Alberta
INFRASTRUCTURE AND
TRANSPORTATION

STANDARD CORE ELEMENTARY SCHOOLS - 300 CAPACITY DESIGN DEVELOPMENT SHORT REPORT

October 2007

fwarchitects
ferrari westwood

Alberta
INFRASTRUCTURE AND TRANSPORTATION

TABLE OF CONTENTS

fwarchitects
ferrari westwood

INTRODUCTION

Ferrari Westwood Architects has been retained to design a 300 Student Standard Elementary Core School. The criteria from which this school has been designed was outlined by the documents distributed by Alberta Infrastructure and Transportation including the RFP, the references document distributed at the May 15th titled Design Of Standard Core Elementary Schools, 2007 meeting as well as the Standard Core Elementary School Design workshop of May 30th, 31st and June 1st, 2007. In addition to this we have incorporated comments and directives that have arisen from our group meetings throughout the design process.

The 300 Student Standard Core Elementary School is designed to accommodate eight modular classrooms with the possibility of adding future modulars as well. The core itself is designed at an area of 1718m^2 with the area of eight addition modular classrooms at 800m^2 giving a total building area of 2518m^2.

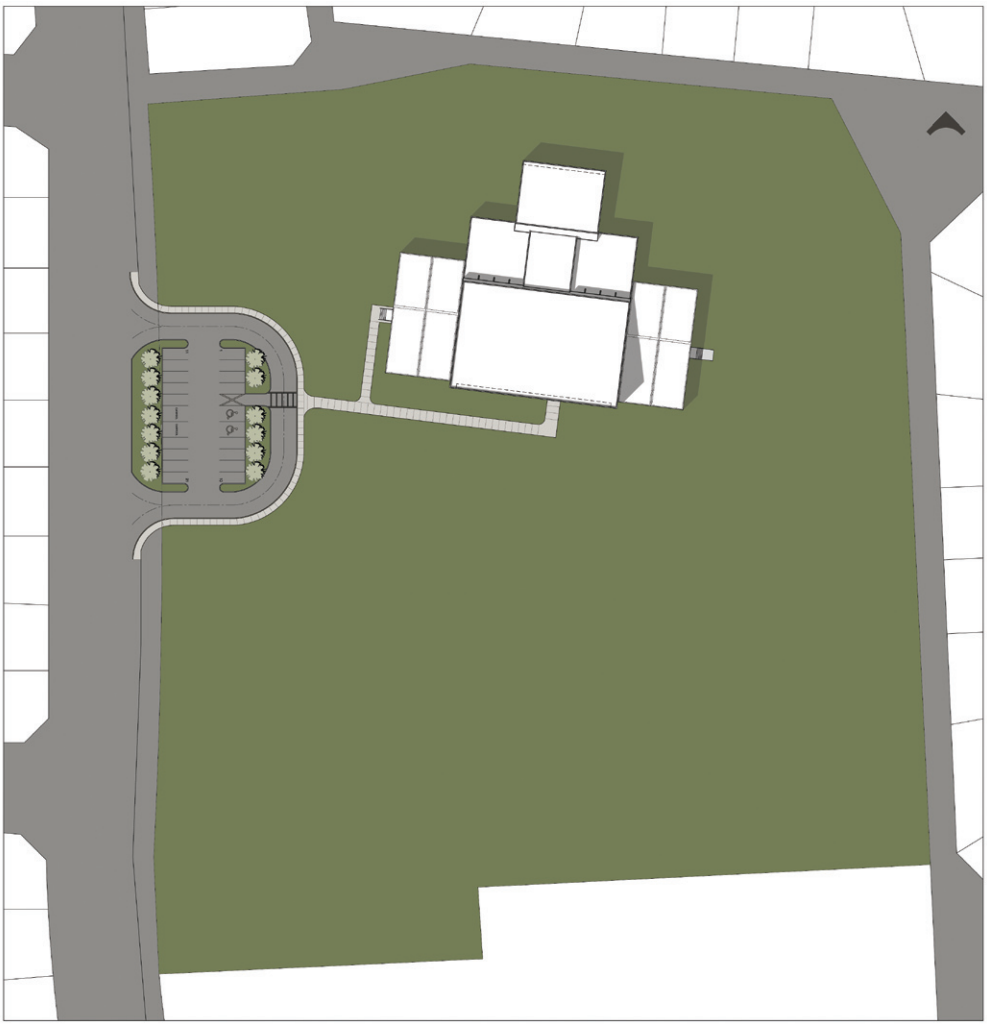
DESIGN CRITERIA

The conceptual design of the Standard Elementary Core School has been identified as creating a core portion of a School that will be permanent building designed to LEED silver standards. To this, core modular classrooms will be added.

Through our workshop Alberta Education added additional design criteria. These criteria included:

