The over-sized solar system could run into problems of over-heating and sub-sequent damage.

It is proposed to change the scope of the solar system retrofit to utilize an existing package system sized to supply only the school complex as it is now. Should the gymnasium be built, a small self contained solar system can be added to it. The cost of the system will be in the order of $20,000 and would require no further consultant design as these small packages are pre-designed and proven.

P. Sandland

Peter Sandland,
Special Projects Engineer.

cc
Mr. A. Somow - Region E & A.
Mr. Graham Richards - Tech Services - DIA - Ottawa.
Mr. Ed Stenson - Chehalis Band,
Chehalis Road, R.R.#1 Comp. 66,
Agassiz, B.C. VOM 1AO.

Canada

Indian and Northern Affairs Canada / Affaires indiennes et du Nord Canada

K. HOLLOWAY

710670

APPENDIX "F"

Vancouver, B. C. V7Y 1C1,

21 October, 1982

OCT 28 9 49 AM '82

Mr. R. A. Holloway, P. Eng.,
Director,
Professional Services,
O t t a w a.

Your file / Votre référence: A-1465-155

Our file / Notre référence: E1425-3 (T)

Functional Review - Buildings

Attached are lists of comments and copies of correspondence concerning the draft copy of the functional review report submitted with your letter dated 16 August, 1982.

Since one of the projects reviewed was Vote 15, Band managed, the Band staff and the project architect employed by the Band were invited to review the draft report and comment. Copies of their response are included in the attachments.

The Region E & A review of the draft report confirms that it describes generally well, the process of evaluation, site visits, discussion in the office and findings cited. There is a need for some minor correction to the report content as listed on the attachments. I do recommend, based on experience gained through this exercise, that the following be reviewed: -

(a) The Terms of Reference and the related review team activities, to ensure that the activities, report and Terms of Reference are compatible, and,

(b) advance preparation concerning the nature and extent of project team participation in the review process to ensure efficient and effective scheduling.

D. Clegg,
Director,
Engineering & Architecture.

Attach

cc Mr. A. Somow - E & A.

Canada

"F"

FUNCTIONAL REVIEW AND EVALUATION

BUILDINGS

B. C. Region - (June 22-25, 1982)

General Comments re Draft Report

- Reports related to the three projects should be separately reported for clarity and to ensure that the copies of final reports can be directed to appropriate areas. This is particularly essential where a Vote 15 project is involved and report copies are circulated to non-government agencies.

- Future reviews should be limited to one project to ensure adequate review of that project.

- Review Terms of Reference and ensure general adherence. The report contents should relate directly to the Terms of Reference.

- The level of functional review detail is questioned. There is justification for examining significant building design standards, or practises, but somewhat detailed review of designs is of very little value and detracts from the stated objectives of these reviews. Observations concerning the processes used, the type of heating system, standard of insulation, overall building cost, etc., are of value, but observations concerning construction details are not of significant value.

The question of Engineering & Architecture role, vis-a-vis, review of plans and specifications prepared by consultants or Public Works Canada staff, should be examined before undertaking additional reviews. If the role/ responsibility is seen as detailed review of plans proposed, it will be necessary to hire additional staff, or enter into additional consultant agreements to review work prepared by the consultants.

• • • •

cc This page + memo to
R. Jones for action, 29/11
JK

"F"

FUNCTIONAL REVIEW AND EVALUATION

BUILDINGS

B. C. Region - (June 22-25, 1982)

Specific Comments re Draft Report

Page 4 - 1.7 Review Participants -- Last name and function incorrect. Should read "J. Allon, former District Engineer - Vancouver District.

Page 6 - 2.1 (a) The reference to 'significant faults" is misleading. I.N.A. staff agree that changes would have been valuable but did not rate these of significant concern to demand a design change.

Page 7 - Finding (b) -- See comment provided by the Consultant, attached -- Page 3. (2.4 a)

Finding (c) -- Incorrect. B.C. Region established a Technical Documents Management System (TDMS) in 1980.

