SCHEDULE 18

TECHNICAL REQUIREMENTS

TABLE OF CONTENTS

SECTION 1 -- GENERAL

1. GENERAL

1.1 INTRODUCTION

References to section numbers in this Schedule are to section numbers of the Technical Requirements unless expressed otherwise.

This Schedule sets out the general technical requirements applicable to all design, construction, maintenance and renewal and handback of the Schools.

The information in the Technical Requirements is organized as follows:

Section 1 – General
Section 2 – Description of Schools
Section 3 – Management Systems and Plans
Section 4 – Project Requirements for Schools
Section 5 – Maintenance and Renewal Requirements for Schools
Section 6 – Handback on Expiry Requirements
Section 7 – Handback Requirements

Appendix A – Standard Core School Design Reports
Attachment A1 – Barr Ryder – K-9 (600) – November 12, 2007
Attachment A2 – Barr Ryder – K-9 (900) – November 12, 2007
Attachment A3 – Group2 Architecture Engineering Ltd. – K-4 (600) -- October, 2007
Appendix B – (Revised) Basic Modular Classroom Informational Plans
Appendix C – Modified School Designs
Appendix D – Site Layouts and Landscape Development Plans
Appendix E – Millwork Sketches
Appendix F – Basic Electrical Requirements and Basic Mechanical Requirements
Appendix G – Alberta Infrastructure, Modular Classroom Control Guideline
Appendix H – Minimum Material Requirements
Appendix I – Operation and Maintenance Manual Requirements for Electrical and Mechanical Systems
Appendix J – School Board Custodial Services
Appendix K - List of School Board Supplied Furniture and Equipment
Appendix L – Accessibility Criteria

In the event of any conflict or inconsistency between any Sections or Appendices to this Schedule 18, such conflict or inconsistency shall be resolved in the following order of priority, highest to lowest:

Sections 1, 2, 4, 5, 7, Appendix L

Appendices E, D, C, A, G, H, J, K
Sections 3 and 6 and Appendices B, F, I

References to any specifically named Standards and Guidelines in the Technical requirements are to the specifically named Standards and Guidelines that existed as of the deadline for SR2 (as defined in the RFP).

1.2 DEFINED TERMS

In this Schedule 18 (Technical Requirements), capitalized terms shall have the meanings set out in section 1.1 of the DBFM Agreement (as defined below) and the following expressions shall have the following meanings (and where applicable their plurals have the corresponding meanings), except where a contrary meaning is clearly intended:

"Accessibility Criteria" means those standards and criteria set out in Appendix "L" that an Area or the School Building is required to meet in order to be Accessible;

"Accessibility Failure" means a failure of an Area or the School Building to comply with all of the Accessibility Criteria, but expressly excludes any non-compliance with the Accessibility Criteria as a direct result of a Utility Failure provided that the Contractor meets its obligation to supply emergency power in accordance with the Technical Requirements and to ensure the safety of the occupants of the School which may arise as a result of the Utility Failure;

"Accessible/Accessibility" means when an Area or the School Building meets all of the Accessibility Criteria;

"Adhoc School Use" means any use of the School for Educational Activities or Educational Support Activities;

"After Hours" means 22:00 to 07:00 on any day;

"Amended Repair Period" means an extension to a Repair Period arising by the terms of this Schedule 18 (Technical Requirements) or by the agreement or direction of the Province;

"Area" means any area of a School Building identified in Table 5.9.6.1 of Section 5.9.6.1;

"Authorization" means any consent, registration, filing, license, permit, approval, authority or exemption from, by or with any Governmental Authority, given in respect of the Project or the M&R, whether given by express action or deemed given by failure to act within any specified period;

"**Base Consumption**" means the energy consumption levels determined for a School at School Availability;

"Basic Modular Classroom" means the generic design for the Modular Classrooms, before the modifications required by the School Boards;

"BMCS" means the building management control system and controls which control the delivery of heat, ventilation and humidity to the Core Structure and the Modular Classrooms necessary to maintain indoor air quality and thermal comfort;

"Building Element" means those elements of a School Building which include but are not limited to all of the functional areas listed in Section 4.9.2, all of the substructure listed in Section 4.9.4, all aspects of the building envelope listed in Section 4.9.5, all aspects of the building interior listed in Section 4.9.6, and the Modular Classrooms listed in Sections 4.10.2.2, 4.10.3.2 and 4.10.3.4;

"Building Equipment" means all equipment required to be supplied and installed at a School by the Contractor pursuant to the Project Requirements, but expressly excludes any School Board Supplied Furniture and Equipment and any playground equipment;

"Building Performance Failure" means, any failure of a Building Element or component thereof, a Building System or component thereof, any Building Equipment or any portion of the Exterior Improvements to meet the performance specifications described in Section 5.12, but expressly excludes any failure of a Building System or any Building Equipment to operate and perform in accordance with the Technical Requirements as a direct result of a Utility Failure, provided that the Contractor meets its obligations to supply emergency power in accordance with the Technical Requirements and to ensure the safety of the occupants of the School which may arise as a result of the Utility Failure;

"Building Performance Failure Category" means any one of the categories of Building Performance Failures described in Section 5.11.1;

"Building System" means those systems of a School Building which include the electrical system, heating and ventilation system, air conditioning, BMCS, plumbing system, fire protection, fire alarm system, security system, master clock and building elevators described in Section 4.9.7;

"CaGBC" means the Canada Green Building Council;

"Cleared Persons" has the meaning ascribed thereto in Section 5.4.1;

"Collaboration Plan" has the meaning ascribed thereto in Section 3.12;

"Commissioning and Startup Plan" has the meaning ascribed thereto in Section 3.4;

"Community Use" means any non-commercial use of a School for community based programs as contemplated by the Joint Use Agreements, including but not limited to community sports, arts and crafts, meetings, club activities, church services, election activities and any other community based function;

"Construction Management Plan" has the meaning ascribed thereto in Section 3.3;

"Contractor Construction Representatives" has the meaning ascribed thereto in Section 4.11.3;

"Contractor M&R Representatives" has the meaning ascribed thereto in Section 5.1.5;

"Core Structure" means the permanent and fixed core structure shown in the Modified School Designs, which excludes the Modular Classrooms;

"DBFM Agreement" means the Agreement to Design, Build, Finance and Maintain nine Schools in the City of Calgary and nine Schools in the City of Edmonton between Her Majesty the Queen in right of Alberta and the Contractor, as defined therein, to which agreement this Schedule 18 (Technical Requirements) is attached;

"Decorating" means painting of any surface within the School Building, hanging of pictures, posters or drawings on the walls, hanging of ceiling decorations, flags, party favours, and any other decorative addition to the School Building not contemplated in the Technical Requirements;

"Detailed Designs" means the plans, specifications and drawings that the Contractor is required to provide pursuant to section 5.9 of the DBFM Agreement;

"Development Permit" means the permit from the relevant City granting permission to develop a School Site upon the conditions prescribed therein by the relevant City;

"Educational Activities" means all curriculum, teaching, career guidance, extra-curricular, remedial, training, practice, vocational, scholastic and educational activities provided for the benefit of students to be undertaken at each School as contemplated by the *School Act*, RSA 2000, c. S-3, as may be amended or replaced from time to time;

"Educational Support Activities" means all parent and administrative support functions carried out in support of the Educational Activities, including but not limited to, parent-teacher interviews, professional development activities of teaching staff, staff meetings, curriculum development activities, before and after school care activities and those support activities contemplated by the *School Act*, RSA 2000, c. S-3, as may be amended or replaced from time to time, that support Educational Activities;

"Emergency Failure" has the meaning ascribed thereto in Section 5.11.1;

"Emergency Response Plan" has the meaning ascribed thereto in Section 3.10;

"**Energy Consumption Report**" means the report detailing the total energy that used over the period of one year by energy type to operate the School in accordance with the temperature, ventilation, humidity and air quality parameters set out in the Technical Requirements, for the specified hours of operation as stated annually by the Province, the minimum operating temperature and the degree day data for each School;

"Examination Periods" means those half term and year end comprehensive examination periods designated by the School Boards;

"**Exterior Improvements"** means, without limitation, all transportation and drop off areas, refuse areas, parking lots, hard surface play areas, sidewalks, fencing, signage, retaining walls, bicycle racks, flag poles, railings and all landscaped areas, including grass, trees, shrubs and other decorative plants, all as described in Section 4.9.8 and excludes any School Board Supplied Furniture and Equipment and excludes playground equipment;

"Failure" means an Accessibility Failure, Building Performance Failure, Service Failure or Reporting Failure;

"Good Industry Practice" means using standards, practices, methods and procedures to a good commercial standard, conforming to applicable laws and relevant Standards and Guidelines and exercising that degree of skill, care, prudence and foresight and industry practices which could reasonably and ordinarily be expected from time to time of a qualified, skilled and experienced person engaged in the same type of undertaking as that of the Contractor, under the same or similar circumstances;

"Governmental Authority" means any federal, provincial, territorial, regional, municipal or local governmental authority, quasi-governmental authority, court, government or self-regulatory organization, commission, board, tribunal, organization or any regulatory, administrative or other agency or any political or other subdivision, department or branch of any of the foregoing, having jurisdiction in any way over any aspect of the performance of the Project or the M&R, in each case to the extent it has or performs legislative, judicial, regulatory, administrative or other functions within its jurisdiction;

"Handback on Expiry Plan" has the meaning ascribed thereto in Section 3.11;

"Help Desk" means the help desk provided by the Contractor for the purposes of providing a single source for repair and maintenance requests and complaints, as is more particularly described in Section 5.7;

"ICT" means information and communication technology;

"Inaccessible/Inaccessibility" means an Area of a School Building or a School Building, which does not meet all applicable Accessibility Criteria or is otherwise declared Inaccessible in accordance with Section 5.9;

"Inaccessible but Used" means an Area which is Inaccessible, but nevertheless used to carry out Educational Activities, Educational Support Activities or used for Adhoc School Use or Community Use;

"Instructional Areas" means all teaching areas within a School Building including but not limited to Core Structure classrooms, Modular Classrooms, science rooms, music rooms, art rooms, early childhood services classrooms, CTS classrooms and food and fashion classrooms;

"Internal Reviewer" has the meaning ascribed thereto in Section 3.2.1;

"Landscape Development Plans" means the landscape development plans for each School Site attached out in Attachment 2 of Appendix "D";

"LEED™ Canada – NC Version 1.0" means CaGBC's Leadership in Energy & Environmental Design (LEED™) Green Building Rating System for New Construction & Major Renovations LEED™ Canada NC Version 1.0 and Addendum;

"LEED™ Certification Plan" has the meaning ascribed thereto in Section 3.5;

"LEED™ Rating System" means the credit rating system set out in LEED™ Canada – NC Version 1.0 and Addendum;

"LEED™ Silver Certification" means the award of LEED™ Silver certification from the CaGBC;

"Maintenance Plan" has the meaning ascribed thereto in Section 3.8;

"Millwork Sketches" means those sketches set out in Appendix "E";

"Minimum Material Requirements" means those minimum materials described in Appendix "H";

"Modified School Designs" means those modified designs and the electrical power and data plans for the Core Structure and the Modular Classrooms as set out in Appendix "C";

"Modular Classroom" means a non-permanent, removable, relocatable modular unit, which may include a classroom, corridor, and mechanical room, as shown in the Modified School Designs, and excludes the Core Structure;

"Operation and Maintenance Manuals" has the meaning ascribed thereto in Section 4.11.11.2;

"**Original Payment Adjustment**" means the Payment Adjustments specified in Section 5, excluding the Payment Adjustments for Repeat Failures;

"**Outside the School Day**" means the period commencing at 16:30 hours and ending at 22:00 hours, Monday to Friday, except for School Holidays, and the period commencing at 07:00 hours and ending at 22:00 hours on School Holidays, during the School Year;

"Payment Adjustment Period" means any period specified in Tables 5.9.6.1, 5.9.6.2 and 5.9.6.3 during which a specified Payment Adjustment is applied;

"PMP" has the meaning ascribed thereto in Section 5.8.1;

"Project Records" means all of the documents identified in Sections 4.11.11.1 and 4.11.11.2;

"Proposed Repair Period" has the meaning ascribed thereto in Section 5.11.5;

"Province" means Her Majesty the Queen in right of Alberta;

"Provincial Construction Representatives" has the meaning ascribed thereto in Section 4.11.3;

"Provincial M&R Representatives" has the meaning ascribed thereto in Section 5.1.5;

"Public Communication Strategies" has the meaning ascribed thereto in Section 3.13;

"QMS" has the meaning ascribed thereto in Section 3.2;

"Reasonable Wear and Tear" means wear and tear that is reasonable given the use and age of the School, and consistent with wear and tear that could reasonably be expected to exist at a school facility similar to the Schools, operating in a similar environment and similar circumstances and of a similar age, but does not include any degradation in the functionality or operability of the School, including decorative fittings, finishes (including paint, fabric and special finishes), floor coverings and other soft finishes so that the School or any of the Building Elements, Building Systems, Building Equipment and Exterior Improvements of the School fails to meet the Technical Requirements or fails to comply with applicable laws, Authorization or Standards and Guidelines;

"Renewal Management Plan" has the meaning ascribed thereto in Section 3.9;

"Repair Period" means any period stipulated in Section 5.12 within which the Contractor is required to perform temporary repairs, install temporary protective measures or complete permanent repairs of any damage, deficiency or impaired condition affecting a School;

"Repeat Failure" has the meaning ascribed thereto in Section 5.12.6;

"Reporting Failure" has the meaning ascribed thereto in Section 5.12.7;

"Response Time" has the meaning ascribed thereto in Section 5.11.2;

"Routine Failure" has the meaning ascribed thereto in Section 5.11.1;

"Safety Plan" has the meaning ascribed thereto in Section 3.6;

"School Board Supplied Furniture and Equipment" means the furniture and equipment listed in Appendix "K" or any other furniture and equipment supplied by the School Boards during the course of the Term;

"School Day" means the period between 07:00 hours and 16:30 hours, Monday to Friday, excluding School Holidays, during the School Year;

"School Holidays" means professional development days, teacher's convention, Saturdays, Sundays, statutory holidays, and generally the Christmas break, spring or Easter break, the summer break, which may be amended annually by the School Board for Schools, and including any other holiday declared by a School Board for its Schools.

"School Representative" means a representative of the a School Board appointed by the relevant School Board pursuant to the terms of the Tri-Party Agreement;

"School Site Investigation Reports" has the meaning ascribed thereto in Section 2.3.3;

"School Year" means the period between September 1 and August 31 of each year during the School M&R Period and the M&R Period;

"Security Clearance Process" has the meaning ascribed thereto in Section 3.7;

"Service Failure" means:

(a) a failure to provide updated "as-built" drawings or updated Operation and Maintenance Manuals as contemplated in Section 5.1.4;

(b) a failure to comply with the security protocols described in Section 5.4.1(a) and (b);

(c) a failure to meet the service standards for the Help Desk as described in Section 5.7.2;

(d) a failure to provide the reports, forecasts or information described in Sections 5.8.2 and 5.12.8; or

(e) a failure to respond to a Help Desk request within the Response Times set out in this Schedule 18 (Technical Requirements);

"Site Layout" means the layout of a School on a School Site, as shown in the drawings attached in Attachment 1 of Appendix "D";

"Standard Core School Design" means any one of the designs set out in the Standard Core School Design Development Reports;

"Standard Core School Design Development Reports" means those Standard Core School Design Development Reports attached hereto in Appendix "A";

"Standards and Guidelines" means the standards, guidelines, policies or requirements, prescribed by the Province or any professional bodies or industry associations or similar organizations, specifically referred to or incorporated by reference in this Schedule 18 (Technical Requirements);

"Urgent Failure" has the meaning ascribed thereto in Section 5.11.1; and

"**Utility Failure**" means any failure or shortage in the supply of water, natural gas or electricity to or failure of a sanitary waste or storm water sewage system for an Area or a School Building provided that such failure or shortage is not caused or contributed to by the Contractor, its agents, contractors or subcontractors or those for whom the Contractor is legally responsible.

Words and abbreviations which are not defined in the Technical Requirements or the DBFM Agreement and which have well known technical or trade meanings and which are used in the Technical Requirements are used in accordance with such recognized meanings.

Standard units of measurement may be abbreviated in the Technical Requirements.

1.3 SECTION REFERENCES

Unless otherwise provided, references to Section numbers are references to Section is this Schedule.

SECTION 2 - DESCRIPTION OF SCHOOLS

2. DESCRIPTION OF SCHOOLS

2.1 GENERAL

The DBFM Agreement provides for the design, build, finance and maintenance of 18 new Schools, nine located in the City of Calgary and nine located in the City of Edmonton, at the sites described in Schedule 12 (School Sites). The general details of the Schools are set out in Schedule 13 (Schools), with the layout for each School Site shown in the Site Layouts.

The Standard Core School Designs were mandated by the Province for all future schools to be built in Alberta, with a view to creating a streamlined design applicable for all schools and all school sites within Alberta. The decision to use a streamlined school design and floor plan for all future schools was based upon the real savings achieved by the Province in utilizing a single design province wide. The Standard Core School Designs include a fixed and permanent Core Structure which incorporates key functional areas such as the gymnasium, library, administration area, certain classrooms, gathering areas and project areas together with the provision of additional teaching areas through the use of Modular Classrooms to easily and economically allow for changing demographics.

The Standard Core School Designs are the basis for the Modified School Designs, the latter of which were prepared in consultation with the School Boards. The Site Layouts were also determined in consultation with the applicable School Board and the relevant City.

Details of the Project Requirements, the M&R Requirements, the Handback on Expiry Requirements and the Handback Requirements for the Schools are detailed in this Schedule 18 (Technical Requirements).

2.2 DESCRIPTION OF SCHOOLS

2.2.1 Initial School Build-Out

On or before the Total Availability Target Date, the Contractor shall carry out the Project for the following Schools:

Table 2.2.1 – Initial School Build-Out

School Board	City	School Community	Grade Structure	Core Structure Area - m2	Number of Modular Classrooms	Approved Capacity of School
CBE	Calgary	Saddle Ridge	K-4	3323	10	550
CBE	Calgary	Evergreen	K-4	3323	10	550

School Board	City	School Community	Grade Structure	Core Structure Area - m2	Number of Modular Classrooms	Approved Capacity of School
CBE	Calgary	Bridlewood	K-6	3323	12	600
CBE	Calgary	Cranston	K-4	3323	10	550
CBE	Calgary	Royal Oak	K-4	3323	10	550
CBE	Calgary	West Springs	K-4	3323	10	550
CSSD	Calgary	Evergreen	K-6	3323	12	600
CSSD	Calgary	Cranston	K-9	5817	14	840
CSSD	Calgary	Saddle Ridge	K-9	5817	14	840
ECS	Edmonton	Terwillegar Heights	K-6	3323	8	500
ECS	Edmonton	The Hamptons	K-9	3509	12	500
ECS	Edmonton	Rutherford East	K-9	3509	12	500
EPSB	Edmonton	Carlton	K-9	5817	6	850
EPSB	Edmonton	Tamarack	K-9	5817	14	850
EPSB	Edmonton	Terwillegar Towne	K-9	5817	14	850
EPSB	Edmonton	Belle Rive	K-9	5817	14	850
EPSB	Edmonton	Rutherford West	K-9	5817	14	850
EPSB	Edmonton	Hollick-Kenyon	K-9	5817	6	850

2.2.2 Additional Modular Classrooms

In addition, during the M&R Period the Contractor will expand certain of the Schools listed above by supplying and installing the additional Modular Classrooms as indicated below at no additional cost to the Province. The additional Modular Classrooms must meet the Project Requirements with respect to design, supply, installation and testing. From and after installation, the additional Modular Classrooms will be subject to the M&R Requirements, the Handback on Expiry Requirements and the Handback Requirements all to be performed by the Contractor, at no additional cost to the Province. Unless otherwise notified by the Province not less than six months prior to the planned delivery date, the dates for the required the delivery and installation of the additional Modular Classrooms are as listed below:

Table 2.2.2 – Additional Modular Classrooms

September 1 of the following years	Carlton – EPSB	Hollick-Kenyon – ESPB	Total # per year
2011	0	0	0
2012	2	2	4
2013	0	0	0
2014	2	2	4
2015	4	4	8
Total	**8**	**8**	**16**

Where the demographics of the community the School serves change requiring the addition of further Modular Classrooms beyond those listed in Table 2.2.2 to accommodate any increased student enrollment, the Province may issue a Change Order Enquiry pursuant to Schedule 1 (Change Orders) to the Contractor for evaluation by the Province in connection with the supply of a new Modular Classroom or the repair of an existing Modular Classroom supplied by the Province, together with the provision of M&R for such an additional Modular Classroom.

2.2.3 Removal of Modular Classrooms

The Contractor acknowledges that the Schools will be designed to incorporate a Core Structure that incorporates key functional areas such as the gymnasium, library, administration area, certain classrooms, gathering areas and project areas, and Modular Classrooms to allow for the addition or removal of teaching areas to easily and economically allow for changing demographics.

Where the demographics of the community the School serves change requiring the removal of Modular Classrooms to accommodate any decreased student enrollment, the Province may require the removal of Modular Classrooms by the Contractor pursuant to a Change Order Directive governed by Schedule 1 (Change Orders), such that the affected Modular Classrooms cease to be subject to the DBFM Agreement. The last paragraph of section 7.2 of the DBFM Agreement shall not apply in respect of the removal of Modular Classrooms as required by the Province pursuant to this Section 2.2.3.

2.3 SCHOOL SITES

2.3.1 School Sites

The Project will be carried out on the School Sites for each School, at the locations identified in Schedule 12 (School Sites). In addition, certain of the Exterior Improvements will be constructed on the City Lands, as identified in the Site Layouts, and will be maintained by the Contractor throughout the Term.

Access to and use of the School Sites for the purpose of carrying out the Project and the M&R has been granted to the Contractor pursuant to Article 4 of the DBFM Agreement. Access to the School Sites from City streets is subject to the requirements set out in Section 4.11.9.5.

If the Contractor requires additional lands for construction activities at a School Site, it is the responsibility of the Contractor to obtain the necessary consents for access to such additional lands.

2.3.2 Development Permits

The Province has applied for Development Permits for each School Site with the relevant City. The Development Permit applications submitted by the Province were based upon the Modified School Designs, the Site Layouts and the Landscape Development Plans. Any expressly permitted variations to any of these documents by the Contractor that causes a delay in the issuance of a Development Permit for a School shall be at the sole risk of the Contractor.

For The City of Calgary, the Contractor's point of contact regarding the Development Permits is:

The City of Calgary

For Development Permits:

Main Contract: Dino Di Tosto
Urban Development
Phone: 403-268-2131
Email: dino.ditosto@calgary.ca

Second Contact: Yang Wang
Phone: 403-268-1132

For Building Permits:

Main Contract: Raymond Yuen
Phone: 403-268-5659

Second Contact: Sheila Smith
Phone: 403-268-8078

For Drainage Site Servicing Plans:

Main Contract: Graham Scattergood
Phone: 403-268-5795

For The City of Edmonton, the Contractor's point of contact regarding the Development Permits is:

The City of Edmonton

Paul Kozak
Planning & Development
Phone: (780) 496-8477
Email: paul.kozak@edmonton.ca

2.3.3 School Site Investigations

The Province retained Golder Associates Ltd. and Morrison Hershfield Limited to perform site investigations for the School Sites. Golder Associates Ltd. and Morrison Hershfield Limited prepared for the Province site investigation reports for each School Site ("**School Site Investigations Reports**") in connection with the above assessments. The School Site Investigation Reports have been provided to the Contractor as information only. The School Site Investigation Reports provided to the Contractor shall not be construed as importing any duty of care to the Contractor on the part of the Province, Golder Associates Ltd. or Morrison Hershfield Limited in relation to the accuracy of such School Site Investigation Reports or the studies or other information contained therein, it being mutually understood and agreed that the Contractor will perform its own research, investigation and due diligence at each School Site.

The Contractor is solely responsible for all geotechnical testing and analysis, site conditions, environmental conditions and requirements, historical assessments and other matters relating to the School Sites as may be required for the necessary Authorizations from Governmental Authorities in connection with the Project.

SECTION 3 -- MANAGEMENT SYSTEMS AND PLANS

3. MANAGEMENT SYSTEMS AND PLANS

Subject to section 5.5 of the DBFM Agreement, the Contractor shall further develop, implement and maintain, and shall monitor, update and manage, until the end of the Term, as applicable, the Contractor's Construction Schedules and the Contractor's Management Systems and Plans to comply with the Technical Requirements.

3.1 CONTRACTOR'S CONSTRUCTION SCHEDULE

Subject to section 5.5 of the DBFM Agreement, the Contractor shall further develop, implement and maintain and shall monitor, update and manage for each School until School Availability is achieved for that School, a Contractor's Construction Schedule for that School.

During the Project, the Contractor shall provide the Province with a Contractor's Construction Schedule for each School that is sufficiently detailed to give the Province an understanding of all significant construction activities at each School. The Contractor shall use a scheduling program that is readable by or compatible with Microsoft Project.

The Contractor's Construction Schedule shall include the design and construction activities for each School and a corresponding integrated overall construction schedule for the Project that:

- breaks down activities to a level of detail sufficient to enable the Province to readily interpret the schedule and facilitate monitoring of the construction progress at each School;

- breaks down long duration activities and sub-activities, which are continuous, repetitive or sequential in nature and which represent the construction activities planned for each School; and in this regard, the Contractor shall submit separate sub-network diagrams; and

- provides all the information evidencing the Contractor's construction plan, which clearly shows the inter-relationships of all activities related to each School and to the Project.

3.2 QUALITY MANAGEMENT SYSTEM

Subject to section 5.5 of the DBFM Agreement, the Contractor shall further develop, implement and maintain, and shall monitor, update and manage, until the end of the Term, the Quality Management System (the "QMS"), as attached in Schedule 4 (Contractor's Management Systems and Plans) to the DBFM Agreement.

The QMS shall demonstrate how the Contractor develops its quality control system and shall describe the Contractor's quality policies and procedures for all stages of the Project and the M&R, specifically addressing the following:

- Design;
- Construction;
- Commissioning and Startup; and
- Maintenance and Renewal.

The QMS shall also describe the Contractor's policies and procedures for implementing and assessing the effectiveness of its quality control system.

The QMS must be satisfactory to the Province, acting reasonably, with the Contractor using the *ISO 9001:2000 Standard* as a guideline for the development of the Contractor's QMS and shall cover all activities, products and services related to the Project and the M&R, prior to the execution of these activities, products and services. The Contractor shall make all QMS records available to the Province for inspection and review. The Contractor shall provide the Province with a copy of any or all quality records when so requested.

The QMS shall stipulate how compliance with the Technical Requirements and the Contractor's Management Systems and Plans is ensured. During all stages of the Project and the M&R, work shall not be started on any component of the Project or the M&R until after the QMS has been completed and implemented for that component of the Project or the M&R. All records from the QMS for design, construction, commissioning and startup and maintenance and renewal, including all audits, shall be maintained and retained by the Contractor until the end of the Term or until otherwise agreed to in writing by the Province.

The individuals responsible for carrying out quality control and quality assurance shall be identified in the QMS.

The QMS shall include, but not be limited to:

3.2.1 Design

The QMS shall require that all designs and professional documents, including plans, engineering drawings, detailed drawings, maps, specifications, reports or other documents or a reproduction of any of them, that describe engineering, geological or geophysical work as contemplated in the *Association of Professional Engineers, Geologists and Geophysicists of Alberta (APEGGA) Act* or regulations, be authenticated by a professional member, in accordance with the *APEGGA Practice Standard for Authenticating Professional Documents V2.0.*

The QMS shall also require that the Contractor's design reports, architectural drawings, specifications and related documents that describe architectural work as contemplated by the *Architects Act* (Alberta) and regulation and the *Safety Codes Act* and regulations be stamped and signed by an architect registered with the *Alberta Association of Architects.*

The QMS shall also require that all designs be reviewed, checked and verified by an independent reviewer (the "**Internal Reviewer**"). The Internal Reviewer shall be a qualified professional engineer or architect, as the design drawing so requires, who may be employed by the legal entity doing the design work.

The Internal Reviewer shall include independent design check notes and shall report that the design checks have been completed based on the information provided by the Contractor's design engineer or architect of record and is satisfied that the designs meet the Technical Requirements.

Changes made to the design of a School prior to School Availability must follow the same review process.

If a non-conformance in the design is determined at any time, including after School Availability, the Contractor shall undertake the necessary modifications at its own cost to ensure the as-built Schools are in accordance with the Project Requirements.

3.2.2 Construction

The QMS shall provide for ensuring that the as-built Schools are in conformance with the requirements of the Contractor's design reports, the Detailed Designs, the Technical Requirements and any related documents developed for the Schools.

The Contractor shall implement a methodology to verify compliance of the construction of the Schools with the Detailed Designs and Technical Requirements. Changes made to the design of a School prior to School Availability shall be stamped and signed by a professional engineer or architect of record from the design team and any such changes are to be reviewed by the Internal Reviewer. Prior to School Availability, a professional engineer or architect of record from the design team shall be required to stamp and sign a declaration that the School has been constructed in accordance with the Contractor's design reports, the Detailed Designs and the Technical Requirements.

The QMS shall detail the pre-commissioning requirements, testing and acceptance program for all construction materials, products and equipment, Building Equipment, Building Systems and the Modular Classrooms, including, but not limited to, the following:

- Importance of construction quality, including material and Building Equipment testing and inspections, testing and inspections frequencies, quality reference standards, product acceptance and rejection criteria;

- Procedures for corrective action when quality control and/or acceptance criteria are not met;

- Feedback to designers for improvement of construction material or Building Equipment quality;

- Recruitment, training and assignment of its skilled workforce;

- Measures to ensure that subcontractors are qualified and licensed as required; and

- Roles and responsibilities of the Contractor's staff in the quality assurance process.

The QMS shall require that complete testing/inspection reports be prepared for the Project and the M&R.

The Contractor shall make all QMS records available to the Province for inspection and review. The Contractor shall provide the Province with a copy of quality records when so requested.

Non-conforming construction works will be considered unacceptable and the Contractor shall undertake the necessary modifications at its own cost to ensure the as-built Schools conform to the requirements of the Detailed Designs and Technical Requirements.

3.2.3 Commissioning and Startup

The QMS shall ensure that the Commissioning and Startup Plan and activities thereunder meet all applicable laws, Authorizations, relevant Standards and Guidelines, and that all Building Equipment and Building Systems conform with and perform as required by the Technical Requirements.

The QMS for Commissioning and Startup shall include details for the following, including without limitation:

- QMS requirements for the commissioning and startup program that will break the required work into areas, with a matrix identifying the person responsible for such work. In addition, the plan shall provide for a schedule of the interactive testing of all Building Systems and Building Equipment;

- Procedures for inspections and where required, receipt of the relevant permits;

- Required QMS processes for testing, diagnosis and correction of problems, repeat testing;

- Procedure to meet the requirements of Section 4.12; and

- QMS requirement for reporting of results of tests and a commissioning and start-up report to the Province.

3.2.4 Maintenance and Renewal

The QMS shall ensure that the M&R performed by the Contractor conforms to the M&R Requirements.

The Contractor shall update annually during the School M&R Period and the M&R Period, the plans detailing the inspection, monitoring and M&R activities for the Schools that will be conducted during the upcoming year to ensure that all M&R Requirements are met.

The QMS shall detail the following, including without limitation:

- Importance of overall quality in the M&R for the Schools, including monitoring, inspections and regulatory compliance, testing and inspections frequency, quality reference standards, product acceptance and rejection criteria;

- Procedures, quality control and quality assurance criteria that include clearly stated deliverables, benchmarks/baselines to facilitate the measurement, reporting, analysis and the continual improvement of M&R and related business processes;

- Procedures, related business processes and accountabilities for inspections, monitoring, the Help Desk, Failure rectification and the Contractor's M&R performance.

- Procedures for recruitment, training and assignment of its skilled workforce;

- Measures to ensure that subcontractors are qualified and licensed as required; and

- Procedures for a formal document and record management defining the control of Help Desk and M&R quality documents and records.

Non-conforming QMS requirements for inspection, monitoring and M&R activities will be considered unacceptable and the Contractor shall undertake the necessary modifications at its own cost to ensure that the inspection, monitoring and M&R are in conformance with the QMS and M&R Requirements.

3.2.5 Internal Audits

The Contractor shall undertake annual internal QMS audits to validate that the required levels of QMS performance prior to School Availability and during the School M&R Period and the M&R Period are being or have been achieved as required by the Technical Requirements. A full system internal audit shall be completed within one year of Execution of the DBFM Agreement and thereafter at least once per year until the end of the Term.

The QMS internal audits shall involve:

- document reviews or system audits to ensure that the Contractor has plans and procedures in place to cover all the required aspects of the QMS; and

- compliance or procedural audits to ensure that the specified plans and procedures are being effectively implemented.

The Contractor shall make all QMS records available to the Province at all times for inspection, review and further instructions. All QMS deficiencies identified by the internal audit must be addressed and corrective measures implemented by the Contractor.

3.2.6 External Audits

At any time during the Term, the Province may at its discretion and at its sole cost engage a third party to carry out a full system audit of the Contractor's QMS to verify that the required levels of QMS performance are being achieved as required under the DBFM Agreement (the "External Audit"). The Contractor shall make available to the third party all QMS records relating to the Project and the M&R. The Contractor must address and implement appropriate corrective measures for all QMS deficiencies identified by the External Audit within 30 days of the Province providing the External Audit to the Contractor.

3.2.6.1 Payment Adjustments

If a deficiency or deficiencies identified by the External Audit have not been corrected within the specified time, a Payment Adjustment of $5,000/week or any partial week, for the first four weeks and $10,000/week or any partial week, thereafter shall apply until such deficiency or deficiencies are corrected.

3.3 CONSTRUCTION MANAGEMENT PLAN

Subject to section 5.5 of the DBFM Agreement, the Contractor shall further develop, implement and maintain, and shall monitor, update and manage, until the end of the

Construction Period, the Construction Management Plan, as attached in Schedule 4 (Contractor's Management Systems and Plans) to the DBFM Agreement.

The Construction Management Plan shall include the following, including without limitation:

- LEED™ Silver Certification registration for each School as described in Section 4.8.1;
- Integration of design and construction processes;
- Scope verification and scope controls;
- Resource planning and management;
- Monitoring and controlling progress;
- Materials and Building Equipment procurement;
- Modular Classroom procurement; and
- Pre-commissioning and testing plan.

The Province will review the Construction Management Plan for the Schools in accordance with Schedule 5 (Design and Plan Certification and Review Procedure) prior to the start of any procurement activities and the construction of the Schools.

3.4 COMMISSIONING AND STARTUP PLANS

Subject to section 5.5 of the DBFM Agreement, the Contractor shall further develop, implement and maintain, and shall monitor, update and manage, for each School until School Availability is achieved for that School, a Commissioning and Startup Plan, as attached in Schedule 4 (Contractor's Management System and Plans) to the DBFM Agreement.

Prior to the start of any commissioning and startup activities at each School, the Contractor shall prepare a Commissioning and Startup Plan for each School and shall include, at a minimum, the following:

- a detailed description of how the Contractor intends to ensure that each School meets the Project Requirements prior to School Availability;
- if commissioning in accordance with the LEED™ Commissioning Best Practices, a detailed description of how the Contractor intends to implement the LEED™ Commissioning Best Practices;

- a detailed description of the Contractor's planned systematic testing and startup procedures for each Building System and all Building Equipment within each School that will be undertaken to ensure that all Building Systems and Building Equipment in each School perform interactively and at the performance levels required in the Technical Requirements;

- testing requirements to meet all applicable laws, Authorizations and the relevant Standards and Guidelines;

- plans for diagnosis of problems, correction of deficiencies and repeating of testing; and

- a detailed description of how the Contractor plans to meet the requirements of Section 4.12.

The Province will review the Commissioning and Startup Plan for each School in accordance with Schedule 5 (Design and Plan Certification and Review Procedure) prior to the start of any commissioning and startup activities at that School.

3.5 LEED™ CERTIFICATION PLAN

Subject to section 5.5 of the DBFM Agreement, the Contractor shall further develop, implement and maintain, and shall monitor, update and manage, until LEED™ Silver Certification is achieved for all Schools, the LEED™ Certification Plan, as attached in Schedule 4 (Contractor's Management System and Plans) to the DBFM Agreement.

The Contractor shall develop the LEED™ Certification Plan to ensure that the Contractor attains at least a LEED™ Silver Certification for each School using the LEED™ Rating System. In all cases, the credits pursued for the Core Structure and the Modular Classrooms must be consistent. The LEED™ Certification Plan must address general compliance requirements and identify procedures for compliance with the LEED™ Rating System.

The Province will review the LEED™ Certification Plan for the Schools in accordance with Schedule 5 (Design and Plan Certification and Review Procedure) within 30 days of Execution of the DBFM Agreement.

The Contractor's LEED™ Certification Plan shall incorporate the following, including without limitation:

- Submission of a completed LEED™ project checklist of estimated credits to demonstrate how the Contractor intends to achieve the LEED™ Silver Certification for each School. The LEED™ project checklist shall identify

estimates for credits in the required, preferred (Y), possible (?) and not-preferred categories (N).

- Sustainable design and construction processes by identifying processes to be used in the areas of design, construction and M&R to achieve high performance "green" Schools.

- Records and documentation processes, which shall include an overall documentation process to support sustainable design and construction to attain the required LEED™ Silver Certification. The Contractor shall assign a LEED™ Accredited Professional as its LEED™ Coordinator. The LEED™ Coordinator shall be responsible for the development and tracking of the necessary LEED™ documentation for each credit and final submission thereof. LEED™ credits must be documented in the plans, specifications and design analyses where applicable. The LEED™ documentation and submissions shall be acknowledged and assigned milestone goals in the Contractor's Construction Schedule.

- Sustainability audits and assessments processes, which shall include evaluation processes and tools to provide information and analyses needed to support sustainability goals of the Schools. These audits and processes include, without limitation:

  Energy Modeling: Utilizing the latest software tools to predict the energy consumption of a School and identify and evaluate energy-saving strategies;

  Lighting Design: Designing end-user space to make the most use of natural lightning as well as energy efficient lighting systems; and

  Commissioning: Developing process for new construction which optimize building performance and incorporate sustainability goals.

- Waste management plan and implementation process, which shall include plans for reducing waste, recycling and salvaging of materials during the Project.

3.6 SAFETY PLAN

Subject to section 5.5 of the DBFM Agreement, the Contractor shall further develop, implement and maintain and monitor, update and manage, until the end of the Term, the Safety Plan, as attached in Schedule 4 (Contractor's Management Systems and Plans) to the DBFM Agreement.

The Contractor, through its Safety Plan, shall describe health and safety standards and practices that the Contractor will implement to reduce or eliminate the occurrence of

accidents while performing its various obligations under the DBFM Agreement, prior to School Availability and during the School M&R Period and the M&R Period.

The Safety Plan shall include the following, including without limitation:

- Safety training program;
- Incident reporting system;
- Accidents prevention program;
- Compliance with applicable laws;
- Roles and responsibilities of safety personnel; and
- The requirements of Schedule 16 (Safety Requirements) of the DBFM Agreement.

The Province will review the Safety Plan for a specific component of the Project or the M&R, as applicable, in accordance with Schedule 5 (Design and Plan Certification and Review Procedure) prior to the start of that component of the Project or the M&R, as applicable.

3.7 SECURITY CLEARANCE PROCESS

Subject to section 5.5 of the DBFM, the Contractor shall further develop, implement and maintain and shall monitor, update and manage, until the end of the Term, a Security Clearance Process, as attached in Schedule 4 (Contractor's Management Systems and Plans) to the DBFM Agreement.

The Province shall review the Security Clearance Process in accordance with Schedule 5 (Design and Plan Certification and Review Procedure) prior to the first School achieving School Availability and the Contractor shall annually update the Security Clearance Process prior to the start of each School Year.

The Contractor shall include the following, without limitation, in its Security Clearance Process:

- The Contractor's plan for requiring all employees and staff to obtain and submit to the Contractor criminal record searches and child welfare checks prior to attending at any School to perform M&R;

- A description of how the Contractor plans to respond to security concerns of the Province and the School Boards; and

- A plan for regularly updating criminal record searches and child welfare checks after the initial clearance has been obtained.

3.8 MAINTENANCE PLAN

Subject to section 5.5 of the DBFM and in accordance with Section 3.2.4 (Quality Management System – Maintenance and Renewal), the Contractor shall further develop, implement and maintain and shall monitor, update and manage, until the end of the Term, the Maintenance Plan, as attached in Schedule 4 (Contractor's Management Systems and Plans) to the DBFM Agreement.

The Contractor shall finalize the Maintenance Plan prior to the first School achieving School Availability and shall update the Maintenance Plan annually prior to the start of each School Year. The annually updated Maintenance Plan shall be a 5-year plan, and shall include the maintenance activities carried out in the previous 12 month period as well as the planned maintenance for the ensuing 5 years.

School Availability would not be achieved for any School until the Maintenance Plan has been reviewed by the Province in accordance with Schedule 5 (Design and Plan Certification and Review Procedure).

The Contractor shall ensure that it addresses in the Maintenance Plan all of the components necessary to ensure the Schools are:

- monitored and inspected regularly as required by applicable laws and relevant Standards and Guidelines and to ensure M&R Requirements are being met;

- maintained to ensure efficiency, life cycle enhancement and minimal disruption to Educational Activities, Educational Support Activities, Community Use and Adhoc School Use;

- maintained, at a minimum, in accordance with applicable laws, relevant Standards and Guidelines and manufacturers' recommended maintenance practices to ensure that the Technical Requirements are being met; and

- maintained to ensure that the Handback Requirements will be met.

The Contractor, in its Maintenance Plan, shall also:

- provide a description of the scheduled or periodic maintenance work to be carried out by the Contractor including but not limited to:

    (i) a process to identify, schedule, and undertake periodic maintenance activities that, to the greatest extent possible, will ensure efficiency, life cycle enhancement and minimal disruption to School operations;

(ii) a process to identify, schedule, and undertake periodic maintenance activities that are in accordance with manufacturers' recommended maintenance schedules or good industry practice;

(iii) a comprehensive list of periodic maintenance activities planned to be undertaken during the M&R Period; and

(iv) a process for communication of the periodic maintenance activities schedule with the Province and the School Boards in accordance with Section 5.3.

- provide a preventative maintenance plan to ensure that the Schools function in such a manner so as to meet the Technical Requirements;

- identify all the Building Systems, Building Elements, Building Equipment and components for cyclical maintenance that have predictable life spans;

- provide a planned schedule for preventative maintenance and major repairs;

- identify a structured approach, in accordance with the Technical Requirements, for the labeling and numbering of a School's Building Systems and Building Equipment. It will include information about the cycle schedule, location, Building Equipment number, a description of the maintenance that the Contractor will be performing, and necessary Building Equipment specifications (i.e. part #, model #, serial # etc.).

3.8.1 Payment Adjustments

If the Contractor fails to develop and provide the Province with an annually updated 5 year Maintenance Plan on or before the first day of each School Year, a Payment Adjustment of $1,200/week or any partial week shall be assessed until the annually updated 5 year Maintenance Plan is submitted.

3.9 RENEWAL MANAGEMENT PLAN

Subject to section 5.5 of the DBFM Agreement and in accordance with Section 3.2.4 (Quality Management System – Maintenance and Renewal), the Contractor shall further develop, implement, and maintain and shall monitor, update, and manage, until the end of the Term, the Renewal Management Plan, as attached in Schedule 4 (Contractor's Management Systems and Plans) to the DBFM Agreement.

The Province will review the Renewal Management Plan in accordance with Schedule 5 (Design and Plan Certification and Review Procedure) prior to the first School achieving School Availability and shall be updated annually on or before the first day of each School Year. The annually updated Renewal Management Plan shall be a 5-year plan,

and shall include the renewal activities carried out in the previous 12 month period as well as the planned renewals for the ensuing 5 years.

School Availability will not be allowed at any School until the initial Renewal Management Plan has been reviewed by the Province in accordance with Schedule 5 (Design and Plan Certification and Review Procedure).

The Renewal Management Plan shall include detailed information on the Contractor's plan for the renewal or replacement of Exterior Improvements, Building Equipment, Building Elements and Building Systems throughout the School M&R Period and the M&R Period. The Renewal Management Plan must include expected life of major Building Systems and Building Equipment having regard to the Handback Requirements set out in Section 7.

3.9.1 Payment Adjustments

If the Contractor fails to develop and provide the Province with an updated 5 year Renewal Management Plan by the start of each School Year, a Payment Adjustment of $1,200/week or any partial week shall be assessed until it is submitted.

3.10 EMERGENCY RESPONSE PLAN

Subject to section 5.5 of the DBFM Agreement, the Contractor shall further develop, implement and maintain and monitor, update and manage, until the end of the Term, an Emergency Response Plan, as attached in Schedule 4 (Contractor's Management Systems and Plans) to the DBFM Agreement.

The Province will review the Emergency Response Plan in accordance with Schedule 5 (Design and Plan Certification and Review Procedure) prior to commencement of construction at any School Site, and again within 60 days of the first School achieving School Availability. The Contractor shall update the Emergency Response Plan annually in conjunction with the relevant School Representative no later than October 1 of every year for each School following School Availability of a School.

The Contractor's Emergency Response Plan shall contemplate two distinct periods and shall provide the details on the manner and timing of reaction to emergencies to ensure public safety (including students and staff) and protection of property while complying with the requirements of the DBFM Agreement regarding such matters.

For each School, prior to School Availability, the Emergency Response Plan shall delineate the Contractor's plan for emergencies during construction.

For each School, after School Availability, the Contractor's Emergency Response Plan must be incorporated into each School's emergency response plan with the requirements of the School taking priority.

The Contractor, in its Emergency Response Plan, shall address the following items:

- an activation process for mobilizing crews on short notice in the event of emergencies;
- a contingency plan if primary staff cannot be reached;
- training to be given to the Contractor's and subcontractor's staff and School Board and School staff with respect to the Contractor's Emergency Response Plan prior to School Availability at each School and the combined Contractor/School Emergency Response Plan during the School M&R Period and the M&R Period;
- communication strategies with the Province, the School Boards, the public, the media, local authorities, utility companies and the police and fire departments;
- an administrative process for the collection from the responsible party of "excluded risk" costs arising from accidents that are not covered by the Contractor's required insurance;
- a strategy with respect to administration of fire calls from local fire departments; and
- a strategy with respect to the practice and administration of debris removal and recycling removal.

In addition to the above, the Contractor shall include in its Emergency Response Plan the following in respect of each School:

(a) A plan to maintain in readiness and implement where necessary, contingency plans should any of the fire safety systems in the School Building fail.

(b) A plan for the Contractor's and their subcontractor's employees, at any time they believe that any matter constitutes a fire risk, to report the deficiency or fire risk immediately to the Contractor M&R Representative, with the Contractor M&R Representative then immediately advising the School Representative.

(c) A plan to ensure all Contractor and subcontractor employees are given regular fire safety instruction and education in compliance with the National Fire Code of Canada and are trained in the operation of the fire alarm system; and

(d) A plan for reporting to the School Representative all circumstances where the Contractor believes Educational Activities or Community Use activities are contrary to compliance with applicable laws relating to fire safety.

3.11 HANDBACK ON EXPIRY PLAN

Subject to section 5.5 of the DBFM Agreement, the Contractor shall further develop, implement and maintain, and shall monitor, update and manage until the end of the Term, the Handback on Expiry Plan, as attached in Schedule 4 (Contractor's Management Systems and Plans) to the DBFM Agreement.

The Province will review the Handback on Expiry Plan in accordance with Schedule 5 (Design and Plan Certification and Review Procedure) within 180 days of achieving Total Availability.

The Contractor shall update the Handback on Expiry Plan every 10 years following Total Availability until the handback inspections commence as set out in section 8.2 of the DBFM Agreement. The Contractor shall update the Handback on Expiry Plan with each required handback inspection of a School described in section 8.2 of the DBFM Agreement.

In its Handback on Expiry Plan, the Contractor shall include detailed information on the Contractor's plan to handback certain documentation regarding the Schools and to train the School Board staff on the Building Systems and Building Equipment at the expiry of the Term. The Contractor, in its Handback on Expiry Plan, must include plans for the following requirements:

(a) Training sessions for the relevant School Board staff or subcontractors of the School Board that include, but are not limited to, description of design philosophy, systems descriptions, design parameters, constraints and operational requirements, system operation strategies, troubleshooting procedures, detailed information on all major Building Equipment, description of how the Building Equipment operates and recommended preventative maintenance, demonstrations on the operation of all Building Systems and major Building Equipment, including start-up, operation and shut down and preventive maintenance, performance testing and balancing and troubleshooting. The Contractor shall arrange, at its own cost, the attendance of the applicable vendor representatives during such training; and

(b) Delivery of records and information to the Province pertaining to the Schools, on a School by School basis, including but not limited to: description of the

physical characteristics of each School; a list of all Building Systems and Building Equipment; up-to-date CAD "as built" drawings showing the current as built condition for each School; complete documentation on preventive maintenance, including a list of all inventory, checklists and records of preventive maintenance inspections and maintenance work for a period of ten years prior to the expiration of the DBFM Agreement; updated Operation and Maintenance Manuals for each School, project files for all M&R completed ten years prior to the expiration of the DBFM Agreement; and current information for all Building Systems and major Building Equipment, including systems and controls descriptions and schematics, and maintenance tasks and schedules.

3.12 COLLABORATION PLAN

Subject to section 5.5 of the DBFM Agreement, the Contractor shall further develop, implement and maintain, and shall monitor, update, and manage, until the end of the Term, the Collaboration Plan, as attached in Schedule 4 (Contractor's Management Systems and Plans) to the DBFM Agreement.

The Province will review the Collaboration Plan for the Construction Period and the M&R Period in accordance with Schedule 5 (Design and Plan Certification and Review Procedure) prior to the start of the Project or the M&R, as applicable.

For each School prior to School Availability, the Contractor, in its Collaboration Plan, is to include a plan and framework for meetings with the Province, the relevant City and the relevant School Board, and any other interested stakeholder the Contractor identifies, to collaborate on Project issues, access issues, coordination issues and any other issues arising prior to School Availability with a view towards streamlining the satisfactory resolution of issues arising during the construction of the School.

During the School M&R Period and the M&R Period, the Contractor, in its Collaboration Plan, is to include a plan and framework for the Contractor to participate with the Province and the School Representatives to discuss M&R performance issues, custodial services, general communication of the stakeholders, and any other matters arising in connection with the cleaning, maintenance, repairs and renewal of the Schools, with a view towards involving all stakeholders with respect to these issues to foster greater cooperation and better services by all during the School M&R Period and the M&R Period.

Collaboration meetings shall form part of the Contractor's Collaboration Plan, the frequency of which shall take into account the need for timeliness of assistance and criticality of issues.

3.13 PUBLIC COMMUNICATIONS STRATEGIES

Subject to section 5.5 of the DBFM Agreement, the Contractor shall further develop, implement and maintain, and shall monitor, update, and manage, until the end of the Term, the Public Communications Strategies, as attached in Schedule 4 (Contractor's Management Systems and Plans) to the DBFM Agreement.

The Province will review the Public Communications Strategies for a specific component of the Project or the M&R, as applicable, in accordance with Schedule 5 (Design and Plan Certification and Review Procedure) prior to the start of that component of the Project or the M&R, as applicable.

The Contractor shall be responsible for public communications in connection with the Project and M&R (but excluding matters relating to School Site selection, School footprint, education matters), which shall include, without limitation, project website development, project phone hotlines, handling of public complaints, where applicable, coordination with the School Boards and the Province's Department of Education, public presentations and open houses, public advertisements and mail drops.

Any direct contact the Contractor makes with the media shall be subject to the prior review and approval of the Province. This shall include, without limitation, media releases, interviews and advertisements.

The Contractor shall maintain comprehensive records of all communications activities including, without limitation, documentation of the information presented, the audience and relevant dates for review and recall by the Province.

SECTION 4 – PROJECT REQUIREMENTS FOR SCHOOLS

4. PROJECT REQUIREMENTS FOR SCHOOLS

This Section 4 sets out the Project Requirements applicable to the Schools.

4.1 STANDARD CORE SCHOOL DESIGNS

The Standard Core School Designs were mandated by the Province for all future schools to be built in Alberta, with a view to creating a streamlined design applicable for all schools and all school sites within Alberta. The decision to use a steam lined school design and floor plan for all future schools was based upon the real savings achieved by the Province in utilizing a single design province wide. The Standard Core School Designs include a fixed and permanent Core Structure which incorporates key functional areas such as the gymnasium, library, administration area, certain classrooms, gathering areas and project areas together with the provision of additional teaching areas through the use of Modular Classrooms to easily and economically allow for changing demographics.

The Standard Core School Designs are a generic design and floor plan for the Core Structures and the placement of the Modular Classrooms.

4.2 STANDARD CORE SCHOOL DESIGN DEVELOPMENT REPORTS

Pursuant to the Province's mandate regarding the Standard Core School Design, the Standard Core School Design Development Reports were prepared for each of the following types of schools:

K-6 (600)
K-9 (600)
K-9 (900)

K-4 Schools identified in Schedule 13 (Schools) use the K-6 (600) Standard Core School Design.

The Standard Core School Design Development Reports are considered to be generic designs and floor plans for schools in Alberta. The Standard Core School Design Development Reports were modified in the Modified School Designs to reflect the program requirements for each School Board. The Standard Core School Design Development Reports remain part of the Project Requirements to provide the Contractor with the design philosophy of the Province respecting the design of the Schools. The Standard Core School Design Development Reports operate as a guideline only to assist the Contractor in its design of the Schools, except to the extent same have been modified for each School Board as set out in the Modified School Designs and enhanced or amended by the additional design criteria set out in this Section 4.

4.3 BASIC MODULAR CLASSROOM

The Basic Modular Classroom is the generic design of the Modular Classrooms prior to the modifications requested by the School Boards. The Basic Modular Classroom Informational Plans attached in Appendix "B" show informational elevations, plans and sections for the Basic Modular Classroom, which are provided to assist the Contractor in its design of the Modular Classrooms as required in Section 4.

The locations of the Modular Classrooms in connection with the Core Structure for each School are shown in the Site Layouts.

4.4 MODIFIED SCHOOL DESIGNS

4.4.1 Modified School Designs

The Modified School Designs were developed after a series of consultations with the School Boards. The Modified School Designs are based upon the Standard Core School Designs and the Basic Modular Classroom and subsequently modified to meet the program requirements of each School Board.

The Modified School Designs include:

(a) the modified Core Structure designs and floor plans; and

(b) the modified Modular Classroom floor plans.

The specific external layouts for each School on the applicable School Site are set out in Appendix "D".

4.5 DESIGN PHILOSOPHY

The design philosophies that the Standard Core School Designs, the Basic Modular Classroom and the Modified School Designs were based upon and which the Contractor shall apply in carrying out the Detailed Designs for the Schools include the following:

(a) Meet all programmatic and educational requirements;

(b) Provide a flexible design that allows the School Building to be easily modified to respond to different teaching methods such as project based learning, collaborative learning, team teaching, seminar style- instruction and individual instruction;

(c) Develop flexible learning and interactive spaces for students, teachers and the community;

(d) Recognize and enhance the environmental systems. Promote sustainability by the incorporation of sustainable design system into the building concept including the maximization of natural lighting and views for all occupied areas;

(e) Use of materials and components that ensure minimum inconvenience and disruption from breakdowns, repairs and maintenance activities;

(f) Use of lighting, thermal and visual designs, acoustics and air quality to ensure maximum student comfort and learning;

(g) Consideration of the Minimum Material Requirements; and

(h) The LEED™ Silver Certification requirements.

4.6 RESPONSIBILITY FOR DESIGN

The Contractor is responsible for completing the Detailed Design of all elements of the Schools including, but not limited to geotechnical investigations, the requirements of all Authorizations (including potentially, the finalization and issuance of the Development Permits as described in Section 2.3) and all technical analysis required to design the Schools in a professional and competent manner.

In carrying out the Detailed Design for the Schools, the Contractor shall comply with the design requirements set out in Section 4, the Modified School Designs and the Site Layouts, except as otherwise required to accommodate structural grids or as required by applicable laws, and consider the design philosophy and intent set out in the Standard Core School Design Development Reports and the Basic Modular Classroom Informational Plans set out in Appendix "B", all of which form part of the Project Requirements. The interpretation and application of these documents shall be carried out in the following order of precedence:

First, Section 4.9.3

Second, Sections 4.9.1, 4.9.2 to 4.9.8 and 4.10

Third, Modified School Designs and Site Layouts

Fourth, Standard Core School Design Development Reports (Appendix "A") and Basic Modular Classroom Informational Plans (Appendix "B").

In addition, but subject to the above order of precedence, the following rules for interpreting these documents shall apply:

(a) figured dimensions shown on a drawing shall govern even though they may differ from dimensions scaled on the same drawing;

(b) drawings of a larger scale shall govern over those of small scale of the same date;

(c) specifications shall govern over drawings; and

(d) documents of a later date shall always govern.

All designs must comply with applicable laws, Authorizations, the relevant Standards and Guidelines and the Technical Requirements.

The requirements to be met in the design of the Schools include considerations with respect to safety, functionality, adaptability, durability, aesthetics, indoor environmental maximization, the Minimum Material Requirements, maintainability, life cycle and LEED™ Silver Certification requirements. These design requirements are generally specified in this Schedule 18 (Technical Requirements). If a requirement is not specified in this Schedule 18, the Contractor shall follow Good Industry Practice, all applicable laws, the relevant Standards and Guidelines, and the Minimum Material Requirements.

The Contractor, in its Detailed Designs, must take into account the addition of all future Modular Classrooms for each School, as shown on the Site Layouts.

4.7 CONTRACTOR'S DESIGN DOCUMENTATION

The Contractor shall prepare the design documentation for each School that covers a full range of the elements required in the School. The Contractor shall include, but not be limited to including, the following in its design documentation:

(a) design development reports for all aspects of the School.

(b) Detailed Designs, as described below, prepared in accordance with standard architectural/engineering practices, including availability in electronic format.

(c) comprehensive construction specifications (complying with the Construction Specifications Canada MasterFormat requirements) including but not limited to specifications for execution and products and material requirements, as necessary.

As a basis for this documentation, the Contractor shall further develop and finalize, as required by this Section 4, the design development reports, plans and specifications in the Contractor's Detailed Designs for the Schools, including but not limited to the following Detailed Designs provided in size A4, suitably scaled and the following schedules:

(d) a site plan/design for each School including but not limited to parking lots, drop off areas and access points, design of the School's drainage including curbs, gutters and catch basins, landscaping and geodetic designs and details of tie-ins with utilities and municipal services;

(e) architectural designs for each School including but not limited to floor plans, exterior elevation drawings, interior elevation drawings showing millwork, glazing and wall-mounted accessories, exterior wall sections with key wall, window and roof junction details, reflective ceiling plans, roof plans and wall, ceiling and floor finish schedules including Modular Classrooms;

(f) structural designs for each School including but not limited to foundation designs and superstructure framing designs including roof deck;

(g) mechanical system designs for each School including but not limited to mechanical foundation plans, plumbing floor plans, heating and ventilation floor plans, mechanical room plans, schematics and details and sprinkler floor plans;

(h) electrical system designs for each School including but not limited to floor plans for electrical power distribution system including transformers, main service, feeders, distribution panels and exterior power, floor plans indicating location of power, communications and fire alarm devices, lighting floor plans and exterior lighting, lighting fixture and security system design details and device locations;

(i) Modular Classroom designs for each School including but not limited to floor plans, building section, walls, skirting details, details of roof and wall sections where modular classrooms connect to each other and to the Core Structure, windows and roof details, reflective ceiling plan, structural design for standard duty and heavy duty units, mechanical description and plan for heating, ventilation and plumbing design, floor plans indicating location of power, lighting and communications devices and lighting fixture details; and

(j) Detailed colour, finishing and materials schedules including but not limited to interior finishes, colours and materials for all exposed surfaces and exterior finishes, colours and materials for all exposed surfaces.

4.8 LEED™ SILVER CERTIFICATION REQUIREMENTS

4.8.1 General Requirements

The Contractor shall pursue LEED™ Silver Certification for each School from CaGBC and shall register each School with CaGBC within 60 days of Execution of the DBFM

Agreement. The Contractor shall also apply for certification of a School within 60 days of that School achieving School Availability and shall provide the Province with proof of that application, together with a copy of all the supporting documentation submitted in support of the application. The Contractor will promptly provide the Province with all communications from CaGBC respecting a School including but not limited to any notices that a School has or has not achieved LEED™ Silver Certification.

4.8.1.1 Payment Adjustments

(a) If the Contractor fails to register each School with CaGBC within the time stipulated, a Payment Adjustment of $200 per day or partial day shall be assessed for each School until such School is registered with CaGBC.

(b) If the Contractor fails to apply for certification of a School within the time stipulated, a Payment Adjustment of $200 per day or partial day shall be assessed for each School until the application for such School it is submitted.

The Contractor shall carry out the Project in accordance with its LEED™ Certification Plan set out in Schedule 4 (Contractor's Management Systems and Plans), this Section 4.8 and Section 4.10.3.12.

4.8.2 Contractor Obligations

The Contractor shall meet all LEED™ Canada – NC Version 1.0 prerequisites and credits necessary for each School to achieve LEED™ Silver Certification. The LEED™ checklists contained in the Standard Core School Design Development Reports are not part of the Technical Requirements. In all cases, the credits for the Core Structure and Modular Classrooms that are to be pursued must be consistent. The School as a whole will be evaluated for LEED™ Silver Certification.

4.8.3 Technical Requirements

The Province does not warrant that the Contractor will achieve LEED™ Silver Certification if the Technical Requirements are met. The Contractor must design the Schools to meet the LEED™ Silver Certification requirements while at the same time meeting the Technical Requirements. The Contractor is solely responsible for attaining LEED™ Silver Certification for each School.

4.8.4 LEED™ Silver Certification

The Contractor shall apply to CaGBC to obtain LEED™ Silver Certification for each School as required under Section 4.8.1 and Section 4.10.3.12, with such certification being received no later than 24 months after School Availability.

If after Execution of the DBFM Agreement there is a change in the requirements for achievement of LEED™ Silver Certification under the LEED™ Rating System, and the Contractor is required by CaGBC to comply with such change, then the Contractor shall notify the Province of such change and such change shall, subject to and in accordance with Schedule 1 (Change Orders), result in a Change Order Directive.

4.8.4.1 Liquidated Damages

If LEED™ Silver Certification is not obtained for each School within 24 months from School Availability (except for delays caused solely by CaGBC), the Contractor shall pay to the Province liquidated damages in the sum of $100,000 (one hundred thousand dollars) for each School that does not achieve LEED™ Silver Certification.

Payment of the liquidated damages to the Province shall be made on the first day of the month following the earlier of: (i) the date of notification from CaGBC that a School will not receive LEED™ Silver Certification; and (ii) the date that is 24 months after School Availability for that School.

Such payment shall constitute full and final settlement of any and all damages that may be claimed by the Province as a result of the Contractor not achieving LEED™ Silver Certification for that School. For greater certainty, a failure by the Contractor to achieve LEED™ Silver Certification shall not constitute a Termination Event under the DBFM Agreement.

4.9 ADDITIONAL DESIGN CRITERIA – CORE STRUCTURE

The additional design criteria set out in this Section 4.9 are intended to complete the design requirements for the Core Structure set out in the Modified School Designs and the School Site Layouts. The Minimum Material Requirements must be considered in conjunction with these additional design criteria.

4.9.1 Interior Environment Design Requirements

4.9.1.1 Acoustics

The Contractor's Core Structure design shall incorporate a high standard of acoustic design. The guidelines set out in Alberta Infrastructure and Transportation's *Standards and Guidelines for School Facilities* (August 2007) are minimum guidelines. The Contractor shall design the Schools' Instructional Areas with minimal noise interference from adjacent classrooms, hallways, mechanical equipment and outside noises. The Contractor will consider such elements as reverberation, sound isolation and background mechanical noise in its Detailed Designs so as to ensure that in all Instructional Areas a high level of clear intelligible speech is achieved. Key design criteria to be implemented

by the Contractor are as indicated below to ensure that all Instructional Areas have the following minimum acoustic characteristics:

(a) Quiet background noise levels due to the operation of heating and ventilation systems and air conditioning (HVAC) and plumbing systems;

(b) Low reverberation;

(c) Adequate noise isolation between classrooms and learning areas and adjacent classrooms, washrooms, corridors, gymnasium and mechanical rooms;

(d) Adequate structural isolation between classrooms and learning areas and adjacent classrooms, gymnasium, washrooms and corridors; and

(e) Adequate noise isolation from outdoor noise sources such as vehicular traffic or aircraft.

The Contractor's mechanical design shall address concerns related to background noise from the HVAC system. The Contractor shall design Instructional Areas so that in all locations where a student or teacher's desk could potentially be located the background HVAC noise shall not exceed RC30 (N) in the classroom and RC40 (N) in corridors. The HVAC system shall be designed so the background HVAC noise shall have a neutral spectrum devoid of tones, low frequency rumbling noises and other distracting sounds. The Contractor shall include in its Detailed Designs vibration isolation for all appropriate mechanical equipment to prevent transmission of discernable vibration into the classrooms.

Reverberation time shall be designed to meet Alberta Infrastructure and Transportation's *Standards and Guidelines for School Facilities* (August 2007).

The Contractor shall design the Core Structure with sound isolation requirements throughout the building. Refer to Alberta Infrastructure and Transportation's *Standards and Guidelines for School Facilities* (August 2007) for minimum requirements for Sound Transmission Class (STC). The minimum Noise Isolation Class (NIC) for classrooms is NIC 45 and for music rooms is NIC 55. Moveable partitions shall have a minimum STC rating of 52.

In addition, the Contractor shall design the acoustics for the Core Structure so as to:

(f) Minimize sound flanking or structural bridging so the maximum potential noise isolation capability is reached. Wall, floor and ceiling assemblies around classrooms will require a STC rating that is 5 points higher than the required NIC rating;

(g) Isolate noise between classrooms and mechanical rooms in order to meet the HVAC background noise level requirements. A mechanical room envelope with a rating of NIC 50 will accommodate most mechanical systems but may not be adequate in all circumstances;

(h) Provide structural discontinuity between classrooms and adjoining spaces to prevent impact noises from creating a distraction in Instructional Areas. Typical activities such as walking in corridors, locker doors closing, etc. shall not exceed a maximum noise level of 40 dBA inside a classroom or other learning area;

(i) Takes into consideration that a building envelope with STC 40 and operable windows as being acceptable for a suburban location that is not adjacent to a major arterial road or airport;

(j) Provide acoustic treatment to both ceiling and walls of the gymnasium to control noise and reverberation; and

(k) Provide acoustic treatment to control noise and sound transmission in music rooms identified in the Modified School Designs.

4.9.1.2 Indoor Air Quality

The Contractor shall ensure that its Detailed Designs incorporate materials that are LEED™ Silver Certification compatible. The elimination of materials that may off-gas or contain potential environmental pollutants is preferred. If the use of materials that may off-gas or contain potential environmental pollutants is required then the use of such materials should be minimized. Meeting the LEED™ criteria together with a carefully designed natural and mechanical ventilation system by the Contractor will provide an acceptable design.

The Detailed Designs shall meet the requirements for achieving LEED™ Silver Certification for indoor air quality, as follows:

(a) Indoor Environmental Quality Prerequisite 1, Minimum IAQ Performance; and,

(b) Indoor Environmental Quality Prerequisite 2, Environmental Tobacco Smoke (ETS) Control: prohibit smoking in the Core Structure while it is under construction.

The Contractor's design for the ventilation system for Instructional Areas shall be designed for a maximum of 30 students per classroom.

For HVAC systems employing outside air economizers, the Contractor shall ensure that the minimum outside air flow rate to every occupied space in the School Building shall meet the requirements of the most current ASHRAE Standard 62.

Regardless of the proposed heating and ventilation system, the Contractor shall provide equipment to allow full outside air economizer cycle for "free cooling" when outside air temperatures permit.

The Detailed Design shall incorporate heat recovery on exhaust air and preheating the outdoor air and improve on the operating efficiency of the Building System.

4.9.1.3 Thermal Comfort

The Contractor, in its Detailed Designs of the Core Structure for thermal comfort, shall focus on implementing strategies that enhance student attention spans, productivity and energy conservation. The Contractor's HVAC design shall respond to the loads imposed by building envelope, internal loads and ventilation loads in an integrated fashion to achieve good thermal comfort, superior indoor air quality and to avoid excessive energy use. The Contractor in its Detailed Designs shall meet the requirements of the current ASHRAE Standard 55. The heating and cooling systems shall be designed to maintain the following conditions in the space, based on the worst case winter design conditions for each City set out in the *Alberta Building Code 2006:*

(a) Heating:

- Occupied Hours: 22°C, with humidity at a minimum of 15% RH during heating modes;
- Unoccupied Hours: 18°C during heating modes;

(b) Cooling:

- Mechanical cooling for the entire Core Structure will not be provided. Classrooms and administration areas to be designed to allow free air cooling as outdoor temperatures permit. The mechanical air system is to be used in conjunction with operable windows.

The Contractor, in its Detailed Designs for the Core Structure for thermal comfort, shall ensure that the design condition temperatures are not exceeded:

(c) The temperature fluctuation shall not exceed ± 1°C from set point during the heating mode;

(d) Temperature fluctuations in air conditioned areas, where forming part of the Detailed Designs, shall not exceed ±1°C from set point;

(e) The horizontal temperature gradient between 300 mm and 3000 mm from the exterior wall, at desk height shall not exceed 2°C;

(f) The vertical temperature gradient between 200 mm and 1700 mm above the floor at any point more than 300 mm from the exterior wall shall not exceed 2°C;

(g) The air velocity shall not exceed 0.15 m/s (30 ft./min.); and

(h) The air circulation rate shall not be less than ASHRAE Standards.

4.9.1.4 Visual Comfort

The Contractor shall design the Core Structure ensure that an enjoyable visual environment is provided, through the use of materials, textures, colours, natural and artificial lighting.

The Contractor in its Detailed Designs shall incorporate the following general strategies for achieving visual comfort:

(a) Integrating natural and electric lighting with appropriate design and controls;

(b) Balancing quantity and quality of light by avoiding excessively high light levels and by designing appropriate illumination levels for individual rooms or room use areas;

(c) Controlling or eliminating glare; and

(d) Incorporating direct and indirect lighting in specific areas to allow more versatility of the space.

The Contractor shall take advantage of incorporating natural daylight as much as possible in its Detailed Designs for the Core Structure.

Daylighting is the controlled admission of natural light into a space. The Contractor shall design for diffuse, uniform daylight throughout the Instructional Areas and corridors where possible. The Contractor shall consider bringing in light from overhead through the use of light pipes or vertical clerestory glazing in its Detailed Designs. Direct beams of sunlight and glare are to be avoided by the Contractor designing the natural light source with controls and filtering mechanisms such as interior shades, louvers, or blinds and exterior overhangs and/or light shelves.

4.9.2 Functional Area Design Requirements

Certain millwork requirements are identified in this Section 4.9.2. If not specifically referred to, the Contractor should incorporate the design intent contained in the Millwork Sketches into its Detailed Designs.

The Contractor must review the functional area requirements set out in this Section 4.9.2 in light of the specific design variations set out in Section 4.9.3.

4.9.2.1 General Classrooms

Classrooms shall be designed to be flexible enough to allow various options for the arrangement of student furniture. Each student is to be provided with a coat hook and shelf within the classroom (refer to Millwork Sketch MW-14 for the design intent) or a locker outside the classroom where indicated in the Modified School Designs. Single compartment sinks are to be incorporated where indicated on the Modified School Designs, if stipulated for a particular classroom.

The Contractor shall design each classroom for "Smart Board" hook ups. The Contractor shall design every classroom for computer hook ups where indicated in the Modified School Designs. Where data cabling is required, the Contractor shall provide conduit rough-ins and cable distribution trays. A minimum of one telephone, one loudspeaker and two 4 port outlet rough ins (conduit) are required. The Contactor shall include a minimum of two additional duplex receptacles located so there is power distribution around the perimeter of the classroom in its Detailed Designs. The Detailed Designs shall incorporate a dedicated power circuit and conduit (for data) overhead for a ceiling mounted LED projector. Refer to the Modified School Designs for additional details.

Solid backing shall be incorporated into the Contractor's perimeter wall design allowing for the fastening of whiteboards and tackboards (to be supplied and installed by School Boards). The solid backing is to be designed to be a minimum of 300 mm wide located 1800 mm above the finished floor for K-4 grades and 2100 mm above the finished floor for grades 5-9. The Contractor shall design each classroom with a minimum of two 1200 x 2400 mm tackboards (supplied and installed by School Boards). The Contractor shall incorporate millwork into the Detailed Designs of each classroom. The Contractor's millwork design shall be upper and lower cabinets. The upper cabinets shall be open adjustable shelving and The Contractor shall design the lower cabinets with lockable doors and an adjustable shelf. The Detailed Designs shall include a 400 mm wide x 2200 mm high locker unit for the teachers' materials. Refer to Modified School Designs for location of teachers' lockers and Millwork Sketch - MW-20 for the design intent of the millwork.

Natural light shall be incorporated into the Contractor's design for each classroom. The Detailed Designs shall include operable or vented exterior windows within each classroom. A floor pattern is preferred to provide some visual relief. The Contractor shall design the ceiling height to a minimum of 3050 mm high, with acoustic ceiling tiles and recessed light fixtures or direct-indirect luminaires. The entry doors are to include acoustic door seals, door bottom and a classroom lockset.

The Contractor shall also provide the millwork design for the Modular Classrooms. Refer to Millwork Sketch MW-22 which illustrates the design intent.

4.9.2.2 Science Rooms

Science rooms are to be designed between 75 – 120 sq. m. in size. Refer to Modified School Design floor plans for layout. The Contractor shall design science rooms with perimeter millwork to extend along three walls and sinks evenly spaced. The Contractor's design of the perimeter millwork shall be comprised of adjustable upper combination open shelving and lockable cabinets with glass inset in the doors for easy visual identification of stored items. The lower cabinets are to be designed with lockable doors and an adjustable shelf. Refer to Millwork Sketches MW-10 and MW-21 for details. The Contractor shall design the counter tops with chemical and heat resistant finish. Solid surface countertops are required for Grade 7-9 science rooms.

The Contractor shall design each science room for "Smart Board" hook ups. The Contractor shall design each science room with current technology for computer hook ups. Where data cabling is required, the Detailed Designs shall provide conduit rough-ins and cable distribution trays. A minimum of one telephone, one loudspeaker, two 4 port outlet rough ins (conduit) and a quad receptacle located next to each 4 port (conduit) are required in Detailed Designs. The Detailed Designs shall include a minimum of two additional duplex receptacles located so there is power distribution around the perimeter of the classroom. The Detailed Designs shall incorporate a dedicated power circuit and conduit (for data) overhead for a ceiling mounted LED projector. Refer to the Modified School Designs for additional details.

The Contractor shall include in its Detailed Designs a fume hood and upper and lower cabinets located in the prep room, directly adjacent to the science room as shown on the Modified School Designs. The Contractor shall design the countertops with chemical and heat resistant finish. Refer to Millwork Sketches MW-1 and MW-9 for design intent. Refer to Section 10000 (Specialties) of the Minimum Material Requirements.

Natural light shall be incorporated into the Contractor's design for each science room. Operable or vented exterior windows are required. The Contractor's designs must include floor finishes that are durable and chemical resistant. A floor pattern is preferred to provide some visual relief. The Contractor shall design the ceiling height to a minimum

of 3050 mm high, complete with acoustic ceiling tiles and recessed light fixtures or direct-indirect luminaires. The entry door is to be designed to swing in the direction of exiting. Each entry door is to incorporate a ½ viewlight, as well as acoustic door seals, door bottom and a classroom lockset.

4.9.2.3 Library

The Contractor shall design the libraries to be flexible enough to allow various options for the arrangement of bookcases and computer workstations. The Contractor's layout of each library shall be designed to allow for clear site lines for ease of supervision. The Contractor, in its Detailed Designs, shall include perimeter fixed shelving and a circulation desk and work area. Refer to the Modified School Designs for design layout and to Millwork Sketches MW-19, MW-28 and MW-29 for the design intent for the library millwork.