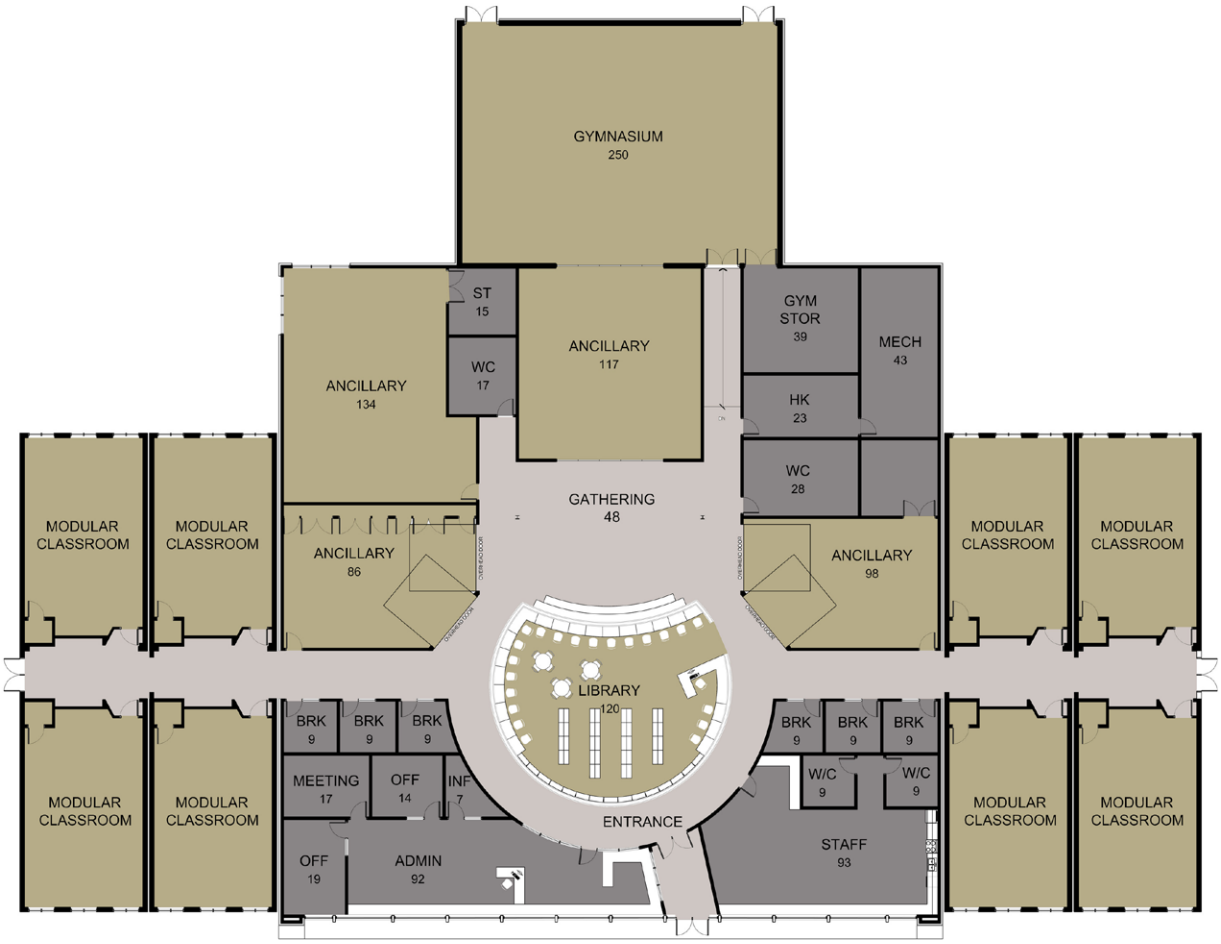
- The core be flexible in nature to address the unique requirements of particular educational needs.
- Create a school that promotes community.
- Specific criteria were also mentioned to directly address curriculum requirements such as the integration of sinks into all of the modular classrooms.

SITE PLAN
OPTION 1



In an effort to maximize site adaptability while maintaining a standardized core school design we have developed a school design that has a compact footprint. This coupled with the schools relatively small size allows for the school to be more easily placed on a variety of school sites. Although the school is designed to face south we have developed a number of possible site options to show how this can be achieved. Shown here is the school in the preferred orientation with vehicular access to the west.

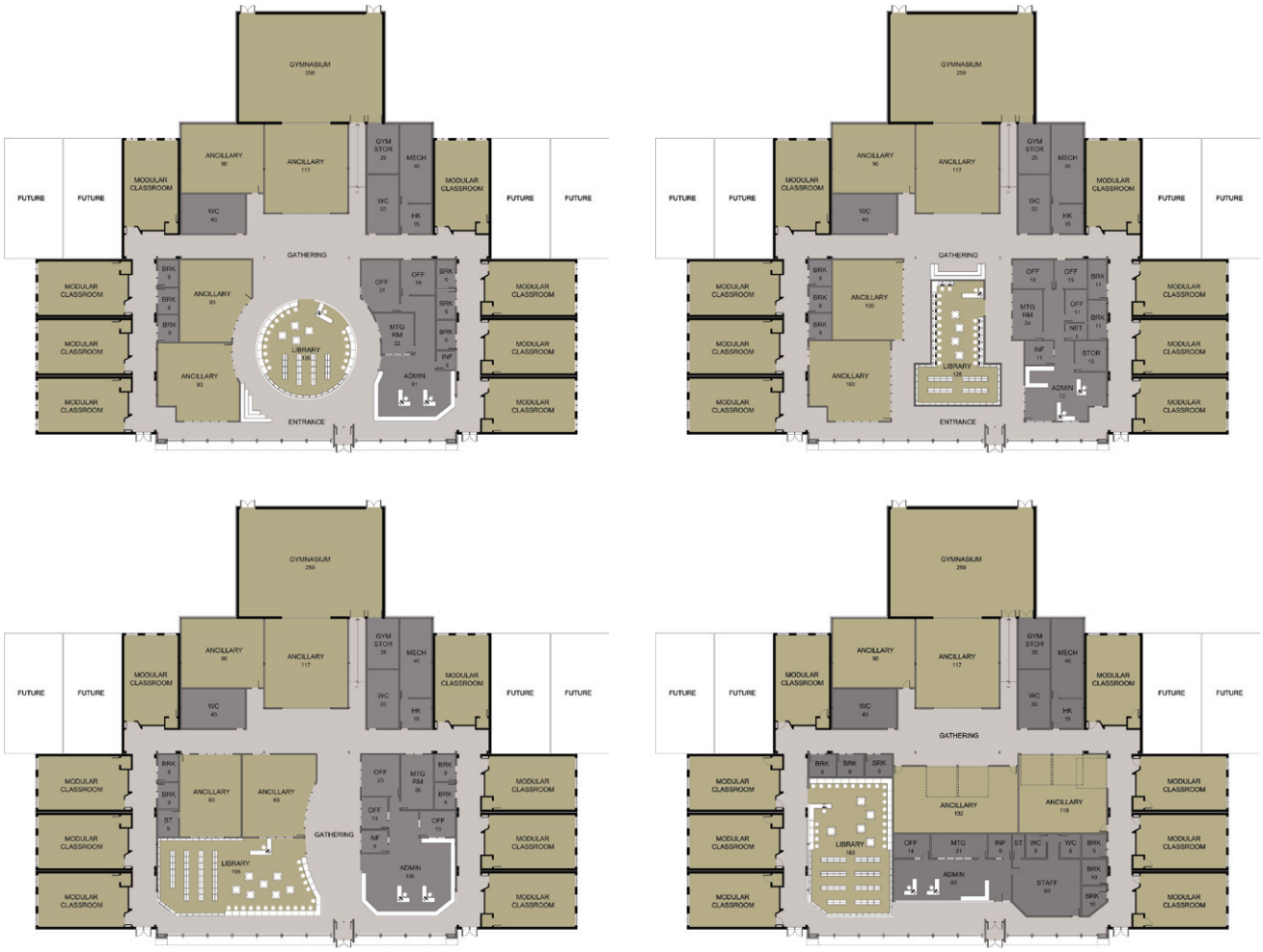
FLOOR PLAN



In designing the school we have endeavoured to create a core that would provide maximum flexibility while still maintaining a standardized shell. We have divided the core into three large blocks; the gymnasium, support utilization spaces with fixed ancillary classroom, and a large flexible block containing two ancillary spaces, a library, admin and staff areas, and break out rooms. This large shell allows flexibility in planning in that rooms can vary in their configuration both in the size of the room and in the adjoining and proximity of other rooms.

