"Helping Build Communities"

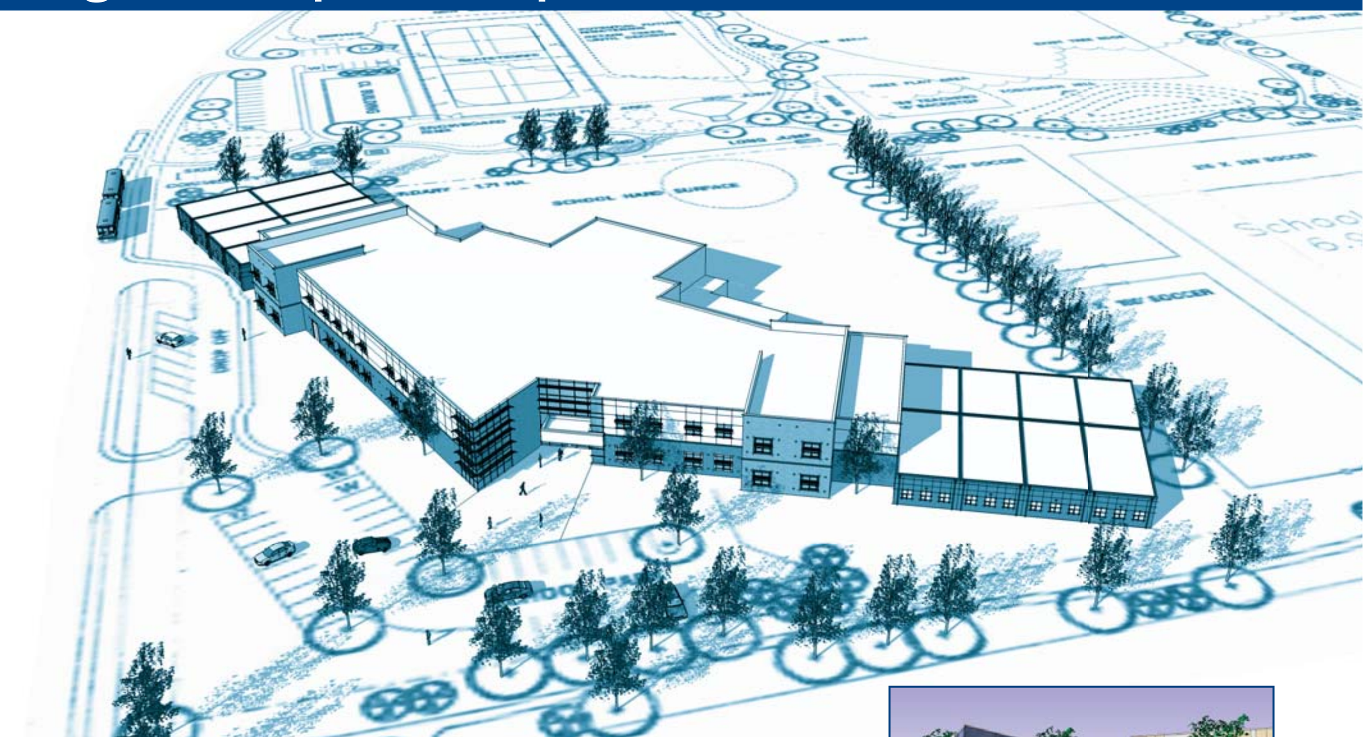
BARR RYDER ARCHITECTS & INTERIOR DESIGNERS

PROPOSED NEW K-9 (900 STUDENTS) CORE SCHOOL

Project No. 27340

Design Development Report

November 12, 2007



Alberta Infrastructure and Transportation

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1.0 INTRODUCTION

In July of 2007, Barr Ryder Architects & Interior Designers and the consultant team were retained by Alberta Infrastructure and Transportation to work with representatives of Alberta Infrastructure and Transportation, a LEED® Specialist and additional consultant team to design a new prototypical 900 student Kindergarten to Grade Nine (K-9) Core School.

The underlying concept for the design of the new prototypical Core School is that the facility is to have a Core building that is designed to accommodate a maximum of 900 students based on the Alberta Infrastructure and Transportation School Infrastructure Manual. The core school design allocates the core functions for the school as permanent construction with all classrooms being modular relocatable units.

In the initial phase of the development of this facility, it was decided that up to 33% of the classrooms are to be included in the allocation for permanent construction, and 16 modular relocatable classrooms have been incorporated into the design, not the full 24.

As part of the minimum mandate for the development of this facility, the Core School is to be designed to achieve a LEED® Silver Certification rating, as a minimum, and will be a leader in institutional sustainable design.

To date the architectural consultant team have been involved in four design workshops with Alberta Infrastructure and Transportation, and the following report outlines the preferred concept resulting from this interactive process.

2.0 ARCHITECTURAL DESIGN

2.1 General

It was determined and unanimously agreed that the most important factor of the design concept of the 900 Core School was that this facility was designed to support the appropriate education of children, ensure their well being, both inside and outside the facility.

As part of the design process, Barr Ryder Architects & Interior Designers established the following philosophical goals as the basis by which the design has evolved.

<u>**Philosophical Goals**</u>

.1 Meet all programmatic and Educational requirements.

.2 The development of the Core School with modular classrooms should be equal to the development of a permanent school.

.3 Develop a central core orientation area with simple circulation systems, establishing clear lines of visibility and orientation for maximization of supervision and security.

.4 Develop a sense of entry at an appropriate student scale.

.5 Maximize community access to the gymnasium.

.6 Allow for potential expansion of the school.

.7 Develop flexible learning and interactive spaces for students, teachers and the community.

.8 Create ability for facility to be separated into wings for appropriate separation of programs as deemed appropriate for the size of the school and age classifications.

.9 Make provision for a variation of design options of components within core.

.10 Simple and cost effective structural, mechanical and electrical systems within the Alberta Infrastructure and Transportation guidelines, including the “persist” wall system.

.11 Incorporation of sustainable design system into the building concept as deemed practical including the maximization of natural lighting and views.

2.2 Building Concept

Given the limitations of the various proposed site areas, it became clear early in the design process that a single storey structure could not effectively meet the objectives of the 900 student Core School. A two-storey solution to the school design would impose a smaller footprint on the site, subsequently allowing more flexibility in the final placement of the facility, and presenting easier incorporation of drop-off areas, staff and visitor parking and playground areas.

A two storey school for a facility of this size obviously creates some accessibility concerns and some supervisory challenges. Accessibility between levels is maintained by ensuring sufficient means of access and egress and an elevator for any potential physically challenged students. The supervisory challenges would be coordinated with the individual school division, however, we believe in the simplicity of the design, given the school administration tools to manage these issues effectively.

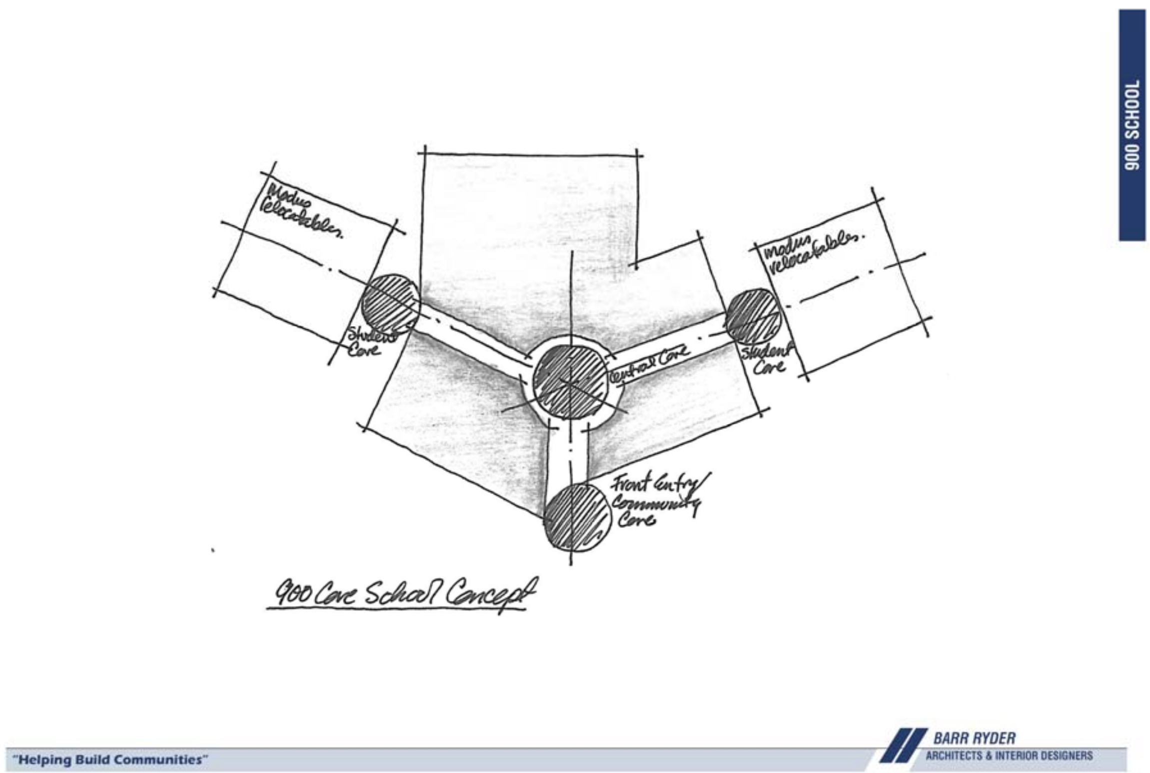
In the evolution of the school concept, it was established that up to eight of the allocated modular relocatable classrooms needed to be included into the permanent core school. The incorporation of the eight modular relocatables not only helped reduce the footprint but also allowed a second floor area to match the main floor thus increasing efficiency.

Also, through the analysis of the new facility and building code review, it was established that not only were firewalls required but the facility is required to be sprinklered. The compartmentalization area constraints without sprinklers were too restrictive to allow appropriate planning of the facility, and it was felt that it could potentially be more cost effective to install sprinklers then add even more firewalls.

The overall school concept establishes a central school core which is entered through the main entrance to the school. From the central core the main public areas are accessible, and two core instructional wings radiate. The modular relocatable classrooms are added at the ends of the core instructional wings, eight per side. The concept for the attachment of the modular relocatable classrooms to the core was to use both Type A and Type B units linked at the ends of each wing. The simple configuration allows each school to stack portables on wings based on individual school populations, and facilitate an appropriate level of flexibility for future demographic changes, at the same time allowing equal access to the schools core functions.

The second floor space planning is similar to the main floor, except the central gathering area is the core and permanent classrooms radiate out from the core. No modular relocatable classrooms are located on the second floor. The educational wings of the school combined with the split floors allows for the maximization of program and grade delineations. Our initial concept has ECS and Division 1 and part of Division 2 on the main floor and Division 3 students on the second floor. Given the number of students and the design, the combination of programmatic variations is extensive.

Generally, the concept for 900 Core School is straightforward, efficient, practical and achieves a balanced educational environment.


900 SCHOOL
Modus Relocatables
Student Core
Central Core
Student Core
Modus Relocatables
Front Entry/Community Core
900 Core School Concept
"Helping Build Communities"
BARR RYDER
ARCHITECTS & INTERIOR DESIGNERS

2.3 Design Development

.1 Site

Based on a typical 4-acre (1.61 hectare) site, Barr Ryder Architects & Interior Designers established the following fundamental site development guidelines:

.1 The orientation of the building should be towards the street:

- Identifiable presence in the community.
- Ease of identification and orientation.
- Clear site lines and visibility for security.

.2 Student access should be from the main road.

- Student safety and site security is paramount.

.3 Student drop off areas for both cars and buses should be directly off the main road.

- Separate drop off areas to be created for both buses and cars.
- A lay by type drop off, reduces the impact of large separate passenger and bus drop off areas.
- There should be limited opportunity for pedestrian traffic to conflict with vehicular traffic.

.4 Student drop off areas to be separated from parking area.

- At no time should students have to cross drive aisles to other parking areas to get to the school.

.5 Student playground areas should be oriented to the rear of the school.

- Playgrounds, play apparatus and sports fields oriented rear of the building to ensure a safe, enclosed area for the students that can be easily controlled and maintained.

Note: It was assumed that the entire site would be enclosed by a 1,500 mm chain link fence with controlled access and egress areas.

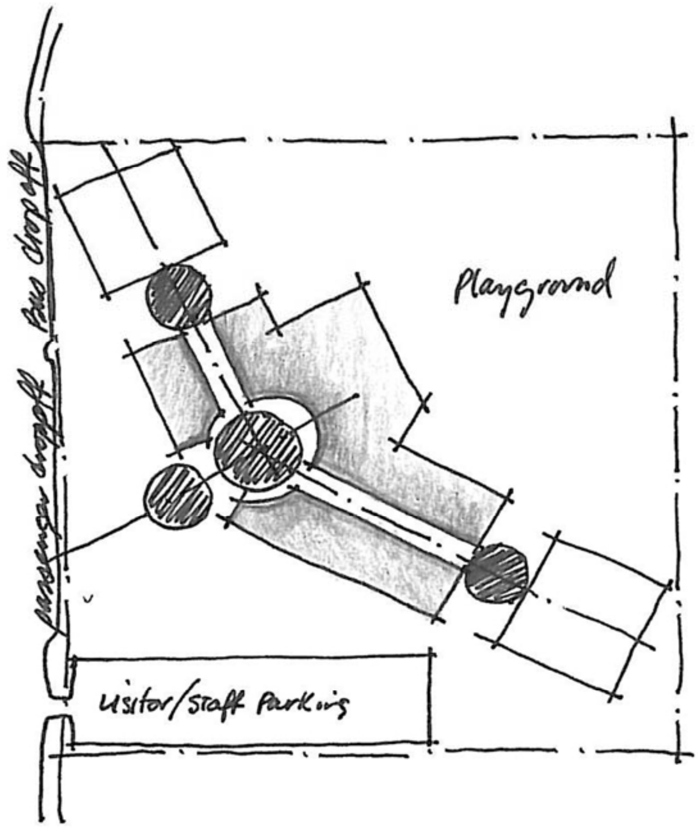
.6 Building orientation for solar patterns is somewhat limited on the generic site, however, each development site will be evaluated on an individual basis.

- Natural light and views, however, are fundamental requirements to the development of this facility.
- Solar shades and/or light shelves can be added to facades for light penetration.

.7 It was also essential to the development of the site that the orientation of the facility would enhance the sense that this new building was part of the community and although a school, the community was welcome.

- A community plaza concept in front of the School.
- Accessible facilities within the School.
- Accessible play structures and sports fields.
- A safe environment for children.

.8 Staff and visitor parking areas would be located away from congested student drop off areas, but adjacent to the school. This location on the site allows for ease of access for staff to the parking areas and the school.



900 Core School - Site Plan

.2 Building

The initial prototype Core School is to be designed based on a total occupancy of nine hundred (900) students. Based on information provided by Alberta Infrastructure and Transportation the total allowable gross area for the Core School should not to exceed 7,417 m².

The programmed areas as provided by Alberta Infrastructure and Transportation outlines that to accommodate nine hundred (900) students the Core School is to include:

- 24 modular relocatable classrooms;
- 2 junior high science classrooms;
- 2 elementary science classrooms;
- 6 ancillary classrooms;
- a gymnasium;
- a library;
- 2 information service areas;
- one CTS lab/classroom;
- an administration area;
- washrooms, and;
- a variety of service and support areas.

A detailed area breakdown for the school is included in “Appendix A”.