The Detailed Designs for the library shall accommodate sufficient power and data (rough-ins) for a computer classroom of a minimum of 25 students. All outlets are to be located to allow for some flexibility in configuring desk locations. A minimum of one telephone, one loudspeaker, two 4 port data outlets (conduit) and a quad receptacle located next to each 4 port data outlet (conduit) are required in addition to each computer connection. The Contractor, in its Detailed Designs, shall incorporate a dedicated power circuit and conduit (for data) overhead for a ceiling mounted LED projector. Refer to the Modified School Designs for additional details.

The Contractor shall design the circulation desk and work area to accommodate a minimum of two computers, layout space, photocopier, book drop off and book borrowing station. The Detailed Designs shall include one sink within the library for the cleaning of books.

The library will be separated from the central gathering area by glazed partitions and a lockable entrance. Refer to Modified School Designs.

4.9.2.4 Music Room

The Contractor shall design the music rooms to be flexible enough to allow various options for the arrangement of student furniture. Acoustics within the space and sound transmission are critical design parameters which must be incorporated in the Detailed Designs. Refer to Modified School Design floor plans for locations of music rooms.

The Contractor shall incorporate millwork and an oversized sink for cleaning instruments in its Detailed Designs for the music rooms. The Contractor shall design the millwork with adjustable upper lockable cabinets. The lower cabinets are to be designed by the Contractor with lockable doors and an adjustable shelf. The Detailed Designs shall

include a 400 mm wide x 2200 mm high locker unit for the teachers' materials. Refer to the Modified School Designs for the location of the locker unit and Millwork Sketches MW-20 and MW-24 for the design intent of the millwork.

The Contractor shall design each music room shall be designed for "Smart Board" hook ups. The Contractor shall design each music room with current technology for computer hook ups. Where data cabling is required, the Contractor shall provide conduit rough-ins and cable distribution trays. A minimum of one telephone, one loudspeaker, two 4 port outlet rough ins (conduit) and a quad receptacle located next to each 4 port outlet (conduit) are required. The Detailed Designs shall include a minimum of 8 additional duplex receptacles equally distributed around the perimeter of the music room. The Contractor, in its Detailed Designs, shall incorporate a dedicated power circuit and conduit (for data) overhead for a ceiling mounted LED projector. Refer to the Modified School Designs for additional details.

Solid backing shall be incorporated into the Contractor's perimeter wall design for the fastening of whiteboards and tackboards (to be supplied and installed by School Boards). The solid backing shall be a minimum of 300 mm wide located 1800 mm above the finished floor for K-4 grades and 2100 mm above the finished floor for grades 5-9. The Contractor shall design each music room with a minimum of two 1200 x 2400 mm tackboards (to be supplied and installed by the School Boards).

Natural light shall be incorporated into the Contractor's design for each music room. Operable or vented exterior windows are required within each music room. Sheet goods are the preferred flooring material. Wall and ceiling materials shall have a durable finish. Acoustic wall panels shall be incorporated in the Contractor's designs. The entry door is to be designed to swing in the direction of exiting, as well as including acoustic door seals, door bottom and a classroom lockset. A larger volume of space is required in the design to enhance the quality of sound. The Contractor shall design the ceiling height to a minimum of 3660 mm.

The Contractor, in its Detailed Designs, shall include practice rooms directly off the music room where shown on the Modified School Designs. The doors to the practice rooms shall incorporate a ½ viewlight, as well as acoustic door seals, door bottom and a passage set.

4.9.2.5 Administration Area

The administration area includes a number of staff functional program areas which include offices, reception, staff washrooms, staff lounge, workroom, conference room and infirmary. Refer to Modified School Designs for layout configurations.

The Contractor shall design the reception area to allow visual supervision of the main entrance and a portion of the central core corridors. The Contractor shall design the area to either open directly onto the corridor or have sufficient window area to optimize visual supervision. The Contractor shall design the reception desk to accommodate barrier free access and parent, teacher and student enquiries. Refer to the Modified School Designs for location and Millwork Sketch MW-27 for design intent.

The Contractor shall incorporate in its Detailed Designs separate offices for the principal, vice principal and administration functions as shown on the Modified School Designs. The office doors shall incorporate a ½ viewlight, as well as acoustic door seals, door bottom and an office lockset. The Contractor shall incorporate one telephone and one data rough in (conduit) and a minimum two receptacles per room in its Detailed Design. The Contractor shall design the ceiling height to a minimum of 2700 mm high. Carpet shall be provided for these areas in the Contractor's Detailed Designs.

The Contractor shall design the staff workroom/copy centre area to provide an area for the teachers and administration staff to layout and assemble materials related to their daily duties. The Contractor's millwork design shall be comprised of upper and lower cabinets as well as an area for staff mail all as shown on the Modified School Designs. Refer to Millwork Sketches MW-1, MW-2, MW-8, MW-9 and MW-18 for details. Natural light shall be incorporated into the Contractor's design for each staff workroom/copy centre area, as will a location for a photocopier, laminator, fax, printer, computer workstation, telephone and loudspeaker, complete with power and data (conduit) as required. An exhaust fan over the photocopier is required. Refer to the Modified School Designs for additional details. The Contractor shall incorporate solid backing into the Contractor's perimeter wall design for the fastening of whiteboards and tackboards (to be supplied and installed by School Boards). The solid backing is to be a minimum of 300 mm wide and 2100 mm above the finished floor. The Contractor shall design the ceiling height to a minimum of 2700 mm high. Sheet goods incorporating a pattern are the preferred material for this area.

The Contractor shall design the staff lounge to allow flexibility for furniture. The Contractor shall ensure that natural light is incorporated into the design. An open area with a kitchenette is required. The Contractor shall design the kitchenette to accommodate full size kitchen appliances as shown on the Modified School Designs (all appliances to be supplied and installed by the School Boards). Where stoves are shown on the Modified School Designs, the Contractor shall design and provide vented range hoods. Refer to Modified School Designs for location and Millwork Sketch MW-25. The Contractor's designs shall provide a double compartment sink with an extra high gooseneck. One telephone, one loudspeaker, two data outlet rough ins (conduit), and a quad receptacle located next to each data (conduit) are required in the Contractor's designs. Refer to the Modified School Designs for additional details. The Contractor shall incorporate solid backing into the Contractor's perimeter wall design for the

fastening of whiteboards and tackboards (to be supplied and installed by School Boards). The solid backing shall be a minimum of 300 mm wide and 2100 mm above the finished floor. The Contractor shall design the ceiling height to a minimum of 2700 mm high. Sheet goods incorporating a pattern are the preferred flooring material for this area.

The Contractor shall design the infirmary to allow visual supervision from the administration area. A door with ½ viewlight or sidelight is required. The Contractor shall incorporate sufficient space in its design of the infirmary for a cot, a sink, eye wash station connected to tempered water supply and millwork for storage of first aid supplies. Refer to the Modified School Designs. The Contractor shall include an area for a small fridge or freezer in its design of the infirmary. The infirmary shall be located in close proximity to a barrier free washroom. The Contractor shall design the solid backing in the washroom and infirmary ceilings to allow for a lift (to be supplied and installed by the School Boards) to help raise and lower students. The Contractor shall design the ceiling height to a minimum 2700 mm high. Sheet goods are required in these areas. One telephone and a minimum of two receptacles are required within the infirmary. Refer to the Modified School Designs for additional details. The Contractor shall incorporate solid backing into the Contractor's perimeter wall design for the fastening for one whiteboard and one tackboard (to be supplied and installed by School Boards).

4.9.2.6 Gymnasium

The Contractor shall design the gymnasium as a multifunctional space which will be used for Educational Activities, Adhoc School Use and Community Use. Controlling access into adjacent spaces is essential in the Contractor's design layout. The Contractor shall incorporate into its Detailed Designs double doors from the interior as well as from the exterior to handle large volume of people and over sized objects. The Contractor's designs of the gymnasium shall incorporate removable mullions for these door openings. The Contractor shall design the gymnasium with a minimum clear ceiling height of 8.0 metres to allow for tournament events. An acoustic design for the ceiling and walls is required of the Contractor. The Detailed Designs shall include acoustic insulated concrete block to the upper portion of the gymnasium. The lower 3000 mm portion of wall shall be smooth, with no projections which may cause injury or abrasion. The Contractor's designs shall include two electric winch controlled ceiling mounted full court basketball backboards and four wall mounted, manually operated cross court basketball backboards. The Detailed Designs shall incorporate a ceiling hung, electronically operated, gymnasium curtain to allow separating the gymnasium into two equal parts. The gymnasium floor design shall be hardwood flooring complete with painted lines for regulation sized activities as follows; basketball full court and two cross court layouts, volleyball full court and two cross court layouts, three badminton cross courts. The Contractor shall include a painted School logo in the centre of each gymnasium (School Boards to provide School logo designs). The Detailed Designs shall provide recessed floor sockets for the badminton and volleyball layouts complete with flush mounted

covers. The overhead sprinkler heads shall be designed by the Contractor with wire guards. The over head light fixtures are to be designed by the Contractor as impact resistant. The Detailed Designs shall provide a minimum of two receptacles per wall, and data rough ins (conduit) for a minimum of one location per wall. Refer to the Modified School Designs for additional details. The Detailed Designs shall provide power and data (conduit) for the following pieces of equipment supplied and installed by the School Boards: shot clock, score board, sound system, and projection screen.

The Contractor shall design a storage room for gymnasium equipment to be supplied by the School Boards with a set of double doors. Refer to Modified School Designs for location and Millwork Sketch MW-26 for the design intent of the millwork. Solid backing shall be incorporated into the Contractor's perimeter wall design.

The Detailed Designs shall include two change rooms, one female, one male, with direct access from the gymnasium. The Contractor shall include toilets and sinks in each change room where shown on the Modified School Designs. Benches shall be designed by the Contractor in accordance with Millwork Sketch MW-15. The wall, ceiling and floor finish designs shall be durable and scrubbable.

The Contractor shall design a teacher gymnasium office complete with sink and shower where located in the Modified School Designs. The wall, ceiling and floor finishes shall be durable and scrubbable. The Contractor shall provide one telephone, data (conduit) outlet and a minimum of two receptacles. The Contractor shall design the ceiling height to a minimum of 2700 mm high. Sheet flooring shall be provided for the office area.

The Detailed Designs shall provide for drama type stage lighting in the gymnasium ceiling space. The Detailed Designs will consist of two ceiling mounted pipe rails each having three outlets, and perimeter outlets for portable spotlights. All outlets to be tied to a hardwired dimmer panel located in the gymnasium. Lighting fixtures will be the responsibility of the School Boards.

4.9.2.7 Art Room

The Contractor shall design the art room with perimeter millwork and an open central area that is flexible enough to allow various options of arrangement of student furniture. Acoustics within the space and sound transmission are critical design parameters which must be incorporated. Refer to Modified School Design floor plans for layout.

The Contractor shall incorporate a kiln (to be supplied and installed by the School Boards) into the Detailed Designs where shown on the Modified School Designs. The designs for all hookups, power and exhaust are the Contractor's responsibility. Refer to Section 10000 (Specialties) of the Minimum Material Requirements. The Detailed Designs shall include an oversized sink complete with an interceptor/sediment trap

located in close proximity to the kiln. Refer to Millwork Sketches MW-6 and MW-30. The Detailed Designs shall include additional sinks throughout the room as shown in the Modified School Designs. Additional exhaust requirements are to be incorporated into the Contractor's designs to eliminate odours from various art materials being stored and used. The Contractor's perimeter millwork shall be designed with adjustable upper lockable cabinets with glass inset in the doors for easy visual identification of stored items. The Contractor shall design the lower cabinets with lockable doors and an adjustable shelf. The Detailed Designs shall include sufficient storage for art supplies as well as art projects. Refer to Millwork Sketch MW-24.

The Contractor shall design each art room for "Smart Board" hook ups. Where data cabling is required, the Contractor shall provide conduit rough-ins and cable distribution trays. A minimum of one telephone, one loudspeaker and two 4 port outlet rough ins (conduit) are required. The Detailed Designs shall include a minimum of two additional duplex receptacles located so there is power distribution around the perimeter of the art room. The Contractor shall incorporate a dedicated power circuit and conduit (for data) overhead for a ceiling mounted LED projector into its Detailed Designs. Refer to the Modified School Designs for additional details.

Solid backing shall be incorporated into the Contractor's perimeter wall design for the fastening of whiteboards and tackboards (to be supplied and installed by School Boards). The solid backing to be a minimum of 300 mm wide located 1800 mm above the finished floor for K-4 grades and 2100 mm above the finished floor for grades 5-9. The Contractor shall design each art room with a minimum of two 1200 x 2400 mm tackboards.

The Contractor shall ensure that natural light is incorporated into the Detailed Designs for each art room. Operable or vented exterior windows are required. Floor finishes must be durable. A floor pattern is preferred to provide some visual relief. The Contractor shall design the ceiling height to a minimum 3050 mm high, complete with acoustic ceiling tiles and recessed light fixtures or direct-indirect luminaires. The entry door is to be designed to swing in the direction of exiting. Each entry door is to incorporate a ½ viewlight, as well as acoustic door seals, door bottom and a classroom lockset.

4.9.2.8 Early Childhood Services

The Contractor shall design each early childhood services classroom with lower heights in mind for the younger children. The space is to be designed by the Contractor with flexibility to allow various options of arrangement of student furniture. Each student is to be provided with a coat hook and shelf within the early childhood services classroom. A single compartment sink with bubbler is to be incorporated in all early childhood services classroom designs. Refer to the Modified School Designs and Millwork Sketch MW-14.

The Contractor shall design each early childhood services classroom for "Smart Board" hook ups. Every classroom shall be designed for computer hook ups where indicated in the Modified School Designs. Where data cabling is required, the Contractor shall provide conduit rough-ins and cable distribution trays. A minimum of one telephone, one loudspeaker, two 4 port outlet rough ins (conduit) are required. The Detailed Designs shall include a minimum of two additional duplex receptacles located so there is power distribution around the perimeter of the classroom. The Contractor shall incorporate a dedicated power circuit and conduit (for data) overhead for a ceiling mounted LED projector into its Detailed Designs. Refer to the Modified School Designs for additional details.

Solid backing shall be incorporated into the Contractor's perimeter wall design for the fastening of whiteboards and tackboards (to be supplied and installed by School Boards). The solid backing shall be a minimum of 300 mm wide located 1800 mm above the finished floor. The Contractor shall design each early childhood services classroom with a minimum of two 1200 x 2400 mm tackboards (to be supplied and installed by School Boards). The Contractor shall incorporate millwork into the Detailed Designs of each early childhood services classroom with upper and lower cabinets provided. The upper cabinets shall be open adjustable shelving and the lower cabinets to be designed with lockable doors and an adjustable shelf. The Contractor shall include a 400 mm wide x 2200 mm high locker unit for the teachers' materials in its Detailed Designs of each early childhood services classroom. Refer to Modified School Designs and Millwork Sketch MW-23.

The Contractor shall ensure that natural light is incorporated into the designs of each early childhood services classroom. Operable or vented exterior windows are required within each early childhood services classroom. A floor pattern is preferred to provide some visual relief. The Contractor shall design the ceiling height to a minimum of 2700 mm high, with acoustic ceiling tiles and recessed light fixtures or direct-indirect luminaires. The entry door shall be designed by the Contractor to swing in the direction of exiting and will include acoustic door seals, door bottom and a classroom lockset.

Separate washrooms are required for early childhood services classrooms. Refer to Modified School Designs. The toilet and sink are to be of a child design to ensure that they are more user friendly for the younger students.

4.9.2.9 Auxiliary Classrooms

These classrooms shall be designed with the same requirements as general classrooms in Section 4.9.2.1, except as noted below.

4.9.2.9.1 CTS (Career Technology Studies) Classroom

The Contractor shall include a dedicated dust collection system including sufficient exhaust and makeup air for the intended use in its Detailed Design of each CTS classroom where shown on the Modified School Designs. Refer to Section 10000 (Specialties) of the Minimum Material Requirements. The Contractor at its option may consider relocating the dust collector to the exterior of the Core Structure provided a suitable enclosure is included to protect the equipment against vandalism and weather. Such enclosure must also be conducive to the overall aesthetics of the Core Structure exterior design. The Contractor's designs shall provide a minimum of one oversized sink complete with interceptor/sediment trap. The Contractor's designs shall include dedicated circuits with emergency shutoff stations for the hook ups of power tools and machinery. Typical equipment used in a CTS classroom includes the following: table saw, band saw, scroll saw, drill press, belt sander, spray booth and miscellaneous shop tools. Millwork in this area is to be designed by the Contractor with adjustable upper lockable cabinets. The lower cabinets are to be designed by the Contractor with lockable doors and an adjustable shelf. The Contractor shall design the walls to minimize sound transmission throughout the room. The Contractor shall design the ceiling height to a minimum of 3660, with a preferred height of 4500 mm. Sealed concrete flooring is the preferred material. The Detailed Designs shall provide a storage room for supplies and student projects.

4.9.2.9.2 Food and Fashion

The Contractor shall provide sufficient workstations to accommodate stoves, fridges, sinks, dishwashers, washers and dryers in its Detailed Designs of each food and fashion classroom. Refer to Modified School Designs. Appliances will be supplied by the School Boards. The Detailed Design for all hook up connections is the Contractor's responsibility. Refer to drawing layouts in the Modified School Designs to indicate the millwork layouts. The Contractor's designs shall provide for vented hoods for the ranges and vents for the dryers. Typical components of the millwork that are to be incorporated in the Detailed Designs are set out in Millwork Sketch MW-7.

4.9.2.10 Washrooms

The Contractor shall design all washrooms to be vandal resistant and to meet barrier free guidelines. The Contractor shall provide standard stock sized mirrors that can be quickly replaced if damaged. The Contractor shall include steel supports for the sink vanities in its Detailed Designs of all washrooms. The wall and floor finishes are to be designed with moisture resistant materials. The floor finish shall to be slip resistant and sloped to the floor drains. In its Detailed Designs, the Contractor shall include a minimum of one floor drain per four washroom fixtures, located in close proximity to the sinks and toilets. Washrooms for early childhood services classrooms shall comply with Section 4.9.2.8.

4.9.2.11 Servery

The Contractor shall design the servery area to allow for the sale and distribution of snacks and refreshments. The Contractor shall design the servery to enable use by the public and students. A rolling shutter is required to lock the area off when not in use. Refer to Section 08350 (Grilles) in Minimum Material Requirements. In its Detailed Designs, the Contractor shall include fixed millwork, sinks and provision to accommodate appliances as shown on the Modified School Designs. Appliances will be supplied and installed by the School Boards. Where stoves are shown on the Modified School Designs, the Contractor shall design and provide vented range hoods.

4.9.2.12 Storage rooms/Janitor Rooms

In the Detailed Designs for storage rooms and janitor rooms, the Contractor shall include shelving and/or mop sinks as shown on the Modified School Designs. Refer to Millwork Sketch MW-17 for shelving design intent.

4.9.3 Further Design Variations

The following additional design variations are required for the Schools which are not detailed in the Modified School Designs or amend the Functional Area requirements set out in Section 4.9.2 to reflect each School Board's program requirements:

4.9.3.1 CBE Variations

The bubbler sinks identified in Section 4.9.2.8 for early childhood services classrooms are not required. The vented hoods identified in Section 4.9.2.9.2 are not required. The height of base cabinet millwork in classrooms and other Instructional Areas is to be adjusted from 900 mm high to 750 mm high. The depth of the base cabinet millwork in classrooms and other Instructional Areas is to be adjusted from 600 mm to 635 mm. In the student washrooms, one sink and vanity section is to be lowered to 750 mm in each group of multiple vanities. The Contractor shall design for two tier lockers and wall mounted benches in the change rooms off the gymnasium. The library shelving shall be reduced from 1800 mm high to 1500 mm high with the base designed to be 150 mm high to allow electrical power and data outlets to be installed in the base. For the janitor's office, the Detailed Designs shall provide standard upper and lower millwork complete with a sink and a microwave shelf. Refer to Modified School Designs for locations.

4.9.3.1.1 Bridlewood School Site

The Contractor shall remove a portion of the existing regional pathway and build a new pathway in the location, both as indicated on the Site Layout for the Bridlewood Site. The

new pathway shall be designed and constructed to the same standard as the existing regional pathway.

4.9.3.2 CSSD Variations

The bubbler sinks identified in Section 4.9.2.8 for early childhood services classrooms are not required. The small sized sink and water closet to be provided in washroom between early childhood services classrooms shall be changed to standard size sink and water closet. No sink or perimeter shelving is required in the library. No shelving is required in the storage rooms unless identified in the Modified School Designs. No reception desk millwork is required in the general administration area. The Contractor shall include showers in its design of the gymnasium change rooms as shown in the Modified School Designs.

4.9.3.2.1 K-6 Schools

There are no designated food and fashion rooms for the K-6 Schools. The design of and requirements identified for food and fashion classrooms are not applicable for the K-6 Schools. There are no designated science classrooms for the K-6 Schools. The design of and requirements identified for science rooms are not applicable for the K-6 Schools. There is no requirement for kiln venting in the art rooms for the K-6 Schools.

4.9.3.2.2 K-9 Schools

The K-9 School designs shall incorporate ventilation and power requirements for two welding booths in CTS classrooms as shown on the Modified School Designs. The Detailed Designs shall provide a 1 ¼" conduit to each welding booth from a panel in the CTS classroom and adequate ventilation to compensate for an exhaust rate of 600 cfm when in use. The Contractor's design for the science lab shall include natural gas double turrent outlets at each sink location and controlled by an emergency shut-off valve located at each lab entrance. The Contractor's weight room design shall incorporate rubber multipurpose flooring. Refer to section 09650 (Resilient Flooring) of the Minimum Material Requirements. For areas that are open from the second floor to the lower floor, the Detailed Designs shall incorporate a 1.8 meter high barrier. The barrier shall be designed to appear to be transparent or translucent by borrowing natural light from the main entry space. Specific areas where this occurs are in the exit stairs where a guardrail is required and the second floor opening over the main entrance.

4.9.3.3 EPSB Variations

The Contractor shall incorporate in its Detailed Designs for all Schools a 4" stubbed out water line complete with a separate water meter and backflow preventer required for irrigating the playing fields adjacent to the School Site. In all Schools with areas that are

open from the second floor to the lower floor, the Contractor shall incorporate a 1.8 meter high barrier in its Detailed Designs for such Schools. The barrier shall be designed to appear to be transparent or translucent by borrowing natural light from the main entry space. Specific areas where this occurs are in the exit stairs where a guardrail is required and the on the second floor off the main entrance adjacent to the general office and vestibule. The ECS classrooms shall include a 3m x 3m carpeted floor area.

4.9.3.4 ECS Variations

The Contractor shall incorporate in its Detailed Designs for all Schools a 4" stubbed out water line complete with a separate water meter and backflow preventer required for irrigating the playing fields adjacent to the School Site.

4.9.3.4.1 K-6 Schools

There are no designated food and fashion rooms, CTS classrooms or science rooms for the K-6 Schools. The design of and requirements identified for these spaces are not applicable for the K-6 Schools. There is no requirement for kiln venting in the art room for the K-6 Schools. There is to be no exterior lower level windows or clerestory glazing over the music / drama room.

4.9.3.4.2 K-9 Schools

The Contractor's design for the science lab shall include natural gas double turrent outlets at each sink location and controlled by an emergency shut-off valve located at each lab entrance.

4.9.4 Substructure

4.9.4.1 Foundations

The 18 School Sites are located in different areas in The City of Calgary and The City of Edmonton. The Contractor must design the foundation for each School to take into account the specific geotechnical information, recommendations and requirements obtained by the Contractor. A concrete footing design supporting a continuous foundation for the Core Structure may be an acceptable foundation system, however, site specific geotechnical conditions will govern. Screw pile foundations supporting the design of the Modular Classrooms (supporting the loads as provided by the manufacturer of the Modular Classrooms) may also acceptable but must take into account geotechnical conditions and drainage of crawl spaces below the Modular Classrooms.

4.9.4.2 Floor Slab

The Contractor shall design the floor slab to ensure that reinforced cast in place concrete will be provided for the main floor. The floor slab shall be designed as either a slab on grade or structural slab at the Contractor's discretion after taking in consideration the geotechnical information of each School Site. The minimum thickness of slab when using a slab on grade is 130 mm. The Detailed Designs shall take into consideration adequate support to accommodate areas where movement may occur, and areas where heavier loads may occur, i.e. library and gymnasium. Additionally, the Detailed Designs shall include drainage for elevator pits.

4.9.5 Building Envelope

4.9.5.1 Superstructure

4.9.5.1.1 Floor Design

The Contractor shall use the most restrictive live load indicia set out in the *Alberta Building Code 2006* in its Detailed Designs.

The Contractor shall meet the requirements of the current edition of the *Alberta Building Code 2006* for the relevant "Climatic Data Design", as described respectively therein, information for each of the Schools in Edmonton and Calgary. The climatic data the Contractor shall consider will include, but not be limited to: "Ground Snow Loading", "Design Temperatures", "Heating Degree-Days", "One day and 15 minute Rainfalls", "Annual Total Precipitation" and "Seismic Data".

The Detailed Designs for upper floors shall be based on 38mm metal steel decking with 100 mm thick reinforced concrete topping supported by a steel structure. The Contractor shall design openings from the second floor onto the main floor so that in the future the openings can be infilled as additional floor space. The Contractor shall design floors to accommodate the extra loading without requiring the foundations to be modified or adding additional structural columns. Load bearing masonry may also be used in the Detailed Designs by the Contractor.

4.9.5.1.2 Roof Design

The Contractor must include open web steel joists to support the roof and second floors in its Detailed Designs. The Contractor shall design clear spans through the majority of the rooms, i.e. classrooms, gymnasium. The Contractor's assembly area design will allow columns to be incorporated into the Detailed Designs. The Contractor must include in its Detailed Designs suitable support for moveable partitions where identified in the Modified School Designs. In its Detailed Designs the Contractor shall include a

waterproof roofing structure that is designed to collect and shed water to the appropriate drainage system (minimum 2% slope).

Where the Contractor designs a flat to low slope roof, the Contractor shall design to include a complete roofing system consisting of waterproof membrane, insulation cover panels, insulation and vapour retarder. Performance system is based on a 2ply SBS modified bitumen membrane roofing system. In its Detailed Designs the Contractor shall provide an additional layer of cap membrane, in a secondary colour a minimum of 900mm wide for:

(a) High traffic areas to all equipment that requires servicing on the roof; and
(b) Locations where downspouts drain onto the roof.

The Contractor shall design roof curbs to a minimum 200 mm high for all roof mounted equipment and penetrations through the roof, except roof drains.

Deflection of the roof system is not to exceed 1/180th of the span for the specified live loading. The Contractor's design of the roof system is to be designed and stamped by a professional engineer licensed in Alberta. The Contractor shall design the roof system to accommodate thermal movement of the roof sheet caused by ambient temperature range of 80˚C to -40˚C. The roof design shall include a minimum R-value of RSI 2.8 across all areas of the roof, except where conflict with equipment and penetration through the roof occurs. In its roof design, the Contractor shall allow for full thermal expansion and contraction of the exterior roof sheet. The Contractor shall design the roof system so as to provide for positive drainage of condensation occurring within metal siding construction and water entering at joints, to exterior face of wall in accordance with NRC "Rain Screen Principals". The Contractor shall design the roof system to withstand dead loads, snow loads, snow build-up and rain load. The Contractor shall design the fastener systems to withstand wind uplift on the roof and sliding forces induced by environmental loads.

Thermo plastic polyolefin roof systems are not acceptable. Thermo plastic Polyvinyl Chloride roofing systems as per FM Class 1-75 (for increased wind exposure) are acceptable. Roof panel systems are not acceptable.

Sloped roofs are to be avoided. Where used they shall be constructed of a Standing Seam Metal roof system over a waterproof membrane.

The Contractor's roof design shall ensure that the primary access onto roof will be from within the School Building. The Contractor will connect different roof heights with exterior access ladders or roof top stairs. The Contractor's design of the roof access hatch shall be lockable from the interior and have incorporated a railing system. The Contractor shall include tie offs, anchors and a fall arrest system in its Detailed Designs as required

by occupational health and safety legislation, regulations and the codes adopted in such enactments.

4.9.5.2 Exterior Enclosure

4.9.5.2.1 Exterior Walls

The Contractor shall ensure that exterior walls shall be designed to stand up to the majority of vandalism and high wear and tear. The Contractor's design shall ensure that exterior wall assemblies separate spaces requiring differing environmental conditions by controlling the flow of air, water and energy.

The Detailed Design of the exterior walls shall be based upon the "Pressure Equalized Rain Screen Insulated Structure Technique", or "PERSIST". This approach is characterized by the following:

(a) Exterior cladding covering an air space shall be pressure equalized with the exterior.

(b) Insulation shall be:

(i) mainly located to the exterior of structural components;
(ii) in direct contact with an air barrier system; and
(iii) exterior of an air barrier system.

The use of spray-foam insulation within the wall system is not acceptable.

The Contractor shall design the exterior walls to ensure that water, snow and ice sheds safely from exterior surfaces and is not trapped in the assembly to cause deterioration, staining or mould. The air barrier system shall be designed to also function as a vapour retarder.

The Contractor shall design the exterior masonry to have an aesthetic finish which will enhance the School's appearance to the community which it is located within, while providing a durable surface that withstands the majority of vandalism and high wear and tear.

The Contractor shall ensure that building surfaces are not designed to be climbable. The Contractor shall avoid the use of ledges, horizontal siding and low roofs in the Contractor's design. The Contractor shall include a hard surface, durable, tall, smooth finish "ball wall" adjacent to the paved play area in its Detailed Designs.

4.9.5.2.2 Exterior Windows

The Contractor shall, as a minimum, include sealed double glazed windows in the Detailed Designs of the exterior windows, doors and sidelights. Low emissivity (Low E) coating on surface #2 in sealed double glazing units shall be used in the Contractor's design. The Contractor shall include the performance of a small box aluminum curtain wall the exterior window assembly design.

Windows shall meet or exceed requirements of CAN/CSA-A440-M90, and the following performance ratings:

(a) Air Tightness: A3 (m3/h) m-1 to ASTM E283-91.
(b) Water Tightness: B7.
(c) Wind Load Resistance: C5.
(d) Minimum Temperature Index: 56.

The Contractor's curtainwall design shall use mechanically keyed gaskets in the box section and pressure plate. The Contractor shall design the main mass of window frames so they do not project beyond the exterior plane of the air barrier. The Contractor shall bridge the cavity of the wall by means of flashings (not the frame or covercap). Covercaps to flashings is not acceptable. Caulking the cover cap in place is not acceptable.

The Contractor shall design exterior sills with a minimum 2% drainage slope to exterior.

The Contractor shall provide a minimum of one venting window per classroom in its Detailed Design.

4.9.5.2.3 Exterior Doors

In its Detailed Designs, the Contractor shall ensure that the exterior doors will resist the majority of vandalism and allow some vision through the doors. The Contractor shall design the exterior doors shall to meet the requirements of Section 4.9.7.6.3.2 (Security Access and Surveillance) and Section 4.9.1.1 (Acoustics). The Contractor shall design the exterior doors to withstand the exterior environmental elements while providing a strong enough finish to withstand the usual vandalism that occurs on school property. The doors must be designed to be able to endure abusive contact with minimal visual dents and damage.

The Contractor shall design the door to the main entrance to the building to meet the Minimum Material Requirements. All other exterior entrance doors and frames are to be designed to use insulated hollow metal. In its Detailed Designs, the Contractor shall include glazing for the upper half of the doors which are directly accessed by the main

corridors. The Contractor's designs shall include glass that is vandal resistant; and if the glass is broken, the loose pieces shall have a minimum ability to cut someone. Float glass is unacceptable. Doors for the gymnasium do not require glazing.

The Contractor shall design all corridor exterior doors and exit doors to swing outward. The Contractor shall design the exterior doors to include fixed mullions for the double doors in most areas. In its Detailed Designs the Contractor shall include removable mullions to main designated delivery area, the gymnasium and all interior corridors to allow the ability to move large items through more easily.

4.9.6 Building Interior

4.9.6.1 Interior Structure

4.9.6.1.1 Interior Walls

The Contractor shall design all interior walls and partitions to meet the acoustic requirements set out in Section 4.9.1.1.

The Contractor shall design the central core corridor walls to be abuse resistant with durable finishes. Detailed Designs including smooth durable masonry surfaces with bullnose corners or abuse resistant drywall are preferred. Where wet areas are foreseeable, such as washrooms, change rooms and drinking fountain areas, The Contractor shall design these walls with a waterproof substrate and a water resistant finish to prevent mould, deterioration and staining. The Contractor shall include double plumbing partitions between washrooms and instructional space in its Detailed Designs.

Depending on the School Board program requirements as shown in the Modified School Designs, a number of partitions are to be designed by the Contractor to ensure flexible use of the space. This may be accommodated in a number of ways such as moveable partitions or removable walls. Refer to Modified School Designs and Section 10650 (Folding Partitions) of the Minimum Material Requirements for specifics.

4.9.6.1.2 Interior Doors and Windows

The Contractor shall design all doors to meet Section 08710 (Hardware) of the Minimum Material Requirements, Section 4.9.7.6.3.2 (Security Access and Surveillance) and Section 4.9.1.1 (Acoustics) and to withstand frequent use. All doors for Instructional Areas are to be designed by the Contractor to swing out in the direction of exiting. The Contractor may design School support rooms and rooms within a "suite" allowing those doors to swing into the room. The Contractor shall include in its Detailed Designs hollow metal, ½ view light doors for corridors and stairwells. The Contractor shall design the doors for mechanical rooms and facility support services as solid hollow metal doors. View lights are not required for these types of doors. Solid core wood doors

designed to meet this Section 4.9.6.1.2 (Interior Doors and Windows) are required for all interior administration and classrooms and other learning areas complete with ½ view lights. Round or oval shape view lights are not permitted. View lights in doors can be deleted in locations where a sidelight is provided. The Contractor shall use fixed mullions in most double door locations in its Detailed Designs. However, Contractor shall design removable mullions for double doors to designated delivery areas, the gymnasium and all interior corridors to allow for improved access for large items. The Contractor shall design all door frame throats to match wall thickness. Use of wood frames or knock down metal frames by the Contractor is not acceptable. The Contractor shall design all doors with Grade 1 Institutional hardware including acoustic seals and door bottoms. Corridor doors must be designed by the Contractor to remain open, automatically closing when the fire alarm is activated. The Contractor shall design corridor doors to have the flexibility to allow sections of the School to be securely locked off as desired by the users.

Interior windows, sidelights and glazed doors shall be designed to have 6mm wired glass at rated closures and 6mm tempered glass at others. The Detailed Designs shall allow for blackout blinds on room side for all glazed doors and sidelights off of the main corridors (blinds supplied and installed by School Boards) for use during "lock down" times.

4.9.6.1.3 Interior Stairs and Landings

The interior stair design shall be closed riser steel pan construction. See also Section 05510 (Metal Stairs) of the Minimum Material Requirements.

4.9.6.1.4 Fittings: Lockers, Toilet Partitions, Handrails, Interior Signage, Storage Shelving, Washroom Accessories, Entry Mats

The Detailed Designs shall provide solid backing in partitions for all fittings.

The Contractor shall provide lockers where indicated on the Modified School Designs. Lockers shall be designed as a 2 tier configuration, 381mm wide x 457mm deep x 1830mm high. The Contractor shall design lockers to be fully recessed to ensure that the face of the lockers is flush with the adjacent wall. The Contractor shall design plywood bases (pressure treated for wet areas). The Contractor shall select up to 4 colours per School for the locker doors, which colours shall be reviewed and approved by the Province prior to the Contractor utilizing the selected colours.

The Contractor shall design toilet partitions to resist a majority of vandalism. The Contractor's hardware design is to be heavy duty, brushed stainless steel, institutional grade with tamperproof screws. The Contractor shall design toilet partitions that are floor mounted and overhead braced. The Contractor shall incorporate privacy panels in the design between urinals. The Contractor shall select up to 2 colours for the doors, which

colours shall be reviewed and approved by the Province prior to the Contractor utilizing the selected colours.

In its Detailed Designs the Contractor shall incorporate handrails on both sides of all stairwells and ramps. The Contractor must design for round steel handrails, with tamperproof fasteners. Wood handrails are not acceptable. In its Detailed Designs for the handrails the Contractor shall comply with the *Alberta Building Code 2006*.

The Contractor shall design an interior signage package. The Detailed Designs for the signage shall not allow the lettering be removed from the exposed surface. The Contractor shall design the signage to incorporate tamperproof screws as part of the installation. The Contractor, in its signage design, shall incorporate the name of the room and room number in title case. The Contractor shall use lettering on the signage that is clearly legible from a minimum distance of 3 meter. In its Detailed Designs, the Contractor shall include the graphic symbol and barrier free symbol, where applicable, for all washroom and change room signage. The Contractor shall include in its Detailed Designs overhead directional signage for key rooms that will be typically accessed by the general public. These key rooms will include areas such as the gymnasium, library, administration area, multipurpose rooms, and zones for different grades of classrooms.

The Contractor shall design storage shelving to have adjustable shelves. The Contractor shall design the storage unit and shelves to inhibit tipping. The Contractor shall design units to Architectural Woodwork Manufacturer Association of Canada (AWMAC) standards. The maximum length of shelves is to be 1070mm. The Contractor shall design shelving units to incorporate proper functionality of users utilizing the space, i.e. grade 1 vs. grade 6 users. Heights, depths and locations will need to be taken into account by the Contractor in its Detailed Designs. Refer to Millwork Sketch MW- 29 for design intent.

The Contractor shall provide washroom accessories that shall be institutional quality, heavy duty, brushed stainless steel finish complete with tamperproof fasteners. The Contractor shall design washrooms as barrier free where indicated on the Modified School Designs. The Contractor shall design washrooms for kindergarten and grade one use with small plumbing fixtures. Refer to Section 4.9.2.8 (Early Childhood Services) and Section 4.9.2.10 (Washrooms).

The Contractor shall design the main entry with a system to prevent and/or remove the bulk of the wet and dirt products from entering the School such as integrated recessed walk off mats. The Contractor shall design the entrances and exits to the recess exterior play areas to allow for removable entry mats. Refer to Section 12480 (Entry Mats) of the Minimum Material Requirements.

4.9.6.2 Interior Finishes

4.9.6.2.1 Wall Finishes

The Contractor shall design all wall finishes to be durable, impact resistant and to require minimal maintenance. The central core wall will receive the most abuse accordingly designs including masonry painted walls are recommended. The Contractor shall design the overall colour scheme with light colours for added reflectance and brightness. The Contractor's chosen colours shall be designed to minimize trends that will go out of style in a few years. The Contractor must design the wall finishes for painting a combination of base and accent colours. Dark coloured walls will be required in drama areas as designated for backdrops. The Contractor shall include in its Detailed Designs a rubber base throughout the School, except in wet areas such as washrooms. For wet areas the Contractor shall design wall finishes with a waterproof backing board and with a water and impact resistant finish such as ceramic or porcelain tile complete with an integral base. The Contractor shall incorporate a waterproof substrate in change rooms and shower areas. Specific acoustic partition design requirements are required in all high open spaces over 3000mm in height such as the gymnasium, refer to Section 4.9.2.6 (Gymnasium).

4.9.6.2.2 Floor Finishes

The Contractor shall design all floor finishes to be durable. The Contractor shall design the main central core and corridors to have slip resistant and low maintenance flooring installed where minimal maintenance other than cleaning is required. The Contractor shall design the floor finish design for Instructional Areas and the multipurpose rooms with durable cleanable finish. Sheet goods or vinyl composite tile are acceptable. The Contractor shall design all washrooms and wet areas with a slip resistant and waterproof surface such as porcelain tile. The Contractor shall design the entire gymnasium with a wood floor. See Section 4.9.2.6 (Gymnasium).

4.9.6.2.3 Ceiling Finishes

The Contractor shall design the central core area and central corridors to reflect light while absorbing sound. The Contractor shall include ceiling finishes that meet Sections 09510 (Acoustic Ceiling Units) and 09850 (Cellulose Fibre Acoustic Coating) of the Minimum Material Requirements in its Detailed Designs. The Contractor shall design the gymnasium, student gathering areas, library and project centres as high volume spaces with exposed structure. The Contractor may design the exposed structure to be sprayed with an acoustic insulation that is designed to absorb sound while enhancing the reflectivity of lighting. The Contractor shall design a washable, durable ceiling finish is for all washrooms and change room areas. The Contractor shall design the majority of classrooms and administrative spaces with a lay in t-bar ceiling, to allow access into the

ceiling space as well as to provide the required NRC (Noise Reduction Coefficients) set out in Alberta Infrastructure and Transportation's *Standards and Guidelines for School Facilities* (August 2007). The Contractor shall design the ceiling such that the ceiling grid is centered in each room and so that cut panels are not less than 300mm where practical. The use of power activated fasteners to underside of concrete structure and metal decking tabs or clips to underside of metal deck structure for anchoring of ceiling system support system is not permitted.

4.9.7 Building Systems

4.9.7.1 Elevators

The Contractor shall include an elevator in its Detailed Designs for all 2 storey Schools. The Contractor shall design such elevators are to be primarily for passengers and also for vertical transportation of heavy and bulky materials and equipment. Refer to Section 14210 (Elevators) of the Minimum Material Requirements. The Contractor shall design elevators to a minimum load capacity of 1588kg. The Contractor's elevator platform design shall be a minimum of 1648mm wide x 2032mm deep and a minimum ceiling height of 2235mm. The Contractor shall design the elevator to include a single slide door, minimum of 1067 mm wide x 2134 mm high. The Contractor shall design the elevators to travel at a minimum of 0.50 metres per second. In its Detailed Designs Contractor shall provide a hands free telephone for emergency use and protective pads and hooks. The Contractor shall design the elevators to CAN/CSA-B44-07 requirements.

4.9.7.2 Plumbing System

The Contractor shall design the plumbing system to meet the School's needs and incorporate water consumption efficiency. Where applicable, the Contractor shall design the plumbing system to meet the requirements of this section, the LEED™ Silver Certification requirements, Alberta Infrastructure and Transportation's *Standards and Guidelines for School Facilities* (August 2007) all applicable laws and all other relevant Standards and Guidelines. In the event of any conflict or inconsistency between these documents, the Contractor shall apply the highest standard.

The Detailed Designs shall include gas-fired, instantaneous, on demand hot water heaters with a system recirculation pump. The Contractor shall design the piping distribution system design to use Type L copper with lead free solder joints. In its Detailed Designs the Contractor shall provide domestic hot water recirculation piping complete with a balance valve where hot water supply piping exceeds 15 m. The Contractor's design for branch piping from a fixture to a recirculation main shall not exceed 8 m. The Contractor shall provide isolation valves to isolate fixtures or group of fixtures from the main and sub-main distribute low piping in its Detailed Designs.

4.9.7.2.1 Plumbing Fixtures

The Contractor shall design the plumbing fixtures to meet the requirements of Alberta Infrastructure and Transportation's *Standards and Guidelines for School Facilities* (August 2007). The Contractor shall design the plumbing fixtures for barrier free use where applicable.

In its Detailed Designs the Contractor shall include floor mounted low flush water closet with battery activated flush valve; wall hung low flush urinal with battery activated flush valve; and stainless steel lavatories in washrooms with battery activated brass. The use of ultra low flush water closets is not acceptable. The Contractor shall provide a baby devoro size toilet and sink in the early childhood services washroom. The Contractor shall design drinking fountains as non-refrigerated where indicated on the Modified School Designs. The Contractor shall include handicap fixtures and brass and stainless steel countertop sinks with low consumption brass in its Detailed Designs. The Contractor's Sink outlet designs shall include laminar flow outlets. The Contractor shall design non-freeze hose bibbs installed at 60 m intervals along School exterior. The Contractor shall design traps or interceptors for sinks in areas such as art rooms and CTS classrooms.

4.9.7.2.2 Domestic Water Distribution

The Contractor shall design domestic water distribution to meet the requirements of Alberta Infrastructure and Transportation's *Standards and Guidelines for School Facilities* (August 2007), applicable laws and all other relevant Standards and Guidelines. In the event of any conflict or inconsistency between these documents, the Contractor shall apply the highest standard.

Pipes, fittings, valves, hose bibbs, water heaters, supply equipment, insulation, supports and backflow preventers shall be designed by the Contractor to meet the requirements of applicable laws and relevant Standards and Guidelines. The Contractor shall design all water lines to be insulated to maintain water temperature, minimize heat loss and to prevent condensation on the piping.

4.9.7.2.3 Sanitary Waste

The Contractor shall design sanitary waste and vent distribution systems to meet the requirements of Alberta Infrastructure and Transportation's *Standards and Guidelines for School Facilities* (August 2007), applicable laws and all other relevant Standards and Guidelines. In the event of any conflict or inconsistency between these documents, the Contractor shall apply the highest standard.

Pipes, fittings, floor drains, waste equipment, insulation and supports are to be designed to meet the requirements of applicable laws and relevant Standards and Guidelines. The sanitary waste system is to be designed to ensure positive drainage and provide sufficient cleanout for maintenance purposes.

4.9.7.2.4 Rain Water Drainage

The Contractor shall design the rain water drainage distribution system to meet the requirements of Alberta Infrastructure and Transportation's *Standards and Guidelines for School Facilities* (August 2007), applicable laws and all other relevant Standards and Guidelines. In the event of any conflict or inconsistency between these documents, the Contractor shall apply the highest standard.

Pipes, fittings, roof drains, insulation and supports are to be designed by the Contractor to meet the requirements of applicable laws and relevant Standards and Guidelines. The Detailed Designs shall provide full flow roof drains with cast iron or aluminum domes.

4.9.7.3 Heating and Ventilation (HVAC)

The Contractor shall design the heating and ventilation systems to meet the requirements of this Section 4.9.7.3, the Minimum Material Requirements, the LEED™ Silver Certification requirements, Alberta Infrastructure and Transportation's *Standards and Guidelines for School Facilities* (August 2007), all applicable laws and all other relevant Standards and Guidelines. In the event of any conflict or inconsistency between these documents, the Contractor shall apply the highest standard.

4.9.7.3.1 Heating Systems

The Contractor shall design a heating plant, distribution, terminal heat transfer units and accessories to maintain comfortable conditions that meet the requirements of Alberta Infrastructure and Transportation's *Standards and Guidelines for School Facilities* (August 2007), applicable laws and all other relevant Standards and Guidelines. In the event of any conflict or inconsistency between these documents, the Contractor shall apply the highest standard.

The Contractor shall use the design heating equipment, piping distribution, heating elements, piping, fittings, valves, supports, insulation and chemical treatment to meet the requirements of applicable laws and relevant Standards and Guidelines.

The heating system shall be designed to suit the appropriate Design Data as specified in the *Alberta Building Code 2006* for the respective City in which each School is located.

The Contractor shall design the heating system so that when one boiler is out of service the remaining boiler or boilers shall be of sufficient capacity to offset building heat loss excluding heat for ventilation. The Contractor shall design for boilers with a minimum 85% efficiency and a maximum of 0 – 20 PPM NO_x emissions shall be minimum standard. The Contractor shall design the boilers with standalone controls and BMCS interface. The heating distribution system shall be designed by the Contractor to include a primary and secondary pumping arrangement. The Contractor shall design the heating media distribution system with a two-pipe reverse return system. In its Detailed Designs the Contractor shall include piping distribution materials that are Schedule 40 black iron or Type L copper or Chlorinated Polyvinyl Chloride (CPVC) Schedule 40and Schedule 80 piping. Grooved mechanical joints are not permitted except sprinkler system piping. The Contractor shall design a means of isolation, balancing and flow measurement at major pieces of equipment and major circuits. The Detailed Designs shall provide an isolation valve and a balance valve on each terminal at the supply and return connections. The Contractor shall include a drain valve with cap and chain on all system low points. The Detailed Designs shall include ball valves for isolation. Globe valves should be used for balancing. Butterfly valves are not acceptable. The Contractor shall provide terminal heat transfer units on the basis of the maintainability, controllability and life cycle costs in its Detailed Designs. The Detailed Designs for each terminal heat transfer unit shall be thermostat controlled to provide individual room control. In its Detailed Designs the Contractor shall provide glycol heat exchanger with related piping and circulation pumps for air system preheat coils. The Detailed Designs shall provide 50-50 mixture utilizing propylene glycol.

4.9.7.3.2 Ventilation and Exhaust Systems

The Contractor shall design ventilation and exhaust systems to meet the requirements of Alberta Infrastructure and Transportation's *Standards and Guidelines for School Facilities* (August 2007), applicable laws and all other relevant Standards and Guidelines. In the event of any conflict or inconsistency between these documents, the Contractor shall apply the highest standard.

The Contractor shall include design criteria, system configurations, ductwork distribution, filtration and insulation to meet the requirements of applicable laws and relevant Standards and Guidelines. The Contractor's air system design shall consist of fresh air and exhaust air roof/wall outlets, motorized fresh, return and exhaust dampers, supply fan, return fans, filter box, preheat coil, ductwork and air outlet distribution and ducted exhaust/return air. The Contractor shall design air handling systems to provide free cooling. The Contractor shall not use mechanical rooms as air plenums. The Contractor shall design the gymnasium with a separate air system with provisions to provide reduced outdoor air volumes for normal usage versus peak occupant usage utilizing variable frequency drives and CO_2 sensors. The Contractor shall design zone air systems in accordance with function, occupied hours and air quality requirements. The

Contractor shall ensure that the Detailed Designs provide that good air distribution and occupant comfort are achieved through appropriate air outlet application, selection and location. The Contractor shall ensure that the Detailed Designs provide for a return air fan when recirculating air to the air system. Usage of a supply fan only is not acceptable.

4.9.7.3.3 Cooling Systems

Mechanical cooling for entire School is not to be provided. Essential cooling systems are to be provided in high heat areas such as the data server rooms and are to be designed to meet the requirements of Alberta Infrastructure and Transportation's *Standards and Guidelines for School Facilities* (August 2007), applicable laws and all other relevant Standards and Guidelines. In the event of any conflict or inconsistency between these documents, the Contractor shall apply the highest standard.

The cooling system shall be designed by the Contractor to suit the appropriate "Design Data" as specified in the *Alberta Building Code 2006* for the respective City in which each School is located. The Contractor shall design the insulation and system configuration to meet the requirements of applicable laws and relevant Standards and Guidelines. In its Detailed Designs the Contractor shall use outdoor air for free cooling when ambient conditions permit.

4.9.7.3.4 Humidification

The Contractor shall design the humidification system to meet the requirements of Alberta Infrastructure and Transportation's *Standards and Guidelines for School Facilities* (August 2007), applicable laws and all other relevant Standards and Guidelines. In the event of any conflict or inconsistency between these documents, the Contractor shall apply the highest standard.

The Contractor shall ensure that the Detailed Designs for the equipment and insulation shall meet the requirements of applicable laws and relevant Standards and Guidelines. The Contractor shall design the humidification system for each air system to provide moisture addition to the supply air to maintain indoor humidity. The Detailed Designs shall allow the humidification system to reset in accordance with outdoor air with a minimum 15% humidity during the heating mode. The Contractor shall design the steam humidifier grids for minimal distance absorption. Steam is to be generated using a factory assembled and tested natural gas packaged unit suitable for indoor installation. In its Detailed Designs the Contractor shall provide make up water provided via water softener. In its Detailed Designs the Contractor shall provide insulation around the humidification piping to meet minimum the *Model National Energy Code of Canada for Buildings 1997* requirements.

4.9.7.4 Fire Protection

The Core Structure and the Modular Classrooms (including corridors) shall be designed by the Contractor to be fully sprinklered and shall meet the requirements of *National Fire Protection Association* (NFPA) Standard 13. The Contractor shall provide recessed sprinkler heads in ceiling areas to minimize vandalism. In its Detailed Designs the Contractor shall provide wire guards in gymnasium and maintenance rooms. The Contractor shall provide fire extinguishers in recessed cabinets in School corridors and will be surface mounted in other areas to meet the minimum applicable laws and Standards and Guidelines.

4.9.7.5 HVAC/Mechanical Controls (BMCS)

The Contractor shall design the Core Structure to include a BMCS system using direct digital controls. The Contractor shall incorporate a system to conserve energy in the design of the BMCS by:

(a) Controlling primary energy consuming equipment;
(b) Develop optimum start and stop time for equipment and systems that do not operate 24 hours a day;
(c) Resetting air and heating water supply temperatures using feedback from occupied space demand;
(d) Reset humidity from outside air;
(e) Using air system to preheat, precool or purge to achieve the objective space temperature at the start of occupancy;
(f) Control car plugs;
(g) Control of zone temperature utilizing user adjustable DDC thermostats; and
(h) Control of exterior lighting.

All BMCS components shall be electronic. The Contractor shall provide in its Detailed Designs electrically powered actuators to drive all valves, dampers and other control devices. The Contractor shall provide in its Detailed Designs insulated blades for fresh and exhaust air dampers.

4.9.7.6 Electrical

The Contractor shall design, where applicable, the electrical system to meet the requirements of this Section 4.9.7.6, the Minimum Material Requirements, the LEED™ Silver Certification requirements, Alberta Infrastructure and Transportation's *Standards and Guidelines for School Facilities* (August 2007), all applicable laws and all other relevant Standards and Guidelines. In the event of any conflict or inconsistency between these documents, the Contractor shall apply the highest standard.

4.9.7.6.1 Electrical System and Distribution

The Contractor shall design the electrical system and distribution to meet the requirements of Alberta Infrastructure and Transportation's *Standards and Guidelines for School Facilities* (August, 2007). In its Detailed Designs the Contractor shall include a complete building power distribution system consisting of main distribution centre, sub-distribution centers, transformers, if required, and branch circuit panelboards. The Contractor shall design a motor control centre where quantity and electrical motor sizes warrant. The Detailed Designs of motor control centers shall meet Alberta Infrastructure and Transportation's *Standards and Guidelines for School Facilities* (August, 2007).

The Contractor shall design and provide, if voltage and ampacity dictate, ground fault protection at the main distribution centre.

4.9.7.6.2 Lighting System

The Contractor shall design a complete lighting system to meet, but not exceed, the latest Illuminating Engineering Society of North America (IESNA) recommended practices for school lighting (See IES RP3 – *Guide for Educational Facilities Lighting*), Alberta Infrastructure and Transportation's *Standards and Guidelines for Schools* (August, 2007) and LEED™ Silver Certification requirements for lighting.

The Contractor shall design to provide a maintained lighting illuminance range of 380 – 450 lux average at a work plane height of 760 mm while ensuring average maintained illuminance does not exceed 450 lux. Illuminance ratios (maximum: minimum) are not to exceed 3:1.

The Contractor shall design the lighting system so that installed power density for lighting is less than 10 watts per square meter.

4.9.7.6.2.1 Interior Lighting and Control

The Contractor shall design an interior lighting system using recessed light fixtures or direct/indirect luminaires with T8 or T5 linear fluorescent lamps and energy efficient electronic ballasts.

The Contractor shall design and provide for a low voltage switching system consisting of local control and interface capability with the BMCS to de-energize selected room and area light fixtures at pre-selected times. Each classroom's lighting shall be controlled in a minimum of two segments, one at the "Smart Board" and one for the remainder of the room to facilitate overhead presentations.

The Contractor shall design a "motion sensor" control system for operation of light fixtures in secondary rooms such as storage rooms and selected offices and support rooms.

4.9.7.6.2.2 Exit and Emergency Lighting System

The Contractor shall design an exit and emergency lighting system throughout the Core Structure in accordance with the *Canadian Electrical Code* and the *Alberta Building Code 2006*.

The Contractor shall design a complete branch circuit power distribution system throughout the Core Structure. The Detailed Designs shall provide for circuitry for computer equipment in accordance with Alberta Infrastructure and Transportation's *Standards and Guidelines for School Facilities* (August 2007). The Detailed Designs shall provide dedicated circuits for equipment as required.

4.9.7.6.2.3 Exterior Lighting System

The Contractor shall design a complete exterior building lighting system including on-building and pole mounted luminaires. The exterior building lighting system shall be designed to operate via photo-electric cell operation.

The Detailed Designs shall utilize a HPS (High Pressure Sodium) lighting source and provide lighting levels in accordance with IESNA recommendations. Lighting fixtures selected are to have sharp cut-off photometrics and be of "night friendly" design. The Detailed Designs shall provide HPS security lighting to illuminate alcoves and concealed areas. Fixture control design is to be via both photocell and BMCS. Low use entrances can be illuminated with incandescent illumination using motion sensor and daylight control.

4.9.7.6.2.4 Branch Wiring

The Contractor shall design a complete system of wiring devices in accordance with each School's Modified School Design. The Contractor shall design receptacles for data workstations with surge protection facilities. Circuit data receptacle designs shall meet the requirements of Alberta Infrastructure and Transportation's *Standards and Guidelines for School Facilities* (August 2007).

Where utilizing floor boxes, the Contractor, in its Detailed Designs, shall use multi-service units with 2 split receptacles and four gang voice/data outlets.

4.9.7.6.3 Communication and Security

The Contractor shall provide conduits and cable including underground service conduits and cables, termination backboards, interior conduits and cables, and cable distribution trays to accommodate an integrated communication system including public address system, telephone system, cable television and Supernet to comply with all the requirements for each School as set out in the Modified School Designs.

The Contractor must also comply with the following requirements:

(a) Cable Television System: Extend cable television service to splitter / amplifier location in telephone room. From splitter, extend co-ax cabling to room outlet locations. Provide cable ends, jacks and plates at field outlets. Confirm signal strength at each field outlet;

(b) Telephone System Interconnection Cabling: Provide a 50 pair copper cable from demarcation location to the main distribution frame and a 25 pair copper cable from main distribution frame to each horizontal distribution frame; and

(c) Paging and Public Address System: Provide and label cabling for paging and public address systems. Provide twisted pair shielded audio cable from the amplifier to each speaker zone and daisy chain the same cable to all speaker outlets within each zone.

4.9.7.6.3.1 Fire Alarm System

The Contractor shall design a complete microprocessor based, addressable, non-coded, single stage fire alarm system meeting the requirements of Alberta Infrastructure and Transportation's *Standards and Guidelines for School Facilities* (August 2007), all applicable laws and other relevant Standards and Guidelines. In the event of any conflict or inconsistency between these documents, the Contractor shall apply the highest standard.

The Contractor shall design fire alarm systems that must allocate individual fire alarm zones for each floor area, sprinkler systems (including gate valves and tamper switches), stairwells, Modular Classrooms, elevator shafts and air handling equipment.

In its Detailed Designs the Contractor shall provide fan shutdown facilities and connection between fire alarm control panel and master clock system controller to inhibit period signal tones and exterior horns.

The Contractor shall complete a fire alarm verification inspection in accordance with the requirements of the CAN/ULC-S537 Standard, Verification of Fire Alarm System and any other applicable laws or Standards and Guidelines.

4.9.7.6.3.2 Security Access and Surveillance

The Contractor shall design an intrusion security system utilizing infra-red motion sensors. All sensors are to be on individual zones. The Contractor shall ensure that its Detailed Designs shall provide for boiler room flood water detection and low building temperature detection. The Contractor shall ensure that its Detailed Designs shall provide both long range and short range motion detectors. In its Detailed Designs, the Contractor shall for the locations of the motion detectors include coverage for exterior doors, all corridors, administration office areas, shops and service rooms including electrical room and mechanical room, stairways, library and computer lab including related storage areas. The Contractor shall design the security system such that it shall be capable of future expansion through the addition of security cameras, video monitors, and additional access devices.

In its Detailed Designs the Contractor shall make provision for interface of security system panel and off-site monitoring function.

4.9.7.6.3.2.1 Door Security System

The Contractor shall design a complete door security system and shall include all electrical equipment required to allow for a complete operating system. The Detailed Designs shall provide an electronic access device at one designated entrance and an electronic locking feature for all exterior entrances from a central control point located in the administration area. The locking feature shall have a single control point for the main entrance doors, and a separate single control point combining all other exterior entrances.

4.9.7.6.3.2.2 C.C.T.V. System

In its Detailed Designs the Contractor shall provide for a rough-in conduit to accommodate School Board supplied complete closed circuit television systems. The design coverage shall include all exterior door entries, corridors, administration areas and computer lab.

4.9.7.6.3.3 Master and Secondary Clocks System

The Contractor shall design and provide a master clock system with main receiver/ transmitter synchronized with the internet or GPS. The Contractor shall provide secondary clocks with GPS settings throughout the facilities.

4.9.7.6.3.4 Voice and Data System, Cable, Conduits and Raceways

The Contractor shall ensure that its Detailed Designs shall provide conduits and cables to accommodate a complete voice and data system to meet the needs of each School as set out in the Modified Schools Designs.

The Contractor shall utilize conduits from individual outlet boxes into accessible ceiling space areas in its Detailed Designs. The Contractor shall design a cable tray, at strategic locations, to run cabling from outlets to respective voice and data head end equipment.

The Contractor shall provide data cabling for each School including installation, termination, labeling and testing of patch panels, jacks and copper and fibre cables to meet the requirements specified in the following articles of the Alberta Infrastructure and Transportation "Consultant Guide for Accommodation and Tenant Improvement, September 2007":

2.14.5- Voice and Data Cabling Standard- General
2.14.6- Voice and Data Cabling Standard- Specific Criteria
2.14.6- Equipment Closet Provisons
2.14.7- Backbone (Riser) Wiring
2.14.8- Labeling
2.14.9- Testing

The Contractor can access this document at Alberta Infrastructure and Transportation's Technical Resource Centre at:

http://www.infratrans.gov.ab.ca/INFTRA_Content/docType486/Production/AccommodationGuide.pdf

The Contractor shall provide a copper cabling system to meet CAN4, EIA/TIA requirements for Category 6 systems. The Contractor shall provide copper patch panels to consist of RJ45 jacks mounted in standard 19" floor racks at each horizontal distribution frame location, maximum 48 ports per patch panel. The Contractor shall provide horizontal cabling consisting of one four pair copper cable to each outlet from the horizontal distribution frame to each data outlet. The Contractor shall provide this same system for each voice outlet.

The Contractor shall provide fibre patch panels consisting of 12 port fibre patch panels with ST connectors, at each termination point, mounted in floor mounted data rack where practicable and wall mounted where space requirements dictate. The Contractor shall provide backbone cabling consisting of one 12 strand 65/125 micron multi mode cable

between the demarcation points for Supernet and main server room, and between main server room and each horizontal distribution equipment location for performance installation, labeling and testing standards for data cabling.

Refer to:

> Alberta Infrastructure's Basic Master Specifications-MasterFormat 95 Version (http://www.infratrans.gov.ab.ca/1001.htm) Sections 16711 and 16712

for additional requirements.

4.9.7.6.3.5 Parking Controls

The Contractor shall design a complete parking area control system including receptacles mounted in metal pedestals, relay cabinets, timers and temperature detection equipment. The Contractor shall design the parking control system to utilize the BMCS to regulate energization cycles.

4.9.8 Exterior Improvements

4.9.8.1 Transportation and Drop Off Areas and Refuse Areas

The Contractor shall design the transportation and drop off areas for each School, as shown on the Site Layouts to include three key areas, namely a separate bus loading/unloading area, a parent drop off area and staff parking areas. The Detailed Designs are to have minimal access points off the City streets and provide students the opportunity to access the School Site with a minimal number of locations required to cross traffic. The bus loading/unloading areas are to be located as indicated on the Site Layouts, subject to any changes that may be required by the relevant City transportation department. The Contractor shall design the bus loading/unloading areas to include a sidewalk with a minimum width of 2.4 m wide. The Contractor shall design a single parent drop off area for each School Site in close proximity to each School's main entrance, allowing sufficient width to ensure traffic can flow past while vehicles are parked. The Contractor shall design parking lots and drop off and bus lanes to be paved and these shall be sloped to drain in accordance with the respective City's requirements.

The Contractor shall design all bus drop off, drive aisles and refuse pick up areas to heavy duty asphalt requirements (minimum 100 mm asphalt thickness), the remaining areas are to be designed for standard duty asphalt requirements (minimum 75 mm asphalt thickness). Refer to Section 02760 (Transportation, Drop Off Areas and Parking Facilities) of the Minimum Material Requirements.

In its Detailed Designs the Contractor shall include standard concrete curbs around the parent drop off area. The Contractor shall design all sidewalks and curbs off the City streets to the relevant City's standards. Storm water retention shall also be designed for LEED™ Silver Certification and the relevant City's requirements.

The Contractor shall design all refuse areas to include concrete aprons for the refuse storage area and these shall be designed to extend to ensure that the front wheels of the dumpster truck will also be on the concrete apron when dumping occurs. The Detailed Designs shall include screening around the refuse area, including gates and bollards.

The Detailed Designs shall ensure that bollards are included around the front main entry to prevent vehicles from driving up to the main entrance.

4.9.8.2 Parking Areas

The Contractor shall design each School to include two separate parking areas, one for staff and one for visitors as shown in the Site Layouts. In its Detailed Designs the Contractor shall include the minimum number of parking stalls as indicated in the Site Layouts. In its Detailed Designs the Contractor shall include the minimum number of barrier free stalls as required by the relevant City's Land Use Bylaw. Asphalt shall be designed to standard duty requirements (minimum 75 mm asphalt thickness). Refer to Section 02760 (Transportation, Drop Off Areas and Parking Facilities) of the Minimum Material Requirements. The Contractor shall also ensure that its parking area design includes painted lines, a minimum of 100 mm wide, for demarcating parking stall locations, the loading and drop off areas and the refuse areas and crosswalks. In its Detailed Designs the Contractor shall include an international graphic symbol at all barrier free parking stall locations. Parking stalls are to be designed using pre-cast wheel stops to prevent vehicles from obstructing adjacent sidewalks and damage to plug-in posts. The Contractor shall design plug-in posts for all staff parking stalls. In its Detailed Designs the Contractor shall include appropriate signage to designate staff, visitor and barrier free parking.

4.9.8.3 Pedestrian Area Paving

In its Detailed Designs the Contractor shall include barrier free, concrete walkways from the City street to the main entrance with a minimum width of 1.5 m unless noted otherwise. In its Detailed Designs the Contractor shall include barrier free, hard surface walkways to sufficient other egress doors to the School to meet minimum barrier free requirements.

4.9.8.4 Barriers

In its Detailed Designs the Contractor shall include barriers to direct pedestrians to marked cross walks leading from the bus drop-off zones to the School entrances. In its

Detailed Designs the Contractor shall include a barrier, such as chain link fencing, to prevent pedestrian traffic crossing the vehicle drop off area at uncontrolled crossings. Chain link fencing shall be a minimum of 1200mm high. Refer to Site Layouts.

4.9.8.5 Athletic and Recreational Surfaces

The Contractor shall design a suitable area for outdoor recreational equipment (excluding playground equipment). In its Detailed Designs the Contractor shall include access to City owned athletic and recreational areas adjacent to the School Site. The Contractor shall design a hard surface play area for each School as shown on the Site Layouts. The Contractor shall design the hard surface play area such that it shall have a minimum of 2% slope away from the School. Asphalt shall be designed to light duty requirements (minimum 35 mm asphalt thickness).

4.9.8.6 Site, Street Furnishings and Flag Poles

In its Detailed Designs the Contractor shall include bicycle rack capacity for a minimum of 10% of the students for each School. The design shall locate the bicycle racks on a hard surface. Refer to Modified School Designs for location The Contractor shall also design for one aluminum flag pole per school, minimum 10 metres high. The pole is to be designed to be tilted and serviced by one person. The Detailed Designs shall include a minimum of two fixed refuse containers near the main entrance of the School. Refer to Section 10350 (Flagpoles) of the Minimum Material Requirements.

4.9.8.7 Exterior Signs

In its Detailed Designs the Contractor shall include vandal resistant, cast aluminum/brass lettering for the exterior of each School. The Contractor design and shall provide lettering for the name of the School once the Province has advised the Contractor of each School's name. These letters are to be sized a minimum of 300mm high. The Contractor shall design the lettering to highlight the entrance and to be visible from the front street, where applicable. All lettering shall be a minimum of 3000 mm above the ground to reduce vandalism to the letters.

4.9.8.8 Landscaping

Contractor shall design the landscaping for the designated areas as shown on the Landscape Development Plans. Designs including berms will be considered as a measure for dealing with grading issues. Trees, shrubs, sod and all other plant material must meet requirements of Section 02930 (Landscaping) of the Minimum Material Requirements and the requirements of the relevant City department. The landscaping design for each School Site is to be completed in conjunction with the relevant City's Parks and Landscaping departments. Landscaping designs must meet the relevant City's Land Use Bylaw.

The Contractor shall remove or relocate those trees requiring such removal or relocation as identified in the Landscape Development Plans.

4.10 ADDITIONAL DESIGN CRITERIA – MODULAR CLASSROOMS

4.10.1 Design Objectives

The Contractor shall, at a minimum, design the Modular Classrooms to be high performance, long life modular units capable of being moved. In addition, the Modular Classrooms must be designed to meet, at a minimum, all applicable laws, including but not limited to the *National Building Code of Canada* and the *Alberta Building Code 2006*, applicable Standards and Guidelines, the requirements of this Section 4.10, and any other Technical Requirement. Finally, the Modular Classrooms must be designed to support the attainment of LEED™ Silver Certification for the new Schools to which they will be attached.

4.10.2 Functional Area Requirements

4.10.2.1 General

The Basic Modular Classroom Informational Plan is set out in Appendix "B" and is provided as information only to assist the Contractor with its design of the Modular Classrooms. The Contractor must comply with all modifications to the Basic Modular Classroom required by each School Board and set out in the Modified School Designs in the Detailed Designs.

In addition, the Contractor shall take into account the Minimum Material Requirements when completing the Detailed Designs for the Modular Classrooms.

The Contractor will design the Modular Classrooms for a 50 year service life. It is intended that the Modular Classrooms can be, if required, moved to any other school in the province, and accordingly, the Contractor shall include the flexibility in design and construction to configure the Modular Classrooms and their adjoining corridors, in three different ways on any given school site:

(a) Individually attached to schools end-on;

(b) Assembled side to side in multiples, with exterior side walls remaining intact, while being attached to schools end-on with an adjoining corridor; or

(c) Assembled end-to-end, with an adjoining corridor separating the units.

4.10.2.2 Classrooms

The Contractor shall ensure that the design for the classrooms (referred to as "classrooms" in this Section 4.10) within the Modular Classrooms has a useable area of 80.0 m2. In order to allow the Modular Classrooms to be connected, the Contractor shall design to constrain the maximum external dimensions of Modular Classrooms once assembled on the School Site to the following dimensions:

A Unit

(a) Width: 7315 mm (24'0")
(b) Length: 15245 mm (50'0")
(c) Height from top of subfloor to parapet: 3810 mm (12' 6" nominal)

B Unit

(a) Width: 7315 mm (24'0")
(b) Length: 12195 mm (40'0")
(c) Height from top of subfloor to parapet: 3810 mm (12' 6" nominal)

The type of unit to be used at each School is set out in the Site Layouts.

In its Detailed Designs the Contractor shall include a 45 minute fire-rated wall between classrooms and the corridor and shall include a 1 hour fire-rated separation between the mechanical room and a classroom. The Contractor shall design locker/coat hanging space in the corridors while maintaining a minimum clear egress distance of 2830 mm between doors, lockers or coat storage when the Modular Classrooms are assembled end to end. In its Detailed Designs the Contractor shall include double egress doors to be provided at one end of the corridor where necessary.

4.10.2.2.1 Classroom Interior

The classrooms within the Modular Classrooms shall be designed to meet the requirements of Section 4.9.2.1 (General Classrooms). Ceiling height for classroom portion of the Modular Classroom shall be 2743 mm (9'0" nominal) and 2895 mm (9'6" nominal) in the corridor portion of the Modular Classroom.

The Contractor shall design floors for the classrooms within the Modular Classrooms that are slip resistant, durable and easily cleaned.

The Contractor shall design all classroom doors to ensure handicap access. Doors shall be hollow metal with ½ view light and shall include hardware to match Core Structure classroom door design.

The mechanical room doors within a classroom must be a rated metal door and frame designed to meet the acoustical requirements set out in Section 4.10.3.3 below. Hardware is to match the Core Structure design for hardware.

4.10.2.3 Other Interior Requirements

The Contractor shall design floors for areas outside the classrooms within the Modular Classrooms that are slip resistant, durable and easily cleaned.

4.10.2.4 Other Constraints

The Detailed Designs shall allow Modular Classrooms to be assembled from smaller sub-units for factory assembly, provided that:

(a) the structural and building envelope requirements for connections are met;

(b) structurally the Modular Classrooms are not disassembled for subsequent moves; and

(c) the Modular Classrooms are effectively a single unit for all subsequent moves within the province in order to address concerns about the integrity of the connections.

The Contractor shall design the Modular Classrooms for a minimum of 10 moves over the first 30 years of their life.

4.10.2.5 Physical Connection to the Core Structure

The Contractor shall design the Modular Classrooms so that physical connection of the Modular Classroom at the School Site to the Core Structure can be accomplished with a minimum of on-site construction. The Detailed Designs shall ensure that electrical, communications and control wiring shall be terminated in easily-accessible panels or junction boxes at suitable locations near the ends of the Modular Classrooms. The Detailed Designs shall ensure that mechanical system water and drain lines shall be capped at suitable locations near the ends of the Modular Classrooms.

4.10.3 Modular Classroom Design Criteria

4.10.3.1 General

Applicable laws, including but not limited to the *Alberta Building Code 2006*, the *National Building Code of Canada*, Authorizations, relevant Standards and Guidelines, this Section 4.10, together with the LEED™ Silver Certification requirements, are intended to provide both minimum requirements together with some guidance on the

technical strategies for designing and building high performance Modular Classrooms. Integration of the strategies in the various disciplines is critical to achieving high performance.

Additional guidance on detailed technical design strategies, together with integration process strategies, can be found in:

> ***High Performance School Buildings Resource and Strategy Guide***, published by the Sustainable Buildings Industry Council, http://www.sbicouncil.org/store/index.php
>
> ***Energy Design Guidelines for High Performance Schools, Cool and Dry Climates***, published by the National Renewable Energy Laboratory, http://www.nrel.gov/docs/fy02osti/29109.pdf

4.10.3.2 Structural

4.10.3.2.1 General Requirements

The Contractor shall ensure that the structure of the Modular Classrooms is sufficiently sound to permit safe occupancy and use of the Modular Classrooms. The Contractor shall design the Modular Classroom to withstand a minimum of 10 subsequent relocations without any detrimental effects to the structural integrity of the unit. The Contractor shall design to limit deflections in accordance with recommended criteria in the *National Building Code of Canada* and the *Alberta Building Code 2006*. Structural details and building envelope details shall be developed in consideration of other movements including the effects of shrinkage. The Contractor shall structurally design and detail the fastening, support, and backing systems of the Modular Classrooms for exterior wall cladding and attachments. Steel connections outside the air barrier shall be galvanized. The Contractor shall avoid thermal bridging in its design. Where this is not possible, the Contractor shall incorporate measures in its design to minimize the effect of thermal bridging.

4.10.3.2.2 Design Loads

The Contractor shall design the Modular Classrooms for the following design loads:

(a) Wind Loads – The Modular Classrooms shall be designed for a 1/50 hourly wind pressure of 1.02 kPa;

(b) Snow Loads, Base Model (Standard Duty) – The structure of the Modular Classrooms shall be designed for a uniformly distributed snow load of 3.6 kPa;

(c) High Snow Load Model (Heavy Duty) – The Contractor shall include, in addition, a high snow load design, for Modular Classrooms that will be used in high snow load locations or when placed adjacent to Schools with high walls or other structures that could result in snow drifting onto the roof of the Modular Classroom. The units in these cases shall be designed for a uniformly distributed snow load of 10.75 kPa;

(d) Snow Loads, Identification of Modular Classrooms – The Contractor shall include permanent identification of unit type as an SD (Standard Duty) unit or an HD (Heavy Duty) unit, by affixing a metal plate showing this designation, with one way screw heads, to the inside of the mechanical room wall, and, in addition, provide a label showing this designation attached to the door frame. Structural design loads shall be shown on Modular Classroom shop drawings;

(e) Other Roof Loads - Roof structures shall also be designed for mechanical or equipment loads and other concentrated loads in accordance with the requirements of the *National Building Code of Canada* and the *Alberta Building Code 2006;* and

(f) Occupancy Loads – The Modular Classrooms shall be designed for a uniformly distributed load of 2.4 kPa, except for assembly areas including corridors, which shall be designed for a uniformly distributed load of 4.8 kPa. Floor structures shall also be designed for mechanical or equipment loads and other concentrated loads in accordance with the requirements of the *National Building Code of Canada* and the *Alberta Building Code 2006*.