By developing a large central space that houses the key areas of the school we have created an architectural form that fosters community. The main activity areas consisting of the Library, the Ancillary Spaces, the Administration and Staff areas, are brought together, forming a town square or heart to the school. These spaces consisting of enclosed, semi enclosed and open spaces housed within a dynamic form with large amounts of natural light making for a dynamic and stimulating environment for today's students. The gathering space found in the heart of the school offers a place for students to come together during recess and lunch. It is situated so as to act as a seating area for smaller performances from the stage / ancillary room. The two adjacent ancillary spaces on the sides of the gathering space can also open up to the gathering spaces to facilitate community events within the school. This space also allows for team teaching and some physical education activities. This centralized gathering space with the major activity spaces encompassing it creates a focal point that fosters community by bringing the staff and students together in one space on a daily basis.

FLOOR PLAN
ALTERNATE OPTIONS

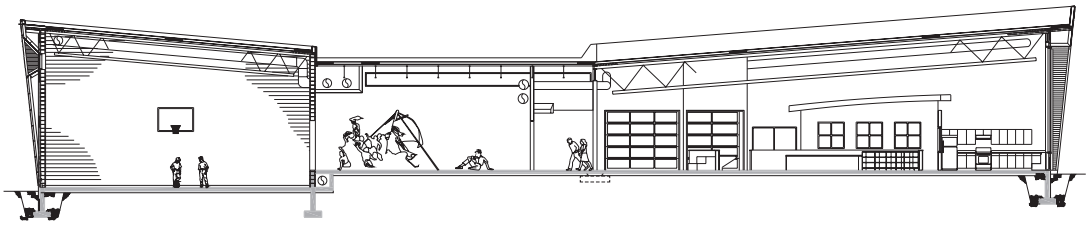


By designing a shell for the front large central space, many interior planning options are possible, four of which are illustrated here. This flexibility is not limited to expansion of rooms in a linear fashion nor are all rooms limited to a standard width. Also room adjacencies are possible on four different sides rather than just two sides as found in flexible design bound by a corridor on one side and an exterior wall on the other side.

The addition of modular classrooms can occur on two different configurations. The A modular unit can be attached to the sides of the central space providing circulation around the perimeter of the large shell space. This configuration allows for maximum flexibility in the planning of large central space.

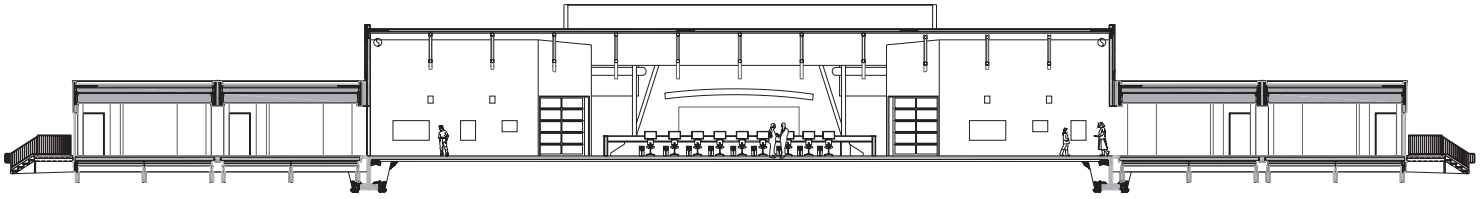
An alternate configuration for the addition of the modular classroom is to align a double loaded corridor addition of modular classrooms on either side of the central space. This configuration allows for maximum visibility as a staff member can view the entire school from the hall just outside the staff room.

BUILDING SECTIONS



SECTION A

SECTION B

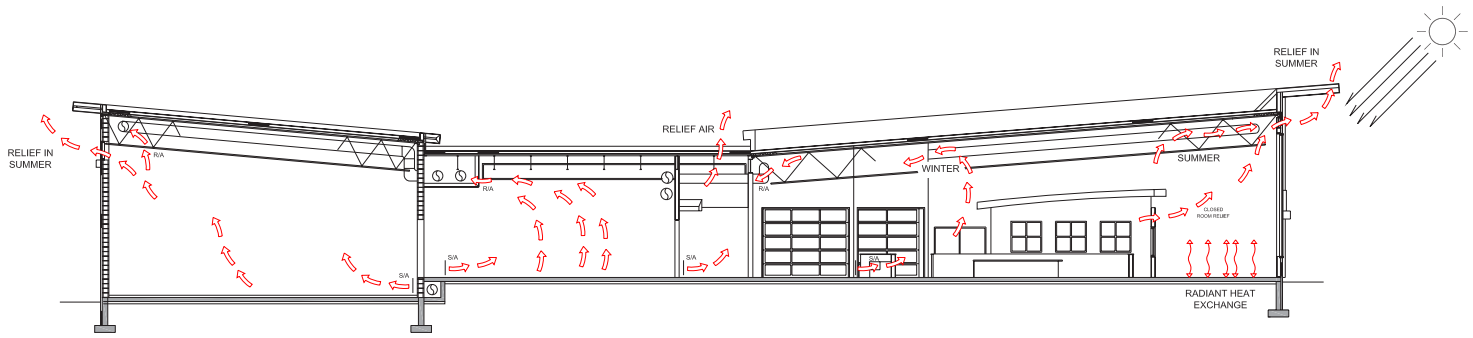


SECTION C

Within the large shell a variety of spaces are found. Some spaces can be open to the ceiling separated by pony walls such as the Library, the front office area and the staff area. Other smaller spaces such as private offices and break out rooms are treated as buildings within a building allowing a smaller scale. Finally spaces such as the ancillary rooms can be walled off to create tall ceiling spaces.

In creating the shell of the main open space the parapets have been extended to a height of one meter above the roof. This extension will help mitigate the extra snow loading on the lower adjacent modular classroom roofs. Although this parapet would suffice in Calgary, an even taller parapet would be required in Edmonton given their higher snow loads. For true flexibility in a variety of location we would recommend the roof structure of the modular classrooms be increased so as to be capable of increased snow loading when placed adjacent to a larger structure.

