Schools of Tomorrow

Fromme Revival

They are the products of the twentieth century's suburban sprawl across the nation. Public schools were erected rapidly and monotonously throughout districts. When they were built decades ago, schools were simply designed to accommodate students with a lack of consideration in the influence of the structures on students and the environment. Today these school buildings are deteriorated, and structures are outdated. Despite of the fact that the modern building technology progressed far and cultural values are focused differently, most of these post cold-war public schools in North American neighbourhoods remain as how they were constructed decades ago. Kawneer's Schools of Tomorrow competition seeks a modern school design that meets *"[the] needs that reach far beyond the color of paint in the classroom."* Today's public school must encompass students' needs and become sustainable.

The challenge comes in making a building that functions in the simplest way possible for the young minds of children, provides a modern workplace for the teachers and staff and promotes the spirit of its community. These large buildings will also need to start using technology and building systems to help reduce their economic and environmental impact. [1]

Situated in North Vancouver, BC, Fromme Elementary school is a typical example of a thirty year old building that is severely deteriorated by the frequent rainfalls and the years of poor maintenance. Having renovated the other elementary schools in the zone in the last five years, the board decided to shut down Fromme Elementary and relocate students to the newer schools. The school building now stands empty and damaged. Following the competition challenge to design an elementary school, Fromme Revival project promotes a school design that preserves the existing fundamental values of Fromme and re-assess them with modern building technology to encounter the needs for students and the local environment.

Competition Objectives[2]*:*

- *To research, respond to and highlight the unique aspects of designing an elementary school that serves the selected site and community.*
- *To build knowledge about materials, products, and daylighting techniques (primarily using Kawneer architectural aluminum building products and systems) that can help earn LEED® certification points while creating a bright and fun atmosphere for learning.*
- *To design a sustainable facility utilizing the USGBC LEED® building standards.**
- *To design a facility that uses the physical environment to support the learning process.*
- *To encourage the use of sustainable and universal design principles for development of both the building and site.*

Fromme Revival Objectives:

- To efficiently incorporate the site's advantages into the design
- To examine and preserve the original design scheme and space organization
- To maximize daylighting with a proper shading device
- To design a sustainable building with materials appropriate for the environment

1. SITE

The most fascinating element in current Fromme Elementary school is its beautiful site. Located on a gentle hilltop that overlooks a field with trees towards South, the school building is also surrounded by steep hills of a small forest in North. This forest is, in fact, less than 15 meters away from the building perimeter. The neighbourhood is clustered close to the school property line.

Aerial view of the site[3]

View of the school entrance

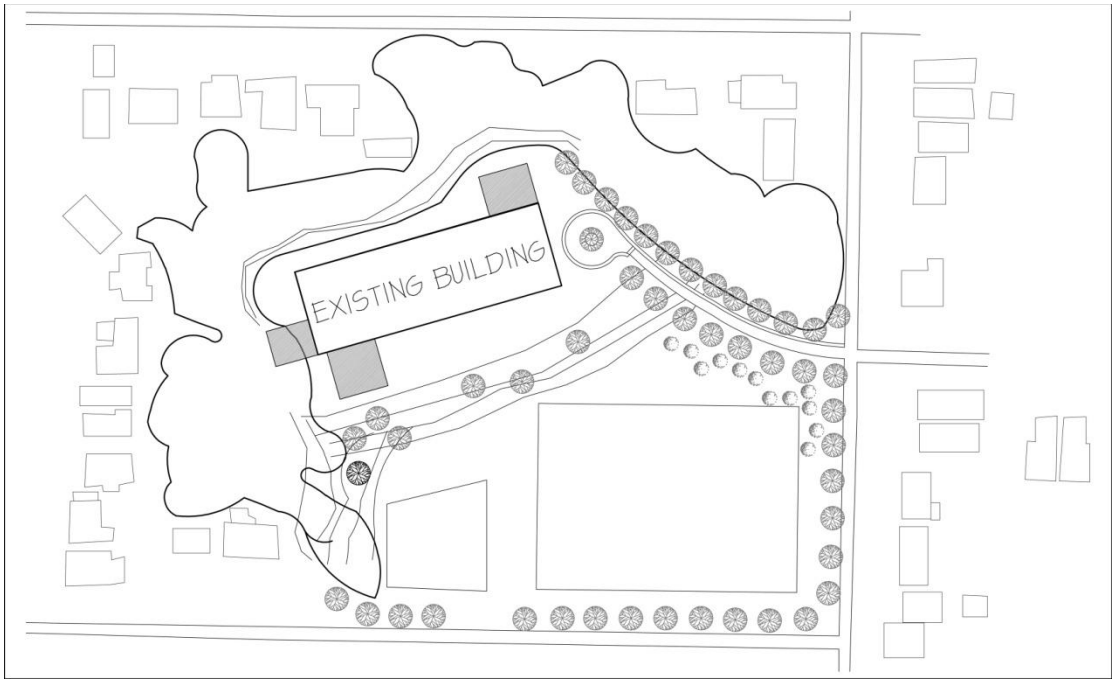
View of North, rear side of the building and forest