All the programmatic, educational and accessibility requirements are to be met in the design of the Core School. Based on several workshops with representatives of up to three school divisions and Alberta Infrastructure and Transportation, some realistic modifications were implemented into the facility to more reflect the actual programmatic needs of this facility. On the recommendation of educators, significant revisions to the school program for the 900 school includes the provision of two ECS classrooms, a second CTS lab/classroom to accommodate food and fashions, the addition of break out areas and a second multipurpose room. As part of the concept for flexibility within the school, we have provided some options for the configuration of the school and break out area. The modified Area Analysis for the 900 Core School is included in the Appendix B. All of the revisions to the programs have essentially been added without the addition of any area to the total gross floor area.

Based on fundamental philosophical goals established for this project the design of the core school is clearly oriented around a central orientation/gathering/focal area. The administration area, gymnasium, ECS suite and library were located off of the central gathering/orientation space for functional access, security and clarity of orientation within the facility.

It was established that it was essential that the administration suite be visually and physically accessible as one immediately enters the school. The centrality of the atrium area and relationship to the core orientation/gathering node not only establishes a sense of welcome, but also reinforces a sense of security and control within the facility. The proposed split wing concept for the school, radiating from the core orientation/gathering node reinforces a high degree of visual and secured access throughout the school.

The gymnasium was oriented on the main entry axis of the school adjacent to the central gathering/orientation node. In the development of a community school, it was established that the gymnasium needs to be easily accessible from the main entry and is reinforced as a major focus for the school and the community.

It was also established early in the analysis of the programmatic requirements for the school, that a second multi-purpose room (Division One) gymnasium area was required to meet the physical education needs of the 900 students. The second gymnasium has been located adjacent to the main gymnasium for ease of access and centralization of programs.

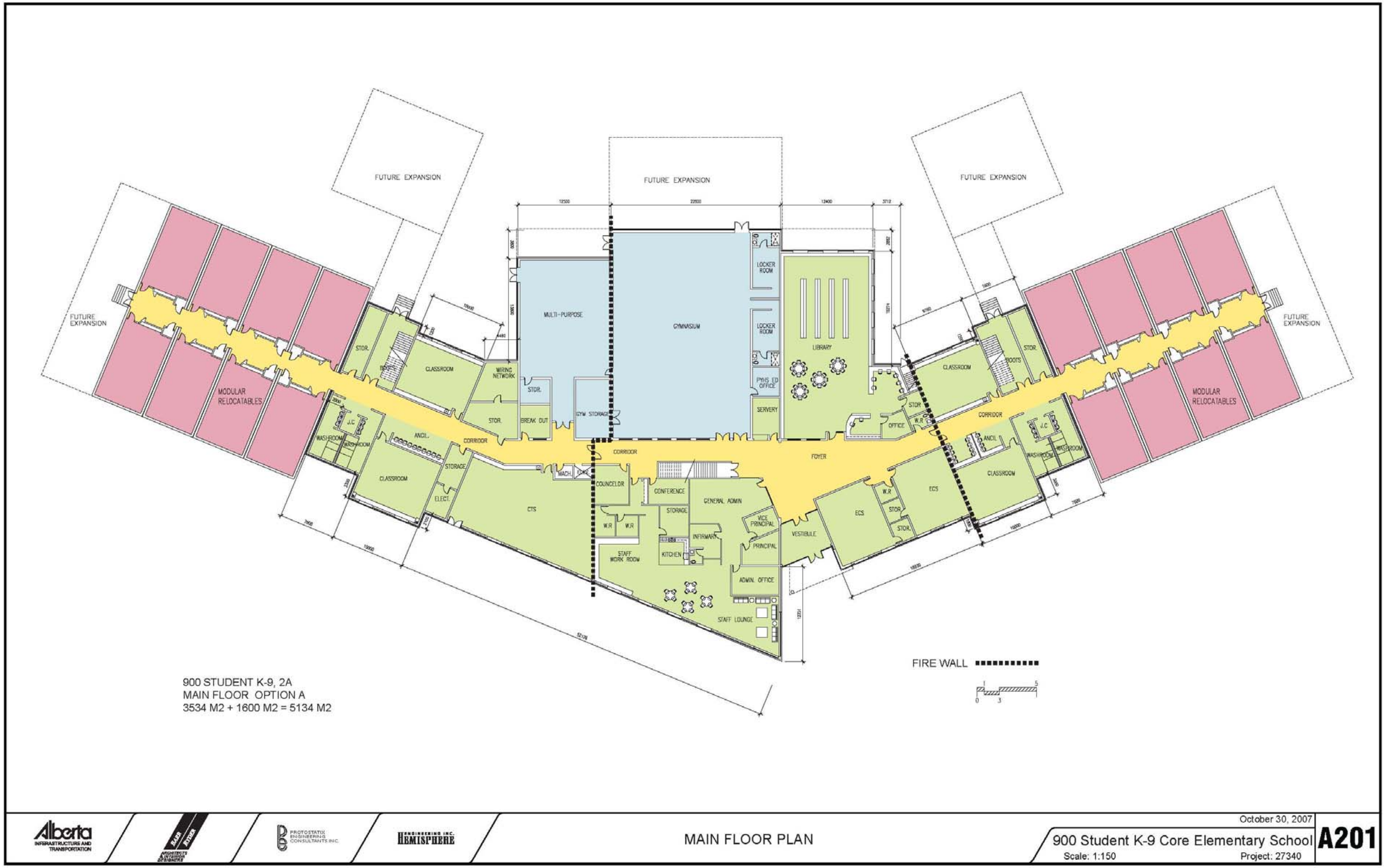
After hour's sports programs and community gatherings were all desired uses for the gymnasium, so central accessibility is critical. It is important in the development of a community school that clear lock off points are established to isolate the gymnasiums for after hours usage. The full sized gymnasium intended to be a two-station gymnasium complete with a retractable divider curtain, and can facilitate a full competitive basketball and volleyball courts, cross-court basketball, volleyball and badminton courts. The smaller multipurpose gymnasium will accommodate activities oriented to the Division One students at the school and could also accommodate less active activities, i.e. scouts, martial arts, theatre, brownies, etc.

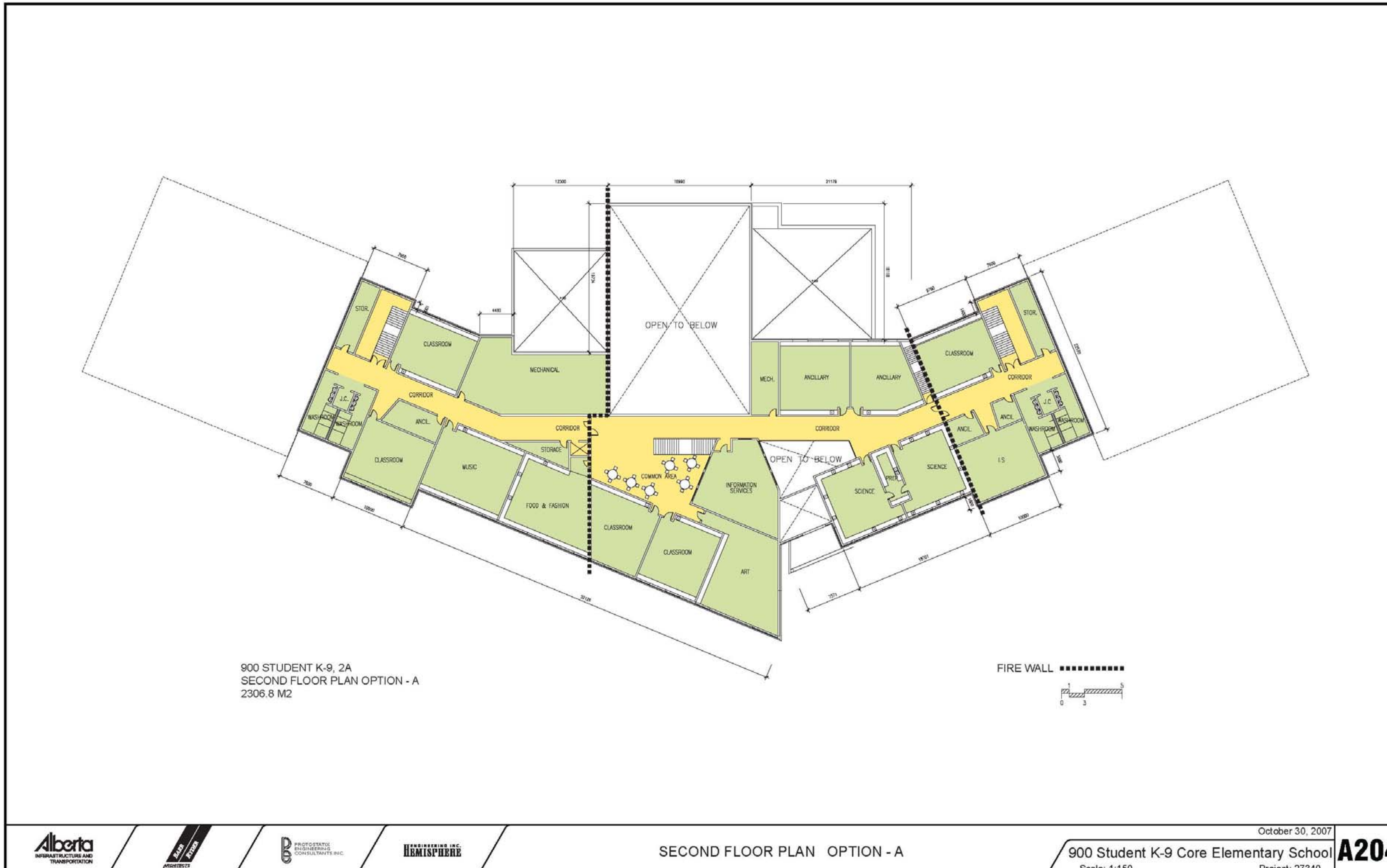
The ECS suite also is centrally located off of the main entrance for ease of access for parents and visibility to the administration suite to ensure the security of the students. A waiting area has also been proposed for parents for the ECS students.

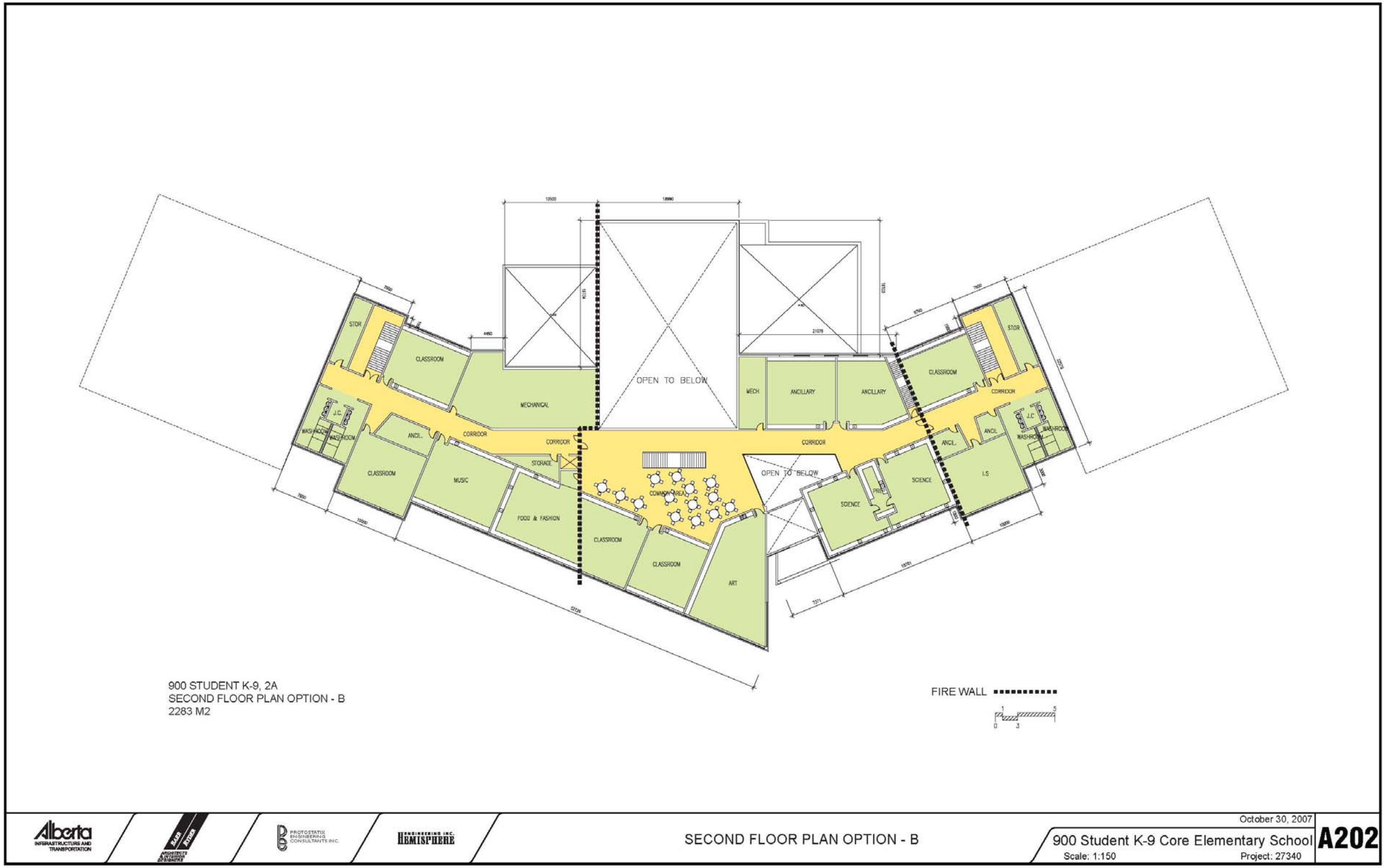
The design of the second floor emulates the main floor and also reinforces the philosophical goals previously outlined. The split between floors effectively assists in the ease of divisional demarcation. Division 3 students have to be located on the second floor along with associated program areas. The balance of the instructional areas would be established based on student population and demographics. It has been assumed that the upper grades of Division 2 students would also be upstairs.

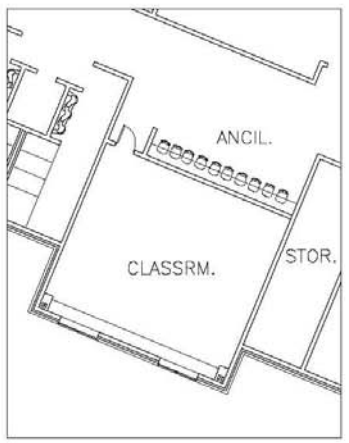
Again the focus for the second floor is a central gathering/orientation node. The permanent core areas radiate from the core node allowing for clear lines of security and control. Three means of access to the second floor have been provided with exit stairs located at each end of the core wings and a convenience store located in the central gathering/orientation node. The second floor is intended to be securely separated from the main floor during after hours operation.

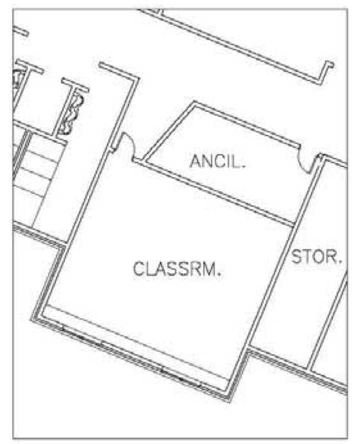
The two permanent main floor wings of the Core School support each pod of modular relocatable classrooms. The wings house the various core areas demanded by the programmatic requirements outlined in the school Infrastructure Manual and as adjusted by the individual school divisions. The modular classroom pods are currently equally split, however the final allocation of modular relocatables will be established based on the population base at each location. Because of the simple groupings of each modular pod, the number and wing location of the classrooms can be modified as the student demographics change.