4.10.3.3 Acoustics

4.10.3.3.1 General

The Modular Classrooms shall be designed by the Contractor to minimize noise interference from outside the School, hallways, other classrooms, mechanical equipment and from within the classroom itself and to achieve a high level of speech intelligibility within the classroom.

The Contractor shall, at a minimum, design the Modular Classrooms in accordance with this Section 4.10.3.3 for each Building System indicated below to ensure that all classrooms have the following acoustical characteristics:

(a) Quiet background noise levels due to the operation of heating, ventilation and air conditioning (HVAC) and plumbing systems;

(b) Low reverberation;

(c) Adequate noise isolation between a classroom and adjacent classrooms, washrooms, corridors and mechanical rooms;

(d) Adequate structural isolation between a classroom and adjacent classrooms, washrooms, corridors; and

(e) Adequate noise isolation from outdoor noise sources such as vehicular traffic or aircraft.

4.10.3.3.2 Mechanical/HVAC Background Noise

The Contractor shall design the Modular Classrooms to ensure that background noise due to operation of HVAC system shall not exceed RC30 (N) for classrooms and RC40 (N) for corridors.

The Contractor shall design the Modular Classrooms such that background HVAC noise criterion in the classrooms shall be achieved at all locations where a student or teacher's desk could potentially be located. This may be 1m or less from noise generating equipment or ventilation grilles. Background HVAC noise shall have a neutral spectrum devoid of tones, low frequency rumble, hiss or other distracting characteristics.

All supply and drainage piping is isolated from the structure to minimize the transfer of waterflow noise caused by the operation of faucets, etc.

4.10.3.3.3 Vibration Isolation

The Contractor shall design the Modular Classrooms to include vibration isolation for all appropriate mechanical equipment to prevent transmission of discernable vibration into the classroom.

4.10.3.3.4 Grilles and Diffusers

The Contractor shall design the Modular Classrooms to include grilles and diffusers that have a catalog Noise Criteria (NC) rating of NC 18 or less for a single diffuser.

4.10.3.3.5 Reverberation Control

The Contractor shall design the Modular Classrooms to ensure that classrooms (unoccupied) shall have a maximum Reverberation Time of 0.6 seconds averaged over the one third octave bands with mid frequencies of 500 Hz, 1000 Hz and 2000 Hz. Acceptable reverberation can typically be achieved by providing a suspended acoustic

ceiling or other acoustic ceiling finish with a minimum Noise Reduction Coefficient - NRC 0.60 throughout the classroom.

4.10.3.3.6 Noise Isolation

The Contractor shall design the Modular Classrooms to include a minimum Noise Isolation Class (NIC) of Classroom/Classroom of NIC 45.

The Contractor shall design the Modular Classrooms to minimize sound flanking or structural bridging so that the maximum potential noise isolation capability of the construction is realized. The Contractor shall design the Modular Classrooms such that wall, floor and ceiling assemblies around the classrooms will achieve a Sound Transmission Class (STC) rating that is 5 points higher than the required NIC rating.

The Contractor shall design the Modular Classrooms such that noise isolation between the classrooms and mechanical rooms is adequate to meet the HVAC background noise requirements. A mechanical room envelope design with a rating of NIC 50 will accommodate most mechanical systems but may not be adequate in all circumstances.

In its Detailed Designs the Contractor shall provide structural discontinuity between the classrooms and adjoining spaces to prevent impact noises from creating a distraction in the classrooms. Typical activities such as walking in corridors, locker doors closing, etc. shall not exceed a maximum noise level of 40 dBA inside a classroom.

4.10.3.3.7 Exterior Noise Isolation

Noise isolation requirements for the building envelope of the Modular Classrooms vary considerably depending on the location of the Modular Classroom. In its Detailed Designs the Contractor shall include a building envelope that will reduce the outdoor noise sufficiently to meet the indoor HVAC Background Noise criterion. A building envelope with STC 40 and operable windows is acceptable for a suburban location that is not adjacent to a major arterial road or airport.

4.10.3.4 Building Envelope

4.10.3.4.1 General

The Contractor shall design the Modular Classrooms with a building envelope that enhances and is integrated with the other Building Systems that provide the thermal, visual and acoustic comfort that enable and support the learning environment, without compromising durability or maintenance. In its Detailed Designs the Contractor shall include a building envelope that reduces the total life cycle cost of owning, operating and maintaining by integrating and optimizing insulation levels, glazing, shading and air leakage control. The Contractor shall design building envelope assemblies that separate

spaces that require differing environmental conditions by controlling the flow of air, moisture, and energy.

The Contractor in its design of the materials used in the building envelope shall utilize materials suitable for the environmental conditions to which each will be exposed. Refer to Minimum Material Requirements. The Detailed Designs for the materials used in the building envelope shall provide a service life consistent with accessibility for maintenance of building components and planned life of the Modular Classrooms. Refer to Minimum Material Requirements.

In its Detailed Designs for the building envelope the Contractor shall utilize rain screen principles to ensure that natural elements of water, snow, and ice shed safely from exterior surfaces and are not trapped in the assembly causing deterioration or staining of finishes and provide an effective air barrier to function as a vapour barrier. The Contractor shall design the air barrier such that it is continuous at all transitions between different construction assemblies of each Modular Classroom unit (floor to wall, roof to wall, window to wall, door to wall, door opening to door opening). In its Detailed Designs for the building envelope the Contractor shall incorporate air tightness of the air barrier such that leakage of the overall air barrier system does not exceed the values set out in the *Alberta Building Code 2006*, Table A-5.4.1.2, Recommended Maximum Air Leakage Rates, when the building envelope is subjected to a differential pressure of 75 Pa when pressurized by a blower door, as demonstrated by blower door test conducted in accordance with ANSI/ASTM-779-99.

In its Detailed Designs for the building envelope the Contractor shall provide a means of maintaining the continuity of the air barrier between adjoining Modular Classrooms at door openings or at corridors, between Modular Classrooms and other construction (corridor or Core Structure) at the openings. The plane of the air seal must be accessible. The Detailed Designs must ensure that the air sealing component's adhesive and structural capacity is not exceeded due to movement of the structural elements. Movement could be caused by structural or wind loading, hygro-thermal (moisture transfer) movement, and movement due to transportation.

In its Detailed Designs for the building envelope the Contractor must prevent condensation from forming on or within the construction assemblies, at transitions between different construction assemblies (floor to wall, roof to wall, window to wall), and at door connections between two adjoining Modular Classrooms or a Modular Classroom and other construction (corridor or Core Structure). In its Detailed Designs for the building envelope the Contractor provide thermal resistance ratings to levels based on life cycle costing for walls, roofs, and floor assemblies. Effective RSI values to be determined as per the methods set out in Appendix C of the *Model National Energy Code of Canada for Buildings 1997*.

4.10.3.4.2 Roofs

The Contractor shall design the roof of the Modular Classrooms to have a minimum slope to drain of 1:50 for field of roof. The slope shall be provided in the design of the Modular Classrooms. Use of sloped insulation shall be kept to a minimum. The Contractor shall design a fully adhered roofing system with proven performance in Alberta climates. The Contractor shall design the roof drainage system to prevent water from draining over the wall cladding system. The Contractor shall consider a design which will minimize damage to roof due to freezing of standing water or from vandalism. In its Detailed Designs the Contractor include an engineer designed and approved personnel fall restraint system at the roof level. The Contractor shall design the minimum thermal resistance for the roof assembly, including thermal bridging, to be RSI 4.4 $W/m^2*°C$ or better.

4.10.3.4.3 Walls

The Contractor shall design the cladding system to resist impact loads and to reduce the effects of vandalism. The Contractor shall design the cladding system to be easily painted to allow matching of colours to other sections of the Core Structure at the School Site. The Contractor shall design the cladding support system to accommodate, at a minimum, both a cement board cladding application and a metal siding application. The Contractor shall design minimum overall thermal resistance of the walls, including thermal bridging, to be RSI 2.6 $W/m^2*°C$ or better.

4.10.3.4.4 Floor Structure

The Contractor shall design the minimum thermal resistance for the floor assembly, including thermal bridging, to be RSI 3.5 $W/m^2*°C$ or better.

4.10.3.4.5 Windows

The Contractor shall design the window assemblies to prevent condensation from forming on the glass surface or on frames with the interior conditions as required and a 2.5% January design temperature. The Contractor shall design the window assemblies as pressure equalized, rain screen systems that drain to the exterior. The Detailed Designs shall have the main mass of the frame to the interior of the thermal break. The Contractor shall design window assembly installations to have an air seal tie-in to the wall air barrier. The Contractor shall design the anchorage for the windows so that it does not interfere with the tie-in of the air seal. The Contractor shall design window or window-wall assemblies to accept security screens. The Detailed Designs shall utilize overall window assemblies that have minimum thermal resistance of RSI 0.45 $W/m^2*°C$ or better. Skylights or other forms of sloped glazing are not allowed, but alternate combinations of end-wall windows and overhead glazing such as light pipes or vertically-

glazed clerestories will be considered.

4.10.3.5 Indoor Air Quality

4.10.3.5.1 General

The Contractor shall design the Modular Classrooms for elimination and control of materials that have the potential to off-gas and control of potential pollutants, together with careful natural and mechanical ventilation system design.

4.10.3.5.2 Ventilation Air

The Detailed Designs for ventilation air for the Modular Classrooms shall meet the following requirements for achieving LEED™ Silver Certification:

(a) Indoor Environmental Quality Prerequisite 1, Minimum IAQ Performance, for each classroom; and,

(b) Indoor Environmental Quality Prerequisite 2, Environmental Tobacco Smoke (ETS) Control: prohibit smoking in the Modular Classrooms while they are under construction in the factory.

The Contractor shall design the ventilation system for a maximum of 30 students per classroom. For HVAC systems employing outside air economizers, the Contractor shall ensure that the minimum outside air flow rate to every occupied space in the Modular Classrooms shall meet the requirements of the most current ASHRAE Standard 62. Regardless of the proposed heating and ventilation system, the Contractor shall include equipment to allow full outside air economizer cycle for “free cooling” when outside air temperatures permit. The Contractor shall design to provide heat recovery on exhaust air.

4.10.3.5.3 Control of Off-Gassing

The Contractor shall in its Detailed Designs incorporate materials that are LEED™ Silver Certification compatible. The elimination of materials that may off-gas or contain potential environmental pollutants is required. If the use of materials that may off-gas or contain potential environmental pollutants is required, then the use of such materials should be minimized. Meeting the LEED™ criteria together with a carefully designed natural and mechanical ventilation system by the Contractor will provide an acceptable Detailed Design.

4.10.3.5.4 Indoor Chemical and Pollutant Source Control

The Contractor in its Detailed Design shall minimize exposure of the School Building occupants to potentially hazardous particulates and chemical pollutants.

4.10.3.6 Visual Comfort

4.10.3.6.1 General

The Contractor shall design the Modular Classrooms to deliver a high performance visual environment. While specific requirements are detailed later in this section, the Contractor shall employ the following general strategies for achieving visual comfort:

(a) Integrating natural and electric lighting with appropriate design and control;

(b) Balancing quantity and quality of light by avoiding excessively high light levels and by designing appropriate strategies for individual rooms or room use areas; and

(c) Controlling or eliminating glare.

4.10.3.6.2 Daylighting & Views

Daylighting is the controlled admission of natural light into a space. The Contractor shall implement in its Detailed Designs daylighting that reduces energy usage for electric lighting and provides occupants a connection between indoor spaces and the outdoors. The Contractor shall design for diffuse, uniform daylight throughout the classroom. The Contractor shall consider bringing in light from overhead through the use of light pipes or vertical clerestory glazing. The Contractor shall design to avoid direct beam sunlight and avoid glare by considering control and filtering design strategies such as interior shades, louvers, or blinds and exterior overhangs and/or light shelves.

4.10.3.7 Lighting

4.10.3.7.1 Electric Lighting - Interior

The Contractor shall design the lighting systems to meet the latest Illuminating Engineering Society of North America (IESNA) recommended practices for school lighting. Specifically, refer to IES RP3 – Guide for Educational Facilities Lighting. The Contractor shall design to provide a maintained lighting illuminance range of 380 - 450 lux average at a work plane height of 760 mm, while ensuring average maintained illuminance does not exceed 450 lux. The Contractor shall design illuminance ratios (maximum: minimum) not to exceed 3:1.

The Detailed Designs shall include recessed light fixtures or direct/indirect luminaires, where ceiling heights permit, with electronic ballasts and T8 or T5 lamps with a minimum Colour Rendering Index of 80, Correlated Colour Temperature of 3500K. The

Contractor shall design the lighting system so that installed power density for lighting is less than 10 watts/m^2.

4.10.3.7.2 Electric Lighting - Lighting Controls

The Contractor shall design the Modular Classrooms so that classroom lighting shall be controlled in a minimum of two segments, one near the whiteboard and one for the remainder of the room to facilitate overhead presentations. The Contractor shall design the classroom lighting controls employing low voltage relays, either connectable to the Core Structure's low voltage lighting control system (where applicable) or be controlled by occupancy sensor connected to and programmed by the BMCS.

4.10.3.7.3 Exit Lighting and Signage

In its Detailed Designs the Contractor shall include exit lighting and signage to meet *Alberta Building Code 2006* requirements. The Detailed Designs for exit signs shall use LED lamps and be supplied with backup power.

4.10.3.8 Electrical Other

4.10.3.8.1 Power / Communication Conduit or Wall Channel Space

The Contractor shall design a vertical raceway from floor to ceiling space in external walls every 1220mm O.C., with minimum cross section of 75 mm X 150 mm, to run convenience power or communications wiring from plenum space to receptacles.

4.10.3.8.2 Power Service

The Contractor shall design a distribution panel for each classroom with sufficient capacity to handle all lighting, convenience power and mechanical loads with ten percent (10%) spare capacity. The panel is to be located in the Modular Classroom mechanical room. The Contractor shall design appropriate service conductors to the Modular Classroom connection point in the corridor ceiling chase area.

4.10.3.8.3 Convenience Power

In its Detailed Designs the Contractor shall ensure that single circuit receptacles are provided at the TV and video projection locations. The designs shall include ten receptacles, on five circuits, for computer workstations, maximum two workstations per circuit. In its Detailed Designs the Contractor shall include ten general convenience receptacles, minimum of two on each wall, maximum two circuits.

4.10.3.8.4 Communications

The Contractor shall design a combination voice and data outlet at the teacher's desk. The Contractor shall ensure that the provision of data outlets shall be made to each computer workstation. The Contractor shall design an overhead-paging outlet in each classroom and corridor. The Contractor shall design an outlet for an intercom station in each classroom. The Contractor shall design one outlet at the teacher's desk and one at the video projector connected by conduit. The Contractor shall design a junction box to connect the communication outlets in the classroom and corridors with an empty conduit for connection to the Core Structure. The Contractor shall design so as to ensure that all of the above will be supplied with a conduit in the wall stubbed to ceiling space.

4.10.3.8.5 Fire Alarm

The Contractor shall design fire alarm devices compatible with the Core Structure fire alarm system. Contractor shall design fire alarm devices that allow for both audible and visual signals.

4.10.3.9 Thermal Comfort

4.10.3.9.1 General

The Contractor shall design the Modular Classrooms for thermal comfort that enhances student attention spans, productivity and energy conservation. Refer to Appendix G for additional requirements.

4.10.3.9.2 Design Capacity

In its Detailed Designs of the Modular Classrooms the Contractor shall include the design capacity to maintain the following conditions in the space, based on the worst case winter design conditions in the *Alberta Building Code 2006*, and provide capacity in the system to restore the classroom from the setback temperature prior to the occupied hour start time.

(a) Heating:

- Occupied Hours: 22°C, with humidity at a minimum of 15% RH during heating mode;
- Unoccupied Hours: 18°C during heating mode;

(b) Cooling:

- Mechanical cooling for the Modular Classrooms will not be provided. The Detailed Designs shall allow free air cooling as outdoor temperatures permit.

4.10.3.9.3 Thermal Environmental Conditions During Occupied Hours

The Contractor shall design the Modular Classrooms so as to ensure that the design condition temperatures are not exceeded:

(a) The temperature fluctuation shall not exceed ±1°C from setpoint during the heating mode;

(b) The horizontal temperature gradient between 300 mm and 3000 mm from the exterior wall, at desk height shall not exceed 2°C;

(c) The vertical temperature gradient between 200 mm and 1700 mm above the floor at any point more than 300 mm from the exterior wall shall not exceed 2°C;

(d) The air velocity shall not exceed 0.15 m/s (30 ft./min.); and

(e) The air circulation rate shall not be less than ASHRAE Standards.

4.10.3.10 HVAC / Mechanical / Controls

4.10.3.10.1 General

The Contractor shall ensure that the HVAC design responds to the loads imposed by building envelope, internal loads and ventilation loads in an integrated fashion to achieve good thermal comfort, superior indoor air quality and to avoid excessive energy use.

The Contractor shall design high performance controls to fully realize the thermal comfort, indoor air quality and reduced operating cost objectives in a high performance Modular Classroom.

While specific design criteria are detailed later in this section, the Contractor shall incorporate the following general strategies for achieving high performance HVAC:

(a) Using high efficiency equipment, particularly equipment with high efficiency at part load;

(b) Appropriate sizing, avoiding oversizing; and

(c) Controls that respond to load and condition changes and that are easy to re-program when operational and functional needs change.

4.10.3.10.2 Heating Ventilation and Air

For each Modular Classroom, the Contractor shall design for a dedicated HVAC unit that shall be located indoors, factory assembled and packaged as a complete unit; and accessible for ease of maintenance.

For the furnace that is supplied, the Contractor shall design controls to include all hardwired safeties, bonnet temperature activated fan switch and heating/cooling fan speed interlocks.

4.10.3.10.3 Mechanical – Water and Plumbing

For each Modular Classroom, the Contractor shall design for the following elements of a simple domestic water system to enable installation of a sink as indicated in the Modified School Designs or at the discretion of the Province, and to allow the potential to use condensing furnaces:

(a) 12 mm domestic hot and cold water lines running from the Core Structure and run in a heated space within the Modular Classroom;

(b) A grey water sump of sufficient capacity, 40 litres minimum;

(c) Stubbed in drain lines plumbed to the grey water sump to allow for potential mechanical furnace condensate line and future sink; and

(d) A sump drain pump, with integral level control, and discharge line, run in a heated space within the Modular Classroom, and able to be connected to Core Structure sewage system.

4.10.3.10.4 Control System

The Contractor shall design an electronic control panel or Remote Control Unit (RCU) to control HVAC unit occupied/unoccupied run times, room temperatures, ventilation quantities and heat recovery performance and to perform data logging and remote access. The Contractor shall design control system hardware that shall be BACNet compliant and shall be connected to and programmed by the BMCS. The Contractor shall design

sensors, devices, controllers, school interface terminal strip, programming and documentation manuals as required to meet the Alberta Infrastructure and Transportation's *Guideline for Relocatable Classroom Controls, 2007* attached in Appendix "G".

4.10.3.11 Durability

4.10.3.11.1 General

The Contractor shall design the Modular Classrooms to have a design service life of 50 years, in the Long category of Table 2, Design Service Life, of CSA Standard S478-95 (R2001).

4.10.3.12 LEED™ Criteria and Certification Requirements for Modular Classrooms

4.10.3.12.1 LEED™ General

The Modular Classrooms are subject to the Province's Green Building Policy. In all cases, the credits for the Modular Classrooms that are to be pursued must be consistent with those being pursued for the Core Structure. Each School, including the Modular Classrooms required in order to achieve School Availability, as a whole will be evaluated for LEED™ Silver Certification..

4.10.3.13 Acceptance Testing of Modular Classrooms

The Contractor shall build one complete Modular Classroom in the factory to function as a prototype unit that will be used to test and verify the performance of the Modular Classrooms and which will be close enough to the final design in function that it will be installed at a School once prototype testing is complete.

The Contractor shall carry out the necessary modifications to the prototype unit to ensure compliance with the LEED™ Silver Certification requirements, this Section 4.10, and other Technical Requirements set out in Schedule 18 generally, and with the results of the following tests specifically, before proceeding with the manufacture of any other Modular Classrooms.

The Contractor shall carry out blower-door test of air tightness of building envelope of completed prototype unit and submit results to the Province. The Contractor shall make provision for the witnessing of this test by the Province.

The Contractor shall make provision for the Province staff to visit factory while the Contractor performs tests of acoustic performance of the prototype unit: reverberation, sound isolation, impact isolation and background noise.

The Contractor shall modify the prototype unit in order to apply the performance of the prototype unit to subsequent production Modular Classrooms, and deliver the prototype unit as part of the total number of Modular Classrooms required under the DBFM Agreement.

4.10.3.14 Modular Classroom Record Documents

The Contractor shall provide, with each Modular Classroom leaving the factory (three hard copies and one electronic copy), the following documents:

(a) Fabrication drawings stamped and signed by the architect or engineer of record;

(b) Inspection reports to demonstrate compliance monitoring services have been provided as required by the *Safety Codes Act*;

(c) Appropriate letters of compliance and regulatory schedules from the manufacturer and registered architect or engineer of record;

(d) HVAC commissioning report and air balance report;

(e) Manufacturers' brochures and specifications on all Building Equipment provided in each Modular Classroom;

(f) Installation manual that details the steps required to place, level and carry out final assembly of the Modular Classrooms at the School Sites.

(g) Signed letter templates and supporting documentation for the mandatory credits detailed in the LEED™ Criteria and LEED™ optional credits that the Contractor is pursuing.

(h) Supporting documentation for Letter Templates, as detailed in the Submittals and Audit sections of LEED™ Canada NC 1.0 Reference Guide.

4.11 CONSTRUCTION OF SCHOOLS

4.11.1. General Construction Requirements

The Contractor is responsible for the supply of all management, professional and technical services, supervision services, construction quality control and quality assurance services, labour, materials and equipment for performing all of the duties and obligations for carrying out the Project.

The Contractor shall ensure that the construction of the Schools conforms to the Project Requirements and the Detailed Designs.

All construction is to reflect a high degree of workmanship and all materials incorporated into the Schools shall be new and free of defects.

Changes to the Detailed Designs prior to School Availability shall be submitted for review by the Province as required under Schedule 5 (Design and Plan Certification Process and Review Procedure) and Section 3.2. Any changes to the Project Requirements set out in Section 4 will be subject to the Change Order requirements set out in Schedule 1 (Change Orders) of the DBFM Agreement.

The Contractor shall supervise and direct the Project competently and efficiently, devoting such attention thereto and applying such skills and expertise as may be necessary to carry out the Project in accordance with the DBFM Agreement. The Contractor shall be solely responsible for:

(a) The means, methods, techniques, sequences and procedures of the Project and for coordinating all Project activities; and

(b) The design, erection, operation, maintenance and removal of temporary structural and other temporary facilities and the design and execution of construction methods required in their use.

The Contractor shall employ a competent superintendent and necessary and qualified support staff who shall be in attendance at each School Site while the Project is progressing.

4.11.2 Electrical and Mechanical

During the installation of the electrical and mechanical systems at a School, the Contractor shall comply with the basic electrical requirements and the basic mechanical requirements set out in Appendix "F".

4.11.3 Representatives

Further to the requirements of section 20.1 of the DBFM Agreement, the Contractor shall appoint a representative for each School ("**Contractor Construction Representatives**"), and shall notify the Province of such appointment not less than 10 Business Days before any construction work is commenced at a School Site. The Contractor Construction Representatives shall be the persons responsible for all communications with the Province regarding the construction of the Schools. The Province shall appoint one or more persons to serve as project representatives in connection with the oversight of the Contractor's construction activities at the School Sites ("**Provincial Construction Representatives**"), and shall notify the Contractor of such appointments within 10 Business Days of receipt of the Contractor's notice of appointment. The Provincial Construction Representatives shall be the persons responsible for all communications

with the Contractor Construction Representatives regarding the construction of the Schools. The Contractor Construction Representatives and the Provincial Construction Representatives may appoint alternatives to serve in addition to, or temporarily in their place, or may delegate some of the functions of such representatives.

The Contractor shall not rely upon any acts, omissions, requirements or directions of the Provincial Construction Representatives or any other person whatsoever as authority for any departure from the terms of the DBFM Agreement.

4.11.4 Construction Completion Work

4.11.4.1 Before Occupancy

Once School Availability has been achieved but before occupancy of a School by students, the Contractor shall coordinate its work required to achieve Construction Completion with the work of the School Board so as to allow the School Board to complete fitting of School Board Supplied Furniture and Equipment prior to occupancy of each School by the students. The Contractor must cooperate with the School Boards, coordinate its work with that of the School Board and do all things necessary, including stopping its Construction Completion work, to ensure that the School Boards' work is not delayed or interfered with.

4.11.4.2 After Occupancy

Once the School is occupied by staff and students, the Contractor's right to access a School and a School Site to carry out Construction Completion work will be subject to the consent of the School Representative, acting reasonably, taking into account the following considerations:

(a) The Contractor may carry out Construction Completion work during the School Day in unoccupied areas of a School, provided that the nature of the work does not interfere with the health or safety of the staff or students, and does not create undue noise or interference with the Educational Activities being carried out in that School; and

(b) The Contractor may carry out Construction Completion work Outside the School Day in unoccupied areas of a School or After Hours, provided that the nature of the work does not interfere with the health or safety of the users of that School.

The Contractor and its subcontractors must strictly comply with all access and security protocols set out in Section 5.4 and with Schedule 16 (Safety Requirements).

4.11.5 Construction Meetings

The Contractor Construction Representatives shall schedule and coordinate the following meetings with the Provincial Construction Representatives for each School and for the entire Project, if required:

(a) Monthly LEED™ Program Meetings;

(b) Bi-weekly Construction Progress Meetings; and

(c) Weekly Commissioning and Start-Up Progress Meetings.

The purpose of these meetings is to review personnel assignments, responsibilities, administrative and procedural requirements and to obtain updates on LEED™ Silver Certification, construction and commissioning progress at each School. The Contractor Construction Representatives shall also coordinate location, attendees and agenda with the Provincial Construction Representatives.

4.11.6 Construction Schedules and Submittals

The Contractor shall provide to the Province the following schedules and updates for each School:

(a) Construction Progress Schedule

By the 25th day of each month the Contractor shall provide a design and construction progress schedule for the next month for each School.

(b) Monthly Construction Progress Report

By the 25th day of each month the Contractor shall provide a written construction progress report for the previous month for each School Site.

(c) Submittals Schedule

Prepare and update monthly by the 15th day of each month a schedule of shop drawings which are to be submitted in the next month by the Contractor for each School.

(d) Modular Classroom Delivery Schedule

Prepare and update monthly by the 20th day of each month a Modular Classroom delivery schedule for each School.

(e) Building Equipment Delivery and Installation Schedule

Prepare and update monthly by the 15th day of each month, a Building Equipment delivery and installation schedule for each School. Include a tabulated summary of all major Building Equipment required to be installed at each School.

(f) Commissioning and Startup Schedule

Prepare and update periodically, a schedule outlining the commissioning and startup activities for each School.

4.11.6.1 Payment Adjustments

If the Contractor fails to deliver to the Province any of the schedules indicated in this Section 4.11.6 within the time specified, a Payment Adjustment of $1,500 per day or partial day will be assessed for each undelivered schedule until such schedule is delivered to the Province.

4.11.7 Applicable Laws, Standards and Guidelines and Authorizations

Subject to the last paragraph of Section 4.7 of the DBFM Agreement, in all aspects of the Project, the Contractor shall comply with all applicable laws, Authorizations, Standards and Guidelines, Good Industry Practice and manufacturers' guidelines and requirements for installation.

4.11.8 Temporary Facilities and Controls

4.11.8.1 Temporary Facilities and Barriers

The Contractor shall be responsible for design and safety of all temporary facilities used by the Contractor to complete the Project. Temporary facilities of such nature that engineering proficiency is required for their design to ensure safety during construction shall be designed by a professional engineer retained by or in the employ of the Contractor. Before the temporary structure is used, the person responsible for the design or his representative shall inspect the structure and issue a certificate stating that it has been constructed according to design.

The Contractor shall also supply, erect and maintain all temporary construction barricades, sidewalk sheds, catch platforms, and accessories as required by the relevant City or other applicable laws.

4.11.8.2 Temporary Utilities for Construction

The Contractor shall, at its own cost, provide and maintain all temporary utilities required during construction including sanitary facilities, water supply, temporary light and power,

temporary heating, telephone, temporary sewers, dewatering until each School has achieved School Availability.

4.11.9 Site Requirements

4.11.9.1 General

Certain of the Exterior Improvements will be constructed on the City Lands within the School Site as shown in Schedule 12 (School Sites) and the Site Layouts. This Section 4.11.9 shall apply to all lands within the School Site.

4.11.9.2 City and Utility Interfacing

The Contractor shall coordinate and interface its construction activities with infrastructure owned and operated by the relevant City and the applicable utility. The Contractor must understand all requirements of the relevant City and utility.

In constructing the Exterior Improvements for the Schools on the City Lands, the Contractor shall be responsible, at its own cost, for:

(a) any modification, relocation and re-connection of all the utility services, including water, sanitary sewer, storm sewer, natural gas, electrical power;

(b) any modifications or relocations of existing street lighting, communication lines, city transportation bus stops and fire hydrants; and

(c) repairs or replacement of existing roads, curbs, gutters, sidewalks and portions thereof,

that is required to accommodate the new access points to the School Sites.

The Contractor shall also be responsible for making good all damage caused to existing roads, curbs, gutters and sideways arising as a result of the Contractor carrying out the Project at the School Site.

Where the Contractor fails to make good any damage it causes to existing roads, curbs, gutters and sidewalks, the Province may elect to make the repairs it deems necessary and the Contractor shall be responsible for the Province's actual cost in making the repairs, plus an administration fee of 25% as liquidated damages. These costs shall be deducted from Payments made to the Contractor.

4.11.9.3 Construction Equipment and Machinery

The Contractor shall confine construction machinery and equipment, the storage of products, and the operations of workers to the School Site identified in the Site Layouts and shall not unreasonably clutter the School Sites with materials, construction machinery and equipment.

4.11.9.4 Protection of the Public and Fire Safety

The Contractor shall ensure that at all times prior to School Availability each School Site shall comply with requirements of the *Alberta Building Code 2006*, Part 8.

4.11.9.5 Access to the School Sites

The Contractor shall only enter the School Sites through collector roadways and not local residential roadways or fields, unless otherwise approved by the relevant City. In addition, the Contractor shall comply with any access requirements set out by the Development Permit for each School Site and all relevant municipal bylaws and regulations. If the Contractor fails to comply with this requirement, it shall immediately repair at its own cost all damage caused to any streets, sidewalks, or lands adjacent to the School Sites by the unauthorized access to the School Sites. Where the Contractor fails to immediately commence and diligently complete the repair of any damage it causes to streets, sidewalks or lands adjacent to the School Sites, the Province may elect to make the repairs it deems necessary and the Contractor shall be responsible for the Province's actual cost in making the repairs, plus an administration fee of 25% as liquidated damages. These costs shall be deducted from Payments made to the Contractor.

4.11.9.6 Site Cleanliness

At all times prior to School Availability, the Contractor shall keep the School Sites free from accumulations of waste materials or rubbish.

Prior to School Availability, the Contractor shall remove from the School Sites all temporary facilities, along with all construction tools, surplus material, equipment, mock-ups and similar items and shall complete a final cleaning of the Schools and the School Sites.

4.11.9.7 Waste Disposal Requirements

The Contractor shall comply with all applicable laws and requirements pertaining to the recycling and disposal of waste materials and Hazardous Substances which the Contractor or its subcontractors are responsible for or those materials and Hazardous Substances which the Contractor or its subcontractors have brought onto the School Sites.

All such items must be regularly removed prior to School Availability and finally removed from a School Site as a condition to achieving School Availability.

4.11.9.8 Cleaning Sidewalks

City Bylaws require, in part, that all snow, ice, dirt, debris or other obstruction, formed or deposited on any public sidewalk adjoining a property shall be cleared away and removed by owner/occupant within the prescribed time when such snow, ice, dirt or other obstruction was formed or deposited thereon. For purposes of this requirement, Contractor shall be deemed to be owner/occupant of a School Site prior to School Availability, and shall be responsible for cleaning all sidewalks as stipulated above.

4.11.9.9 Cleaning Streets

The Contractor shall ensure that all dirt, debris or other obstructions, formed or deposited on any public street adjoining a School Site shall be cleared away and removed in accordance with City requirements.

4.11.9.10 Construction Signage

The Contractor shall include temporary on-site warning, traffic directing, and other information signs as required by applicable laws.

4.11.9.11 Fencing and Security

To ensure public safety, at all times prior to School Availability for a School, the Contractor shall fence off the construction area for each School Site and shall ensure that appropriate security is in place.

4.11.9.12 Notice of Failure to Perform

The Province will provide written notice if the Contractor has defaulted in the performance of any of its obligations as required in this Section 4.11.9. The Contractor shall rectify all such defaults within two days from receipt of such notice.

4.11.9.13 Payment Adjustments

If the Contractor has failed to rectify any default of its obligations under this Section 4.11.9 within the time specified in Section 4.11.9.12, then in addition to any other remedies the Province may have under Section 4.11.9, Payment Adjustments of $1,500 per day or partial day will be assessed for each default identified in the notice provided under Section 4.11.9.12 until such defaults have been rectified.

4.11.10 Utility Service Connections

In this Section 4.11.10, "Utility" means a public or private utility company. The Contractor shall be responsible for applying, paying, processing and connection of School Site service lines to Utility's lines and sources located in the street or boulevard adjacent to the School Site, regardless of whether the required work is performed by Contractor's own forces, subcontractors or by a Utility. The Contractor shall coordinate all service connections work and shall make all necessary arrangements with, comply with requirements of, and cooperate fully with each Utility and the relevant City.

Where the Contractor is not responsible for provision of the utility service (i.e. Supernet, cable television and telephone), the Contractor is required to provide and install suitably sized conduit from the School Building to the existing Utility service line. If the Utility service (i.e. cable) is not yet installed in the streets or boulevards adjacent to the School Site boundaries (excluding the East Rutherford Site) the conduits must be stubbed off at the School Site boundary.

Upon the required roads and Utility services for the East Rutherford Site being installed the Contractor will be responsible for all connections of site services at this School Site in accordance with the first paragraph of this Section 4.11.10.

Upon School Availability being achieved, the Contractor shall ensure all accounts are in good standing and shall arrange for the transfer of the Utility service and account to the relevant School Board.

4.11.11 Project Records

4.11.11.1 Project Record Documents

Prior to School Availability for each School, the following documents are to be designated and retained for the Province as project record documents for each School:

(a) Three hard copies and one electronic copy of all the design documentation described in Section 4.7;

(b) Three hard copies and one electronic copy (CAD and PDF) sets of “As built” drawings of a School and each Building System.

(c) Three hard copies and one electronic copy of the documents required under Section 4.10.3.14 (Modular Classroom Record Documents).

4.11.11.2 Operation and Maintenance Data and Manuals

Prior to School Availability for each School, the Contractor shall submit three hard copies and one electronic copy of completed, Contractor prepared, operation and maintenance data manuals for all Building Equipment, Building Systems, materials and finishes of each School ("**Operation and Maintenance Manuals**").

Except for the Modular Classroom record documents stipulated in Section 4.10.3.14 and the electrical and mechanical Operation and Maintenance Manuals, the Operation and Maintenance Manuals for all Building Equipment shall include but not be limited to:

(a) Installation instructions, including manufacturers' printed instructions;

(b) Operating instructions, including manufacturers' printed instructions;

(c) Building Equipment identification: name plate information for each piece of Building Equipment;

(d) Maintenance instructions, including manufacturers' printed instructions;

(e) Manufacturers' recommended spare parts for the Building Equipment;

(f) Suppliers and subcontractors list with their contacts;

(g) Tag directory identifying tag number and Building Equipment description and location;

(h) Shop drawings list;

(i) Final reviewed shop drawings;

(j) Manufacturers' product data for Building Equipment, systems, materials and finishes; and

(k) Certifications and inspection reports prepared by any Governmental Authority and testing agency.

The electrical and mechanical systems Operation and Maintenance Manuals shall meet the requirements set out in Appendix "I".

4.12 COMMISSIONING AND STARTUP

The Contractor shall commission and startup all Building Equipment and Building Systems for each School in accordance with its QMS and Commissioning and Startup Plan set out in Schedule 4 (Contractor's Management Systems and Plans).

The commissioning and startup work, shall include, but not be limited to the following:

(a) Testing: Perform tests to confirm compliance with the Technical Requirements and take corrective action as necessary.

(b) Adjusting: Perform adjustments to ensure proper, efficient and safe operation in accordance with the Technical Requirements.

(c) Balancing: Perform balancing to ensure that the various parts of a Building System are in a proper state of equilibrium.

If required by applicable laws boilers installed in a School must comply with and be inspected by the Alberta Boiler Safety Association. The Contractor must have a QMS program for such Building Equipment registered and acceptable to the Alberta Boiler Safety Association;

All other Building Systems and Building Equipment, if required by applicable laws, shall be inspected and certified by the appropriate Governmental Authority, with the inspection certificates provided to the Province;

The Contractor shall give the Province not less than five days notice of the commencement of its commissioning and startup activities for a School, and shall further provide the Province with not less than five days notice of any testing, retesting and startup procedure to allow the Province the opportunity to witness such tests or procedures.

The Contractor shall also provide to the Province, prior to School Availability:

(d) copies of all tests results and reports derived from the commissioning and startup procedures and copies of test certificates;

(e) all Operation and Maintenance Manuals required under Section 4.11.11.2; and

(f) all required Authorizations, including but not limited to an occupancy permit, for each School.

4.13 ORIENTATION SEMINARS

Within 60 days of achieving School Availability, the Contractor shall conduct for the Province and the appropriate School Board staff an orientation seminar to explain the School, the Building Equipment, and all Building Systems and to generally instruct the Province and School Board staff with respect to the operation of a School, its Building Equipment and the Building Systems.

The Contractor shall provide the Province with not less than 21 days notice of the date or dates for the applicable orientation seminars.

SECTION 5 - MAINTENANCE AND RENEWAL REQUIREMENTS FOR SCHOOLS

5. MAINTENANCE AND RENEWAL REQUIREMENTS FOR SCHOOLS

This Section 5 sets out the M&R Requirements applicable to the Schools.

5.1 RESPONSIBILITY FOR M&R

5.1.1 General

The Contractor is responsible for the supply of all management, supervision, professional and technical services, quality control and assurance, labour, materials and equipment for performing all of the duties and obligations necessary to perform the M&R during the School M&R Period and the M&R Period.

The performance requirements set out in the Technical Requirements represent the expected quality of the Schools that the Contractor shall maintain during the School M&R Period and the M&R Period. The Contractor shall carry out the program of planned routine maintenance and preventative maintenance specified in the Maintenance Plan to ensure the Schools meet the performance requirements set out in the Technical Requirements during the School M&R Period and the M&R Period. The Contractor shall monitor and assess the condition of the Schools and ensure compliance with the performance requirements throughout the School M&R Period and the M&R Period. In addition to planned routine and preventative maintenance, the Contractor shall provide demand maintenance and repair of the Schools, as contemplated in Section 5.12, to respond to requests for repairs or maintenance required at the Schools.

Where performance standards are not specified in the M&R Requirements, the Contractor is expected to perform the M&R in accordance with Good Industry Practice, all applicable laws and the relevant Standards and Guidelines.

All M&R together with any monitoring, inspecting and certifying shall be carried out in accordance with these M&R Requirements, all applicable laws, Authorizations and relevant Standards and Guidelines.

5.1.2 Materials and Workmanship

The Contractor shall ensure that all materials, and all repairs, replacements and renewals carried out by the Contractor as part of its M&R obligations under this Section 5 shall, unless otherwise specified herein, be of the same quality as the standards and criteria set out in the Technical Requirements and the Detailed Designs, taking into account advancements in materials development and Good Industry Practice at the time of replacement or renewal. Where parts, systems or components need to be replaced, they shall be replaced with new parts, systems or components. No used or reconditioned parts, systems or components shall be used without the prior written consent of the Province.

5.1.3 M&R Waste Disposal Requirements

At all times during the School M&R Period and the M&R Period, the Contractor shall keep each School free from accumulations of those waste materials or rubbish related to the Contractor's performance of the M&R.

The Contractor shall comply with all applicable laws and requirements pertaining to the recycling and disposal of waste materials and Hazardous Substances which the Contractor or its subcontractors are responsible for or those materials and Hazardous Substances which the Contractor or its subcontractors have brought into the School for the purposes of carrying out the M&R. All such items must be regularly removed from a School during the School M&R Period and the M&R Period.

5.1.3.1 Notice of Failure to Perform

The Province will provide written notice if the Contractor has defaulted in the performance of any of its obligations as required in this Section 5.1.3. The Contractor shall rectify all such defaults within one Business Day from receipt of such notice.

5.1.3.2 Payment Adjustments

If the Contractor has failed to rectify any default of its obligations under this Section 5.1.3 within the time specified in Section 5.1.3.1, then Payment Adjustments of $300 per day or partial day will be assessed for each default identified in the notice provided under Section 5.1.3.1 until such defaults have been rectified.

5.1.4 "As-built" Drawings and Operation and Maintenance Manuals

All "as-built" drawings and Operation and Maintenance Manuals shall be updated, as required, to reflect the M&R activities of the Contractor and any Modification that change the physical dimensions or characteristics of the Schools, or change the Building Systems or Building Equipment in the Schools. The maximum time for completion and providing such updated "as-built" drawings and updated Operation and Maintenance Manuals to the Province shall be two months after completion of the repair, M&R activity or Modification.

5.1.4.1 Payment Adjustments

If the updated "as-built" drawings and updated Operation and Maintenance Manuals are not provided to the Province within the time stipulated, a Payment Adjustment of $2,000 per month or any partial month for each revised set of "as-built" drawings or set of revised Operation and Maintenance Manuals will be assessed until the revised set of "as-built" drawings or the revised set of Operation and Maintenance Manuals are delivered to the Province.

5.1.5 Provincial Responsibilities for School Operations

Excluded from the Contractor's M&R obligations are the Province's responsibilities to provide custodial services, boiler monitoring, maintenance, repair and renewal of the School Board Supplied Furniture and Equipment and the ICT wiring, equipment and systems, and to provide occupant support services. The specific obligations of the Province in connection with each or these items are as follows:

5.1.5.1 Custodial Services and Boiler Monitoring

The Province shall ensure that custodial services, including providing qualified staff to carry out these services, for the Schools as listed in Appendix "J" to this Schedule 18 are performed. The Province shall ensure that the custodial services and boiler monitoring will be performed at the minimum frequencies set out in Appendix "J". The Province shall ensure that only "green" products on the recommended list of cleaning and maintenance products for the Building Equipment, Building Elements, Building Systems or Exterior Improvements are used in the provision of the custodial services at the Schools.

The Contractor shall ensure that it is familiar with the scope of the custodial services to be performed by the School Boards when carrying out the M&R required under this Section 5.

5.1.5.2 School Board Supplied Furniture and Equipment Maintenance and Renewal

The Province shall be responsible for the maintenance, repair and renewal of all School Board Supplied Furniture and Equipment. The Contractor is responsible for the maintenance and renewal of all millwork, and furniture and Building Equipment and Building Systems supplied and installed by the Contractor as detailed in Section 4. For clarity, the Contractor will be responsible for the maintenance and renewal of the fire alarm system, security system and the BMCS.

5.1.5.3 ICT Wiring and Cabling Maintenance and Renewal

The Province shall be responsible for the maintenance, repair and renewal of all ICT wiring and cabling. The ICT wiring and cabling for which the Province is responsible includes, but is not limited to, voice, data and cable television wiring.

5.1.5.4 Occupant Support

The Province shall arrange for providing all occupant support services that are necessary and incidental to the Educational Activities carried out at the Schools. Occupant support services include, but are not limited to, arranging for seating, bleachers, the gymnasium stage or desks, moving furniture, supplying teaching aids and equipment and providing any other occupant requested service not within the Contractor's M&R obligations.

5.1.6 M &R Representatives

Further to section 20.1 of the DBFM Agreement, the Contractor shall appoint a representative for each School ("**Contractor M&R Representatives**"), and shall notify the Province of such appointment not less than 10 Business Days before any M&R is commenced at a School.

The Contractor M&R Representatives shall be the persons responsible for all communications with the Province regarding the M&R carried out at the Schools. The Province shall appoint one or more persons to serve as representatives in connection with the oversight of the Contractor's M&R activities at the Schools ("**Provincial M&R Representatives**"), and shall notify the Contractor of such appointments within 10 Business Days of receipt of the Contractor's notice of appointment. The Provincial M&R Representatives shall be the persons responsible for all communications with the Contractor M&R Representatives regarding the M&R for the Schools.

The Contractor M&R Representatives and the Provincial M&R Representatives may appoint alternatives to serve in addition to, or temporarily in their place, or may delegate some of the functions of such representatives.

The Contractor shall not rely upon any acts, omissions, requirements or directions of the Provincial M&R Representatives or any other person whatsoever as authority for any departure from the terms of the DBFM Agreement.

5.2 SCHOOL USE

5.2.1 Types of Use

During the School Year, each School shall be used and occupied by the School Boards and the relevant City as follows:

(a) during the School Day, for Educational Activities and Educational Support Activities; and

(b) Outside the School Day for Community Use and Adhoc School Use.

5.2.2 Notification of Use

5.2.2.1 School Use

On or before September 1 of each School Year during the School M&R Period and the M&R Period and thereafter updated from time to time, the Province will notify the Contractor of the School Holidays and Examination Periods for each School. The Contractor shall carry out its M&R obligations during the School Year in accordance with these schedules and at the times contemplated in Section 5.3.

5.2.2.2 Scheduled Community Use

On or before September 1, and updated on or before January 7 and June 1, of each School Year during the School M&R Period and the M&R Period, the Province shall notify the Contractor in writing of scheduled Community Use for each School for the ensuing period, as the case may be, together with nature of the use, the Areas of the School that will be used and the dates and times planned for such Community Use. If the scheduled Community Use, nature of the use, or the dates and times planned for scheduled Community Use changes for any School during the School Year, upon being made aware of such changes the Province shall promptly notify the Contractor of the changes. The Contractor shall accommodate scheduled Community Use in the performance of its M&R obligations, unless otherwise approved by the Province.

5.2.2.3 Unscheduled Community Use

Unscheduled Community Use of a School may also occur during the School Year. For the Schools in Edmonton, unscheduled Community Use is booked by The City of Edmonton, as and when requested by community users. For Schools in Calgary, unscheduled Community Use is booked by the CBE, CCSD and The City of Calgary, as and when requested by community users. In each case, as soon as the Province is made aware of any unscheduled Community Use, the Province will immediately notify the Contractor of such unscheduled Community Use.

5.2.2.4 Adhoc School Use

For Adhoc School Use of a School, the Province will provide the Contractor with reasonable notice of the times and days of any Adhoc School Use (which shall not be less than 72 hours) together with the nature of the use and the areas of the School that will be used.

5.3 M&R SCHEDULING

5.3.1 M&R Scheduling

5.3.1.1 General

In accordance with the schedules provided by the Province pursuant to Section 5.2.2 above, after School Availability at a School, the Contractor may only carry out its M&R obligations in respect of that School as follows:

(a) Emergency maintenance and repairs may be undertaken by the Contractor, upon notice to the Province and the School Representative, at any time during the School Day, including Examination Periods, Outside the School Day and After Hours, in the affected Area of the School, whether occupied or not, provided that in doing so the Contractor does not compromise the health and safety of students, teachers and staff at that School; and

(b) all other maintenance and repairs may be undertaken by the Contractor during the School Day (except during Examination Periods), Outside the School Day or After Hours in unoccupied Areas of the School only; provided that in doing so the Contractor does not disrupt any Educational Activities, Adhoc School Use or Community Use carried out in occupied Areas of the School or compromise the health and safety of students, teachers and staff or other users of that School.

5.3.1.2 Unscheduled Use of School and Scheduled M&R Work

If the Contractor has scheduled M&R work at a School and:

(a) the Contractor is subsequently notified of unscheduled Community Use to take place:

(i) in the Area of the School in which the Contractor's planned M&R was to occur; and

(ii) during the period set for the planned M&R work,

then the Contractor will be required to accommodate such unscheduled Community Use in the performance of its M&R obligations unless otherwise approved by the Province provided the Contractor was provided 72 hour's prior notice of the conflict between the unscheduled Community Use and the scheduled M&R work; or

(b) the Contractor is subsequently notified of unscheduled Adhoc School Use to take place:

(i) in the Area of the School in which the Contractor's planned M&R was to occur; and

(ii) during the period set for the planned M&R work,

then the Province will require the School Board to use all reasonable efforts to have the Adhoc School Use relocated to another Area of such School. If such relocation is not reasonably possible, the Contractor shall be required to accommodate such Adhoc School Use provided the Contractor was provided 72 hour's prior notice of the conflict between the unscheduled Adhoc School Use and the scheduled M&R work.

The Contractor must provide the Province and the School Representative for each School with a monthly schedule of planned M&R activities to be carried out at each School. The Contractor must confirm all planned M&R activities prior to arrival at the School as set out in section 6.4(b) of the Tri-Party Agreement.

5.4 SECURITY CLEARANCE AND SCHOOL ACCESS PROTOCOL

5.4.1 Security Clearances

The Contractor, at its own cost, shall ensure that all individuals that will be performing M&R at the Schools, not less than 15 Business Days prior to the first time such staff or persons are to attend at a School to perform the M&R:

(a) have obtained from the appropriate ministry of the Province, a clear child welfare check indicating that such individuals have not had any reports or complaints of inappropriate behavior with children or any restraining orders; and

(b) have obtained from a local law enforcement authority a certificate stating that no criminal record exists for such individuals; or

(c) if a criminal record does exist, have obtained the express written permission of the School Board to attend at the School to perform the M&R; and

(d) have executed a consent form as required by FOIP authorizing the disclosure of the above personal information to the Province and the applicable School Board.

(collectively "**Cleared Persons**").

The Contractor shall submit to the Province the information obtained under (a) to (d) above not less than 12 Business Days prior to such individual attending at the Schools to perform the M&R. The Province's or the applicable School Board's refusal to grant access to any individual on account of a criminal record or unsatisfactory child welfare check shall not relieve the Contractor of any of its obligations under the DBFM Agreement. The Contractor is solely responsible for any consequences, including additional costs or delays, arising from a refusal by the Province or the School Boards to grant access to the Schools.

In accordance with its Security Clearance Process set out in Schedule 4 (Contractor's Management Systems and Plans), the Contractor shall promptly advise the Province and the School Representatives of any individual who, subsequent to his/her commencement of M&R at a School, becomes subject to a criminal record or child welfare complaint.

5.4.2 Access Requirements

Except in the case of Emergency Failures and other emergencies, not less than five Business Days prior to the Contractor or any person that will be carrying out M&R at the School attending at the School, the Contractor will provide the Province and the relevant

School Representative with a list of the names of all Cleared Persons approved by the Province and the School Boards that will be attending at the School to perform M&R for the ensuing year.

The Contractor shall ensure that all Cleared Persons performing M&R at a School during the School Day and Outside the School Day shall:

(a) report to that School's administration office before commencing any M&R at the School;

(b) present picture identification including name and employer's name;

(c) be clean and neat of appearance and appropriately attired for a school setting;

(d) sign any visitor registry required by the School;

(e) indicate the nature of the M&R to be performed, location at the School where the M&R will be performed and the expected duration of the work; and

(f) sign out prior to leaving the School.

5.4.3 Conduct of Cleared Persons

In addition to the requirements set out in Sections 5.4.1 and 5.4.2, the Contractor shall ensure that Cleared Persons who are at a School to perform M&R comply with any School Board or School policies relating to the conduct of staff and security clearance matters. It shall be the Contractor's responsibility to obtain such policies from the School Representatives prior to attending at the Schools.

5.4.4 Payment Adjustments

If any staff of the Contractor or its subcontractors attending at a School to perform M&R fails to comply with any requirement referenced in this Section 5.4.1(a) and (b) or Section 5.4.1(a) and (c), a Payment Adjustment of $4,000 per incident shall be assessed.

5.5 LIAISON WITH SCHOOL BOARDS

In order to facilitate day-to-day communications between the Contractor and each School Board during the School M&R Period and the M&R Period, each School Board through its respective Tri-Party Agreement, has appointed a School Representative.

The Contractor M&R Representatives shall be the persons responsible for all communications with the School Representatives regarding the day to day performance of M&R at a School, complaints, Help Desk requests, any Failures occurring at the School, and the performance of the responsibilities of the Province set out in Section 5.1.5 above. Provided that such communications do not amend or alter any obligations of

the Contractor or the Province under the DBFM Agreement, the Contractor shall be entitled to rely upon the communications of the School Representatives regarding the day to day performance of M&R at the applicable Schools, complaints, status of repairs, Help Desk requests, any Failures occurring at the School, and the performance of the responsibilities of the Province set out in Section 5.1.5 above.

In the event of a dispute arising between a Contractor M&R Representative and a School Representative, the matter shall be resolved in accordance with section 9 of the Tri-Party Agreement.

5.6 COLLABORATION

In accordance with the Contractor's Collaboration Plan, the Contractor shall schedule regular collaboration meetings for each School with the Province and the relevant School Representative to discuss all matters relating to the requirements of this Section 5 and the Tri-Party Agreement.

5.7 HELP DESK

5.7.1 Help Desk Requirements

The Contractor shall develop, install, operate, manage and maintain a communication system to receive, record, action and monitor calls/notifications of Failures, and any non-compliance with this Section 5 in relation to the Schools (the "Help Desk"). The Help Desk output logs and reports shall be available in real time "read only" format to the Province and the School Representatives.

The Help Desk shall operate 24 hours per day, 365(6) days per year, including provisions for backup. The Help Desk shall provide the day-to-day notification interface between the Province, the School Representatives, the Contractor and any of its subcontractors in relation to the following matters:

(a) All inquiries and repair requests;

(b) The notification of Building Performance Failures, Service Failures and Accessibility Failures and complaints or compliments from any persons relating to the Contractor's M&R performance;

(c) Monitoring of alarms and security systems;

(d) Notification of accidents or emergencies requiring assistance of the Contractor;

(e) Request for information relating to the operation of the Help Desk; and

(f) Update of progress regarding the rectification of any Building Performance Failures, Service Failures or Accessibility Failures.

A daily electronic log of all Help Desk requests and calls reporting Building Performance Failures, Service Failures and Accessibility Failures and requests for repairs shall be

maintained. The Help Desk shall record into the electronic log all relevant details, including, but not limited to, the following information:

(g) Help Desk operator's name;
(h) Requester's name;
(i) Date and time;
(j) Affected School and location within the School;
(k) Repair or correction required;
(l) Service Failure, Building Performance Failure and/or Accessibility Failure;
(m) Building Performance Failure Category (Emergency, Urgent or Routine);
(n) Response Time;
(o) Unique request reference identifier;
(p) Subcontractor and contact name to which the request was passed;
(q) Date and time request was passed to the relevant subcontractor;
(r) Action taken and by whom;
(s) Service Failure rectification time and the applicable Repair Period for Building Performance Failures and repair requests; and
(t) Accessibility Failure duration.

All Failures shall be reported to the Help Desk by the Province as soon as possible after the Province becomes aware of the Failure. If the Failure is identified through monitoring, inspecting or testing by the Contractor or its subcontractors or is reported to the Contractor M&R Representative by the Province or the School Boards, the Contractor M&R Representative shall promptly report such Failure to the Help Desk.

The Help Desk shall act as the central repository of the building data base information and operational work orders system.

The Contractor shall not delete or alter any details recorded by the Help Desk unless approved in writing by Province and the following information is recorded:

(u) The exact nature and impact of the alteration or deletion;
(v) The reason for the alteration or deletion; and
(w) The name of the person who authorized the alteration or deletion.

The Help Desk shall provide emergency incident support by raising alarms, reporting events to internal and external authorities and logging details of emergencies.

5.7.2 Performance Requirements

The Help Desk shall meet the following performance requirements during the School M&R Period and the M&R Period:

(a) All repair requests or reports of Building Performance Failures, Service Failures and Accessibility Failures shall be logged by the Help Desk regardless of the time of day such request or report of a Building Performance Failure, Service Failure or Accessibility Failure occurs;

(b) Help Desk calls shall be answered 95% of the time on or before the 5th ring; and

(c) Access to Help Desk records and logs shall be provided as requested by the Province, upon two hours notice.

5.7.3 Monitoring for Compliance

Each School Year, the Contractor shall carry out at least 4 random audits of Help Desk calls received for the previous calendar month, reviewing a minimum of 50% of the calls received during the month being audited. The Contractor will promptly forward the results of each random audit upon its completion and in any event no later than five Business Days before the end of the month following the audited month.

5.7.4 Payment Adjustments

If the Contractor fails to:

(a) log all repair requests or reports of Building Performance Failures, Service Failures and Accessibility Failures regardless of time of day such request or report of a Building Performance Failure, Service Failure or Accessibility Failure occurs, a Payment Adjustment of $1,000 per failure will be assessed;

(b) answer 95% of the calls audited under Section 5.7.3 on or before the 3rd ring, a Payment Adjustment of $700 per failed audit will be assessed;

(c) provide the results of the random audit within the time stipulated, a Payment Adjustment of $500 per failure will be assessed.

(d) provide access to Help Desk records and logs as requested, upon two hours notice, a Payment Adjustment of $500 per failure will be assessed.

5.8 PERFORMANCE MONITORING AND REPORTS

5.8.1 Performance Monitoring Program

The Contractor shall have in place a "Performance Monitoring Program" ("**PMP**") for all of the M&R. Processes forming part of the PMP shall be included in the Contractor's QMS. The PMP will outline the actions the Contractor shall undertake to ensure the M&R Requirements are being met. The PMP will be an additional electronic system that permits the Province and the School Boards, through "read-only" access, to determine if the Schools are being maintained in accordance with the M&R Requirements. The PMP shall include, but not be limited to, the following types of monitoring methods:

(a) Records of communications by the Contractor, the Province and/or the School Representative with the Help Desk or the Contractor M&R Representative;

(b) Records of all Failures and the status or rectification of such Failures; and

(c) Self-monitoring by the Contractor.

5.8.2 Reports

The Contactor shall provide the following reports:

(a) Monthly Summary Report - The Contractor shall prepare a monthly report comprised of a summary for all Schools, with a separate report for each School, outlining all circumstances known to the Contractor that trigger, or if continued, will trigger a Payment Adjustment and any other events, developments or circumstances material to the Contractor's performance of the M&R Requirements. The Contractor shall deliver the monthly summary report to the Province five Business Days following the last day of the month during the School M&R Period and the M&R Period;

(b) Monthly Incident Listing – The Contractor shall prepare a monthly listing for each School of all Help Desk repair requests made and all Building Performance Failures, Service Failures and Accessibility Failures occurring during the previous month, the Repair Period or Amended Repair Period for each Building Performance Failure or rectification period for any Service Failure and date of rectification of each Building Performance Failure or Service Failure. The Contractor shall deliver the monthly incident listing to the applicable School Board and the Province at least five Business Days prior to the first Business Day of each month during the School M&R Period and the M&R Period;

(c) Monthly Planned Maintenance and Renewal Schedules – Based upon the annual planned routine and preventative maintenance and repair schedule and renewal schedule provided by the Contractor under 5.8.2(d), the Contractor shall detail the monthly planned routine and preventative maintenance and repair schedule and renewal schedule for each School for the ensuing month and shall submit the monthly planned maintenance and renewal schedule to the Province and the applicable School Board no later than the first Business Day of each month during the School M&R Period and the M&R Period; and

(d) Annual Planned Maintenance and Renewal Schedule - The Contractor shall prepare the annual planned routine and preventative maintenance schedule and annual renewal schedule for each School and shall detail the planned M&R for the ensuing year and shall submit the annual planned maintenance and renewal schedule to the Province no later than October 1 in each year during the School M&R Period and the M&R Period.

5.8.2.1 Payment Adjustments

If the Contractor fails to:

(a) provide the report required by Sections 5.8.2(a), (b) and (c), as the case may be, within the time stipulated, a Payment Adjustment of $600 per day or partial day per report shall be applied for each undelivered report until received;

(b) provide the report required by Section 5.8.2(d) within the times stipulated, a Payment Adjustment of $1000 per day or partial day per report shall be applied for each undelivered report until received.

5.9 SCHOOL ACCESSIBILITY

5.9.1 Contractor's Obligation

In respect of each School, the Contractor shall ensure that each School Building and each Area is Accessible at all times during the School Year, from the day that School Availability is achieved until the end of the Term.

5.9.2 Area Inaccessibility

Where the Province determines an Area does not meet all of the Accessibility Criteria then, subject to Section 5.9.3 below, that Area will be determined to be Inaccessible.

5.9.3 Inaccessible but Used

If an Area is Inaccessible, the Province may, in its sole discretion, determine that the Area may still be used for Educational Activities, Educational Support Activities and Community Use, such decision being based upon the Province being satisfied that the health and safety of the students and staff will not be jeopardized if the Inaccessible Area is used.

If the Province determines that the Area may still be used for Educational Activities, Educational Support Activities and Community Use, then the Area shall be declared by the Province to be Inaccessible but Used. The Province shall make this determination at the time the Contractor attends at the affected School to rectify the Accessibility Failure and shall immediately notify the Help Desk of this determination.

If the Province fails to make the determination that an Area is Inaccessible but Used, but the Area is subsequently used for Educational Activities, Educational Support Activities or Community Use, then the Area shall be deemed to be Inaccessible but Used commencing from the time the Area is used.

5.9.4 School Building Inaccessibility

A School Building will be declared Inaccessible when:

(a) in any day, the aggregate square meters of the Instructional Areas in a School Building which are Inaccessible or Inaccessible but Used within the School Building exceeds 35% of the aggregate square meters of all Instructional Areas within the relevant School Building; or

(b) in any day, either:

i. the female washrooms at a School Building which are Inaccessible or Inaccessible but Used within a School Building exceeds 65% of the aggregate number of all female washrooms within the relevant School Building, or

ii. the male washrooms at a School Building which are Inaccessible or Inaccessible but Used within a School Building exceeds 65% of the aggregate number of all male washrooms within the relevant School Building.

5.9.5 Province's Right to Assess Payment Adjustments for Accessibility Failures

In all circumstances where an Area is determined to be or the School Building is declared to be Inaccessible or is determined or deemed to be Inaccessible but Used, then subject to Section 5.9.7, the Province may apply the appropriate Payment Adjustments set out in Sections 5.9.6.1, 5.9.6.2 and 5.9.6.3.

5.9.6 Payment Adjustments

5.9.6.1 Inaccessible Areas

Where an Area is Inaccessible then, subject to Section 5.9.7, the Payment Adjustments set out in this Section 5.9.6.1 shall apply to each such Area that is Inaccessible from the time the Help Desk is notified of the Accessibility Failure pursuant to Section 5.9.8.1 until the Accessibility Failure is either permanently rectified or temporary measures or protections are installed and the Area that is Inaccessible is declared Accessible pursuant to Section 5.9.8.2.

Table 5.9.6.1: Area Inaccessibility Payment Adjustments

Areas	**Payment Adjustment**			
	Payment Adjustment Period			
	Monday to Friday (Excluding Examination Periods and School Holidays)	**Examination Periods**	**School Holidays**	
			Occupied	**Unoccupied**
Instructional Areas	$2,000 per day or partial day for each Instructional Area	$ 3,000 per day or partial day for each Instructional Area	$ 1,000 per day or partial day for each Instructional Area	$ 500 per day or partial day for each Instructional Area
Administration area and offices	$1000 per day or partial day for each such area	$ 1,000 per day or partial day for each such area	$ 500 per day or partial day for each such area	$ 250 per day or partial day for each such area
Library	$1000 per day or partial day	$ 1,000 per day or partial day	$ 1,000 per day or partial day	$ 500 per day or partial day
Custodial/janitor office	$1000 per day or partial day	$ 1,000 per day or partial day	$ 1,000 per day or partial day	$ 1,000 per day or partial day
Common areas such as student gathering areas and hallways	$3,000 per day or partial day for each such area	$ 3,000 per day or partial day for each such area	$ 1,500 per day or partial day for each such area	$ 750 per day or partial day for each such area
Washrooms, change rooms	$2,000 per day or partial day for each such area	$ 2,000 per day or partial day for each such area	$ 1,000 per day or partial day	$ 500 per day or partial day

			for each such area	for each such area
Gymnasium	$4,000 per day or partial day	$ 4,000 per day or partial day	$ 4,000 per day or partial day	$ 1,000 per day or partial day
Storage rooms	$1000 per day or partial day for each such area	$ 1,000 per day or partial day for each such area	$ 500 per day or partial day for each such area	$ 250 per day or partial day for each such area

Where an Accessibility Failure starts during one Payment Adjustment Period and continues into any other Payment Adjustment Period, the Payment Adjustment applicable for each and every Payment Adjustment Period shall be assessed until that Accessibility Failure is rectified.

5.9.6.2 Inaccessible but Used

Where an Area is Inaccessible but Used, then subject to Section 5.9.7, a Payment Adjustment will be assessed commencing from the time the Area is determined to be or is deemed Inaccessible but Used until the Accessibility Failure is either permanently rectified or temporary measures or protections are installed and the Area that is Inaccessible is declared Accessible pursuant to Section 5.9.8.2.

The Payment Adjustments that will be applied are as follows:

Table 5.9.6.2: Area Inaccessible but Used Payment Adjustments

Areas	**Payment Adjustments**			
	Payment Adjustment Period			
	Monday to Friday (Excluding Examination Periods and School Holidays)	**Examination Periods**	**School Holidays**	
			Occupied	**Unoccupied**
Instructional Areas	$1,000 per day or partial day for each Instructional Area	$ 2,000 per day or partial day for each Instructional Area	$ 500 per day or partial day for each Instructional Area	$ 250 per day or partial day for each Instructional Area
Administration area and offices	$500 per day or partial day for each such area	$ 500 per day or partial day for each such area	$ 300 per day or partial day for each	$ 200 per day or partial day for each

Areas	Payment Adjustments			
	Payment Adjustment Period			
	Monday to Friday (Excluding Examination Periods and School Holidays)	Examination Periods	School Holidays	
			Occupied	Unoccupied
			such area	such area
Library	$500 per day or partial day	$ 500 per day or partial day	$ 500 per day or partial day	$ 300 per day or partial day
Custodial/janitor office	$500 per day or partial day	$ 500 per day or partial day	$ 300 per day or partial day	$ 200 per day or partial day
Common areas such as student gathering areas and hallways	$1,500 per day or partial day for each such area	$ 1,500 per day or partial day for each such area	$ 800 per day or partial day for each such area	$ 500 per day or partial day for each such area
Washrooms, change rooms	$1,000 per day or partial day for each such area	$ 1,000 per day or partial day for each such area	$ 500 per day or partial day for each such area	$ 300 per day or partial day for each such area
Gymnasium	$2,000 per day or partial day	$ 2,000 per day or partial day	$ 2,000 per day or partial day	$ 1,000 per day or partial day
Storage rooms	$500 per day or partial day for each such area	$ 500 per day or partial day for each such area	$ 300 per day or partial day for each such area	$ 200 per day or partial day for each such area

Where an Accessibility Failure starts during one Payment Adjustment Period and continues into any another Payment Adjustment Period, the Payment Adjustment applicable for each and every Payment Adjustment Period shall be assessed until that Accessibility Failure is rectified.

5.9.6.3 School Building Inaccessibility

Where a School Building is declared Inaccessible, the Payment Adjustment for the Accessibility Failure for such School Building will be assessed from the time the Inaccessibility of such School Building is declared by the Province until the Accessibility Failure is permanently repaired or temporary measures or protections are installed and

such School Building is declared Accessible pursuant to Section 5.9.8.2. The Payment Adjustment that will be assessed for Inaccessibility of a School Building shall be as follows:

Table 5.9.6.3: School Building Inaccessibility Payment Adjustments

Payment Adjustments and Payment Adjustment Periods			
Monday to Friday Day (Excluding Examination Periods and School Holidays)	**Examination Periods**	**School Holidays**	
		Occupied	**Unoccupied**
$ 20,000 per day or partial day	$ 30,000 per day or partial day	$ 10,000 per day or partial day	$ 5,000 per day or partial day

Where a School Building Accessibility Failure starts during one Payment Adjustment Period and continues into any another Payment Adjustment Period, the Payment Adjustment applicable for each and every Payment Adjustment Period shall be assessed until that School Building Accessibility Failure is rectified.

5.9.7 No Payment Adjustments for an Accessibility Failure

For the purposes of Section 5.9.7, an Area or a School Building described as "Inaccessible" or the term "Inaccessibility" shall include references to Inaccessible but Used Areas.

5.9.7.1 First 30 Days Following School Availability

Only to the extent that a School achieves School Availability on or prior to the School Availability Target Date, the Payment Adjustments for an Accessibility Failure as specified in Section 5.9.6.1, 5.9.6.2 or 5.9.6.3 will not be applied in respect of any Inaccessible Area or the Inaccessible School Building of such School for the first 30 days following School Availability of that particular School. Thereafter Payment Adjustments for any and all Accessibility Failures will apply with respect to that School.

5.9.7.2 Specific Circumstances in which No Payment Adjustments for an Accessibility Failure will be Applied

The Payment Adjustments for an Accessibility Failure specified in Section 5.9.6.1, 5.9.6.2 or 5.9.6.3 will not be applied in respect of an Inaccessible Area or the Inaccessible School Building if, and to the extent that it has been demonstrated to the reasonable satisfaction of the Province that the relevant Inaccessibility is a direct result of:

(a) a Change Order Directive or Change Order Confirmation issued by the Province that requires an Area or a School Building to be Inaccessible in order to carry out the terms of the Change Order and is documented in the Change Order Confirmation or Change Order Directive, provided that to

the extent reasonably possible the Contractor carries out the Change Order After Hours or during a School Holiday when the School is unoccupied and provided further that the Contractor completes the Change Order within the time stipulated;

(b) planned M&R activities approved by the Province which require an Area or a School Building to be Inaccessible for the period of the planned M&R activities, provided that such planned M&R activities occur After Hours or during a School Holiday when the School is unoccupied and provided further that the planned M&R activities are completed within the time stipulated by the Contractor;

(c) the Province's performance or non-performance of the obligations under the DBFM Agreement;

(d) a Damage Event to an Area or to a School Building provided that to the extent reasonably possible the Contractor carries out the repairs After Hours or during a School Holiday when the School is unoccupied and provided further that the Contractor is taking all reasonable steps to complete the repairs in accordance with the Repair Period or Amended Repair Period; or

(e) any Building Performance Failure arising at a School, the damage from which the Contractor is required to insure pursuant to Schedule 11 (Insurance Requirements) of the DBFM Agreement, but which arises, and without being caused by the negligence of the Contractor or those for whom the Contractor is legally responsible, from:

(i) damage caused by the Province or the School Boards and their respective contractors, employees and agents, and persons for whom they are legally responsible;

(ii) damage caused by any third party (excluding the Contractor, its agents, contractors and subcontractors and any persons for whom they are legally responsible); or

(iii) damage caused by any fire, explosion, lightning, storm, tempest, floods, bursting or overflowing of water tanks, pipes or apparatus, or earthquakes which occur due to an act of God,

provided that to the extent reasonably possible the Contractor carries out the repairs After Hours or during a School Holiday when the School is unoccupied and provided further that the Contractor is taking all reasonable steps to complete the repairs within the Repair Period or Amended Repair Period.

5.9.8 Procedure on Inaccessibility

5.9.8.1 Notice of Inaccessibility

(a) Where the Province considers that an Area or the School Building is or may be Inaccessible, the Province shall immediately notify the Help Desk of the Accessibility Failure and provide information regarding:

(i) The affected Area or the School Building;
(ii) The issue believed to be causing or contributing to the Area or the School Building to be Inaccessible;
(iii) The timing or estimated timing of the issue believed to be causing or contributing to the cause of the Area or the School Building becoming Inaccessible; and
(iv) Details of the Accessibility Criteria that are not being met.

(b) The Province may notify the Contractor M&R Representative or any subcontractor of the Contractor that an Area or a School Building is or may be Inaccessible, provided however that the Province shall also notify the Help Desk of the Accessibility Failure and provide similar information as set out in (a) above.

(c) Where the Contractor M&R Representative or any subcontractor of the Contractor considers that an Area or a School Building is or may be Inaccessible, the Contractor M&R Representative or any subcontractor of the Contractor shall immediately notify the Province, and the Province shall in turn promptly notify the Help Desk of the Accessibility and provide similar information as set out in (a) above.

(d) Upon receipt of notification of the Province's notifying the Help Desk of Inaccessibility, the Contractor shall attend at the affected School within the Response Time required for an Emergency Failure to determine:

(i) whether an Inaccessibility has arisen;
(ii) the cause of the Inaccessibility (to the extent the Contractor can make this determination using all reasonable efforts);
(iii) the Repair Period applicable to the Inaccessibility and whether the repairs can be completed within the stipulated Repair Period;
(iv) any Proposed Repair Period; and
(v) whether any of the provisions of Section 5.9.7 are applicable in respect of the relevant Inaccessibility;

(e) Where the Contractor and the Province disagree on

i) whether an incident of Inaccessibility has arisen;

ii) the cause of the Inaccessibility;

iii) the relevant Repair Period, or the Proposed Repair Period; or

iv) whether any of the provisions of Section 5.9.7 are applicable in respect of the relevant Inaccessibility

then the Contractor may refer the matter to the Dispute Resolution Procedure.

(f) Regardless of the determination of the matters referred to in Section 5.9.8.1(d), the Contractor shall commence the necessary repairs to rectify the Inaccessibility within the applicable Repair Period for the Building Performance Failure believed to be causing or contributing to the Area or the School Building to be Inaccessible. The Contractor shall provide to the Province and the applicable School Representative on a daily basis a progress update regarding the repairs being undertaken in the affected Area or School Building to rectify the Inaccessibility until the Inaccessibility is rectified.

5.9.8.2 Cessation of Inaccessibility

(a) The Contractor shall immediately notify the Help Desk when it believes that permanent repairs have been completed and that the affected Area or School Building is Accessible.

(b) The Help Desk shall thereafter promptly notify the Province and the School Representative that the Contractor believes that the permanent repairs have been completed and that the relevant Inaccessibility has been rectified.

(c) The Province shall be entitled to inspect the affected Area or School Building where such Inaccessibility has been permanently repaired and must carry out such inspection within 24 hours of receiving notice from the Help Desk that the Inaccessibility has been rectified.

(d) If the Province agrees that the permanent repairs are complete and the Inaccessibility has been rectified, they shall immediately notify the Help Desk.

(e) If the Province does not agree that the permanent repairs are complete, it shall promptly notify the Contractor of same and that the Accessibility Failure has not been rectified. The Contractor may refer the matter to the Dispute Resolution Procedure.

5.9.9 Payment Adjustments for Failure to Repair Building Performance Failures Causing Inaccessibility

In addition to the Payment Adjustments set out in Section 5.9.6 (unless excluded under Section 5.9.7), if temporary measures or protection or permanent repairs for the Building Performance Failure believed to be causing or contributing to the Area or the School Building to be Inaccessible are not completed within the Repair Period or Amended Repair Period, then the Payment Adjustments applicable to the Building Performance Failures set out in Section 5.12 shall apply.

All Building Performance Failures that cause or contribute to the cause of an Accessibility Failure shall be deemed to be Emergency Failures with the Repair Period for rectification of such Accessibility Failure being the Emergency Failure Repair Period for the applicable Building Performance Failure. Where the damage relates to a number of Building Elements, Building Systems or Building Equipment, the longest of the stipulated Repair Periods shall apply.