ENERGY DIAGRAM



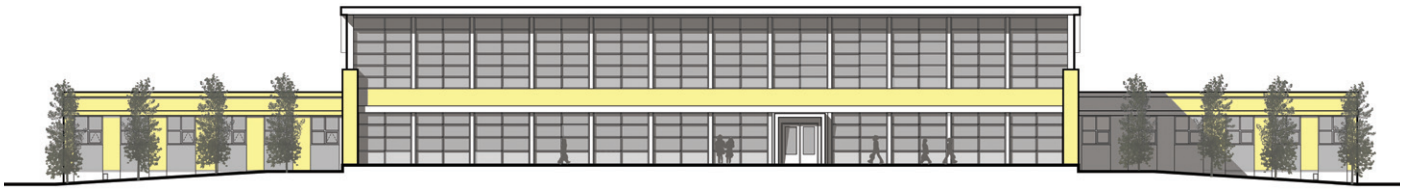
The building has been designed to meet the criteria of LEED gold. We have developed a more aggressive mechanical design option that allows efficiencies making LEED Gold possible. This option appears quite feasible if life cycle costing is factored in. These initiatives include solar-geothermal heating and passive solar heating.

The building form has been designed to exaggerate the benefits of passive solar heating. The south face of the main space has a large amount of glazing to take advantage of solar gain in the winter months. The main building masses have a slope roof to allow for natural convection currents to exhaust warm air through opening vents when solar heating loads are excessive.

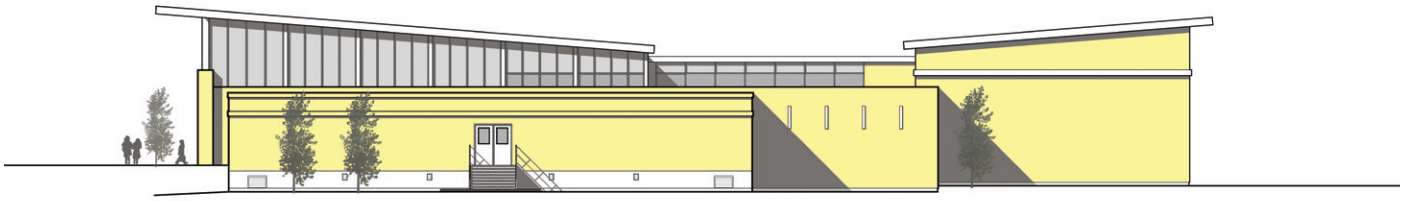
In addition to this, excessive solar gains are controlled through the use of exterior venetian blinds. These blinds will be located on the top two thirds of the south facing window elevation with traditional blinds on the lower windows.

Although the volume of the main space may be higher than a conventional school of this size, it has been designed as to take advantage of passive mechanical mean while at the same time allowing for flexibility in planning. Through the use of a large amount of natural light the electrical consumption will be lower than a typical school of this size as well. Efficiencies in a compact building footprint also help in compensating for the additional building height

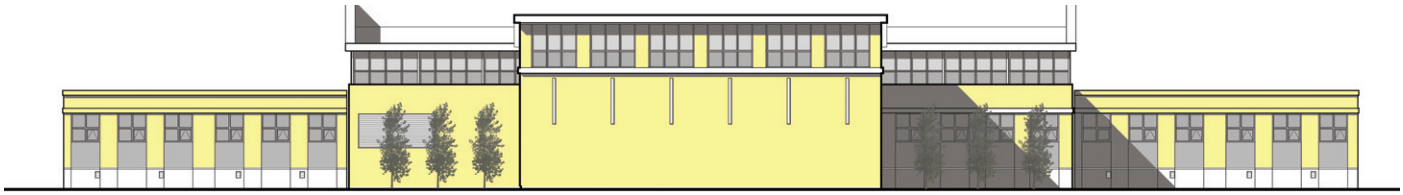
EXTERIOR ELEVATIONS



FRONT ELEVATION



SIDE ELEVATION

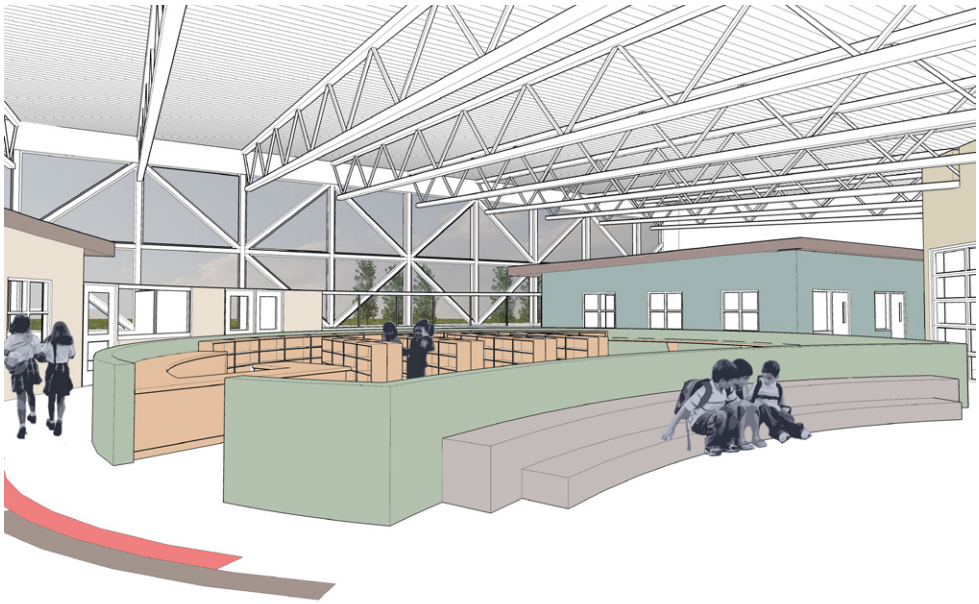


REAR ELEVATION

In designing an alternate option for the exterior elevations we incorporated similar exterior materials with more modernist design principals. The metal cladding has incorporated three colors to help break up the scale of the massing. Dark grey metal cladding has been used to complement the exterior glazing, while a tan colored metal siding is being used to contrast the glazing and the dark siding. Other changes include the addition of a front overhang that extends somewhat further than the previous option. The proposed material pallet for the school core would also be incorporated on the modular classrooms using pre-finished colors. Pre-finished metal break shapes will also be used to break up the bland facades of the modular classrooms.

EXTERIOR PERSPECTIVE

INTERIOR PERSPECTIVES



The interior design of the large central space will be designed by the school district the school is being built for. As this space is wide open a great deal of flexibility will be available to the school district. This coupled with the large amount of glazing facing south will make for a bright, naturally lit space. The sloped ceiling rising towards the large windows will create an exciting dynamic space that then can be subdivided into the required areas to meet the schools programmatic needs.