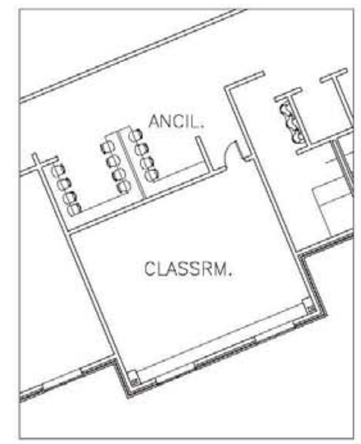

FUTURE EXPANSION
FUTURE EXPANSION
FUTURE EXPANSION
FUTURE EXPANSION
FUTURE EXPANSION
MODULAR RELOCATABLES
MODULAR RELOCATABLES
MULTI-PURPOSE
GYMNASIUM
LOCKER ROOM
LOCKER ROOM
LIBRARY
CLASSROOM
CORRIDOR
FOYER
CTS
ECS
ECS
GENERAL ADMIN
CONFERENCE
STAFF LOUNGE
STAFF WORK ROOM
KITCHEN
INFIRMARY
VICE PRINCIPAL
PRINCIPAL
ADMIN. OFFICE
VESTIBULE
FIRE WALL
900 STUDENT K-9, 2A
MAIN FLOOR OPTION A
3534 M2 + 1600 M2 = 5134 M2
MAIN FLOOR PLAN
October 30, 2007
900 Student K-9 Core Elementary School
Scale: 1:150
Project: 27340
A201

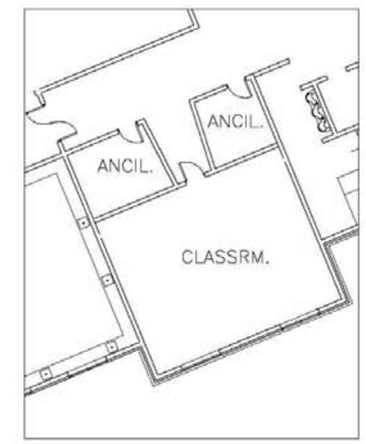

OPEN TO BELOW
MECHANICAL
CLASSROOM
STOR.
CORRIDOR
J.C.
WASHROOM
ANCIL.
MUSIC
STORAGE
FOOD & FASHION
COMMON AREA
INFORMATION SERVICES
ART
MECH.
ANCILLARY
SCIENCE
PREP.
I.S.
900 STUDENT K-9, 2A
SECOND FLOOR PLAN OPTION - A
2306.8 M2
FIRE WALL
SECOND FLOOR PLAN OPTION - A
October 30, 2007
900 Student K-9 Core Elementary School
Scale: 1:150
Project: 27340
A204


OPEN TO BELOW
MECHANICAL
CLASSROOM
STOR
CORRIDOR
ANCIL.
J.C.
WASHROOM
MUSIC
STORAGE
FOOD & FASHION
COMMON AREA
ART
MECH
ANCILLARY
SCIENCE
PREP
I.S.
900 STUDENT K-9, 2A
SECOND FLOOR PLAN OPTION - B
2283 M2
FIRE WALL
October 30, 2007
SECOND FLOOR PLAN OPTION - B
900 Student K-9 Core Elementary School
Scale: 1:150
Project: 27340
A202
Alberta
INFRASTRUCTURE AND TRANSPORTATION
HEMISPHERE









BREAKOUT AREA OPTIONS

October 30, 2007
900 Student K-9 Core Elementary School
Scale: NTS
Project: 27340
A203

.3 Building Scale and Details

As this School is a kindergarten to grade nine (K-9) facility and two storey's, the design team felt it was essential that the new Core School presented a scale that was appropriate to the age group and the community. A two-storey school requires careful delineation of elements and materials to ensure one is not faced with overpowering facades and scale especially for smaller students. Our concept for the treatment of the school was to split materials or colours between floors, maintain a single storey entry element and introduce shading elements that would not only break the massiveness of the façade but also contribute to our LEED® program requirements. As we pass into the facility the significance of the entry and orientation/gathering node is reinforced by a two storey space. All other areas in the school can be scaled down appropriately based on each Division characteristics if desired.

Light and views will also play a significant role in the development of this facility. All teaching and occupied spaces will receive appropriate levels of natural lighting. Exterior windows would be operable for access to fresh air.

Areas like the main entry circulation node/gathering space have been detailed with certain wall glazing to receive a significant amount of light to radiate deep into the heart of the school.

.4 Exterior Elevations Concept

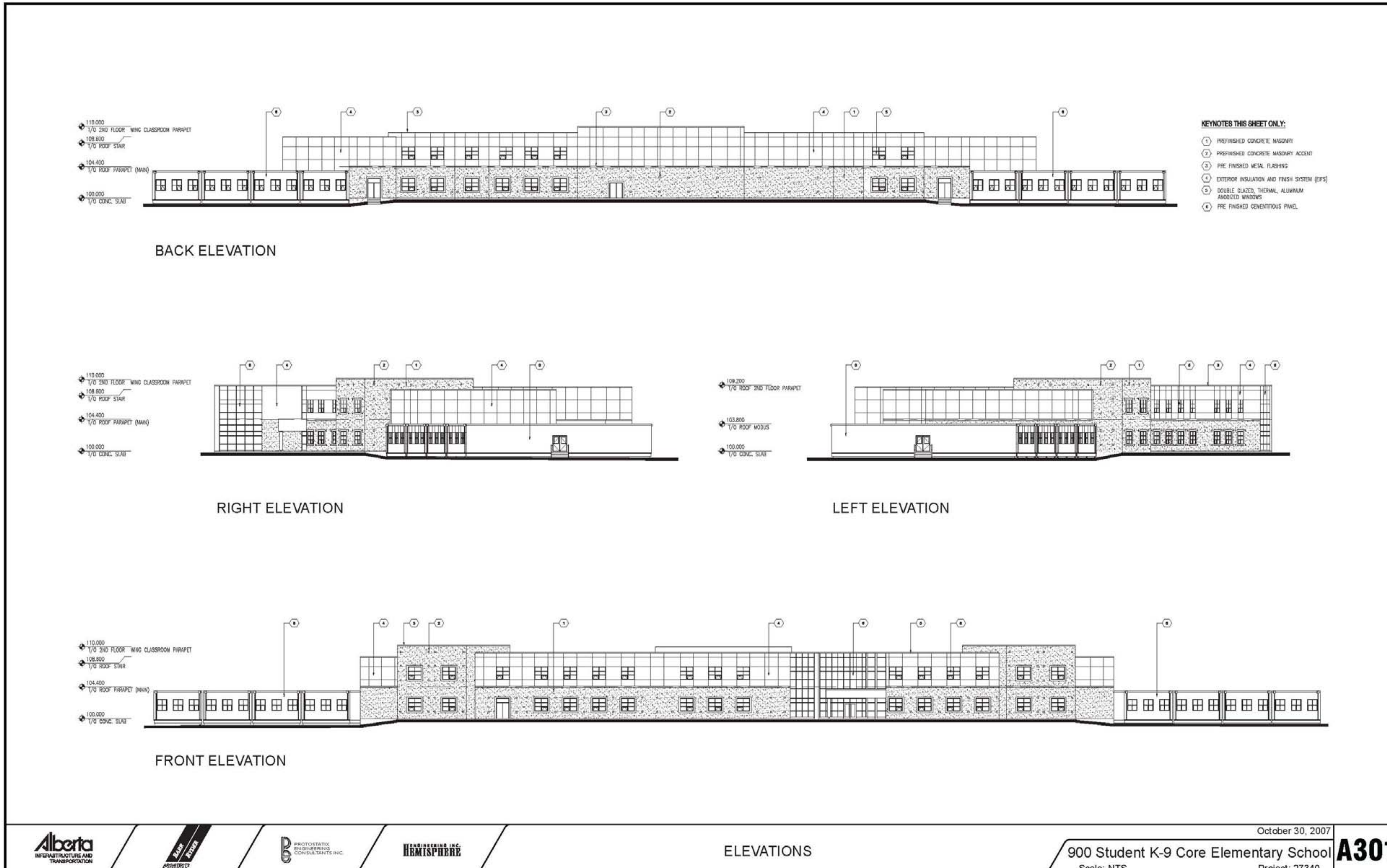
For the design of the two storey Core School, it was felt important that the School reflect a sophisticated level of scaling that would address the three divisions of students in addition to community usage. Colours and materials as mentioned would be used to break the scale of the school, reflect a neighborhood scale, conform to any architectural controls, and personify durability and longevity. A lower scale entrance element not only protects the entry area, but also reduces the scale of the two-storey façade. In our building concept continuous glazing at the edges of the entrance courtyard frame the entrance to the school and are intended to act as a beacon to the community. Continuously lit at night these glazed elements are intended to be way finders and a focus for the community.

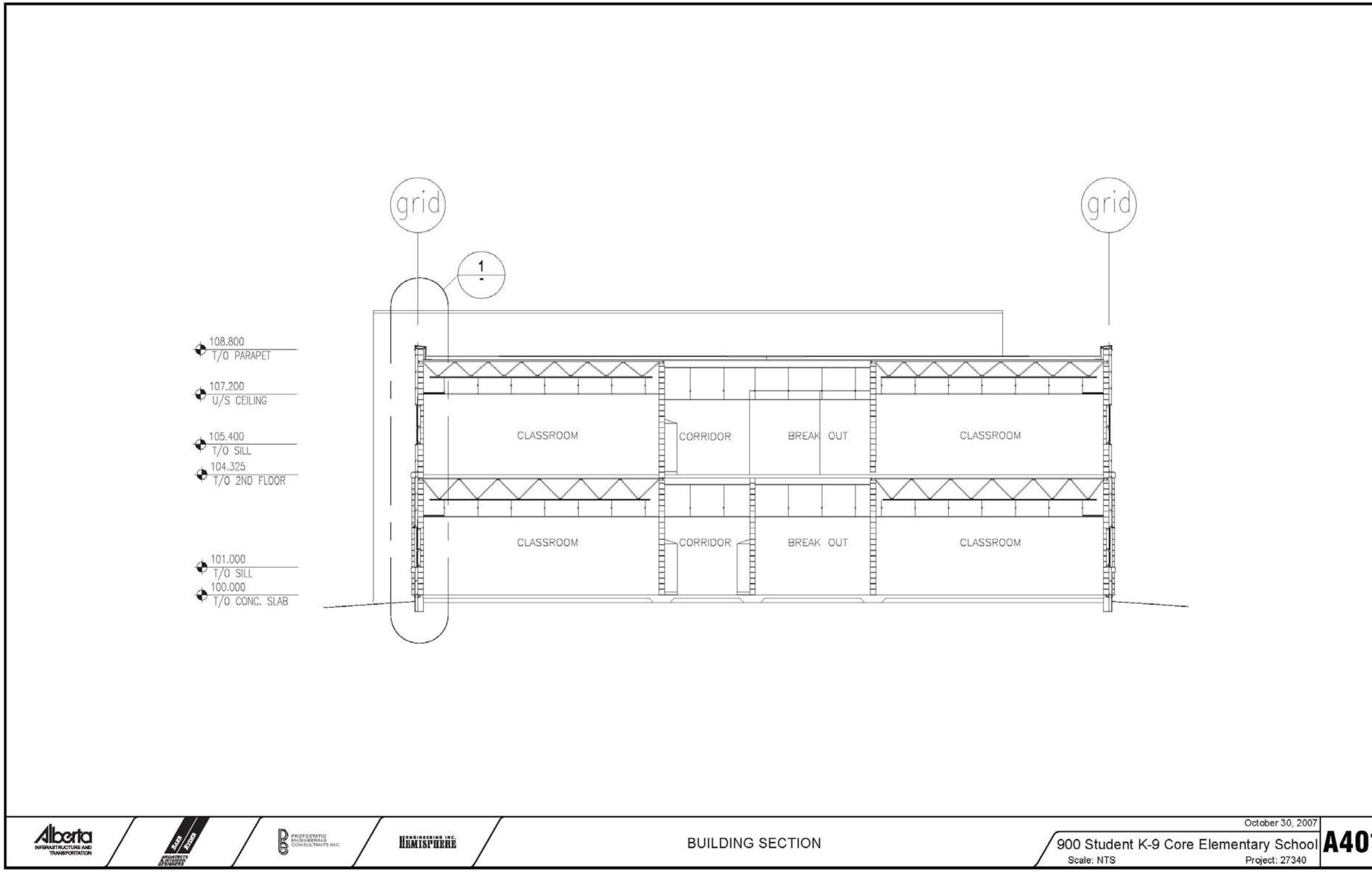
As a minimum, durable masonry materials should be utilized for the first 4.5 meters of the school and alternate approved products can be incorporated into the upper façade of the facility to assist sealing.

The planning and design process have established a school footprint with basic boundaries for development, however, depending upon the community, the school division and any development restrictions, the aesthetics for the school can be varied.

The configuration of the school allows for a variety of entry accents and façade accents along the exterior of the permanent school, including student entrances to the playground areas. Some of these options have been included in this report.

Currently, the modular relocatable classrooms have fairly limited finish options, but can be easily painted or refinished appropriately during the construction process. Our firms building design concept would attempt to use colour and manipulate materials to incorporate the modular units, cohesively with the building design.


BACK ELEVATION
KEYNOTES THIS SHEET ONLY:
1 PREFINISHED CONCRETE MASONRY
2 PREFINISHED CONCRETE MASONRY ACCENT
3 PRE FINISHED METAL FLASHING
4 EXTERIOR INSULATION AND FINISH SYSTEM (EIFS)
5 DOUBLE GLAZED, THERMAL, ALUMINUM ANODIZED WINDOWS
6 PRE FINISHED CEMENTITIOUS PANEL
RIGHT ELEVATION
LEFT ELEVATION
FRONT ELEVATION
Alberta INFRASTRUCTURE AND TRANSPORTATION
PROTOSTATIX ENGINEERING CONSULTANTS INC.
HEMISPHERE ENGINEERING INC.
ELEVATIONS
October 30, 2007
900 Student K-9 Core Elementary School
Scale: NTS
Project: 27340
A301


grid
grid
1
108.800
T/O PARAPET
107.200
U/S CEILING
105.400
T/O SILL
104.325
T/O 2ND FLOOR
101.000
T/O SILL
100.000
T/O CONC. SLAB
CLASSROOM
CORRIDOR
BREAK OUT
CLASSROOM
CLASSROOM
CORRIDOR
BREAK OUT
CLASSROOM
BUILDING SECTION
October 30, 2007
900 Student K-9 Core Elementary School
Scale: NTS
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A401

Concept Option 1

Concept Option 1 Entry

Concept Option 2

Concept Option 2 Entry

2.4 Facility Construction

The proposed new school is to be constructed to meet or exceed the basic requirements for the construction of schools as outlined by Alberta Infrastructure and Transportation.

The overall concept for the development of the construction system for this facility is predicated on the following:

- Ensure durable materials throughout the facility – average 25-year lifespan.
- Ensure easily maintainable products and technology.
- Accessible and clearable surfaces.
- Surfaces to be vandal proof.