Huge, coniferous trees greet the long driveway to the school entrance. These trees wrap around through the forest in the rear side of the building, hugs the school and lines up around the entire school property. The forest generates a sense of a protection and an intimate landscape. It is difficult to defy this proximity of the landscape to the building, and what it offers to the students. Thus, it was clear that the existing landscape had to be fully integrated into the new design.

Another interesting aspect is the relationship of the topography and the building location. The entire property runs on a gently increasing slope that stops at the building perimeter and rises again after the forest line. This creates a gentle hill where the school building stands atop with a clear view towards South. It also offers a direct sunlight. The forest in the North barricades the wind chill. The higher elevation creates the walk from the entrance to the school a spiritual enlightenment as teachers and students climb the gentle hill every day.

View of the entrance and the field (The existing building is situated on the highest elevation followed by trees.)

These site advantages offer a great location for the school; however, such case also restricts the square footage of the building. The building perimeter is stopped by the forest line in the rear and a drastic drop in the elevations in the front. Given these conditions, the existing building perimeter rather makes the most plausible form. The existing Fromme Elementary follows the space the site created. The building is rectangular, and an additional office building sits on the right corner.



New site plan (grey blocks represent the additions of the project.)

Evidently, there is not much given space in this restricted enclosure. The existing building runs on a tilted axis (South-East), and the most reasonable spaces for additions are the corners of each end. It was crucial to minimize any change in the landscape in order to preserve its current advantages. Thus, the new additions for the project occur on each end of the current building. Not only does it spatially make sense; furthermore, it provides a harmonious weight on both ends in terms of aesthetic sense. Further addition that was inevitable (on the left corner towards the forest) is the music room, which sits on the higher elevation and becomes a part of the upper floor.

Often it is common in early foundation construction to re-stabilize the site in order to suit the new building. However, for Fromme Revival project, the preservation of the current site conditions is emphasized for what it offers to the existing building. Also, the existing school perimeter works perfectly balanced with the surrounding. Thus, the scheme of the original Fromme was to be preserved with minimum intrusion for the additions.

2. EXISITING FROMME ELEMENTARY & CAUSE OF DETERIORATION

The existing elementary school is severely deteriorated due to the lack of maintenance. The building façade, roof flashing, soffits and some of the posts are heavily weathered. The windows are stained. The concrete foundations and brick blocks are green with the age of the school. Even though the facility is operable, however, the appeal of the exterior is discouraging and daunting. Windows are scarce, and there is a lack of transparency for light. It is difficult to tell whether it is an elementary school or an old storage.