Dynamic forms and colors can create a dynamic stimulating and exciting space to enhance the educational experience of the students. Wide open areas allow students and teachers to come together in their daily activities as a community. This routine experience of all student and teachers working together in some capacity each and every day fosters and enhances a sense of community within the school.

LEED PROJECT CHECKLIST

LEED Canada-NC 1.0 Project Checklist

Alberta Infrastructure Core School - 300 Capacity

Alberta

Yes	?	No			
8	**1**	**5**	**Sustainable Sites**	**14** Points	
Y			Prereq 1	**Erosion & Sedimentation Control**	Required
Y			Credit 1	**Site Selection**	1
	?		Credit 2	**Development Density**	1
		X	Credit 3	**Redevelopment of Contaminated Site**	1
Y			Credit 4.1	**Alternative Transportation**, Public Transportation Access	1
Y			Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	1
		X	Credit 4.3	**Alternative Transportation**, Alternative Fuel Vehicles	1
Y			Credit 4.4	**Alternative Transportation**, Parking Capacity	1
		X	Credit 5.1	**Reduced Site Disturbance**, Protect or Restore Open Space	1
Y			Credit 5.2	**Reduced Site Disturbance**, Development Footprint	1
Y			Credit 6.1	**Stormwater Management**, Rate and Quantity	1
		X	Credit 6.2	**Stormwater Management**, Treatment	1
		X	Credit 7.1	**Heat Island Effect**, Non-Roof	1
Y			Credit 7.2	**Heat Island Effect**, Roof	1
Y			Credit 8	**Light Pollution Reduction**	1

Yes	?	No			
3		**2**	**Water Efficiency**	**5** Points	
Y			Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1
		X	Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1
		X	Credit 2	**Innovative Wastewater Technologies**	1
Y			Credit 3.1	**Water Use Reduction**, 20% Reduction	1
Y			Credit 3.2	**Water Use Reduction**, 30% Reduction	1

Yes	?	No			
10	**2**	**3**	**Energy & Atmosphere**	**17** Points	
Y			Prereq 1	**Fundamental Building Systems Commissioning**	Required
Y			Prereq 2	**Minimum Energy Performance**	Required
Y			Prereq 3	**CFC Reduction in HVAC&R Equipment**	Required
8			Credit 1	**Optimize Energy Performance**	1 to 10
	?		Credit 2.1	**Renewable Energy**, 5%	1
		X	Credit 2.2	**Renewable Energy**, 10%	1
		X	Credit 2.3	**Renewable Energy**, 20%	1
Y			Credit 3	**Best Practice Commissioning**	1
Y			Credit 4	**Ozone Protection**	1
		X	Credit 5	**Measurement & Verification**	1
	?		Credit 6	**Green Power**	1

Yes	?	No			
6	**1**	**7**	**Materials & Resources**	**14** Points	
Y			Prereq 1	**Storage & Collection of Recyclables**	Required
		X	Credit 1.1	**Building Reuse:** Maintain 75% of Existing Walls, Floors, and Roof	1
		X	Credit 1.2	**Building Reuse:** Maintain 95% of Existing Walls, Floors, and Roof	1
		X	Credit 1.3	**Building Reuse:** Maintain 50% of Interior Non-Structural Elements	1
Y			Credit 2.1	**Construction Waste Management:** Divert 50% from Landfill	1
Y			Credit 2.2	**Construction Waste Management:** Divert 75% from Landfill	1
		X	Credit 3.1	**Resource Reuse:** 5%	1
		X	Credit 3.2	**Resource Reuse:** 10%	1
Y			Credit 4.1	**Recycled Content:** 7.5% (post-consumer + ½ post-industrial)	1
Y			Credit 4.2	**Recycled Content:** 15% (post-consumer + ½ post-industrial)	1
Y			Credit 5.1	**Regional Materials:** 10% Extracted and Manufactured Regionally	1
	?		Credit 5.2	**Regional Materials:** 20% Extracted and Manufactured Regionally	1
		X	Credit 6	**Rapidly Renewable Materials**	1
		X	Credit 7	**Certified Wood**	1
Y			Credit 8	**Durable Building**	1

Yes	?	No			
13		**2**	**Indoor Environmental Quality**	**15** Points	
Y			Prereq 1	**Minimum IAQ Performance**	Required
Y			Prereq 2	**Environmental Tobacco Smoke (ETS) Control**	Required
		X	Credit 1	**Carbon Dioxide (CO_2) Monitoring**	1
Y			Credit 2	**Ventilation Effectiveness**	1
Y			Credit 3.1	**Construction IAQ Management Plan:** During Construction	1
Y			Credit 3.2	**Construction IAQ Management Plan:** Testing Before Occupancy	1
Y			Credit 4.1	**Low-Emitting Materials:** Adhesives & Sealants	1
Y			Credit 4.2	**Low-Emitting Materials:** Paints and Coating	1
Y			Credit 4.3	**Low-Emitting Materials:** Carpet	1
Y			Credit 4.4	**Low-Emitting Materials:** Composite Wood and Laminate Adhesives	1
Y			Credit 5	**Indoor Chemical & Pollutant Source Control**	1
Y			Credit 6.1	**Controllability of Systems:** Perimeter Spaces	1
		X	Credit 6.2	**Controllability of Systems:** Non-Perimeter Spaces	1
Y			Credit 7.1	**Thermal Comfort:** Compliance	1
Y			Credit 7.2	**Thermal Comfort:** Monitoring	1
Y			Credit 8.1	**Daylight & Views:** Daylight 75% of Spaces	1
Y			Credit 8.2	**Daylight & Views:** Views 90% of Spaces	1

Yes	?	No			
5			**Innovation & Design Process**	**5** Points	
Y			Credit 1.1	**Innovation in Design**	1
Y			Credit 1.2	**Innovation in Design**	1
Y			Credit 1.3	**Innovation in Design**	1
Y			Credit 1.4	**Innovation in Design**	1
Y			Credit 2	**LEED® Accredited Professional**	1

Yes	?	No		
45	**4**	**19**	**Project Totals** (pre-certification estimates)	**70** Points

Certified 26-32 points **Silver** 33-38 points **Gold** 39-51 points **Platinum** 52-70 points

fwarchitects
ferrari westwood

A.I. PROJECT RATIOS

Alberta INFRASTRUCTURE & TRANSPORTATION

STANDARD CORE ELEMENTARY SCHOOLS
PROJECT INFORMATION

Project Identification

Project Name: Standard Core Elementary School
300 Capacity
Location: Base Case - Edmonton
School Board: N/A
Architect: Ferrari Westwood Architects

Building Type: School
Project Start Date: N/A
Completion Date: N/A
Market Condition: April 2007 Constant $
Geographic Location Factor: Edmonton Base Rate

Description of Building

Single storey steel structure with metal cladding. Exterior of school core to blend with exterior of modular classrooms. The core primarily consists of a large central space enclosed by a clear span open structure with both smaller independent structures, and free standing walls within. Large south facing windows augment the mechanical system as well as building form which promotes natural ventilation through convection. The large central space provides maximum flexibility while at the same time promoting a sense of community in the school.