The proposed school is to be constructed as a noncombustible building as defined in the Alberta Building Code 1997. The facility is to be subdivided into three compartments separated by a 90 minute ULC rated masonry firewall. Based on requirements outlined by Alberta Infrastructure and Transportation, the proposed facility will not be sprinklered. A more definitive building code review and classification is outlined in Appendix C.

For the purposes of this report the basic construction systems are conceptual only, each individual school board and school location will finalize the construction systems.

Foundations will typically be frost wall and footings or grade beams and piles and the floor construction has been assumed to be reinforced concrete slab on grade, depending upon geotechnical conditions. Exterior and interior load bearing walls are proposed to be lightweight concrete masonry units. A more definitive outline of the structural components is outlined in the structural component of the report.

Interior non-load bearing partitions are specified to be lightweight concrete masonry units. Depending upon the specific school division requirements, a decision to use impact resistant gypsum board and steel stud framed walls to increase flexibility within the school is possible.

Exterior partitions will be constructed as a rain screen (Persist wall), with the interior wythe of the wall being 200 mm masonry block, 90 mm of rigid insulation, air/moisture barrier membrane, 30 mm air space and an exterior wythe of 100 mm masonry. Upper portions of walls (above 4400 mm) may be finished with a drained exterior finish insulation with a similar ‘R’ value as the lower portion of the wall system for cost efficiency. Floor structure will typically be concrete floor on steel deck supported by open web steel joists or concrete beams and columns as deemed necessary. The roof will be constructed to meet the requirements of an ARCA roof system including a two-ply SBS membrane or approved equal, 25 mm protective insulation, 200 mm of rigid insulation will be placed on an air/moisture barrier membrane on sheathing on metal deck and steel trusses. Pre-finished metal flashings and a cement plaster soffit finishes the balance of the construction system. All proposed windows will be thermally broken double glazed aluminum windows complete with low “E” argon, except clerestory windows, are proposed to be an insulated light panel system as manufacturered by Kalwall or equal.

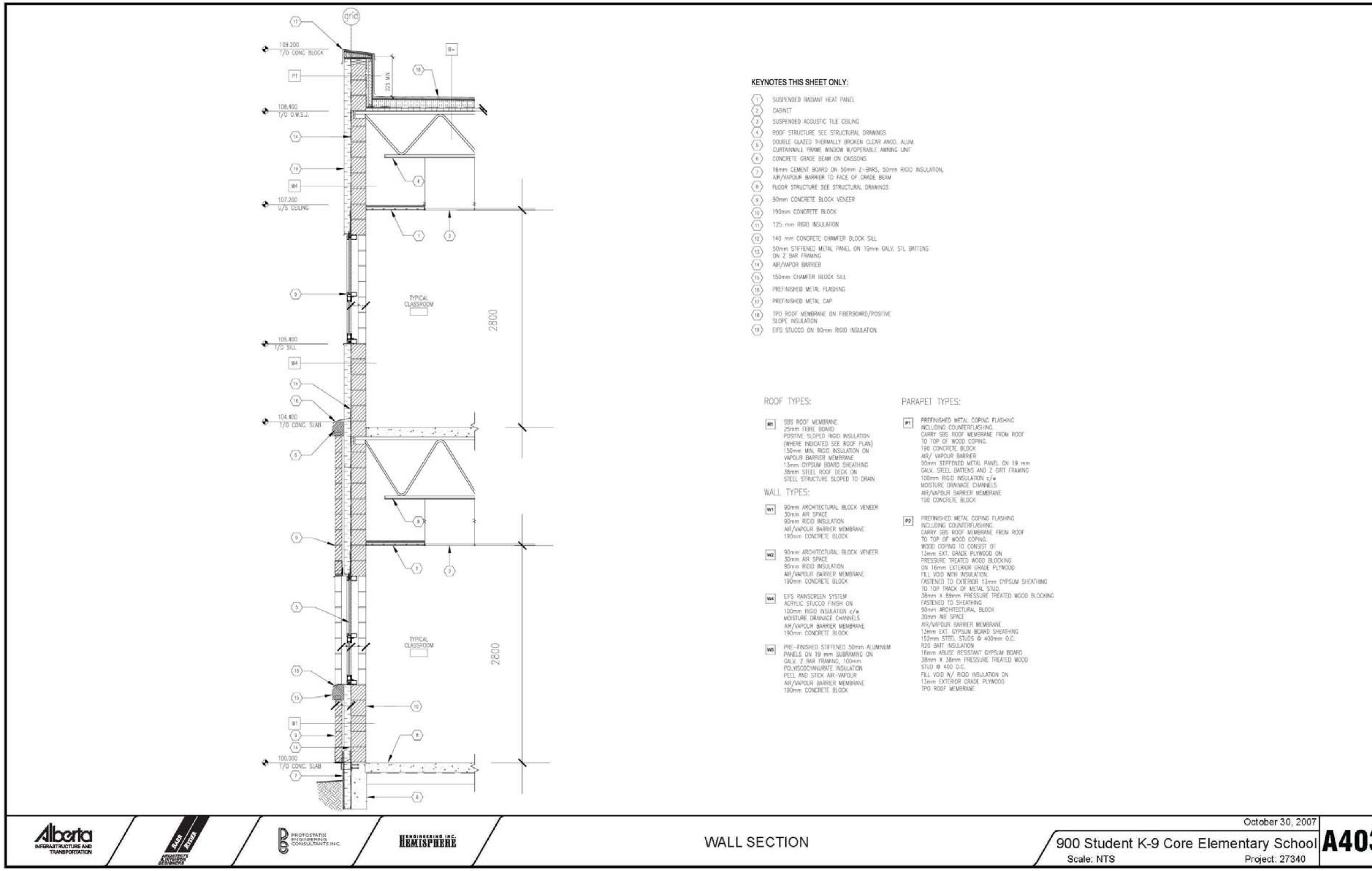
Wall/floor finishes will be selected based on durability and ease of maintenance but would typically include:

- Paint
- Ceramic Tile
- Vinyl Composite Tile
- Resilient Flooring
- Hardwood (gymnasium)
- Carpet
- Rubber Base

A proposed finish schedule has been established as a material guide only, and has been enclosed in Appendix D.

In the development of the building design careful consideration has been made to ensure that the overall building design meets and/or exceeds the parameter by which all provincially funded schools are designed in Alberta.

A complete listing of building Design Ratio's have been calculated and included in Appendix E of this document.


KEYNOTES THIS SHEET ONLY:
1 SUSPENDED RADIANT HEAT PANEL
2 CABINET
3 SUSPENDED ACOUSTIC TILE CEILING
4 ROOF STRUCTURE SEE STRUCTURAL DRAWINGS
5 DOUBLE GLAZED THERMALLY BROKEN CLEAR ANOD. ALUM. CURTAINWALL FRAME WINDOW W/OPERABLE AWNING UNIT
6 CONCRETE GRADE BEAM ON CAISSONS
7 16mm CEMENT BOARD ON 50mm Z-BARS, 50mm RIGID INSULATION, AIR/VAPOUR BARRIER TO FACE OF GRADE BEAM
8 FLOOR STRUCTURE SEE STRUCTURAL DRAWINGS
9 90mm CONCRETE BLOCK VENEER
10 190mm CONCRETE BLOCK
11 125 mm RIGID INSULATION
12 140 mm CONCRETE CHAMFER BLOCK SILL
13 50mm STIFFENED METAL PANEL ON 19mm GALV. STL BATTENS ON Z BAR FRAMING
14 AIR/VAPOR BARRIER
15 150mm CHAMFER BLOCK SILL
16 PREFINISHED METAL FLASHING
17 PREFINISHED METAL CAP
18 TPO ROOF MEMBRANE ON FIBERBOARD/POSITIVE SLOPE INSULATION
19 EIFS STUCCO ON 90mm RIGID INSULATION
ROOF TYPES:
R1 SBS ROOF MEMBRANE
25mm FIBRE BOARD
POSITIVE SLOPED RIGID INSULATION
(WHERE INDICATED SEE ROOF PLAN)
150mm MIN. RIGID INSULATION ON
VAPOUR BARRIER MEMBRANE
13mm GYPSUM BOARD SHEATHING
38mm STEEL ROOF DECK ON
STEEL STRUCTURE SLOPED TO DRAIN
WALL TYPES:
W1 90mm ARCHITECTURAL BLOCK VENEER
30mm AIR SPACE
90mm RIGID INSULATION
AIR/VAPOUR BARRIER MEMBRANE
190mm CONCRETE BLOCK
W2 90mm ARCHITECTURAL BLOCK VENEER
30mm AIR SPACE
90mm RIGID INSULATION
AIR/VAPOUR BARRIER MEMBRANE
190mm CONCRETE BLOCK
W4 EIFS RAINSCREEN SYSTEM
ACRYLIC STUCCO FINISH ON
100mm RIGID INSULATION c/w
MOISTURE DRAINAGE CHANNELS
AIR/VAPOUR BARRIER MEMBRANE
190mm CONCRETE BLOCK
W5 PRE-FINISHED STIFFENED 50mm ALUMINUM
PANELS ON 19 mm SUBRAMING ON
GALV. Z BAR FRAMING, 100mm
POLYISOCOYANURATE INSULATION
PEEL AND STICK AIR-VAPOUR
AIR/VAPOUR BARRIER MEMBRANE
190mm CONCRETE BLOCK
PARAPET TYPES:
P1 PREFINISHED METAL COPING FLASHING
INCLUDING COUNTERFLASHING.
CARRY SBS ROOF MEMBRANE FROM ROOF
TO TOP OF WOOD COPING.
190 CONCRETE BLOCK
AIR/ VAPOUR BARRIER
50mm STIFFENED METAL PANEL ON 19 mm
GALV. STEEL BATTENS AND Z GIRT FRAMING
100mm RIGID INSULATION c/w
MOISTURE DRAINAGE CHANNELS
AIR/VAPOUR BARRIER MEMBRANE
190 CONCRETE BLOCK
P2 PREFINISHED METAL COPING FLASHING
INCLUDING COUNTERFLASHING.
CARRY SBS ROOF MEMBRANE FROM ROOF
TO TOP OF WOOD COPING.
WOOD COPING TO CONSIST OF
13mm EXT. GRADE PLYWOOD ON
PRESSURE TREATED WOOD BLOCKING
ON 16mm EXTERIOR GRADE PLYWOOD
FILL VOID WITH INSULATION.
FASTENED TO EXTERIOR 13mm GYPSUM SHEATHING
TO TOP TRACK OF METAL STUD.
38mm X 89mm PRESSURE TREATED WOOD BLOCKING
FASTENED TO SHEATHING
90mm ARCHITECTURAL BLOCK
30mm AIR SPACE
AIR/VAPOUR BARRIER MEMBRANE
13mm EXT. GYPSUM BOARD SHEATHING
152mm STEEL STUDS @ 400mm O.C.
R20 BATT INSULATION
16mm ABUSE RESISTANT GYPSUM BOARD
38mm X 38mm PRESSURE TREATED WOOD
STUD @ 400 O.C.
FILL VOID W/ RIGID INSULATION ON
13mm EXTERIOR GRADE PLYWOOD
TPO ROOF MEMBRANE
TYPICAL CLASSROOM
2800
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Alberta INFRASTRUCTURE AND TRANSPORTATION
HEMISPHERE
WALL SECTION
October 30, 2007
900 Student K-9 Core Elementary School
Scale: NTS
Project: 27340
A403

2.5 Leadership in Energy and Environmental Design (LEED®)

As part of the design teams mandate for the development of the 900 Core School, the proposed new school should meet or exceed the LEED® requirements to achieve LEED® Silver Certification.

To achieve LEED® Silver Certification, the design team has committed to the following design strategies based on the green building rating system. A completed LEED® Checklist has been included in Appendix F.

Sustainable Sites (SS)

.1 Erosion and Sedimentation Control
Prerequisite 1

The design team intends to adopt an erosion and sediment control plan for the project site during construction. Strategies may include temporary and permanent seeding, mulching, earth dikes, silt fencing, sediment traps and basins.

.2 Site Selection
Credit 1 (1 point)

Although there has been no specific site selected for the proposed school, it is felt that the design team in conjunction with the Owner would ensure the following:

- Preference given to sties that do not include sensitive site elements and restrictive land types.
- Minimization of building footprint to minimize site disruption.

.3 Alternative Transportation
Credit 4.1 (1 point)

As it is anticipated that the proposed sites are urban sites, the design team is confident that public transportation will be available in the vicinity of the school. In addition, a certain percentage of the students will be bused to the site.

.4 Alternative Transportation - Bicycle Storage and Changing Rooms
Credit 4.2 (1 point)

It is the intention of the design team to incorporate bicycle racks and showering/changing facilities into the design of the school.

.5 Reduced Site Disturbance – Protect or Restore Open Space
Credits 5.1 and 5.2 (2 points)

During the development of the site, natural trees and vegetation are to be incorporated into the design. Clearly marked construction boundaries are to be established and maintained during construction and all damaged areas of the existing site are to be restored.

.6 Storm Water Management - Rate and Quality
Credit 6.1 (1 point)

The design team will evaluate the potential for incorporation of this Credit into the design based on site selection.

.7 Heat Island Effect – Roof
Credit 7.2 (1 point)

The incorporation of an ENERGY STAR® highly reflective, and high emissivity roof for at least 75% of the proposed schools roof is a priority to the design team.

.8 Light Pollution Reduction
Credit 8 (1 point)

The design team intends to eliminate light trespass from the building and site to improve night sky access and reduce the developments impact on the nocturnal environment.

Water Efficiency (WE)

.1 Water Efficient Landscaping
Reduce by 50% - Credit 1.1 (1 point)

Overall the landscape design is intended to utilize all indigenous species and reduce or eliminate irrigation requirements. The use of high efficiency irrigation systems or the utilization of storm water or grey water for irrigation will be evaluated on a per project basis.

.2 Water Use Reduction
30% Reduction – Credits 3.1 & 3.2 (2 points)

The design team will employ strategies that will maximize water efficiencies within the building to meet or exceed 30% less potable water use. Strategies include the use of high efficiency fixtures and fixture sensors.

Energy and Atmosphere (EA)

.1 Fundamental Building Systems Commissioning
Pre-Requisite 1

As part of the requirements for the development of this project the engagement of a commissioning authority and the adoption of commissioning plan are to be included in the bidding documents. A commissioning report will be prepared at the end of the project.

.2 Minimum Energy Performance
Pre-requisite 2

The design team will design the school to ensure the building complies with A/SHRAE/IESNA Standard 90.1-1999 (without amendments) or 10% better than MNECB. Overall the building envelope and systems are to be designed to maximize energy performance.

.3 CFC reduction in HVAC and refrigeration equipment and elimination of halons
Pre-requisite 3

All HVAC and refrigeration equipment specified for the project will not use any CFC refrigerants and thus reduces ozone depletion.

.4 Optimize Energy Performance
Credit 1 (4 points)

The design team will propose energy systems for the school that will achieve up to 30% reduction in design energy cost based on ASHRAE/IESNA 90.1-1999.

.5 Ozone Protection
Credit 4 (1point)

All HVAC and refrigeration equipment specified for the school will not contain HCFC's.

.6 Measurement and Verification.
Credit 5 (1 point).
The building is to be designed with equipment to measure energy and water performance.

Materials and Resource (MR)

.1 Storage and Collection of Recyclables – Prerequisite 1

.2 Facilities needed for the appropriate collection at recyclables are to be provided in the school.