All available planning and technical information became part of TDMS and is stored centrally at Regional Office, and also at some District offices. For details, see EA-HQ-80-42 - "Implementation of the Technical Documents Management System, Pilot Project in British Columbia Region, Indian and Inuit Affairs", March 28, 1980, by Alex Dunne.

Finding (d) -- Evaluations in process now.

Page 8 - Finding (e) -- Partially correct. The communication with P.W.C. in this Region is rather amicable and cooperation is generally good.

In the case of Chilcotin School addition, slow reporting and inadequate cooperation with the Chilcotin School Project Team were caused by P.W.C. Design & Construction Manager, who since then, has resigned from Public Service.

The present situation does not require any interference as recommended by the Evaluation Review Team.

Finding (f) -- The recommendation is out-of-date.

"As-built" drawings in this Region are stored on 105 mm microfiche, reproducible to half size or original size of the standard drawings. The system is compatible with TDMS.

Page 9 - Finding (h) -- Incorrect. O & M manuals for Chilcotin School received from P.W.C. early this year and were immediately distributed to both District and school. They were available at the time of the review.

must be '80

Finding (i) -- Incorrect. Treasury Board approval of July 14, 1982, at maximum project cost of $972,600 with stipulation that D.I.N.D. seek revised T.B. authority, should Class "A" estimate exceed the above amount. This has never happened.

The approved funds for the project were: -

Construction contract -	$ 910,000
Contingencies -	45,500
Consultant's fee	10,000
P.W.C. Administration charges -	7,000
	$ 972,500

The solar component was not considered part of this project.

The actual spendings on the project were $951,500 or $21,000 less than approved maximum (solar not included).

Finding (j) -- See Consultant's comments in his letter of September 28, 1982, addressed to the Project Manager -- Attachment "A".

Page 14 - 2.3 Architectural

The recommendation is generally valid but there should be an understanding and acceptance that architectural features, some of which increase the cost of the structure above a basic standard cost, are an essential part of the school building. The school building is, in a majority of the rural and remote Indian communities, the main, and probably the only, public/community building. The appearance of the structure is of considerable importance to the community residents. Engineering & Architecture staff should be supporting the need for a reasonable project allocation for architectural feature.

Chilcotin School Addition

The findings regarding the Chilcotin School addition project implemented for us by Pacific Region of P.W.C. will be dealt with in upcoming "Project Evaluation" in accordance with T. B. regulations.

RESPONSE TO FOLLOWING PREPARED BY THE CONSULTANT

Page 14

2.3 Architectural

Finding (a) -- Change Order 14 was issued as a result of a sprinkler installation problem which became apparent during on-site measurement prior to fabrication. It was identified that the proposed route for the sprinkler line was in conflict with the sloping laminated beam at grid line G° 12. Possible penetration of the beam was explored and found to be impractical due to required location and size of penetration. The re-routing of the line on the outer face of the beams was identified as being the only practical solution which would satisfy the sprinkler coverage requirements of the Dominion Fire Commission. In order to simplify piping runs, two 4,200 lengths of insulated bulkhead were constructed adjacent to grid lines G° and 12.

2-inch rigid insulation was utilized; the bulkhead was ventilated to the library space and the heating line was located adjacent to that of the sprinkler.

For response regarding failure of the heating system, see Page 20? (12)(a).

Finding (b) -- No addition to or reduction from a signed construction contract by Change Order is undertaken flippantly or arbitrarily. At the completion of a contract, the Change Order Log reflects the outcome of the give-and-take negotiations which occur during the construction process. In our role as agent of the owner, we have attempted to negotiate, on their behalf, with the contractor, to ensure that the outcome of disputes is reasonable and fiscally just. In our opinion, Change Order 18 reflects this process of negotiation. The Change Order was submitted for owner approval to cover the General Contractor's labour costs for trimming the ends of laminated beams. This trimming was necessitated by the settlement of trusses during the erection process. This settlement had been anticipated and allowed for by the Structural Engineer and a blanket clause within the specifications covered trimming work of this type. However, it became apparent through an inspection of the General Contractor's detailed prebid takeoff (copy obtained by Architect at time of contract signing) that no allowance had been made for this work. It was therefore recommended by the Architect that the owner accept this work as extra to the contract and that time cards (verified by the Clerk of the Works) be submitted to support the request for extra funds.