Outline Specification

A10 Foundation:
Reinforced concrete foundation walls and spread footings. Foundation depth to suit site conditions.

B10 Superstructure:
Steel deck on open web steel joists or fabricated trusses on steel beams on steel columns

B20 Exterior Enclosure
Metal Cladding on R-20 walls PERSIST wall. Aluminum frame punch windows.

B30 Roofing
SBS or single membrane.

C10 Interior Construction:
Concrete block

C30 Interior Finishes:
Most floors covered in vinyl composite tile. Carpet in library and admin. area. Ceilings are both painted open with acoustical deck and lay in acoustical tile. Walls are painted with some tile areas within washrooms.

D20 Plumbing:
Below Grade Sanitary & Storm System. Low Pressure Gas. Hot & Cold Domestic Water.

D30 HVAC:
Radiant Floor Heating with Displacement Ventilation and Heat Recovery.

D40 Fire Protection:
Not Sprinklered

D50 Electrical:
400 amp, 120/208 volt main service. Data, voice, TV, P.A. and security wiring distributed via cable trays and conduit. Wiring and connections for additional portables included. High efficiency lighting used throughout.

Capital Cost of Permanent Core per m² (April 2007$)

Building Area and Volume

	Core	Built-out
Gross Floor Area:	1720m2	2505.7 m^2
Net Floor Area:	1572 m^2	2296.8 m^2
Volume:	9272 m^3	11 163.5m^3
Exterior Cladding:	1008.1 m^2	1539.1 m^2
Roof Area:	1704 m^2	2437.6 m^2
No. of Stories above grade:	1	1
Modular Classrooms Built Out:	N/A	8

Ratios

	Core	Built-out
Net Floor Area / GFA:	0.91	0.916
Exterior Cladding Area / GFA:	0.59	0.614
Window Area / GFA:	0.135	0.123
Roof Area / GFA:	1.00	0.97

Capacities

Percentage exterior wall glazed:	17%
Soil characteristics:	N/A
Density plumbing fixtures:	23
Heating capacities:	440 KW
Cooling capacities:	None
Ventilation capacities:	1.65 Litres/ Sec/m^2
Lighting intensity:	Classroom - 9 Watts/m2
	Gym - 13 Watts/m2 Corridor - 7 Watts/m2

Floor Area (by Type)

No.	Type	Core	Built-out
	Ancillary Classrooms/CTS	432.6 m^2	432.6 m^2
	Permanent Core Classrooms	0 m^2	0 m^2
	Gymnasium	244.5 m^2	244.5 m^2
	Library	119.5 m^2	119.5 m^2
	Administration/Staff	250.9 m^2	250.9 m^2
	Storage	69.6 m^2	69.6 m^2
	Mech/Elect/Maintenance	71.6 m^2	87.6 m^2
	Circulation	219. m^2	331 m^2
	Other	290 m^2	354 m^2
	Modular Classrooms Built-out	----N/A---	616 m^2
	Gross Floor Area	1697 m^2	2505.7 m^2

fwarchitects ferrari westwood

STRUCTURAL

1. STRUCTURAL DESIGN CRITERIA

The school will be designed to the following criteria (latest Codes and Standards):

- Alberta Building Code
- CAN/CSA A23.3: "Design of Concrete Structures" for limit states design of all building and other concrete structures.
- CSA S304.1: "Masonry Design for Buildings" for limit states and serviceability criteria of masonry components.
- CAN/CSA S16.1: "Limit States Design of Steel Structures" for limit states and serviceability criteria of steel components.
- Snow loading: Ss = 1.6 kPa, Sr = 0.1 kPa
- Wind loading: q(30) = 0.40 kPa
- Soil: lateral pressure and fill over structures in accordance with the geotechnical report.
- Live loads: Floor loads as to "Alberta Infrastructure: Standards and Guidelines for School Facilities".

2. ELEMENTARY SCHOOL

2.1 New Gymnasium

We propose that this will be built with load bearing concrete masonry unit walls on three sides. On the fourth side, to accommodate the windows, the roof will be supported on steel columns. A masonry infill wall will be provided. The walls will be supported on reinforced concrete foundation walls and strip footings.

The span of the roof is significant and we propose to use fabricated steel trusses. The roof deck will be acoustic metal decking. Lateral stability will be provided by diaphragm action in the roof deck and masonry shear walls.

The sloping wall will be framed with steel fixed back to the roof trusses and steel columns.

We propose that the floor will be of concrete slab on grade.

2.2 School Buildings

We propose that these new structures will comprise reinforced concrete foundation walls and spread footings supporting steel columns. The spread footings' founding depth will be adjusted to suit the recommendations of the geotechnical report as well as the actual site conditions.

The roof structure will comprise steel deck on open web steel joists (OWSJ's) or fabricated trusses and supported by steel beams.

Stability of these areas will be provided by vertical steel bracing in column bays.

We propose that the floor will be of concrete slab on grade.