.3 Construction Waste Management
Divert 50% from landfill – Credit 2.1 (1 point)

As part of the bidding documents the contractor will be required to implement a waste management plan. The waste management plan will identify strategies to ensure that at least 50% of construction and land cleaning waste is recycled or salvaged.

.4 Recycled Content
15% (Post consumer + ½ Post Industrial) – Credit 4.2 (2 points)

As part of the bidding documents the design team and contractor is to identify and confirm a minimum 15% goal for recycled content materials.

.5 Regional Materials
10% extracted and manufactured regionally – Credit 5.1 (1 point)

The design team intends to specify a minimum 10% of construction materials or products for which at least 80% of the mass is extracted, processed and manufactured within 800 km (500 miles) of the project.

.6 Durable Building

The design team will select Durables products and materials for installation into the building that exceed the design service life as established in Table 2 in CSA S478-95 (R2001) – Guideline on Durability in Buildings.

Indoor Environmental Quality (EQ)

.1 Minimum IAQ Performance
Pre-requisite 1

The design team intends the IAQ Performance of the building to exceed the requirements of (Sections 4, 5, 6 and 7) ASHRAE 62-2001.

.2 Environmental Tobacco Smoke (ETS) Control
Pre-requisite 2

Smoking will be prohibited in the building.

.3 Carbon Dioxide (CO_2) Monitoring – Credit 1 (1 point)

The school building will be designed with carbon dioxide sensors integrated into the building automation system (DDC).

.4 Ventilation Effectiveness
Credit 2 (1 point)

The HVAC system and building envelope is to be designed to optimize air change effectiveness including displacement ventilation and operable windows.

.5 Construction IAQ Management Plan
During Construction – Credit 3.1 (1 point)

During the course of construction the general contractor will adopt an IAQ management plan to protect the HVAC system during construction, control pollutant sources and interrupt contamination pathways.

.6 Construction – IAQ Management Plan
Testing Before Occupancy – Credit 3.2 (1 point)

It is the intention of the design team to immunize indoor air quality problems resulting from the construction process to help sustain the comfort and well being of construction workers and building occupants.

.7 Low Emitting Materials

Low-VOC materials are to be specified in construction documents and VOC limits are to be clearly outlined for sealants and adhesives.

.8 Low Emitting Materials
Paints and Coating – Credit 4.2 (1 point)

Low-VOC paints and coatings are to be specified in construction documents and VOC limits are to be clearly outlined for paints and coatings.

.9 Low Emitting Materials
Carpet – Credit 4.3 (1 point)

Low-VOC carpet products and systems are to be specified in construction documents and VOC limits are to be clearly outlined for carpets and related systems.

.10 Low Emitting Materials
Composite Wood and Laminate Adhesives

Wood and agri-fiber products and laminating adhesives specified on the school project will contain no added urea-formaldehyde.

.11 Indoor Chemical and Pollutant Source Control
Credit 5 (1 point)

In the design development process separate exhaust and plumbing systems are to be designed into the building for room with contaminants to achieve physical isolation from the rest of the building.

.12 Thermal Comfort
Compliance – Credit 7.1 (1 point)
Monitoring – Credit 7.2 (1 point)

The design team intends to provide a thermally comfortable environment that will support the productivity and wellbeing of the occupants of the school and comply with ASHRAE Standard 55-2004, Thermal Comfort Conditions for Human Occupancy, and provide a monitoring system to ensure compliance.

.13 Daylight and Views
Views for 90% of Spaces – Credits 8.188.2 (2 points)

The design team intend to ensure that at least 90% of all regularly occupied space achieve a direct line of sight to vision glazing.

Innovation and Design Process (ID)

.1 Innovation and Design – Credit 1 (1 point)

The design team believes that the Core School Concept and other design and maintenance strategies developed for the school will result in a minimum of one point for innovation and design.

.2 LEED® Accredited Professional
Credit 2 (1 point)

At least on principal, participant of the project team will have successfully completed the LEED® Accredited Professional exam.

3.0 STRUCTURAL DESIGN

3.1 Structural Systems

This section describes the recommended overall structural systems proposed for the 900 Core School in Edmonton, Alberta and the applicable building code requirements that govern the design.

Structurally, our challenge is not only to look at the building as a static structure, but to also be concerned with how the building might evolve as occupant needs change, or how it will accommodate the rapid growth of information technology, and to ensure that the structural systems chosen is flexible to accommodate those future changes.

These issues are as important as the structural design of the building itself and become an important factor when choosing the structural system of the building.

The structural systems for the 900 Core School have also been developed to be economical, and responsive to the architectural requirements for the building within the framework of environmental sustainability.

In choosing the structural systems for the 900 Core School, emphasis was given to the following items.

.1 Safety

- The design of all structural systems will meet or exceed all applicable CSA Standards, thus providing a safe environment for its occupants for years to come.

.2 Economically Responsible

- With the current economical conditions in Edmonton, preference will be given to structural systems that are widely available, thus minimizing the risk of labour shortage.

- Budget reviews and comparisons with the Architect and Owner will be made throughout the design stage to ensure the economical goals set for the project.

.3 Functionality

- The main structural components chosen are masonry walls and structural steel. Masonry walls other than their excellent capability as structural elements, provide a durable low maintenance surface as well as excellent acoustic values. Structural steel framing is an excellent structural system that can be custom designed to meet the Architect’s strict requirements for vibrations and deflection specifications.

.4 Durability

- Structural systems have been chosen to reduce on-going maintenance costs.

.5 Green Design

- Preference has been given to structural materials with high recycled material content.

3.2 Design Requirements

The structural systems will be capable of sustaining the following loading requirements:

Main Floor:	Dead Load	=	1.0	kPa
	Live Load	=	4.8	kPa
Second floor:	Dead Load	=	4.2	kPa
	Live Load	=	2.4	kPa
Library:	Live Load	=	7.2	kPa
Mechanical Room:	Dead Load	=	4.2	kPa
	Live Load	=	7.2	kPa
Roof Structure:	Dead Load	=	1.2	kPa
	Live Load	=	1.0	kPa
	Snow Load	=	1.46	kPa + Snow Drift
	Important Factor (I_S)	=	1.15	

Appropriate snow piling will also be incorporated into the roof design due to difference in roof heights.

The structural design will incorporate the actual anticipated loads in the various designated areas, which are unique to the building occupancy, and all equipment loads will be individually considered.

3.3 Lateral Load Resistant Systems

The main lateral load resisting elements of the building will be designed using the following parameters:

.1 Wind

- Reference Hourly Wind Pressure 1/50 0.45 kPa
  Important Factor (I_W) 1.15

.2 Earthquake

- Peak Ground Acceleration 0.059

- 5 % Damped Spectral Response Acceleration Values, Sa(T)
  - Period = 0.2 s Sa(0.2) = 0.12
  - Period = 0.5 s Sa(0.2) = 0.056
  - Period = 1.0 s Sa(0.2) = 0.023
  - Period = 2.0 s Sa(0.2) = 0.008

- Site Class As per geotechnical report recommendation

- Acceleration Based Site Coefficient (Fa) Site Class dependent

- Velocity-based Site Coefficient (Fv) Site Class dependent

- Importance Factor (I_E) 1.3

- Force Modification Factors
  - Structural Steel Brace Frames 1.5
  - Concrete Masonry Walls 1.5
  - Cast-In-Place Concrete Walls 1.5

3.4 Design Criteria

The structural design will be in accordance with the following codes and standards:

- Alberta Building Code 2006
- National Building Code 2006
- Structural Steel Design CAN/CSA-S16-01
- Reinforced Concrete Design CAN/CSA-A23.1 / A23.2 / A23.3
- Engineering Masonry Design CSA-S304.1

3.5 Construction Materials

The following materials will be utilized for the 900 Core School.

.1 Concrete

	Minimum Compressive Strength at 28 days (MPa)
• Foundations	35
• Conventional slab-on-grade	30
• Walls	35
• Toppings	30
• Masonry Corefills	20

- Air entrainment will be used for concrete exposed to the atmosphere or cast against the ground.

- Type GU hydraulic cement will be used for all concretes, unless noted otherwise in the geotechnical report.

- Grade 400 reinforcing steel conforming to CAN/CSA-G30.18-M92 will be specified for reinforced concrete.

.2 Steel

- Structural steel will conform to the requirements of CAN/CSA-G40.20 / G40.21-04. Grade 350W steel will be used for W-Shapes and hollow structural sections. Grade 300W steel will be used for other structural shapes and plate.

- Open web steel joists in accordance to CAN/CSA-S16-01.

- Metal decking in accordance to CAN/CSA-S136-01.

.3 Masonry

- Masonry block will confirm to the requirements of CSA-A371-04.

3.6 Foundation System

Even though there has been no recent geotechnical evaluation for the proposed sites, based on our experience in the Edmonton area, it would appear that concrete footings supporting a continuous foundation wall should be an acceptable foundation system. If concentrations of soluble sulphates are present in the soils, Portland Cement Type 50 will be utilized.

3.7 Main Floor

A reinforced cast-in-place concrete floor on grade will be provided for the main floor.

The floor will consist of 130 mm reinforced concrete slab unless noted otherwise by the soils report, resting on compacted 150 mm clean well-graded granular base over native clay till soils below.

Cast-in-place concrete structural supported floors will be provided for all exterior concrete stoops at doorways and any other areas, which may be designated as “sensitive to movement”.

3.8 Second Floor

The second floor structure will consist of 125 mm reinforced concrete topping over 38 mm composite steel deck, supported by a series of steel joists on top of load bearing masonry walls.

3.9 Mechanical Room

The floor system for the Mechanical room will consist of 125 mm thick reinforced concrete topping acting composite with 38 mm steel decking, supported by steel beams.

Utilization of steel deck and joists becomes feasible and economically viable due to multiple units, where the repetitive use of standard components manufactured in a factory may be fully utilized.

This system has excellent structural rigidity and at the same time provides fire resistance, sound control, durability, low maintenance and rapid construction, thus eliminating any unwanted construction waiting periods.

3.10 Roof System

The roof structure over the new school will consist of a combination of steel deck supported by steel joists, beams, and steel trusses.

Exposed steel trusses will be utilized to support the roof over the gymnasia, as well as above the Atrium, the library, the woods lab and in the foods and fashion lab areas.

3.11 Wall System

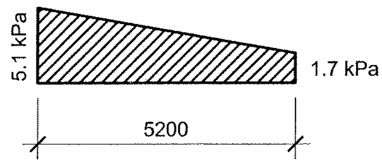
Load bearing masonry walls will be utilized to support the roof and mezzanine structures. Masonry walls will consist of either 200 mm or 300 mm, reinforced concrete block walls.

Masonry walls other than their excellent capability as structural elements, provide a durable low maintenance surface for long time. All exterior masonry walls will be insulated as required.

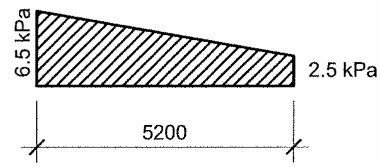
3.12 Site Construction Overview

Pre-fabrication of structural members combined with speed of erection saves valuable overall construction time. Pre-fabricated steel joists, beams, and steel deck are manufactured and precut to length while foundations and site work proceed at the same time, allowing delivery and erection from truck to structure on a precise and predetermined construction schedule. Once installation of the precut members is underway, construction of the roof will proceed shortly afterwards, thus reducing unwanted construction schedule delays.

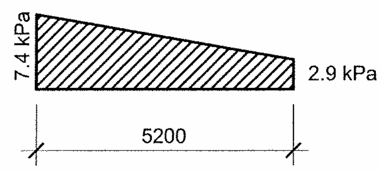
MODULAR CLASSROOM SNOW PILING FOR 900 CORE SCHOOL



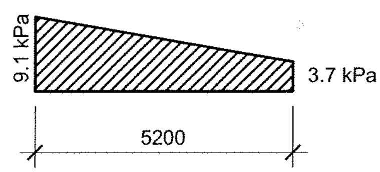
AREA WITH GROUND SNOW LOAD (Ss) = 2.0 kPa



AREA WITH GROUND SNOW LOAD (Ss) = 2.9 kPa



AREA WITH GROUND SNOW LOAD (Ss) = 3.5 kPa



AREA WITH GROUND SNOW LOAD (Ss) = 4.5 kPa

4.0 MECHANICAL DESIGN

4.1 Introduction

The 900 student capacity Standard Core School project consists primarily of two major components of work. These phases of work are the development of:

- Core facility areas which are centrally located in the complex including:
- Administration/ staff area
- Washrooms and common areas
- Storage area
- Wiring network
- Circulation
- Flexible space – student gathering
- Gymnasium, gymnasium storage and physical education office
- Ancillary rooms
- Science labs/classrooms
- CTS lab/classroom
- Mechanical and electrical areas
- Any other areas required by the program

This component of work will involve the development of new spaces to satisfy growing demand for instructional capacity.

Modular classroom expansion surrounding the core of the school to allow for growth in a number of students and class sizes.

From a mechanical systems and services perspective, this project will involve the installation of new infrastructure for the new facility, as well as the extension of essential services to serve the added modular classrooms.

4.2 Overview

The scope of mechanical work for the core space includes heating, ventilation, plumbing, fire protection and control systems sufficient for effective and reliable facility operations. The goals and objectives of the mechanical design are:

.1 To provide a design that meets the Client’s needs as defined by the program, and by communication in design meetings.

.2 To provide a design within the budget allowed for this work.

.3 To provide a design that is generally consistent with the current A.I. technical standards and guidelines that relate to facilities of this nature.

.4 Provide a sustainable, efficient and functional system for the facility which is consistent with LEED® performance criteria.

.5 The mechanical design will comply with the current *Alberta Building Code* (2007) and all applicable Provincial and Municipal Codes. Good quality mechanical systems will be used throughout the project. ASHRAE will be used as a guide to establish criteria for heating and ventilation system design.

.6 System design will reflect a prudent blend of life cycle cost considerations including capital costs, utility consumption costs and simple straightforward systems that can be understood and operated in an effective manner. Consideration will be given to providing accessibility for maintenance. Canadian products will be specified wherever possible to facilitate easy replacement of parts.

4.3 Fire Protection and Life Safety

All systems shall satisfy the latest building code and NFPA requirements.

The building will be fully sprinkled to NFPA 13 regardless of combustibility. In general protection levels will be to Light Hazard with Ordinary Group 1 and Group 2 Occupancies unless otherwise directed by the ‘Authority having jurisdiction’. The sprinkler system will be wet pipe quick response system. For locations where potential freeze conditions are possible such as vestibules, dry heads will be provided.

Extinguishers will be distributed in recessed cabinets, consistent with *Alberta Building Code* requirements.

4.4 Site Service Utilities

New storm and sanitary services are to be provided based on the generic site plan. Lines will be connected to Municipal utilities. The site will be subject to local Guideline requirements. Storm water ponding may be required in new green space adjacent to the new facility for storm water retention where local Municipal requirements mandate this need.

A new gas service will be provided as required to suit the building loads as well as loads for future modular, portable classrooms.

4.5 Plumbing Systems

All new plumbing systems are to be of the latest design and of the highest degree of water consumption efficiency. The washroom layout and fixture count to be reviewed for code compliance and adequate to satisfy future space planning. Ultra low flow urinals will be utilized as a sustainable design measure, along with ultra low flush toilets as a further water conservation measure. Barrier free accessible layout and fixture replacement will be necessary to accommodate new building functions. New lavatories, trim and sinks are proposed along with water conserving faucet sets with the intent of achieving the highest potential LEED® Water Efficiency (W.E.) credit.

Plumbing fixtures will be selected consistent with program requirements and in close communication with Client and the Architect.