5.9.10 Cap on Accessibility Payment Adjustments

If collectively the Areas declared Inaccessible, including but not limited to the Areas declared Inaccessible but Used, in a School Building exceeds the thresholds of Inaccessibility for a School Building set out in Section 5.9.4 above, then the Payment Adjustments set out in Section 5.9.6.3 shall apply.

5.10 DECORATING OR UNAUTHORIZED MODIFICATIONS TO SCHOOLS

5.10.1 General

Pursuant to the Tri-Party Agreement, the School Boards may not carry out any Modifications to the School Building. School Boards may request the Province to proceed with a Modification, but such request is subject to the consent of the Province. If the Province consents to School Board's proposed Modification, such Modification may only proceed in accordance with section 7.3 of the DBFM Agreement.

The Tri-Party Agreement further provides that the School staff may undertake Decorating of the School Building provided that such Decorating does not result in the Technical Requirements no longer being met for the affected Building Element or does not materially increase the Contractor's cost of carrying out the M&R.

5.10.2 Contractor's Rights

(a) If any Decorating or any unauthorized Modifications to a School Building is carried out by School staff, upon becoming aware of same, the Contractor shall promptly inspect such Decorating or unauthorized Modification to determine: (i) if the Decorating results in the Technical Requirements no longer being met for the affected Building Element or results in a material increase in the Contractor's cost of carrying out the M&R; (ii) if the unauthorized Modification carried out meets the Technical Requirements but nonetheless results in a material increase in the Contractor's cost of carrying out the M&R as a result of the unauthorized Modification; or (iii) if the unauthorized Modification carried out does not meet the Technical Requirements.

(b) Upon completion of its inspection, the Contractor shall immediately notify the Province of its determination.

(c) If the Contractor determines that repairs or a replacement are required, the Province shall promptly attend at the School to assess the Decorating or unauthorized Modification in relation to the Technical Requirements. If the Province agrees with the Contractor, the Contractor shall carry out such repairs or replacement as if requested under a Change Order Directive pursuant to Schedule 1 (Change Orders), and shall invoice the Province for such repairs or replacement in an amount to which the Contractor would be entitled if the repairs or replacement were completed under a Change Order Directive governed by Schedule 1. If the Province disagrees with the Contractor, the repairs or replacement shall be postponed, and the matter shall be resolved by the Province and the Contractor through the Dispute Resolution Procedure.

(d) If the Contractor determines that the Decorating does not impact the Technical Requirements for the affected Building Element and does not materially increase the Contractor's cost of carrying out the M&R or that unauthorized Modification meets the Technical Requirements but does not materially increase the Contractor's cost of carrying out the M&R, the Contractor shall carry out all M&R required for the affected Building Element or the unauthorized Modification and shall ensure that the affected Building Element or the unauthorized Modification meet the Handback Requirements.

5.11 PROCEDURE RESPECTING BUILDING PERFORMANCE FAILURES

5.11.1 Building Performance Failure Categories

Unless otherwise provided herein, all Building Performance Failures occurring at a School will be categorized into Building Performance Failure Categories, as follows:

Building Performance Failure Category	**Description**
Emergency Failure	Any Building Performance Failure that: (i) is creating an imminent danger to a Building Element, Building System, Exterior Improvement or any part thereof, or (ii) imperils the health and safety of the users of the School. is expressly deemed to be an Emergency Failure. Any Accessibility Failure is expressly deemed to be an Emergency Failure.

Building Performance Failure Category	Description
Urgent Failure	Any Building Performance Failure that: (i) impacts the operational function of a Building Element, Building System, Exterior Improvement or any part thereof, or the Educational Activities carried out at the School, or (ii) that may develop into an Emergency Failure if not promptly repaired, is expressly deemed to be an Urgent Failure.
Routine Failure	Any Building Performance Failure affecting the user's enjoyment of the School or otherwise of an administrative or routine nature.

The Province shall, acting reasonably, make the initial determination of the Building Performance Failure Category for a particular Building Performance Failure arising at a School. Where the Province makes the determination of the Building Performance Failure Category and the Contractor disagrees with such determination, the Contractor may refer the matter to the Dispute Resolution Procedure.

5.11.2 Response Times

The Contractor shall respond to requests to the Help Desk regarding any Building Performance Failure by attending at the site of the Building Performance Failure to assess the nature of the Building Performance Failure and to begin where reasonably possible the repair of the Building Performance Failure within the following response times ("**Response Times**"):

Failure	Response Time
Emergency Failures	Immediately but in any event not later than 2 hours from the Province's notification to the Help Desk
Urgent Failures	Not later than 24 hours from the Province's notification to the Help Desk
Routine Failures	Not later than 7 days from the Province's notification to the Help Desk

If the Contractor fails to attend at the site of the Building Performance Failure to assess the nature of the Building Performance Failure and to begin where reasonably possible

the repair of the Building Performance Failure within the Response Times indicated in this Section 5.11.2, a Payment Adjustment will be assessed for each such failure to respond as follows:

Response Time	Payment Adjustment
Emergency Failure	$3,000 per occurrence
Urgent Failure	$2,000 per occurrence
Routine Failure	$1,000 per occurrence

5.11.3 Emergency Response Failures

5.11.3.1 Notification of Emergency Failure

Where that an Emergency Failure occurs at a School, the Province shall promptly notify the Help Desk of such Emergency Failure. The Help Desk shall immediately confirm with the Province that the Contractor or its subcontractor will attend the affected School within two hours to attend to the Emergency Failure.

5.11.3.2 Contractor's Failure to Respond

Notwithstanding the generality of section 16.6 of the DBFM Agreement and pursuant to the provisions thereof, if:

(a) the Help Desk does not answer to the Emergency Failure call;

(b) the Help Desk cannot confirm that the Contractor or its subcontractor is en route to the affected School for arrival within the Response Time for Emergency Failures; or

(c) the Contractor or its subcontractor do not arrive at the affected School within the Response time for Emergency Failures,

then, where in the opinion of the Province further serious and substantial damage to the affected School will occur if immediate action is not taken, the Province or its designate may take whatever steps it deems necessary to prevent further loss or damage to the affected School.

5.11.3.3 Consequences to Contractor

Where the Province have taken steps pursuant to Section 5.11.3.2 to prevent further loss or damage to a School, whether in the nature of temporary measures or protection or permanent repairs, the Contractor shall be responsible for all costs incurred by the Province in connection therewith, plus an administration fee of 25% as liquidated damages. These costs shall be deducted from Payments made to the Contractor.

If permanent repairs have been completed by the Province, the Contractor shall be responsible for the M&R associated with such permanent repairs and shall be obligated to ensure that the repaired Area, Building Equipment, Building Element or Building System meets the Handback Requirements at the end of the Term. For the purposes of section 16.6 of the DBFM Agreement, the actions of the Province under this Section 5.11.3 do not constitute a Relief Event.

5.11.4 Procedure re: Cause of Building Performance Failure

(a) Within the applicable Response Time, the Contractor shall attend at a School suffering the Building Performance Failure and shall as soon as practicable, but in any event within 2 hours after arriving at the School, notify the Province of the Contractor's initial assessment, acting reasonably, of the cause of the Building Performance Failure.

(b) Where Contractor assesses the Building Performance Failure to be the result of a Damage Event, then the Contractor shall immediately notify the Province. Upon such notification Province shall promptly, but in any event within 2 hours attend at the affected School to view and inspect the cause of the Building Performance Failure.

(c) Where the Province agrees that the Building Performance Failure results from a Damage Event then:

(i) the Province shall issue, in writing, an Amended Repair Period for the Building Performance Failure extending the Repair Period for the period required for the determining the cause of the Building Performance Failure, and if requested by the Province under section 3.1(b) and (c) of Schedule 1 (Change Orders), the period required for preparing, evaluating and awarding invitational tenders or competitive tenders in connection with the required repairs;

(ii) the Contractor shall proceed as if the repairs necessitated by the Building Performance Failure were requested by the Province under a Change Order Directive pursuant to Schedule 1 (Change Orders); and

(iii) the Contractor shall complete the repairs within the Amended Repair Period.

(d) Where the Province disagrees with the Contractor's assessment that the Building Performance Failure is the result of a Damage Event then:

(i) the Contractor shall proceed to repair the Building Performance Failure within the stipulated Repair Period and in accordance the Technical Requirements;

(ii) if the Contractor refers the matter to the Dispute Resolution Procedure and the dispute is resolved in the Contractor's favour such that the Building Performance Failure is determined to be the result of a Damage Event, the Province shall pay the Contractor's invoice in an amount to which the Contractor would be entitled as if the repairs were requested by the Province under a Change Order Directive pursuant to Schedule 1 (Change Orders); and

(iii) if the Contractor does not refer the matter to the Dispute Resolution Procedure or if the Contractor does refer the matter to the Dispute Resolution Procedure and the dispute is resolved in the Province's favour, the Contractor will not be entitled to any payment from the Province for the Contractor's costs associated with performing such repairs.

(e) Where the Building Performance Failure is assessed by the Contractor to be within the scope contemplated in section 11.8(b) of the DBFM Agreement, then the Contractor shall proceed to repair the Building Performance Failure within the stipulated Repair Period and in accordance the Technical Requirements.

5.11.5 Adjustment of Repair Period

Where the Contractor is of the opinion, acting reasonably, that the Repair Period for the Building Performance Failure is not sufficient to complete the required repairs given the nature and extent of the damage, impaired condition or deficiency, the weather if the Building Performance Failure affects the Exterior Improvements or the exterior of a School Building, or the time for ordering materials and replacement parts or components, the Contractor shall, not longer than one Business Day after responding to the Building Performance Failure, propose to the Province a reasonable extension to the Repair Period ("**Proposed Repair Period**") that in its opinion is sufficient to complete the temporary measures or protection and the permanent repairs in given circumstances.

If the Province agrees with the Proposed Repair Period, then the Province shall issue, in writing, an Amended Repair Period to reflect the repair time set out in the Proposed Repair Period. If the Province or its designate, acting reasonably, do not agree with the Proposed Repair Period, then the Province may at its option:

(a) deny any extension to the Repair Period, in which case the Repair Period stipulated in Section 5.12 for the Building Performance Failure shall apply; or

(b) determine its own extension to the Repair Period, in which case such proposed extension shall be issued by the Province, in writing, as the Amended Repair Period.

Where the Contractor disagrees with the determination of the Province pursuant to this Section 5.11.5, the Contractor shall immediately commence the required repairs and use

all reasonable efforts to complete the permanent repairs in accordance with the Repair Period or Amended Repair Period. The Contractor may refer the matter to the Dispute Resolution Procedure. The Repair Period or Amended Repair Period determined pursuant to the Dispute Resolution Procedure shall apply for the purposes of Payment Adjustments.

5.11.6 Multiple Building Performance Failures

Where multiple Building Performance Failures arise from a single event, the Payment Adjustments for each Building Performance Failure affecting a School will be assessed as set out in Section 5.12.

5.11.7 Application of Emergency Failure Payment Adjustments

(a) If the Emergency Failure has both been temporarily protected before the end of the Repair Period for temporary protection or measures and the Emergency Failure has been permanently repaired before the end of the Repair Period for permanent repairs, then no Payment Adjustment for the Emergency Failure shall apply.

(b) If the Emergency Failure has been temporarily protected before the end of the Repair Period for temporary protection or measures but the Emergency Failure has not been permanently repaired by the end of the Repair Period for permanent repairs, then Payment Adjustments will apply from the expiry of the Repair Period for permanent repairs until the permanent repairs are completed.

(c) If the Emergency Failure has not been temporarily protected by end of the Repair Period for temporary protection or measures but the Emergency Failure has been permanently repaired by the end of the Repair Period for permanent repairs, then Payment Adjustments shall apply from the expiry of the Repair Period for temporary protection or measures until the expiry of the Repair Period for permanent Repairs.

(d) If the Emergency Failure has not been temporarily protected by end of the Repair Period for temporary protection or measures and the Emergency Failure has not been permanently repaired by the end of the Repair Period for permanent repairs, then Payment Adjustments shall apply from the expiry of the Repair Period for temporary protection or measures until the permanent repairs are completed.

5.11.8 Monitoring for Compliance

In addition to any specified requirements contained herein, the Contractor shall regularly monitor the condition and evaluate the need for maintenance or repair of each School in accordance with the program of planned routine or preventative maintenance documented in the Contractor's Maintenance Plan. In addition, the Contractor shall conduct inspections and testing at each School, and the Building Elements, Building Systems and

Building Equipment contained in each School as required by applicable laws, Authorizations and Standards and Guidelines.

In addition to the Contractor's obligation to monitor, inspect and carryout testing at the Schools, the Province shall be entitled, as contemplated by and in accordance with section 14.4 of the DBFM, to monitor, inspect and carry out its own tests of the Schools, the Building Systems, Building Elements and Building Equipment to verify that the performance requirements for the Schools set out in the Technical Requirements are being satisfied.

5.12 PERFORMANCE REQUIREMENTS FOR A SCHOOL

In respect of each School, the Contractor shall perform the M&R at the School in accordance with the performance requirements set out in this Section 5.12 from the day that School Availability is achieved to the end of the Term.

5.12.1 Building Envelope

This Section 5.12.1 refers to all the elements of a building envelope, which include without limitation, roof systems, walls, doors, and windows.

5.12.1.1 Roof Systems

A roof is the system of interacting roof components and materials designed to weatherproof and insulate the top surface of each School Building including without limitation all structural components, roof fabric, flashings, copings, vents, drains, stacks, parapets and other penetrations. In addition, the roof system includes eaves and fascia.

5.12.1.1.1 Maintenance Requirements

The Contractor shall properly maintain the roof system of each School Building to ensure that the roof system:

(a) meets the Accessibility Criteria applicable to the roof system;

(b) functions and operates safely and performs in accordance with the Technical Requirements and the Detailed Designs;

(c) meets all applicable laws and Authorizations; and

(d) meets the Handback Requirements at the end of the Term.

In addition, the Contractor shall maintain the roof system of each School Building to ensure that:

(e) the roof is weather tight with continuity of membrane and sealant;

(f) the roof is structurally sound, with a uniform and even surface;

(g) the roof is free of defects affecting performance or safety;

(h) coverage is continuous and complete across entire surface of the roof of the School Building;

(i) the roof is free of leaks, damp penetration, spalling, noticeable sagging, decay, cracks, rust, corrosion, damage, distortion or displacement and mould;

(j) all parts of the roof system are tightly fastened and structurally sound;

(k) eaves and fascia are structurally sound and secure;

(l) roof drainage is free flowing and performs in accordance with the Detailed Designs;

(m) drains and vents are free of debris and obstruction;

(n) water is dispersed from the roof in accordance with the Technical Requirements and the Detailed Designs;

(o) the insulation is intact, dry and performing in accordance with the Technical Requirements and the Detailed Designs; and

(p) any other performance requirement set out in the Technical Requirements is being met.

Except in the case where an Accessibility Failure arises, where an inspection determines that the roof system on a School Building is in need of maintenance or repairs, such required maintenance and repairs are deemed to be an Urgent Failure.

The Contractor shall regularly inspect roof systems in accordance with the Contractor's Maintenance Plan. Thermographic scans (and cut samples, if necessary) to confirm that the roof system of each School Building is weather tight shall be undertaken by the Contractor on or before the anniversary date of School Availability in the 20thth year following School Availability of a School and thereafter every five years. The Contractor shall provide all inspection and testing results to the Province within 10 Business Days of the inspection or test.

All repairs and renewals of the roof system shall meet the Technical Requirements and the Detailed Designs, all applicable laws and the relevant Standards and Guidelines.

5.12.1.1.2 Payment Adjustments

If the Contractor fails to deliver the inspection and test results within the time specified in this Section 5.12.1.1.1, a Payment Adjustment of $2,000 per day per School shall be assessed until the inspection and test results are received by the Province.

5.12.1.1.3 Repair Periods

The Contractor shall complete temporary protection and measures or shall complete permanent repairs within the following timelines from the time that a roof system deficiency or impaired condition is reported to the Help Desk:

(a) Emergency Failures – The Contractor shall attend the affected School and respond to any Emergency Failure immediately but in any event no later than two hours from the time of notification. The Contractor shall permanently repair such Emergency Failures within four hours of the Contractor's arrival at the affected School. If the Contractor cannot complete permanent repairs within four hours of the Contractor's arrival at the affected School, the Contractor shall make temporary protection and measures immediately but in any event not later than six hours from notification of the Emergency Failure. Temporary protection and measures may not be in place for more than five days, at which time permanent repairs shall be completed.

(b) Urgent Failures – The Contractor shall permanently repair Urgent Repairs as soon as is practicable but in any event not later than five days after notification of the Urgent Failure.

(c) Routine Failures – The Contractor shall permanently repair Routine Failures as soon as practicable but in any event not later than 30 days after notification of the Routine Failure.

5.12.1.1.4 Payment Adjustments

If the Contractor fails to install the temporary protection and measures or to make permanent repairs, as applicable, within the Repair Period indicated in Section 5.12.1.1.3 above, then Payment Adjustments will be assessed for each Failure, as follows:

(a) For Emergency Failures that are not temporarily protected or permanently repaired, as applicable, within the Repair Period, a Payment Adjustment of $2,000 per day or partial day per School will be assessed in accordance with Section 5.11.7;

(b) For Urgent Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $1,000 per day or partial day per School will be assessed until the permanent repairs are completed; and

(c) For Routine Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $500 per day or partial day per School will be assessed until the permanent repairs are completed.

5.12.1.2 Exterior Walls and Foundations

Exterior walls and foundations include without limitation all structural components, claddings, cappings, exhaust and supply vents, chimney stacks and flues, drainage systems, soffits, other penetrations and attachments, such as landings, ramps, stairwells, fire exits, steps, porches, decks, walkways, entrances, penthouses, safety barriers (bollards), walkways, balconies and insulation.

5.12.1.2.1 Maintenance Requirements

The Contractor shall properly maintain the exterior walls and foundations of each School Building to ensure that the exterior walls and foundations:

(a) function and operate safely and perform in accordance with the Technical Requirements and the Detailed Designs;

(b) meet all applicable laws and Authorizations; and

(c) meet the Handback Requirements at the end of the Term.

In addition, the Contractor shall maintain the exterior walls and foundation of each School Building to ensure that:

(d) the foundation is structurally sound, and free of defects affecting performance of the foundation or safety;

(e) there is no subsistence or differential settlement of the foundation;

(f) the exterior walls and foundation are weather tight with continuity of material across the entire surface;

(g) the exterior walls, attachments and the foundation are free from hazardous materials, cracks and/or deflection, rust, corrosion, damage, distortion or displacement;

(h) the exterior walls are free from leaks and dampness penetration and mould;

(i) the exterior walls are uniform in colour and pattern;

(j) all structural components of the exterior walls are structurally sound and securely fastened;

(k) all joints and penetrations to the exterior walls and foundations are properly sealed, weather tight and performing in accordance with the Detailed Designs and Technical Requirements;

(l) chimney stacks and flues are structurally sound and secure and the flue is free from blockages and excess soot;

(m) drainage systems are free flowing, with no blockages;

(n) exhaust and supply vents are free of any blockages; and

(o) attachments to the exterior walls and foundations, described in Section 5.12.1.2 above, shall be structurally sound, securely fastened and functioning in accordance with the Technical Requirements and the Detailed Designs.

The Contractor shall regularly inspect all exterior walls in accordance with the Contractor's Maintenance Plan. All repairs and renewals of the exterior walls and foundation performed by the Contractor shall meet the Technical Requirements and the Detailed Designs, all applicable laws and the relevant Standards and Guidelines.

5.12.1.2.2 Repair Periods

The Contractor shall complete temporary protection and measures or shall complete permanent repairs within the following timelines from the time that the exterior walls and foundation deficiency or impaired condition is reported to the Help Desk:

(a) Emergency Failures – The Contractor shall attend the affected School and respond to any Emergency Failure immediately but in any event no later than two hours from the time of notification. The Contractor shall permanently repair such Emergency Failures within four hours of the Contractor's arrival at the affected School. If the Contractor cannot complete permanent repairs within four hours of the Contractor's arrival at the affected School, the Contractor shall make temporary protection and measures immediately but in any event not later than four hours from notification of the Emergency Failure. Temporary protection and measures may not be in place for more than five days, at which time permanent repairs shall be completed.

(b) Urgent Failures – The Contractor shall permanently repair Urgent Repairs as soon as is practicable but in any event not later than five days after notification of the Urgent Failure.

(c) Routine Failures – The Contractor shall permanently repair Routine Failures as soon as practicable but in any event not later than 30 days after notification of the Routine Failure.

5.12.1.2.3 Payment Adjustments

If the Contractor fails to install the temporary protection and measures or to make permanent repairs, as applicable, within the Repair Period indicated in Section 5.12.1.2.2 above, then Payment Adjustments will be assessed for each Failure as follows:

(a) For Emergency Failures that are not temporarily protected or permanently repaired, as applicable, within the Repair Period, a Payment Adjustment of $2,000 per day or partial day per School will be assessed in accordance with Section 5.11.7;

(b) For Urgent Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $1,000 per day or partial day per School will be assessed until the permanent repairs are completed; and

(c) For Routine Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $500 per day or partial day per School will be assessed until the permanent repairs are completed.

5.12.1.3 Exterior Doors

Exterior doors includes without limitation all entrances to the School Buildings, including steel, aluminum or wood doors and frames, overhead and coiling doors, automatic entrances, door tracks and jambs, air vents, other ventilation outlets, glass, kick plates and finishes, as well as all door hardware components, including without limitation, hinges, locks, catches, door closers and handles, weather stripping, electronic hardware parts and strikes and all overhead door opening equipment, controls and wiring.

5.12.1.3.1 Maintenance Requirements

The Contractor shall properly maintain the exterior doors of each School Building to ensure that the exterior doors:

(a) function and operate safely and perform in accordance with the Technical Requirements and the Detailed Designs;

(b) meet all applicable laws and Authorizations; and

(c) meet the Handback Requirements at the end of the Term.

In addition, the Contractor shall maintain the exterior doors of each School Building to ensure that:

(d) the exterior doors are weather tight;

(e) the exterior doors are free of defects affecting performance, safety and security;

(f) the exterior doors are intact, properly fitted, open and close freely without scraping or binding and latch securely and seal tightly when closed;

(g) door finishes are uniform in colour and free from peeling, scratches, chips or other similar damage, subject to Reasonable Wear and Tear;

(h) door tracks, doorjambs and all door hardware items including hinges, locks, closers, catches and handles are securely fastened and operate without binding, rubbing or catching in any way;

(i) air vents, grilles and other ventilation outlets are not blocked;

(j) exterior door glass is complete and free of cracks, chips or other damage;

(k) all hardware and other attachments are fastened securely with no loose or missing parts and glass and, where applicable, are free of cracks or broken pieces; and

(l) the exterior doors are secure, with the door security system fully operational at all times.

Any damage to an exterior door that prevents a School Building from being secured is deemed to be Emergency Failure.

The Contractor shall regularly inspect all exterior doors in accordance with the Contractor's Maintenance Plan. The Contractor shall perform all repairs and renewals of the exterior doors to meet the Technical Requirements and the Detailed Designs, all applicable laws and the relevant Standards and Guidelines.

5.12.1.3.2 Repair Periods

The Contractor shall complete temporary protection and measures or shall complete permanent repairs within the following timelines from the time that the exterior door deficiency or impaired condition is reported to the Help Desk:

(a) Emergency Failures – The Contractor shall attend the affected School and respond to any Emergency Failure immediately but in any event no later than two hours from the time of notification. The Contractor shall permanently repair such Emergency Failures within four hours of the Contractor's arrival at the affected School. If the Contractor cannot complete permanent repairs within four hours of the Contractor's arrival at the affected School, the Contractor shall make temporary protection and measures immediately but in any event not later than six hours from notification of the Emergency Failure. Temporary protection and measures may not be in place for more than one day, at which time permanent repairs shall be completed.

(b) Urgent Failures – The Contractor shall permanently repair Urgent Repairs as soon as is practicable but in any event not later than five days after notification of the Urgent Failure.

(c) Routine Failures – The Contractor shall permanently repair Routine Failures as soon as practicable but in any event not later than 30 days after notification of the Routine Failure.

5.12.1.3.3 Payment Adjustments

If the Contractor fails to install the temporary protection and measures or to make permanent repairs, as applicable, within the Repair Period indicated in Section 5.12.1.3.2 above, then Payment Adjustments will be assessed for each failure as follows:

(a) For Emergency Failures that are not temporarily protected or permanently repaired, as applicable, within the Repair Period, a Payment Adjustment of $2,000 per day or partial day per School will be assessed in accordance with Section 5.11.7;

(b) For Urgent Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $1,000 per day or partial day per School will be assessed until the permanent repairs are completed; and

(c) For Routine Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $500 per day or partial day per School will be assessed until the permanent repairs are completed.

5.12.1.4 Exterior Windows

Exterior windows include without limitation standard and specialized windows, curtain wall windows and entrance windows including glazing, seals, frames, tracks, ledges and finishes as well as motorized window blinds supplied by the Contractor under Section 4.

5.12.1.4.1 Maintenance Requirements

The Contractor shall properly maintain the exterior windows of each School Building to ensure that the exterior windows:

(a) function and operate safely and perform in accordance with the Technical Requirements and the Detailed Designs;

(b) meet all applicable laws and Authorizations; and

(c) meet the Handback Requirements at the end of the Term.

In addition, the Contractor shall maintain the exterior windows of each School Building to ensure that:

(d) the exterior windows operate to manufacturers' specifications;

(e) the exterior windows are safe and are free of defects affecting performance and security;

(f) the exterior windows are intact and properly fitted and sealed;

(g) the exterior windows are weather tight and free of condensation;

(h) the exterior windows, frames, tracks and ledges are securely fastened and free from cracks, breaks, thermal seal failures or other impairments;

(i) all movable components operate freely and easily with no loose or missing parts;

(j) where applicable, exterior windows open and close without binding; and

(k) exterior windows and components are uniform in colour and free from corroded or cracked finishes or cracked, broken or twisted frames.

The Contractor shall maintain the motorized window blinds to ensure they:

(l) are complete and securely fixed;

(m) are free of noticeable sagging;

(n) are properly fitted providing complete coverage;

(o) open and close properly;

(p) meet the manufacturer's performance requirements; and

(q) are free from tears, holes or other similar damage, subject to Reasonable Wear and Tear.

Any exterior window that is broken (beyond cracking or chipping) shall be deemed to be an Emergency Failure.

The Contractor shall regularly inspect all exterior windows and motorized window blinds shall be regularly inspected in accordance with the Contractor's Maintenance Plan. The Contractor shall perform all repairs and renewals of the exterior windows and motorized window blinds to meet the Technical Requirements and the Detailed Designs, all applicable laws and the relevant Standards and Guidelines.

5.12.1.4.2 Repair Periods

The Contractor shall complete temporary protection and measures or shall complete permanent repairs within the following timelines from the time that the exterior windows or motorized window blinds deficiency or impaired condition is reported to the Help Desk:

(a) Emergency Failures – The Contractor shall attend the affected School and respond to any Emergency Failure immediately but in any event no later than two hours from the time of notification. The Contractor shall permanently repair such Emergency Failures within four hours of the Contractor's arrival at the affected School. If the Contractor cannot complete permanent repairs within four hours of the Contractor's arrival at the affected School, the Contractor shall make temporary protection and measures immediately but in any event not later than six hours from notification of the Emergency Failure. Temporary protection and measures may not be in place for more than three days, at which time permanent repairs shall be completed.

(b) Urgent Failures – The Contractor shall permanently repair Urgent Repairs as soon as is practicable but in any event not later than five days after notification of the Urgent Failure.

(c) Routine Failures – The Contractor shall permanently repair Routine Failures as soon as practicable but in any event not later than 30 days after notification of the Routine Failure.

5.12.1.4.3 Payment Adjustments

If the Contractor fails to install the temporary protection and measures or to make permanent repairs, as applicable, within the Repair Period indicated in Section 5.12.1.4.2 above, then Payment Adjustments will be assessed for each failure as follows:

(a) For Emergency Failures that are not temporarily protected or permanently repaired, as applicable, within the Repair Period, a Payment Adjustment of $2,000 per day or partial day per School will be assessed in accordance with Section 5.11.7;

(b) For Urgent Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $1,000 per day or partial day per School will be assessed until the permanent repairs are completed; and

(c) For Routine Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $500 per day or partial day per School will be assessed until the permanent repairs are completed.

5.12.2 Building Interior

The building interior includes without limitation ceilings, walls, floors and floor coverings, fixtures and fittings, doors, windows and finishes.

5.12.2.1 Ceilings

Ceilings include all ceiling materials and components, including without limitation, acoustic tile, gypsum board or metal linear ceiling surfaces and all structural support frames and components.

5.12.2.1.1 Maintenance Requirements

The Contractor shall properly maintain the ceilings in each School Building to ensure that the ceilings:

(a) function and operate safely and perform in accordance with the Technical Requirements and the Detailed Designs;

(b) meet all applicable laws and Authorizations; and

(c) meet the Handback Requirements at the end of the Term.

In addition, the Contractor shall maintain the ceilings in each School Building to ensure

that:

(d) the ceilings are intact, properly fitted and sealed, and are structurally sound and secure;

(e) the ceilings are complete and level, with a uniform and even surface;

(f) ceiling joints are flush with no loose, missing or broken pieces or components;

(g) the ceilings have no noticeable cracks, damaged finishes, deflections, water marks, staining or damp surfaces;

(h) the ceilings are free from mould, asbestos and other hazardous materials;

(i) the ceilings are uniform in colour and pattern with finishes continuous over the surface; and

(j) the ceilings are free of any impairment which would pose a safety hazard.

Except in the case of an Accessibility Failure, any failure of a ceiling to meet the performance criteria set out in Section 5.12.2.1.1 subsection (h) above shall be deemed to be an Urgent Failure. Any failure of a ceiling to meet the performance criteria set out in Section 5.12.2.1.1 subsection (j) above shall be deemed to be an Emergency Failure.

The Contractor shall regularly inspect all ceilings in accordance with the Contractor's Maintenance Plan. The Contractor shall perform all repairs and renewals of the ceilings to meet the Technical Requirements and the Detailed Designs, all applicable laws and the relevant Standards and Guidelines.

5.12.2.1.2 Repair Periods

The Contractor shall complete temporary protection and measures or shall complete permanent repairs within the following timelines from the time that the ceiling deficiency or impaired condition is reported to the Help Desk:

(a) Emergency Failures – The Contractor shall attend the affected School and respond to any Emergency Failure immediately but in any event no later than two hours from the time of notification. The Contractor shall permanently repair such Emergency Failures within four hours of the Contractor's arrival at the affected School. If the Contractor cannot complete permanent repairs within four hours, the Contractor shall make temporary protection and measures immediately but in any event not later than six hours from notification of the Emergency Failure. Temporary protection and measures may not be in place for more than three days, at which time permanent repairs shall be completed.

(b) Urgent Failures – The Contractor shall permanently repair Urgent Repairs as soon as is practicable but in any event not later than five days after notification of the Urgent Failure.

(c) Routine Failures – The Contractor shall permanently repair Routine Failures as soon as practicable but in any event not later than 30 days after notification of the Routine Failure.

5.12.2.1.3 Payment Adjustments

If the Contractor fails to install the temporary protection and measures or to make permanent repairs, as applicable, within the Repair Period indicated in Section 5.12.2.1.2 above, then Payment Adjustments will be assessed for each failure as follows:

(a) For Emergency Failures that are not temporarily protected or permanently repaired, as applicable, within the Repair Period, a Payment Adjustment of $2,000 per day or partial day per School will be assessed in accordance with Section 5.11.7;

(b) For Urgent Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $1,000 per day or partial day per School will be assessed until the permanent repairs are completed; and

(c) For Routine Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $500 per day or partial day per School will be assessed until the permanent repairs are completed.

5.12.2.2 Interior Walls and Partitions

Interior walls and partitions include without limitation all interior walls, partitions, components and finishes and all supporting elements.

5.12.2.2.1 Maintenance Requirements

The Contractor shall properly maintain the interior walls and partitions in each School Building to ensure that the interior walls and partitions:

(a) function and operate safely and perform in accordance with the Technical Requirements and the Detailed Designs;

(b) meet all applicable laws and Authorizations; and

(c) meet the Handback Requirements at the end of the Term.

In addition, the Contractor shall maintain the interior walls and partitions in each School Building to ensure that:

(d) the interior walls are structurally sound and safe;

(e) the interior walls are adequately protected, uniform and have an even surface;

(f) the interior walls are free from asbestos and other hazardous materials;

(g) the interior walls and partitions have continuity of material across its entire surface;

(h) the interior walls and partitions are free from cracks and/or deflection, damage, distortion or displacement;

(i) the interior walls and partitions are free from dampness and mould;

(j) finishes and coverings are complete, uniform in colour and pattern and are free from peeling, rips, tears or discolouration, subject to Reasonable Wear and Tear;

(k) ventilation penetrations are not blocked;

(l) the interior wall tiling and backsplashes are water tight and free of chipping or lifting; and

(m) the interior wall penetrations, including ventilation grills, are securely fastened.

Except in the case of an Accessibility Failure, any failure of an interior wall to meet the requirements of Section 5.12.2.2.1 subsections (f) and (i) shall be deemed to be an Urgent Failure.

The Contractor shall regularly inspect all interior walls and partitions in accordance with the Contractor's Maintenance Plan. The Contractor shall perform all repairs and renewals of the interior walls and partitions to meet the Technical Requirements and the Detailed Designs, all applicable laws and the relevant Standards and Guidelines.

5.12.2.2.2 Repair Periods

The Contractor shall complete temporary protection and measures or shall complete permanent repairs within the following timelines from the time that the interior wall deficiency or impaired condition is reported to the Help Desk:

(a) Emergency Failures – The Contractor shall attend the affected School and respond to any Emergency Failure immediately but in any event no later than two hours from the time of notification. The Contractor shall permanently repair such Emergency Failures within four hours of the Contractor's arrival at the affected School. If the Contractor cannot complete permanent repairs within four hours of the Contractor's arrival at the affected School, the Contractor shall make temporary protection and measures immediately but in any event not later than six hours from notification of the Emergency Failure. Temporary protection and

measures may not be in place for more than three days, at which time permanent repairs shall be completed.

(b) Urgent Failures – The Contractor shall permanently repair Urgent Repairs as soon as is practicable but in any event not later than five days after notification of the Urgent Failure.

(c) Routine Failures – The Contractor shall permanently repair Routine Failures as soon as practicable but in any event not later than 30 days after notification of the Routine Failure.

5.12.2.2.3 Payment Adjustments

If the Contractor fails to install the temporary protection and measures or to make permanent repairs, as applicable, within the Repair Period indicated in Section 5.12.2.2.2 above, then Payment Adjustments will be assessed for each failure as follows:

(a) For Emergency Failures that are not temporarily protected or permanently repaired, as applicable, within the Repair Period, a Payment Adjustment of $2,000 per day or partial day per School will be assessed in accordance with Section 5.11.7;

(b) For Urgent Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $1,000 per day or partial day per School will be assessed until the permanent repairs are completed; and

(c) For Routine Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $500 per day or partial day per School will be assessed until the permanent repairs are completed.

5.12.2.3 Floors

Floors include but are not limited to hard floors including ceramic tile, terrazzo, concrete and wood flooring, resilient flooring, recessed entry mats and all soft or carpeted floors.

5.12.2.3.1 Maintenance Requirements

The Contractor shall properly maintain the floors in each School Building to ensure that the floors:

(a) function and operate safely and perform in accordance with the Technical Requirements and the Detailed Designs;

(b) meet all applicable laws and Authorizations; and

(c) meet the Handback Requirements at the end of the Term.

In addition, the Contractor shall maintain the floors in each School Building to ensure that:

(d) the floors are structurally sound, intact and properly fitted;

(e) the floor is fully supported at all bearing points;

(f) the floor is water tight with no damp spots;

(g) the floor has no subsidence or differential settlement;

(h) the floors and support systems are free of holes, tears, scoring, cracks, breaks, uneven surfaces, heaving or other impairments;

(i) the floors do not creak or squeak;

(j) floor coverings are to be fully adhered to the floor, do not pose any tripping or other safety hazard and are uniform in colour and pattern, subject to Reasonable Wear and Tear;

(k) flooring does not bubble, blister or stretch;

(l) there is no lifting, tears or cracking at joints or corners;

(m) repairs, patches and replacements shall match colour and pattern of existing floor coverings;

(n) recessed entry mat frames are properly fitted with no tripping hazards or loose parts; and

(o) recessed entry mats are functioning as intended, without material deterioration or wearing.

In addition, the Contractor shall maintain the gymnasium floors:

(p) to ensure that the floor is safe and protected;

(q) the finish is intact and complete with minimal scratches, marks, scuffs, chips or other similar damage, subject to Reasonable Wear and Tear;

(r) the lines are clearly visible and intact; and

(s) to ensure that floor sockets for athletic equipment, such as posts and nets, are secure, safe and functional.

The Contractor shall regularly inspect all floors and floor coverings in accordance with the Contractor's Maintenance Plan. The Contractor shall perform all repairs and renewals of the floors and floor coverings to meet the Technical Requirements and the Detailed Designs, all applicable laws and the relevant Standards and Guidelines.

5.12.2.3.2 Repair Periods

The Contractor shall complete temporary protection and measures or shall complete permanent repairs within the following timelines from the time that the floor deficiency or impaired condition is reported to the Help Desk:

(a) Emergency Failures – The Contractor shall attend the affected School and respond to any Emergency Failure immediately but in any event no later than two hours from the time of notification. The Contractor shall permanently repair such Emergency Failures within four hours of the Contractor's arrival at the affected School. If the Contractor cannot complete permanent repairs within four hours of the Contractor's arrival at the affected School, the Contractor shall make temporary protection and measures immediately but in any event not later than six hours from notification of the Emergency Failure. Temporary protection and measures may not be in place for more than three days, at which time permanent repairs shall be completed.

(b) Urgent Failures – The Contractor shall permanently repair Urgent Repairs as soon as is practicable but in any event not later than five days after notification of the Urgent Failure.

(c) Routine Failures – The Contractor shall permanently repair Routine Failures as soon as practicable but in any event not later than 30 days after notification of the Routine Failure.

5.12.2.3.3 Payment Adjustments

If the Contractor fails to install the temporary protection and measures or to make permanent repairs, as applicable, within the Repair Period indicated in Section 5.12.2.3.2 above, then Payment Adjustments will be assessed for each failure as follows:

(a) For Emergency Failures that are not temporarily protected or permanently repaired, as applicable, within the Repair Period, a Payment Adjustment of $1,000 per day or partial day per School will be assessed in accordance with Section 5.11.7;

(b) For Urgent Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $700 per day or partial day per School will be assessed until the permanent repairs are completed; and

(c) For Routine Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $400 per day or partial day per School will be assessed until the permanent repairs are completed.

5.12.2.4 Fixtures, Fittings, Millwork and Equipment

Fixtures, fittings, millwork and equipment include without limitation all fixed in place millwork, as shown on the Modified School Designs, such as overhead cabinets,

cupboards, counters, laboratory cabinets, classroom storage cabinets, book cases as well as the doors, drawers and shelving and related hardware, bathroom, toilet and locker room partitions, lockers and benches. Millwork not shown in the Modified School Designs is not part of the Contractor's obligations under Schedule 18. Fixtures, fittings, millwork and equipment also include moldings, trim and interior signage provided by the Contractor and paper towel, soap and toilet paper dispensers. Also included is the specific Building Equipment indicated herein such as dust collectors, fume hoods, kiln vents and stove vents, permanently fastened gymnasium divider curtains, the gymnasium stage lighting and the gymnasium equipment referred to in Section 11485 (Gymnasium Equipment) of the Minimum Material Requirements.

5.12.2.4.1 Maintenance Requirements

The Contractor shall properly maintain the fixtures, fittings, millwork and equipment in each School Building to ensure that the fixtures, fittings, millwork and equipment:

(a) function and operate safely and perform in accordance with the Technical Requirements and the Detailed Designs;

(b) meet all applicable laws and Authorizations; and

(c) meet the Handback Requirements at the end of the Term.

In addition, the Contractor shall maintain the fixtures, fittings, millwork and equipment in each School Building to ensure that:

(d) fixtures, fittings and millwork are intact with no missing or damaged parts;

(e) equipment is fully operational, with no missing or damaged parts;

(f) fixtures, fittings, millwork and equipment are properly secured, fastened and fitted;

(g) all finishes and countertop surfaces are firmly attached and free from discolouration or broken pieces;

(h) cabinet doors and drawers open and close freely;

(i) cabinet hardware operates smoothly with no missing parts;

(j) washroom and locker room partitions, doors and lockers are securely fastened;

(k) washroom and locker room partition, door and locker finishes are free from peeling, uniform in colour;

(l) washroom and locker room doors and locker doors swing freely, closing and locking without binding;

(m) equipment performs to manufacturers' specifications;

(n) interior signage provided by the Contractor is legible and securely fastened in place; and

(o) minimum repair or replacement size is one matching length, sheet or single component.

Equipment breakdown and the failure of washroom cubicle doors or locker doors to close and lock shall be deemed to be Urgent Failures.

The Contractor shall regularly inspect the fixtures, fittings, millwork and equipment in accordance with the Contractor's Maintenance Plan. Equipment shall be maintained in accordance with manufacturers' guidelines. The Contractor shall perform all repairs and renewals of the fixtures, fittings, millwork and equipment to meet the Technical Requirements and the Detailed Designs, all applicable laws and the relevant Standards and Guidelines.

5.12.2.4.2 Repair Periods

The Contractor shall complete temporary protection and measures or shall complete permanent repairs within the following timelines from the time that the fixtures, fittings, millwork and equipment deficiency or impaired condition is reported to the Help Desk:

(a) Emergency Failures – The Contractor shall attend the affected School and respond to any Emergency Failure immediately but in any event no later than two hours from the time of notification. The Contractor shall permanently repair such Emergency Failures within four hours of the Contractor's arrival at the affected School. If the Contractor cannot complete permanent repairs within four hours of the Contractor's arrival at the affected School, the Contractor shall make temporary protection and measures immediately but in any event not later than six hours from notification of the Emergency Failure. Temporary protection and measures may not be in place for more than five days, at which time permanent repairs shall be completed.

(b) Urgent Failures – The Contractor shall permanently repair Urgent Repairs as soon as is practicable but in any event not later than five days after notification of the Urgent Failure.

(c) Routine Failures – The Contractor shall permanently repair Routine Failures as soon as practicable but in any event not later than 30 days after notification of the Routine Failure.

5.12.2.4.3 Payment Adjustments

If the Contractor fails to install the temporary protection and measures or to make permanent repairs, as applicable, within the Repair Period indicated in Section 5.12.2.4.2 above, then Payment Adjustments will be assessed for each failure as follows:

(a) For Emergency Failures that are not temporarily protected or permanently repaired, as applicable, within the Repair Period, a Payment Adjustment of

$2,000 per day or partial day per School will be assessed in accordance with Section 5.11.7;

(b) For Urgent Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $1,000 per day or partial day per School will be assessed until the permanent repairs are completed; and

(c) For Routine Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $500 per day or partial day per School will be assessed until the permanent repairs are completed.

5.12.2.5 Interior Doors

Interior doors include hollow metal, steel and solid or hollow wood core doors, and all associated hardware and components such as door frames, tracks and jambs, hinges, locks, catches, closers, handles and glass, where applicable.

5.12.2.5.1 Maintenance Requirements

The Contractor shall properly maintain the interior doors of each School Building to ensure that the interior doors:

(a) function and operate safely and performs in accordance with the Technical Requirements and the Detailed Designs;

(b) meet all applicable laws and Authorizations; and

(c) meet the Handback Requirements at the end of the Term.

In addition, the Contractor shall maintain the interior doors of each School Building to ensure that:

(d) the interior doors are free of defects affecting performance, safety and security;

(e) the interior doors are intact, properly fitted, open and close freely, without scraping or binding and shall latch securely when closed;

(f) door finishes are uniform in colour and free from peeling, scratches, chips or other similar damage, subject to Reasonable Wear and Tear;

(g) door tracks, doorjambs and all door hardware items including hinges, locks, closers, catches and handles are securely fastened and operate without making noise or binding, rubbing or catching in any way;

(h) air vents, grilles and other ventilation outlets are not blocked;

(i) interior door glass is complete and free of cracks, chips or other damage;

(j) all hardware and other attachments are fastened securely with no loose or missing parts and glass and, where applicable, are free of cracks or broken pieces; and

(k) minimum repair or replacement size is one matching length, sheet or single component.

The Contractor shall regularly inspect all interior doors in accordance with the Contractor's Maintenance Plan. The Contractor shall perform all repairs and renewals of the interior doors to meet the Technical Requirements and the Detailed Designs, all applicable laws and the relevant Standards and Guidelines.

5.12.2.5.2 Repair Periods

The Contractor shall complete temporary protection and measures or shall complete permanent repairs within the following timelines from the time that the interior door deficiency or impaired condition is reported to the Help Desk:

(a) Emergency Failures – The Contractor shall attend the affected School and respond to any Emergency Failure immediately but in any event no later than two hours from the time of notification. The Contractor shall permanently repair such Emergency Failures within four hours of the Contractor's arrival at the affected School. If the Contractor cannot complete permanent repairs within four hours of the Contractor's arrival at the affected School, the Contractor shall make temporary protection and measures immediately but in any event not later than six hours from notification of the Emergency Failure. Temporary protection and measures may not be in place for more than three days, at which time permanent repairs shall be completed.

(b) Urgent Failures – The Contractor shall permanently repair Urgent Repairs as soon as is practicable but in any event not later than five days after notification of the Urgent Failure.

(c) Routine Failures – The Contractor shall permanently repair Routine Failures as soon as practicable but in any event not later than 30 days after notification of the Routine Failure.

5.12.2.5.3 Payment Adjustments

If the Contractor fails to install the temporary protection and measures or to make permanent repairs, as applicable, within the Repair Period indicated in Section 5.12.2.5.2 above, then Payment Adjustments will be assessed for each failure as follows:

(a) For Emergency Failures that are not temporarily protected or permanently repaired, as applicable, within the Repair Period, a Payment Adjustment of

$1,000 per day or partial day per School will be assessed in accordance with Section 5.11.7;

(b) For Urgent Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $700 per day or partial day per School will be assessed until the permanent repairs are completed; and

(c) For Routine Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $400 per day or partial day per School will be assessed until the permanent repairs are completed.

5.12.2.6 Interior Windows

Interior windows include without limitation standard and specialized windows, interior wall windows and entrance windows including all frames, tracks, coverings and ledges that form part of the interior window.

5.12.2.6.1 Maintenance Requirements

The Contractor shall properly maintain the interior windows of each School Building to ensure that the interior windows:

(a) function and operate safely and performs in accordance with the Technical Requirements and the Detailed Designs;

(b) meet all applicable laws and Authorizations; and

(c) meet the Handback Requirements at the end of the Term.

In addition, the Contractor shall maintain the interior windows of each School Building to ensure that:

(d) the interior windows operate to manufacturers' specifications;

(e) the interior windows are safe and are free of defects affecting performance;

(f) the interior windows are intact and properly fitted and sealed;

(g) the interior windows, frames, tracks and ledges are securely fastened and free from cracks, breaks, missing parts, broken parts or other impairments;

(h) all movable components, where applicable, are secure and operate freely and easily with no loose or missing parts; and

(i) the interior windows and components are safe and in good operating condition with no broken or cracked glass or other missing or broken parts.

The Contractor shall regularly inspect all interior windows of each School in accordance with the Contractor's Maintenance Plan. The Contractor shall perform all repairs and renewals of the interior windows shall meet the Technical Requirements and the Detailed Designs, all applicable laws and the relevant Standards and Guidelines.

5.12.2.6.2 Repair Periods

The Contractor shall complete temporary protection and measures or shall complete permanent repairs within the following timelines from the time that the interior windows deficiency or impaired condition is reported to the Help Desk:

(a) Emergency Failures – The Contractor shall attend the affected School and respond to any Emergency Failure immediately but in any event no later than two hours from the time of notification. The Contractor shall permanently repair such Emergency Failures within four hours of the Contractor's arrival at the affected School. If the Contractor cannot complete permanent repairs within four hours of the Contractor's arrival at the affected School, the Contractor shall make temporary protection and measures immediately but in any event not later than six hours from notification of the Emergency Failure. Temporary protection and measures may not be in place for more than three days, at which time permanent repairs shall be completed.

(b) Urgent Failures – The Contractor shall permanently repair Urgent Repairs as soon as is practicable but in any event not later than five days after notification of the Urgent Failure.

(c) Routine Failures – The Contractor shall permanently repair Routine Failures as soon as practicable but in any event not later than 30 days after notification of the Routine Failure.

5.12.2.6.3 Payment Adjustments

If the Contractor fails to install the temporary protection and measures or to make permanent repairs, as applicable, within the Repair Period indicated in Section 5.12.2.6.2 above, then Payment Adjustments will be assessed for each failure as follows:

(a) For Emergency Failures that are not temporarily protected or permanently repaired, as applicable, within the Repair Period, a Payment Adjustment of $1,000 per day or partial day per School will be assessed in accordance with Section 5.11.7;

(b) For Urgent Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $700 per day or partial day per School will be assessed until the permanent repairs are completed; and

(c) For Routine Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $400 per day or partial day per School will be assessed until the permanent repairs are completed.

5.12.3 Building Systems

Building systems include without limitation the plumbing system, heating and ventilation system and air conditioning, electrical system, communication system, fire prevention equipment, fire alarm system and elevators.

5.12.3.1 Plumbing System

The plumbing system includes, but is not limited to:

(a) Domestic hot and cold water service including piping system, hot water heater, recirculation pumps and piping and branch piping, non-freeze hose bibbs, supply and drainage lines;

(b) Sanitary sewer including piping, traps or interceptors, drainage lines; and

(c) Plumbing fixtures including water closets, urinals, flush valves, faucets, sinks, non-refrigerated drinking fountains, shower fixtures.

5.12.3.1.1 Maintenance Requirements

The Contractor shall properly maintain the plumbing system in each School Building to ensure that the plumbing system:

(a) meets the Accessibility Criteria applicable to plumbing systems;

(b) functions and operates safely and performs in accordance with the Technical Requirements and the Detailed Designs;

(c) meets all applicable laws and Authorizations; and

(d) meets the Handback Requirements at the end of the Term.

In addition, the Contractor shall maintain the plumbing system in each School Building to ensure that:

(e) a constant supply of hot and cold water is produced for sinks, water closets and urinals on demand;

(f) domestic hot water must be generated for distribution at a minimum of 55°C;

(g) piping insulation is intact and free from dampness or deterioration to ensure no heat loss;

(h) piping and the parts and components thereof are securely fastened;

(i) piping and the parts and components thereof are free of all drips or leaks;

(j) taps, valves and other related parts and fittings function and operate in accordance with the Technical Requirements and the Detailed Designs;

(k) all fixtures, including toilets, urinals, sinks and drinking fountains, are securely fastened, free of all drips or leaks, with all moving parts including taps, flush valves, drain stoppers and water fountains operating freely and easily;

(l) all sanitary sewer pipes, drainage traps and interceptors are free flowing and unblocked;

(m) the sanitary sewer system provides safe conveyance of sewage or waste to the disposal system and contains the odours produced; and

(n) the plumbing system operates with minimal noise and prevents the transmission of discernable vibration into Instructional Areas.

Any failure of a plumbing system to meet the performance criteria set out in Section 5.12.3.1.1 subsections (e) and (g) above shall be deemed to be an Emergency Failure.

The Contractor shall regularly inspect the plumbing system at each School in accordance with the Contractor's Maintenance Plan. The Contractor shall perform all repairs and renewals of the plumbing system to meet the Technical Requirements and the Detailed Designs, all applicable laws and the relevant Standards and Guidelines.

5.12.3.1.2 Repair Periods

The Contractor shall complete temporary protection and measures or shall complete permanent repairs within the following timelines from the time that the plumbing system deficiency or impaired condition is reported to the Help Desk:

(a) Emergency Failures – The Contractor shall attend the affected School and respond to any Emergency Failure immediately but in any event no later than two hours from the time of notification. The Contractor shall permanently repair such Emergency Failures within four hours of the Contractor's arrival at the affected School. If the Contractor cannot complete permanent repairs within four hours of the Contractor's arrival at the affected School, the Contractor shall make temporary protection and measures immediately but in any event not later than six hours from notification of the Emergency Failure. Temporary protection and measures may not be in place for more than three days, at which time permanent repairs shall be completed.

(b) Urgent Failures – The Contractor shall permanently repair Urgent Repairs as soon as is practicable but in any event not later than five days after notification of the Urgent Failure.

(c) Routine Failures – The Contractor shall permanently repair Routine Failures as soon as practicable but in any event not later than 30 days after notification of the Routine Failure.

5.12.3.1.3 Payment Adjustments

If the Contractor fails to install the temporary protection and measures or to make permanent repairs, as applicable, within the Repair Period indicated in Section 5.12.3.1.2 above, then Payment Adjustments will be assessed for each failure as follows:

(a) For Emergency Failures that are not temporarily protected or permanently repaired, as applicable, within the Repair Period, a Payment Adjustment of $3,000 per day or partial day per School will be assessed in accordance with Section 5.11.7;

(b) For Urgent Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $2,000 per day or partial day per School will be assessed until the permanent repairs are completed; and

(c) For Routine Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $1,000 per day or partial day per School will be assessed until the permanent repairs are completed.

5.12.3.2 Heating and Ventilation System and Air Conditioning

The heating and ventilation system includes all equipment and components relating to such system including but not limited to boilers, compressors, furnaces, pumps, motors, controls, duct work, vents, mixing boxes and dampers relating to the delivery of heat, ventilation, air and humidity to each School Building. The air conditioning includes all air conditioning equipment required for high heat areas as described in Section 4.9.7.3.3.

The heating and ventilation system also includes the BMCS.

5.12.3.2.1 Maintenance Requirements

The Contractor shall properly maintain the heating and ventilation system and the air conditioning in each School Building to ensure that the heating and ventilation system and the air conditioning at each School:

(a) meets the Accessibility Criteria applicable to heating and ventilation systems and the air conditioning;

(b) functions and operates safely and performs in accordance with the Technical Requirements and the Detailed Designs;

(c) meets all applicable laws and Authorizations; and

(d) meets the Handback Requirements at the end of the Term.

In addition, the Contractor shall maintain the heating and ventilation system in each School Building to ensure that:

(e) the heating and ventilation system operates to prevent the transmission of discernable vibration into Instructional Areas;

(f) all equipment, parts and components are securely fastened and functioning according to the Detailed Designs and Technical Requirements to ensure energy efficiency;

(g) the heating and ventilation system meet the performance requirements set out in Section 4.9.1.3(c) to (h), Section 4.9.7.3 and Section 4.10.3.9.3(a) to (e);

(h) humidity is maintained such that it meets the performance requirements set out in Section 4.9.1.3(a), Section 4.9.7.3.4 and Section 4.10.3.9.2(a);

(i) all duct work and controls functions without air leakage;

(j) piping and equipment operates with no missing parts;

(k) piping and equipment is free of leaks, rust or corrosion;

(l) where applicable, insulation is intact and free of damage or holes;

(m) filtration media is maintained and replaced as necessary to maintain indoor air quality and the efficient operation of the heating and ventilation system;

(n) the BMCS is maintained to ensure optimum operation of the heating and ventilation system and electrical system, including:

i. resetting the air and heating water supply temperatures;
ii. resetting the humidity from outside air; and
iii. controlling the lighting and car plugs; and

(o) the BMCS operates in accordance with the Detailed Designs and initiates the appropriate alarms as required.

Any failure of the BMCS to initiate appropriate alarms shall be deemed to be an Emergency Failure.

Any temperature fluctuation of the heating and ventilation system which exceeds ±5°C of the set point shall be deemed to be an Emergency Failure.

The Contractor shall regularly inspect, test, verify and calibrate the heating and ventilation system, air conditioning and BMCS at each School in accordance with the Contractor's Maintenance Plan. The Contractor shall perform all repairs and renewals of the heating and ventilation system, air conditioning and BMCS to meet the Technical Requirements and the Detailed Designs, all applicable laws and the relevant Standards and Guidelines.

5.12.3.2.2 Repair Periods

The Contractor shall complete temporary protection and measures or shall complete permanent repairs within the following timelines from the time that the heating and ventilation system and air conditioning deficiency or impaired condition is reported to the Help Desk:

(a) Emergency Failures – The Contractor shall attend the affected School and respond to any Emergency Failure immediately but in any event no later than two hours from the time of notification. The Contractor shall permanently repair such Emergency Failures within four hours of the Contractor's arrival at the affected School. If the Contractor cannot complete permanent repairs within four hours of the Contractor's arrival at the affected School, the Contractor shall make temporary protection and measures immediately but in any event not later than six hours from notification of the Emergency Failure. Temporary protection and measures may not be in place for more than one day, at which time permanent repairs shall be completed.

(b) Urgent Failures – The Contractor shall permanently repair Urgent Repairs as soon as is practicable but in any event not later than five days after notification of the Urgent Failure.

(c) Routine Failures – The Contractor shall permanently repair Routine Failures as soon as practicable but in any event not later than 30 days after notification of the Routine Failure.

5.12.3.2.3 Payment Adjustments

If the Contractor fails to install the temporary protection and measures or to make permanent repairs, as applicable, within the Repair Period indicated in Section 5.12.3.2.2 above, then Payment Adjustments will be assessed for each failure as follows:

(a) For Emergency Failures that are not temporarily protected or permanently repaired, as applicable, within the Repair Period, a Payment Adjustment of $3,000 per day or partial day per School will be assessed in accordance with Section 5.11.7;

(b) For Urgent Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $2,000 per day or partial day per School will be assessed until the permanent repairs are completed; and

(c) For Routine Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $1,000 per day or partial day per School will be assessed until the permanent repairs are completed.

5.12.3.3 Electrical System

The electrical system includes interior lighting, exterior lighting and "electrical - other" described below in Section 5.12.3.3.2.

5.12.3.3.1 Interior and Exterior Lighting

Interior and exterior lighting includes without limitation all light fixtures, lamps, tubes, luminaires, ballasts, room lighting controls, light poles and emergency and exit lighting.

5.12.3.3.1.1 Maintenance Requirements

The Contractor shall properly maintain the interior and exterior lighting in each School Building to ensure that the interior and exterior lighting in each School:

(a) meets the Accessibility Criteria applicable to interior and exterior lighting;

(b) functions and operates safely and performs in accordance with the Technical Requirements and the Detailed Designs;

(c) meets all applicable laws and Authorizations; and

(d) meets the Handback Requirements at the end of the Term.

The Contractor shall maintain the interior lighting in each School Building to ensure that:

(e) interior lighting is fully functional and safe;

(f) interior lighting meets the lux levels set out in Section 4.9.7.6 and Section 4.10.3.7.1;

(g) flickering or burned out lamps or tubes are replaced;

(h) lamps and tubes operate with no sign of visual deterioration;

(i) interior light fixtures are kept securely fastened and free from tarnishing, cracks, chips, peeling or other similar damage;

(j) all shades, light switches and controls are free of cracks, breakage, chips or similar damage;

(k) lighting controls operate in accordance with manufacturers' performance specifications and in accordance with the Detailed Designs;

(l) emergency and exit lighting is kept fully charged and operational at all times;

(m) emergency and exit lighting meets the requirements of the *Canadian Electrical Code* and the *Alberta Building Code 2006;*

(n) all other interior lighting parts and components meet CSA Standards; and

(o) interior lighting does not create a fire hazard.

Any failure of the interior lighting to meet the performance criteria set out in Section 5.12.3.3.1.1 subsections (e) or (o) shall be deemed to be an Emergency Failure.

In addition, the Contractor shall maintain the exterior lighting in each School Building to ensure that:

(p) exterior lighting is fully functional and safe;

(q) exterior lamps and tubes are replaced when flickering or burned out;

(r) exterior light fixtures and poles are maintained in good operating condition;

(s) exterior light fixtures are kept clean and in good repair with no visible corrosion, peeling or discolouration;

(t) exterior light fixtures have no missing or broken parts;

(u) exterior light fixtures and poles are structurally sound and operate safely;

(v) exterior light poles shall be maintained plumb within 10 mm in 1 meter;

(w) exterior light covers shall be secure and free from cracks, broken or missing parts or discolouration; and

(x) exterior lighting does not create a fire hazard.

Any failure of the exterior lighting to meet the performance criteria set out in Section 5.12.3.3.1.1 in subsection (x) shall be deemed to be an Emergency Failure.

The Contractor shall regularly inspect and test the interior and exterior lighting in accordance with the Contractor's Maintenance Plan. The Contractor shall perform all repairs and renewals of interior and exterior lighting shall meet the Technical Requirements and the Detailed Designs, all applicable laws and the relevant Standards and Guidelines.

5.12.3.3.2 Electrical – Other

"Electrical – other" includes without limitation the electrical distribution system, transformers, switchgear, switchboards and panelboards, electrical distribution panels and controls, feeders, circuit breakers, electrical outlets and receptacles, car plugs and posts, conduit, raceway and wiring. "Electrical – other" also includes the emergency lighting system.

5.12.3.3.2.1 Maintenance Requirements

The Contractor shall properly maintain the components of "electrical – other" in each School Building to ensure that the components of "electrical – other":

(a) meets the Accessibility Criteria applicable to the components of "electrical – other";

(b) functions and operates safely and performs in accordance with the Technical Requirements and the Detailed Designs;

(c) meets all applicable laws and Authorizations; and

(d) meets the Handback Requirements at the end of the Term.

The Contractor shall maintain the components of "electrical – other" in each School Building to ensure that:

(e) the power distribution system constantly supplies power to the School;

(f) the power distribution system provides a safe and sufficient power supply in accordance with the Technical Requirements;

(g) the power distribution system functions as designed, without undue noise or vibration;

(h) the main distribution system equipment and components is fully operational and free of defects that affect proper operation of the system;

(i) all raceways, conduit, boxes, wiring, fittings, fixtures, controls and safety devices are fully operational in accordance with the Technical Requirements and the Detailed Designs;

(j) all raceways, conduit, boxes, wiring, fittings, fixtures, controls and safety devices are securely fastened to their intended point of anchorage and labeled;

(k) all electrical outlets and receptacles shall be operational with no broken, missing or loose parts;

(l) all car plug posts are operating in accordance with the Technical Requirements and the Detailed Designs;

(m) all car plug posts are free from damage, peeling finishes or corrosion and shall be free of missing, broken of loose parts; and

(n) the emergency lighting system is operational and functioning in accordance with applicable laws and the Detailed Designs.

Any failure of a power distribution system to meet the requirements of Section 5.12.3.3.2.1 subsections (e) and (f) or the failure of an emergency lighting system to meet the requirements of Section 5.12.3.3.2.1 subsection (n) shall be deemed to be an Emergency Failure.

The components of "electrical – other" at each School shall be regularly inspected and tested in accordance with the Contractor's Maintenance Plan. All repairs and renewals of the components of "electrical – other" shall meet the Technical Requirements and the Detailed Designs, all applicable laws and the relevant Standards and Guidelines.

5.12.3.3.3 Repair Periods

The Contractor shall complete temporary protection and measures or shall complete permanent repairs within the following timelines from the time that any electrical system deficiency or impaired condition is reported to the Help Desk:

(a) Emergency Failures – The Contractor shall attend the affected School and respond to any Emergency Failure immediately but in any event no later than two hours from the time of notification. The Contractor shall permanently repair such Emergency Failures within four hours of the Contractor's arrival at the affected School. If the Contractor cannot complete permanent repairs within four hours of the Contractor's arrival at the affected School, the Contractor shall make temporary protection and measures immediately but in any event not later than six hours from notification of the Emergency Failure. Temporary protection and measures may not be in place for more than five days, at which time permanent repairs shall be completed.

(b) Urgent Failures – The Contractor shall permanently repair Urgent Repairs as soon as is practicable but in any event not later than five days after notification of the Urgent Failure.

(c) Routine Failures – The Contractor shall permanently repair Routine Failures as soon as practicable but in any event not later than 30 days after notification of the Routine Failure.

(d) Lighting levels that fall below the minimum requirements set out in Technical Requirements in any Area and any lamps or tubes within an Instructional Area and any security lighting lamps or tubes in a School which are burned out or flickering must be replaced by the Contractor within one day after notification. All other lamps or tubes that are burned out shall be replaced by the Contractor not later than five days after notification.

5.12.3.3.4 Payment Adjustments

If the Contractor fails to install the temporary protection and measures or to make permanent repairs, as applicable, within the Repair Period indicated in Section 5.12.3.3.3 above, then Payment Adjustments will be assessed for each failure as follows:

(a) For Emergency Failures that are not temporarily protected or permanently repaired, as applicable, within the Repair Period, a Payment Adjustment of $2,000 per day or partial day per School will be assessed in accordance with Section 5.11.7;

(b) For Urgent Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $1,000 per day or partial day per School will be assessed until the permanent repairs are completed;

(c) For Routine Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $500 per day or partial day per School will be assessed until the permanent repairs are completed; and

(d) For lux levels repairs or tube and lamp replacements that are not permanently repaired within the Repair Period, a Payment Adjustment of $500 per day or partial day per school will be assessed until the permanent repairs are completed.

5.12.3.4 Communications Systems

Communication systems include the security system, master clock system, parking controls as well as all ICT conduit and raceways required to be provided by Contractor pursuant to Section 4.

5.12.3.4.1 Maintenance Requirements

The Contractor shall properly maintain the communication systems in each School Building to ensure that the communication systems:

(a) meet the Accessibility Criteria applicable to a particular communication system;

(b) function and operate safely and perform in accordance with the Technical Requirements and the Detailed Designs;

(c) meet all applicable laws and Authorizations; and

(d) meet the Handback Requirements at the end of the Term.

The Contractor shall maintain the communication systems in each School Building to ensure that:

(e) the security system, master clock system and the secondary clock system operate and perform in accordance with the manufacturers' performance specifications and recommendations, and the Technical Requirements;

(f) the security system, master clock system and the secondary clock system shall meet the Technical Requirements and the Detailed Designs;

(g) the security system is fully operational and initiates alarms in accordance with the Technical Requirements; and

(h) ICT conduit and raceways shall be intact and securely fastened at all times.

Any failure of a security system to meet the performance requirements set out in Section 5.12.3.4.1 subsection (g) shall be deemed to be an Emergency Failure.

The Contractor shall regularly inspect and test the security system and master clock system at each School in accordance with the Contractor's Maintenance Plan. The Contractor shall perform all repairs and renewals of any communication system to meet the Technical Requirements and the Detailed Designs, all applicable laws and the relevant Standards and Guidelines.

5.12.3.4.2 Repair Periods

The Contractor shall complete temporary protection and measures or shall complete permanent repairs within the following timelines from the time that the communications systems deficiency or impaired condition is reported to the Help Desk:

(a) Emergency Failures – The Contractor shall attend the affected School and respond to any Emergency Failure immediately but in any event no later than two hours from the time of notification. The Contractor shall permanently repair such Emergency Failures within four hours of the Contractor's arrival at the affected School. If the Contractor cannot complete permanent repairs within four hours of the Contractor's arrival at the affected School, the Contractor shall make temporary protection and measures immediately but in any event not later than six hours from notification of the Emergency Failure. Temporary protection and measures may not be in place for more than one day, at which time permanent repairs shall be completed.

(b) Urgent Failures – The Contractor shall permanently repair Urgent Repairs as soon as is practicable but in any event not later than five days after notification of the Urgent Failure.

(c) Routine Failures – The Contractor shall permanently repair Routine Failures as soon as practicable but in any event not later than 30 days after notification of the Routine Failure.

5.12.3.4.3 Payment Adjustments

If the Contractor fails to install the temporary protection and measures or to make permanent repairs, as applicable, within the Repair Period indicated in Section 5.12.3.4.2 above, then Payment Adjustments will be assessed for each failure as follows:

(a) For Emergency Failures that are not temporarily protected or permanently repaired, as applicable, within the Repair Period, a Payment Adjustment of $2,000 per day or partial day per School will be assessed in accordance with Section 5.11.7;

(b) For Urgent Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $1,000 per day or partial day per School will be assessed until the permanent repairs are completed; and

(c) For Routine Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $500 per day or partial day per School will be assessed until the permanent repairs are completed.

5.12.3.5 Fire Prevention Equipment and Fire Alarm System

Fire prevention equipment includes all fire safety systems and equipment, such as fire sprinklers, standpipe and hose networks, and fire extinguishers (including carbon dioxide, wet chemical, dry chemical, clean agent and foam extinguishers).

The fire alarm system includes, without limitation, the fire alarm system control panel, heat and smoke detectors, pull stations, alarms, anunciators and all associated wiring and equipment.

5.12.3.5.1 Maintenance Requirements

The Contractor shall properly maintain the fire prevention equipment and fire alarm system in each School Building to ensure that the fire prevention equipment and fire alarm system:

(a) meet the Accessibility Criteria applicable to the fire prevention equipment and the fire alarm system;

(b) function and operate safely and perform in accordance with the Technical Requirements and the Detailed Designs;

(c) meet all applicable laws and Authorizations; and

(d) meet the Handback Requirements at the end of the Term.

The Contractor shall maintain the fire prevention equipment and fire alarm system in each School Building to ensure that:

(e) the fire prevention equipment and fire alarm system are fully functional and operating as designed;

(f) fire prevention equipment and fire alarm system are maintained, repaired and updated, as required, to ensure it is in compliance with the Technical Requirements and all applicable laws;

(g) sprinkler systems and components shall be free of leaks and damage, with all parts functioning and operational in accordance with the requirements of the Technical Requirements and the Detailed Designs;

(h) where any fire prevention equipment or component of the fire alarm system requires replacement, the Contractor shall replace such equipment with equipment of an equivalent or higher standard than the existing equipment or component; and

(i) fire extinguishers and other fire fighting equipment are maintained in accordance with the relevant Standards and Guidelines (i.e. CSA Standards).

Any failure of the fire prevention equipment or fire alarm system to meet the performance requirements set out in Section 5.12.3.5.1 subsection (e) shall be deemed to be an Emergency Failure. Any failure of a fire protection equipment or fire alarm system to comply with applicable laws or Authorizations shall be deemed to be an Emergency Failure.

Suitable systems and procedures must be established and maintained by the Contractor to ensure that all fire prevention equipment is examined and tested, with the records of all such tests and the dates thereof prepared in an accurate and sufficiently detailed manner. The Contractor shall ensure that the fire protection equipment and fire alarm system at each School is regularly monitored in accordance with the Contractor's Maintenance Plan and tested in accordance with all applicable laws and Authorizations.

5.12.3.5.2 Repair Periods

The Contractor shall complete temporary protection and measures or shall complete permanent repairs within the following timelines from the time that the fire prevention equipment and fire alarm system deficiency or impaired condition is reported to the Help Desk:

(a) Emergency Failures – The Contractor shall attend the affected School and respond to any Emergency Failure immediately but in any event no later than two hours from the time of notification. The Contractor shall permanently repair such Emergency Failures within two hours of the Contractor's arrival at the affected School. If the Contractor cannot complete permanent repairs within two hours of the Contractor's arrival at the affected School, the Contractor shall make temporary protection and measures immediately but in any event not later than four hours from notification of the Emergency Failure. Temporary protection and measures may not be in place for more than four hours, at which time permanent repairs shall be completed.

(b) Urgent Failures – The Contractor shall permanently repair Urgent Repairs as soon as is practicable but in any event not later than five days after notification of the Urgent Failure.

(c) Routine Failures – The Contractor shall permanently repair Routine Failures as soon as practicable but in any event not later than 30 days after notification of the Routine Failure.

5.12.3.5.3 Payment Adjustments

If the Contractor fails to install the temporary protection and measures or to make permanent repairs, as applicable, within the Repair Period indicated in Section 5.12.3.5.2 above, then Payment Adjustments will be assessed for each failure as follows:

(a) For Emergency Failures that are not temporarily protected or permanently repaired, as applicable, within the Repair Period, a Payment Adjustment of $4,000 per day or partial day per School will be assessed in accordance with Section 5.11.7;

(b) For Urgent Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $2,000 per day or partial day per School will be assessed until the permanent repairs are completed; and

(c) For Routine Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $1,000 per day or partial day per School will be assessed until the permanent repairs are completed.

5.12.3.6 Building Elevators

Building elevators include but are not limited to the elevator cab, cabling, telephone, indicator lights, call buttons, door openers, controllers, pit drains, and all parts and components thereof.

5.12.3.6.1 Maintenance Requirements

The Contractor shall properly maintain the building elevator in each School Building to ensure that the building elevator:

(a) functions and operates safely and performs in accordance with the Technical Requirements and the Detailed Designs;

(b) meets all applicable laws and Authorizations; and

(c) meets the Handback Requirements at the end of the Term.

The Contractor shall maintain the building elevator in each School Building to ensure that:

(d) the building elevator is operational and available for use;

(e) the building elevator maintains a speed of 0.50 meters per second;

(f) the elevator car moves smoothly;

(g) the elevator car levels properly at each floor, without tripping hazards;

(h) the doors opening smoothly without binding;

(i) all elevator safety devices function properly;

(j) all parts and components, including but not limited to, indicator lights, call buttons, emergency telephone, door openers and controllers operate in accordance with the Technical Requirements and the Detailed Designs; and

(k) the elevator door and passenger compartment finishes must be free from peeling or discolouration and, where applicable, paneling must be securely fastened.

Any failure of the building elevator to meet the performance requirement set out in Section 5.12.3.6.1 subsections (d) or (e) shall be deemed to be an Emergency Failure.

The Contractor shall ensure that the building elevator is regularly maintained by qualified personnel. The Contractor shall ensure that the building elevator shall be inspected annually in accordance with applicable laws and Authorizations.

5.12.3.6.2 Occupant Release Requirements

The Contractor shall immediately respond to all elevator alarms or telephone calls from a building elevator and immediately initiate the required action to release occupants.

In the event of failure in the operation of the building elevator, elevator occupants must be released from the elevator as soon as practicable but in any event no later than one hour from notification.

5.12.3.6.3 Repair Periods

The Contractor shall complete temporary protection and measures or shall complete permanent repairs within the following timelines from the time that the building elevator deficiency or impaired condition is reported to the Help Desk:

(a) Emergency Failures – The Contractor shall attend the affected School and respond to any Emergency Failure immediately but in any event no later than two hours from the time of notification. The Contractor shall permanently repair such Emergency Failures within four hours of the Contractor's arrival at the affected School. If the Contractor cannot complete permanent repairs within four hours of the Contractor's arrival at the affected School, the Contractor shall make temporary protection and measures immediately but in any event not later than six hours from notification of the Emergency Failure. Temporary protection and measures may not be in place for more than one day, at which time permanent repairs shall be completed.

(b) Routine Failures – The Contractor shall permanently repair Routine Failures as soon as practicable but in any event not later than 5 days after notification of the Routine Failure.

5.12.3.6.4 Payment Adjustments

(a) If the Contractor fails to release the occupants of a building elevator which has failed to operate within the time stipulated in Section 5.12.3.6.2 above, a Payment Adjustment will be assessed for each such failure at $750 for every half-hour of delay per School.

(b) If the Contractor fails to install the temporary protection and measures or to make permanent repairs, as applicable, within the Repair Period indicated in Section 5.12.3.6.3 above, then Payment Adjustments will be assessed for each failure, as follows:

(i) For Emergency Failures that are not temporarily protected or permanently repaired, as applicable, within the Repair Period, a Payment Adjustment of $4,000 per day or partial day per School will be assessed in accordance with Section 5.11.7; and

(ii) For Routine Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $1,000 per day or partial day per School will be assessed until the permanent repairs are completed.

5.12.4 Exterior Improvements

Exterior Improvements do not include the pathway constructed by the Contractor as a CBE Variation under Section 4.9.3.1.