View of South façade

Front entrance roof structure

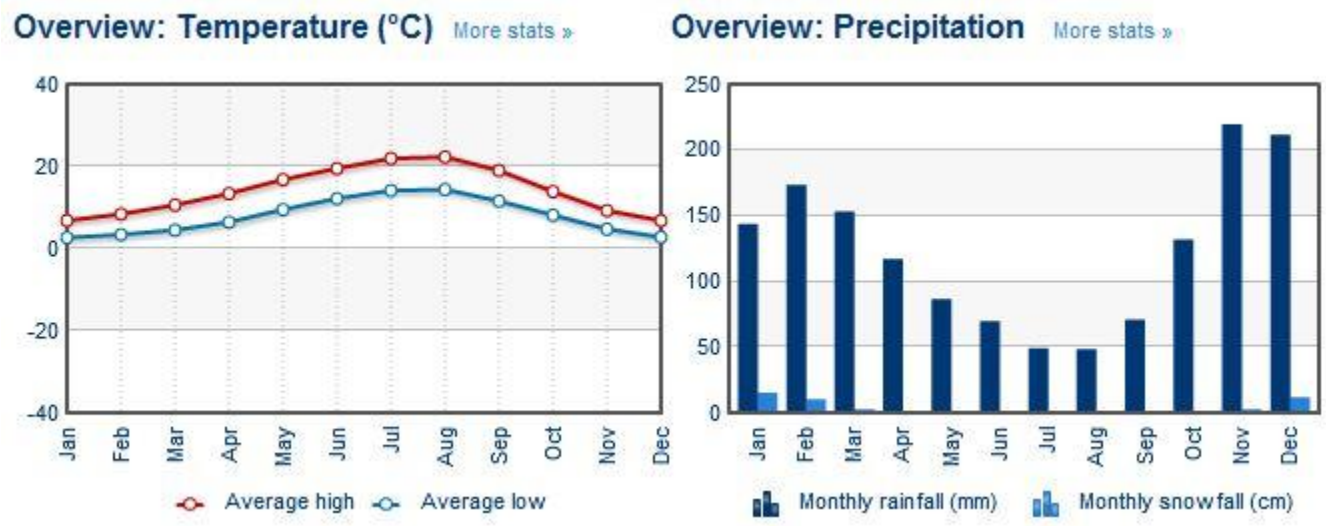
The front half of the main floor level is dedicated to the outdoor space. With lack of light inside, however, it is dull and daunting. The school entrance roof structure, which has a wide opening, is interesting pique. But the space does not serve any purpose. The North side of the building is completely closed off. Overall appearance of the building is sombre.

Outdoor space in the main floor level

West façade

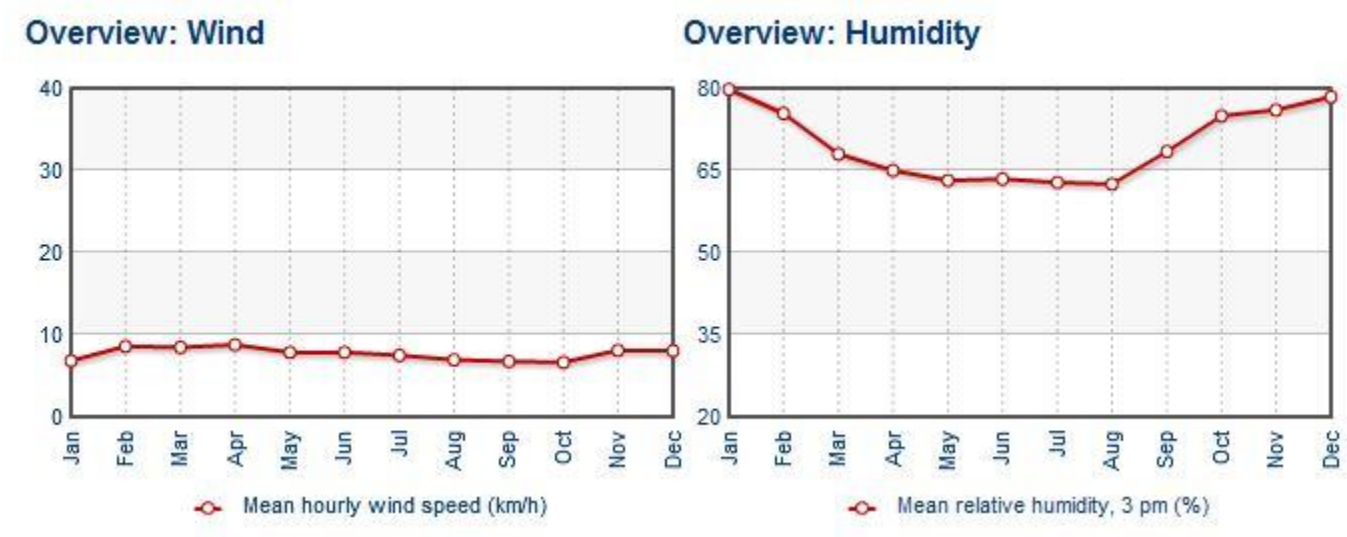
North Vancouver School District has been renovating and, in some cases, rebuilding near-by elementary schools for the past five years. Lynn Valley Elementary school, which is located less than half an hour away from Fromme, has been completely rebuilt. Upper Lynn Valley Elementary has been renovated extensively. Within fifty kilometres, three major elementary schools have been renovated to accommodate the students. Fromme's closure is heavily due to the district's budget with the recent constructions. It is preferred that the remaining Fromme students are to be transferred to these newly-renovated schools since there are already three different elementary schools in less than half an hour reach from Fromme Elementary. Financial issues have been the most critical for the district, and maintaining a thirty year old building has been costly.