Page 15 - Finding (b) -- The request to use double glazing units, in lieu of single glazing for corner window conditions, was made by the window supplier in order that constant glazing beads could be utilized.

At the time of the Federal inspection, no protection had been installed. The glazing compound referred to, is the standard compound which is an integral part of the double glazed unit.

Protection is currently being installed.

Page 17 - Finding (e) -- Comments regarding specifications have been noted and logged.

Page 18 - Finding (f) -- In order to reduce construction costs, the asphalt shingles were substituted for the previously specified pre-finished metal roofing. Revised drawings and specifications were issued in August of 1982. (after visit + completion of bldg)

Docomentation effected: -

A4 through 8

DZ-1 through 8

Specifications

It seems that the above drawings were not available to the Federal inspectors and consequently, there was some confusion regarding the type of roof assembly utilized.

Mr. R. Elston of Inter Provincial Inspectors Ltd.* inspected the roof daily during installation and he makes the following observstions: -

- The roofing membranes have been installed in accordance with good practise and finished work is sound;
- The buckling referred to in the report is almost certainly the folding of the EPDM roofing membrane. This folding is correct practise for this material as cutting is to be avoided wherever possible;
- The EPDM membrane extends a minimum of 400 mm up the sheathing below the shingles thereby eliminating the need for a metal flashing. In fact, if a flashing were installed, there would be a risk of shingle buckling as a result of thermal movement within the flashing material.

* Inter Provincial Inspectors Ltd.,
13696 - 104th Avenue, Surrey, B.C.
V3T 1W4.

Page 20 -

2.4 Mechanical

Finding (a) -- We have reviewed the items listed by the Department of Indian Affiars and would comment as follows:-

1. Agreed that the mechanical layout would have been more fuel efficient for a more compact building design.

2. The domestic hot water generating capacity does have a reserve in it for future student load.

3. We would not normally provide two boilers for a school within this climatic area. Servicing of a boiler failure can usually be available within a day and the possibility of freeze-up is very remote.

4. Their comment regarding ventilation is not quite accurate. We agree that classroom ventilation was desirable, not "that it should have been provided". We pointed out that ventilation was discussed during the design phase, but was not implemented due to cost. The ventilation units that are provided look after the exhaust requirements and will keep the interior corridor areas fresh. The classrooms will have to rely on opening windows for ventilation.

Page 23 -

2.5 Electrical

Finding (a) -- The discrepancies indicated had, in fact, been picked up and corrected on our office prints, but should, of course, also appear on the "As-builts".

With regard to the electrical closet size, this was kept small to allow the Architect and owner more useful working space. We could, of course, have requested an individual electrical room. However, it is considered the present arrangement would easily permit the installation of a 200 amp 3-pole fused switch giving adequate capacity for another panel to serve 10 additional classrooms.

Page 24 -

Finding (d) -- The question of "talk-back" on the audio system was discussed with the Department of Indian Affairs, Vancouver office, on November 21, 1980. We were advised that numerous complaints had been received from teaching staff about lack of privacy (or "listening in"), and we proposed at the time to specify a one-way page/music system only. This was approved and presumably a set of drawings and specifications went to the Department at the time of tender. No query was received at this time.

Finding (f) -- Maintenance manuals have been submitted by Webb Electric and currently they are preparing "As-built" drawings for this project.

" A "

"F"

tony parsons architect

Suite 101
1650 Alberni, Vancouver
British Columbia. V6G 1B1
Telephone: (604) 684 6584

September 28, 1982

Ed Stensen
Chehalis Community School
R.R. #1
Chehalis Road
Agassiz, B.C.
V9M 1A0

Dear Ed:

I enclose responses to the Federal Inspectors' Report. Although the item regarding Cost Control, Page 9 (j) does not fall within Architectural, Mechanical or Electrical, I make the following observations in the hope that they will assist you in your reply:

The Class 'D' estimate was prepared by Brooks Wedge, Quantity Surveyors. This estimate was based upon detailed schematic drawings and was therefore an informed price.] not a "D" est

The Class 'C' price was generated by taking the Brooks Wedge, Quantity Surveyors, estimate and adding an escalation allowance for the six month elapsed period. This allowance was obtained from Barnett Treharne Yates, Quantity Surveyors.