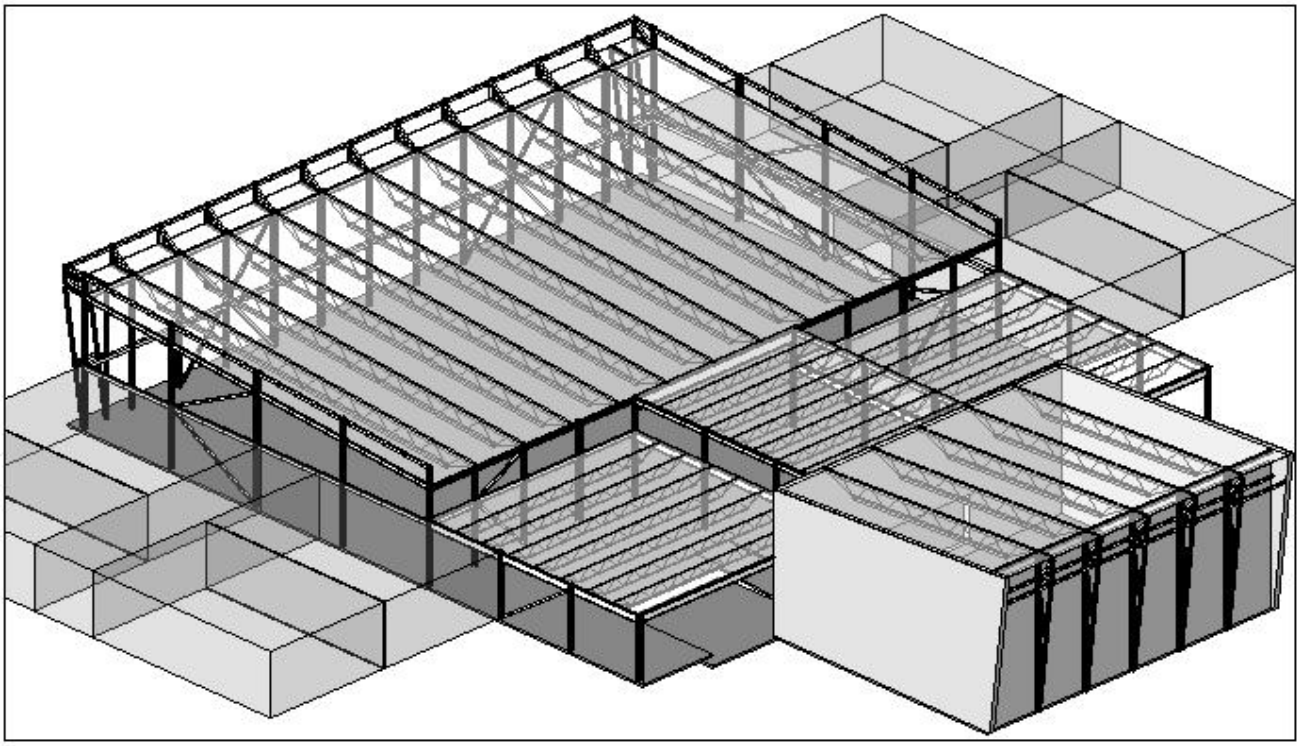
2.3 Modular Classrooms

The modular classrooms will be supported by screw piles if appropriate for the site. This will allow easy removal when the modulars are removed.

A parapet is provided on the main school building to prevent large snow drift loads on the modular buildings.

3. LEED ™ APPROACH

We understand that the design and construction initiative of the school is to achieve a LEEDTM Silver Rating. Earth Tech will collaborate with the Architects, Construction Manager and other consultants to achieve this target. Although the range of structural options are limited, it is desirable to specify construction materials and components that are regionally manufactured, ideally sustainable and possess a measure of recycled content, e.g. partial replacement of cement with supplementary cementitious materials. A high percentage of recycled steel is also required.



MECHANICAL

1. GENERAL

The following report is a summary of the key elements of the mechanical systems for the 300 Capacity Core Elementary School. For additional details, refer to the full design development report.

2. PLUMBING SYSTEMS

2.1 NATURAL GAS

A complete low pressure natural gas distribution system will be provided. Capped connections will be provided for both wings of Modular Classrooms.

2.2 STORM DRAINAGE SYSTEM

Provide a complete storm water drainage system to drain each roof; with a standard flow roof drainage system that is collected below grade and connected to the storm sewer provided by Civil.

2.3 SANITARY DRAINAGE SYSTEM

Provide a complete sanitary drainage system, including waste and vent connections to each plumbing fixture, as well as primed and vented floor drainage throughout.

2.4 POTABLE WATER SYSTEMS (HOT AND COLD)

Service shall be a 150mm combined fire and domestic water. Irrigation water is not being provided off the potable water system. It has been assumed that the irrigation requirements of the site will be met with an alternate source, in order to qualify for LEED Credit 1.2.

High efficiency, natural gas fired hot water tanks will be provided to meet the hot water requirements of the facility. A dual tank configuration will be provided for redundancy. Hot water to be provided at 49°C [120°F] for all uses.

A domestic hot water recirculation system will be provided to ensure instant hot water to the faucets. This is especially important given the low flow characteristics of the faucets. Pump operation is to be scheduled by the Building Automation System.

2.5 PLUMBING FIXTURES

Plumbing fixtures shall be generally as follows; however, the final fixture selection is to be based on the school division constructing the facility:

WC's:	Dual flush (3/6 litre) floor mounted with open front seat on elongated bowls.
Urinals:	Waterless urinals with vitreous china construction.
Lavs:	Self-rimming counter mounted vitreous china with proximity sensor tempered water. Faucets to be ultra-low flow with a maximum of 1.9 lpm [0.5gpm].

Drinking Fountains: Refrigerated barrier free wall hung, of split height design for both children and adult usage. To be provided with R-134a or R-410a refrigerant.

3. FIRE PROTECTION SYSTEMS

3.1 The facility will NOT be sprinkler protected. Supplemental portable fire extinguishers will be provided in accordance with NFPA 10.

4. HVAC SYSTEM

4.1 The School will be divided into two (2) distinct zones: Gym and School. The Gym will be provided with a mixed air displacement ventilation system and a perimeter hot water heating system. The School is to be provided with a displacement ventilation system and a zoned radiant floor heating and cooling system. Supplemental heating will be provided in specific high load locations to maintain optimal slab control by keeping slab surface and supply water temperatures as low as possible.

4.2 The south exposure of the building has been designed to allow for passive heating of the space, in conjunction with day lighting. To minimize the risk of overheating the building due to the large amount of south glazing, external shading and natural ventilation has been incorporated into the design of the south facade. The shading and high level operable vents are automatically controlled by the BMS.

4.3 For the central systems, a condensing boiler plant is to provide the heating of the facility while a dry-cooler will be provided for free cooling of the radiant slabs during the shoulder seasons. The building would be capable of free cooling up to ambient temperatures between 12-18°C [55-65°F], similar to a conventional building.

4.4 There will be no mechanical cooling in the facility, however, slab cooling is possible at night and during cooler outside conditions. In addition to this evaporative cooling of the ventilation air has been incorporated. Additional provisions will be made to allow for the installation of mechanical cooling if desired by the respective school boards. The additional work required is minimal and would include the addition of heat pumps, and their respective circulation pumps, in the mechanical room. The heat pumps would utilize the dry-cooler for heat rejection to provide peak summer cooling and the pre-heat coils provided in the air handling units would be used for cooling of the ventilation air.

5. BUILDING AUTOMATION SYSTEM

5.1 Supply, install and commission complete Building Automation System (BAS). The BAS shall be responsible for all automatic control and monitoring functions of the mechanical system equipment and interfacing with the lighting control systems.