Domestic water piping, sanitary water piping, storm and plumbing vents will be networked throughout the building back to the service connections and mechanical plant. Site work is required in terms of service connections, depending upon location and depth of new site service connections.

Domestic hot water for the facility is to be provided by individual high efficiency water heaters installed in the mechanical room. A small domestic hot water recirculation pump will be provided to ensure availability of hot water throughout the facility.

All domestic hot, cold and recirculation piping will be thermally insulated for energy conservation. Domestic hot, cold and recirculation piping will be extended to all fixtures. Domestic hot water will be generated for distribution at 54°C.

Reduced pressure backflow preventer assemblies will be provided consistent with the *National Plumbing Code* requirements.

A system of sanitary drains and venting will collect sanitary waste and will transfer effluent to the Municipal sewer system. The primary connection point will be a sanitary manhole in the adjacent site prior to termination in the municipal service.

Storm water will ultimately be directed to a municipal storm water system. Consideration is being given to a storm water retention system. Storm water may be collected by a system of roof drains and catch basins.

4.6 Heating Systems

Design Criteria

Space Use	*Indoor Design Temp.*	*Indoor Relative Humidity*	*1% ABC Outdoor Design Temp. + 10% (Edmonton, AB)*
Classsrooms, Administration & General Office Space:			
- Occupied	22°C	15%	-37°C
- Unoccupied	18°C	N/A	-37°C

Heating system for the building will be a combination of perimeter baseboard heating, and/or passive radiant heating panels suspended from the structure. These perimeter elements will be of a 2-pipe configuration. The perimeter panels will be controlled in concert with air system functions for the building.

The orientation of the heating system will be as follows:

- Two hot water high efficiency heating boilers will be situated in the mechanical room. One exchanger will be provided for the air system glycol heating loop.

- For the respective heating loops, hydronic circulating pumps, expansion tanks and accessories will be installed locally in the mechanical room.

- A network of insulated reversed return hot water supply and return lines running to heating risers and mains will distribute heating water to the facility.

- Radiant panels will be zoned on an exposure basis. Each zone will be controlled by thermostats and valves with individual room control where appropriate.

- Entrance unit heaters will be ceiling or wall mounted in vestibules and entryways to allow for offsetting of infiltration at door entrances.

- The proposed system will provide the occupants with a high level of thermal comfort with a passive and quiet delivery of low grade radiant energy to the building structure. This system will afford the appropriate level of zoning and controls to suit space requirements.

4.7 Cooling Systems

Design Criteria

Space Use	*Indoor Design Temp.*	*Indoor Relative Humidity*	*2.5% ABC Outdoor Temp DB/WB (Edmonton, AB)*
General Common Spaces			
Administration	26°C	N/A	29/10°C N/A 2%
Computer Classrooms	24°C	N/A	29/19°C N/A

Mechanical cooling for the entire facility will not be provided. Where essential, cooling for the project will be by way of Dx split systems or dedicated cooling only AC units. The orientation of the cooling system will be as follows:

- Computer or high heat load rooms will be fitted out with either ductless split units or dedicated cooling units such that cooling can be managed effectively with either free cooling or mechanical cooling as heat loads require. Hub rooms and server rooms will be managed with unitary cooling unit sized for the equipment loads. For the respective rooms, equipment will be installed locally in the mechanical room or otherwise serviceable location.

- Classroom and administration air systems would be designed to allow for free cooling for spaces as outdoor conditions permit, however no mechanical cooling is planned. The air systems are intended be used in concert with operable windows to provide for occupant comfort in summer months.

4.8 Ventilation Systems

Design Criteria

System	*Minimum People O/A. (CFM per person)*	*Minimum Space O/A (CFM per person per sq.ft.)*
Administration/ General	5	0.06
Classrooms	10	0.12

*Exhaust rate from toilets will be minimum 2 CFM/ft². Air supply to facility will make up this volume or 20 CFM per person, whichever is greater.

The main building ventilation systems will consist of two indoor air system situated in the mechanical room and mezzanine. The classroom and office area systems will be designed with the premise of providing displacement ventilation at reduced air change rates, and with higher proportions of outdoor air such that fan energy consumption and duct sizes can be reduced. The gymnasium system will utilize duct mounted 'drum style' diffusers and will draw return/ exhaust through the washroom/change rooms. These systems will temper the outdoor air to supply the occupied spaces though duct risers and low level supply grilles. All systems will be equipped with return fan, isolation dampers, filter bank, glycol heating coil supplied from the heat exchangers, enthalpy wheel or heat pipe, and a draw-through supply fan. All components will be selected for a life expectancy 30 years based on ASHRAE standards.

Ventilation to the classroom areas will be an 100% outdoor air, displacement ventilation system to supplement the operable windows in the building. This distribution system would supply air around the perimeter of each floor to afford the minimum ventilation supplied to the spaces. *Alberta Building Code* requirements will establish the minimum level of mechanical ventilation.

Ventilation to the office and administration areas will be 100% outdoor air supplied from overhead and returned at low level in order to ensure that the LEED® Ventilation Effectiveness credit is obtained.

All air systems will be utilizing enthalpy wheel heat recovery systems on the facility exhaust air streams to improve operating efficiency and will serve to preheat the outdoor air for the new ventilation systems for the building.

Air systems will be equipped with variable temperature with space temperature feedback to reset the discharge air temperature. Air delivery to classrooms and offices will be constant volume during occupancy and reduced volume during non occupancy utilizing an occupancy sensor or scheduled. Air systems will be designed to use 100% outdoor air and will provide free cooling when outdoor conditions permit.

Gas fired steam grid humidifiers will be utilized to provide humidification during the winter months in the classroom/office air systems. Humidifiers will be mounted in the mechanical rooms or air systems.

Air system filtration on all units shall be two stage and meet MERV 13 for LEED® compliance and air quality control.

4.9 Exhaust Systems

Exhaust system for washrooms in the building consist of a network of exhaust ductwork connected to the primary exhaust fans. The exhaust requirement be in compliance with *Alberta Building Code*. Exhaust systems will also be provided for photocopier areas as well as lunch/kitchenette areas and specific science classrooms

Representative areas which will be equipped with ducted exhaust systems to fans will be as follows:

- Science labs.
- Washrooms, change rooms and janitor rooms will be exhausted at the rate of 2 CFM/sq.ft. as required by Code.
- Storage areas will be exhausted at the rate of 1 CFM/sq.ft.
- Servery areas will be exhausted as dictated by the exhaust hood design.

4.10 Insulation

.1 General

Piping, equipment and sheet metal work with surface temperatures greater or less than surrounding air temperature will be insulated to control heat transfer and condensation. Insulation shall meet minimum *MNEBC* requirements.

.2 Piping

- Insulation on piping systems will include:
- Heating water.
- Glycol systems.
- Domestic hot, cold and recirculation.
- Roof drains and a portion of pipe near roof.
- Plumbing vents near roof.

.3 Ductwork

- Insulation on duct systems will include:
- Outside air ducts/plenums.
- Supply ducts carrying conditioned air.
- Exhaust/relief ducts near louvers.
- Acoustic treatment where required.

4.11 Humidification Systems

Humidity control will be provided for the core building only. It has been suggested that a minimum amount of humidity control be provided by using a gas fired steam injection humidifier in the air systems to maintain a minimum of 15% humidity in the building during the winter months.

The steam generators proposed for the air systems will be factory assembled and shipped as a complete unit and will be utilized to generate low pressure steam for distribution to humidifier grids in air handling systems.

The relative humidity will be variable, dependent on outside air conditions above 5°C. Humidity will be added only to the -up air systems; not to individual rooms.

4.12 Controls

The proposed system of room temperature control is simplistic and affords a reasonable level of temperature control. It is recommended that this system be DDC based, and flexible to function and expandability.

.1 Central Plant Control

The direct digital control system will operate fan systems, heat exchangers, cooling plant, heating plant and all monitoring and alarm functions. Features will include:

.1 Software to optimize system operation and start/stop scheduling for unoccupied temperature setback.

.2 Smart standalone processing unit in the mechanical space linked to an operator's terminal with colour CRT, printer, keyboard interface, telephone modem for remote monitoring and interface.

.3 Software to optimize energy efficient operation including:

- Precise control operation through PID (proportional/integral/ derivation) logic.
- Schedule water temperature with outdoor air temperature to limit heat losses from piping distribution.
- Space temperature and weather profile feedback to anticipate supply air temperature settings on air system.

.2 Space Temperature Control

Room thermostats, one in each control zone will control space temperature by modulating a control valve on the hot water radiant panel.

4.13 Energy Conservation Measures in Mechanical Systems

Due to the high volume of air that will be exhausted from classrooms, heat recovery will be incorporated into the air system operation.

Minimum 85% efficient boilers will be used.

High efficiency fan and pump motors will be specified. Heating piping and domestic water piping will be insulated.

DDC control of systems will enable exhaust fans and ventilation air units to shut down during unoccupied periods. An unoccupied space temperature setback system will be incorporated to lower room temperatures. On night cycle, the fan systems will be off and room temperatures will be maintained at night setting by the hot water heating system. Controls in the ventilation supply system will allow reset of the mixed air temperature to minimize the amount of air tempering.

Use of “heat wheel” or “heat pipe” heat recovery technology is being utilized for the primary expansion as an energy savings option.

4.14 Executive Summary

The proposed development of the facility is driven by an optimal balance of comfort and efficiency. The intent is to provide a sustainable and environmentally conscience system design for the facility, the following highlights are considered:

- Improvements to plumbing facilities and fixtures to improve water use efficiency and functionality.

- Improvements to heating systems for control and heat distribution management to ensure blanket coverage or exterior zones.

- Addition of mechanical cooling systems in the form of unitary systems where supplemental cooling is required.

- Addition of heat recovery systems to reduce outdoor air heating loads.

- Ventilation systems improvements to ensure low level displacement ventilation air is accurately and unobtrusively delivered to occupied spaces which can be further enhanced by use of operable windows.

- Improvements to life safety systems to meet minimum Code requirements.

- Addition on minimal humidification control for the building of occupant comfort.

5.0 ELECTRICAL DESIGN

5.1 Introduction

The following Electrical Design Report describes briefly the electrical systems proposed for the 900 Core School and Modular Schools, and are based on the Alberta Infrastructure Standards Core Elementary School Facilities, and the current edition of the Alberta Building Code, Canadian Electrical Code, and all Provincial and Municipal Codes.

The electrical design shall include features to minimize and control energy consumption consistent with LEED® performance criteria.

5.2 Power Service and Distribution

Service will be provided underground from a utility company network to a pad mounted transformer located adjacent to the building. From this transformer, an underground 120/208 volt, 3 phase, 4 wire secondary power service will be provided to the electrical distribution centre located in the main electrical room.

We propose to provide a new 1200 amp 120/208V, 3 ø, 4 wire service complete with:

- 1200 amp, 3 pole main branch
- TVSS unit
- Utility current transformer section; utility meter
- Integrated digital meter
- Moulded case thermal/magnetic breaker for control of branch circuit panels
- Exact service size to be confirmed during detail design.

Branch circuit panels will be located throughout the School to most effectively serve the various areas of load concentration.

Power, data, security, sound, and fire alarm will be provided for in the corridor serving the modular classrooms.

5.3 Telephone Service and Distribution

An underground telephone service (100 mm conduit) from TELUS facilities off site will be provided, it will be located in the same trench as the power service. This service will terminate in the computer networking room. An additional 100 mm conduit will be provided for Supernet cable.

A cable tray system will be provided through the school to serve outlets in offices and classrooms. The tray will extend down the corridor serving the modular classrooms.

5.4 Duplex Receptacles

Duplex receptacles will be provided throughout all areas of the school for convenience of the staff and for ease of operation of the facility. Special consideration will be given to such areas, Science rooms and auxiliary spaces to ensure that sufficient duplex receptacles are provided to meet the special requirements of those areas.

The exact location and quantity of duplex receptacles in all areas will be determined with equipment layouts.

5.5 Car Park Receptacle

Car park receptacles will be provided in the parking lot. Receptacles will be mounted in pre-manufactured posts which can be readily removed for maintenance and/or replacement.

These receptacles will be controlled from the mechanical BMCS system.

5.6 Lighting

Fluorescent lighting will be the primary source of illumination throughout the school with incandescent and compact fluorescent lighting used in selected areas for display and feature lighting for architectural elements or as a means of changing the aesthetics of an area.

The primary light fixtures will be a 610 mm by 1220 mm with recessed refractor lensed fluorescent luminaire for the school. Energy efficient T5 and T8 lamps and electronic ballast will be used in order to reduce energy consumption.

Gymnasium luminaires will be surface mounted. The luminaires will be equipped with energy efficient T5/HO lamps and electronic ballast.

All lighting in classroom/office will be controlled using line voltage switching. Corridors and gathering areas will be centrally controlled, using low voltage switching. Multi-level control will be provided for in all classrooms and will allow illumination levels to be varied with changing tasks. Daylight sensors will be provided for controllability of fluorescent lighting and will adjust the level of light automatically with the amount of natural light within the classroom.

Exterior site lighting will be provided at exits, pedestrian walkways and throughout parking areas, and will be controlled by motion sensors.

Site lighting will be designed to the illumination levels a set forth by the Illuminating Engineering Society of North America.

All exterior lighting will be Dark Sky compliant.

Selected light fixtures within corridor will be controlled from the security key pad to turn lights on during non-operational school hours to allow personal travel.

Occupancy sensors will be utilized in storage, washrooms and electrical/ mechanical rooms.

Daylight sensors will be incorporated to reduce illumination levels in high ceiling areas taking into account the natural light level.

Lighting design will be such as to achieve less than 1 watt per sq.ft. for lighting power density.

5.7 Lighting Types and Areas

Gymnasium Luminaires: pendant/surface mounted totally enclosed/wire guard complete with 6 – 54 watt T5 high output fluorescent lamps; 2 level switched.

Storage/change Rooms, Mechanical/Electrical: surface/pendant mounted strip lights; 2 – 32 watt fluorescent lamps; wire guards.

Administration/Offices: recessed 610 x 610; 3 – 17 watt fluorescent lamps or Biax with indirect lens.

Classrooms: recessed 610 x 1220, lensed; RT5 – 2-28W T5 watt fluorescent lamps; 2730 lumens per lamp utilizing volumetric lighting.

Corridors: recessed 610 x 1220, lensed; 2 – 32 watt fluorescent lamps.

Common/Gathering Area: pendant, direct/indirect compact fluorescent lamps.

Vestibules: recessed pot lights; 1 – 32 watt PL fluorescent lamp.

Washroom: recessed 610 x 1220 lensed; 2 – 32 watt fluorescent lamps. Wall mounted, lensed; valance 1-32 W fluorescent lamp.

5.8 Exit Lights

Exit lights will be provided throughout the School and will be LED type and shall be self powered.

5.9 Emergency Lighting

Emergency power battery packs and remote heads utilizing self-test technology will be provided for throughout the School in accordance with the requirements of the Alberta Building Code.

5.10 Fire Alarm and Smoke Detection System

Fire alarm and smoke detection system utilizing current addressable technology with horn strobes and isolation modules will be provided for.

Location of all devices will be as per the current Alberta Building Codes.

5.11 Stage Lighting

Provisions will be made for drama type stage lighting at the portable stage location in the gymnasium. Provisions will consist of two forestage, ceiling mounted pipe rails, each having three outlets; and outlets around the perimeter of the gymnasium to provide for portable spot lights. All outlets will be tied to a hardwired dimmer panel located in the gymnasium. No stage lighting fixtures will be provided in the contract.