5.12.4.1 Snow and Ice Removal and Control

5.12.4.1.1 Maintenance Requirements

The Contractor shall maintain pedestrian and vehicular traffic areas (other than sidewalks at a School and the main School Building entrance area), including City sidewalks at each School Site, by keeping such areas free of snow and ice through:

(a) plowing, sanding and salting (including the application of other ice-melt products);

(b) removal of snow and ice from these areas (other than sidewalks on a School Site and the main School Building entrance area); and

(c) locating snow piles at a School Site away from vehicular and pedestrian access and travel points to ensure the safety and proper visibility for pedestrians and vehicles at such School Site.

as more fully described in the Contractor's Maintenance Plan.

The Contractor is responsible, at its own cost, for repairing all damage to paved surfaces, sidewalks, landscaping and fixtures arising as a result of its snow and ice removal activities as soon as weather permits but with temporary protection and measures put in place immediately.

5.12.4.1.2 Repair Periods

The Contractor shall complete all snow and ice removal obligations at each School within the following timelines:

(a) City sidewalks

(i) Snow accumulations of greater than 10 centimeters in any 24 hour period shall be removed by 07:00 a.m. the day following the cessation of the snowfall;
(ii) Ice conditions shall be managed (sanding, salting, etc) by 07:00 a.m. on each day; and
(iii) Snow accumulations of less than 10 centimeters in any 24 hour period shall be removed as required by applicable laws.

(b) Transportation Drop Off Areas and Parking Areas

(i) Snow accumulations of greater than 15 centimetres in any 24 hour period shall be removed by 07:00 a.m. on the day following the cessation of the snowfall;
(ii) Ice conditions shall be managed (sanding, salting, etc) by 07:00 a.m. on each day; and
(iii) Snow accumulations of less than 15 centimetres in any 24 hour period shall be removed within five days following the cessation of the snowfall.

5.12.4.1.3 Payment Adjustments

If the Contractor fails to meet the snow and ice removal obligations within the Repair Period stipulated in Section 5.12.4.1.2 above, then Payment Adjustments for each failure will be assessed as follows:

(a) For snow and ice removal under Sections 5.12.4.1.2(a)(i) and (ii) and (b)(i) and (ii), a Payment Adjustment of $100 per hour of delay per School shall be assessed until the removal has been completed; and

(b) For snow removal under Sections 5.12.4.1.2(a) (iii) and (b) (iii), a Payment Adjustment of $300 per day or partial day per School shall be assessed until the removal has been completed.

5.12.4.2 Exterior Improvements (excluding Landscaped Areas)

5.12.4.2.1 Maintenance Requirements

The Contractor shall properly maintain the Exterior Improvements (excluding landscaped areas) at each School to ensure that the Exterior Improvements (excluding landscaped areas):

(a) meet the requirements of the Technical Requirements and the Detailed Designs;

(b) meet all applicable laws and Authorizations; and

(c) meet the Handback Requirements at the end of the Term.

The Contractor shall maintain the Exterior Improvements (excluding landscaped areas) at each School to ensure that:

(d) concrete, asphalt or other hard surface materials have no uneven surfaces, tripping hazards, spalling, holes, damaged or broken curbs and are free of potholes, open cracks, and sinking;

(e) concrete, asphalt and other hard surface materials are safe, sound, smooth, even and continuous, with minimal patching;

(f) curbs and edgings are sound, with no chips, cracks, breaks;

(g) all areas drain as set out in the Technical Requirements and the Detailed Designs;

(h) the drainage system, including all gutters and drains, are kept clean and unblocked and function in accordance with the Technical Requirements and the Detailed Designs;

(i) all roadway, lane and parking lot lines are clear and complete;

(j) barrier free access is maintained, where applicable;

(k) exterior signs including informational, directional and parking signs are legible, free from rust, corrosion, peeling or fading, with all posts maintained plumb;

(l) exterior structures including but not limited to flagpoles, fencing, railings, bicycle racks and exterior wall signage are safe, sound, secure and operational and free from rust, corrosion, peeling or fading;

(m) flagpoles are maintained plumb; and

(n) permanently fastened fixtures are maintained in a safe condition, securely fastened and free from rust, corrosion or peeling.

The Contractor shall regularly monitor and inspect the Exterior Improvements (excluding landscaped areas) in accordance with the Contractor's Maintenance Plan. The Contractor shall perform all repairs and renewals of any Exterior Improvement (excluding landscaped areas) to meet the Technical Requirements and the Detailed Designs, all applicable laws and the relevant Standards and Guidelines.

5.12.4.2.2 Repair Periods

The Contractor shall install temporary protection and measures or shall complete permanent repairs within the following timelines from the time that the Exterior Improvements (excluding Landscaped Areas) deficiency or impaired condition is reported to the Help Desk:

(a) Emergency Failures – The Contractor shall attend the affected School and respond to any Emergency Failure immediately but in any event no later than two hours from the time of notification. The Contractor shall permanently repair such Emergency Failures within four hours of the Contractor's arrival at the affected School. If the Contractor cannot complete permanent repairs within four hours of the Contractor's arrival at the affected School, the Contractor shall make temporary protection and measures immediately but in any event not later than six hours from notification of the Emergency Failure. Temporary protection and measures may not be in place for more than one day, at which time permanent repairs shall be completed.

(b) Urgent Failures – The Contractor shall permanently repair Urgent Repairs as soon as is practicable but in any event not later than 10 days after notification of the Urgent Failure.

(c) Routine Failures – The Contractor shall permanently repair Routine Failures as soon as practicable but in any event not later than 60 days after notification of the Routine Failure.

5.12.4.2.3 Payment Adjustments

If the Contractor fails to install the temporary protection and measures or to make permanent repairs, as applicable, within the Repair Period indicated in Section 5.12.4.2.2 above, then Payment Adjustments will be assessed for each failure as follows:

(a) For Emergency Failures that are not temporarily protected or permanently repaired, as applicable, within the Repair Period, a Payment Adjustment of $500 per day or partial day per School will be assessed in accordance with Section 5.11.7;

(b) For Urgent Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $300 per day or partial day per School will be assessed until the permanent repairs are completed; and

(c) For Routine Failures that are not permanently repaired within the Repair Period, a Payment Adjustment of $100 per day or partial day per School will be assessed until the permanent repairs are completed.

5.12.4.3 Landscaped Areas

The landscaped areas include all grass, trees, shrubs and other decorative plants at each School.

5.12.4.3.1 Maintenance Requirements:

The Contractor shall properly maintain the landscaped areas at each School to ensure that the landscaped areas:

(a) meet the requirements of the Technical Requirements and the Detailed Designs;

(b) meet all applicable laws and Authorizations; and

(c) meet the Handback Requirements at the end of the Term.

The Contractor shall maintain the landscaped areas at each School to ensure that:

(d) the landscaped areas reasonably weed free and are in a healthy growing condition, with edges neatly trimmed;

(e) trees and shrubs are regularly pruned and fertilized, with dead growth removed;

(f) dead or diseased trees or shrubs are promptly removed and replaced, as required;

(g) tree and shrub growth does not interfere with walkways and does not cause a safety hazard or become unsightly;

(h) mulch or other ground cover is in place with uniform and complete coverage;

(i) all landscaped areas drain as required in the Detailed Designs;

(j) edging is completed once per month;

(k) grass height is maintained between 60 and 75 mm;

(l) fertilizer is applied at a minimum of three times per year or as further required to maintain healthy growth; and

(m) aerating is done annually.

The Contractor shall monitor the landscaped areas in accordance with the Contractor's Maintenance Plan. All replacement shrubs, trees or decorative plants shall meet the requirements of the Technical Requirements and relevant Authorizations.

5.12.4.3.2 Repair Periods

The Contractor shall correct or repair the landscaped area deficiencies within the following timelines from the time that deficiency is reported to the Help Desk:

(a) Deficiencies that pose a safety hazard to School staff, students and the public shall be permanently repaired within one day. If permanent repairs cannot be completed within one day, temporary protection or measures shall be made immediately but in any event no later than one day from notification. Temporary protection and measures shall not be in place for more than 7 days at which time permanent repairs shall be completed;

(b) Deficiencies such as grass length, weed control, dead or diseased growth, shall be corrected within 7 days; and

(c) Deficiencies such as dead or diseased shrub or tree replacements, failure to fertilize or aerate shall be corrected within 30 days.

5.12.4.3.3 Payment Adjustments

If the Contractor fails to make the temporary protection and measures, permanent corrections or corrections within the Repair Periods indicated in Section 5.12.4.3.2 above, then a Payment Adjustment of $300 per day or partial day per School will be assessed for each failure until the permanent repairs or corrections are completed.

5.12.5 Graffiti Removal

5.12.5.1 General

In this Section 5.12.5, "Graffiti" shall mean any images or lettering scratched, scrawled, painted or marked in any manner anywhere in or on any School that are vulgar, gang related, sexually offensive, or offensively names an individual, contains swear words or other offensive slurs or any other markings, images, symbols or lettering on any School that are not part of the normal finish of that School's surfaces..

Notwithstanding any other provision in the DBFM Agreement or this Schedule 18 (Technical Requirements), the Contractor is not required to remove Graffiti unless and until the Province calls the Help Desk to request such removal. The Province may at any time request the removal of specific Graffiti in which case Section 5.12.5.2 shall apply. In respect of each School, not more than once every three years after School Availability for that School, the Province may request the general cleanup and removal of all Graffiti at that School in which case Section 5.12.5.3 shall apply.

5.12.5.2 Specific Graffiti Removal

Upon notification to the Help Desk requesting specific Graffiti removal, the Contractor shall:

(a) immediately, but in any event within 24 hour's of notification, remove the specified Graffiti from the interior or exterior of the affected School or any Exterior Improvements. If the Contractor fails to remove the Graffiti within such Repair Period, a Payment Adjustment of $1000 per day per School will be assessed until the Graffiti is removed.

(b) if the removal of the Graffiti damages the finish to the Building Element or Exterior Improvement, the damaged finish will be repaired or replaced within 60 days from the date of the removal of the Graffiti. If the Contractor fails to repair or replace the damaged finish within such Repair Period, a Payment Adjustment of $500 per day per School will be assessed until the damaged finish is repaired or replaced.

5.12.5.3 General Graffiti Removal

Upon notification to the Help Desk requesting general Graffiti removal, the Contractor shall:

(a) within 14 days of the Help Desk notification, provide the Province with a workplan outlining the nature and extent of the work to be carried out and the proposed dates, times and duration during a School Holiday that such work will be carried out. The Province shall approve the dates proposed for such work or propose alternate dates;

(b) during the period agreed upon, carry out the general cleanup and removal of Graffiti from the interior or exterior of the affected School and any Exterior Improvements and the repair of any damaged finishes. If the Contractor fails to remove the Graffiti and repair any damaged finishes within this period, a Payment Adjustment of $1000 per day per School will be assessed until the Graffiti is removed and the finishes are repaired.

5.12.6 Repeat Failures

5.12.6.1 Building Performance Failures

Where three or more of the same type of Building Performance Failures (whether consecutive or not) occur at the same School in any rolling six month period during the School M&R Period and M&R Period in relation to the same Building Performance Failure, then:

(a) on the second Building Performance Failure in that six month period, the Payment Adjustment for the second Building Performance Failure will equal the Original Payment Adjustment for the Building Performance Failure multiplied by two;

(b) on the third Building Performance Failure in that six month period, the Payment Adjustment for the third Building Performance Failure will equal the Original Payment Adjustment for the Building Performance Failure multiplied by four.

5.12.6.2 Service Failures

Where three or more Service Failures (whether consecutive or not) occur in any rolling six month period during the School M&R Period and M&R Period in relation to the same Service Failure, then:

(a) on the second Service Failure in that six month period, the Payment Adjustment for the second Service Failure will equal the Original Payment Adjustment for the Service Failure multiplied by two;

(b) on the third Service Failure in that six month period, the Payment Adjustment for the third Service Failure will equal the Original Payment Adjustment for the Service Failure multiplied by four.

5.12.6.3 Accessibility Failures (other than School Building)

Where three or more Accessibility Failures other than to the School Building (whether consecutive or not) occur at the same School in any rolling six month period during the School M&R Period and M&R Period in relation to the same Building Performance Failure, then:

(a) on the second Accessibility Failure in that six month period, the Payment Adjustment for the second Accessibility Failure will equal the Original Payment Adjustment for the Accessibility Failure multiplied by two;

(b) on the third Accessibility Failure in that six month period, the Payment Adjustment for the third Accessibility Failure will equal the Original Payment Adjustment for the Accessibility Failure multiplied by four.

5.12.6.4 Accessibility Failures – School Building

Where there are three occurrences (whether consecutive or not) of the same School Building being declared Inaccessible pursuant to Section 5.9.4 in any rolling six month period during the School M&R Period and M&R Period, then:

(a) on the second Accessibility Failure of such School Building in that six month period the Payment Adjustment for the second Accessibility Failure of such School Building will equal the Original Payment Adjustment for the Accessibility Failure of such School Building multiplied by two;

(b) the third Accessibility Failure of such School Building in that six month period shall be a potential Termination Event for the purposes of and having the consequences set out in section 16.8(k) of the DBFM Agreement.

The Province shall notify the Contractor after the first and second occurrence of noncompliance with the School Building Accessibility performance requirement in any rolling six month period.

5.12.7 Reporting Failures

A "Reporting Failure" means a failure by the Contractor to record or to correctly record an Accessibility Failure Payment Adjustment, a Service Failure Payment Adjustment, a Building Performance Failure Payment Adjustment, a Repeat Failure Payment Adjustment or a Reporting Failure Payment Adjustment in respect of an event which should have given rise to an Accessibility Failure Payment Adjustment, a Service Failure Payment Adjustment, a Building Performance Failure Payment Adjustment, a Repeat Failure Payment Adjustment or a Reporting Failure Payment Adjustment, if it had been correctly reported.

5.12.7.1 Payment Adjustment

Any error or omission, including a failure to report an Accessibility Failure Payment Adjustment, a Service Failure Payment Adjustment, a Building Performance Failure Payment Adjustment, a Repeat Failure Payment Adjustment or a Reporting Failure Payment Adjustment, in the information to be provided by the Contractor under section 9.3 of the DBFM Agreement shall result in a Payment Adjustment as calculated below.

In any month in the School M&R Period and the M&R Period that a Reporting Failure is identified (regardless of when it occurred), the Contractor must:

(a) where an Accessibility Failure Payment Adjustment, a Service Failure Payment Adjustment, a Building Performance Failure Payment Adjustment, a Repeat Failure Payment Adjustment or a Reporting Failure Payment Adjustment is not reported, record the relevant Payment Adjustment;

(b) where a Reporting Failure, an Accessibility Failure Payment Adjustment, a Service Failure Payment Adjustment, a Building Performance Failure Payment Adjustment, a Repeat Failure Payment Adjustment or a

Reporting Failure Payment Adjustment was incorrectly calculated, record the correction to be included; and

(c) on the 3rd Reporting Failure in any 12 month period, record a Reporting Failure Payment Adjustment of a sum equal to 50% of the relevant Payment Adjustments referred to in (a) and (b) above.

5.12.8 Energy Management

The Contractor shall prepare an annual Energy Consumption Report measured against the Base Consumption, by energy type and time-phased by month for each School. The Energy Consumption Reports shall be provided to the Province on or before the first School Day in September during the School M&R Period and the M&R Period.

5.12.8.1 Payment Adjustment

If the Contractor fails to provide an Energy Consumption Report for each School within the time stipulated, a Payment Adjustment of $600/day or partial day for each undelivered Energy Consumption Report shall be applied until received.

SECTION 6 – HANDBACK ON EXPIRY REQUIREMENTS

6. HANDBACK ON EXPIRY REQUIREMENTS

This Section 6 sets out the Handback on Expiry Requirements applicable to the Schools.

6.1 General

Not earlier than 365 days and not later than 90 days prior to the end of the Term, the Contractor shall perform and deliver all of the requirements as detailed in its Handback on Expiry Plan set out in Schedule 4 (Contractor's Management Systems and Plans) for each School.

6.1.1 Payment Adjustments

If the Contractor fails to perform the Handback on Expiry Requirements for each School within the time stipulated, a Payment Adjustment of $3,000 per day for each School shall be assessed until the Handback on Expiry Requirements for a School are completed.

SECTION 7 - HANDBACK REQUIREMENTS

7. HANDBACK REQUIREMENTS

This Section 7 sets out the Handback Requirements applicable to the Schools.

7.1 Handback Requirements

At the end of Term, the Contractor shall hand back the Schools to the Province in a condition that meets or exceeds the following requirements:

(a) The School Buildings meet all of the Accessibility Criteria;

(b) The Schools fully comply with all applicable laws and Authorizations;

(c) Each Building Element, Building System, all Building Equipment and the Exterior Improvements at a School shall be in good condition and operating order, excluding Reasonable Wear and Tear, and, if applicable, shall not have any structural faults and/or defect; and

(d) Each Building Element, Building System, all Building Equipment and the Exterior Improvements at a School shall perform in accordance with performance specifications and standards set out in the Technical Requirements and the Detailed Designs subject to Reasonable Wear and Tear.

SCHEDULE 18 (TECHNICAL REQUIREMENTS)

APPENDICES

APPENDIX A – STANDARD CORE SCHOOL DESIGN REPORTS

Attachment A1 – Barr Ryder – K-9 (600) – November 12, 2007 – 67 and 18 pages

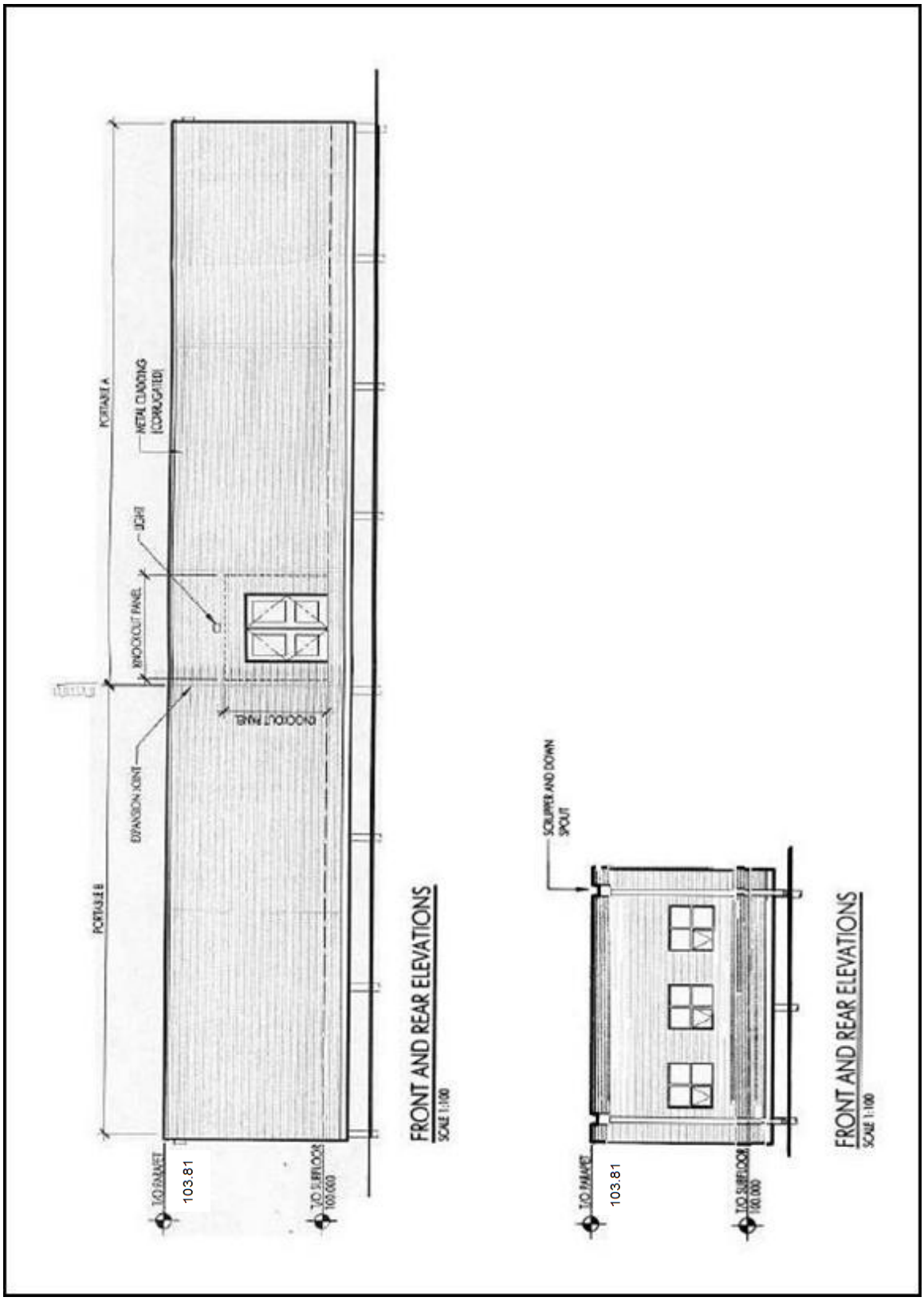
Attachment A2 – Barr Ryder – K-9 (900) – November 12, 2007 – 73 and 44 pages

Attachment A3 – Group2 Architecture Engineering Ltd. – K-6 (600) (October, 2007) – 76 pages

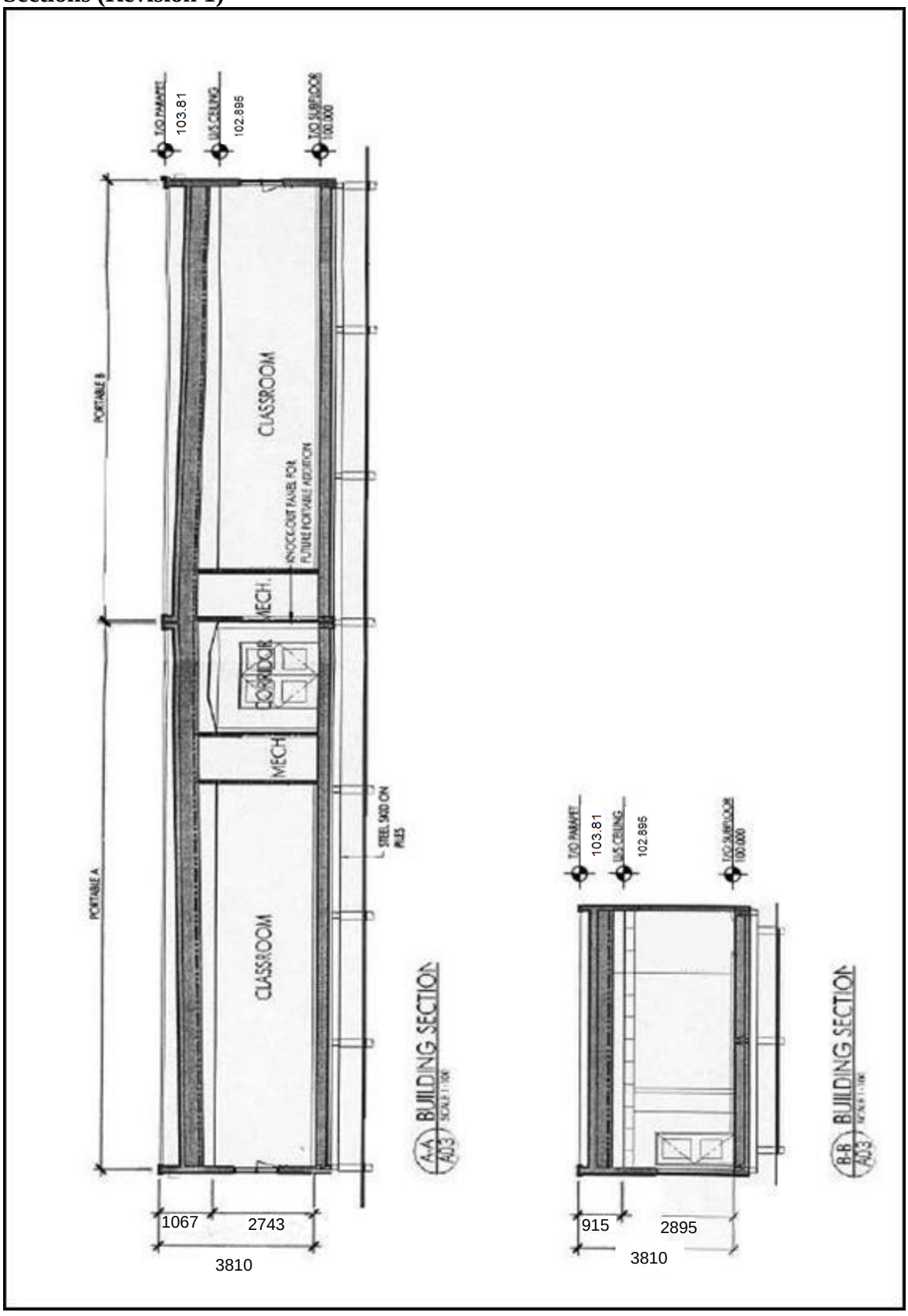
Separate Attachments – total of 278 pages

APPENDIX B – (REVISED) BASIC MODULAR CLASSROOM INFORMATIONAL PLANS

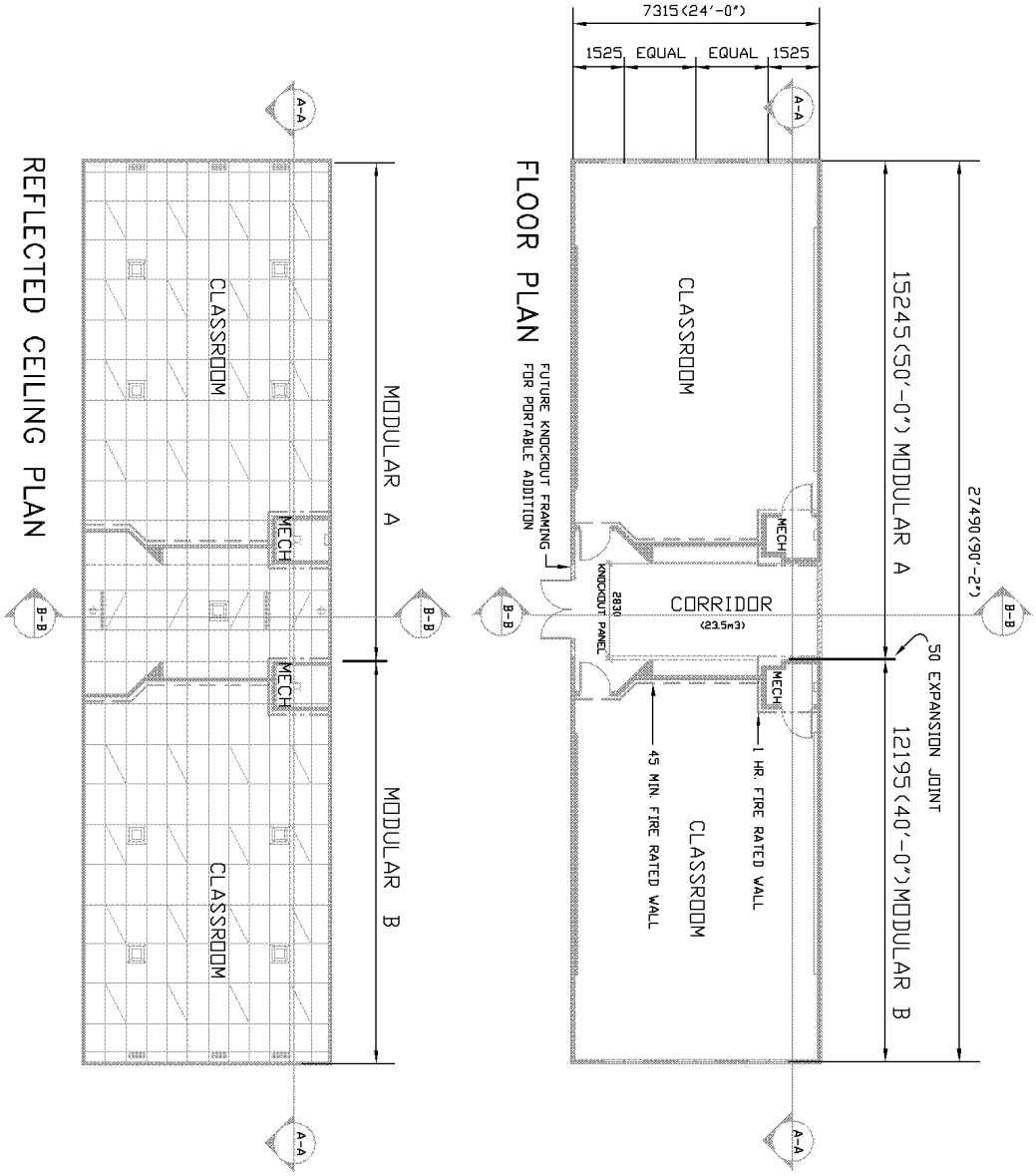
Elevations (Revision 1)



Sections (Revision 1)



Floor and Ceiling Plans



DECEMBER 2007

APPENDIX C - MODIFIED SCHOOL DESIGNS

List of Modified School Design drawings (separate attachments) and electrical power and data plans (separate attachments)

Modified School Design Drawing #	Electrical Power and Data Plan #	School Board	City	Community
2	**E-2**	CBE	Calgary	Saddle Ridge
9	**E-9**	CBE	Calgary	Evergreen
1	**E-1**	CBE	Calgary	Bridlewood
2	**E-2**	CBE	Calgary	Cranston
10	**E-10**	CBE	Calgary	Royal Oak
11	**E-10**	CBE	Calgary	West Springs
3	**E-3**	CSSD	Calgary	Evergreen
8A & 8B	**E-8A & E-8B**	CSSD	Calgary	Cranston
8A & 8B	**E-8A & E-8B**	CSSD	Calgary	Saddle Ridge
4	**E-4**	ECS	Edmonton	The Hamptons – 'The Grange'
4	**E-4**	ECS	Edmonton	Rutherford East
5	**E-5**	ECS	Edmonton	Terwillegar Heights
6A & 6B	**E-6A & E-6B**	EPSB	Edmonton	Carlton
6A & 6B	**E-6A & E-6B**	EPSB	Edmonton	Tamarack
7A & 7B	**E-7A & E-7B**	EPSB	Edmonton	Terwillegar Towne
6A & 6B	**E-6A & E-6B**	EPSB	Edmonton	Belle Rive
7A & 7B	**E-7A & E-7B**	EPSB	Edmonton	Rutherford West
6A & 6B	**E-6A & E-6B**	EPSB	Edmonton	Hollick-Kenyon

APPENDIX D – SITE LAYOUTS AND LANDSCAPE DEVELOPMENT PLANS

Attachment 1 – Site Layouts

Attachment 2 – Landscape Development Plans

ATTACHMENT 1 – SITE LAYOUTS

List of Site Layout Drawings – Separate attachment 18 pages

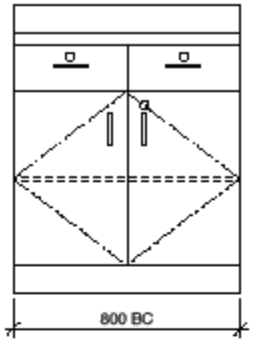
School Board	City	Community
CBE	Calgary	Saddle Ridge
CBE	Calgary	Evergreen
CBE	Calgary	Bridlewood
CBE	Calgary	Cranston
CBE	Calgary	Royal Oak
CBE	Calgary	West Springs
CSSD	Calgary	Evergreen
CSSD	Calgary	Cranston
CSSD	Calgary	Saddle Ridge
ECS	Edmonton	Terwillegar Heights
ECS	Edmonton	The Hamptons – 'The Grange'
ECS	Edmonton	Rutherford East
EPSB	Edmonton	Carlton
EPSB	Edmonton	Tamarack
EPSB	Edmonton	Terwillegar Towne
EPSB	Edmonton	Belle Rive
EPSB	Edmonton	Rutherford West
EPSB	Edmonton	Hollick-Kenyon

ATTACHMENT 2 – LANDSCAPE DEVELOPMENT PLANS

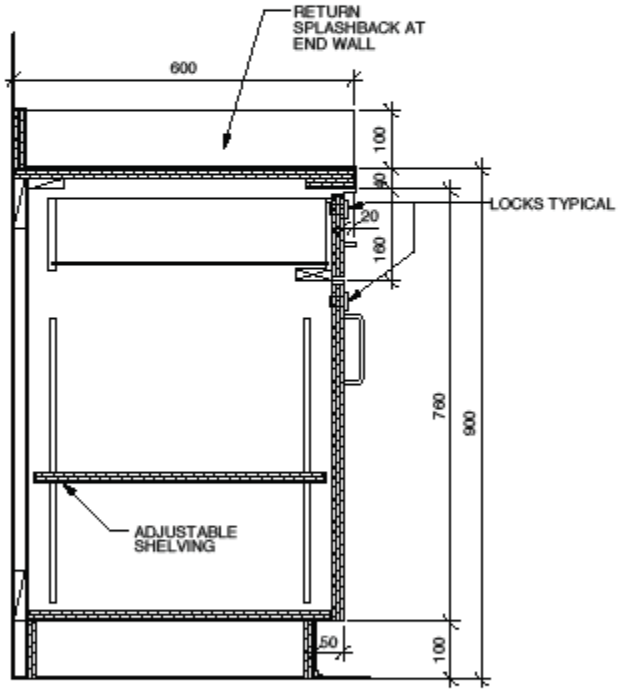
List of Landscape Development Plans – Separate attachment, 18 pages

Drawing No.	Title	School Site
L.01	Landscape Development Plan	K-9 Belle Rive Lake District Public Elementary Junior High School
L.02	Landscape Development Plan	K-9 Carlton Public Elementary Junior High School
L.03	Landscape Development Plan	K-9 Hollick Kenyon Pilot Sound Public Elementary Junior High School
L.04	Landscape Development Plan	K-9 Rutherford West Heritage Valley Public Elementary Junior High School
L.05	Landscape Development Plan	K-9 Tamarack The Meadows Public Elementary Junior High School
L.06	Landscape Development Plan	K-9 Terwillegar Town Public Elementary Junior High School
L.07	Landscape Development Plan	K-9 Hampton's – 'The Grange' Catholic Elementary Junior High School
L.08	Landscape Development Plan	K-9 Rutherford East Catholic Elementary Junior High School
L.09	Landscape Development Plan	K-6 Terwillegar Heights Catholic School
L10	Landscape Development Plan	Calgary Board of Education – Bridlewood
L11	Landscape Development Plan	Calgary Board of Education – Cranston
L12	Landscape Development Plan L12	Calgary Board of Education – Evergreen
L13	Landscape Development Plan L13	Calgary Board of Education – Royal Oak
L14	Landscape Development Plan L14	Calgary Board of Education – Saddle Ridge
L15	Landscape Development Plan L15	Calgary Board of Education – West Springs
L16	Landscape Development Plan L16	Calgary Roman Catholic Separate School District - Cranston
L17	Landscape Development Plan L17	Calgary Roman Catholic Separate School District - Evergreen
L18	Landscape Development Plan L18	Calgary Roman Catholic Separate School District – Saddle Ridge

APPENDIX E – MILLWORK SKETCHES



1/1 BASE CABINET ELEVATION
Scale: 1:20



2/1 SECTION
Scale: 1:10

ACI ARCHITECTURE INC.

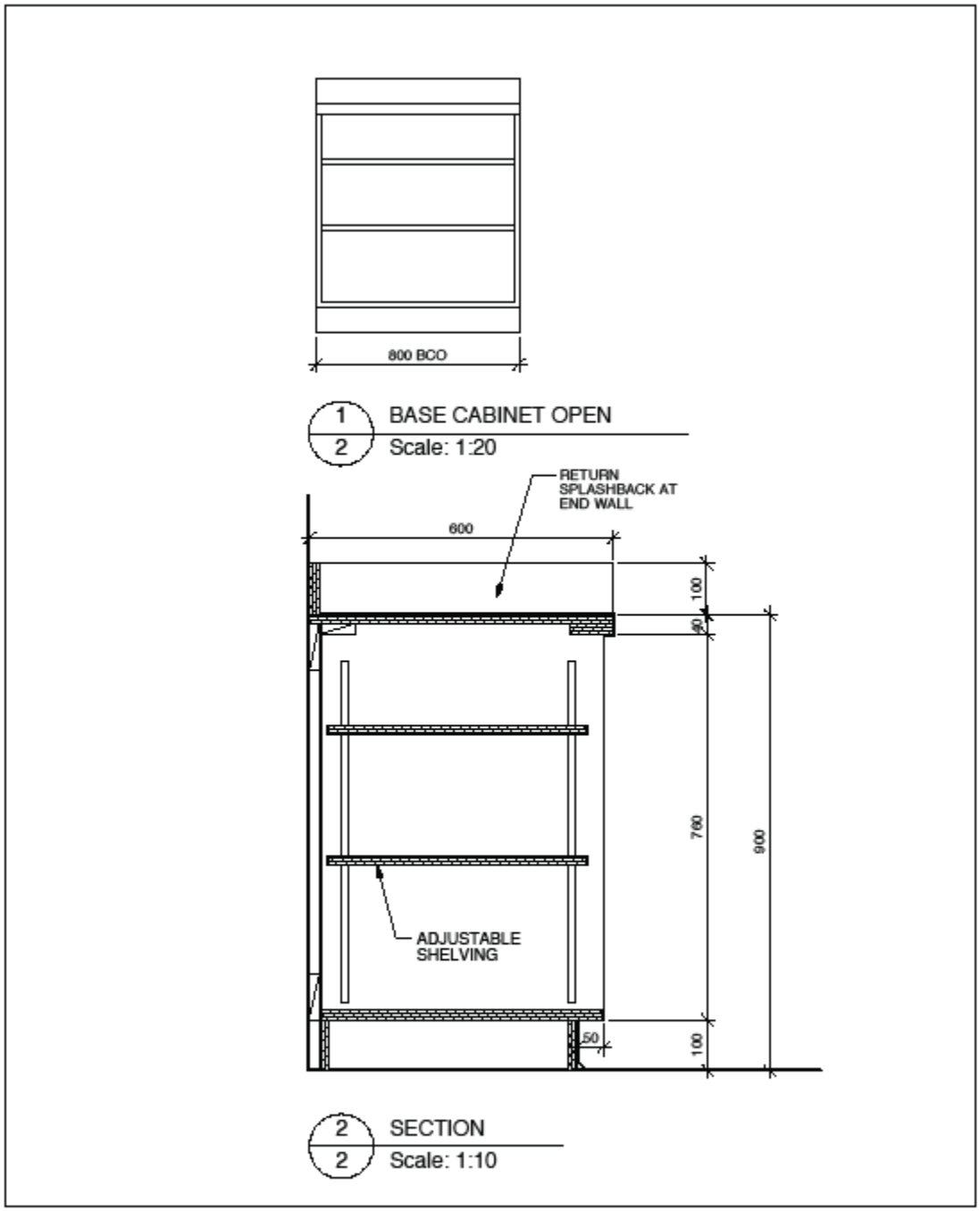
Client
ALBERTA INFRASTRUCTURE AND TRANSPORTATION

Project
ALBERTA SCHOOLS ALTERNATIVE PROJECT

Drawing Title
BASE CABINET

Scale	AS NOTED	Designed By	ACI
Project No.	0709	Drawn By	MA / DM
Date	2007 DEC 20	Checked By	ACI

Drawing No.
MW-1



ACI ARCHITECTURE INC.

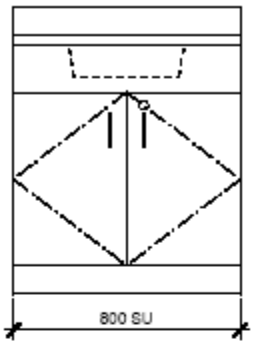
Client
ALBERTA INFRASTRUCTURE AND TRANSPORTATION

Project
ALBERTA SCHOOLS ALTERNATIVE PROJECT

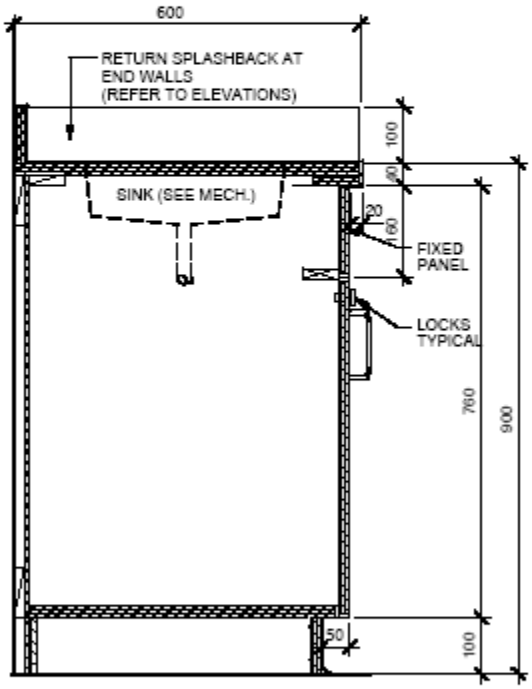
Drawing Title
BASE CABINET OPEN

Scale	AS NOTED	Designed By	ACI
Project No.	0709	Drawn By	MA / DM
Date	2007 DEC 20	Checked By	ACI

Drawing No.
MW-2



1/3 SINK UNIT ELEVATION
Scale: 1:20



2/3 SECTION
Scale: 1:10

ACI ARCHITECTURE LTD.

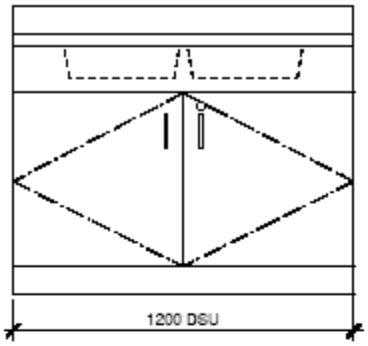
Client
ALBERTA INFRASTRUCTURE AND TRANSPORTATION

Project
ALBERTA SCHOOLS ALTERNATIVE PROJECT

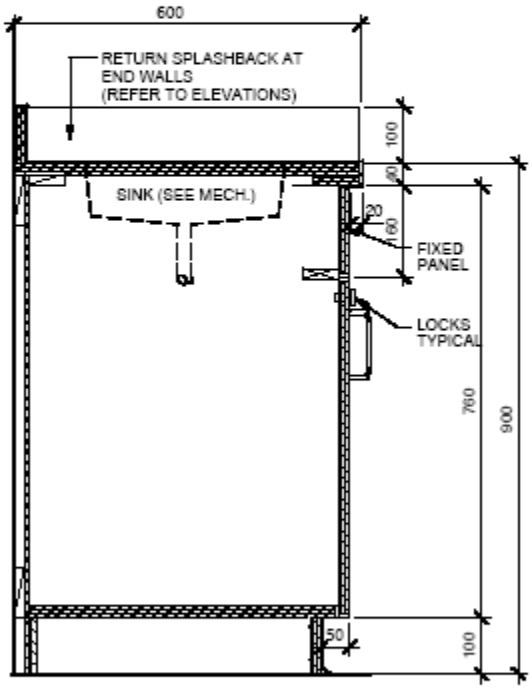
Drawing Title
STANDARD SINK UNIT

Scale	AS NOTED	Designed By	ACI
Project No.	0709	Drawn By	MA / DM
Date	2008 JANUARY 01	Checked By	ACI

Drawing No.
MW-3



1/4 DOUBLE SINK ELEVATION
Scale: 1:20



2/4 SECTION
Scale: 1:10

ACI ARCHITECTURE LTD.

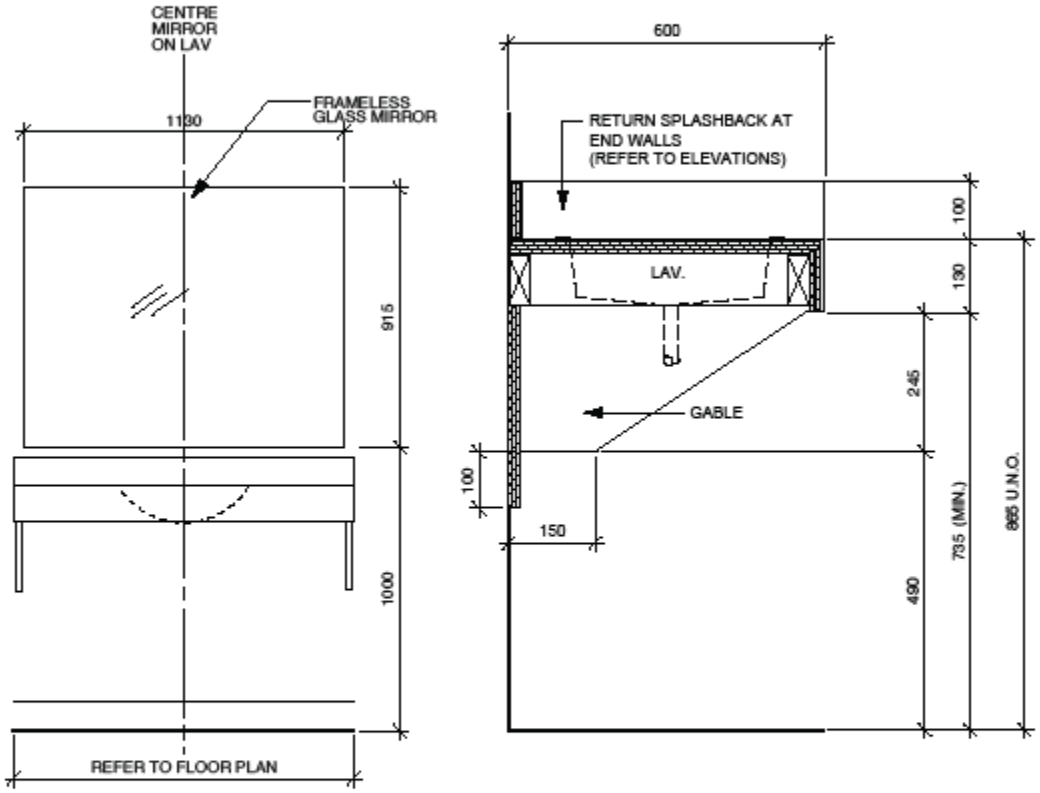
Client
ALBERTA INFRASTRUCTURE AND TRANSPORTATION

Project
ALBERTA SCHOOLS ALTERNATIVE PROJECT

Drawing Title
DOUBLE SINK UNIT

Scale	AS NOTED	Designed By	ACI
Project No.	0709	Drawn By	MA/DM
Date	2008 JANUARY 01	Checked By	ACI

Drawing No.
MW-4



1/5 VANITY UNIT ELEVATION
Scale: 1:20

2/5 SECTION
Scale: 1:10

ACI ARCHITECTURE INC.

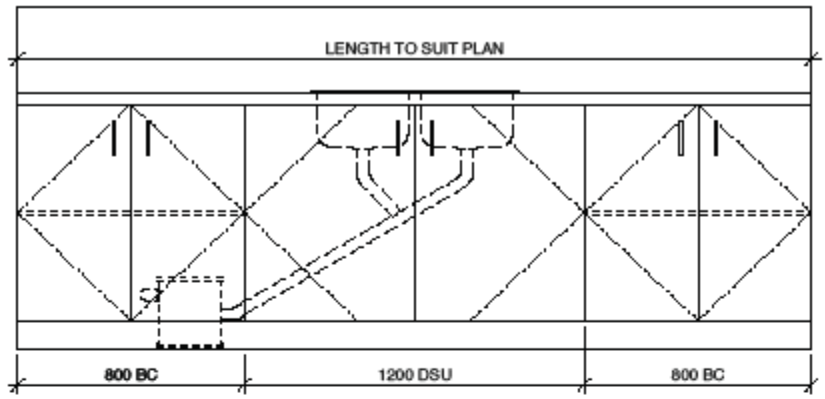
Client
ALBERTA INFRASTRUCTURE AND TRANSPORTATION

Project
ALBERTA SCHOOLS ALTERNATIVE PROJECT

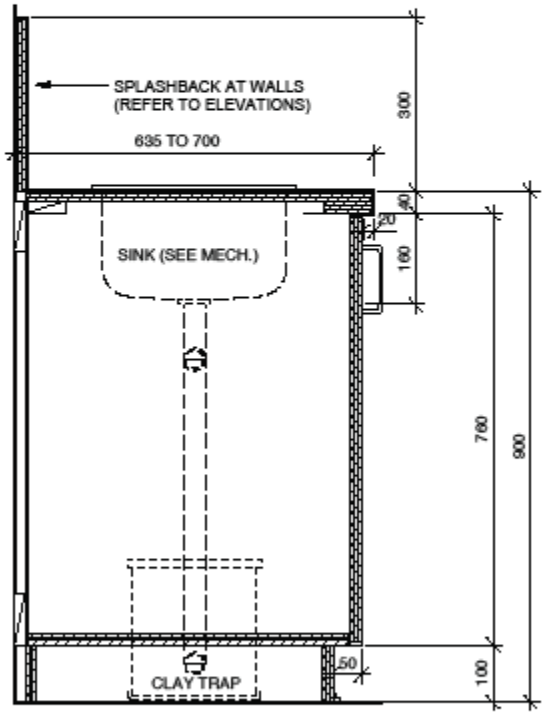
Drawing Title
VANITY UNIT

Scale	AS NOTED	Designed By	ACI
Project No.	0709	Drawn By	MA / DM
Date	2007 DEC 20	Checked By	ACI

Drawing No.
MW-5



1/6 ART SINK ELEVATION
Scale: 1:20



2/6 SECTION
Scale: 1:10

ACI ARCHITECTURE INC.

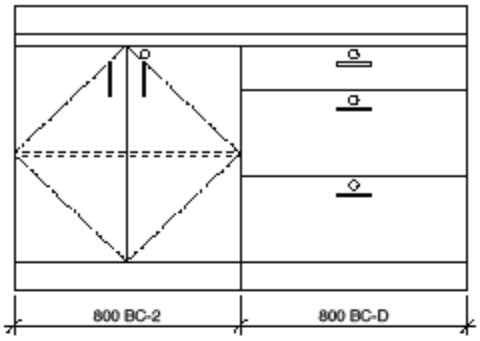
Client
ALBERTA INFRASTRUCTURE AND TRANSPORTATION

Project
ALBERTA SCHOOLS ALTERNATIVE PROJECT

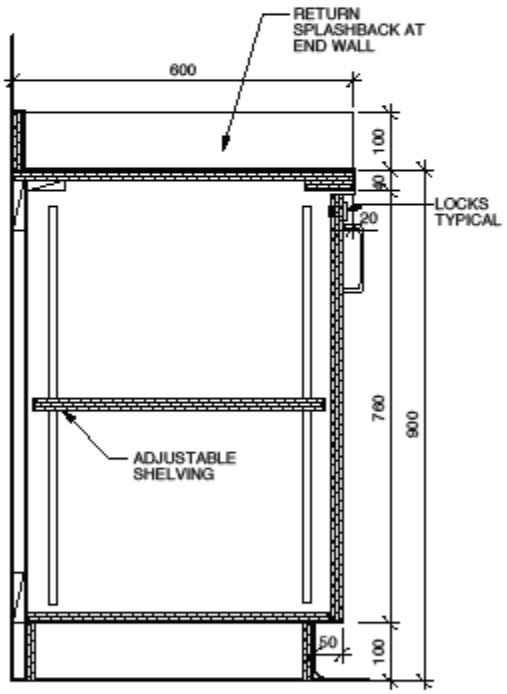
Drawing Title
ART ROOM SINK MILLWORK

Scale	AS NOTED	Designed By	ACI
Project No.	0709	Drawn By	MA / DM
Date	2007 DEC 20	Checked By	ACI

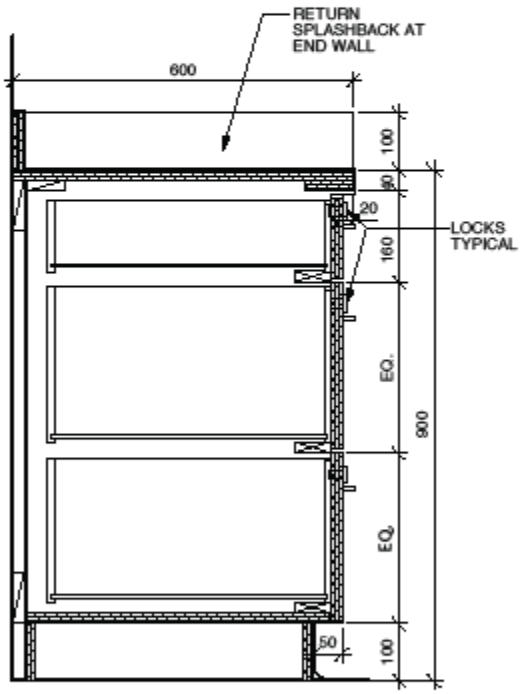
Drawing No.
MW-6



1/7 HOME-EC MILLWORK
Scale: 1:20



2/7 BC-2 SECTION
Scale: 1:10



3/7 BC-D SECTION
Scale: 1:10

ACI ARCHITECTURE INC.

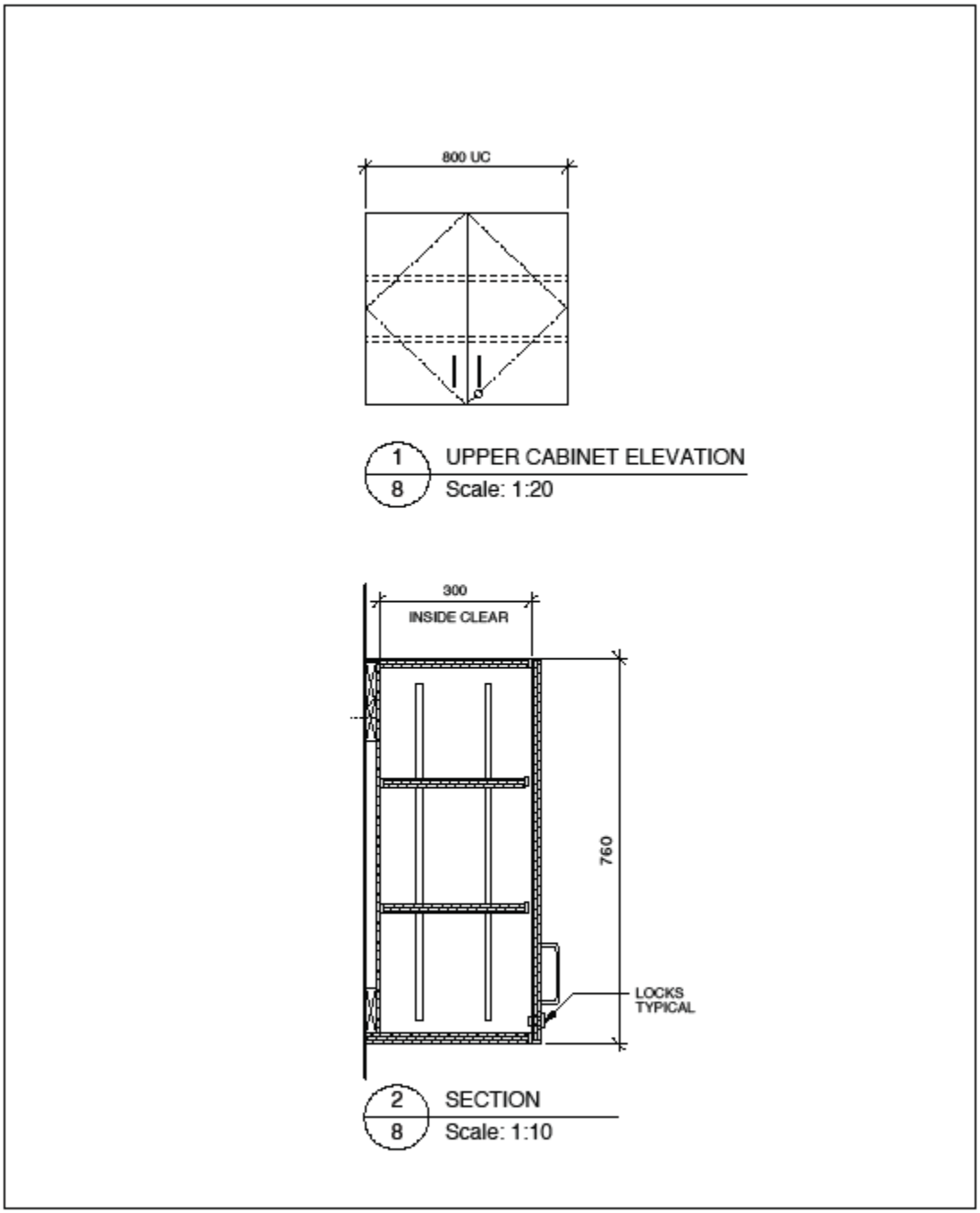
Client
ALBERTA INFRASTRUCTURE AND TRANSPORTATION

Project
ALBERTA SCHOOLS ALTERNATIVE PROJECT

Drawing Title
HOME-EC MILLWORK

Scale	AS NOTED	Designed By	ACI
Project No.	0709	Drawn By	MA / DM
Date	2007 DEC 20	Checked By	ACI

Drawing No.
MW-7



ACI ARCHITECTURE INC.

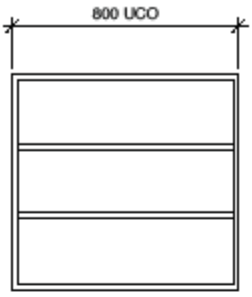
Client
ALBERTA INFRASTRUCTURE AND TRANSPORTATION

Project
ALBERTA SCHOOLS ALTERNATIVE PROJECT

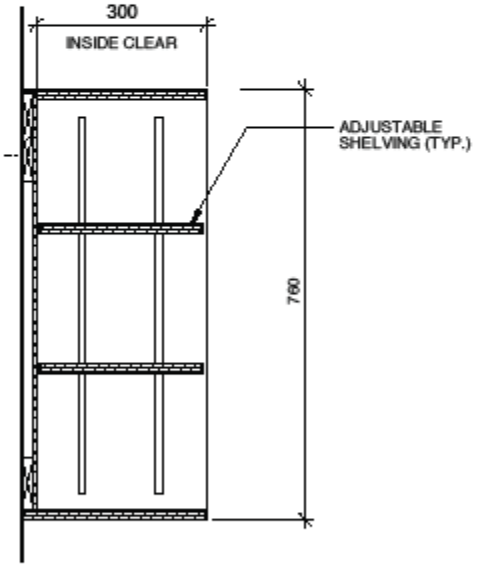
Drawing Title
UPPER CABINET

Scale	AS NOTED	Designed By	ACI
Project No.	0709	Drawn By	MA / DM
Date	2007 DEC 20	Checked By	ACI

Drawing No.
MW-8



1/9 UPPER CABINET (OPEN) ELEVATION
Scale: 1:20



2/9 SECTION
Scale: 1:10

ACI ARCHITECTURE INC.

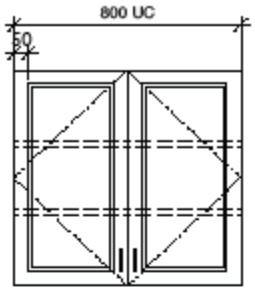
Client
ALBERTA INFRASTRUCTURE AND TRANSPORTATION

Project
ALBERTA SCHOOLS ALTERNATIVE PROJECT

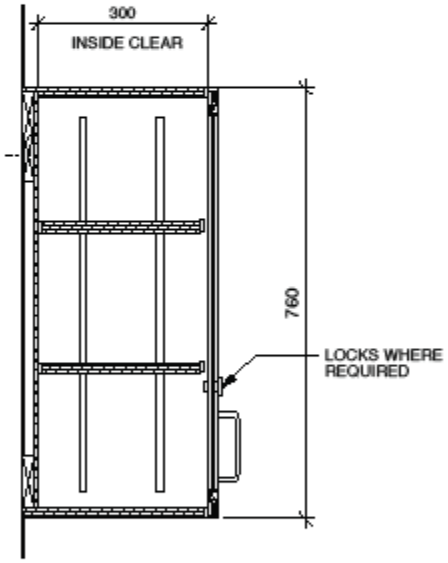
Drawing Title
UPPER CABINET OPEN

Scale	AS NOTED	Designed By	ACI
Project No.	0709	Drawn By	MA / DM
Date	2007 DEC 20	Checked By	ACI

Drawing No.
MW-9



1/10 UPPER CABINET WITH GLAZING ELEV.
Scale: 1:20



2/10 SECTION
Scale: 1:10

ACI ARCHITECTURE INC.

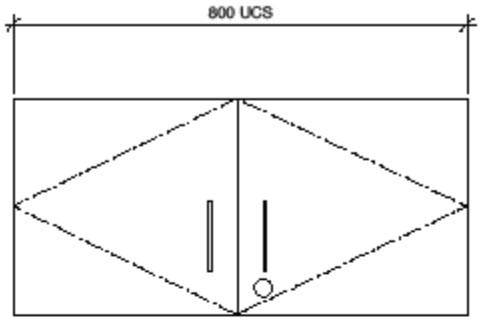
Client
ALBERTA INFRASTRUCTURE AND TRANSPORTATION

Project
ALBERTA SCHOOLS ALTERNATIVE PROJECT

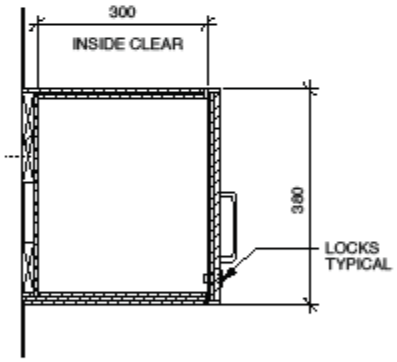
Drawing Title
SCIENCE ROOM UPPER CABINET WITH GLAZING

Scale	AS NOTED	Designed By	ACI
Project No.	0709	Drawn By	MA / DM
Date	2007 DEC 20	Checked By	ACI

Drawing No.
MW-10



1/11 UPPER CABINET (SHORT) ELEVATION
Scale: 1:10



2/11 SECTION
Scale: 1:10

ACI ARCHITECTURE INC.

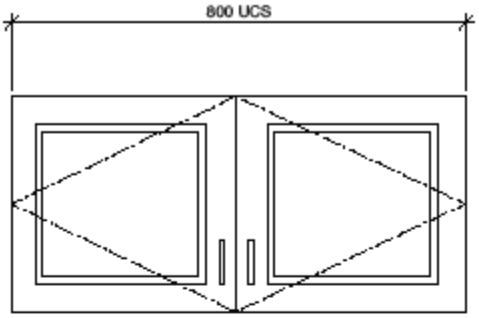
Client
ALBERTA INFRASTRUCTURE AND TRANSPORTATION

Project
ALBERTA SCHOOLS ALTERNATIVE PROJECT

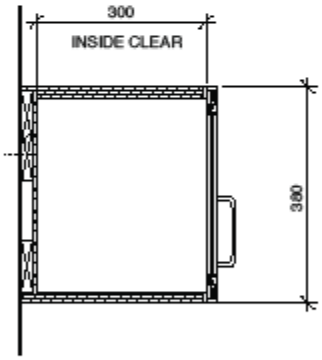
Drawing Title
UPPER CABINET SHORT

Scale	AS NOTED	Designed By	ACI
Project No.	0709	Drawn By	MA / DM
Date	2007 DEC 20	Checked By	ACI

Drawing No.
MW-11



1/12 UPPER CAB. SHORT WITH GLAZING ELEV.
Scale: 1:10



2/12 SECTION
Scale: 1:10

ACI ARCHITECTURE INC.

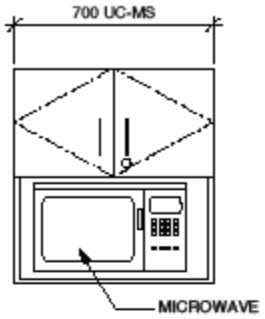
Client
ALBERTA INFRASTRUCTURE AND TRANSPORTATION

Project
ALBERTA SCHOOLS ALTERNATIVE PROJECT

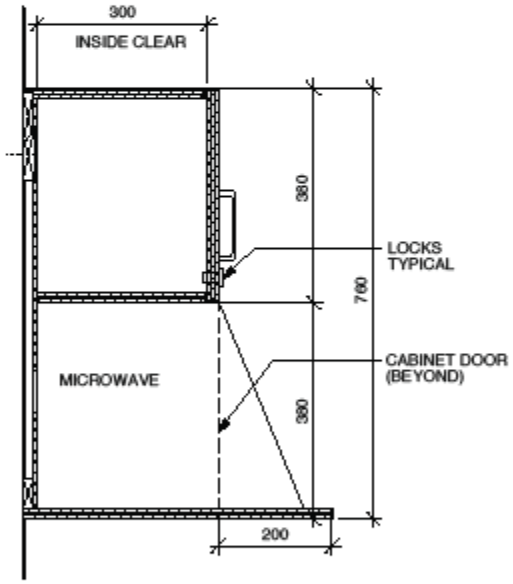
Drawing Title
SCIENCE ROOM UPPER CAB SHORT WITH GLAZING

Scale	AS NOTED	Designed By	ACI
Project No.	0709	Drawn By	MA / DM
Date	2007 DEC 20	Checked By	ACI

Drawing No.
MW-12



1/13 UPPER CAB.& MICROWAVE SHELF ELEV.
Scale: 1:20



2/13 SECTION
Scale: 1:10

ACI ARCHITECTURE INC.

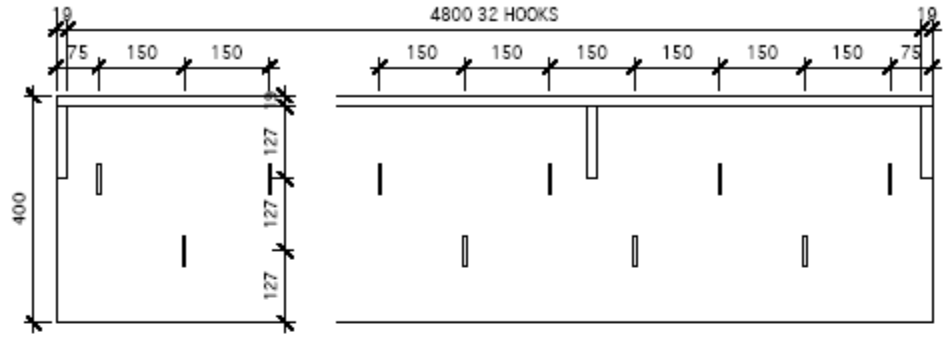
Client
ALBERTA INFRASTRUCTURE AND TRANSPORTATION

Project
ALBERTA SCHOOLS ALTERNATIVE PROJECT

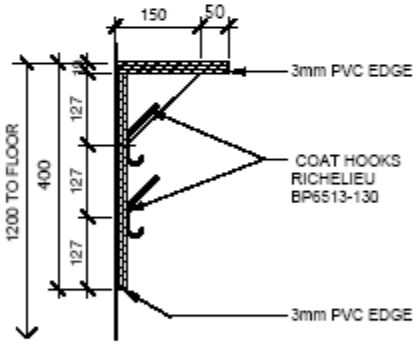
Drawing Title
UPPER CABINET & MICROWAVE SHELF

Scale	AS NOTED	Designed By	ACI
Project No.	0709	Drawn By	MA / DM
Date	2007 DEC 20	Checked By	ACI

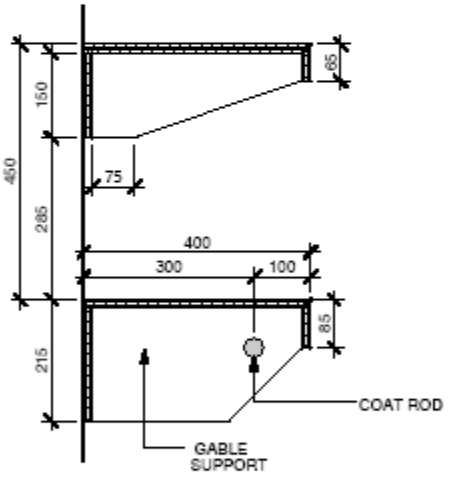
Drawing No.
MW-13



1/14 COAT HOOKS UNIT ELEVATION
Scale: 1:10



2/14 COAT HOOKS AND SHELF
Scale: 1:10



3/14 COAT ROD AND SHELF
Scale: 1:10

ACI ARCHITECTURE INC.

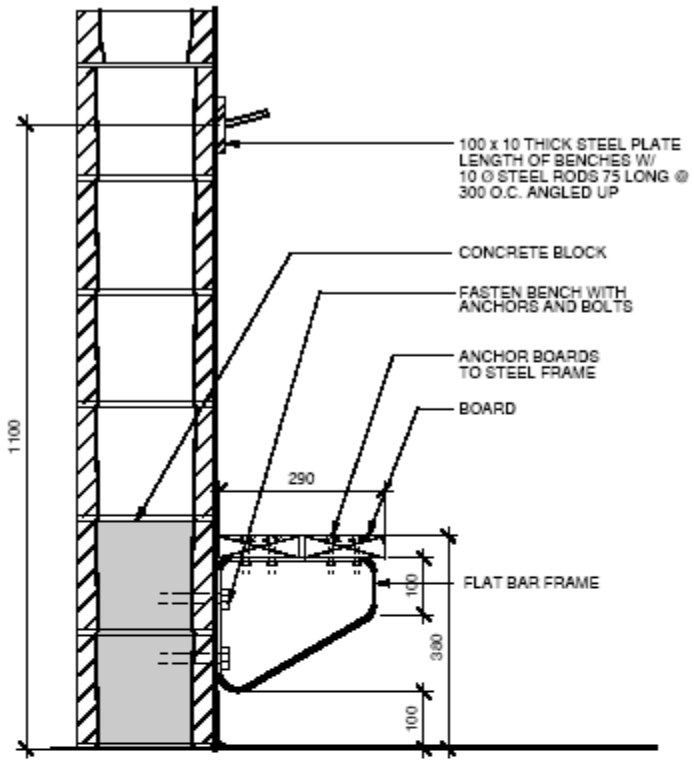
Client
ALBERTA INFRASTRUCTURE AND TRANSPORTATION

Project
ALBERTA SCHOOLS ALTERNATIVE PROJECT

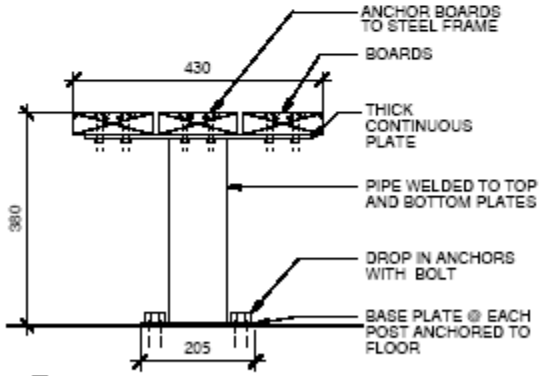
Drawing Title
COAT HOOKS AND SHELF
COAT ROD AND SHELF

Scale	AS NOTED	Designed By	ACI
Project No.	0709	Drawn By	MA / DM
Date	2007 DEC 20	Checked By	ACI

Drawing No.
MW-14



1/15 LOCKER ROOM BENCH AT WALL
Scale: 1:10



2/15 LOCKER ROOM BENCH (MIDDLE ROW)
Scale: 1:10

ACI ARCHITECTURE INC.