ELECTRICAL

1.0 ELECTRICAL STANDARDS AND GUIDELINES

Electrical design will comply with all applicable standards and codes including the Alberta Building Code, Canadian Electrical Code, IESNA and NFPA.

2.0 INTRODUCTION

The intent of the electrical design for the 300 student Core Elementary School is to provide an energy efficient, flexible, economical and functional system. The electrical systems will be easily adapted to the specific needs of different school districts throughout the Province.

The design will focus on energy efficient methods in compliance with LEED® performance criteria.

3.0 POWER & DISTRIBUTION

3.1 Building Distribution

Power will be provided to the building from a 400 amp, 120/208 volt main service. The main distribution equipment will be located in the electrical room adjacent to the mechanical room. Utility transformers will be located as close as practical to the main electrical service to minimize main service length.

Branch circuit panels will be provided with sufficient circuits to supply the core area. Separate panels will be located close to the modular classroom locations with sufficient circuit counts to accommodate a fully configured school. Conduit and wire will be provided from these panels to the portable classroom power connection points.

Power for computer equipment will be provided with separate neutral conductors. The main distribution will be provided with transient voltage surge suppression to minimize potential damage to the system from external power system faults.

Mechanical equipment will be serviced from a motor control centre located in the mechanical room. Variable frequency drives will be utilized to increase energy efficiency and system effectiveness.

4.0 Interior Lighting - General

Interior lighting systems will be designed to provide a warm and inviting atmosphere. The luminaires will be chosen to reflect the character of the different building areas. The lighting design will optimize performance, efficiency and life cycle cost.

A variety of lighting sources will be utilized including compact fluorescent, T8 and T5 fixtures. Care will be taken to specify fixtures using standard components to ensure long term availability of lamps and ballasts. All lamps will be high color rendering (>85) to enhance architectural color schemes and improve the feeling of the space.

Light levels in each area will comply with IES recommended levels for school facilities.

4.1 Administration Area

Lighting in the administration area will consist of recessed fluorescent fixtures utilizing T5 technology. Light levels will be designed to current IES standards.

4.2 Gathering Area, Library

The unique architecture of these spaces will be highlighted using a mixture of fluorescent linear fixtures, compact fluorescent recessed pot lights and suspended compact fluorescent fixtures.

4.3 Ancillary Areas

Ancillary area lighting methods will be coordinated with the type of ceiling chosen for the individual schools. Open web design will utilize suspended linear fluorescent. T bar ceilings will be illuminated with recessed fluorescent fixtures.

4.4 Washrooms

All washrooms will utilize recessed or wall mounted fluorescent lighting with occupancy sensor control

4.5 Gymnasium

Gymnasium lighting will utilize high output T5 fluorescent technology. The lighting will be controlled from a local switching station which will provide switching for two different levels as well as separate areas. Each fixture will be capable of operating at full or ½ brightness providing even light distribution at each selected level.

4.6 Storage Areas, Housekeeping

These areas will be illuminated with surface mounted T8 fluorescent strip fixtures.

4.7 Mechanical Room

The Mechanical/Electrical room will utilize chain suspended or surface mounted industrial fluorescent strip fixtures.

5.0 Exterior Lighting

The exterior lighting system will be designed to create a secure environment. Care will be exercised in choosing the most energy efficient light sources. Maintenance of the fixtures will be a major consideration and fixtures using easily available lamps and ballasts will be chosen.

The exterior lighting design will use fixtures approved for “dark sky” application to minimize the amount of light spilling into areas where it is not required. LEED requirements for controlling light trespass will be met.

6.0 Lighting Control

All lighting in the facility will be switched using low voltage switching. Multi level lighting will utilize dual ballasts separately switched. Low voltage panels will be interfaced with the BMCS.

Occupancy sensors will be utilized to control lighting in areas where they can be integrated with mechanical controls. Light level sensors will be integrated with the low voltage control system in areas with high natural light levels.

7.0 AUXILIARY SYSTEMS

Auxiliary systems provide the infrastructure to support voice and data communications throughout the facility. As the technology used by these systems is rapidly changing, it is particularly important to provide expandability and flexibility in the system design.

7.1 Data and Voice Cabling

Main system data/voice racks will be located in a server room which will be located in the Administration area. From this room, a network of cable trays will distribute data/voice cabling throughout the facility. Cable tray will run down corridors above T bar ceilings and cabling will distribute from the corridor tray into the classrooms, computer rooms, offices and other areas.

System cabling will be Category 6 for both data and voice. This provides the maximum system flexibility. All patch panels and end devices will be Category 6 certified.

Cable tray runs will be located to provide ease of access to the modular classroom data entry points.

7.2 Security System

An electronic security system consisting of keypads, glass break detection, motion detection and door switches will be installed to discourage unauthorized entrance. The system will be capable of communicating with an external monitoring agency and will provide specifics of the type of alarm and location in the building.

Access control will be provided at the main building access point. Building access will be via proximity readers. The access control system will be integrated with the intrusion alarm system.

Building access lighting (night lights) will be controlled through the building security system. Lights will be normally off. Activation of the access control system will turn the lights on to enable safe passage through the building.

7.3 Intercommunication System

Intercommunication and public address systems will be provided for the school. Administration areas and instructional areas will have wall or desk mounted handsets. There will be a public address system with speakers throughout the school. The telephone, class programming and intercommunication systems will be fully integrated.

A separate sound system will be provided for the gymnasium.

7.4 Clock System

The clock system will utilize wireless technology with time updated via internet or GPS. Clocks will be battery powered with integral antennas to receive updated time settings and transmit confirming data to the central control unit.

8.0 LIFE SAFETY SYSTEMS

8.1 Fire Alarm System

Fire alarm systems will be single stage, microprocessor based, addressable designed to the latest code requirements.

8.2 Exit and Emergency Lighting

Exit and emergency luminaries will be located to meet the requirements of the Alberta Building Code.

8.3 Emergency Power and Lighting

Emergency lighting for the building will be provided from 12 volt DC battery packs with integral or remote heads. All exit fixtures will be connected to the DC battery distribution system.

9.0 COMMISSIONING

Electrical system commissioning will be in accordance with LEED requirements. All system components will be tracked from specification to shop drawings to final installation. Performance of all system components will be tested and documented.

10.0 LEED

As this is a LEED project, Division 16 will be required to meet all requirements for site clean up, waste material disposal, documentation of hazardous materials, etc. Documentation and commissioning in accordance with LEED standards will be a requirement of the contract.