The Class 'B' estimate was prepared by Barnett Treharne Yates, Quantity Surveyors, and submitted in September 1980. It would appear that Indian Affairs did not receive a copy of this submission.

The Class 'A' estimate (referred to as Class 'B' in the report) was prepared by Barnett Treharne Yates, Quantity Surveyors, and submitted on the 28th of January 1981. As the result of building modifications a Revised Class 'A' estimate was submitted on February 2, 1981.

I am unable to reconcile prices referred to in this item with those submitted and therefore with the exception of the Tendor price and Contract Sum the source of the figures referred to remains a complete mystery.

. . . 2

tony
parsons
architect

As you are 'horribly' aware the tender call occurred within one of the most cost volatile construction periods the province has experienced. With eleven general contractors picking up documents we felt that a competitive price would result. However, only two bids were obtained and in some finishing trades no prices were available from the Bid Depository. It has become apparent through discussions with the General Contractor's Quantity Surveyor that the same building bid today would probably result in a reduced contract price. In addition it would seem that many small sub-contracting firms within the vicinity of the site were, as a result of firm size and workload, unable to meet the bonding requirements of the Bid Depository.

If you need any additional information please contact me.

Yours truly,

TONY PARSONS ARCHITECT

Tony Parsons

TP/tm

Enclosure

Chehalis Community School

CHEHALIS ROAD
R.R.#1, COMPT. #69
AGASSIZ, B.C.
V0M 1A0

OCTOBER 8, 1982

RE: REPORT-EA-HQ-82-563
FUNCTIONAL REVIEW AND EVALUATION
BUILDINGS
B.C. REGION (JUNE 22-25, 1982)

TO WHOM IT MAY CONCERN:

Please find attached responses from consulting architect and his sub-consultants to the above mentioned report. Also including is an accompaning letter from the architect outlining his confusion over cost estimates referred to in the report.

On behalf of the Chehalis Band, I would like to add a number of points to the attached information.

We find the overall report inconsistant with what was the intent of a Vote 15 project. That is what the Band will administer and have control of the project. The aspects of the building which the report refers to as "significant faults with the design" and acsthetic aspects importamt to the consulting architect and/or the Band may not be important to others" are the very things that make this building unique and which are contributing to the sucess of the project.

If the Departmental guidlines referred to by the report had been followed to the letter the resulting building would have been another "design in Ottawa DIA box school." However "box schools" do not generate the kind of community enthusians and involvement that are evident in Chehalis today. The Chehalis people and the architect worked for two years to create a unique building design, one the whole community could be proud of. It may not be quite as fuel efficent or have the "optimum perimeter to floor area ratio" but we are already starting to reap the educational benefits of the community pride. And it must be remembered that education of students is what this whole thing is about.

A number of comments are in order concerning the manner which the review was carried out.

1. Although numerous references were made in the report concerning architectual matters, the architect was not consulted.

2. An interview was held with the mechanical consultant, who was under contract to the architect, who in turn was under contract to the Chehalis Band. That this interview was held with either the architect or the Band being represented, we find very inappropriate.

Various This meeting was arranged by the Region to solve a technical problem - the architect was contacted but was unable to attend, & suggested they deal directly with the engineer

3. During their visit to Chehalis the review team spent most of the time cross examing staff about highly technical matters, we had no knowledge of. The one time the question of administration and Band involvement came up (issues important to the Band) two of the three team members felt then so important they carried on a private conversation across the table between the speakers.

Do not agree. Fully understan this comment JK

In summary the Band does not feel there are "significant faults with the design" as the report suggests. And we feel the review team made no attempt to understand the goals and objectives the Band is attempting to realize through this project. A broader view of community self development and the application of Departmental guidlines to community initiated project would definitely increase the chances of projects succeed probably help between Band-Department relation.

Sincerely,

Ed Stenson
Project Manager

E.S./S.W.