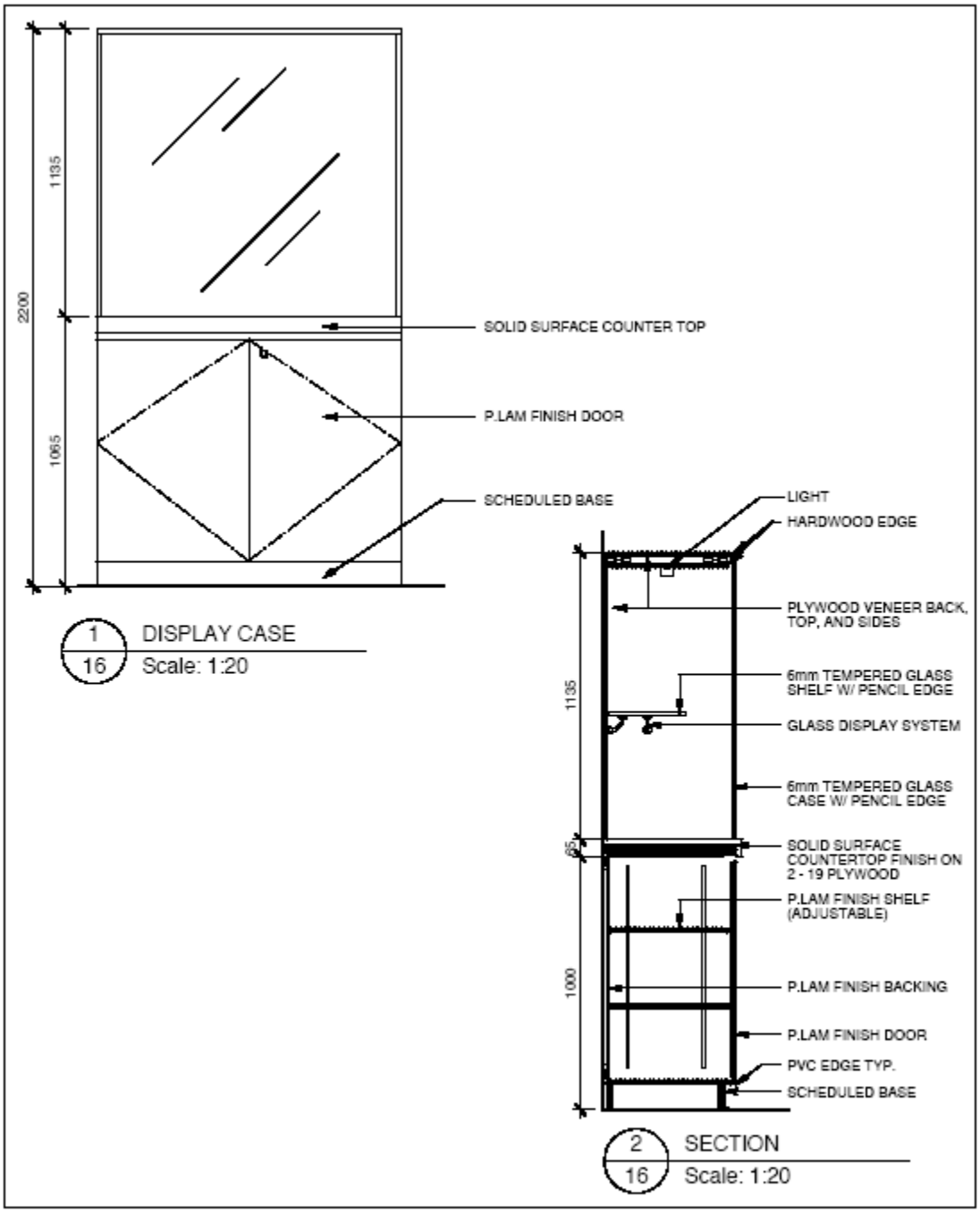
Client
ALBERTA INFRASTRUCTURE AND TRANSPORTATION

Project
ALBERTA SCHOOLS ALTERNATIVE PROJECT

Drawing Title
LOCKER ROOM BENCH

Scale	AS NOTED	Designed By	ACI
Project No.	0709	Drawn By	MA / DM
Date	2008 JAN 31	Checked By	ACI

Drawing No.
MW-15



ACI ARCHITECTURE INC

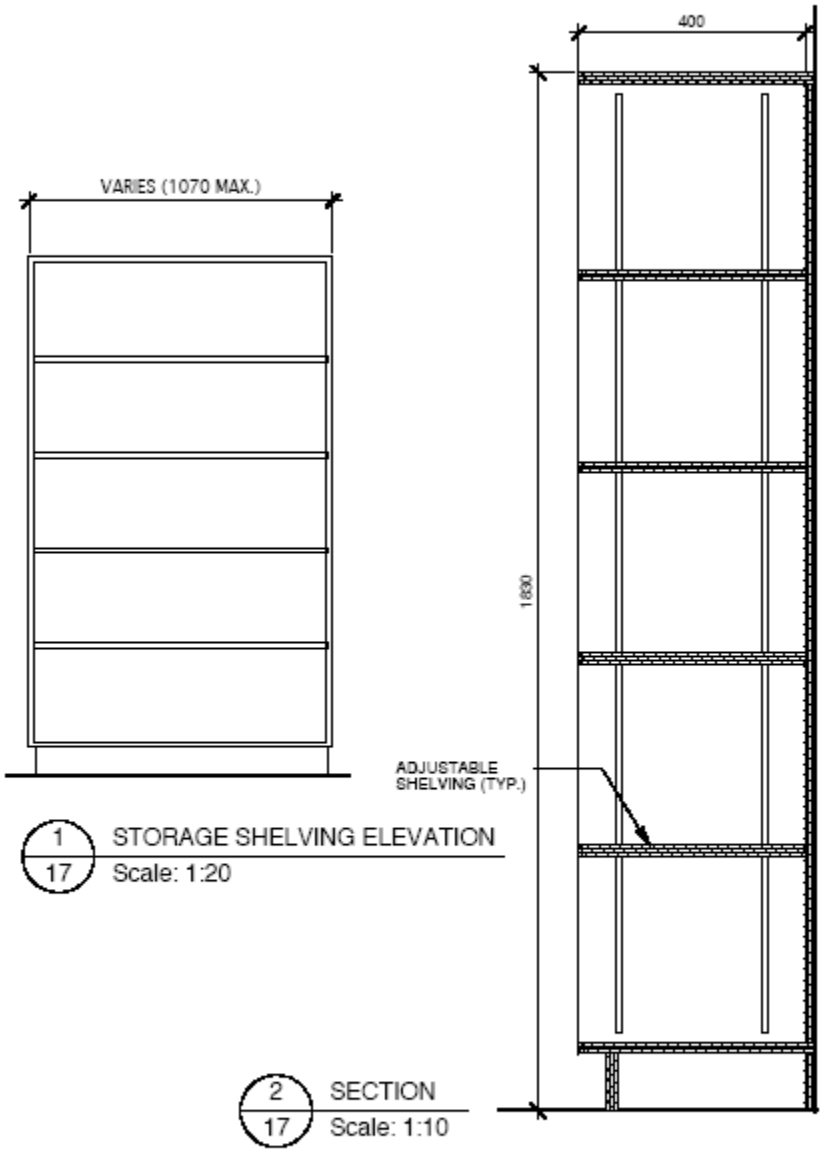
Client: ALBERTA INFRASTRUCTURE AND TRANSPORTATION

Project: ALBERTA SCHOOLS ALTERNATIVE PROJECT

Drawing Title: DISPLAY CASE

Scale	AS NOTED	Designed By	ACI
Project No.	0709	Drawn By	MA / DM
Date	2007 JAN 31	Checked By	ACI

Drawing No. MW-16



1/17 STORAGE SHELVING ELEVATION
Scale: 1:20

2/17 SECTION
Scale: 1:10

ACI ARCHITECTURE INC

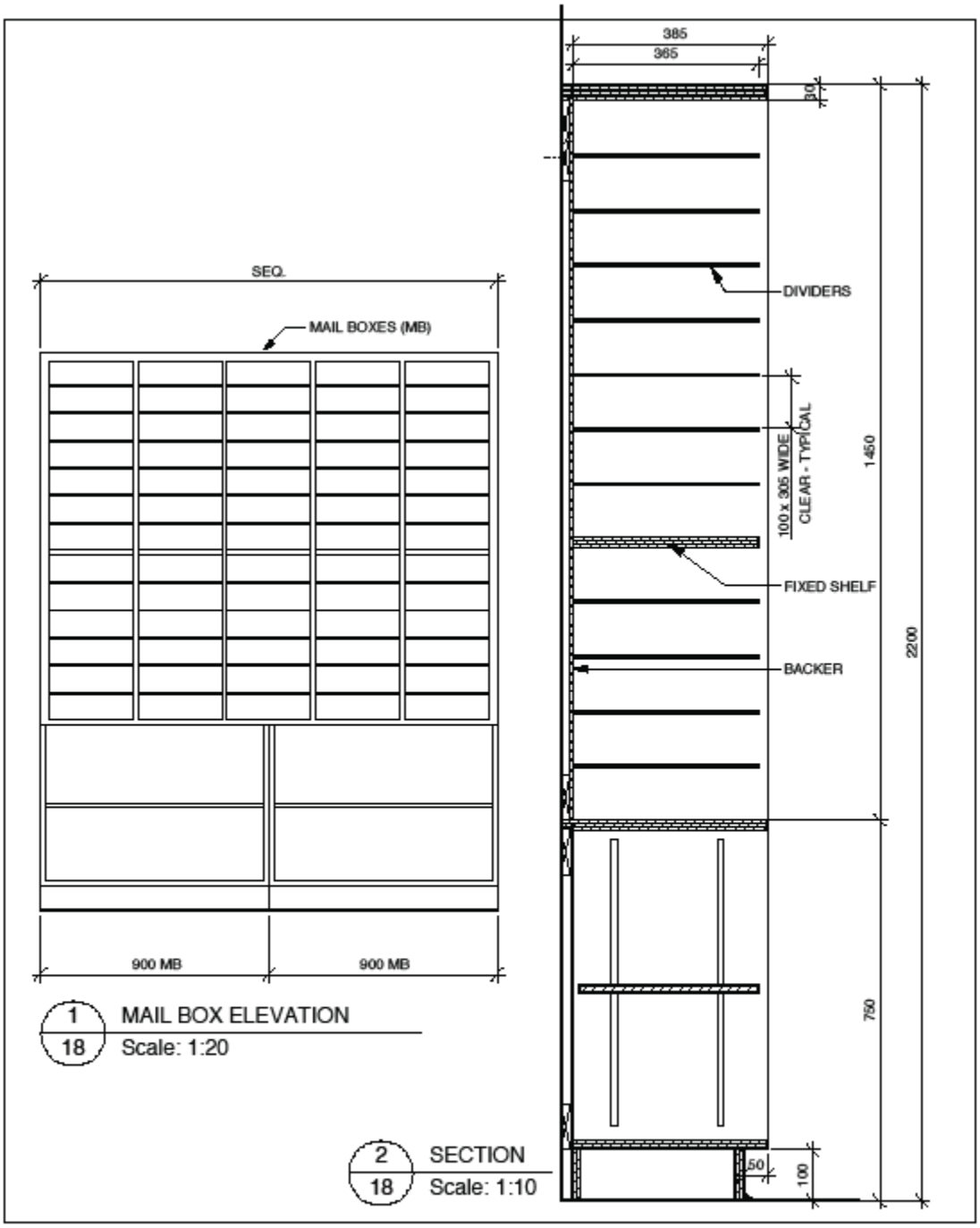
Client:
ALBERTA INFRASTRUCTURE AND TRANSPORTATION

Project:
ALBERTA SCHOOLS ALTERNATIVE PROJECT

Drawing Title:
STORAGE SHELVING

Scale	AS NOTED	Designed By	ACI
Project No.	0709	Drawn By	MA / DM
Date	2008 JAN 31	Checked By	ACI

Drawing No.
MW-17



ACI ARCHITECTURE INC.

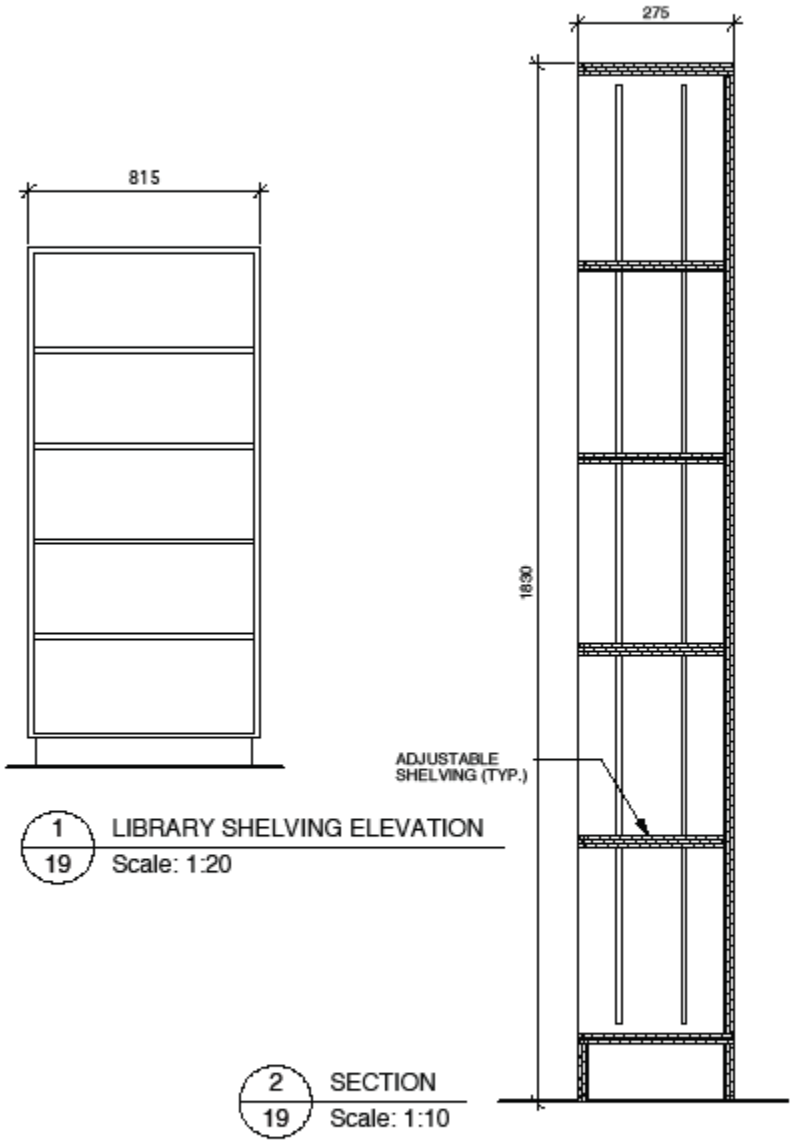
Client
ALBERTA INFRASTRUCTURE AND TRANSPORTATION

Project
ALBERTA SCHOOLS ALTERNATIVE PROJECT

Drawing Title
MAIL BOX

Scale	AS NOTED	Designed By	ACI
Project No.	0709	Drawn By	MA / DM
Date	2007 DEC 20	Checked By	ACI

Drawing No.
MW-18



1/19 LIBRARY SHELVING ELEVATION
Scale: 1:20

2/19 SECTION
Scale: 1:10

ACI ARCHITECTURE INC.

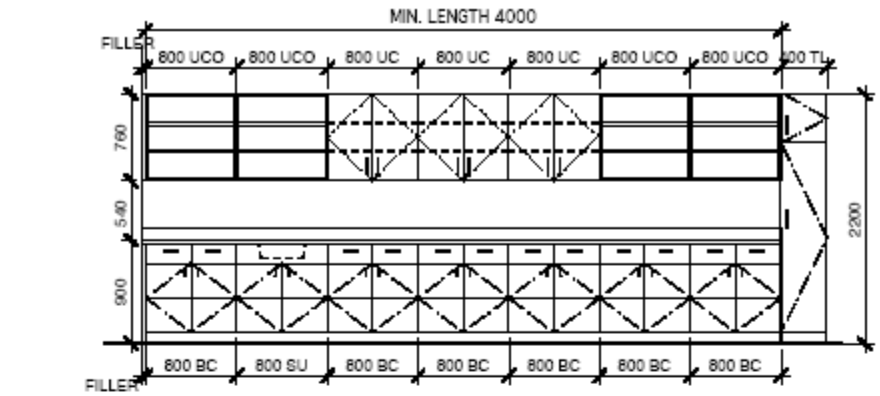
Client
ALBERTA INFRASTRUCTURE AND TRANSPORTATION

Project
ALBERTA SCHOOLS ALTERNATIVE PROJECT

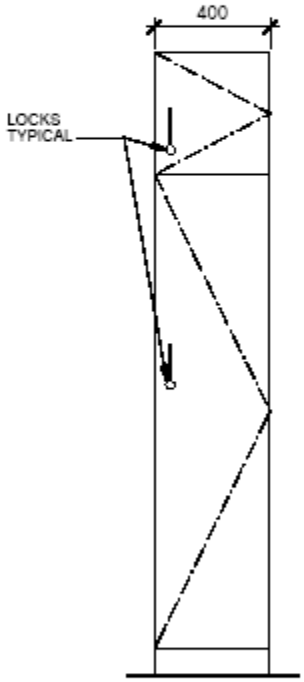
Drawing Title
LIBRARY SHELVING

Scale	AS NOTED	Designed By	ACI
Project No.	0709	Drawn By	MA / DM
Date	2007 DEC 20	Checked By	ACI

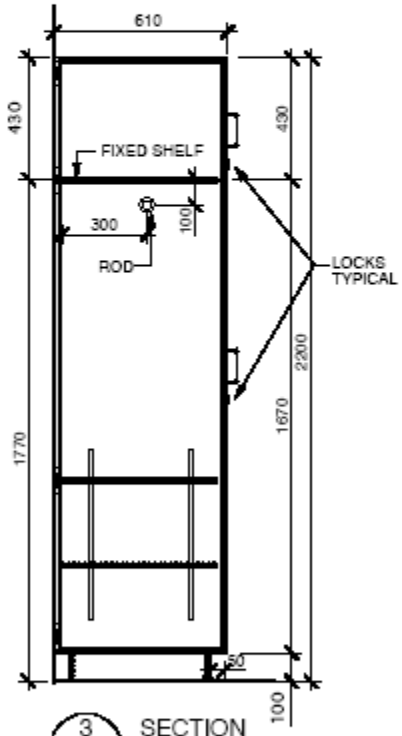
Drawing No.
MW-19



1/20 STANDARD CLASSROOM MILLWORK
Scale: 1:50



2/20 TEACHER LOCKER ELEVATION
Scale: 1:20



3/20 SECTION
Scale: 1:20

ACI ARCHITECTURE INC.

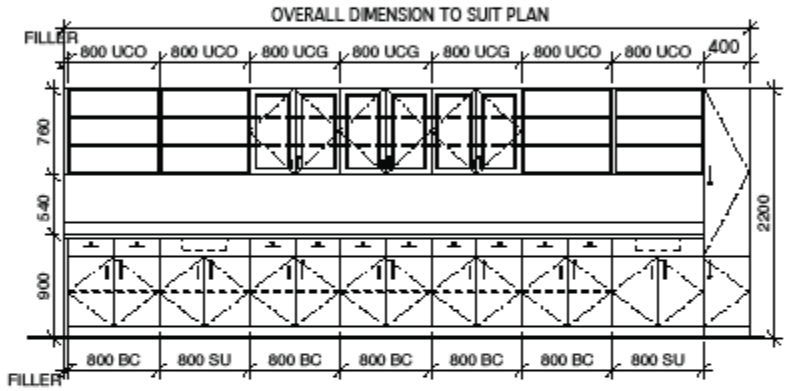
Client
ALBERTA INFRASTRUCTURE AND TRANSPORTATION

Project
ALBERTA SCHOOLS ALTERNATIVE PROJECT

Drawing Title
STANDARD CLASSROOM MILLWORK & TEACHER LOCKER

Scale	AS NOTED	Designed By	ACI
Project No.	0709	Drawn By	MA / DM
Date	2007 DEC 20	Checked By	ACI

Drawing No.
MW-20



1/21 STANDARD SCIENCE ROOM MILLWORK
Scale: 1:50

*PROVIDE MILLWORK FOR THREE WALLS
-REFER TO MODIFIED SCHOOL DESIGNS

ACI ARCHITECTURE INC.

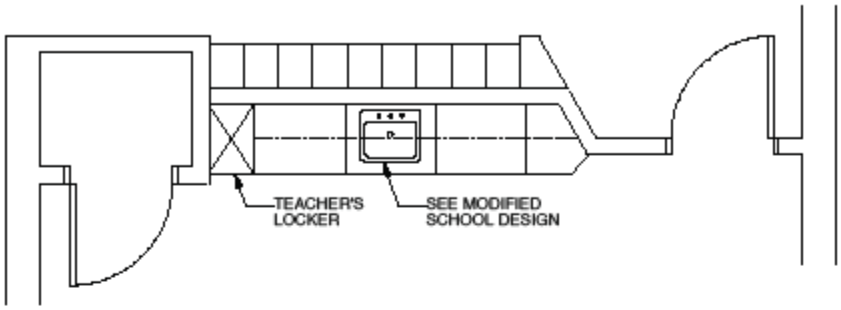
Client
ALBERTA INFRASTRUCTURE AND TRANSPORTATION

Project
ALBERTA SCHOOLS ALTERNATIVE PROJECT

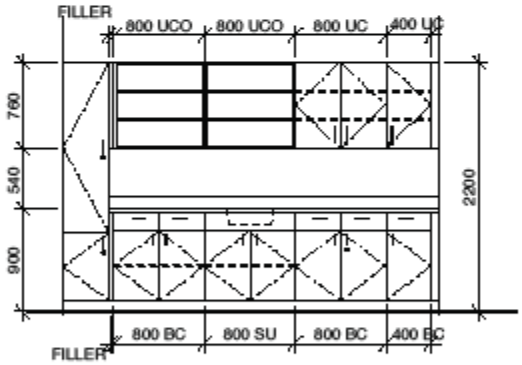
Drawing Title
STANDARD SCIENCE ROOM MILLWORK

Scale	AS NOTED	Designed By	ACI
Project No.	0709	Drawn By	MA / DM
Date	2007 DEC 20	Checked By	ACI

Drawing No.
MW-21



1/22 MODULAR CLASSROOM MILLWORK TYPICAL
Scale: 1:50



2/22 MODULAR CLASSROOM MILLWORK TYPICAL
Scale: 1:50

ACI ARCHITECTURE INC.

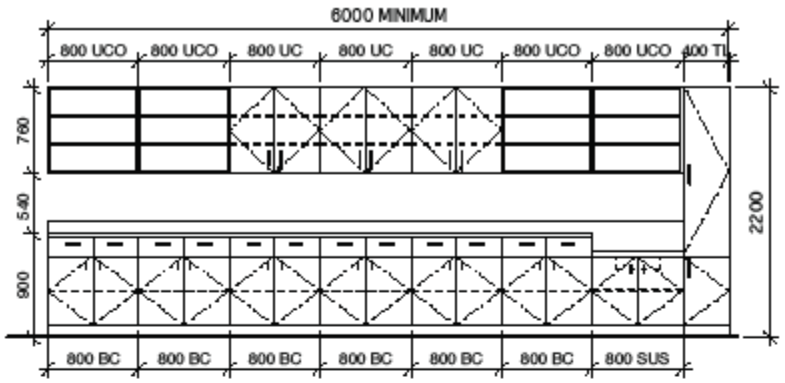
Client
ALBERTA INFRASTRUCTURE AND TRANSPORTATION

Project
ALBERTA SCHOOLS ALTERNATIVE PROJECT

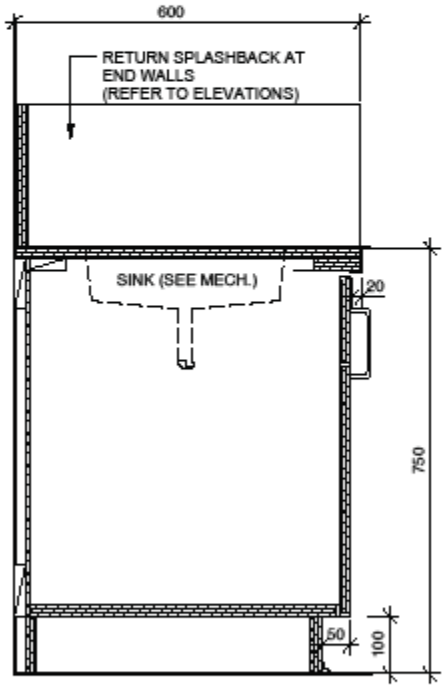
Drawing Title
STANDARD MODULAR CLASSROOM MILLWORK

Scale	AS NOTED	Designed By	ACI
Project No.	0709	Drawn By	MA / DM
Date	2007 DEC 20	Checked By	ACI

Drawing No.
MW-22



1/23 ECS CLASSROOM MILLWORK
Scale: 1:50



2/23 SECTION (SINK UNIT SHORT)
Scale: 1:10

ACI ARCHITECTURE INC.

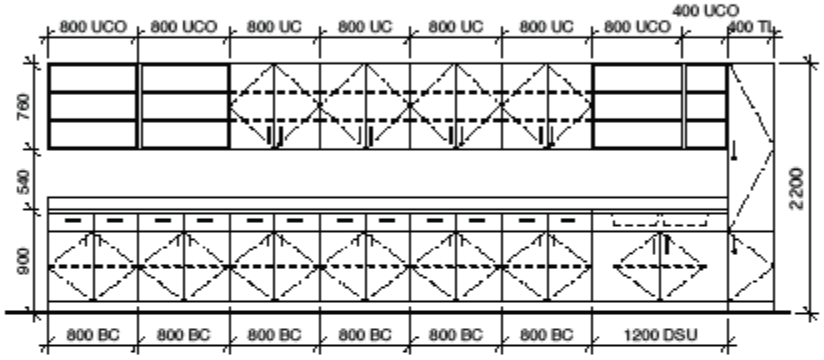
Client
ALBERTA INFRASTRUCTURE AND TRANSPORTATION

Project
ALBERTA SCHOOLS ALTERNATIVE PROJECT

Drawing Title
ECS CLASSROOM MILLWORK

Scale	AS NOTED	Designed By	ACI
Project No.	0709	Drawn By	MA/DM
Date	2007 DEC 20	Checked By	ACI

Drawing No.
MW-23



1/24 MUSIC/ART CLASSROOM MILLWORK
Scale: 1:50

ACI ARCHITECTURE INC.

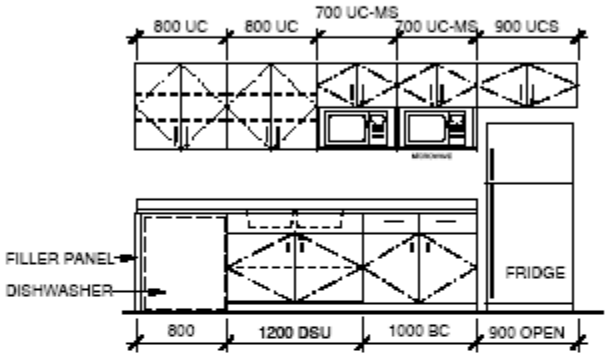
Client
ALBERTA INFRASTRUCTURE AND TRANSPORTATION

Project
ALBERTA SCHOOLS ALTERNATIVE PROJECT

Drawing Title
MUSIC/ART CLASSROOM MILLWORK

Scale	AS NOTED	Designed By	ACI
Project No.	0709	Drawn By	MA/DM
Date	2007 DEC 20	Checked By	ACI

Drawing No.
MW-24



1/25 STAFF KITCHEN MILLWORK ELEVATION
Scale: 1:50

ACI ARCHITECTURE LTD.

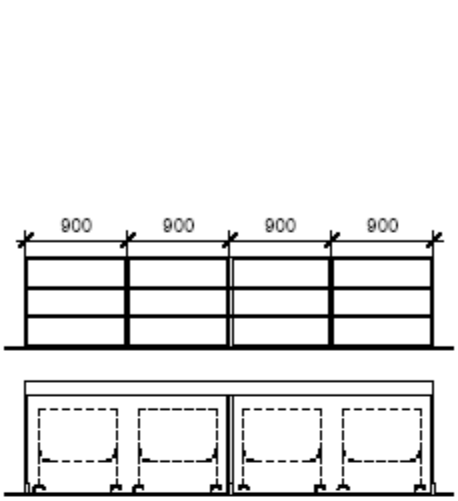
Client
ALBERTA INFRASTRUCTURE AND TRANSPORTATION

Project
ALBERTA SCHOOLS ALTERNATIVE PROJECT

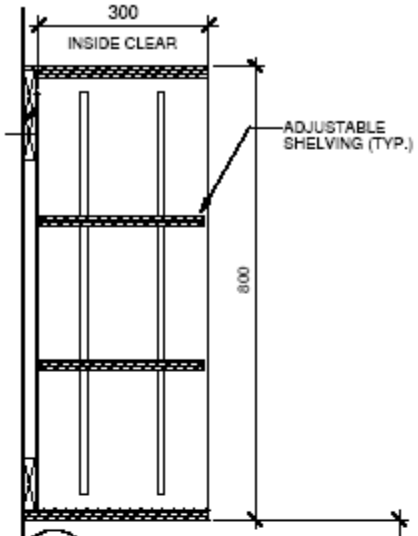
Drawing Title
STAFF KITCHEN MILLWORK

Scale	AS NOTED	Designed By	ACI
Project No.	0709	Drawn By	MA/DM
Date	2007 DEC 20	Checked By	ACI

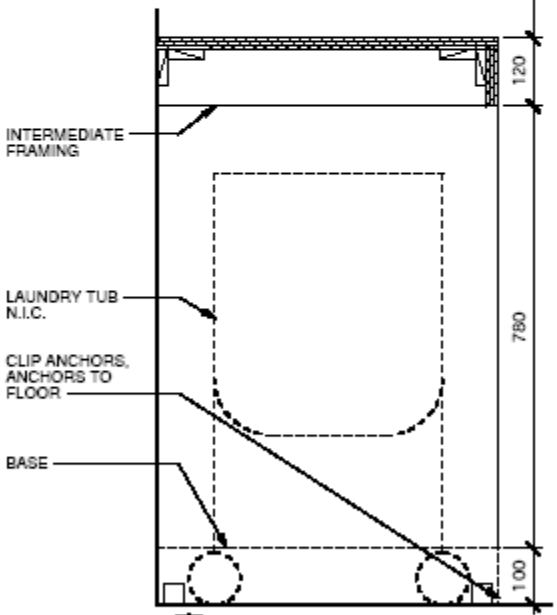
Drawing No.
MW-25



1/26 GYM. STORAGE MILLWORK ELEVATION
Scale: 1:50



2/26 SECTION
Scale: 1:10



3/26 SECTION
Scale: 1:10

ACI ARCHITECTURE LTD.

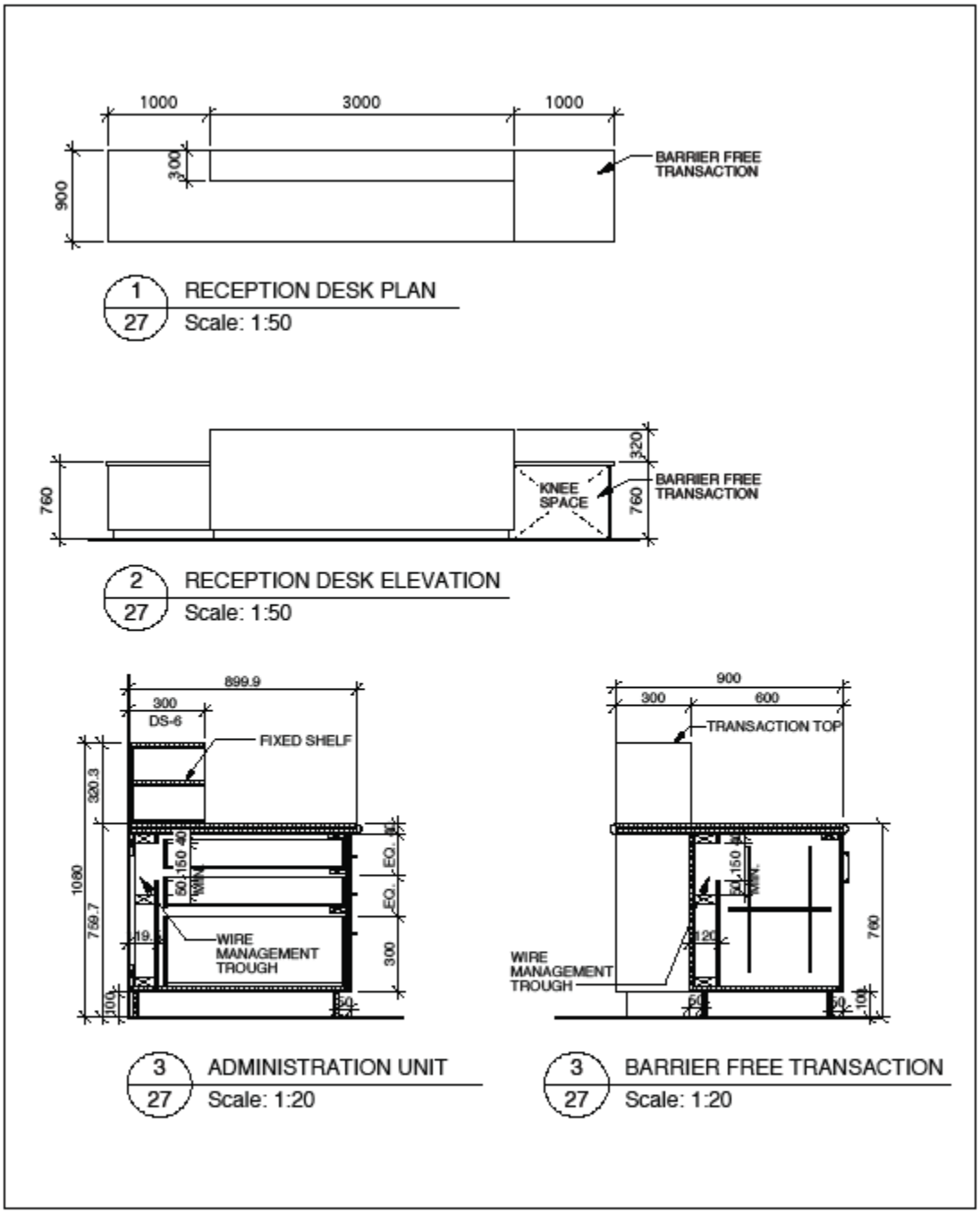
Client
ALBERTA INFRASTRUCTURE AND TRANSPORTATION

Project
ALBERTA SCHOOLS ALTERNATIVE PROJECT

Drawing Title
GYM. STORAGE MILLWORK

Scale	AS NOTED	Designed By	ACI
Project No.	0709	Drawn By	MA/DM
Date	2007 DEC 20	Checked By	ACI

Drawing No.
MW-26



ACI ARCHITECTURE INC.

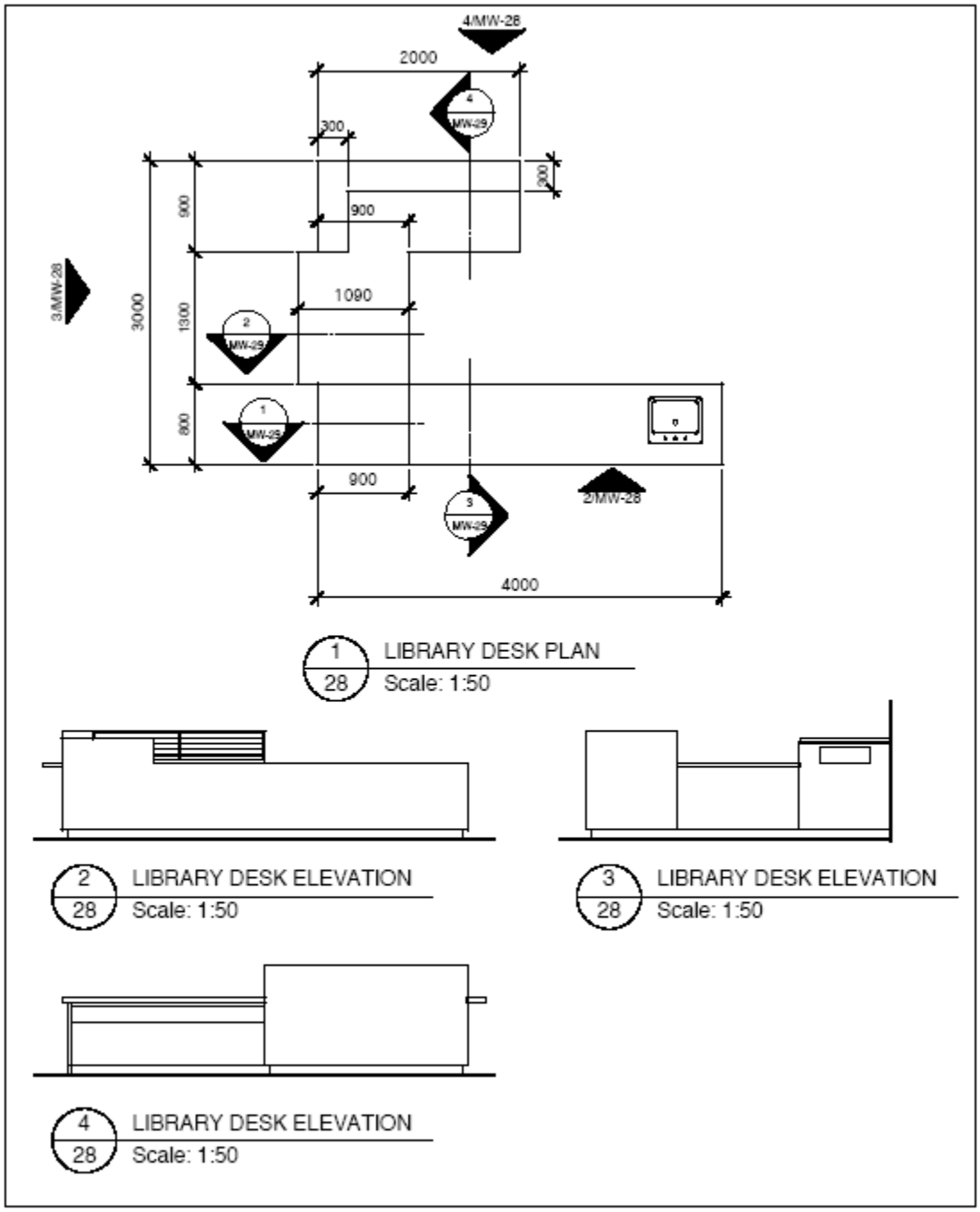
Client: ALBERTA INFRASTRUCTURE AND TRANSPORTATION

Project: ALBERTA SCHOOLS ALTERNATIVE PROJECT

Drawing Title: RECEPTION DESK MILLWORK

Scale	AS NOTED	Designed By	ACI
Project No.	0709	Drawn By	MA/DM
Date	2007 DEC 20	Checked By	ACI

Drawing No. MW-27



ACI ARCHITECTURE LTD.

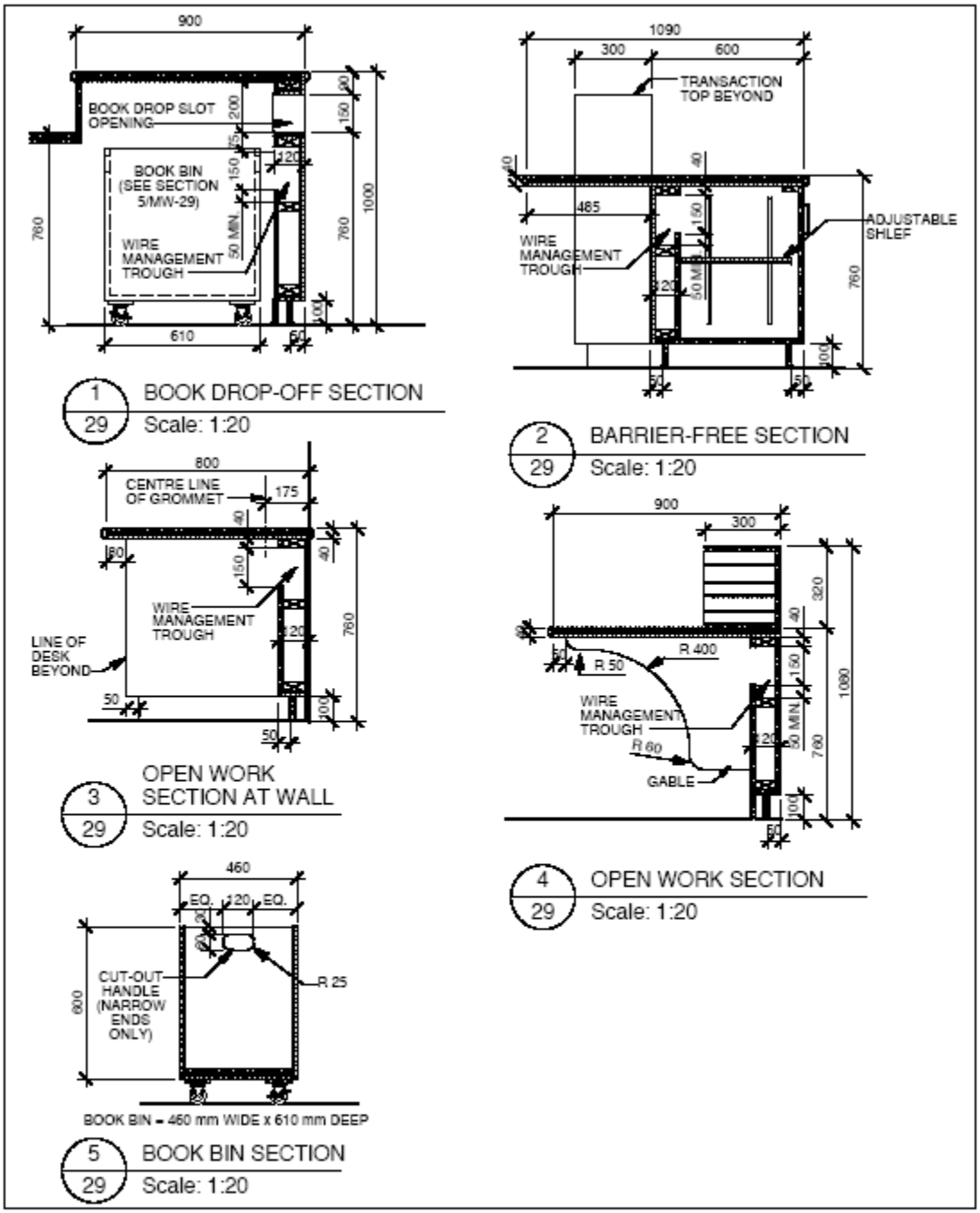
Client
ALBERTA INFRASTRUCTURE AND TRANSPORTATION

Project
ALBERTA SCHOOLS ALTERNATIVE PROJECT

Drawing Title
LIBRARY DESK MILLWORK

Scale	AS NOTED	Designed By	ACI
Project No.	0709	Drawn By	MA/DM
Date	2008 JAN 31	Checked By	ACI

Drawing No.
MW-28



ACI ARCHITECTURE INC

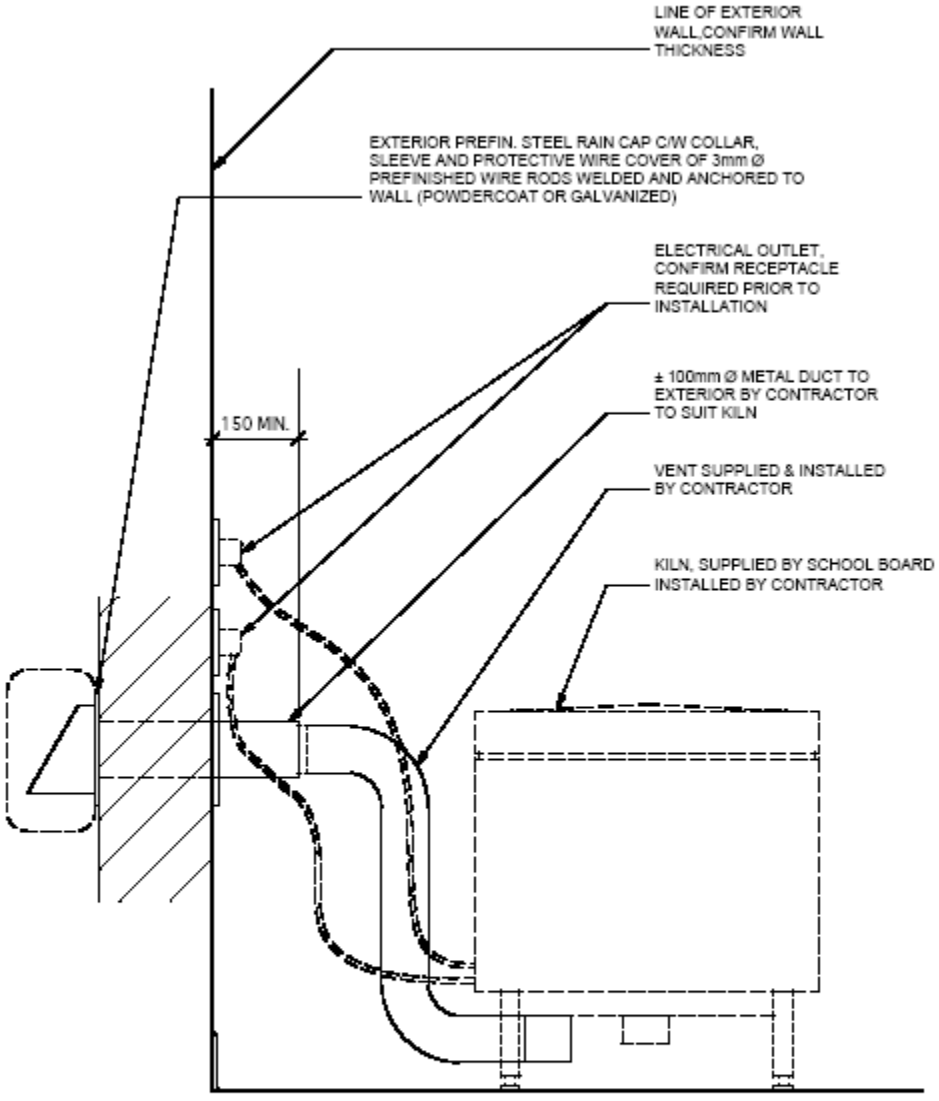
Client: ALBERTA INFRASTRUCTURE AND TRANSPORTATION

Project: ALBERTA SCHOOLS ALTERNATIVE PROJECT

Drawing Title: LIBRARY DESK MILLWORK

Scale	AS NOTED	Designed By	ACI
Project No.	0709	Drawn By	MA/DM
Date	2008 JAN 31	Checked By	ACI

Drawing No.: MW-29



1/30 KILN INSTALLATION DETAIL
Scale: 1:10

ACI ARCHITECTURE INC

Client: ALBERTA INFRASTRUCTURE AND TRANSPORTATION

Project: ALBERTA SCHOOLS ALTERNATIVE PROJECT

Drawing Title: KILN INSTALLATION DETAIL

Scale	AS NOTED	Designed By	ACI
Project No.	0709	Drawn By	MA / DM
Date	2008 JAN 31	Checked By	ACI

Drawing No. MW-30

APPENDIX F – BASIC ELECTRICAL REQUIREMENTS AND BASIC MECHANICAL REQUIREMENTS

Attachment F1 – Basic Electrical Requirements

Attachment F2 – Basic Mechanical Requirements

ATTACHMENT F1 – BASIC ELECTRICAL REQUIREMENTS

1. REQUIREMENTS OF APPLICABLE LAWS

.1 Comply with *Safety Codes Act* and rules and regulations made pursuant thereto, including the *Canadian Electrical Code*.

.2 Unless otherwise indicated, all references to "Canadian Electrical Code" or "CEC" shall mean the Canadian Electrical Code, Part I, CSA C22.1-06, (20th edition), Safety Standard for electrical installations and the variations made thereto by Alberta regulation, which are in force.

.3 All electrical products shall be tested, certified and labeled in accordance with a certification program accredited by the Standards Council of Canada. Where a product is not so labeled, provide written approval by the authority having jurisdiction.

.4 Submit to appropriate Governmental Authority or utility the necessary number of drawings and specifications for examination and approval prior to commencement of electrical work. Pay associated fees.

.5 Submit to the Province a copy of electrical permits obtained from a Governmental Authority.

.6 If a Governmental Authority conducts an electrical inspection, submit copy of certificate of acceptance provided by the Governmental Authority.

2. SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

.1 Submit shop drawings, product data and samples, as specified, indicating details of construction, dimensions, capacities, weights and electrical performance characteristics of equipment and materials.

.2 Provide product data for the following:

.1 Panelboards.
.2 Luminaires.
.3 Motor control.
.4 Fire alarm panels and components.
.5 Control panels.
.6 Other items, as requested by the Province.

3. RECORD DRAWINGS

.1 Record actual locations of all pull boxes, panelboards, luminaires, feeders, electrical equipment and electrical site services.

.2 Record any changes to circuit designations.

4. REFERENCE STANDARDS

.1 Comply with applicable Standards and Guidelines of following organizations:

.1 Electrical and Electronic Manufacturers Association of Canada (EEMAC).

.2 National Electrical Manufacturers Association. (NEMA).

.3 Institute of Electrical and Electronic Engineers (IEEE).

.4 Insulated Power Cable Engineers Association (IPCEA).

5. TESTING

.1 Prior to energizing any portion of the electrical system, perform megger tests on all parts of the distribution system. Results shall meet the requirements of the CEC, the applicable Governmental Authority and the Technical Requirements.

6. ELECTRICAL IDENTIFICATION

.1 Colour Identification of Equipment:

.1 Electrical equipment shall be prefinished in coded colours as follows:

.1 120/208V or 120/240V Line Voltage Equipment: grey.
.2 Fire Alarm System Equipment: red.
.3 Telephone Cabinets: green.
.4 Ballast Cabinets: green.

.2 Refer to Alberta Infrastructure and Transportation's *Colour Coding Requirements for Mechanical and Electrical Systems, June 1987* for specific paint colour numbers.

.3 Where impracticable to obtain equipment prefinished in coded colours, equipment may be site painted in coded colours.

.2 Nameplate Identification: Identify following equipment with lamicoid nameplates, 3 mm thick, black face, white core, mechanically attached, 20 mm high with 8 mm high letters:

.1 Panelboards.
.2 Disconnection switches, magnetic motor starters and contactors.
.3 Transformers.
.4 Wireways.
.5 Line voltage cabinets and enclosures.
.6 Low voltage cabinets and enclosures.
.7 Pull and junction box covers over 100 mm size.

.3 Panelboard Directories: Identify loads controlled by each overcurrent protective device in each panelboard, by means of a typewritten panelboard directory.

.4 Colour Identification of Conduit and Cable: Identify all systems, except line voltage, with paint or colour banding tape.

.5 Identification of Pull and Junction Boxes: Identify boxes for all systems, except line voltage, as follows:

.1 Boxes over 100 mm size: Spray paint inside and outside of boxes in coded colours.

.2 Boxes 100 mm or less in size: Spray paint inside of boxes in coded colours. Apply permanent identifying markings directly to box covers using indelible black ink.

.6 Colour Identification of Wiring:

.1 Identify No. 4/0 AWG wiring and smaller by continuous insulation colour.

.2 Identify wiring larger than No. 4/0 AWG by continuous insulation colour or by colour banding tape applied at each end and at splices.

.3 Colour coding shall be in accordance with Canadian Electrical Code.

.4 Maintain phase sequence and colour coding throughout each system.

.7 Name/Number Identification of Wiring:

.1 Identify No. 8 AWG wiring and smaller using one of the following materials:

.1 Heat shrink sleeves, blank.
.2 Clear plastic tape wrap-on strips with white writing section.
.3 Wrap-on strips, pre-numbered.
.4 Slip-on identification bead markers or sleeves, blank or pre-numbered.

.2 Type or print on blank wire identification materials using indelible black ink.

.3 Identify wiring at all pull boxes, junction boxes, and outlet boxes for all systems.

.4 Identify each conductor as to panel and circuit, terminal, terminal numbers, system number scheme, and polarization, as applicable.

ATTACHMENT F2 – BASIC MECHANICAL REQUIREMENTS

1. REQUIREMENTS OF APPLICABLE LAWS

.1 All mechanical products shall be tested, certified and labeled in accordance with a certification program accredited by the Standards Council of Canada. Where a product is not so labeled, provide written approval by the appropriate Governmental Authority.

.2 Submit to the appropriate Governmental Authority and utility the necessary number of drawings and specifications for examination and approval prior to commencement of mechanical work. Pay associated fees.

.3 Submit to the Province copies of mechanical permits obtained from a Governmental Authority.

.4 If a Governmental Authority conducts a mechanical inspection, submit copy of certificate of acceptance provided by Governmental Authority.

2. REFERENCE STANDARDS

.1 Comply with the applicable Standards and Guidelines of the following organizations:

.1 General Mechanical Provisions to CSA, NEMA, MG1-98, ULC:
Mechanical general requirements including general testing, fire stopping, equipment supports, housekeeping pads, access doors, spare parts, special tools, demonstration and operating instructions and requirements for operation and maintenance manuals and record drawings.

.2 Domestic Water Supply Piping – incoming water service to ASSI/AWWA, CSA 64.4, AWWWA C900, ULC:
AWWA C900 PVC pressure pipe and fittings, joints. Water service gate isolation valves and reduced pressure backflow preventers.

.3 Mechanical Identification to CAN/CGSB-24.3, ANSI/NFPA 13:
Piping and duct identification systems. Mechanical equipment identification and valve controller tagging. Equipment location identifiers. Specified systems will be SETON snap-on and strap-on labels and arrows. All valve tagging and equipment identification to be by lamacoid labels and discs.

.4 Mechanical Systems Balancing to AABC, NEBB:
Specifications for total air balance services to be provided by AABC or NEBB personnel including report format and total air balance requirements. Balance points for air handling units and exhaust fans and locations for room sound power level measurements are provided.

.5 Chemical Treatment and Procedures to ASME, Sec VIII:
Startup and testing of all mechanical systems including startup procedures for ventilation systems and building system startup.

Hot water media and treatment specifications including molybdenum inhibitor, test coupons, side arm filters, hot water media and inhibitor test kits and all flush and clean and testing procedures.

.6 Piping and Equipment Insulation to CAN/CGSB 51.9, ANSI/NFPA 90A, CAN/CGSB-51.2, CSA HA M1980:
Piping insulation for hot water, domestic water and humidification piping. Canvas jackets for exposed insulated piping in mechanical and electrical rooms, aluminum jackets for exterior piping. Insulated removable valve enclosures for hot water gate, butterfly and flow balancing valves.

.7 Ductwork and Breeching Insulation to SMACNA, ASTM C423, CAN/CGSB-51.10, CAN/CGSB-51.11, ANSI/NFPA 90A, ANSI/NFPA 90B-1993:
Type D1 Rigid and D2 flexible insulation for supply air and exhaust air ducts and for radiant ceiling panels. Canvas jackets for exposed supply air and exhaust air ducts.

Rigid and flexible acoustic duct lining and 22ga. perforated lining for specific rectangular and all round ducts. Acoustic lining is also used in lieu of thermal insulation on C/A ducts to act as the thermal barrier.

Alumina silicate matt insulation for gas fired appliance breeching complete with aluminum alloy jackets.

.8 Pipe and Pipe Fittings to ASTM 88M, ANSI B16.18, ANSI B16.22 B137.10 ASTM F128,1 ANSI/NSF 61, ANSI B306, CAN/CSA-B70, CSA B125, ASTM D 2564, CAN/CSA B181.2, CSA B181.12, CAN40S102.2, ASTM A53, CSA W47.1:

Plumbing: Hard drawn Type 'L' Domestic water piping, PEX-AI-PEX domestic water tubing and fittings. Domestic water fittings and connection methods installation instructions and domestic water systems flushing, cleaning and disinfecting.

Drainage: Copper tube and fittings and mechanical joint cast iron piping and fittings. Fire retardant PVC piping and fittings and directions on acceptability for use within the building.

Hydronic and Steam: Schedule 40 steel piping, fittings and joints for hydronic heating systems and steam humidification systems.

Natural Gas: Schedule 40 steel piping, fittings and joints for all natural gas-fired equipment and piping.

.9 Pipe and Equipment Supports to ANSI B31.1, MSS SP-58:
Hanging and support systems for mechanical systems including hot water piping, Domestic water piping, drainage piping and natural gas piping, ducts and miscellaneous equipment. Section includes specifications for clevis hangers, rod hangers, Can-truss hangers and wall brackets, insulation shields and saddles, upper supports and riser clamps.

.10 Pressure Gauges and Thermometers to ANSI/ASME-B40.1, CAN/CGSB-14.4 CAN/CGSB-14.5:
Thermometers including wells; pressure and vacuum gauges.

.11 Pumps:
Hydronic: Radially split cast iron inline circulators and vertical inline pumps for hot water primary and secondary pumps and iron body inline circulators for air handling unit, heating coil circulators. All pumps with mechanical seals.

Plumbing: Cast brass body in line circulators for domestic hot water recirculation and water service recirculation. Multi stage stainless steel jet pumps for non potable water pressure and grey water filter pressure pumps, packaged grey water lift station with solid transfer pumps.

.12 Expansion Compensation to ASTM A 53-90B, ASTM A 105/A 105M-02:
Braided stainless steel flexible connections equipment; guides and anchors for hot water systems; acoustic isolators for hot water systems; and inline expansion joints for hot water systems.

.13 Mechanical Vibration Control to SMACNA, ASHRAE RP-812:
All vibration isolation equipment including inertia bases for larger pumps, acoustic barriers, elastomeric pads, floor and hanging spring isolators and spring isolated hanging systems.

.14 Plumbing Specialties to ASTM A 126, CSA B79, ANSI/AWWA C700, CSA B64, ANSI Z359.1:
All plumbing accessories and specialty items including: floor drains, cleanouts, water hammer arrestors, hose bibs, strainers, vent flashing, domestic hot water expansion tank, domestic water valves, domestic water manifolds, backflow preventers, eyewash stations and showers, trap seal primers, vent flashings, thermostatic and pressure mixing valves and gravity film shower heat recovery exchangers.

.15 Domestic Water Heaters to CSA B51:
Domestic water tanks and heaters.

.16 Plumbing Fixtures and Trim to CAN/CSA-B45, CSA B125:
Plumbing fixtures and trim include lavatories, hand sinks, mop sinks, water closets, urinals, and showers. Faucets will be with infrared control, all trim will be institutional cast brass. All lavatory faucets to be metered and include anti scald temperature stops. All shower mixing valves to be pressure balancing fixture supplies.

.17 Boilers draft assisted meeting California Nitrous Oxide Requirements.

.18 Hydronic Terminal Heat Transfer Units:
Finned tube baseboard convectors, radiant ceiling panels and steel radiators.

Cabinet and suspended fan powered unit heaters.

.19 Coils to ANSI.ARI 410:
Duct mounted heating coils.

.20 Packaged Heat Recovery Ventilators to CSA C22.2, ANSI/ARI 430, CAN/CGSB181:
Energy recovery ventilators specification including fan, coil and motor schedules, unit construction, finish, medium and high efficiency filters, energy wheels and trim. Inlet, discharge and radiated fan sound power level are also included.

.21 Gas Fired Steam Humidifiers to CSA:
Water to steam humidifier and grid for connection to gas fired humidifiers and for installation in air handling units.

.22 Fans to CSA C22.22, CAN/CGSB 1.181, ANSI/ASHRAE 51:
General fans including cabinet and inline exhaust air fans, transfer fans and cooling fans. All inline centrifugal fans are included with acoustic lined housings. Performance schedules for all fans including LwA or Sones sound criteria are included.

.23 Ductwork to SMACNA, ASHRAE:
Low velocity ducts below 10m/s including proprietary joints, sealant, fitting, duct weights, hangers and supports to SMACNA and ASHRAE.

.24 Ductwork Accessories SMACNA, ASHRAE:
Ventilation accessories including neoprene flexible connections, duct access doors, turning vanes and instrument test ports.
Single bladed and multi-bladed dampers balancing dampers. Displacement ventilation dampers.
Aluminum insulated/thermally broken dampers for outdoor air and exhaust air dampers.
Fire and smoke damper fabrication and installation instructions.

.25 Breeching and Chimneys:
Listed all fuels pressure boiler chimneys and fabricated mild steel breeching and listed. Chimney accessories and flue barometric dampers.

.26 Air Outlets and Inlets to SMACNA, ASTM E 90, AMCA:
Steel ceiling diffusers, steel wall and ceiling grilles, aluminum ceiling grilles. Displacement ventilators. A schedule of all diffusers is provided.

Shop fabricated wall hoods, factory fabricated low profile roof hoods and factory fabricated extruded stationary aluminum louvres.

.27 Air Filters to UCL-S111, CAN/CGSB 15.10, CAN/CGSB 15.18, ASHRAE 52:
Low efficiency filters, housings and magnehelic gauges for mechanical room cooling systems.

.28 Silencers to ASTM C 423-90a, ASTM E 90-90, ASTM E 477-90:

Passive low and medium velocity silencers for supply and return air ducting at air handling units.

.29 BMCS: General Requirements; Shop Drawings, Product Data and Review Process; Start-up and Check-out; Commissioning; Project Record Documents; Identification; Local Area Network (LAN); Operator Work Station (OWS); Building Controllers Family of Controllers; Field Control Devices; Field Installation; Site Requirements Applications and Systems Sequences of Operation to C-22.1 CEC:
General requirements for DDC base BMCS system.
Submittal requirements and procedures for DDC based BMCS system.
Start-up for DDC based BMCS system.
Procedures for DDC based BMCS commissioning including coordination issues for total building commissioning.
Procedures for DDC based BMCS record drawings and submissions.
Identification requirements for DDC based BMCS.
DDC based BMCS system networking, requirements.
DDC based BMCS system operating system including hardware, software, connectivity and display.
DDC based BMCS system controllers including application specific controllers and network controllers.
DDC based BMCS system devices including AI/DIAOAI devices, low and line voltage devices and all ancillary control equipment and materials.
Installation specification for DDC based BMCS system.
DDC based BMCS system controls sequences for specific building systems controlled by BMCS.

3. SHOP DRAWINGS, PRODUCT DATA AND SAMPLES

.1 Provide shop drawings and comply with requirements of DBFM Agreement and Section 4 of Schedule 18.

.2 Identify materials and equipment by manufacturer, trade name and model number. Include copies of applicable brochure or catalog material. Maintenance and operating manuals are not suitable submittal material.

.3 Clearly mark submittal material using arrows, underlining or circling to show differences from specified, e.g. ratings, capacities and options being proposed. Cross out non-applicable material. Specifically note on the submittal specified features such as special tank linings, pumps seals materials or painting.

.4 Include dimensional and technical data sufficient to check if equipment meets requirements. Include wiring, piping, and service connection data and motor sizes.

.5 Installed materials and equipment shall meet specified requirements regardless of whether or not shop drawings are reviewed by the Province.

4. MECHANICAL IDENTIFICATION

.1 Comply with requirements of latest edition of Alberta Infrastructure's *Colour Coding Requirements for Mechanical and Electrical Systems, June 1987*.

5. TESTING

.1 Equipment and mechanical systems shall be tested to determine compliance with specified Technical Requirements.

.2 Prior to starting any mechanical equipment and system, perform all the required testing. Results shall meet the Technical Requirements and the requirements of the appropriate Governmental Authority.

6. PROJECT RECORD DRAWINGS

.1 Submit record drawings identifying location of fire dampers, major control lines, BMCS sensors, access doors, tagged valves and actual room names or numbers.

APPENDIX G - ALBERTA INFRASTRUCTURE, MODULAR CLASSROOM CONTROL GUIDELINE

ALBERTA INFRASTRUCTURE & TRANSPORTATION

GUIDELINE FOR

RELOCATABLE CLASSROOM CONTROLS

2007

Roman G. Unyk, P.Eng.
Senior Mechanical Engineer, BMCS
Phone: (780) 422-7469
E-mail: roman.unyk@gov.ab.ca
Alberta Infrastructure
Technical Resources and Standards Branch
Mechanical Engineering Section
November, 2007

1. General

1.1 INTENT

.1 The intent of this document is to provide guidance regarding the scope, installation, configuration and programming of the system that will be used to control the mechanical equipment and lighting in a relocatable classroom. It will also cover backups and documentation for operations staff as well as a user guide for teaching staff.

.2 A major aim of the Alberta Infrastructure and Transportation (AI&T) Relocatable Classroom Program is to provide students and teachers with classroom units that have a level of indoor air quality and comfort comparable to that of any regular classroom. AI&T has also embraced the concept of LEED™ and the relocatable classrooms are being designed and constructed with LEED™ Silver as a minimum target. With these goals in mind, the guideline will deal with the desired control sequences to be used to provide this comfortable environment in an energy efficient manner. These will integrate mechanical system control, occupancy sensing, equipment scheduling as well as lighting override/control.

.3 Additional operational features such as tie-ins for a school security system and dial-out mechanical alarm will also be detailed.

.4 A major component of the guideline is to provide a common interface "profile" based upon BACnet objects to facilitate interfacing various classrooms from differing vendors into a school's BMCS network in a standardized fashion.

1.2 ABBREVIATIONS

.1 BACnet: ASHRAE Standard Building Automation & Control Network Protocol
.2 CCS: Central Control Station
.3 BMCS: Energy Management Control Systems
.4 LEED™: Leadership in Energy and Environmental Design
.5 PCS Portable Control Station
.6 PCU: Programmable Control Unit
.7 PID: Proportional Integral Derivative

1.3 BASIC MECHANICAL & ELECTRICAL REQUIREMENTS

.1 The mechanical system is to include:
  .1 an exhaust fan to ensure positive entry of 212 L/s of fresh air

.2 heating with minimum 4-1 turndown, 2-1 if heat reclaim is provided
.3 humidifier
.4 small sump and sump pump, c/w high level alarm
.5 100% outside air free cooling capability
.6 mixing dampers for non-displacement systems
.7 heat reclaim and CO2 sensor

.2 System must be designed and component sizing selected such that the supply air temperature swing during any form of cycling operation under any heating, free cooling or ventilation mode is less than 5 degC.

.3 Include room for DX cooling and all necessary controls and programming for this function whether or not classroom is being equipped with cooling.

.4 System must be designed such that there are no marked changes in classroom pressurization under any combination of supply fan speed, damper position or exhaust fan operating status.

.5 A contactor is required for overall control of the lighting. If daylight harvesting is being employed, then additional controls or control interfaces will be required. Ensure these are compatible with the PCU.

.6 Program start ballasts are required to preserve lamp life under frequent switching.

.7 Mechanical and electrical requirements must be coordinated with the mechanical and electrical disciplines.

2. Standard Functional Profile

2.1 GENERAL

.1 The ultimate purpose of a relocatable classroom is to allow it to be moved from one site to another with little difficulty. Since it is expected that classrooms will be sourced from a variety of manufacturers and will be supplied with different mechanical systems, it is necessary to ensure that the controls appear the same from one classroom to another, in as much as this is possible. Without such standardization, significant unnecessary expense is added to a move.

.2 BACnet has been chosen as the interface standard mainly because all previous relocatable classrooms have included native BACnet compliant hardware. However, a major benefit of BACnet is that it allows auto-discovery of connected hardware and exposed “objects”. Integration of a

relocatable classroom to a school's BMCS is greatly facilitated if the exposed objects follow a common naming convention and offer identical functionality. Consistency of common features is mandatory.

.3 For the purposes of this guideline, these objects will be broken down into three types:

.1 Basic operational objects required for day to day operation/interaction with the mechanical system. These are not specific to actual equipment, but are generic in nature. These include scheduling, occupancy, setpoints, failure alarms etc.

.2 Engineering objects required to setup features or tune the generic control sequences. These include system status, setpoint offsets, control loop parameters etc.

.3 Product specific objects/options not included above.

.4 In the following profile descriptions, the ## refers to the classroom number. It is expected this portion of the name will need to be changed every time a classroom is relocated and incorporated into a new network. Italicized names refer to variables or virtual points.

2.2 BASIC OPERATIONAL OBJECTS:

Note: R = read, W = write, T = trend, O = override, C = Calibrate, A = alarm & limits
* = Objects that are required only if related options have been included

Name	Description and Interaction	(units)
RC##OAT	Outside Air Temperature AI (degC)	RTC
RC##ST	Space (classroom) Temperature AI (degC)	RTCA
RC##RH	Space Relative Humidity AI (%RH)	RTCA
RC##CO2	CO2 AI (PPM)	*RTC
RC##LL	Light Level AI (Lux)	*RT
RC##L	Lighting Contactor DO (On/Off)	RWTO
RC##OCCUPIED	Occupied Mode flag (Yes/No)	RWTO
RC##ST_USP	User Space Temp Setpoint (degC)	RWTO
RC##LL_SP	Light Level Setpoint (Lux) *RWTO	
RC##ST_24max	Max space temp over last 24 hrs (degC)	RT
RC##ST_24min	Min space temp over last 24 hrs (degC)	RT
RC##OAT_24max	Max OAT over last 24 hrs (degC)	RT

RC##OAT_24min	Min OAT over last 24 hrs (degC)	RT
RC##ST_24max	Max space temp over last 24 hrs (degC)	RT
RC##ST_24min	Min space temp over last 24 hrs (degC)	RT
RC##RH_24max	Max RH value over last 24 hrs (%RH)	RT
RC##RH_24min	Min RH value over last 24 hrs (%RH)	RT
RC##CO2_24max	Max CO2 value over last 24 hrs (PPM)	*R
RC##CO2_24min	Min CO2 value over last 24 hrs (PPM)	*R

2.3 ENGINEERING / MAINTENANCE RELATED OBJECTS:

Note: R = read, W = write, T = trend, O = override, C = Calibrate, A = alarm & limits
* = Objects that are required only if related options have been included

Name	Description and Interaction	(units)
RC##SAT	Supply Air Temperature AI (degC)	RTCA
RC##MAT	Mixed Air Temperature AI (degC)	RTCA
RC##OCCS	Occupancy Sensor DI (On/Off)	RT
RC##TC	Time Clock DI (Occupied/Unoccupied)	RT
RC##OCCMOR	Man Occup Override Button DI (On/Off)	RWO
RC##FAULT	Mech fault DI, flamefail etc (Alarm/Normal)	RTA
RC##SUMP_HI	High Sump level Alarm DI (Alarm/Normal)	RTA
RC##SF	Supply Fan continuous run DO (On/Off)	RWTO
RC##EF	Exhaust Fan DO (On/Off)	RWTO
RC##H	Humidifier control DO (On/Off)	RWTO
RC##HTG_E	Heating Enable DO (enabled/disabled) *RWTO	
RC##CLG	Cooling element (DX coil) DO (On/Off)	RWTO
RC##CLG_E	Cooling Enable DO (Enabled/Disabled) *RWTO	
RC##MALM	Mechanical Alarm DO (Alarm/Normal)	RTA
RC##SALM	Security Alarm Contact DO (Closed/Open)	RTA
RC##MAD	Mixed Air Damper AO (%)	RWTO
RC##HTG_R	Heating Reset AO (%) *RWTO	
RC##OCCsched	Occupancy Schedule Option (Yes/No)	RWO
RC##OCCtclk	Occupancy TimeClock Option (Yes/No)	RWO
RC##OCCesave	Occupancy EnergySave Option (Yes/No)	RWO
RC##OCCco2	CO2 Control Option (Yes/No)	RWO

RC##CLG_INSTALLED	Cooling Available option (Yes/No)	RWO
RC##OCC_MORT	Occupancy Manual Override Time (min)	RWO
RC##OCC_TMR	Manual occupancy count down timer (min)	R
RC##OCC_WS	Occupied Mode Weekly Schedule	RWTO
	All schedule setup parameters	RW
RC##OCC_AS	Occupied Mode Annual Schedule	RWTO
	All schedule setup parameters	RW
RC##OCC_PROB	Occupancy Probability (%)	RWTO
RC##ST_SP	Operating Space Temp Setpoint (degC)	RWTOA
RC##ST_SPmax	Max allowed SpaceTemp setpt (degC)	RW
RC##ST_SPmin	Min allowed SpaceTemp setpt (degC)	RW
RC##ST_NSP	Night setback space temp setpoint (degC)	RWTO
RC##RH_SP	RH Setpoint (%)	RWTO
RC##MAT_SP	MAT Setpoint (degC)	RWTO
RC##MAD_MIN	Mixed Air Damper Min Posn. (%)	RWTO
RC##SAT_SP	SAT Setpoint (degC)	RWTO
RC##HTG	Heating element output value (%)	RT
	Note: multi stage firing value would also be shown in % of fire i.e. 50%, 100%	
RC##CO2_SP	CO2 Setpoint (PPM)	*RWTO
RC##CO2_HIALM	CO2 High Alarm (Alarm/Normal)	*RTA
RC##CO2_FAULT	CO2 sensor fault (Alarm/Normal)	*RWTOA
RC##L_INTMR	Lighting Interrupt Timer (On/Off)	RWTO
RC##ST_CO	Space Temp Controller Output Value (%)	RWTO
	All control loop setup parameters	RW
RC##ST_PG	ST Loop Proportional Gain ( )	RWO
RC##ST_IG	ST Loop Integral Gain ( )	RWO
RC##MAT_CO	Mix Air Temp Controller Output Value (%)	RWTO
	All control loop setup parameters	RW
RC##MAT_PG	MAT Loop Proportional Gain ( )	RWO
RC##MAT_IG	MAT Loop Integral Gain ( )	RWO
RC##DTIME	Decimal 24hr Time (Hrs)	RT

3. Control Sequences

3.1 GENERAL

.1 In many ways, the older standalone portables were somewhat less problematic because these mechanical systems were very simple in nature and the typical thermostat interface was generally straight forward in

nature and well understood by most people. Unfortunately, the older mechanical systems did not provide good comfort conditions, were not energy efficient and could not be counted-on to provide the required amount of fresh outside air.

.2 In response to indoor air quality concerns and energy efficiency, the current relocatable classrooms have mechanical and control systems that are much more complex. Heating is now modulated or at least staged, mixing dampers modulate in response to space demands, mechanical cooling may be available and heat reclaim is now standard. Occupancy can be scheduled or sensed and lighting controls can be simple overrides or include daylight harvesting. Resulting control sequences are not only lengthy but more highly integrated.

.3 Programming style should be of a form that enables the control strategies to be easily followed. Clarity, simplicity and elegance are more important than program size. Extensive inclusion of comments is mandatory. Hundreds of classrooms will be constructed, a little extra time spent in preparation and documentation will have huge paybacks during warrantee and beyond.

.4 Text based programs must be modular in nature and as structured as the language will permit. Unconditional branching should be used sparingly. All jumps from the body of a module should target the end of that module. Similarly, jumps from the body of a sub-module should target the end of that sub-module.

.5 Graphic style programming must be nested/broken into easily manageable modules that can be clearly shown on letter sized sheets. Each to be well annotated with text descriptions of the function of each such graphic page. Large function blocks should have all parameters listed on accompanying pages.

.6 The control sequences need to accommodate the following scenarios:

.1 Controls completely self contained: Occupancy determined by classroom occupancy sensor only.

.2 Controls completely self contained: Occupancy determined by internal weekly and annual schedules. Mechanical systems and lights operate during occupied hours regardless of occupancy sensor readings. During unoccupied hours, the occupancy sensor is used for security applications and to turn on lights, not HVAC control.

.3 Controls completely self contained: Similar to 2) above, but occupancy sensor is used in occupied mode to save extra energy by decreasing outside air intake and turning out the lights when no occupancy is sensed. This is the default mode of operation.

.4 Controls interfaced to simple time-clock: Time-clock determines occupancy schedule. Mechanical systems and lights operate during occupied hours regardless of occupancy sensor readings. During unoccupied periods, the occupancy sensor is used for security applications and to turn on lights, not HVAC control.

.5 Controls interfaced to simple time-clock: Similar to 4) above, but occupancy sensor is used in occupied mode to save extra energy by decreasing outside air intake and turning out the lights when no occupancy is sensed.

.6 Controls interfaced to school BMCS: Similar to 4) or 5) above but school's BMCS can be programmed to override classroom's internal occupancy schedules, energy savings option flag as well as the various setpoints. If necessary, it would also be possible to perform these as well as other functions manually from offsite.

.7 Any of the above but with the manual override timer activated.

.7 The mechanical system may use a modulating or multistage gas valve or even some other form of heating. The system will also use some form of heat recovery. This may be in the form of a heat wheel, heat pipe or air-to-air heat exchanger with built in exhaust fan. The programming must be written such that these differences are hidden from the basic operational profile. As an example, heating is to be a value between 0-100%. This can directly represent a modulating gas valve or electric heating coil. Multistage firing rates would show as stepped values (i.e. 4 stages would be 25%, 50%, 75%, 100%). Special, vender specific, setup parameters should be made available via product specific objects/options.

.8 It is not necessary to create programming exactly as shown in the following articles. The sample programming uses various techniques and mixed mode mathematics that are not available to all systems. Such details should be treated as a guideline as to how the sequences are to operate. It is **not** the intent of this guideline to limit the vendor to specific methods of programming or diminish their responsibility for producing a reliable product. More efficient strategies and techniques are welcome as long as comfort and energy efficiency are not compromised.

3.2 BUILDING OPERATING MODES

.1 Three fundamental modes of operation are defined:

.1 Occupied: Normal operation, space at normal occupied setpoint, main fan continuous operation, exhaust fan and mixing dampers set to provide required outside air with free cooling capability and heating/cooling are enabled. Pressing the thermostat's occupancy button will put the space into occupied mode operation for the number of minutes contained in variable ***RC##OCC_MORT***. The transition into occupied mode is also to incorporate warm-up and purge functions as follows:

.1 Warm-up: This function is active whenever the space temperature is noticeably below setpoint as would occur during startup after a night setback period or with an equipment failure. During this mode, the amount of fresh air is smoothly decreased to allow for greater heating capacity and quicker recovery as follows:

Temp. below setpt	Max allowed mixing damper position
3 degC	0 % (fully closed)
0.5 degC	100% or as desired by normal programming

Mixing damper position	Exhaust Fan
Less than ½ of ***RC##MAD_MIN***	OFF
Greater or equal to ***RC##MAD_MIN***	ON

.2 Purge: This function simply disables mechanical DX cooling during the first 20 minutes of occupancy.

.2 Occupied with Energy Savings Active: This is similar to the regular occupied mode but includes features to conserve energy if no actual occupancy is being sensed. As the probability of occupancy drops below 20%, the lights are pulsed off for one second, mixing dampers slowly close over 5 minutes and the exhaust fan goes off once the dampers have closed to less than ½ of their minimum ventilation position. The one second lighting interruption notifies any occupants that there has been insufficient activity to indicate occupancy and all that is required is a single activation of the occupancy sensor to reinstate normal occupied mode control.

.3 Unoccupied: Space at night setback temperature, supply fan off except as required to intermittently heat the space, exhaust fan off and dampers fully closed to outside air. This mode is entered directly if an external time-clock or network override indicates that occupancy has ended. However, if occupancy is being determined using the sensors, then the stepped response used with the energy savings option precedes final system shutdown.

3.3 DEFINITIONS, SETUP PARAMETERS AND SYSTEM VARIABLES

.1 In the following control sequence descriptions, **physical points** are shown in **bold and capitalized** and ***Virtual point***s are shown in ***bold and capitalized italics***.

.2 All parameters listed below must be able to be setup via an attached portable computer or network connection to a central control station or, directly at the keypad of the smart thermostat keypad.
NOTE: Keypad access to these settings must be protected with a pass code or similar means.

.3 Parameter ***RC##CLG_INSTALLED:*** Cooling installed, units "Yes/No", default value "No". Set this parameter to "Yes" if DX Cooling has been installed and is available.

.4 Parameter ***RC##MAD_MIN***: Minimum mixed air damper position, units "%", default value as required to ensure about 212 L/s of outside air will be provided while the exhaust fan is running (i.e. typically somewhere between 30% and 40%).

.5 Parameter ***RC##OCCschd***: Internal schedule option, units "Yes/No", default value "Yes". Occupancy is determined via the internal weekly schedule ***RC##OCC_WS*** and annual schedule ***RC##OCC_AS***. If set to "No" then occupancy is assumed to be determined via the occupancy sensors. Initially set up weekly scheduled occupied hours between 7:30AM and 6:00PM, Monday through Friday. Set up annual holiday schedule for the major holidays and summer vacation from mid July through to mid August. School operator/custodian will need to make final adjustments on receipt of classroom.
NOTE: If connected to school's BMCS set the schedule option to yes and download schedules from BMCS. As an alternative, set this option to yes and create a program in the BMCS to override the status of the internal

weekly and annual schedule based upon the status of the BMCS's schedules.

.6 Parameter ***RC##OCCtclk***: Hardwired time clock option, units "Yes/No", default value "No". Set parameter to "Yes" to indicate that occupancy is to be determined via the external time clock input **RC##TC**. This takes precedence over the internal weekly and annual schedules. Ideally, setting ***RC##OCCtclk*** to "Yes" would automatically reset ***RC##OCCschd*** to "No". As an alternative, it should not be possible to set ***RC##OCCtclk*** to "Yes" if ***RC##OCCschd*** is already "Yes".