5.12 Intrusion Detection System

An intrusion detection system and access control will be provided for. All will consist of entry key pad at the main entry to the school; motion sensor with vestibules and corridors. This system will be zoned to allow for community functions.

5.13 Sound and Intercommunication System

A sound and PA system will be provided for and will consist of administrative hand sets in the general office and library. Intercom system should also double as the telephone system. Hand sets will be provided for in each classroom to allow communication to the general office and classroom to classroom. The system will also control classroom change signal and exterior signals, voice mail and homework lot line features. All corridors and instructional areas will have speakers.

A self-contained system will be provided for in the gymnasiums to allow independent programs to functions within the area without having to tie through the main school system.

Exterior speaker horns will be provided around the school perimeter to allow paging to bus unloading and playground areas. These horns will be tied to an independent zone control in the main system to allow paging only in the school if so desired.

5.14 Cable Television System

A television distribution system will be provided throughout the School.

The RG6-FT4 cable will e routed through the cable tray to the wall outlet locations.

Television outlets will e provided in classrooms, project centres, breakout, conference rooms, staff lunge and gymnasium.

5.15 Computer Provisions

Computer outlets will be provided in all Instructional space throughout the School complete with cable tray distribution in the corridor ceiling space.

Category 6 cabling will be provided, complete with RJ45 connectors.

Eight computer ports will be provided for in each Instructional space.

Two computer outlets will also be provided for at the teacher station, one at the front of each classroom for smart board use and a computer outlet in the classroom ceiling for projector use.

The core school will have provision for wireless transmitters.

5.16 Clocks

Primex wireless GPS clocks will be utilized in the classrooms and hallways.

5.17 Energy Conservation Features

In an effort to minimize and control energy consumption and to provide a sustainable, efficient and functional system for the facility which is consistent with LEED® criteria, it is proposed that the following special features be incorporated into the electrical systems of the school:

- Energy efficient lamps and ballasts.
- Multi-level local lighting controllability.
- DDC control of car park receptacle operation.
- Time clock control of exterior parking lot lighting.
- Use of fluorescent T8 and T5 technology.
- Occupancy sensor control of lighting in all washrooms; Daylight control of corridors.

Appendices

Appendix A – AI's T Area Analysis

PROPOSED NEW 900 STUDENT K-9 SCHOOL

School Capacity

- 900 students

AI approved area:

- 900 Students – Built out gross area – 7417 m²

INSTRUCTIONAL AREA

24 Modular Classrooms @	100 m²	2400 m²
2 Science Classrooms @	120 m²	240 m²
2 Science Classrooms @	95 m²	190 m²
2 Ancillary @	130 m²	260 m²
4 Ancillary @	90 m²	360 m²
1 Gymnasium @	705 m²	705 m²
1 Gym Storage @	71 m²	71 m²
1 Library @	360 m²	360 m²
2 Information Session @	115 m²	115 m²
1 CTS	200 m²	200 m²
Subtotal		4901 m²

NON-INSTRUCTIONAL AREAS

Administration and Staff

Principal	15 m²
Vice Principal	12 m²
Administration Office	40 m²
Council Office	50 m²
General Administration	70 m²
Conference Room	50 m²
Staff Room	65 m²
Staff Work Room	80 m²
Men's	8 m²
Women's	12 m²
Infirmary	40 m²
Kitchen	30 m²
Mechanical	160 m²
Subtotal	632 m²

APPENDIX A – AI'S T AREA ANALYSIS – 900 CORE SCHOOL

Physical Education	130 m²
Storage Area	152 m²
Washroom Area	108 m²
Building Gross up	1494 m²
Subtotal	1884 m²
Gross Floor Area	7417 m²
Permanent Area	5017 m²
Modular Classroom Area	1600 m²

Appendix B – Modified Area Analysis

PROPOSED 900 STUDENT K-9 STANDARD CORE SCHOOL – OPTION A

School capacity 900 students

Alberta Infrastructure Approved Area

900 Students – K-9 Elementary – 7,417 m²

Instructional Area	**Area (m²)**	**Total (m²)**
16 (Modular Portable Classrooms)	100	1600
7 Classrooms	varies	551.6
2 ECS	85.1	170.2
2 Junior High Science Classrooms	79.25	158.5
2 Elementary Science Classrooms	82.4/80	162.4
1 Large Ancillary Classroom	130	130
4 Ancillary Classrooms	varies	395.7
2 Information Services	78.8/76.25	155
1 Gymnasium	700	700
1 Gymnasium Storage	50	50
1 CTS	203	203
1 Library	360	360
Subtotal		**4636.4**

Non-Instructional Areas

Principal	18
Vice Principal	12.4
Administration Office	24
Counselor's Office	23.9
General Administration	73
Conference Room	18.2
Staff Room	166.3
Staff Work Room	42
Men's	8
Women's	12
Infirmary	20
Kitchen	15
Mechanical	215
Subtotal	**647.8**

APPENDIX B – MODIFIED AREA ANAYLSIS – 900 CORE SCHOOL

Physical Education	76
Storage	155
Wiring Network	28
Washrooms	206
Subtotal	**465**
Building Gross Up (circulation, wall areas, flexible space)	1667.8
TOTAL	**7417 m²**
Total Core School Area (Including Portables)	7417 m²
Total Core School Area (Excluding Portables)	7417 m² - 1600 m² = 5817 m²

APPENDIX B – MODIFIED AREA ANAYLSIS – 900 CORE SCHOOL

PROPOSED 900 STUDENT K-9 STANDARD CORE SCHOOL – OPTION B

School capacity 900 students

Alberta Infrastructure Approved Area

900 Students – K-9 Elementary – 7417 m²

Instructional Area	Area (m²)	Total (m²)
16 (Modular Portable Classrooms)	100	1600
7 Classrooms	varies	627.8
2 ECS	85.1	170.2
2 Junior High Science Classrooms	79.25	158.5
2 Elementary Science Classrooms	82.4/80	162.4
1 Large Ancillary Classroom	130	130
1 Inf. Services (combined 4 rooms)	varies	110.9
1 Information Services	95.7	95.7
4 Ancillary Classrooms	varies	95.7
1 Large Ancillary Classroom	113	113
1 Gymnasium	700	700
1 Gymnasium Storage	50	50
1 CTS	203	203
1 Library	360	360
Subtotal		**4877.2**

Non-Instructional Areas

Principal	18
Vice Principal	12.4
Administration Office	24
Counselor’s Office	23.9
General Administration	73
Conference Room	18.2
Staff Room	166.3
Staff Work Room	42
Men’s	8
Women’s	12
Infirmary	20
Kitchen	15
Mechanical	215
Subtotal	**647.8**

APPENDIX B – MODIFIED AREA ANAYLSIS – 900 CORE SCHOOL

Physical Education	76
Storage	155
Wiring Network	28
Washrooms	206
Subtotal	**465**
Building Gross Up (circulation, wall areas, flexible space)	**1427**
TOTAL	**7417 m²**
Total Core School Area (Including Portables)	7417 m²

Total Core School Area (Excluding Portables) 7417 m² - 1600 m² = 5817 m²

Appendix C – ABC 1997 Building Code Review

Group A, Division 2, up to 6 Storeys, Any Area, Sprinklered (3.2.2.4)

1) A building classified as Group A, Division 2, that is not limited by building area, is permitted to conform to Sentence (2) provided:

   a) except as permitted by Sentences 3.2.2.7(1) and 3.2.2.18(2), the building is sprinklered throughout, and

   b) it is not more than 6 storeys in building height.

2) Except as permitted by Article 3.2.2.16., the building referred to in Sentence (1) shall be of noncombustible construction, and

   a) floor assemblies shall be fire separations with a fire-resistance rating not less than 1 hour,

   b) mezzanines shall have a fire-resistance rating not less than 1 h, and

   c) loadbearing walls, columns and arches shall have a fire-resistance rating not less than that required for the supported assembly.

Group A, Division 2, up to 3 Storeys, Increased Area, Sprinklered (3.2.2.26)

1) A building classified as Group 1, Division 2 is permitted to conform to Sentence (2) provided:

   a) except as permitted by Sentences 3.2.2.7(1) and 3.2.2.18 (2), the building is sprinklered throughout,

   b) it is not more than 3 storeys in building height, and

   c) it has a building area not more than

      i) 4800 m^2 if 1 storey in building height,
      ii) 2400 m^2 if 2 storeys in building height, or
      iii) 1200 m^2 if 3 storeys in building height.

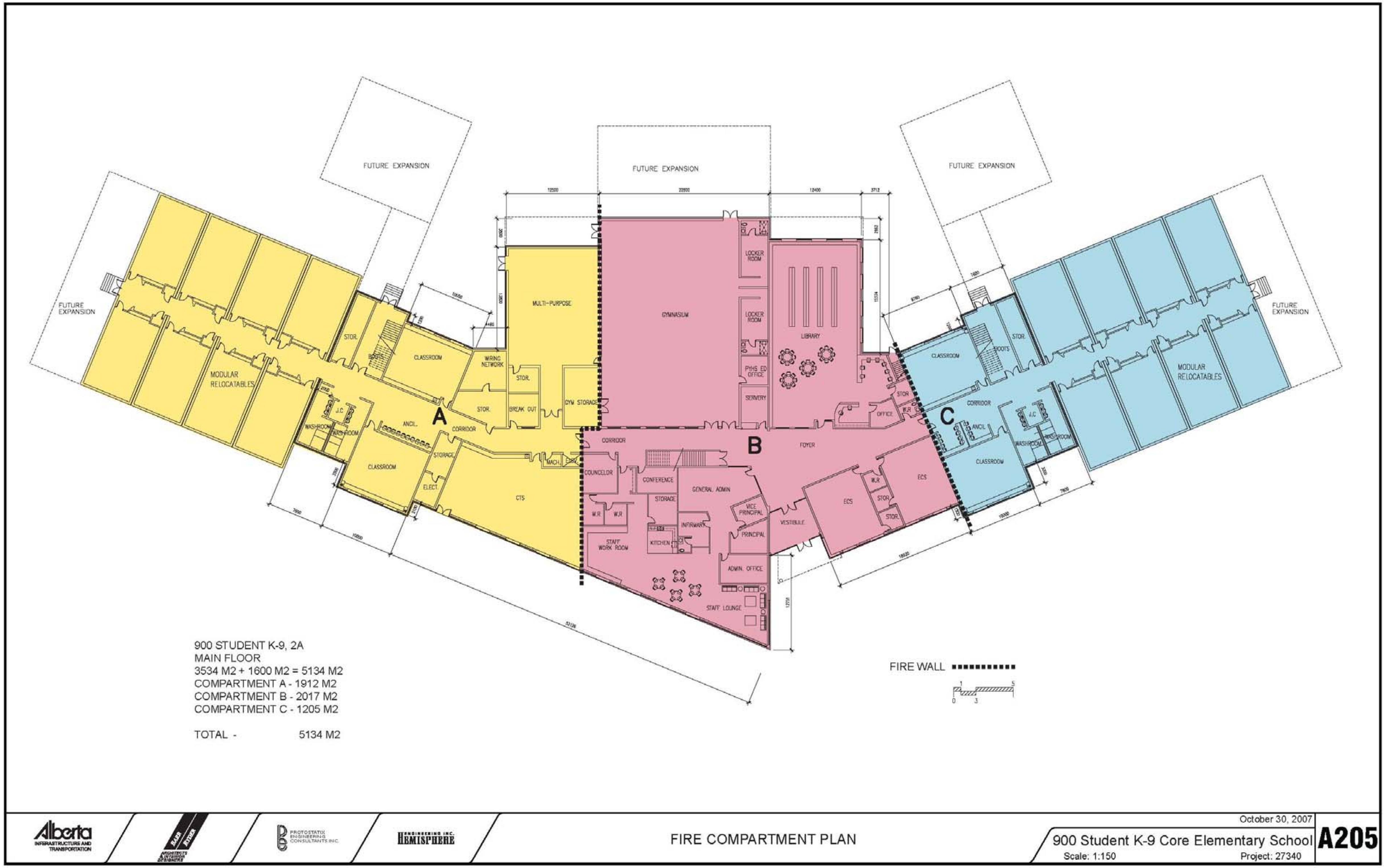
2) the building referred to in Sentence (1) is permitted to be of combustible construction or non-combustible construction used singly or in combination, and

   a) floor assemblies shall be fire separations and, if of combustible construction, shall have a fire resistance rating not less than 45 min,

   b) mezzanines shall have, if of combustible construction, a fire resistance rating not less than 45 min, and

   c) loadbearing walls, columns and arches supporting an assembly required to have a fire resistance rating shall

      i) have a fire resistance rating not less than 45 min, or
      ii) be of non-combustible construction.


FUTURE EXPANSION
FUTURE EXPANSION
FUTURE EXPANSION
FUTURE EXPANSION
FUTURE EXPANSION
MULTI-PURPOSE
GYMNASIUM
LOCKER ROOM
LOCKER ROOM
LIBRARY
PYHS ED OFFICE
SERVERY
MODULAR RELOCATABLES
MODULAR RELOCATABLES
CLASSROOM
CLASSROOM
CLASSROOM
CLASSROOM
WIRING NETWORK
STOR.
BREAK OUT
GYM STORAGE
CORRIDOR
CORRIDOR
CORRIDOR
FOYER
ANCIL.
ANCIL.
STORAGE
ELECT.
CTS
J.C
J.C
WASHROOM
WASHROOM
WASHROOM
WASHROOM
COUNCILLOR
CONFERENCE
GENERAL ADMIN
STORAGE
VICE PRINCIPAL
PRINCIPAL
INFIRMARY
KITCHEN
STAFF WORK ROOM
ADMIN. OFFICE
STAFF LOUNGE
VESTIBULE
ECS
ECS
OFFICE
A
B
C
900 STUDENT K-9, 2A
MAIN FLOOR
3534 M2 + 1600 M2 = 5134 M2
COMPARTMENT A - 1912 M2
COMPARTMENT B - 2017 M2
COMPARTMENT C - 1205 M2
TOTAL - 5134 M2
FIRE WALL
FIRE COMPARTMENT PLAN
October 30, 2007
900 Student K-9 Core Elementary School
Scale: 1:150
Project: 27340
A205

Appendix D –Proposed Finish Schedule

APPENDIX D – PROPOSED FINISH SCHEDULE – 900 CORE SCHOOL

900 SCHOOL

PROPOSED FINISH SCHEDULE

Room Name	Floor	Base	Wall	Ceiling
ADMINISTRATION				
Conference	CPT	RB	PT	ACT/PT GWB
General Office	CPT	RB	PT	ACT
Staff Work Room	VCT	RB	PT	ACT
Principal	CPT	RB	PT	ACT
Vice Principal	CPT	RB	PT	ACT
Administrator	CPT	RB	PT	ACT
Infirmary	VCT	RB	PT	ACT
Counselling	CPT	RB	PT	ACT
Washroom	VCT	RB	PT/TILE	PT DW
CORE				
Foyer/Vestibule	RF	RB	PT	PT
Multi-Purpose Room	RF	RB	PT	ACT/PT GWB
Washroom	CT	CT	CT	VCT
Ancillary	VCT	RB	PT	ACT
Break Out	VCT	RB	PT	ACT
Classrooms	VCT	RB	PT	ACT
ECS	VCT	RB	PT	ACT
Kitchenette	VCT	RB	PT	ACT
Corridor	VCT	RB	PT	ACT
Mech	CONC	-	PT	EXPOSED
Janitor	CONC	-	PT	EXPOSED
Storage	CONC	-	PT	EXPOSED
Locker Room	VCT/CT	RB/CT	PT	PTD GWB
P.E. Office	VCT	RB	PT	ACT
Gym	WOOD	VRB	PT	PT EXPOSED