.7 Parameter ***RC##OCCesave***: Energy savings option, units "Yes/No", default value "Yes". When enabled, the occupancy sensor is used to save extra energy when no occupancy is sensed during occupied conditions by turning out the lights as well as decreasing outside air intake during cold or extremely hot weather.
NOTE: This option makes no difference in manual occupancy override mode. It is assumed someone wants everything up and running, no matter what the actual occupancy.

.8 Parameter ***RC##OCCco2***: CO2 control option, units "Yes/No", default value "No". If available, the CO2 sensor is used to save extra energy by decreasing outside air quantities requirements during occupied conditions during cold or extremely hot weather.

.9 Variable ***RC##OCC_MORT:*** Occupancy Manual Override Time, units "Minutes", default value 53. This is the duration that the system will be put into occupied mode whenever the intelligent thermostat's occupancy manual override button **RC##OCCMOR** is momentarily depressed.

.10 Variable ***RC##OCC_TMR:*** Manual Occupancy ***C***ount Down Timer, units "Minutes", default value 0. This timer indicates the number of minutes remaining in occupied mode since the momentary closing of the intelligent thermostat's occupancy manual override button. The timer automatically counts down to zero and is set to the manual override time value ***RC##OCC_MORT*** whenever button **RC##OCCMOR** is depressed.

.11 Variable ***RC##OCC_PROB:*** Occupancy Probability, units of %, default value 0. This is a value that indicates the likelihood that the classroom is occupied. In the following sequence, the occupancy sensor must produce 3 captures within a short time to provide 99% probability and since the value is always being decreased, one activation every 6.6 minutes is required to keep probability above zero. This so called probability of occupancy goes from 100 to zero if nothing has been sensed in 20 minutes. As an added feature, the probability value is limited to 33 when

schedules are enabled but indicating unoccupied OR a hardwired time clock is being used but is also indicating an unoccupied period. This allows for a much faster timeout should someone just pop in for a few moments to pick something up, or whatever.

During manual occupancy override, probability is not valid because all systems are forced ON. Just set value to 33% while in manual mode so probability is already limited when counter times out. Should there still be significant occupancy in the space, the probability will climb and the systems will remain in occupied mode as desired.

Every 3 seconds do all of the following:

If ***RC##*OCCS** is "ON"
Then increase the value of ***RC##OCC_PROB*** by 33
Else decrease the value of ***RC##OCC_PROB*** by 0.25

Limit ***RC##OCC_PROB*** to values between 0 and 100%

If ***RC##OCCtclk*** is "Yes" AND input **RC##TC** shows **un**occupied
OR ***RC##OCCschd*** is "Yes" AND schedules are showing an **un**occupied state
Then limit ***RC##OCC_PROB*** to values between 0 and 33%

If ***RC##OCC_TMR*** > 0 (i.e. occupancy manual override is **active**)
Then set ***RC##OCC_PROB*** to 33%

.12 Parameter ***RC##ST_SPmax***: Maximum allowed Space Temp SetPoint, units "DegC", default value of 24.0 DegC.

.13 Parameter ***RC##ST_SPmin***: Minimum allowed Space Temp SetPoint, units "DegC", default value of 21.5 DegC.

.14 Variable ***RC##ST_USP***: Space Temp User SetPoint, units "DegC", default value of 21.5 DegC. This is the value of space temperature setpoint entered or adjusted by the user via the intelligent stat keypad.

.15 Controller ***RC##ST_CO***: Space temperature control loop, output units "%"
Output Range: 0-100%, but limited to 0-75% if ***RC##CLG_INSTALLED*** is "No"
Bias: Set at 45%
Controlled variable: Space temperature **RC##ST**
Setpoint: ***RC##ST_SP***

Parameter ***RC##ST_PG***: Proportional gain, default value equivalent to 25%/degC error
Parameter ***RC##ST_IG***: Integral gain, default value equivalent to 5%/degC error/hour
Miscellaneous: integral windup to be limited

.16 Controller ***RC##MAT_CO***: Mixed air temperature control loop, output units "%"
Output Range: 0-100% (0% is for dampers at full return air)
Bias: Set at 0%
Controlled variable: Space temperature **RC##MAT**
Setpoint: ***RC##MAT_SP***
Parameter ***RC##MAT_PG***: Proportional gain, default value equiv to 25%/degC error
Parameter ***RC##MAT_IG***: Integral gain, default value equivalent to 5%/degC error/hour
Miscellaneous: integral windup to be limited

.17 Interrupt timer ***RC##L_INTMR***: Lighting Interrupt Timer, units "On/Off", default value is Off. This timer is to turn "On" for exactly one second every time probability ***RC##OCC_PROB*** drops below 20%. It resets after the one second activation and waits until the probability value once again goes above 20% then activates again whenever the probability value passes down through 20%.

.18 Variable ***RC##DTIME***: Decimal Time, units "Hours". This is the value of PCU time in decimal hours in 24 hour format. It can be used to check PCU clock synchronization, communications issues etc.

3.4 BASIC DATA GATHERING

.1 Create routines that provide the following maximum and minimum values over a sliding window period of the last 24 hours (hourly data is sufficient):

.1 ***RC##OAT_24max***: Maximum outside air temperature
.2 ***RC##OAT_24min***: Minimum outside air temperature
.3 ***RC##ST_24max***: Maximum classroom space temperature
.4 ***RC##ST_24min***: Minimum classroom space temperature
.5 ***RC##RH_24max***: Maximum classroom relative humidity
.6 ***RC##RH_24min***: Minimum classroom relative humidity
.7 ***RC##CO2_24max***: Maximum classroom CO2 level (if so equipped)
.8 ***RC##CO2_24min***: Minimum classroom CO2 level (if so equipped)

3.5 DETERMINATION OF OCCUPANCY

.1 Determination of occupancy is simple when time schedules or a time clock are available. However, in self contained mode or whenever the energy savings option is active, occupancy can only be determined via IR motion sensors mounted near the windows and sensing into the room.

.2 In practice it has been difficult to find a balance between responsiveness and nuisance activations. One wishes to avoid going into occupied mode should someone just look into the room, but it should not require there to be 10 people moving about the room either. Since the teacher can initialize occupied mode upon entry into the room by touching the stat's occupancy enable/override button, immediate automated response is not required.

.3 The strategy should cover the possibility of a couple of students working quietly and also provide a somewhat faster response for a larger active group. The programming must even handle the situation where a group has been working very quietly, sensed occupancy is about to expire and the lights have just been pulsed off to indicate they will be going fully off in the next 5 minutes. Any activity within the remaining time should markedly delay the onset of unoccupied mode.

.4 It also seems reasonable to limit automatic activation to hours between 6:00AM and 9:00PM. The manual override button can be used outside these hours.

.5 Since there are multiple occupancy inputs, response must be based upon their priority. Occupancy manual override has highest priority and the time clock has precedence over the schedules, sensed occupancy has the lowest priority.

.6 ***RC##OCC_PROB*** already provides much of the required functionality for sensing occupancy. It ramps up far too quickly, but can still be used with a suitable delay mechanism. The complete sequence can be summarized as follows:

If ***RC##OCC_TMR*** > 0 {i.e. occupancy manual override is active}
OR (***RC##OCCtclk*** is "Yes", AND input **RC##TC** shows occupied)
OR (***RC##OCCtclk*** is "No", AND ***RC##OCCschd*** is "Yes",
AND schedules are showing an occupied state)
OR (***RC##OCCtclk*** is "No", AND ***RC##OCCschd*** is "No",
AND ***RC##OCC_PROB*** has been continuously above 33 for 10 minutes

AND the time is between 6:00AM and 9:00PM)
Then set ***RC##OCCUPIED*** to "Yes"
Else If ***RC##OCC_TMR*** = 0 {i.e. occupancy manual override is not active}
OR (***RC##OCCtclk*** is "Yes", AND input **RC##TC** shows unoccupied)
OR (***RC##OCCtclk*** is "No", AND ***RC##OCCschd*** is "Yes", AND schedules are showing an unoccupied state)
OR (***RC##OCCtclk*** is "No", AND ***RC##OCCschd*** is "No", AND (***RC##OCC_PROB*** < 1,
OR the time is NOT between 6:00AM and 9:00PM))
Then set ***RC##OCCUPIED*** to "No"

i.e. The classroom goes into occupied mode if the manual override timer is active, OR the time clock option is enabled and the time clock contact is made, OR the time clock option is not enabled but the internal schedules are active and showing an occupied state, OR occupancy is being determined solely via the occupancy sensors and these have been indicating at least some occupancy over 10 minutes and the time of day is reasonable. Otherwise, the classroom goes into unoccupied mode if the manual override timer is not active, OR the time clock option is enabled but the time clock contact is open, OR the time clock option is not enabled but the internal schedules are active and showing an unoccupied state, OR occupancy is being determined solely via the occupancy sensors and these have not seen anything for many minutes, or the time is outside serviced hours.

3.6 PACKAGED HVAC UNIT CONTROL - DETAILS

.1 Calculate the space temperature setpoint value ***RC##ST_SP*** as follows:

.1 In occupied mode when ***RC##OCCUPIED*** is "Yes" let the operating setpoint ***RC##ST_SP*** be the user set value ***RC##ST_USP*** which is limited to a range between ***RC##ST_SPmin*** and ***RC##ST_SPmax***.

.2 In unoccupied mode, when ***RC##OCCUPIED*** is "No" let the operating setpoint equal the night setpoint ***RC##ST_NSP*** but limited to values between 15 and 20 degC. ***RC##ST_NSP*** is to have a default value of 17 degC. ***RC##ST_NSP*** must not be allowed to be higher than ***RC##ST_USP***.

.2 Supply fan **RC##SF**, is to run continuously in occupied mode when ***RC##OCCUPIED*** is "Yes". In unoccupied mode the fan is only to run as

necessary to maintain space at the setback setpoint. No more than 6 cycles per hour are to be allowed. i.e. minimum off time is to be about 10 minutes.

.3 Exhaust fan **RC##EF** is to run while ***RC##OCCUPIED*** is "Yes", AND supply fan **RC##SF** is running, AND mixing dampers **RC##MAD** are greater or equal to minimum position ***RC##MAD_MIN***.

.4 Exhaust fan **RC##EF** is to be OFF while ***RC##OCCUPIED*** is "No", OR supply fan **RC##SF** is OFF, OR mixing dampers **RC##MAD** are less than ½ of minimum position ***RC##MAD_MIN***. Minimum off time is to be 10 minutes.

.5 Use controller ***RC##ST_CO*** to sequence heating, mixing dampers and cooling stages as follows:

RC##ST_CO controller output

```
|----------------------|----------------------|----------------|
0%                    45%                    75%             100%
     RC##HTG              RC##MAD              RC##CLG
```

NOTE: If cooling is not available (i.e. ***RC##CLG_INSTALLED*** is "No") then limit control loop output to values between 0% and 75%.
NOTE: Controller response must be tuned so as to ensure slow smooth operation. The output must not cause the cooling (DX) or heating (gas) valves to cycle more than about 6 times per hour.

.6 Separate control over mixed air temperature is often desired. This can be incorporated into the above scheme by resetting mixed air temperature setpoint ***RC##MAT_SP*** with respect to supply air temperature controller position as follows:

RC##ST_CO	***RC##MAT_SP***
75% or greater	13 degC
45% or less	23 degC

.7 Allow cooling only while **RC##SF** is ON, AND occupied mode **RC*##OCCUPIED*** is "Yes", AND outside air temperature **RC##OAT** is greater than 18 degC. Disable DX cooling when **RC##SF** goes OFF, OR **RC*##OCCUP*** is "No", OR **RC##OAT** drops below 15 degC. Also disallow cooling during the warm-up/purge phase that is the first 20 minutes of occupancy.

.8 When enabled for operation, control cooling as follows:

RC##ST_CO	cooling (DX)
95% or greater	ON
75% or less	OFF

NOTE: Do not allow more than 6 cycles per hour.

.9 Mixing dampers **RC##MAD** modulate over controller ***RC##ST_CO*** output range of 45% (dampers full return air) up to 75% (dampers full to outside air). OR, if separate mixed air temperature control is being used, then modulate mixing dampers **RC##MAD** over controller ***RC##MAT_CO*** output range of 0% (dampers full return air) up to 100% (dampers full to outside air)

.10 Smoothly limit damper position during warm-up based upon the difference between classroom space temperature and setpoint as follows:

Space Temp. below Setpoint	Max allowed mixing damper position
3 degC	0 % (fully closed)
0.5 degC	100% (fully open)

.11 To ensure smooth start-up or restart during colder weather, slow the speed of damper opening such that they cannot go from fully closed to fully open in less than 10 minutes. However, allow them to close quickly if required.

.12 Include an economizer function such that mixing dampers **RC##MAD** close to minimum position ***RC##MAD_MIN*** when the outside air temperature **RC##OAT** is 2 degC above space temperature **RC##ST**. The dampers are to revert to normal operation when **RC##OAT** is 1 degC below **RC##ST**.

.13 If the energy savings option ***RC##OCCesave*** is "Yes", AND outside air temperature is below 0 degC, then linearly limit damper opening from 100% down to 0% as ***RC##OCC_PROB*** goes from 20% down to 0%. Note: No need to override in extremely warm weather, this is handled by the normal economizer function.

.14 Mixing dampers **RC##MAD** shall go fully closed when supply fan **RC##SF** is OFF, OR **RC##*OCCUPIED*** is "No".

.15 In order to provide for a consistent interface profile for a variety of mechanical systems, a modulating heating element has been assumed such that 0% indicates no heat and 100% is for full heat. Map the actual hardware provided to controlled by **RC##HTG** with respect to

RC##ST_CO. Many scenarios also require enable/disable control over the heating device via **RC##HTG_E**. Some examples of likely possibilities follow:

.1 For a PCU controlled fully modulating device such as pulse width modulated electric heating:

RC##ST_CO	**RC##HTG**
0%	100% (full heat)
45%	0% (no heat)
RC##ST_CO	**RC##HTG_E**
50% or more	heating device disabled
40% or less	heating device enabled

.2 For a PCU controlled modulating gas valve with a 4-1 turn down ratio:

RC##ST_CO	**RC##HTG**
0%	100% (full fire)
35%	0% (minimum fire i.e. 25% output)
RC##ST_CO	**RC##HTG_E**
40% or more	heating disabled
30% or less	heating enabled

.3 For four stages of heating, a separate digital output is required for each stage. ***RC##HTG*** becomes a virtual point related to the stages as follows:

RC##ST_CO	***RC##HTG***	Heating Stage
0 – 11%	75 – 100%	Stage 4, ON @ 98, OFF @ 77
11 – 22%	50 – 75%	Stage 3, ON @ 73, OFF @ 52
22 – 33%	25 – 50%	Stage 2, ON @ 48, OFF @ 27
33 – 44%	0 – 25%	Stage 1, ON @ 23, OFF @ 2

.4 For two stages of heating, a separate digital output is required for each stage. ***RC##HTG*** becomes a virtual point related to the stages as follows:

RC##ST_CO	***RC##HTG***	Heating Stage
0 – 20%	50 – 100%	High fire, ON @ 90, OFF @ 60

20 – 40%	0 – 50%	Low fire, ON @ 40, OFF @ 10

.5 Some heating devices cannot be controlled directly by the PCU. These generally have self contained controls that maintain the supply air temperature at some setpoint value ***RC##SAT_SP***. The PCU can be interfaced to these types of controllers with enable **RC##HTG_E** and reset **RC##HTG_R**. ***RC##HTG*** again becomes a virtual point and is used to reset the supply air temperature setpoint. The values shown in the tables are included as examples only. Actual numbers should reflect the needs of the supplied mechanical equipment.

For a heating device with a high turn down ratio:

RC##ST_CO	***RC##HTG***	**RC##HTG_R**
0%	100% (full heat)	As required for SAT setpoint of 55 degC
45%	0% (no heat)	As required for SAT setpoint of 22 degC

RC##ST_CO	**RC##HTG_E**
50% or more	heating disabled
35% or less	heating enabled

For a heating device with a 4 -1 turn down ratio:

RC##ST_CO	***RC##HTG***	**RC##HTG_R**
0%	100% (full heat)	As required for SAT setpoint of 55 degC
35%	0% (minimum heat)	As required for SAT setpoint of 30 degC

RC##ST_CO	**RC##HTG_E**
45% or more	heating disabled
30% or less	heating enabled

.16 Ensure heating equipment does not cycle excessively. Typically do not allow more than about 6 on/off cycles per hour.

.17 An electric coil may be controlled with a solid state relay that is pulse width modulated under software control.

.18 Space relative humidity setpoint ***RC##RH_SP*** is calculated as a reset function with respect to outside air temperature as follows:

RC##RH_SP	**RC##OAT**
15%	-35 degC or lower
30%	0 degC or higher

.19 Enable humidification device **RC##H** if the space relative humidity **RC##RH** is at least 5%RH below setpoint ***RC##RH_SP***, AND supply fan **RC##SF** is "On", AND occupied mode ***RC##OCCUPIED*** is "Yes". Turn off humidification if there is a sump alarm via **RC##SUMP_HI** is "Alarm", OR **RC##RH** is above setpoint, OR, supply fan **RC##SF** is "Off", OR occupied mode ***RC##OCCUPIED*** is "No".

3.7 LIGHTING CONTROL

.1 For safety and security reasons, lighting must be able to be turned on as soon as there is any indication of occupancy. Therefore, enable power to lighting contactor **RC##L** as soon as occupancy sensor has had a capture (i.e. whenever ***RC##OCC_PROB*** > 30%).

.2 In general, lights are to be operational whenever the space is in occupied mode. However, when the energy savings option is active, the lights are to be turned off when the there is no sensed occupancy even if the class is in occupied mode. To ensure there are no surprises, the lights are pulsed off for 1 second about 5 minutes before they would be turned off (i.e. as ***RC##OCC_PROB*** drops below 20%). This allows time for any occupants to reinstate normal occupied mode control with a simple wave of the hand etc.

.3 The logic can be summarized as follows:

If ***RC##OCC_TMR*** > 0 {i.e. occupancy manual override is active}
OR ***RC##OCC_PROB*** > 30% {occupancy sensor has had 1 capture}
OR (***RC##OCCUPIED*** is "Yes", AND ***RC##OCCesave*** is "No")
OR (***RC##OCCUPIED*** is "Yes", AND ***RC##OCCesave*** is "Yes",
AND ***RC##L_INTMR*** is OFF) {i.e. not trying to pulse lights off for 1 sec}
Then enable **RC##L** {i.e. allow lights to be turned on}
Else disenable **RC##L** {turn lights off}

NOTE: This routine must be scanned very rapidly to ensure lights can be pulsed off properly, or some other equivalent logic must be created to achieve the same result.

.4 If daylight harvesting is to be used, then modulate appropriate classroom lights to maintain light level **RC##LL** at a setpoint ***RC##LL_SP*** adjustable from the intelligent thermostat's keypad. Control should be reasonably rapid but time-averaged so as not to be annoying during fluctuations in daylight caused by cumulous clouds or the like.

3.8 SECURITY CONTACT CONTROL

.1 The intent of this output is to provide a convenient tie-in point for a school security system. Scheduling etc. will be handled by the security system. Security contact simply mirrors status of occupancy sensors.

RC##SALM = **RC##OCCS**

3.9 EMERGENCY CONTROL

.1 On detection of failure of intelligent thermostat:

.1 Supply fan shall go into continuous operation.
.2 Exhaust fan shall remain off (occupied or unoccupied mode)
.3 Mixing dampers shall remain fully closed (occupied or unoccupied mode)
.4 Space temperature to be controlled using the mixed air temperature sensor.
.5 Lighting control is to remain unaltered.

3.10 CO2 MONITORING AND CONTROL

.1 Each classroom may be equipped with a carbon dioxide sensor **RC##CO2** that provides the concentration of CO2 in parts per million (PPM).

.2 Inexpensive CO2 sensors may drift over time. Some form of auto zero calibration function is required. Even then, the devices should be checked annually until some confidence in their reliability is attained.

.3 If a CO2 sensor is provided, then also provide a sequence of operation that checks the minimum value of the sensor over a 24 hr period. The sliding window minimum value of CO2 level from the basic data gathering routines can be used for this check. If the lowest value over the last day has not been near the atmospheric average, then there is likely a problem with the sensor so alarm the situation: i.e.

At 10:00 AM:
IF ***RC##CO2_24min*** is NOT between 250 and 500
THEN set ***RC##CO2_FAULT*** to “alarm” and display this condition on the stat

Once the fault has been corrected a manual reset of ***RC##CO2_FAULT*** must also restore ***RC##CO2_24min*** to 499 so as to allow further collection of data starting at a “normal” value.

.4 LEED™ only requires that CO2 be monitored. However, with the level of controls necessary to produce the sequences of operation in this guideline, it would also be possible for the system to control the amount of fresh air introduced into the space. Since the mechanical system is designed to bring in the amount of fresh air required for full occupancy, energy savings are possible if the number of students is less than maximum. NOTE: Simple breaks in occupancy are already handled by the energy saving option, i.e. dampers closed and exhaust fan off when no occupancy is sensed.

.5 If control over fresh quantities is being implemented or considered:

.1 For reliability reasons, it is not recommended that any CO2 control routine increase fresh air quantities above that provided for in the standard mechanical design. These are already significant and provide for a fully occupied classroom.

.2 If there is a problem with the sensor (i.e. when ***RC##CO2_FAULT*** is in alarm) disable CO2 control over fresh air quantities and revert to normal fresh air rates. Only revert to CO2 controlled operation when the alarm has been manually restored (i.e. the operations staff have corrected the problem)

.3 Setpoint ***RC##CO2_SP*** should be conservative. A default value of 800 PPM would be reasonable and the classroom should not be allowed to exceed 1000 PPM for any significant duration. Only allow setpoints between 750 and 900. It should be remembered that the whole purpose of these advanced relocatable classrooms is to improve environmental conditions for the students.

.4 Since the mechanical system requires some form of heat reclaim, the amount of energy to be saved by CO2 control is diminished. Decreasing the flow rate of fresh air must be balanced by decreases in exhaust rates. On/off control of the exhaust fan is not an adequate means of control in an occupied classroom, some form of speed control or modulation is required. This complicates an already complicated mechanical system.

.5 Decreased air flow through the heat reclaim will make certain types significantly more efficient, which is beneficial in one respect but it also makes the unit much more prone to frost and ice buildup. Increased defrosting may be required. Water pooling in the unit in never a good thing.

3.11 ALARM PROGRAMS

.1 Enable mechanical alarm output **RC##MALM** when any of the following critical alarms is detected:

.1 Low space temperature via **RC##ST** < 12 degC.
.2 Mechanical system failure via **RC##FAULT**.
.3 High sump alarm via **RC##SUMP_HI**
.4 Intelligent-thermostat (user interface) failure.

.2 Display an alarm on the intelligent-thermostat when any of the following non-critical alarms is detected:

.1 ***RC##CO2_HIALM***, high CO2 level via **RC##CO2** > 1000 PPM for 30 min
(if CO2 device is available)
.2 ***RC##CO2_FAULT***, CO2 sensor fault (if CO2 device is available)

4. Documentation

4.1 CONTROLS O&M MANUAL, O&M DISK AND SYSTEM BACKUP

.1 Provide one complete copy of a Controls Operation and Maintenance Manual as follows:

.1 Divisions :
.1 Controls: Hardware (Configuration/Installation)
.2 Controls: Software (Database/Programming)
.3 Controls: Maintenance
.4 O&M Disk (full manual in electronic format)
.5 Backup Disk

.2 A D-ring binder with two plastic sheet lifters and clear outside overlay pockets is acceptable.
.3 Binder cover and spine shall display the project title, classroom model, date of manufacture, serial number and manufacturer's name. The cover sheet should also have "DO NOT REMOVE FROM CLASS MECHANICAL ROOM" in bold red near the bottom. Other information and logos may be added to the cover as desired.

.2 Controls - Hardware (Configuration/Installation):

.1 Organize the information into sections, with index and divider tabs, as follows:
- .1 Configuration (include explanations of architecture)
- .2 System Schematics
- .3 PCU

.2 Configuration: Provide a basic configuration diagram showing PCU and related devices. Provide an explanation of system architecture. Describe each hardware component and the networks that manage system communications.

.4 System Schematics: Provide schematics of the mechanical system indicating point locations, mnemonics and hardware address. Include any wiring details and equipment schematics showing where and how equipment is interfaced to PCU. Drawings must be clear and of adequate size for easy reading. If necessary, fold larger sheets into binder.

.5 PCU: Provide a copy of the PCU panel directory showing point mnemonics, termination addresses and wiring numbers. Also include the panel directory of any associated equipment/interface cabinet.

.3 Controls - Software (Database/Programming):

.1 Organize the information into sections, with index and divider tabs, as follows:
- .1 Point/object Tables
- .2 Graphics
- .3 Descriptions and Procedures
- .4 PCU

.2 Point/object Tables: Provide two lists that, when combined, contain all the physical and virtual points/objects as well as a suitable description as to their function and their database address. The first table is to contain only the standard profile objects, the second to contain all remaining objects.

.3 Graphics: Provide a hardcopy of recommended graphic display screens.

.4 Descriptions and Procedures: Provide a description of overall control philosophy. Describe all hardware interlocks with other equipment that may affect or override action of software control modules. Provide procedures for operating staff to interface with

software control modules, to override system or component operation, to adjust system control setpoints, etc. Name virtual points provided in software for this purpose and recommend adjustment increments and limits where applicable

.5 PCU: Provide the following information separated with coloured sheets:

.1 List of physical and virtual point mnemonics, with a detailed description of the meaning of each mnemonic.

.2 For each User Control Language Program module in the PCU provide:

.1 a description of purpose and logic of module.

.2 a hardcopy listing of the program module.

.3 Complete hardcopy listing of the database. Include each hardware point, virtual point, schedule, report, trend, controller etc.

.4 Controls Maintenance:

.1 Without limiting the Contractor's obligations under Section 5 of Schedule 18 (Technical Requirements), provide a description of maintenance procedures for all Building Equipment and Building Systems. Include a schedule for recommended planned and preventative maintenance work and intervals. Include a list of resources to call upon for maintenance and servicing of Building Equipment. Provide the supplier's name, address and phone number as well as the service contact.

.5 O&M Disk (full manual in electronic form):

.1 In addition to the hardcopy manuals, provide the Operation and Maintenance Manuals in electronic form as follows:

.1 O&M data shall be organized exactly as specified for the hardcopy manuals.

.2 Data shall be compiled into Adobe portable document format and assembled into as few files as practical. (NOTE: It would be preferable if there were no more than one file per division.)

.3 Include table of contents links that allow direct access to data as per the divider tabs required in the hardcopy manual.

.2 Provide an O&M Disk, in the form of a CD-R. Insert in suitable pouch in hardcopy manual.

.6 Backups: Provide two (2) complete system backups, each must contain everything necessary to restore the system to full operation should a catastrophic failure occur. Also include a jpg, gif or dxf version of the graphic display screen that can be used by a host system in the future. One package is to be included in the Operation & Maintenance Manual that will remain in the "Manuals" cabinet in the portable classroom's mechanical space. The remaining package is also to be in the cabinet but in a separate enveloped marked "SYSTEM BACKUP".

4.2 TEACHER'S GUIDE

.1 This guide/pamphlet is to provide casual users such as teachers, custodial staff or even students, with basic operating information for the user interface (smart thermostat). It must be written in a clear straight forward manner and be free of acronyms and technical language. Pictures and graphics should be used as much as possible to illustrate operations and concepts. Include information as follows:

- .1 Display Screen: Show screen layout and displayed information such as room and outside air temperature, relative humidity, occupancy and operating mode if applicable. Graphics and/or annotated pictures of actual displays should be included.
- .2 Keypad: Show keypad layout, label each key and provide basic information as to operation of each key.
- .3 Operation: Pictorially and textually guide the casual user through the use of the basic thermostat menu options such as setting temperature setpoint, occupancy override and setting light level (if available).
- .4 Occupancy Sensing: Provide a clear description of how the occupancy sensor works, how it is used to determine occupancy and what are the differences between occupied and unoccupied modes of operation.
- .5 Reporting: Describe any reporting features such as alarms, if these are displayed on the screen.
- .6 Green/LEED™ Initiative: Provide a section on the importance of occupant comfort and indoor air quality. Describe the energy conservation features of the classroom mechanical equipment.

5. Controller Hardware and Software

5.1 PROGRAMMABLE CONTROL UNIT (PCU) & INTELLIGENT THERMOSTAT

.1 The PCU is to be a single stand-alone, custom programmable (NOT simply configurable), native BACnet controller.

.2 Included interfaces to allow connection to a larger BACnet system via an EIA-485 or Ethernet network to share information, execute commands, or save/load database and control sequences from a Central Control Station and/or laptop computer.

.3 Memory capacity and point configuration to suit application plus one spare universal input and one spare analogue output.

.4 Watchdog timer. Failure of PCU shall automatically switch outputs to a pre-selected fail-safe condition.

.5 Real Time Clock function with programmable scheduling.

.6 Permanently marked removable terminal block for the wiring of all sensors, control devices, network and PCU power.

.7 Intelligent thermostat (net-sensor) with the following features as a minimum:

- .1 Screen capable of continuous display of operating mode, system status as well as outside and inside air temp to a resolution of 0.5 degC.
- .2 Four programmable buttons providing setpoint increase/decrease and occupied/unoccupied mode operation.
- .3 Additional keys and screen display functionality as required to provide access to setup and sequence configuration functions. Entry into setup mode shall be protected with some form of passcode.
- .4 Ability to set device to continuously display room setpoint or current room temperature.
- .5 Space temperature accuracy of +/- 0.3 degC.
- .6 Neutral colour, vented, metal or robust plastic, enclosure with base to cover wall opening.

.8 Each physical or virtual point, controller point or schedule, is to have a unique, user-definable, system-wide, logical point mnemonic. The format of these point mnemonics shall conform to the Alberta Infrastructure Guideline for Logical Point Mnemonics. Refer to control sequences for other relevant names.

5.2 PROGRAMMING/CONFIGURATION TOOL AND MANUALS

.1 Three licensed software development tools must be provided to each School Board to allow the recreation/modification/configuration/saving/reloading of all controller

data bases and custom controls sequences, via a portable computer connected to the PCU. Include any required interface device/cable/hardware.

.2 Development tool to include a control sequence editor that:

.1 has full screen editing of program source code.
.2 uses graphic display, drag-and-drop graphic representations and graphic linking of objects for block language type languages.
.3 automatically changes all program occurrences of a point mnemonic, if that point mnemonic is changed in data base.
.4 flags undefined point mnemonics if a point is removed from the data base.

.3 Include a development tool user's manual as well as a programming instruction manual listing all procedures, functions, operators and reserved words together with a description and examples of their use in programming.

6. Execution

6.1 OCCUPANCY & LIGHT SENSORS / DEVICES

.1 Install TWO occupancy sensors, contacts wired in parallel. Sensors to be mounted high in back corners near the windowed wall. Sensor beams should cross and cover both possible blackboard locations. Sensing area must not include windows, ceiling or door out to hallway. Sensitivity to be adjusted so as to trigger on student or teacher movement but not to respond to normal heating, ventilating, air conditioning system warm or cold air movement.

.2 If daylight harvesting is to be used, then have light sensors look down from ceiling in area that receives light from the windows, clearstory or other device.

.1 For a generic design, light sensors would be located approximately 3m in from the windows. For a clearstory or light tube, sensor should point down from ceiling in close proximity to lit area.

.2 Lighting control zones to be coordinated with sensed areas.

.3 Some form of daylight attenuation may be required if class is to be able to be darkened for AV presentations. These may be manual in nature.

6.2 WIRING AND INSTALLATION

.1 Wiring: to CSA C22.2 No. 75-M1983, copper conductor, 600 V RW90 X-link insulation. 300 V insulation allowed for conductors not entering enclosures containing line voltage.

.2 120 VAC Control Wiring: minimum #14 AWG.

.3 Low Voltage Field Wiring:

- .1 Minimum #22 AWG.
- .2 Twisted pairs.
- .3 Stranded, except #18 AWG and larger may be solid.
- .4 Shielded with drain wire, except for digital input/output wiring carrying less than 25mA and not installed in tray.
- .5 Multi-conductor wiring must have individually twisted and shielded pairs with a drain wire for each pair. Cable must have overall shield. Maximum 6 pairs.

.4 Plenum rated cable to be FT4 rated.

.5 Neatly arranged panduit with snap on covers shall be used to restrain wiring inside cabinets larger than 300mm square.

.6 Neatly train and cable tie wiring in cabinets smaller than 300 mm square. Adhesive backed twist ties or adhesive backed cable tie holders are not allowed. Wiring shall be secured to cabinet back with mountable cable ties fastened with #8 or larger sheet metal screws.

.7 Each field device shall have its own signal and return wire individually terminated in the panel. The use of a common return wire or ground for more than one control point is not allowed.

.8 Plenum rated cable shall be secured to the building structure at intervals not exceeding 2 meters. Attaching cable to the ceiling support system is not allowed.

.9 A single continuous non-spliced cable shall be used for connecting each field device.

6.3 WIRING IDENTIFICATION

.1 Use heat shrink sleeves, with printed or legible hand written identifier, OR factory coded slip-on identification bead markers or sleeves. Wrap-on adhesive strips are not allowed.

.2 Size of sleeves to be selected so that they do not slip off when wire is removed from termination and shaken.

.3 Wiring more than 1 meter in length must be labeled at both ends.

.4 Labels for all system point wiring shall, as a minimum, contain the following information:

.1 Panel end: panel terminal number or hardware address.
.2 Device end: panel number as well as panel terminal number or hardware address.

.5 Label panel power supply wiring with the panel connector number.

.6 Label communications port wiring with panel connector number and device name (e.g. “J1-modem”, “J2-printer”).

.7 Label communications trunk wiring with the panel number, router number etc. to which the other end of the cable is connected.

.8 Wiring on each side of a terminal block or splice shall be labeled with the information required for the device end of the wire.

6.4 GROUNDING

.1 Provide a complete ground system for all PCU equipment, including panels, conductors, conduit, raceways, connectors and accessories. Grounding shall be by means of electrical supply conductor bonding method. Separate grounding conductors not permitted.

.2 Grounding between control panels and field devices shall have a star configuration. The shield for a field device shall be grounded at the panel only.

.3 The shield for communications wiring must be contiguous throughout its full length and shall be grounded at one point only. For intelligent thermostats, the ground shall be at the PCU. Splices shall expose no more than 2cm of unshielded wire.

6.5 SCHOOL INTERFACE CABINET AND TERMINAL STRIP

.1 Supply and install a 250m square, 100mm deep, junction box on the wall, 50mm above ceiling tile height on the hallway side of the classroom. Install one 12 position terminal strip centrally within the box and affix with #8 screws. Connect this junction box to the PCU cabinet with 25mm EMT.

.2 School interface strip: Provide separation between the output and input locations. Wire points to PCU and ensure each shield and drain wire to be taken back to PCU and terminated there. Affix a layout sheet on the door inside surface. Label locations as follows:

Wire pair #1:	Mechanical Alarm (relay output)
Wire pair #2:	Security Alarm (relay output)
Wire pair #3:	Time Clock (dry contact input)
Wire pair #4 + shield:	School Network (BACnet)

END OF GUIDELINE

APPENDIX H - MINIMUM MATERIAL REQUIREMENTS

The intent behind the Minimum Material Requirements is to set out the minimum standards of materials to be used in a School that the Province will accept. The Minimum Material Requirements are not mandatory (unless otherwise specified) if the Contractor chooses to use materials that exceed these minimum requirements.

List of Minimum Material Requirements

Material		Material	
02500 Site Services 02760 Transportation, Drop Off Areas and Parking Facilities 02930 Landscaping 03300 Concrete 03350 Concrete Floor Finishes 04200 Masonry Units 05120 Structure 05510 Metal Stairs 06400 Architectural Woodwork 07410 Metal Cladding 07460 Cementitious Siding 07500 Roofing and Flashings 08110 Hollow Doors and Metal Frames 08210 Flush Wood Doors 08350 Grilles 08410 Curtainwall 08500 Windows 08710 Hardware 08800 Glass and Glazing 09220 Stucco		09250 Gypsum Board 09320 Ceramic, Porcelain, Quarry Tile 09510 Acoustic Unit Ceilings 09525 Acoustic Baffles 09641 Wood Flooring 09650 Resilient Flooring 09680 Carpet 09721 Vinyl Coated Wall Fabric 09850 Cellulose Fibre Acoustic Coating 09900 Painting 10000 Specialties 10160 Washroom Partitions 10350 Flagpoles 10500 Lockers 10650 Folding Partitions 11480 Gymnasium Curtain Divider 11485 Gymnasium Equipment 12480 Entry Coverings 12490 Motorized Blinds 14210 Elevators 15050 Basic Mechanical Materials 16050 Basic Electrical Materials	

02500 SITE SERVICES

1. General

1.1 REFERENCE DOCUMENTS

The Contractor shall consider the following reference documents in the design of the Schools:

.1 ANSI/AWWA M11-91, Steel Pipe - A Guide for Design and Installation

.2 ANSI/AWWA C207-94, Steel Pipe Flanges for Waterworks Service
Sizes 4 in through 144 in (100 mm through 3600 mm).

.3 ANSI/AWWA C502-94, Dry-Barrel Fire Hydrants

.4 ANSI/AWWA C500-93, Metal-Seated Gate Valves for Water Supply Service

.5 CSA B137.1-9, 5 Polyethylene Pipe, Tubing and Fittings for Cold Water Pressure Services

.6 Rigid Poly (Vinyl Chloride) (PVC) Pipe for Pressure Applications

.7 CAN/CGA-B149.1-M91, Natural Gas Installation Code

.8 CSA B51-95, Boiler, Pressure Vessel, and Pressure Piping Code

.9 CSA Z662-96, Oil and Gas Pipeline Systems

.10 ASTM C76-95a, Reinforced Concrete Culvert, Storm Drain and Sewer Pipe

.11 CSA B182.1-96, Plastic Drain and Sewer Pipe and Pipe Fittings

.12 CSA B182.2-95, PVC Sewer Pipe and Fittings

.13 CSA A23.1-94, Concrete Materials and Methods of Concrete Construction

2. Products

2.1 MATERIALS

The Contractor shall consider the following minimum material requirements in the design of the Schools:

.1 Concrete: 20 MPa, 80 mm slump, sulphate resistant Portland cement.

.2 Provide factory-fabricated pipe and pipe fittings of sizes, types, pressure ratings, and fasteners.

.3 Steel Pipe and Pipe Fittings: Pipe to ANSI/AWWA C200-91; Fittings: to ANSI/AWWA C208-83.

.4 Polyvinyl Chloride (PVC) Pipe and Fittings: Pipe to CSA B137.3-93, CI DR 18, Fittings to CSA B137.3-93.

.5 Gate Valves: to ANSI/AWWA C500-93, non-rising stem, square body, to open counter-clockwise.

.6 Hydrants: to ANSI/AWWA C502-94, compression type, complying with requirements of local authority having jurisdiction.

.7 Sanitary and Storm Pipe: Rigid PVC pipe – SDR 35 meeting ASTM specification D3034.

.8 Non-Corrugated Perforated Plastic Drain Pipe: to CSA B182.1-96, minimum150 mm diameter.

.9 Filter Gravel: coarse aggregates to CSA A23.1-94, Table 3, Group 1, 20 mm to 5 mm nominal minimum size of aggregate.

.10 Fittings and Solvent Cement: as specified.

END OF SECTION

02760 TRANSPORTATION, DROP OFF AREAS AND PARKING FACILITIES

1. General

The Contractor shall consider the following reference documents in its design of the Schools.

1.1 REFERENCE DOCUMENTS

.1 ASTM D3515-01, Hot-Mixed, Hot-Laid Bituminous Paving Mixtures.

.2 ASTM D242-04, Mineral filler for Bituminous Paving Mixtures.

.3 ASTM D692-00 (2004), Course Aggregate for Bituminous Paving Mixtures.

.4 ASTM D1073-06, Fine Aggregate for Bituminous Paving Mixtures.

.5 The following documents, referenced in this Section, are published by the Master Painters Institute (MPI)

- .1 Architectural Painting Specification Manual, latest edition. (APS Manual)
- .2 Maintenance Repainting Manual, latest edition. (MR Manual)
- .3 Approved Product List, latest edition.

.6 Concrete Materials and Methods of Concrete Construction: CSA A23.1/A23.2-94.1.2

2. Products

2.1 MATERIALS

The Contractor shall consider the following minimum requirements in the design of the Schools:

.1 Hot mix pavement mixtures utilizing asphalt cement and aggregate in accordance with ASTM D3515-96.

.2 Traffic marking to MPI EXT 2.1A, Latex.

.3 Concrete ingredients, admixtures and reinforcing steel: CSA A23.1-04/A23.2-04.

END OF SECTION

02930 LANDSCAPING

1. General

1.1 REFERENCE DOCUMENTS

The Contractor shall consider the following reference documents in the design of the Schools:

.1 Nomenclature: to "International Code of Nomenclature for Cultivated Plants".

.2 Canadian Standards For Nursery Stock: latest edition by Canadian Nursery Trades Association / Landscape Canada.

.3 *Alberta Yards & Gardens, What to Grow* published by Alberta Agriculture, Food and Rural Development, Agdex 200/32-1.

.4 *Pruning in Alberta* published by Alberta Agriculture**,** Food and Rural Development Agdex 270/24-1.

2. Products

2.1 MATERIALS

The Contractor shall consider the following minimum material requirements in the design of the Schools:

.1 Topsoil: natural, fertile, friable, agricultural soil meeting following requirements:

- .1 Not less than 6% organic material.
- .2 pH value ranging from 5.9 to 7.0.
- .3 Non-toxic to plant growth.
- .4 E.C.-Salinity reading not exceeding 1.5.
- .5 Soil texture: loam soil as defined by Canadian System of Soil Classification.
- .6 Reasonably free from subsoil, slag, clay, stone, lumps, live plants, roots, sticks, quack-grass, noxious weeds and foreign matter.

.2 Grass seed: certified Canada No. 1 seed, free of disease, weed seeds or other foreign materials in accordance with the Canada “Seeds Act” and “Seeds Regulations” for lawn grass mixtures, having minimum purity of 97% and germination of 75%.

.1 Seed mixture 'C'
25% Fairway crested wheatgrass,
15% Sodar streambank wheatgrass,
10% Reubens Canada bluegrass,
10% Kentucky bluegrass blend,
10% Hard fescue,
25% Boreal creeping red fescue,
5% Fiesta III perennial ryegrass.

.3 Nursery Sod: freshly cut and healthy with strong, fibrous root system. Containing maximum of 2% of other grass species, and maximum of two broad leaf weeds and ten other weeds per 40 m2. Sod soil portion shall be a maximum of 40 mm and minimum 25 mm.

.4 Bluegrass/Fescue grass sod: sod grown from minimum 65% Kentucky bluegrass blend, 35% Creeping red fescue.

END OF SECTION

03300 CONCRETE

1. General

The Contractor shall consider the following reference documents in the design of the Schools:

1.1 REFERENCE DOCUMENTS

.1 ASTM C330-00, Standard Specification for Lightweight Aggregates for Structural Concrete.

.2 ASTM A82-02 Standard Specification for Steel Wire, Plain, for Reinforcement.

.3 ASTM A185-07 Standard Specification for Steel Welded Wire Reinforcement, Plain for Concrete.

.4 ASTM A1022-07 – Standard Specification for Deformed and Plain Stainless Steel Wire for Concrete Reinforcement.

.5 CAN/CSA-A23.1-04, Concrete Materials and Methods of Concrete Construction.

.6 CAN/CSA-G30.18-M92 (R2002) Latest edition - Billet-Steel Bars for Concrete Reinforcement

.7 CAN/CSA-G40.21-98 - Structural Quality Steel

2. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools:

2.1 MATERIALS

.1 Portland Cement, Supplementary Cementing Materials: to minimum standards in CAN/CSA-A3000-03.

.2 Aggregates: to minimum standards in CSA A23.1.

.3 Cast-in-place concrete: to conform to minimum standards in CSA-A23.1.

.4 Fly ash content to meet LEED™ Silver Certification requirements.

END OF SECTION

03350 CONCRETE FLOOR FINISHES

1. General

The Contractor shall consider the following reference documents in the design of the Schools:

1.1 REFERENCE DOCUMENTS

.1 CAN/CSA-A23.1-04, Concrete Materials and Methods of Concrete Construction.

.2 CAN/CGSB-25.20-95, Surface Sealer for Floors.

2. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools:

2.1 MATERIALS

.1 Portland Cement, Supplementary Cementing Materials: to CAN/CSA-A3000-03.

.2 Surface Sealer: to CAN/CGSB-25.20-95, Type 2 – Water Based.

.3 Colouring agent: non-metallic type concrete colouring pigments.

END OF SECTION

04200 MASONRY UNITS

1. General

The Contractor shall consider the following reference documents in the design of the Schools:

1.1 REFERENCE DOCUMENTS

.1 CSA A165 Series-04 CSA Standards for Masonry units.

.2 CSA A371-94, Masonry Construction for Buildings.

2. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools:

2.1 MATERIALS

.1 Concrete Block Masonry Units: to minimum CSA A165. Series 04 and Classification: H/15/D/M.

.2 Sound Absorbing block: 250 deep block, minimum NRC 0.70, horizontally and vertically reinforceable with rear thru cavity, dual chamber design, c/w acoustic inserts.

.3 Bullnose corner blocks to be used on exposed corners.

.4 Cavity Weeps/Vents: Preformed plastic or galvanized steel, 100 mm long.

.5 Mortar: to minimum CSA A179-04.

.6 Mortar Colour Admixtures: Metallic oxide pigments. Colour will be selected from manufacturer's standard range. Pigments shall not exceed 10-15% by weight of cement content.

.7 Masonry cement is not permitted.

.8 Grout: to minimum CSA A179-04.

.9 Flashings: Modified Bitumen Base Flashing: SBS modified sheet membrane, minimum 1.0 mm thick self-adhering type or minimum 3.0 mm thick torch-applied type.

END OF SECTION

05120 STRUCTURE

1. General

The Contractor shall consider the following reference documents in the design of the Schools:

1.1 REFERENCE DOCUMENTS

.1 ASTM A108-07, Standard Specification for Steel Bars, Carbon, Cold-Finished, Standard Quality.

.2 ASTM A307-07a, Standard Specification for Carbon Steel Bolts and Studs, 60 000 PSI Tensile Strength.

.3 ASTM A325M-05, Standard Specification for High-Strength Bolts for Structural Steel Joints (Metric)

.4 ASTM A490M-06, Standard Specification for High Strength Steel Bolts, Classes 10.9 and 10.9.3 for Structural Steel Joints (Metric)

.5 CAN/CGSB-1.105, Quick-Drying Primer

.6 CAN/CSA-G40.20/ G40.21, General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steels

.7 CAN/CSA-S16.1-94 (R2000), Limit States Design of Steel Structures.

.8 CSA S136-01 (R2007), North American Specification for the Design of Cold-Formed Steel Structural Members.

.9 CSA W59-03 Welded Steel Construction (Metal Arc Welding).

2. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools:

2.1 MATERIALS

.1 Steel: Structural quality, to minimum CAN/CSA-G40.20.

.2 Rolled and Hollow Structural Steel Sections: to minimum CAN/CSA-G40.21.

.3 Cold Rolled Sections: Conforming to minimum CAN/CSA S136 with yield strength of 380 Mpa.

END OF SECTION

05510 METAL STAIRS

1. General

The Contractor shall consider the following reference documents in the design of the Schools.

1.1 REFERENCE DOCUMENTS

.1 CAN/CGSB-1.105-M91, Quick-Drying Primer

.2 CAN/CSA-G40.20/ G40.21-98, General Requirements for Rolled or Welded Structural Quality Steel / Structural Quality Steels

.3 CAN/CSA-S16.1-94, Limit States Design of Steel Structures

.4 CSA W59-M1989 (R2001), Welded Steel Construction (Metal Arc Welding).

2. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools.

2.1 MATERIALS

.1 Steel: Structural quality, to minimum CAN/CSA-G40.20.

.2 Structural Steel Sections and plates: to minimum CAN/CSA-G40.21 Type 38W.

.3 Welding materials: to CSA W59-1989. (R2001).

.4 Shop Coat Primer: to CAN/CGSB-1.40-M89.

.5 Form treads and risers from minimum 3 mm steel plate.

.6 Stringers shall be minimum C310 x 31 kg/m channels.

.7 Landings shall be steel plate minimum 3 mm thick.

.8 Balusters and Handrails shall be 38 mm diameter steel pipe.

END OF SECTION

06400 ARCHITECTURAL WOODWORK

1. General

1.1 REFERENCE DOCUMENTS

The Contractor shall consider the following reference documents in the design of the Schools:

.1 "Architectural Quality Standards Woodwork" of the Architectural Woodwork Institute (AWMAC) 2003 edition, hereinafter referred to as "AWMAC Manual" – Custom Grade".

.2 ANSI/BMHA A156.9-2001, American National Standard for Cabinet Hardware.

2. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools:

2.1 MATERIALS

.1 Silicone Sealant: to minimum CAN/CGSB-19.13-M87, Shore A hardness 15-25, clear colour.

2.2 COUNTERTOPS

.1 High pressure plastic laminate: general purpose grade, standard duty, minimum 1.06 mm thick complete with PVC edging.

.2 Core: poplar or mahogany plywood, minimum 19 mm thick. Liner grade backer sheet to underside of all countertops.

.3 Solid surface countertops: Solid surface material (SSM) shall consist of reacted monomers and resins, mineral fillers and pigments manufactured in sheets of 13 mm nominal thickness. SSM shall be solid, non-porous, homogeneous, hygienic, renewable, and, when applicable, may feature inconspicuous hygienic seams. SSM shall be free from conspicuous internal strengthening fibers. SSM must meet or exceed performance standards set forth in ISSFA -2-01.

2.2 CASEWORK

.1 Plastic Laminate Casework Exposed Parts:

- .1 Core for Doors: plywood.
- .2 Core for All Other Panel Products: hardwood plywood.
- .3 Laminate Grade: general purpose grade, standard duty, minimum 1.06 mm thick.
- .4 Plastic laminate to both sides of doors and drawer fronts.
- .5 Edge Banding for doors and drawer fronts: minimum 3 mm PVC edge to match faces.

.2 Plastic Laminate Casework Semi-Exposed Parts:

- .1 Core for Doors: plywood.
- .2 Core for all other Panel Products: hardwood plywood.
- .3 Liner Grade: minimum thickness of 0.76 mm, used on the following:
  - .1 Semi-exposed shelves.
  - .2 Interior portions of case bodies.
  - .3 All surfaces of drawer boxes.
- .4 Semi-exposed Surface of Casework Doors and Fronts: same as exposed face.
- .5 Edge Banding: minimum 1 mm PVC edge, colour to match door face.

.3 Prefinished Casework:

- .1 To AWMAC custom grade for clear finish, 'Nova' by States Industries or 'Multi-core' by Longlac Wood Industries.
- .2 Core: manufacturer's option to AWMAC Manual.
- .3 AWMAC Veneer Grade: minimum B grade.
- .4 Semi-exposed Parts: as governed by AWMAC grade for this casework type.
- .5 Edging: minimum 3mm PVC: colour to match panel.

.4 Hardware (Institutional grade):

- .1 Hinges: minimum 125 degree opening; concealed hinge; swing free; self closing; nickel plated steel hinge arm and hinge cup.
- .2 Pulls: Stainless steel "D" pull, 101 mm c.c., brushed nickel finish.
- .3 Drawer Slides: minimum 45 kg. load capacity; steel track; full extension, steel ball bearings.
- .4 Door Locks/Catches: Provide locks to all units, disk tumbler cam type. Each room to be keyed alike. Vandal resistant elbow catch for each pair of lockable doors.

.5 Shelf Pilaster and Brackets: Steel standards, zinc coated; 13 mm adjustable standards; recess mounted. Aluminum standards are not acceptable.

.6 File Folder Rails: complete with Hanging rails, sleeves and brackets.

.7 Grommets: minimum size to be 60mm diameter, 22mm depth. Provide at reception desks, countertop areas where electrical, telephone and data outlets are located below.

END OF SECTION

07410 METAL CLADDING

1. General

The Contractor shall consider the following reference documents in the design of the Schools:

1.1 REFERENCE DOCUMENTS

.1 ASTM A653M-96, Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.

.2 CGSB 19-GP-5M, Sealing Compound, One Component, Acrylic Base, Solvent Curing.

.3 ASTM B209-07, Standard Specification for Aluminum and Aluminum-Alloy, Sheet and Plate.

2. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools:

2.1 MATERIALS

.1 Sheet steel: Exposed to exterior, minimum grade A, Z275 coating designation, factory precoated with fluorocarbon paint finish, 2 coat system dry paint film thickness of 0.025 mm conforming to film test procedures described in CSSBI Bulletin No. 5. Factory preformed prepainted metal, to profile chosen by designer.

.2 Exterior sheet: factory preformed prepainted metal minimum 0.76 mm thick.

.3 Exterior corners: of same profile, material and finish as adjacent siding material.

.4 Rigid insulation: Mineral fibreboard insulation to CAN/CGSB 51.10-92, type 2, Class 5 rigid and as follows:

- .1 Thermal Resistance: minimum 0.73m2˚ c/w per 25.4 mm thickness.
- .2 Minimum Density: 45 kg/m3.
- .3 Thickness: minimum 75 mm.

.5 Accessories: cap flashings, drip flashings, internal corner flashings, copings and closures for head, jamb, sill and corners, of same material and finish as exterior siding, brake formed to shape.

END OF SECTION

07460 CEMENTITIOUS SIDING

1. General

The Contractor shall consider the following reference documents in the design of the Schools:

1.1 REFERENCE DOCUMENTS

.1 ASTM C1186-07 Standard Specification for Flat Non-Asbestos Fiber-Cement Sheets

2. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools:

2.1 MATERIALS

.1 Siding

.1 Non-asbestos fibre cement siding to ASTM C1186 Grade II:

.1 Lap Siding: minimum 7.5mm thick x minimum 145mm high, manufacturers standard finish and colour range.

.2 Vertical Siding: minimum 7.5mm thick, 1220mm x 4880 scored sheets with stucco type finish. Colour as selected by the Province from manufacturer's standard colour range.

.3 Trim: minimum 7.5mm thick, colour to be as selected by the Province from manufacturer's standard colour range.

.2 Accessories

.1 Exposed trim, closures, and cap pieces of same material, colour and finish as siding.

.2 Fasteners and retaining clips to be of a corrosion resistant finish in accordance with siding manufacturers recommendations.

END OF SECTION

07500 ROOFING AND FLASHINGS

1. General

The Contractor shall consider the following reference documents in the design of the Schools:

1.1 REFERENCE DOCUMENTS

.1 CAN/CGSB-37.29 latest edition, Rubber-Asphalt Sealing Compound.

.2 CAN/CGSB-51.20 latest edition, Thermal Insulation, Polystyrene Boards and Pipe Covering.

.3 The system must meet or exceed the Alberta Roofing Contractors Association Ltd. (ARCA) requirements.

.4 CSA S136-01 (R2007), North American Specification for the Design of Cold-Formed Steel Structural Members.

.5 Canadian Sheet Steel Building Institute Standards 10M and 20M.

.6 ASTM D4434 (latest version), “Standard for Polyvinyl Chloride Sheet Roofing”. Classification: Type II, Grade 1.

.7 Alberta Building Code (2006).

2. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools:

2.1 MATERIALS

.1 Provide minimum 2.5 mm thick, SBS modified bitumen premanufactured sheet, with manufacturer's standard internal reinforcement, compatible with substrates and adjoining membranes.
Roofing cap sheet: light colour cap sheets.

.2 For Thermo plastic Polyvinyl Chloride roofing, provide minimum 80 mil (2.0 mm), thermoplastic membrane with fiberglass reinforcement.

.3 Insulation:

.1 Insulation to be Molded Expanded Polystyrene (MEPS) Board: certified for conformance with CAN/CGSB-51.20-M87, Thermal Insulation, Polystyrene, Boards and Pipe Covering, Type 2 or approved alternate.

.2 A rigid isocyanurate foam insulation conforming to CAN/ULC-S770.

.3 Flexible Flashing and Air Seal Membrane: For SBS modified roofing system, provide minimum 2.5 mm thick, SBS modified bitumen pre-manufactured sheet, with manufacturer's standard internal reinforcement, compatible with substrates and adjoining membranes.

.4 Vapour Barrier: One ply self-adhesive polyester reinforced 3.5mm thickness, or 2 ply #15 organic felts fully mopped.

.5 Metal flashings:

.1 Galvanized Steel Sheet: commercial quality sheet to ASTM A653-M96, with Z275 designation zinc coating.

.2 Prepainted Galvanized Steel: commercial quality to ASTM A653-M96 with Z275 zinc coating prepainted with baked on enamel with colours of proven durability for exterior exposure, to CSSBI Technical Bulletin No. 7, 5000 series.

.6 Thermal Barrier: Exterior grade gypsum sheathing to CSA A82.27, M, minimum thickness shall be 12 mm (1/2").

.7 Profile Materials: Z275 galvanized sheet steel conforming to ASTM A653M Grade 230, having a minimum nominal core thickness .76 mm.

.8 Roof Panel Support System: Hidden fastener, purpose-made, thermally responsive ful

.9 Subgirts: If required, subgirts shall be fabricated from a minimum 1.22 mm (.050") thick Z275 Galvanized steel.

.10 Clips: To be fabricated from a minimum of 1.22 mm (.050") steel, with minimum Z275 galvanized coating.

END OF SECTION

08110 HOLLOW DOORS AND METAL FRAMES

1. General

The Contractor shall consider the following reference documents in the design of the Schools:

1.1 REFERENCE DOCUMENTS

.1 Requirements of Canadian Manufacturing Standards for Steel Doors and Frames published by the Canadian Steel Door and Frame Manufacturers' Association.

.2 ASTM A653M-06 Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.

.3 Fire door and frame components and assemblies shall be labeled and listed by an organization accredited by Standards Council of Canada.

2. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools:

2.1 MATERIALS

.1 Sheet Steel: to ASTM A653M-06 commercial quality steel, cold rolled, zinc coated to ZF075 coating designation.

.2 Reinforcement for Hardware: carbon steel, welded in place, prime painted, to the following minimum thicknesses:

.1	Hinge, pivot and panic bar reinforcements:	3.5 mm
.2	Lock face, flush bolts, concealed bolts:	2.5 mm
.3	Concealed or surface closer reinforcements:	2.5 mm
.4	Other surface hardware reinforcements:	2.5 mm

2.2 DOORS

.1 Doors constructed of sheet steel, seamless construction with no visible seams or joints on faces at vertical edges.

.2 Exterior doors: Minimum 1.6 mm face sheet steel, internally steel stiffened with continuous vertical steel stiffeners at 150 mm O.C. spot welded to both face sheets; fill voids with glass fibre insulation.

.3 Interior Doors: Minimum 1.2 mm face sheet steel, honeycomb core material consisting of rigid pre-expanded resin impregnated Kraft paper having maximum 25 mm hexagonal shaped cells.

2.3 FRAMES

.1 Exterior frames to be a minimum 2.0 mm thick steel thermally broken.

.2 Interior frames to be a minimum 1.6 mm thick steel, 2.0 mm steel for openings larger than 1200 wide.

END OF SECTION

08210 FLUSH WOOD DOORS

1. General

The Contractor shall consider the following reference documents in the design of the Schools:

1.1 REFERENCE DOCUMENTS

.1 Canadian Standards Association (CSA).

.1 CSA O115-M1982 (R2000), Hardwood and Decorative Plywood.

.2 National Fire Protection Association (NFPA).

.1 NFPA (fire) 80 2007 edition, Fire Doors and Windows.
.2 NFPA (fire) 252-2008 edition, Fire Tests of Door Assemblies.

.3 Architectural Woodwork Manufacturers Association of Canada (AWMAC).

.1 Architectural Woodwork Quality Standards Illustrated, 2003 edition

.4 Underwriters' Laboratories of Canada (ULC).

.1 ULC CAN4 S104M-M80 (R1985), Standard Method for Fire Tests of Door Assemblies.

2. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools:

2.1 MATERIALS

.1 Wood fire rated doors shall be labeled.

.2 Door materials: to meet AWMAC requirements and other specified requirements.

.3 Door Thickness: minimum 45 mm.

2.2 MINERAL CORE DOORS

.1 Fire rated wood doors: tested in accordance with CAN4 S104 or NFPA 252 to achieve rating.

.2 Reinforcement: SLM, as required for hardware installation, as indicated in AWMAC Quality Standards for Architectural Woodwork, 1998 edition.

.3 Provide mineral core doors for fire ratings over 20 minutes.

2.3 SOLID CORE DOORS

.1 Wood doors shall be constructed of a solid wood core, 7 ply construction. Particleboard cores are not acceptable.

.2 Fire Rating: Minimum of 20 minute fire rating.

.3 Face of the doors to be a hardwood veneer to be premium Grade A, stain grade.

END OF SECTION

08350 GRILLES

1. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools:

1.1 MATERIALS

.1 Rolling Grille – Serveries

.1 Rolling grille: Interlocking flat profile slats, type FE-138, aluminum with endlocks on alternate, clear anodized, finish.

.2 Guides: continuous extruded aluminum shapes (minimum 60 x 54 mm) with continuous silicon treated strips. Guide finish to be clear anodized.

.3 Bottom bar: extruded aluminum minimum size of 45mm deep x 57mm high. Provide cylinder locking receiver.

.4 Barrel: 100 mm minimum diameter steel pipe barrel, maximum deflection of 7mm per 305mm of width. Helical torsion springs for counter balancing the curtain.

.5 Hood: square aluminum hood with clear anodized finish.

.6 Operation: manual push up operation of a maximum force of 13.7kg of effort utilizing finger lifts.

.7 Locking Mechanism: Keyed cylinder lock.

.2 Rolling Grille – Office Area

.1 Horizontal rods: Continuous double channel extruded aluminum section with "V" groove line appearance on center.

.2 Vertical spacing: Aluminum panel connectors, 51mm by 64mm minimum.

.3 Connectors are spaced around minimum 3mm thick polycarbonate panel inserts. Ends of polycarbonate edges shall be encapsulated in rigid vinyl spline.

.4 Bottom Bar: Heavy extruded tubular aluminum

.5 Guides: Heavy extruded aluminum shape minimum 64mm by 37mm with upset shoulders for curtain retention. Each guide will be fitted with vinyl stripping for quiet operation and to cushion both sides of curtain.

.6 Counterbalance: Helical torsion spring assembly set in steel pipe of recommended size by manufacturer to support curtain with a maximum deflection of 7mm per 305mm of curtain width.

.7 Bracket Plates: Minimum 5mm steel plate to support counterbalance assembly, curtain (and hood, optional)

.8 Centered keyed cylinder both sides of bottom bar.

.9 Manual push-up operation.

.3 Side Folding Grille – Office Area

.1 Panel: minimum 180mm wide with minimum 90mm high bottom and top plates of truss like aluminum and glazed with minimum 3mm Polycarbonate with a 100 percent viewable area of a minimum 115mm wide. Provide two-piece vertical aluminum tubular hinges between panels.

.2 Finish-Exposed Aluminum Parts: Clear Anodized

.3 Overhead Track: Extruded Aluminum, minimum 35 mm wide by maximum 45mm high, complete with alignment bars, track pins. Provide nylon Trolleys and carry weight of complete curtain.

.3 Manual pull - push operation. Provide attached pull straps on Closures over 2700 mm in height and all countertop applications.

END OF SECTION

08410 CURTAINWALL

1. General

The Contractor shall consider the following reference documents in the design of the Schools:

1.1 REFERENCE DOCUMENTS

.1 CAN/CSA-G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel.

2. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools:

2.1 MATERIALS

.1 Exterior Frame: Thermally broken extruded aluminum curtain wall section, 50 mm x 146 mm size, 3.0 mm minimum thickness flush stops.

.2 Aluminum extrusions: Aluminum Association alloy AA6063-T5.

.3 Sheet aluminum: Aluminum Association alloy AA1100 anodizing quality.

.4 Steel reinforcements: to CAN/CSA-G40.21-04.

.5 Weather-stripping: waterproof, rot-proof pile fibre 4 mm high x 6 mm wide in neoprene backing of flexible vinyl.

.6 Finish on exposed aluminum surfaces shall be clear anodized coating to AAM12C22A41 not less than 18 micrometer thick, Architectural Class I designation.

END OF SECTION

08500 WINDOWS

1. General

The Contractor shall consider the following reference documents in the design of the Schools:

1.1 REFERENCE DOCUMENTS

.1 CAN/CSA-A440-M90, Windows.

.2 CAN/CSA-G40.21-04, General Requirements for Rolled or Welded Structural Quality Steel.

.3 CAN/CSA-G164-M92, Hot Dip Galvanizing Of Irregularly Shaped Articles.

.4 ASTM A653M-06, Steel Sheet, Zinc-Coated (Galvanized) or Zinc-Iron Alloy-Coated (Galvannealed) by the Hot Dip Process.

.5 ASTM E283-91, Determining the Rate of Air Leakage Through Exterior Windows, Curtain Walls, and Doors Under Specified Pressure Differences Across the Specimen

2. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools:

2.1 MATERIALS

.1 Materials, attachments, accessories, shall meet or exceed requirements of CAN/CSA-A440-M90.

.2 Aluminum: Aluminum Association (AA) alloy 6063-T5 or 6063-T6 for extrusions and AA 1100, anodized quality, for sheet.

.3 Steel: to CAN/CSA-G40.21-04, hot dip galvanized to CAN/CSA-G164-M92.

.4 Sheet Steel: to ASTM A653M-06, hot dip galvanized to Z275 coating designation.

.5 Small box curtain wall: Kawneer 1602 or approved alternate.

.6 Anodized Finishes: Provide surface preparation and anodized finish on exposed aluminum surfaces to Aluminum Association Architectural designation, with even distribution of approved colour variation, as follows:

.1 Clear Anodized Coating: to AA M12C22A41 not less than 18 micrometers thick, Architectural Class I designation.

.7 Mechanically keyed gaskets in the box section complete with pressure plate.

.8 Exterior sills: brake formed aluminum sheet, minimum 1.3 mm thick.

.9 Closures: brake formed aluminum sheet, minimum 1.3 mm thick.

END OF SECTION

08710 HARDWARE

1. General

1.1 REFERENCE DOCUMENTS

The Contractor shall consider the following reference documents in the design of the Schools:

.1 Standard hardware location dimensions in accordance with Canadian Metric Guide for Steel Doors and Frames (Modular Construction) prepared by Canadian Steel Door and Frame Manufacturer's Association.

.2 ANSI/BHMA A156.1-2000, Butts and Hinges.

.3 ANSI/BHMA A156.2-1996, Bored and Preassembled Locks and Latches.

.4 ANSI/BHMA A156.3-2001, Exit Devices.

.5 ANSI/BHMA A156.4-2000, Door Controls - Closers.

.6 ANSI/BHMA A156.5-2001, Auxiliary Locks and Associated Products.

.7 ANSI/BHMA A156.6-2001, Architectural Door Trim.

.8 ANSI/BHMA A156.8-2000, Door Controls – Overhead Stops and Holders.

.9 ANSI/BHMA A156.13-2002, Mortise Locks and Latches, Series 1000.

.10 ANSI/BHMA A156.15-2001, Release Devices – Closer Holder, Electromagnetic and Electromechanical

.11 ANSI/BHMA A156.16-2002, Auxiliary Hardware.

.12 ANSI/BHMA A156.18-2000, Recommended Practices for Materials and Finishes.

.13 ANSI/BHMA A156.19-2002, American National Standard for Power Assist and Low Energy Power Operated Doors

.14 ANSI/BHMA A156.21-2001, Thresholds.

.15 ANSI/BHMA A156.22-2003, Door Gasketing and Edge Seal Systems.

.16 ANSI/BHMA A156.25-2001, Electrified Locking Devices.

.17 ANSI/BHMA A156.31-2001, Electric Strikes and Frame Mounted Actuators.

1.2 SOURCE OF SUPPLY

.1 Use one manufacturer's products only for all similar items.

2. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools.

2.1 HARDWARE FOR FIRE RESISTANCE RATED DOORS

.1 Provide UL listed hardware on doors required to have a fire resistance rating. Hardware to match hardware specified in the following articles.

2.2 LOCKS AND LATCHES

.1 Mortise and bored type locks shall be listed in BHMA's Directory of Certified Locks and Latches.

.2 Bored Latches: to ANSI/BHMA A156.2, series 4000 bored lock, grade 1, designed for passage function.

.3 Mortise Locks and Latches: to ANSI/BHMA A156.13, series 1000 mortise locks, grade 1, designed for function as specified in the Technical Requirements, and keyed as stated in hardware schedule. Mortise body to have adjustable bevel front to conform to shape of door edge.

.4 Lever handles: plain design with end return towards door, solid lever.

.5 Roses and escutcheons: round roses for bored latches, rectangular escutcheons for mortised locksets.

.6 Normal strikes: manufacturer's standard wrought box type, lip projection curved to protect jamb.

.7 Cylinders: key into keying system as noted.

.8 Finish: Satin Chrome.

.9 Product Manufacturers: one of the following, at the Contractor's option.

.1 Corbin
.2 Sargent
.3 Schlage
.4 Yale

Substitutions will not be accepted.

2.3 DOOR HANGING DEVICES:

.1 Butts and Hinges: to ANSI/BHMA A156.1, designated by letter A and numeral identifiers listed in standard, satin chrome finish.

.1 Interior: full mortised, steel, 5 knuckle, bearing type, 114 mm x 114 mm, A8112.

.2 Exterior: full mortised, stainless steel, 5 knuckle, bearing type, 114 mm x 114 mm A5111.

.3 Pins: Non-rising on in-swing doors, non-removable on out-swing doors, button type.

2.4 EXIT DEVICES

.1 Products shall be to ANSI/BHMA A156.3, grade 1, modern with push pad or modern narrow stile with push pad as required, functions as specified in design, satin stainless steel finish.

.1 Application and Types:
- .1 Exterior doors - type 4, narrow style rim.
- .2 Interior single doors and active leaf of interior double doors – type 10, narrow style mortised.
- .3 Inactive leaf of interior double doors – type 5, narrow style surface vertical rod.

.2 Auxiliary items(s):
- .1 Type 21 - Door coordinator with carry bar, bar type with filler piece.
- .2 Type 22 – Removable mullion.

.3 Exit devices on exterior doors shall be electrically equipped to automatically lock, using one of the following features, when the exterior doors are locked down from a central point in the administration area. Refer to ANSI/BHMA A156.25.

.1 Fail-secure exterior trim, or

.2 Automatic latch retraction.

.4 Product Manufacturers: one of the following, at the Contractor's option.

.1 Corbin
.2 Sargent
.3 Schlage
.4 Yale
.5 Von Duprin

Substitutions will not be accepted.

2.5 DOOR CLOSERS AND ACCESSORIES:

.1 Door Controls (Closers): to ANSI/BHMA A156.4, surface mount, modern type with cover, designated by letter C and numeral identifiers listed in standard, size in accordance with ANSI/BHMA A156.4, table A1, painted aluminum finish.

.1 In-swing doors: parallel arm mount, C02021
.2 Out-swing doors: hinge side mount, C02011

.2 Door Controls – Overhead Stops: to ANSI/BHMA A156.8, designated by letter C and numeral identifiers listed in standard, concealed slide stop – C51541 or surface mount stop – C52541, satin stainless steel finish.

.3 Closer/Holder Release Devices: to ANSI/BHMA A156.15, designated by letter C and numeral identifiers listed in standard complete with options, finish to match satin chrome. Devices tied into fire alarm to release holder upon activation of the fire alarm. 24 volt with a maximum of two devices tied into one transformer.

.4 Door coordinator with carry bar, bar type with filler piece for double doors.

.5 Provide drop plate as required to coordinate with Overhead Holders/Stops.

2.6 LOW ENERGY SWING DOOR OPERATORS

.1 Low Energy Power Operated Doors: doors with a power mechanism that opens and closes the door upon receipt of an actuating signal and does not generate more kinetic energy than specified in ANSI/BHMA A156.19. Closing of doors is linked to and integral with power operator mechanism.

.2 Operator:

.1 Type: electro-mechanical, surface-mounted to door frame header, connected to door with pivoting linkage arm.

.2 Motor: electric, permanent magnet, minimum 1/12 HP (60W) DC motor, equipped with circuit protection, connections for power and control wiring, and suited to building's electrical service at point of installation.

.3 Provide semi-concealed, readily accessible, "on-off" switch.

.4 Gears shall be in an air-tight, gasketed gear box concealed within operator enclosures.

.5 Operators shall be equipped with a clutch mechanism as required to meet performance and regulatory requirements.

.6 Provide manufacturer's standard, surface mounted enclosure, designed to prevent entry of dust.

.7 Enclosure shall allow ready access for adjustments, servicing and maintenance of operator and controls.

.8 Enclosures Finish:

.1 Plastic: colour of finish shall be compatible with adjacent door frame.

.2 Aluminum: clear anodized

.3 Electronic Controls:

.1 Electronic controls shall be solid state, low voltage.

.2 Swing doors controls shall include provision for time delay from 1-30 seconds before closing, and individually adjustable closing and opening speeds.

.3 Provide readily accessible, semi-concealed "on-off" switch.

.4 Electronic controls shall be electronically shut down from a central point in the administration area when the building is in lock down mode. Coordinate this function with the single point shut down identified in paragraph 2.4.2

.4 Accessories:

.1 Provide recessed international symbol of accessibility (ISA) and the following clearly legible wording under ISA's: "PUSH TO OPEN", on push plates or on identification plates adjacent to activating device.

.2 Push plates and identification plates shall be stainless sheet steel, satin finish. Letters on plates shall be recessed, in colour matching symbol of accessibility, in upper case, and Helvetica medium font.

.3 Identification plates shall be minimum 100 mm x 100 mm.

.4 Push buttons shall be red, in stainless steel cover plate.

.5 Fasteners:

.1 Materials for Fastening Metals to Metals: aluminum, nonmagnetic stainless steel, finished to match adjacent material.

.2 Materials for Fastening Metals to Concrete and Masonry: stainless steel or carbon steel, hot dip galvanized to CAN/CSA-G164-M92.

.3 Provide tamper-resistant exposed fasteners for mounting devices and to replace batteries in exterior locations and interior public spaces.

.6 Finishes:

.1 Factory finish components.

.2 Hardware: Satin chrome.

.3 Stainless Steel: no. 4, satin finish.

.4 Aluminum: clear anodized.

.5 Exposed Steel: apply finishes as follows:

.1 Primer: Vinyl Wash Primer to CAN/CGSB 1.121-93.

.2 Finish Coats: two coats of Quick Drying Gloss Enamel to CAN/CGSB-1.88-92.

2.7 AUXILIARY LOCKS AND ASSOCIATED PRODUCTS

.1 Products shall be to ANSI/BHMA A156.5, grade 1, designated by letter E and numeral identifiers listed in standard and specified below, satin chrome finish.

.2 Latch bolt, type E0121, keyed outside with thumbturn inside. Key into keying system.

.3 Bored dead bolt, type E0141, keyed both sides. Key into keying system.

.4 Mortised dead bolt, type E06081, operated by key from inside only. Key into keying system.

.5 Cylinders: types as required to accommodate lockset, exit device or bolt. Key into keying system.

2.8 ELECTRIC STRIKE AND STAND-ALONE CARD READER SYSTEM

.1 Products shall be to ANSI/BHMA A156.31, designated by letter E and numeral identifiers listed in standard and specified in design, finish as specified in design.

.2 Electric Strike: semi-rim mounted, continuous duty, fail secure, 12 or 24 volts as specified in design, type E09311. Provide manufacturer’s wiring and devices required for complete installation.

.3 Card Reader System:

.1 System is to include all required hardware and software to fully monitor and control the designated door. System is to utilize 26 bit, Corporate 1000 cards. System shall be capable of expansion.