APPENDIX D – PROPOSED FINISH SCHEDULE – 900 CORE SCHOOL

900 SCHOOL

KEY:

CT:	Ceramic Tile - Porceline Tile T: Olympia Le Pietre - White SHR: Mosaic Floor Tile Daltile - Keystones - D037 (White) Wall Tile: Type 1 - Class MR4, 150 x 150 x 6mm size. Square edges, Glazed Locker room, Boys/Girls Washroom, Kitchenette Shower Wall Tile: Daltile - Permatones - 6501 (Matte White)
ACT:	Acoustical Ceiling Tile Armstrong Cortega CGC Radar
VCT:	CGC Sheetrock Brand Lay-In Ceiling Tile Clima Plus BPB ProRoc Gypsum ceiling panels, type c vinyl STC rating 35 min, flame spread rating 25 or less
WOOD:	Wood Strip Flooring, 19mmx38mmxWDE Random Lengths 305mm-2130mm Gym: Cushioned WD Flooring System 6mil polyethelene membrane, factory assembled STL Encased WD 1-3/8" x 2-5/8" x 8ft. Sleeper Plywood subfloor, 19mm (3/4") thick, 1120 x 2440 size: 610mmx1220mmx13mm thick
CT:	300 x 300 Armstrong Imperial Texture Excellon
VRB:	Perimeter Base: 76mm x 100 mm x 6mm hard rubber, vented
RB:	Resilient Base - CAN/CSA A126-S, Continuous top set, Complete w/Pre-moulded end stops and external corners Amtico/Flexco/Johnsonite Rubber 3.17 thick, Height 100mm
CPT:	Carpet - Krauss, Dominator or Approved Equal 36 oz, Piece Dyed, DuPont Nylon
PTD:	Painted
RF:	Linoleum Sheet Flooring: composed of natural ingredients which are mixed and calandared onto juke backing. Acceptable products: 1. DLW 2. FORBO MARMOLEUM 3. ARMSTRONG MARMORETTE 4. DOMCO Tarkett Linosom Veneto Gloss 60 degree specular Black coloured rods for welded seam installation to dissimilar colour joints only. Matching colour rods for common colour joints.

Note: Manufacturers noted for information only, in all cases or approved equal as per Alberta Infrastructure & Transportation approved.

"Helping Build Communities"

BARR RYDER
ARCHITECTS & INTERIOR DESIGNERS

Appendix E – Design Ratios

APPENDIX E – DESIGN RATIOS – 900 CORE SCHOOL

Project Identification			
Project Name:	Standard Core Elementary/ Jr. High School – 900 Capacity	Building Type:	School
Location:	Base Case – Edmonton	Project Start Date:	N/A
School Board:	N/A	Completion Date:	N/A
Architect:	BARR RYDER ARCHITECTS	Market Condition:	April 2007 Constant $
Constructor:		Geographic Location Factor:	Edmonton Base Rate

DESCRIPTION OF BUILDING

2 Storey. Fnd Drilled Conc Piles, Grade Beams dependent on Soil conditions. Loadbearing Blk , Ext wall Cladding 4.5 m Ht Masonry Veneer, Upper Walls above 4.5m EIFS, Double glz thermally broken Alum Windows, Alum. Curtain Wall at Entry, Roof Modified SBS 2-ply Flat Roof, Int. Partitions Conc Blk (GB/SS Admin.). Floors VCT (Carpet Library/Admin) Wood @ Gym, Ceramic Tile Washrooms, Ceilings Acoustic Tile/GB, Walls Pt/Ceramic Tile Washrooms, Millwork, Mech-Heat w/t Perimeter Radiant Ceiling Panels c/w Gas Fired Finned-Tube Hot Water Boilers

Building Area and Volume

	Core	Built-out
Gross Floor Area:	5817 m^2	7417 m^2
Net Floor Area:	5270 m^2	6689 m^2
Volume:	29877m^2	36465m^2
Exterior Cladding:	2716 m^2	3497 m^2
Roof Area:	3560 m^2	5160 m^2
No. of stories above grade:	2 no.	2 no.
Modular Classrooms Built Out:	N/A	16 no.

Outline Specification

A10 Foundation:
Piles with grade beams and pile caps for isolated columns, 125 slab on grade based on soils condition in area

B10 Superstructure:
Load bearing concrete block, steel beam interior structure, concrete second floor system.

B20 Exterior Enclosure:
Wall Cladding is 4.5m of masonry veneer, Fascia, upper walls EIFS system, Alum Double glz thermally broken windows, Curtain Wall At Entry.

B30 Roofing: 2 Ply SBS Modified Membrane

C10 Interior Construction:
Concrete block partitions, GB/SS partitions at Admin. Area.

C30 Interior Finishes:
Vinyl composite tile flooring, ceramic tile @ washrooms, carpet Library, admin and staff lounge, wood floor in gym, ceilings are a combination of painted drywall and acoustic tile, wall finish are predominantly paint, ceramic wall tiles at showers, urinals and mop sink.

D30 HVAC, Fire Protection:
System utilizes interior air handling units and boilers, perimeter radiation utilized for heating, air conditioning– excluded, building sprinklered, mechanical system controlled using digital controls.

Ratios

	Core	Built-out
Net Floor Area/GFA:	.90:1	.90:1
Exterior Cladding Area/GFA:	.51:1	.52:1
Window Area/GFA:	.09:1	.09:1
Roof Area/GFA:	.61:1	.77:1

Capacities

Percentage exterior wall glazed: 18 %
Soil characteristics:
Density plumbing fixtures:
Heating capacities:
Cooling capacities:
Ventilation Capacities:
Lighting intensity:

Floor Area (by type)

No.	Type	Core	Built-out
	Ancillary Classrooms/CTS	852.2 m^2	n/a m^2
	Permanent Core Classrooms	1133.9 m^2	n/a m^2
	Gymnasium	844.5 m^2	n/a m^2

APPENDIX E – DESIGN RATIOS – 900 CORE SCHOOL

Project Identification				
D50 Electrical: Main Service size of 1200 amps at 120/208 volts, Data, Voice and TV systems included using conduit & cable trays, security system included, public address system included, connections to allow for future portables.		Library	342 m^2	n/a m^2
		Administration/Staff	448 m^2	n/a m^2
		Storage	190.8 m^2	n/a m^2
		Mech/Elect/Maintenance	262.3 m^2	m^2
Capital Cost of Permanent Core per m^2 (April 2007$)		Circulation	1145 m^2	m^2
		Other	112.3 m^2`	m^2
		Modular Classrooms Built out	N/A	1600 m^2
	Gross Floor Area		5817m^2	7417m^2

Appendix F – LEED® Checklist

LEED CHECKLIST

Project Name - K-9 Core School (900 Students)
Project # - 27340

Date - 03/10/2007
Prepared By - SB

Credit Tally Y	?	N	Category	Title	Points Available	Responsible Professionals Primary	Secondary	Comments
Y	**?**	**N**	**Sustainable Sites**					
Y			Prereq 1	**Erosion & Sedimentation Control**	0	Contractor	Arch	Silt fencing, Sediment traps
1			Credit 1	**Site Selection**	1	Owner/Client	Arch	Client responsiblilty
		1	Credit 2	**Urban Redevelopment**	1			
		1	Credit 3	**Brownfield Redevelopment**	1			
1			Credit 4.1	**Alternative Transportation**, Public Transportation Access	1	Arch		Confirm Public transit access
1			Credit 4.2	**Alternative Transportation**, Bicycle Storage & Changing Rooms	1	Arch		22 bike stalls and 1 shower req'd
		1	Credit 4.3	**Alternative Transportation**, Hybrid & Alternative Fuel Vehicles	1	Arch	Owner/Client	
1			Credit 4.4	**Alternative Transportation**, Parking Capacity	1	Arch		Provide Parking Stalls
1			Credit 5.1	**Reduced Site Disturbance**, Protect or Restore Open Space	1	Contractor	Arch	Arch to provide reqmts to Contractor
1			Credit 5.2	**Reduced Site Disturbance**, Development Footprint	1	Arch	Contractor	Arch to provide reqmts to Contractor
1			Credit 6.1	**Stormwater Management**, Rate and Quantity	1	Mech	Arch	
		1	Credit 6.2	**Stormwater Management**, Treatment	1	Mech	Arch	
	1		Credit 7.1	**Landscape & Exterior Design to Reduce Heat Islands** Non-Roof	1	Land	Arch	
1			Credit 7.2	**Landscape & Exterior Design to Reduce Heat Islands** Roof	1	Land	Arch	Energy star Roof
1			Credit 8	**Light Pollution Reduction**	1	Elec	Arch	
9	1	4	**Subtotal**	Possible Points	**14**			

Y	?	N	Category	Title	Points Available	Primary	Secondary	Comments
Y	**?**	**N**	**Water Efficiency**					
1			Credit 1.1	**Water Efficient Landscaping**, Reduce by 50%	1	Land	Arch	
1			Credit 1.2	**Water Efficient Landscaping**, No Potable Use or No Irrigation	1	Land	Arch	
	1		Credit 2	**Innovative Wastewater Technologies**	1	Mech		
1			Credit 3.1	**Water Use Reduction**, 20% Reduction	1	Mech		
1			Credit 3.2	**Water Use Reduction**, 30% Reduction	1	Mech		
4	1	0	**Subtotal**	Possible Points	**5**			

03/10/2007 1/3

Credit Tally Y	?	N	Category	Title	Points Available	Responsible Professionals Primary	Secondary	Comments
Y	**?**	**N**	**Energy & Atmosphere**					
Y			Prereq 1	**Fundamental Building Systems Commissioning**	0	Comm	Mech/Arch	
Y			Prereq 2	**Minimum Energy Performance**	0	Mech	Elec	
Y			Prereq 3	**CFC Reduction in HVAC&R Equipment**	0	Mech		
4		6	Credit 1.1	**Optimize Energy Performance**	10	Mech, Elec	Arch	min 29% Energy Reduction
		1	Credit 2.1	**Renewable Energy**, 5%	1	Arch	Mech, Elec	
		1	Credit 2.2	**Renewable Energy**, 10%	1	Arch	Mech, Elec	
		1	Credit 2.3	**Renewable Energy**, 20%	1	Arch	Mech, Elec	
	1		Credit 3	**Additional Commissioning**	1	Comm		
1			Credit 4	**Ozone Depletion**	1	Mech		
1			Credit 5	**Measurement & Verification**	1	Mech	Elec	
		1	Credit 6	**Green Power**	1	Client		Client Action
6	1	10	**Subtotal**	Possible Points	**17**			
Y	**?**	**N**	**Materials & Resources**					
Y			Prereq 1	**Storage & Collection of Recyclables**	0	Contractor	Arch	
		1	Credit 1.1	**Building Reuse**, Maintain 75% of Existing Shell	1	Arch		
		1	Credit 1.2	**Building Reuse**, Maintain 100% of Existing Shell	1	Arch		
		1	Credit 1.3	**Building Reuse**, Maintain 100% Shell & 50% Non-Shell	1	Arch		
1			Credit 2.1	**Construction Waste Management**, Divert 50%	1	Contractor	Arch	Contractor
	1		Credit 2.2	**Construction Waste Management**, Divert 75%	1	Contractor	Arch	Contractor
	1		Credit 3.1	**Resource Reuse**, Specify 5%	1	Arch		Under investigation
	1		Credit 3.2	**Resource Reuse**, Specify 10%	1	Arch		
1			Credit 4.1	**Recycled Content**, Specify 25%	1	Arch		Product specification
		1	Credit 4.2	**Recycled Content**, Specify 50%	1	Arch		
1			Credit 5.1	**Local/Regional Materials**, 10% Manufactured Locally (steel/concrete)	1	All		
		1	Credit 5.2	**Local/Regional Materials**, of 20% Above, 50% Harvested Locally	1	All		
	1		Credit 6	**Rapidly Renewable Materials**	1	Arch		
		1	Credit 7	**Certified Wood**	1	Arch	Struct	
1			Credit 8	**Durable building**	1	Arch		research CSA S478-95(R2001)
4	4	6	**Subtotal**	Possible Points	**14**			

Y	?	N	Category	Title	Points Available	Primary	Secondary	Comments
Y	?	N	**Indoor Environmental Quality**					
Y			Prereq 1	**Minimum IAQ Performance**	0	Mech		
Y			Prereq 2	**Environmental Tobacco Smoke (ETS) Control**	0	Contractor	Owner	By Arch/Owner
1			Credit 1	**Carbon Dioxide** (CO_2) **Monitoring**	1	Mech		
1			Credit 2	**Increase Ventilation Effectiveness**	1	Mech	Arch	
1			Credit 3.1	**Construction IAQ Management Plan**, During Construction	1	Contractor	Mech	Contractor - outline in spec.
1			Credit 3.2	**Construction IAQ Management Plan**, Before Occupancy	1	Contractor	Mech	Contractor - outline in spec.
1			Credit 4.1	**Low-Emitting Materials**, Adhesives & Sealants	1	Arch		specifications
1			Credit 4.2	**Low-Emitting Materials**, Paints	1	Arch		specifications
1			Credit 4.3	**Low-Emitting Materials**, Carpet	1	Arch		specifications
1			Credit 4.4	**Low-Emitting Materials**, Composite Wood	1	Arch		specifications
1			Credit 5	**Indoor Chemical & Pollutant Source Control**	1	Mech	Arch	Foot Grilles, Full height walls, P. copier?
	1		Credit 6.1	**Controllability of Systems**, Perimeter	1	Arch	Elec	research window locn's, light controls
	1		Credit 6.2	**Controllability of Systems**, Non-Perimeter	1	Mech	Arch	research window locn's, light controls
1			Credit 7.1	**Thermal Comfort**, Comply with ASHRAE 55-1992	1	Mech		Heating, cooling, vent, and humidification monitored and maintained at set levels.
1			Credit 7.2	**Thermal Comfort**, Permanent Monitoring System, DDC	1	Mech		DDC system will provide monitoring and system control capability
1			Credit 8.1	**Daylight & Views**, Daylight 75% of Spaces	1	Arch	Elec	research window locn's, light controls
1			Credit 8.2	**Daylight & Views**, Views for 90% of Spaces/regularly occupied	1	Arch	Elec	research window locn's, light controls
13	2	0	**Subtotal**	Possible Points	**15**			
Y	?	N	**Innovation & Design Process**					
1			Credit 1.1	**Innovation in Design**: Green Products Housekeeping	1	Client		Open for discussion
		1	Credit 1.2	**Innovation in Design**: Education Feature	1	Arch		Open for discussion
		1	Credit 1.3	**Innovation in Design**: Water Performance: Cistern connection	1	Mech		Open for discussion
		1	Credit 1.4	**Innovation in Design**: 95% Construction Waste Management	1	Contractor		Open for discussion
1			Credit 2	**LEED™ Accredited Professional**	1	Arch		ACHIEVED
2	0	3	**Subtotal**	Possible Points	**5**			
38	5	23	**Total Project Score**	Possible Points	**70**			**SILVER**

Certified 26 to 32 points **Silver** 33 to 38 points **Gold** 39 to 51 points **Platinum** 52 or more points

03/10/2007

TO BE PROVIDED UNDER SEPARATE COVER

Appendix G – Hanscomb Estimate