.2 Exterior grade proximity card reader for 26 bit, Corporate 1000 cards.

.3 Provide one terminal for programming cards.

2.9 ARCHITECTURAL DOOR TRIM

.1 Products shall be to ANSI/BHMA A156.6, designated by letter J and numeral identifiers listed in standard and specified below, finish as specified below.

.2 Door Protection Plates: kick plate type J103, 1.27 mm thick stainless steel, 305 mm in height x door width less 20 mm, satin finish.

.3 Push Plates: type J301, 1.27 mm thick stainless steel, 100 mm x 400 mm, satin finish.

.4 Pull Units with Plate: type J405, stainless steel, 200 mm centre to centre pull bar of 19 mm diameter rod, 100 mm x 400 mm plate size, satin finish.

2.10 AUXILIARY HARDWARE

.1 Products shall be to ANSI/BHMA A156.16, designated by letter L and numeral identifiers listed in standard, to match satin chrome finish.

.2 Stop, Wall Mounted: convex bumper pad, type L02101.

.3 Stop, Floor Mounted: domed with bumper pad.
.1 Type L02141 for regular doors.
.2 Type L02161, for doors with thresholds and undercut doors.

.4 Lever Extension Flush Bolt: 305 mm long latch bar, type L04081, and type L04091 for doors with radiussed swing edge.

.5 Door Silencer: for metal door frames, type L0311.

.6 Dustproof Strike: non-locking, type L04021, to suit bolt specified.

2.11 WEATHERSTRIPPING AND DOOR SEALS

.1 Products shall be to ANSI/BHMA A156.22, designated by letter R and numeral identifiers listed in standard and specified below.

.2 Head and Jamb Seal:
- .1 Extruded aluminum frame and retainer, solid closed cell neoprene insert, clear anodized finish, type R3B166.

.3 Adjustable Head and Jamb Seal: (for sound attenuation)
- .1 Extruded aluminum frame and solid closed cell neoprene insert, screw attachment and adjustment, clear anodized finish, type R3B266.

.4 Door Bottom Seal with Rain Drip:
- .1 Extruded aluminum frame and contact type vinyl insert, clear anodized finish, Type R3D536.

.5 Automatic Door Bottom Seal: (for sound attenuation)
- .1 Heavy duty, door seal of extruded aluminum frame and solid closed cell neoprene seal, closed ends, adjustable, automatic retract mechanism when door is open, clear anodized finish.
  - .1 Recessed in door bottom – Type R3B326
  - .2 Surface mounted – Type R3B336
  - .3 Recessed in door face – R3B346

.6 Door Sweep:
- .1 Extruded aluminum frame and closed cell neoprene sweep, clear anodized finish, type R3B416.

.7 Astragal: overlapping, extruded aluminum for regular double doors, steel for fire resistance rated double, both edges radiussed and smooth, 3 mm x 45 mm x height of doors less depth of rebate.

2.12 THRESHOLDS

.1 Thresholds: to ANSI/BHMA A156.21, barrier-free, width as required by design x full width of door opening, extruded aluminum, mill finish, serrated surface, with thermal break of rigid PVC, scribed to frame profile. Type J32193.

2.13 FASTENINGS

.1 Supply screws, bolts, expansion shields and other fastening devices required for satisfactory installation and operation of hardware.

.2 Match exposed fastening devices to finish of hardware.

.3 Where pull is scheduled on one side of door and push plate on other side, supply fastening devices, and install so pull can be secured through door from reverse side. Install push plate to cover fasteners.

.4 Use fasteners compatible with material through which they pass.

.5 Use sex nuts and bolts for doors without special reinforcing for closers.

2.14 KEYING

.1 Locks shall be master keyed and construction master keyed.

.2 Determine detailed requirements for master keying system upon consultation with the Province, prior to finalizing keying schedule.

.3 Form keys from nickel silver.

.4 Provide two change keys for each lock. Provide all other keys as required to meet keying system requirements.

2.15 KEY CONTROL SYSTEM

.1 Provide a steel cabinet complete with index control system, key tags, and key envelopes.

.2 Provide adequate capacity to contain all keys, plus minimum 25% additional capacity with tags.

END OF SECTION

08800 GLASS AND GLAZING

1. General

The Contractor shall consider the following reference documents in the design of the Schools:

1.1 REFERENCE DOCUMENTS

.1 CAN/CGSB-12.1-M90, Tempered or Laminated Safety Glass.

.2 CAN/CGSB-12.3-M91, Flat, Clear Float Glass.

.3 CAN/CGSB-12.4-M91, Heat Absorbing Glass.

.4 CAN/CGSB-12.8-97, Insulating Glass Units.

.5 CAN/CGSB-12.11-M90, Wired Safety Glass.

.6 CAN/CGSB-19.13-M87, Sealing Compound, One-Component, Elastomeric, Chemical Curing.

.7 CGSB 19-GP-14M, Sealing Compound, One Component, Butyl-Polisobutylene Polymer Base, Solvent Curing.

.8 CAN/CGSB-19.24-M90, Multicomponent, Chemical-Curing Sealing Compound.

2. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools:

2.1 MATERIALS

.1 Sealed insulating glass units for exterior windows and curtainwall assemblies must comply with CAN/CGSB-12.8-M90.

.2 Spacer/separator: between interior of sealed unit and secondary seal to provide continuous vapour barrier.

.3 Sealants for Insulating Glass Units:

.1 Butyl-polyisobutylene Sealants: one component, polymer base, solvent curing, to CGSB 19-GP-14M, colour to match frame colour.

.2 Polysulphide Base and Polyurethane Base Sealants: to CAN/CGSB-19.24-M90, multi-component, chemical curing, and as follows:

.1 Type: 2 - non-sag.
.2 Class: A - glazing.
.3 Movement Capability: plus and minus 25%.
.4 Colour: Black.

.3 Silicone Base Sealants: to CAN/CGSB-19.13-M87, one component, elastomeric, chemical curing, and as follows:

.1 Rheological Properties: Class 2 - non-sag.
.2 Substrate Class: G - Glass.
.3 Glazing Suitability: Class A - resists ultraviolet through glass.
.4 Temperature Class: L - low temperature
.5 Movement Class: 40.
.6 Colour: Black.

.4 Do not use polyurethane sealants for insulating glass units having laminated glass with a polyvinyl butyrate interlayer.

END OF SECTION

09220 STUCCO

1. General

The Contractor shall consider the following reference documents in the design of the Schools:

1.1 REFERENCE DOCUMENTS

.1 ASTM C932--06, Surface-Applied Bonding agents for Exterior Plastering

.2 CAN/CGSB-51.32-M77, Sheathing, Membrane, Breather Type

.3 ASTM C150-07, Standard Specification for Portland Cement

.4 Association of Wall and Ceiling Contractors “Specification Standards Manual” (For Lathing, Plastering, Stucco, Veneer Plaster, Gypsum Wallboard, Steel Studs, Exterior Insulation and Finish System and Associated Systems) 1993 Edition.

.5 Comply with "Portland Cement Plaster Stucco Resource Guide", 2003 Edition, of the Alberta Wall and Ceiling Association.

2. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools:

2.1 MATERIALS

.1 Sheathing Paper: to CAN/CGSB-51.32-M77, breather type.

.2 Reinforcement (stucco): stucco mesh in accordance with Alberta Wall and Ceiling Contractors “Specification Standards Manual.”

.3 Reinforcement (parging): metal lath mesh in accordance with Alberta Wall and Ceiling Contractors “Specification Standards Manual”.

END OF SECTION

09250 GYPSUM BOARD

1. General

The Contractor shall consider the following reference documents in the design of the Schools:

1.1 REFERENCE DOCUMENTS

.1 ASTM C840-07 - Standard Specification for Application and Finishing of Gypsum Board.

.2 CAN/CGSB-7.1-M86 - Cold Formed Steel Framing Components.

.3 ASTM C1396/C1396M-06a, Standard Specification for Gypsum Board.

.4 ASTM C 36/C36M-03e1, Abuse Resistant Board

.5 ASTM C630/C630M-03e, Water Resistant Gypsum Backing Board

.6 ASTM C645-07a, Standard Specification for Nonstructural Steel Framing Members**.**

2. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools:

2.1 GYPSUM BOARD

.1 Gypsum Board: to ASTM C 36/C36M-03e1.

.2 Type "X" Gypsum Board: board with Type X core, to ASTM C 36/C36M-03e1.

.3 Abuse Resistant Board: to ASTM C 36/C36M-03e1.

.4 Moisture Resistant Board: to C630/C630M-03e.

2.2 FRAMING MEMBERS

.1 Studs and Tracks: to CAN/CGSB-7.1 M86, minimum 0.70 mm galvanized sheet steel to ASTM A653M-96, Z180 zinc coating.

.2 Furring: minimum 0.60 mm thick galvanized sheet steel to ASTM A653M-96, Z180 zinc coating.

.3 Resilient Furring: minimum 0.60 mm thick galvanized steel, pre-punched for fasteners, 35 mm face width, 16 mm high.

2.3 SUSPENDED CEILING AND SOFFIT SYSTEM COMPONENTS

.1 Carrying Channels: Cold rolled steel to CSA A82.30-M1980.

.2 Tie Wire and Hangers: to CSA A82.31 - M91, galvanized.

2.4 ACOUSTIC TREATMENT MATERIALS

.1 Acoustic Sealant: non-hardening, non-skinning permanently flexible, to CAN/CGSB-19.21-M87.

.2 Acoustic Insulation: fibrous glass or mineral fibre, unfaced batts, friction fit.

2.5 ACCESSORIES

.1 Screws: to ASTM C1002-07a, and modified as required for fastening to 1.22 mm and thicker steel studs.

.2 Corner Beads: to ASTM C1047-05, galvanized sheet steel, beaded angle, knurled and perforated, 32 mm wide flanges, for joint compound filling, metal and paper flange combination, beaded angle.

.3 Edge Beads: to ASTM C1047-05, galvanized sheet steel to ASTM A653M-96, Z180 zinc coating, beaded edge, knurled and perforated flange 32 mm wide.

.4 Control Joints: to ASTM C1047-05, pre-formed galvanized metal or plastic "V" type, perforated flanges.

.5 Joint treatment material, joint tape and topping compound: to ASTM C475-94.

END OF SECTION

09320 CERAMIC, PORCELAIN, QUARRY TILE

1. General

The Contractor shall consider the following reference documents in the design of the Schools:

1.1 REFERENCE DOCUMENTS

.1 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet, for Use in Building Construction.

.2 CAN/CGSB-75.1-M88, Tile, Ceramic.

.3 CAN 2-75, Glazed Ceramic Wall Tile.

.4 ANSI A118.1-1992 Specifications for Dry-Set Portland Cement Mortar.

2. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools:

2.1 MATERIALS

.1 Porcelain Floor Tile: to CAN/CGSB-75.1-M88, Type 4, Class MR1, unglazed, rectified edge, minimum size 300 x 300 mm. Colour as selected by the Province from manufacturer's standard colour range.

.2 Unglazed Mosaic Porcelain Floor Tile: to CAN/CGSB-75.1-M88, Mohs rating 6, Class TYPE 2, MR1. Colour as selected by the Province from manufacturer's standard colour range.

.3 Glazed Ceramic Wall Tile: to CAN 2-75: Type 5, Class MR4, faces glazed, cushioned edges on all 4 sides, minimum size 4.25" x 4.25" x 1/4". Colour as selected by the Province from manufacturer's standard colour range.

.4 Thin-set Mortar: to ANSI A118.4 when combined with acrylic mortar admix, Shear Bond Strength: 440 psi (7 day), Compressive Strength: 3000 psi (7 day).

.5 Water Resistant Backing Panel: Durock Cement Board or Dens Shield Tile Guard by Georgia Pacific Company.

.6 Cement: to CAN/CSA-A5-93.

END OF SECTION

09510 ACOUSTIC UNIT CEILINGS

1. General

The Contractor shall consider the following reference documents in the design of the Schools:

1.1 REFERENCE DOCUMENTS

.1 American Society for Testing and Materials (ASTM)
- .1 ASTM E 1264-98, Classification for Acoustical Ceiling Products.

.2 Canadian General Standards Board (CGSB)
- .1 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet, for Use in Building Construction.
- .2 CAN/CGSB-92.1-M89, Sound Absorptive Prefabricated Acoustical Units.

.3 Canadian Standards Association (CSA)
- .1 CSA B111-74(R1998), Wire Nails, Spikes and Staples.

.4 Underwriters Laboratories of Canada (ULC)
- .1 CAN/ULC-S102-88(R2000), Surface Burning Characteristics of Building Materials.

2. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools:

2.1 CEILING PANELS

.1 Ceiling units to CAN/CGSB-92.1-M89, Sound Absorptive Prefabricated Acoustical Units and conforming to ASTM E 1264-98 (2005).

.2 Rating of tiles to CAN/ULC-S102-88 (R2000), Surface Burning Characteristics of Building Materials.

.3 Suspended acoustic panel ceiling tile that is compatible size to suit lay in light fixtures and mechanical diffusers. Typical sizing is imperial measurement grid of 610 mm x 1220 mm (24” x 48”).

.4 Acoustic Ceiling Panels shall be mineral fibre, non-directional fissured, flat lay in tiles, white in colour for maximum reflectance.

.5 Minimum CAC – Ceiling Attenuation Class of 35.

.6 Minimum LRC – Light Reflectance Coefficient of 0.80.

.7 Minimum recycled content of Acoustic Ceiling Panels is 72%.

2.2 CEILING GRID

.1 Support system to CSA B111-74(R1998), Wire Nails, Spikes and Staples. Suspension system made of commercial quality cold rolled steel zinc coated, shop painted satin sheen, white and die cut interlocking components main and cross tee of double web.

.2 Fire-rated Suspension System: Fire rated to ULC design, exposed T bar grid including wall mounting, blue steel retainer clips.

.3 Hangers: 2.6 mm steel wire galvanized.

END OF SECTION

09525 ACOUSTIC BAFFLES

1. General

The Contractor shall consider the following reference documents in the design of the Schools:

1.1 REFERENCE DOCUMENTS

.1 AATCC8-2005, Colorfastness to Crocking: AATCC Crockmeter Method.

.2 AATCC 16-2004, Colorfastness to Light

.3 ASTM C423-90a, Sound Absorption and Sound Absorption Coefficients by the Reverberation Room Method

.4 ASTM D1117-01, Standard Guide for Evaluating Nonwoven Fabrics

.5 CAN/CGSB-51.10-92, Mineral Fibre Board Thermal Insulation

2. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools:

2.1 MATERIALS

.1 Baffle Core: rigid fibrous glass board insulation, to CAN/CGSB-51.10-92, and as follows:
Density: 45-112 kg/m3.

.2 Noise Reduction Coefficient (NRC): minimum 0.85 tested to ASTM C423-90a, Type A or No. 4.

.3 Wood: straight, smoothly, essentially clear with slight defects permitted, average moisture content of 6-9%.

.4 Hangers: metal cables, minimum 1.6 mm diameter.

.5 Fabric: 100% polyester yarn, weight 270 g/m2 minimum, plain weave flame spread and smoke spread ratings to meet the *Alberta Building Code 2006*. Colour as selected by the Province from manufacturer's standard colour range.

END OF SECTION

09641 WOOD FLOORING

1. General

The Contractor shall consider the following reference documents in the design of the Schools:

1.1 REFERENCE DOCUMENTS

.1 CAN/CGSB-1.36-M97, General Purpose Interior Alkyd Varnish.

.2 CAN/CGSB-1.175-M97, Polyurethane Interior Coating, Oil Modified, Clear, Gloss and Satin.

.3 CAN/CGSB-25.2-92, Paste Floor Wax.

.4 CAN/CGSB-51.34-M86, Vapour Barrier, Polyethylene Sheet for Use in Building Construction.

.5 CAN/CSA-O80 Series-97 (R2002), Wood Preservation.

.6 CSA O151-04, Canadian Softwood Plywood.

2. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools:

2.1 MATERIALS

.1 Flooring: Northern Hard Maple to Canadian Specification C.L.A., Prime or second grade and better, minimum 57mm face width x 26.2mm thick.

.2 Resilient Pads: 9.5mm x 63.5mm x 76mm air channeled moulded resilient rubber pads compressible 1.5mm without permanent displacement under 275 KPa loading.

.3 Sleepers: 38mm x 76mm x 1200mm pressure treated Douglas Fir to CAN/CSA-O80 Series-97 (R2002), with wood preservative; kiln dried after treatment.

.4 Nails: Special barbed type, for use with power driver.

.5 Membrane: minimum 0.10 thick, type 2 polyethelene.

.6 Protective Coating: clear single component moisture cured polyurethane to Master Painter's Institute Approved Product List Item #31.

.7 Game Lines: Coloured urethane paint, compatible with the urethane floor finish.

.8 Base: moulded rubber, 150 high Vent-Cove Base.

END OF SECTION

09650 RESILIENT FLOORING

1. General

The Contractor shall consider the following reference documents in the design of the Schools:

1.1 REFERENCE DOCUMENTS

.1 ASTM F2034-03e1 Standard Specification for Sheet Linoleum Floor Covering

.2 ASTM F1066-04 Standard Specification for Vinyl Composition Floor Tile

.3 ASTM F1861-02 Standard Specification for Resilient Wall Base

.4 ASTM F2169-02 Standard Specification for Resilient Stair Treads

2. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools:

2.1 MATERIALS

1. Flooring Types

.1 Sheet Linoleum composed of natural ingredients which are mixed and calendared onto a jute backing to ASTM F2034-03 e1.

.2 Vinyl Composition Floor Tile: to ASTM F-1066-04, and as follows:

.1 Type: A, Composition 1, Class 2 through pattern.

.2 Thickness: 3.2 mm.

.3 Size: 305 x 305 mm.

.3 One piece rubber tread and nosing.

.4 Rubber Multipurpose Flooring (for weight rooms only):

1. Prefabricated athletic rubber flooring, calandered and vulcanized with a base of natural and synthetic rubber, stabilizing agents and pigmentation.

2. Thickness: 10 mm. Manufactured in two layers, which are vulcanised together. The shore hardness of the top layer will be greater than that of the bottom layer. Materials to be available in tile or roll configuration.

3. Colour as selected by the Province from manufacturer's standard colour range.

2.2 RESILIENT BASE

.1 Resilient Base: to ASTM F-1861, and as follows:

.1 Type 1, rubber, B cove, Minimum thickness 3.17 mm, Minimum height 100mm.

2.3 ACCESSORY COMPONENTS

.1 Vinyl adapter strips, vinyl transition strips and plastic coving strips.

2.4 ACCESSORY MATERIALS

.1 Sub-Floor filler: white premix latex containing no gypsum requiring water only to produce cementitious paste.

.2 Primers: as recommended by primer and adhesive manufacturer.

.3 Adhesives: solvent-free, as recommended by flooring manufacturer and adhesive manufacturer for each flooring material and type and location of substrate.

.4 Welding Rod: designed to weld seams of sheet flooring, as recommended by flooring manufacturer, colour to be selected from standard range by the Province.

END OF SECTION

09680 CARPET

1. General

The Contractor shall consider the following reference documents in the design of the Schools:

1.1 REFERENCE DOCUMENTS

.1 Carpet components, construction and performance shall meet or exceed requirements of CAN/CGSB-4.129-93, Carpet for Commercial Use.

.2 Carpet system: must meet or exceed the Carpet and Rug Institutes Green Label Plus Certification.

2. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools:

2.1 MATERIALS

.1 Carpet tile must have the Environmentally Preferable Product (EPP) designation from an independent third party.

.2 Carpet tile: minimum 30% post industrial recycled content independently certified by a third party organization and have a minimum 3.7% post consumer recycled content independently certified by a third party organization.

.3 Carpet tile: minimum 28 ounce, 100% nylon, level loop, solution dyed, modular size of 915 mm x 915 mm (36” x 36”).

.4 Texture retention, stain resistance, flame spread and smoke spread ratings to conform to Alberta Building Code.

.5 Backing to contain anti-microbial characteristics, to ensure mould and water resistance.

.6 Manufacturer must have a collection and recovery system for the carpet.

.7 Carpet adhesive: mill applied water based, releasable pressure sensitive type adhesive. Adhesive to meet or exceed the VOC and

emission standards for South Coast Air Quality Management District Rule #1168. VOC levels to be 3rd party certified.

.8 Cementitious Underlayment: self-levelling and trowel grade, pre-mixed, polymer-modified, containing no gypsum, not softened by water after final set. Minimum compressive strength 10 MPa at 8 hours and 20 Mpa at 7 days.

.9 Underlayment Bond Coat: compatible with releasable pressure sensitive tile to substrate.

.10 Carpet Edge Guard: non-metallic, extruded or molded heavy-duty rubber "T" shaped cap insert and minimum 50 mm wide, aluminum anchorage flange, profiled to accept cap.

.11 Rubber base to be type TP, thermoplastic, solid, coved minimum 3.2 mm thick, 101.6 mm high.

END OF SECTION

09720 VINYL COATED WALL FABRIC

1. General

The Contractor will consider the following reference documents in its design of the Schools.

1.1 REFERENCE DOCUMENTS

.1 CGSB 41-GP-30M, Wallcoverings, Vinyl-Coated Fabrics.

2. Products

The Contractor will consider the following minimum material requirements in its design of the Schools.

2.1 MATERIALS

.1 Materials shall be approved by Underwriters' Laboratories of Canada, for Fire Hazard Classifications per Alberta Building Code (ABC), 1997 edition.

.2 **Field Fabric:** Vinyl covered wall fabric, Wall Fabric Designation: to meet and exceed CGSB 41-GP-30M, 1370 mm finished width, ULC labeled, Type 2 - medium duty weight meeting the following minimum requirements:

- .1 Fabric weight: minimum 68 g/m^2.
- .2 Vinyl weight: minimum 424 g/ m^2.
- .3 Flame spread rating: 10 maximum.
- .4 Smoke developed rating: 10 maximum.
- .5 One colour as selected by the Province from manufacturer’s standard colour range.

.3 Adhesive: Water-base type as recommended by fabric manufacturer to suit application to substrate.

END OF SECTION

09850 CELLULOSE FIBRE ACOUSTIC COATING

1. General

The Contractor will consider the following reference documents in its design of the Schools.

1.1 REFERENCE DOCUMENTS

.1 Acoustical coating to CAN/CGSB-92.2-M90.

.2 NRC requirements to ASTM C423, Type A mounting.

.3 ASTM E84-07b Surface Burning Characteristics of Building Materials.

2. Products

The Contractor will consider the following minimum material requirements in its design of the Schools.

2.1 MATERIALS

.1 Acoustical spray coating material: minimum 25mm thick, non-combustible cellulose fibre, impact resistant, with integral dry adhesive formulated for combination with liquid additive.

.2 Liquid additive: acrylic based emulsion having a solids content of not less than 46% and a ph of 9.0 to 9.5 at 25°C.

.3 The coating shall have a maximum flame spread rating of 15, maximum smoke develop rating of 5.

.4 Noise reduction coefficient to be a minimum of 0.75.

.5 Light reflectance to be a minimum of 80.

END OF SECTION

09900 PAINTING

1. General

The Contractor will consider the following reference documents in its design of the Schools.

1.1 REFERENCE DOCUMENTS

.1 "Architectural Painting Specification Manual", latest edition, including the latest edition of the "Approved Products Lists", published by the Master Painters Institute (MPI).

2. Products

The Contractor will consider the following minimum material requirements in its design of the Schools.

2.1 MATERIALS

.1 Only MPI approved products from MPI Approved Product Lists corresponding to the specified finishing systems.

.2 Where the MPI Approved Products List identifies products for a given product type that are environmentally friendly, designated by E1, E2 or E3, select products as follows:

- .1 Use a product with either an E2 or E3 designation, where available.
- .2 Where a product with an E2 or E3 designation is not available, use a product with a E1 designation.

.3 All paint products to be low or no VOC except areas and materials required to have high strength coatings which will not conform.

.4 Select MPI approved products that participate in the Environmental Choice Program (ECP)

- .1 ECP-12-89, Solvent-borne Paints.
- .2 ECP-07-89, Water-borne Surface Coatings.

END OF SECTION

10000 SPECIALTIES

1. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools:

1.1 FUME HOODS

.1 To CSA, ANSI/UL approved: acceptable manufacturers Fisher Hamilton, Russ Reeves Sales, H.H. Hawkins, Labconco or approved alternate.

.2 Static pressure: minimize static pressure loss with sufficient baffle openings and a round bell mounted stub duct. Average static pressure loss readings when measured with sash in full open position at 100 FPM face velocity shall not exceed 75FPM @0.25 inches, 100FPM @0.35 inches and 125 FPM @ 0.60 inches.

.3 Noise level not to exceed 60 dBa.

.4 Illumination: vapour proof incandescent light, 2- 20 watt fluorescent fixture minimum 80 footcandles in the average work area.

.5 Safety glass: clear float tempered, minimum 6mm thick.

.6 Exterior shell: double sided fume hood, 18 gauge sheet steel with powder coated finish.

.7 Interior liner: Polyresin, minimum 6mm thick, solid fiberglass reinforced pressed thermoset resin board, white in colour.

.8 Sash Cables: Stainless steel, aircraft grade, uncoated, 3/32” diameter.

.9 Sash pull: stainless steel, 18 gauge, type 304.

.10 Sash tracks: Polyvinyl chloride, corrosion resistant.

.11 Cable pulleys: Plastic, ball bearing type, 1 ½” diameter.

.12 Capacity: minimum 485 CFM.

.13 Water: cold water gooseneck plumbing, prepiped from valve to outlet.

1.2 KILN VENTING SYSTEM

.1 Downdraft venting system: Environment 2 by SKUTT or approved alternate.

.2 Minimum 3” diameter 8’-0” length flexible aluminum duct.

.3 Power: 115 volt, 1.4 amp with in line power switch.

.4 Minimum air volume 140 CFM.

.5 Vent motor: Wall mounted

.6 Kiln Capacity: Maximum kiln capacity to be used with this system is 12 cubic feet (24 cubic feet with additional plenum cup kit).

1.3 DUST COLLECTOR SYSTEM

.1 Dust collection system: Model RP-2 by Micro Air or approved alternates.

.2 Minimum 1200 CFM.

.3 Filtration: 99.99% efficient fire retardent cartridge.

.4 Noise level: maximum 72 DBA measured at 5’-0” away from unit.

.5 Motor: Minimum 3HP, 208/230 volt, 60 hz.

.6 Blower: High pressure direct drive blower, 3450 RPM.

END OF SECTION

10160 WASHROOM PARTITIONS

1. General

The Contractor shall consider the following reference documents in the design of the Schools:

1.1 REFERENCE DOCUMENTS

.1 ASTM A653M-96, Sheet Steel, Zinc Coated (Galvanized) or Zinc-Iron Alloy Coated (Galvannealed) by the Hot Dip Process.

.2 Spray apply finish enamel to CAN/CGSB-1.88-92, Type 2 gloss.

2. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools:

2.1 MATERIALS

.1 Sheet steel: minimum commercial grade, stretcher leveled, sheet steel to ASTM A653M-96, with Z275 zinc coating.

.2 Minimum steel thickness:

.1	Panels, doors, urinal screens:	0.80 mm.
.2	Pilasters:	1.00 mm.
.3	Reinforcement:	3.00 mm.
.4	Headrails:	1.00 mm.

.3 Hardware:

.1 Hardware components to be stainless steel.

.2 Hinges: adjustable to automatically return inswinging doors from any position to nominal 30 degrees from closed position, and shall return outswinging doors to closed position.

.3 Barrier-free hardware required for barrier free washrooms.

.4 Floor Anchorage: concealed stainless steel fasteners.

.5 Door, panel and pilaster thickness to be minimum 32mm.

.6 Latch set, door bumpers, brackets as required.

END OF SECTION

10350 FLAGPOLES

1. General

The Contractor shall consider the following reference documents in the design of the Schools:

1.1 REFERENCE DOCUMENTS

.1 ASTM B 241/B 241M - Standard Specification for Aluminum and Aluminum-Alloy Seamless Pipe and Seamless Extruded Tube.

2. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools:

2.1 MATERIALS

.1 Flagpoles

.1 Shaft: Provide three seamless cone tapered aluminum ground set internal halyard poles c/w tilting base. Finish: to be brushed aluminum.

.2 Flagpole height: minimum 9000 mm.

.3 Provide all required balls, trucks, halyards, cleats, collars and foundation tubes for complete assembly of each flagpole. Base covers to match pole finish.

.4 Flagpoles resistant to wind velocities up to 177km/hr without permanent deformation.

.5 Truck: Cast aluminum housing and spindle, with one 60.3mm diameter cast nylon sheaves; revolving mounting with stainless steel ball bearings, non-fouling.

.6 Halyard: Internal system;

.1 Materials: 8 mm diameter (Number 10) white waterproof polypropylene.

.2 Hardware: Two chrome swivel-type flag snaps; neoprene-coated counterweight, beaded nylon retainer

ring.

.7 Cleat: Internal-mounted at factory, cam-action with internal sheave; cast aluminum access door and frame with keylock.

.8 Ground set foundation assembly for manual tilt.

.2 Accessories

.1 Ground Sleeve: Galvanized steel components as follows:

.1 Foundation tube: Corrugated, 16 gauge, centered on face of base plate.

.2 Base plate: Square, side dimensions 100 mm greater than inside dimension of foundation tube.

.3 Ground spike: 19 mm diameter, centered on face of base plate opposite foundation tube attachment.

.4 Setting plate: 152 mm square.

.5 Hinge pin: Hinge pin system c/w tilting base.

.2 Provide standard spun aluminum flash collar.

.3 Provide spun aluminum finial, 14 gauge minimum wall thickness, 150 mm minimum diameter, flush seam, clear anodized finish.

.4 Provide aluminum housing cleat covers finish matching shaft, with key operated cylinder lock.

END OF SECTION

10500 LOCKERS

1. General

The Contractor shall consider the following reference documents in the design of the Schools:

1.1 REFERENCE DOCUMENTS

.1 CAN/CGSB-44.40-92, Steel Clothing Locker

2. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools:

2.1 MATERIALS

.1 Lockers shall be manufactured using at least 50% recycled steel (36% post-commercial and 14% post-industrial).

.2 Lockers: to CAN/CGSB-44.40-92, 381 mm wide x 457 mm deep x 1830 mm high double tier.

.3 Body: 0.70 mm thick cold rolled steel, continuously lock formed back and sides.

.4 Frame: 1.6 mm thick formed steel channel, welded one piece construction, notched frame for rigid shelf support, 1.8 mm thick 5 knuckle hinges.

.5 Doors: 1.6 m thick cold rolled steel outer panel, 1.0 mm thick cold rolled steel inner panel for welded sandwich panel construction with sound abating honeycomb core, black polypropylene handle box flush with door face, prepared for number plates, rubber bumper silencers, ventilation louvres top and bottom.

.6 Finish: Baked enamel. Colour as selected by the Province from manufacturer’s standard colour range.

.7 Accessories: wall coat hooks, double ceiling hooks, metal vented top trim, closures and filling panels, finished end panels, sloped tops, number plates and padlock hasps:

8. Bases: 100 mm high plywood base.

END OF SECTION

10650 FOLDING PARTITIONS

1. General

The Contractor shall consider the following reference documents in the design of the Schools.

1.1 REFERENCE DOCUMENTS

.1 ASTM E 413 - Classification for Rating Sound Insulation; 1987 (Reapproved 1999).

.2 ASTM E 557 - Standard Practice for the Installation of Operable Partitions; 2000.

.3 ASTM E 90 – Standard Test Method for Laboratory Measurement of Airborne Sound Transmission Loss of Building Partitions and Elements

2. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools.

2.1 MATERIALS

.1 Folding mechanical manually operated, top supported, centre stacked, paired panels.

.2 Panel minimum 80 mm (3.15”) thick, and of uniform and equal widths not exceeding the width of the specified panel finish. Panels shall be full height, one piece construction. Panels shall have reinforced 21 gauge (minimum) steel face panels, complete with a reinforced steel frame to produce a rigid, one piece panel which does not twist or rack.

.3 Materials shall be approved by the Underwriters' Laboratories of Canada, for Fire Hazard Classifications per NBC 1977. Make test data available to substantiate these requirements.

.4 Carrier Components: Ball bearing trolleys, two wheels at every second hinge and wheel at end posts.

.5 Acoustical performance of the operable partition shall have been tested in an acoustical laboratory in accordance with ASTM E 90.

.1 The lead nose and expandable closure shall seal to the wall by means of an extruded, soft vinyl, compressible bulb seal. Vertical wall jambs shall not be permitted.

.2 The vertical seals between panels shall interlock a minimum of 50 mm (2") by means of unbreakable scratch and dent proof, solid colour, self aligning, PVC tongue and groove extrusions. Metal or plastic trim with less than 50 mm (2") of interlock shall not be permitted.

.3 The horizontal top seal shall be, two, continuous contact, multi finger, 25mm vinyl sweep seals or a retractable seal that operates simultaneously with the bottom seals .

4 The operable floor seal shall be a mechanical, retractable bottom seal providing 30 mm (1.2") operating clearance. Downward seal pressure shall provide maximum acoustical seal and stabilize the bottom of the partition. Bottom seal allowing for less than 30 mm (1.2") of operating clearance shall not be permitted.

.6 Suspension Systems:

.1 Track shall be #1, heat treated, tempered, anodized aluminum track, connected to the support structure with pairs of .375" adjustable hanger rods, and brackets spaced in accordance with the supplier's recommendations.

.2 Trolleys for single side stacked panels, all steel precision bearing, glass reinforced nylon tired, 4 wheeled trolleys. Mill finished aluminum track shall not be permitted. Non precision bearings or steel tires shall not be permitted.

.3 Trolleys for paired straight run panels, Teflon disc-type omni directional, glass reinforced nylon tired, 4 wheeled trolleys. Mill finished aluminum track is not permitted.

.4 Panel weight shall be 10 – 13 lbs. / sq. ft. based on panel size and option selected.

.7 Hardware: latching steel door handles, satin chrome finish, lock cylinder master-keyed to building keying system.

.8 Accessories: aluminum jamb moulding, stacking straps and snaps, white enameled ceiling guard full width of top seal at drawn position and all fitments required.

END OF SECTION

11480 GYMNASIUM CURTAIN DIVIDER

1. General

The Contractor shall consider the following reference documents in the design of the Schools:

1.1 REFERENCE DOCUMENTS

.1 NFPA 701: Standard Methods of Fire Tests for Flame Propagation of Textiles and Films

2. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools:

2.1 CURTAIN

.1 An all-vinyl on nylon material, with the following characteristics:

- .1 Weight: minimum18 oz. per sq. yd.
- .2 Hydrostatic resistance: minimum 40 psi.
- .3 Tear resistance: minimum 45 kg.
- .4 Colour as selected by the Province from manufacturer's standard colour range.
- .5 Flame retardance: passes NFPA 701.

.2 Fabric shall be in complete unspliced widths. Seams of curtain shall have heat sealed finish. Hems shall be turned and stitched.

.3 Brass hoisting grommets spaced to manufacturers standards for loading.

2.2 SUSPENSION SYSTEM

.1 3mm Aircraft Cable and all associated clews, fasteners and pulleys required for suspension and movement to manufacturers standards for loading.

.2 Bottom of Curtain hemmed with 38mm outside dia. padded pipe in hem, connected to each hoisting cable.

2.3 HOIST

.1 Electric winch motor - Size and voltage appropriate to suit.

END OF SECTION

11485 GYMNASIUM EQUIPMENT

1. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools:

1.1 BASKETBALL BACKSTOPS – CEILING SUSPENDED, MAIN COURT

.1 Provide 2 – main court ceiling mounted, rear swing mechanism, complete with electric winch minimum 3/4" HP.

.2 Frame of 50 mm square painted steel tubing.

.3 Steel parts primed and finished with spray coat of industrial enamel.

1.2 BASKETBALL BACKSTOPS – WALL MOUNTED SIDEFOLD, CROSS COURTS

.1 Provide 4 – backstops with sidefolding mechanism and operating pole.

.2 Steel tubing frame, 50 mm square, including adjustable stabilizing bars. No cable braces permitted, height adjustment of minimum 610 mm required.

.3 Steel parts primed and finished with spray coat of industrial enamel paint.

1.3 BACKBOARDS AND GOALS

.1 Main courts: fibreglass backboard complete, spring loaded, removable nylon net, safety edge cushion. Backboard to have baked enamel border and target area.

.2 Cross courts: aluminum backboard complete with factory painted border and target area. Standard bolted mount, steel goal with removable nylon net.

1.4 VOLLEYBALL/BADMINTON END AND INTERMEDIATE POSTS

.1 End post: combination volleyball/badminton posts Supplied with 2 casters for movement to and from storage.

.2 Badminton end and intermediate posts: 48 mm dia. O.D. x 3.5 mm thick round tubing, with 350 mm reinforcing insert. External bracing of 25 mm x 2.7 mm gauge round tubing. Bottom brace with rubber padding for floor protection.

.3 Volleyball end and intermediate posts: 76 mm dia. O.D. x 3.5 mm thick round tubing, with 350 mm reinforcing insert. External bracing of 25 mm x 2.7 mm gauge round tubing. Bottom brace with rubber padding for floor protection.

.4 Finish: primed and finished in industrial enamel.

.5 End post accessories:

.1 50 mm nylon caster wheels.

.2 Adjustable nickel plated fittings for net height adjustment.

3. Manual crank winch and polypropylene leaders to receive nets.

1.5 FLOOR SOCKETS

.1 Floor post sockets: steel tube with base plate.

.2 Flush socket floor covers. bronze post socket covers to sit over post sockets flush with floor. Provide fingergrip opening for removal.

.3 Storage Room Sockets: steel tube with base plate.

END OF SECTION

12480 ENTRY COVERINGS

1. Products

The Contractor shall consider the following minimum materials requirements in the design of the Schools.

1.1 ENTRY MAT SYSTEM

.1 Miliken First Appearances Entryway System, or approved substitution.

.2 Tufted, Cut Pile, 100% Nylon, 27 oz/sq. yd. finished face weight.

.3 Tile: 457 x 457 (18” x 18”) tile squares, nominal total thickness 11 mm (0.435”), finished pile height 6.0 mm (0.237”).

.4 Step 1: P/4022 E-Z Scrub matting, recessed.

.5 Step 2: P/4043 Clean Sweep.

.6 Products to be part of the CRI Indoor Air Quality Program and have CRI Seal of Approval.

END OF SECTION

12490 MOTORIZED BLINDS

1. General

The Contractor shall consider the following reference documents in the design of the Schools:

1.1 REFERENCE DOCUMENTS

.1 NFPA 701: Standard Methods of Fire Tests for Flame Propagation of Textiles and Films.

2. Products

The Contractor shall consider the following minimum material requirements in the design of the Schools:

2.1 MATERIALS

.1 Shade Construction:

.1 Shadecloth to be visually transparent, single material Colour as selected by the Province from manufacturer's standard colour range. Flame retardance: passes NFPA 701.

.2 Bottom bar shall be rectangular 6mm x 37mm with internal grooves to accommodate a fabric guide carrier at each end and hardware to attach to cable guide system where applicable.

.3 Cable guide, full length for all shades.

.4 Shade roller to be an extruded aluminum tube minimum 1.0 mm thick with two fabric mounting channels.

.2 Motor Drive:

.1 Provide maintenance free, totally enclosed, electric single phase motor, minimum voltage size 95-125v 60hz, (Class-A (max. 140 deg. C) thermal protection.

.2 Provide limit switches, circuit brakes, solenoid disc brakes.

.3 Electrical controls:

.1 Rocker type switches with momentary stopping, raising and lowering capabilities.

END OF SECTION

14210 ELEVATORS

1. General

The Contractor shall consider the following reference documents in the design of the Schools.

1.1 REFERENCE DOCUMENTS

.1 Comply with requirements of CAN/CSA-B44-94 and CSA B44S1-96, Supplement to B44-94.

2. Products

2.1 MATERIALS

The Contractor shall consider the following minimum materials in the design of the Schools.

.1 Frame: structural steel.

.2 Platform: Sound isolating steel frame platform, plywood or steel subfloor.

.3 Cab walls to be of 14-gauge sheet steel, with powder paint finish.

.4 Doors and Frames; 1.52 mm thick steel, baked enamel finish.

.5 Hoistway Fascias: 1.9 mm sheet steel.

END OF SECTION

15050 BASIC MECHANICAL MATERIALS

1. General

1 Materials and equipment installed shall be new, full weight and of quality specified in accordance with performance requirements.

.2 Statically and dynamically balance rotating equipment.

.3 Each major component of equipment shall bear manufacturer's name, address, catalog and serial number in a conspicuous place.

2. Products

The Contractor shall consider the following minimum materials requirements in its design of the Schools.

2.1 HANGERS AND SUPPORTS

.1 Pipe supports shall meet the requirements of ANSI/ASME B31.1-2007, Power piping.

.2 Duct hangers shall follow the recommendations of the SMACNA Duct Manuals.

2.2 DUCTWORK AND BREECHING INSULATION

.1 Duct insulation, recovery materials, vapour barrier facings, tapes and adhesives shall have maximum flame spread ratings less than or equal to 25 and maximum smoke developed less than or equal to 50, when tested in accordance with CAN/ULC S102-1988, NFPA 255-1996 or ASTM E84-96a.

.2 Insulating materials and accessories shall withstand service temperatures without smoldering, glowing, smoking or flaming when tested in accordance with ASTM C411-82.

.3 Comply with the following applicable Standards and Guidelines:

.1	ASTM C411	Hot-Surface Performance of High Temperature Thermal Insulation.
.2	ASTM CR11-05	Standard Test Method For Hot Surface Performance Of High Temperature Thermal Insulation.

.3	ASTM E84-07a	Standard Test Method for Surface Burning Characteristics of Building Materials
.4	CAN/CGSB-51.10-92	Mineral Fiber Board Thermal Insulation
.5	CAN/CGSB-51.11-92	Mineral Fiber Thermal Insulation Blanket
.6	CAN/CGSB-51.12-95	Thermal Insulating and Finishing Cement
.7	CGSB 51-GP-52Ma	Vapour Barrier, Jacket and Facing Materials for Pipe, Duct and Equipment Thermal Insulation
.8	NFPA (FRF) 25	NFPA 255: Standard Method of Test of Surface Burning Characteristics of Building Materials, 2006 Edition
.9	CAN/ULC-S102-03	Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

2.3 PIPING AND EQUIPMENT INSULATION

.1 Comply with the following applicable Standards and Guidelines:

.1	ASTM C411-05	Standard Test Method for Hot-Surface Performance of High Temperature Thermal Insulation.
.2	ASTM E84-07a	Standard Test Method for Surface Burning Characteristics of Building Materials
.3	CAN/CGSB-51.2-95	Calcium Silicate Thermal Insulation, for Piping, Machinery and Boilers

.4	CAN/CGSB-51.9-92	Mineral Fiber Thermal Insulation for Piping and Round Ducting
.5	CAN/CGSB-51.10-92	Mineral Fiber Board Thermal Insulation
.6	CAN/CGSB-51.11-92	Mineral Fiber Thermal Insulation Blanket
.7	CAN/CGSB-51.12-95	Thermal Insulating and Finishing Cement
.8	CAN/CGSB-51.40-95	Flexible, Elastomeric, Unicellular Thermal Insulation, Sheet and Pipe Covering
.9	CGSB 51-GP-52Ma	Vapour Barrier, Jacket and Facing Materials for Pipe, Duct and Equipment Thermal Insulation
.10	CAN/CGSB-51.53-95	Poly (Vinyl Chloride) Jacketing Sheet for Insulated Pipes, Vessels and Round Ducts
.11	NFPA (FIRE) 255	NFPA 255 Standard Method of Test of Surface Burning Characteristics of Building Materials, 2006 Edition
.12	CAN/ULC-S102-103	Method of Test for Surface Burning Characteristics of Building Materials and Assemblies

.2 Pipe insulations, recovery materials, tapes, vapour barrier facings and adhesives shall have maximum flame spread rating of 25 and maximum smoke developed rating of 100 except in plenum spaces and air handling systems where maximum smoke development rating shall be 50, when tested in accordance with CAN/ULC-S102-03, NFPA (FIRE) 255, or ASTM E84-07a.

.3 Insulating materials and accessories shall withstand service temperatures without smoldering, glowing, smoking or flaming when tested in accordance with ASTM C441-05.

2.4 PIPE AND PIPE FITTINGS

.1 Comply with the following Standards and Guidelines and applicable laws:

Applicable Standards and Guidelines:

.1	ANSI/ASME B16.18-2001(R2005)	Cast Copper Alloy Solder Joint Pressure Fittings
.2	ANSI/ASME B16.22-2001 (R2005)	Wrought Copper and Copper Alloy Solder Joint Pressure Fittings
.3	ANSI/ASME B16.3-20006	Malleable Iron Threaded Fittings: Classes 150 and 300
.4	ANSI/ASME B16.5-2003	Pipe Flanges and Flanged Fittings
.5	ANSI/ASME B16.25- 2003	Buttwelding Ends
.6	ANSI/ASME B16.39-1989	Malleable Iron Threaded Pipe Unions – Classes 150, 250 and 300
.7	ANSI/ASME B31.1-2007	Power Piping
.8	ANSI/ASME B31.3-2006	Process Piping
.9	ANSI/ASME B31.5-2006	Refrigeration Piping and Heat Transfer Components
.10	ANSI/ASME B16.9-2003	Factory-Made Wrought Buttwelding Fittings
.11	ASME Section IX 2007 ASME	Welding and Brazing Qualifications Boiler and Pressure Valve Code- Section IX
.12	ASTM A53/A53M-07	Standard Specification for Pipe, Steel, Black and Hot-

		Dipped, Zinc-Coated Welded and Seamless
.13	ASTM A106/A106M-06a	Standard Specification for Seamless Carbon Steel Pipe for High-Temperature Service
.14	ASTM A214/214M-96 (2005)	Standard Specification for Electric-Resistance-Welded Carbon Steel Heat-Exchanger and Condenser Tubes
.15	ASTM B32-04	Standard Specification for Solder Metal
.16	ASTM B88-03	Standard Specification for Seamless Copper Water Tube
.17	ASTM B280-03	Standard Specification for Seamless Copper Tube for Air Conditioning and Refrigeration Field Service
.18	ASTM B306-02	Standard Specification for Copper Drainage Tube (DWV)
.19	ASTM B664-90 (2006)	Standard Specification for 80% Silver - 20% Graphite Sliding Contact Materials
.20	ASTM C564-03a	Standard Specification for Rubber Gaskets for Cast Iron Soil Pipe and Fittings
.21	ASTM D1002-05	Standard Specification for Apparent Shear Strength of Single-Lap-Joint Adhesively Bonded Metal Specimens by Tension Loading (Metal-to-Metal)
.22	ASTM D2235-04	Standard Specification for Solvent Cement for Acrylonitrile-Butadiene-

		Styrene (ABS) Plastic Pipe and Fittings
.23	ASTM D2464-06	Standard Specification for Threaded Poly (Vinyl Chloride) (PVC) Plastic Pipe Fittings, Schedule 80
.24	ASTM D2564-04c1	Standard Specification for Solvent Cements for Poly (Vinyl Chloride) (PVC) Plastic Piping Systems
.25	ASTM D3138-04	Standard Specification for Solvent Cements for Transition Joints Between Acrylonitrile-Butadiene-Styrene (ABS) and Poly (Vinyl Chloride) (PVC) Non-Pressure Piping Components
.26	ASTM G17-07	Standard Test Method for Penetration Resistance of Pipeline Coatings (Blunt Rod)
.27	CAN/ICSA B149.1-05	Natural Gas and Propane Installation Code
.28	CSA B52-05 SMART	Mechanical Refrigeration Code
.29	CAN/CSA-B70-06	Cast Iron Soil Pipe, Fittings and Means of Joining
.30	CAN/CSA-B1800-02	ABS Drain, Waste, and Vent Pipe and Pipe Fittings
.31	CAN/CSA-B1800-02	PVC Drain, Waste, and Vent Pipe and Pipe Fittings
.32	ASTM F441/F441M-02	Standard Specifications for Chlorinated Polyvinyl Chloride (CPVC) Plastic Pipe, Schedules 40 and 80

Applicable laws:

.1 National Plumbing Code of Canada 1995.

.2 Alberta Regulation 219/97 – Plumbing Code Regulation.

.3 Provincial Board of Labour Regulations for Welded Steel precision tubing as approved by the authority having jurisdiction.

END OF SECTION

16050 BASIC ELECTRICAL MATERIALS

1. Products

The Contractor shall consider the following minimum materials requirements in its designs of the Schools.

1.1 CONDUIT

.1 Provide conduit of proper type and size to suit intended use, fulfill wiring requirements, and comply with CEC.

.2 EMT: to CSA C22.2 No.83-M1985. Provide rain-tight fittings in weatherproof and damp areas.

.3 Rigid Metal: to CSA C22.2 No.45-M1981.

.4 Rigid PVC (Unplasticized): to CSA C22.2 No.211.2-M1984.

.5 Flexible Metal Conduit: to CSA C22.2 No. 56-1977.

.6 Following materials for mechanical protection of direct buried conductors, as permitted under CEC Rule 12-012(3) (e).

.1 Polyethylene Pipe: to CSA B137.1-95, minimum series 75.
.2 Flexible Plastic Underground Power Cable Ducting: to CSA C22.2 No. 211.1 1984.

2.2 WIRE AND CABLE

.1 Building Wiring: to CSA C22.2 No. 75-M1983, copper conductor, 600 V or 1000V RW90 X-link insulation. Use in all locations, except for underground wire which shall be RW90 X-Link -40°C or TWU75 -40°C. Aluminum Alloy conductor may be used for feeders 100 Amps and over.

.2 Wire Sizing: according to CEC. Minimum wire size shall be #12 AWG.

.3 Do not use metallic or non-metallic sheathed cables or wire with aluminum conductors, except where otherwise indicated.

.4 Armoured Cable: to CSA C22.2 No. 51-95. Use only for final connections to luminaires in lengths not exceeding 1.5 m and for runs concealed in metal or wood frame partitions containing only one circuit.

2.3 BOXES AND FITTINGS

.1 Provide boxes and fittings suitable for intended use and area installed and as follows:

.1 Outlet Boxes: to CSA C22.2 No. 18-92.
.2 Pull and Junction Boxes: to CSA C22.2 No. 40-M1989.
.3 Bushings, Knockout Closures, and Locknuts: to CSA C22.2 No. 18-92.

2.4 WIRING DEVICES

.1 Specification grade and as follows:

.1 Switches: to CSA C22.2 No. 111-M1986, toggle type, 15 A, 125 V, full load rated.
.2 Receptacles: to CSA C22.2 No. 42-M1984, duplex, 15 A, 125 V, U-ground.
.3 Cover Plates: Provide as per requirements.

2.5 DISCONNECTS

.1 Disconnects: to CAN/CSA C22.2 No.4-M89 and required by CEC to suit application.

2.6 CABINETS AND ENCLOSURES

.1 Cabinets and Enclosures: to CSA C22.2 No. 40-M1989, and as follows:

.1 Interior Cabinets: EEMAC-1
.2 Exterior Enclosures: EEMAC-3R

2.7 GROUNDING EQUIPMENT

.1 Grounding Equipment: to CSA C22.2 No. 41-M1987.

2.8 SUPPORTING DEVICES

.1 Provide ventilated cable tray for low tension systems, Class C1, ladder type or basket type. Tray to consist of open cable tray with minimum dimensions of 450 mm x 100 mm deep, galvanized steel. Support cable tray passes through fire rated walls, provide total enclosed tray for a distance of 200 mm on each side of the wall.

END OF SECTION

APPENDIX I – OPERATION AND MAINTENANCE MANUAL REQUIREMENTS FOR ELECTRICAL AND MECHANICAL SYSTEMS

Attachment I1 – Electrical Operation and Maintenance Manual

Attachment I2 – Mechanical Operation and Maintenance Manual

ATTACHMENT I1

ELECTRICAL OPERATION AND MAINTENANCE MANUAL REQUIREMENTS

1. INTENT

.1 The Contractor is responsible for maintenance manuals of the electrical systems. The Contractor shall obtain all specified operation and maintenance data. Using this data, Contractor shall prepare and submit three (3) Electrical Operation and Maintenance Manuals to the Province.

2. MANUAL SYSTEM CATEGORIES

.1 Organize manual into the following major system categories:

- .1 PDS - Power Distribution System
- .2 CAS - Communication and Security Systems
- .3 LTG - Lighting Systems
- .4 FSS - Fire Safety Systems
- .5 SPS - Special Systems

.2 Provide master divider tabs and index for each major system category, with white tabs, 75 mm in length.

3. SUB-SYSTEM DIVISIONS

.1 Divide major system categories into subsystems as follows:

- .1 PDS - Power Distribution System:
  - .1 High Voltage Systems (Above 750 Volts)
  - .2 Low Voltage Systems (Below 750 Volts)
  - .3 Emergency Systems
  - .4 Motor Control Systems
- .2 CAS - Communication and Security Systems, if required:
  - .1 Security System
  - .2 Programmable Clock System
- .3 LTG - Lighting Systems:
  - .1 Interior Lighting
  - .2 Exterior Lighting
  - .3 Lighting Control
- .4 FSS - Fire Safety Systems:
  - .1 Fire Alarm System

.2 Emergency Voice Communication System

.5 SPS - Special Systems:
.1 Isolated Power Systems
.2 Uninterrupted Power Supplies
.3 Other Systems

.2 Organize each sub-system into the following sections:

.1 Operations Section
.2 Maintenance Section
.3 Contract Documentation Section
.4 Standards Section

.3 Provide an index and divider for each subsystem and section, colour coded as follows:

.1 PDS Subsystems - Blue
.2 CAS Subsystems - Green
.3 LTG Subsystems - Yellow
.4 FSS Subsystems - Red
.5 SPS Subsystems - Orange

.4 Use 45 mm tabs for each subsystem and 40 mm tabs for sections, use same colour for section tabs as for subsystem tabs.

4. OPERATIONS SECTION

.1 In each system or category and/or subsystem, include an operations section which includes:

.1 System Description
.2 System Operating Instructions
.3 Schematic Diagrams
.4 Equipment Data Sheets

.2 System Descriptions: prepare descriptions which, at a minimum, include the following:

.1 Power Distribution System - PDS:

.1 Calculated demand in kVA of entire system and on each transformer 150 kVA and above.
.2 Short Circuit analysis of entire system, including incoming fault level.

.3 Protective Device Coordination study for entire system, including emergency system.
.4 Description of protection, transfer and metering scheme for both normal and emergency systems supported by schematic diagrams.
.5 Calculated system operating power factor together with method of improvement and anticipated improvement.
.6 Calculated demand in kVA of Emergency Power System.
.7 Single line diagram of entire power system indicating all breaker, switches, protective devices and instrumentation.
.8 Calculated demand on UPS systems where installed.

.2 Communication and Security Systems - CAS:

.1 Security Systems:

.1 Manufacturer and model numbers of system and all components.
.2 System installer.
.3 Integral transient and memory protection.
.4 System type and composition.
.5 Location in School and areas served.
.6 Function of major components.

.2 Programmable Clock System, if applicable:

.1 Manufacturer and model numbers of system and all components.
.2 System installer.
.3 Integral transient and memory protection.
.4 Master Clock:

.1 Location.
.2 Supervisor and connection periods.
.3 Manual control.
.4 Daylight savings feature.
.5 Program control points (i.e. control of lighting, bells, mechanical equipment, etc.).

.5 Clocks:

.1 Digital or analog.
.2 12 or 24 hour system.
.3 Mounting.

.6 Interval Timer Clock:

.1 Stop, start, reset buttons.
.2 Pilot lights.
.3 Clock descriptions.

3 Lighting Systems - LTG:

.1 Interior Lighting:

.1 Include following in description of interior lighting system:

.1 Calculate and include energy consumption in Watts per square metre.

.2 Include any areas where ambient lighting has been supplemented with task lighting.

.3 On a room by room basis, anticipated design lighting levels.

.4 Describes all ballast and light sources/lamps used.

.5 Include description of diffusers.

.6 Include battery lighting units and exit lights.

.2 Exterior Lighting:

.1 Include following in description of exterior lighting:

.1 Include anticipated designed lighting levels for parking lots, roadways, etc.

.2 Describe ballasts and light sources to be used.

.3 Include description of diffusers and distribution pattern for each fixture to be used.

.3 Lighting Control System:

.1 Interior Lighting:

.1 Describe method of switching. Include switching of corridors, large general use

areas and any lighting connected to emergency or standby power.

.2 For low-voltage switching systems, include following:

.1 Manufacturer and model number of system.
.2 Type of switch used.
.3 Relay.
.4 Interface card in panels.
.5 Time clock/computer controlled and zone(s) of control.
.6 Location of any master switches and area they control.

.2 Exterior Lighting:

.1 Describe method of controlling exterior lighting (i.e. photocell, timelock, override switch, master switch, etc.)

.2 Include location of all control equipment.

.4 Fire Safety Systems - FSS:

.1 Fire Alarm System:

.1 Manufacturer and model number of system.
.2 General description i.e. single or two stage, zoned, non-coded, etc.
.3 Interconnection to other system i.e., security system, BMCS, etc.
.4 Fire alarm control unit.
.5 Power supply for system.
.6 Communicators.
.7 Pull Stations.
.8 Heat Detectors.
.9 Smoke Detectors.
.10 Signal Device - bell or speaker.
.11 Amplifiers (if speakers used).
.12 Door Holder.
.13 Sprinkler flow and tamper devices.
.14 End-of-line device.
.15 Printers.
.16 Floor fire alarm panel.

.17 Integral transient and memory protection.

.2 Emergency Voice Communication System:

.1 Manufacturer and model number of system.
.2 Command centre.
.3 Power supply.
.4 Amplifiers.
.5 Zoning and Zone Control.
.6 Speakers - types, enclosures, power requirements.
.7 Microphone/Telephone.
.8 Integral transient and memory protection.

7. SYSTEM OPERATING INSTRUCTIONS

.1 Prepare system operating instructions, with the manufacturers' and suppliers bulletins as backup. Provide the following:

.1 Power Distribution System - PDS:

.1 Provide an overall description of operation of power system in both normal and emergency mode.

.2 For high voltage systems, provide detailed instructions for system switching, equipment isolation, discharging and grounding.

.3 Automatic Power Factor improvement equipment detailing method of input summation, protection, switching and size of incremental increase/decrease in kVAR.

.4 Protective schemes such as overcurrent, short circuit, undervoltage, ground fault, including lock out and restraint as applicable.

.5 Transfer schemes both normal and emergency.

.6 Emergency power generation, including load shedding and peak shaving.

.2 Communication and Security Systems - CAS:

.1 Security System:

.1 Describe in "Operator Layman" language, specific instructions for operating and programming system and components of system.

.2 Exact type and specific location of each device used.

.3 Identify safety devices, detection equipment and other conditions that must be satisfied in order for equipment to be operated.

.4 Do not include individual passwords, access codes and similar confidential data in Operation & Maintenance Manual. Include reference to whom to contact should this information be required.

.2 Programmable Clock System:

.1 Monitor Clock:

.1 Manual/automatic control.
.2 Programming instructions.
.3 List features used/not used.

.2 Clocks.
.3 Interval timer clock.

.1 Control panel.

.3 Lighting Systems - LTG:

.1 List type of lamps that can be used with ballasts provided to obtain results.
.2 Timelock.
.3 Photocell.
.4 Low Voltage Setting:
.1 Details of systems type and composition.
.2 Location in the building.
.3 Function of each component.
.4 Provisions for future expansion.

.5 Computer controlled - specific instructions for operating and programming system.

.4 Fire Safety Systems - FSS:

.1 Fire Alarm System:

.1 Fire alarm control unit.
.2 Wiring class.
.3 Zoning.

.4 Programming instructions if microprocessor / addressable.
.5 Supervisory zone operation.
.6 Systems trouble.
.7 System reset.
.8 CRT/Printer Operation.
.9 Communication.
.10 First stage alarm:
  .1 System operation.
  .2 Auxiliary relay operation:
    .1 Door release.
    .2 Elevator homing.
    .3 Smoke damper operation.
    .4 Fan shutdown.
    .5 Sprinkler system.
    .6 Security system.
    .7 Fire department "alert" or "alarm".
.11 Second stage alarm:
  .1 Zone evacuation.
  .2 Automatic evacuation.
  .3 Signal silence.
  .4 Auxiliary relay operation (if different from first stage alarm).

.2 Emergency Voice Communication System:
  .1 Central control unit.
  .2 Zoning control.
  .3 Station operation.
  .4 Connection to other systems (paging system).
  .5 Tones / recorded messages / etc.
  .6 Volume control.

8. SYSTEM SCHEMATICS

.1 Include all schematics that are applicable, which will assist in operation and maintenance of system.

10. MAINTENANCE SECTION

.1 General:

  .1 Summarize data for recommended maintenance, supplemented by any additional appropriate data.

  .2 Include recommended maintenance as a section of each system.

.3 Organize data into sections, with divider tabs as follows:

.1 Recommended Maintenance Tasks and Schedules
.2 Spare Parts
.3 Suppliers and subcontractors
.4 Tags and Directories
.5 Maintenance Brochures

.2 Recommended Maintenance Tasks and Schedules:

.1 Organize data according to system category, with further breakdown into individual systems as used in operations division of the manual. Provide section index and divider tabs for each system category. Summarize recommended maintenance tasks from maintenance manufacturer's brochures, for each component of system in following format:

.1 Daily
.2 Weekly
.3 Monthly
.4 Semiannually
.5 Annually
.6 When required

.3 Parts List:

.1 Organize data according to system category, with further breakdown into individual systems as used in operations division of manual. Provide section index and divider tabs for each system category. Summarize recommended maintenance tasks from maintenance manufacturer's brochures, for each component of system.

.4 Suppliers and Contractors List:

.1 Provide summary of suppliers and subcontractors for each component of the system. List name, address and telephone number of each.

.5 Tags and Directories:

.1 Provide a copy of tags and directories.

.6 Maintenance Brochures:

.1 Include copies of all manufacturers' printed maintenance brochures pertaining to each product, equipment or system. Provide section index and divider tabs.

11. DOCUMENTATION AND STANDARDS SECTION

.1 Coordinate collection of data required for this section.

.2 Organize all data into sections, with divider tabs, as follows:

.1 Drawing List
.2 Shop Drawings and Product Data
.3 Certificates
.4 Reports
.5 Standards Division

.3 Drawing List: provide a list of all drawings required for performance of the Project and the M&R.

.4 Shop Drawings and Product Data: provide final copies of all shop drawings and product data. Include section index and divider tabs.

.5 Subcontractor Certifications: provide copies of subcontractor certifications for the performance of the product and systems, and test reports verifying performance of products and systems. Include section index and divider tabs with maximum of twenty-five sheets or one report per tab. This should include, but not be limited to the following:

.1 Electrical systems inspection.
.2 Utility company inspection.
.3 Occupational Health and Safety inspection.
.4 Fire Alarm Verification certificate.

.6 Reports: include copies of all reports relating to the testing, adjusting and balancing of equipment and systems. Include section index and divider tab for each report.

.7 Standards Division: allow 25 mm binder space for standards.

ATTACHMENT I2

MECHANICAL OPERATION AND MAINTENANCE MANUAL REQUIREMENTS

1. INTENT

.1 The Contractor is responsible for maintenance manuals of the mechanical systems. The Contractor shall obtain all specified operation and maintenance data. Using this data, Contractor shall prepare and submit three (3) Mechanical Operation and Maintenance Manuals to the Province.

2. MANUAL DIVISIONS

.1 Organize manual into following divisions:

.1 Operations Division
.2 Maintenance Division
.3 Standards Division

.2 Provide master divider tab and index for each division.

3. OPERATIONS DIVISION - MECHANICAL SYSTEMS

.1 Organize all data into sections according to system category, with divider tabs, as follows:

.1 AIR - Air Systems
.2 CTL - Control Systems
.3 CLG - Cooling Systems
.4 FPN - Fire Protection Systems
.5 HTG - Heating Systems
.6 MIS - Miscellaneous Systems
.7 PLG - Plumbing Systems

.2 Organize data for each system category (section) into individual systems (subsections). Provide an index for each system category and a divider tab for each individual system.

.3 For each individual system, except Controls System, include following data.

.1 System Description: provide details of system type, composition, areas served, location in building, design criteria and function of major components. All equipment arranged to operate together as one system shall be considered part of that system description.

Design criteria shall, at minimum, include following where applicable:

.1 Occupied space conditions.
.2 Outdoor ambient conditions.
.3 Air circulation rate.
.4 Exhaust air rate.
.5 Minimum outside air.
.6 Building pressurization.
.7 Future load allowances.
.8 Standby capabilities.
.9 Calculated load and design capacity of domestic water supply mains.
.10 Calculated load and design capacity of drainage mains.

.2 System Schematic: provide a system schematic showing all components comprising central system. Identify each component using its BMCS mnemonic and generic name designation. Use this mnemonic in all references to equipment throughout manual.

.3 Operating Instructions: provide, in "operator" layman language, specific instructions for start-up, shutdown and seasonal change over of each system component. Include following:

.1 Exact type and specific location of each switch and device to be used in system operation.

.2 Identify safety devices and interlocks that must be satisfied in order for equipment to start.

.3 List conditions to be fulfilled before attempting equipment start up, i.e. valves position correct, glycol mixture concentration proper, piping filled with fluid, filters/strainers in place, etc.

6. OPERATIONS DIVISION - CONTROLS SYSTEM HARDWARE

.1 BMCS Hardware:

.1 System Description
.2 System Schematic
.3 Operating Instructions
.4 Equipment Identification

.2 Complete BMCS Hardware subsections according to general format and contents outlined in “Operations Division - Mechanical Systems”.

7. OPERATIONS DIVISION - CONTROLS SYSTEM SOFTWARE

.1 System Introduction:

.1 Provide a brief description of overall control philosophy.

.2 Describe hardware interlocks with other equipment that may affect or override action of software control modules.

.3 Describe procedure for operating staff to interface with software control modules to override system or component operation, to adjust system or building control set points, etc. Name virtual points provided in software for this purpose and recommend adjustment increments and limits where applicable.

.2 System Schematic: provide a labeled schematic indicating locations, point mnemonics, and proper names of physical control points in system. Include RCU panel wiring diagrams with field point termination addresses. Good quality shop drawings may be used for this purpose.

.3 Software Modules:

.1 For each module provide a description of purpose and logic of module.

.2 Provide a description of each software Input and Output Variable on Point Mnemonic Descriptions Sheet.

.3 Provide a hard copy listing of software module.

8. MAINTENANCE DIVISION

.1 Summarize data for this section from Supplier and Sub-trade maintenance submissions, supplemented by appropriate additional data.

.2 Organize data into sections, with divider tabs as follows:

.1 Maintenance Tasks and Schedules
.2 Spare Parts
.3 Suppliers and Contractors
.4 Tags and Directories

.3 Maintenance Tasks and Schedules: organize data according to system category, with further breakdown into individual systems as used in operations division of the manual. Provide section index and divider tabs for each system category. Summarize maintenance tasks from manufacturers' maintenance brochures, for each component of each system in following format:

.1 Daily
.2 Weekly
.3 Monthly
.4 Semi-annually
.5 Annually
.6 When required

.4 Suppliers and Contractors List: provide summary of suppliers and contractors for each component of each system. List company name, address and telephone number of each.

.5 Tags and Directories: provide a copy of tag and other directories.

9. CONTRACT DOCUMENTATION DIVISION

.1 Organize operation and maintenance data into sections, with divider tabs, as follows:

.1 Drawings List
.2 Shop Drawings and Product Data
.3 Certifications
.4 Warranties and Bonds
.5 Maintenance Brochures
.6 Reports

.2 Drawings List: provide a list of all drawings used in performance of the construction contract.

.3 Shop Drawings and Product Data: provide final copies of all shop drawings and product data. Include section index and divider tabs. Maximum of twenty-five sheets or one shop drawing per tab.

.4 Certifications by Contractor: provide copies of Contractor certifications for performance of products and systems, and test reports verifying performance of products and systems. Include section index and divider tabs with maximum of twenty-five sheets or one report per tab.

.5 Certifications by Inspection Agency: collect and include copies of following inspection certification reports:

.1 Plumbing and Gas Standards
.2 Building Standards and Fire Prevention
.3 Boilers and Pressure Vessel Standards
.4 Utility Company
.5 Other Reports Required by Authorities

.6 Maintenance Brochures: include copies of all manufacturers' printed maintenance brochures pertaining to each product, equipment or system. Provide section index and divider tabs. Maximum of twenty-five sheets or one brochure per tab.

.7 Field Reports: collect and include field reports. Include section index and divider tab for each report:

.1 Valve tag directory.

.2 Hydronic systems pipe pressure test certificates.

.3 Chemical treatment and cleaning reports.

.4 Start-up and testing reports.

.5 Manufacturer's start-up reports.

.6 Acoustic reports.

.7 Testing, Balancing and Adjusting reports.

.8 BMCS physical point confirmation and calibration reports.

.9 BMCS software verification report.

END OF SECTION

APPENDIX J - SCHOOL BOARD CUSTODIAL SERVICES

The School Board will provide the following custodial services at each School, including the requisite qualified personnel trained to provide such services. The frequencies for performing the services indicated below are the minimum frequencies required by the Province, as set out in the Tri-Party Agreement.

Custodial Services of the School Board	**Once Daily**	**As Required**	**Weekly**	**Monthly**	**Annually**
Exterior Duties					
Sweep entrances	X				
Put up and take down flag	X				
Pick up garbage in playground & along fences			X		
Snow clearing – remove snow or ice from entrance sidewalks		X			

Interior Duties	**Once Daily**	**As Required**	**Weekly**	**Monthly**	**Annually**
Classroom Servicing Schedule. Includes all other instructional areas, such as Art, Science, Drama, Music and CTS.					
Empty waste receptacles	X				
Empty pencil sharpeners	X				
Secure doors & windows	X				
Clean student work stations			X		
Clean chalk boards/white boards			X		
Clean chalk rails	X				
Floor care, i.e. sweeping and spot mopping	X				
Damp mop floors		X			
Clean sinks & fittings	X				
Clean telephones/hand sets			X		
Spot wash walls/windows				X	
Wash Walls					X
Clean window coverings					X
Clean windows inside/outside					X
Clean furniture					X
Wash off any Graffiti with non-abrasive cleaner		X			
Washroom Servicing Schedule					
Washroom inspections	X				
Clean sinks & fittings	X				
Clean urinals & fittings	X				
Clean toilets & fittings	X				
Empty waste receptacles	X				
Damp mop floor	X				
Clean linen towel & soap dispensers	X				

Interior Duties	Once Daily	As Required	Weekly	Monthly	Annually
Clean mirrors	X				
Hand plunging and hand snakes to remove foreign objects		X			
Wash light switches & door handles	X				
Fill hand towel & toilet tissue dispensers	X				
Wash partitions	X				
Wash walls					X
Spot wash walls (as required)		X			
Clean windows					X
Flush floor drains				X	
Wash off any Graffiti with non-abrasive cleaner		X			
Boiler Monitoring	X				
Gymnasium Servicing Schedule					
Dust mop floor	X				
Dust mop stage		X			
Sweep/vacuum stairs & landings			X		
Clean and inspect gym chairs (after usage)		X			
Clean bleachers (after usage)		X			
Clean gym storage room				X	
Dust backstops				X	
Scrub/damp mop gym floor			X		
Clean under stage					X
Hallways & Stairways Schedule					
Floor care	X				
Clean fountains & fittings	X				
Spot wash walls & windows	X				
Spot check & clean lockers	X				
Dust lockers, ledges & exhibit cases			X		
Dust banisters			X		
Clean fountain drains	X				
Damp mop/auto scrub floor			X		
Buff or burnish floor					3x
Dust stairway walls					3x
Clean exhibit cases		X			
Clean inside lockers					X
Wash off any Graffiti with non-abrasive cleaner		X			
Office & Staff Room Schedule					
Empty waste receptacles	X				
Secure doors & windows	X				
Empty pencil sharpeners	X				
Clean sinks & fittings	X				

Interior Duties	Once Daily	As Required	Weekly	Monthly	Annually
Clean office furniture				X	
Clean telephones/hand sets			X		
Shampoo carpet					X
Clean windows inside/outside					X
Cafeteria Servery & Kitchen Schedule (as applicable)					
Empty waste receptacles	X				
Daily floor care	X				
Damp mop floor	X				
Wash floor in food prep area	X				
Clean linen towel & soap dispensers	X				
Spot wash walls & windows	X				
Wash doors	X				
Clean canopy & hood			X		
Clean fridge/freezer coils					X
Clean ventilation grills					X
Wash chairs					X

Common Items – Interior custodial services	Daily	As Required	Weekly	Monthly	Annually
Low dusting – To height of 2 metres			X		
High dusting – Over 2 metres					X
Routine floor care					X
Wash woodwork, doors and frames					X
Clean lights & fixtures – to a height of 4 metres and under only					X
Clean ventilation grills – to a height of 4 metres and under only					X
Spot wash walls & windows		X			
Wash off any Graffiti with non-abrasive cleaner		X			

APPENDIX K- SCHOOL BOARD SUPPLIED FURNITURE AND EQUIPMENT

The School Board is responsible supplying, installing, maintaining and renewing for the following fixtures, furniture and equipment:

Gymnasium:

Score clock
Loose recreational equipment such as mats, volleyball nets, gymnastics equipment and all weight room equipment
Portable stage, carts, laundry storage tubs, projector screen, stage curtains
Light fixtures for stage lighting

Library:

All moveable bookshelves
Computer workstations
Tables, chairs

Core Regular Classrooms:

Moveable educational casework, whiteboards, tackboards, ”Smart Boards”, projectors, screens, desks, chairs and window dressings

CTS, Science, Art, Music Rooms

Appliances, flammable and hazardous materials storage cabinet, kilns, eye wash bottles, movable paper and musical instrument storage cabinets, desks, chairs, window dressings, welding booth bench and equipment, fire curtain and exhaust system

Modular Classrooms

Moveable educational casework, whiteboards, tackboards, ”Smart Boards”, projectors, screens, desks, chairs and window dressings

Administration, Staffroom, Staff Work Area

Office equipment, appliances, white boards, tackboards, all movable cabinets and furnishings such as desks, couches, chairs and tables

Infirmary and Special Needs

Staff desk, chairs, cot, tackboard, fridge and lift

Servery

Appliances

Other Systems

PA system, cable television, Supernet, telephone system excluding cable for all these systems

Miscellaneous

Signage to identify teacher’s name, site message boards, boot racks, stage drapery and lighting

and any other furniture or equipment supplied by the School Boards during the Term and not specified to be provided by the Contractor pursuant to Section 4 of Schedule 18.

APPENDIX L - ACCESSIBILITY CRITERIA

1.1 To classify an Area as Accessible considering Good Industry Practice, the Area must:

1.1.1 exist;

1.1.2 be accessible by means that are safe and free from obstruction;

1.1.3 have fire alarm systems, fire prevention equipment, security systems, and emergency exits which are fully operational in accordance with the Detailed Designs and Technical Requirements;

1.1.4 not demonstrate failure of or damage to any Building Element which materially and adversely affects use of the Area or places the occupant at risk of harm;

1.1.5 be maintained within a temperature range of +/- 5 degrees Centigrade of the design temperatures set out in Sections 4.9.1.3(a) and (b);

1.1.6 have a ventilation system operating at levels that do not exceed the levels set out in Sections 4.9.1.3(g) and (h) and Section 4.10.3.9.3(d) and (e) for more than one School Day in accordance with the Detailed Designs and Technical Requirements;

1.1.7 be capable of illumination at lux levels set out in Sections 4.9.7.6.2 and 4.10.3.7.1;

1.1.8 have a sufficient and safe electrical supply in accordance with and where required by the Detailed Designs and the Technical Requirements;

1.1.9 have a sufficient, constant and safe hot and cold water supply and drainage system functioning in accordance with the Detailed Designs and the Technical Requirements;

1.1.10 be compliant with all applicable laws and Authorizations; and

1.1.11 be free from flood, weather penetration, damp and mould affecting the structure, any Building Element, Building System or Building Equipment of a School to the extent that precludes the safe occupation of the Area.