It is imperative for the new Fromme to be sustainable and efficient. To be sustainable means the building is highly tolerant to the local climate conditions. To be efficient means the maintenance must be kept to minimum without deteriorating the building. Fromme Revival project aims to achieve these goals by considering suitable building materials and appropriate structures to prevent the building from weathering.



North Vancouver climate statistics[4]

North Vancouver is generally humid and warm. The coldest temperature rarely reaches below zero. In the summer, it rises not much than thirty degrees Celsius. The precipitation is a crucial factor since it rains more than half the year, typically from late October to early April. Rain is mostly responsible for the building damage over years. In the summer, it rarely rains. Instead the summer sunlight is fierce. Humidity is another important cause. Not only is it discomforting for habitants, it infects the closed air and taints the environment.



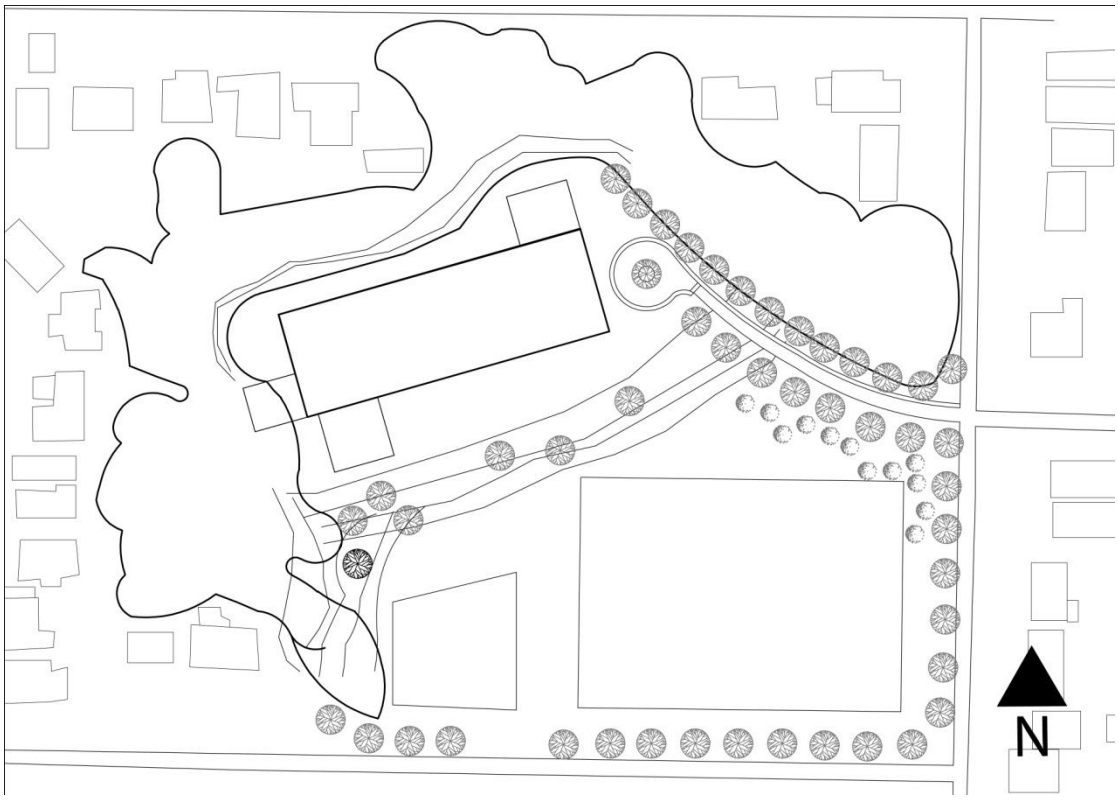
North Vancouver climate statistics[5]

New school building must be tolerant to the long period of rainfalls and the humidity. Green building is feasible through a proper composition of effective structures such as overhang and ventilation system as well as local building materials such as weather-stripped, laminated timber and sealed concrete. Since North Vancouver does not have severe climate conditions, sustainability and durability of the building can be managed without expensive mechanical systems.

Furthermore, the existing building lacks the amount of natural light for a healthy environment. The general atmosphere of the school is depressing especially considering, it rains in grey more than half the year in the city. Exposure of the natural light into the building must be amplified. Kawneer competition requirement specifically entails the strong need for optimum light quality. Not only does the new school need to bring in a vast amount of sunlight in winter, it must be capable of proper shading and preventing the over-heating of the building in the summer.

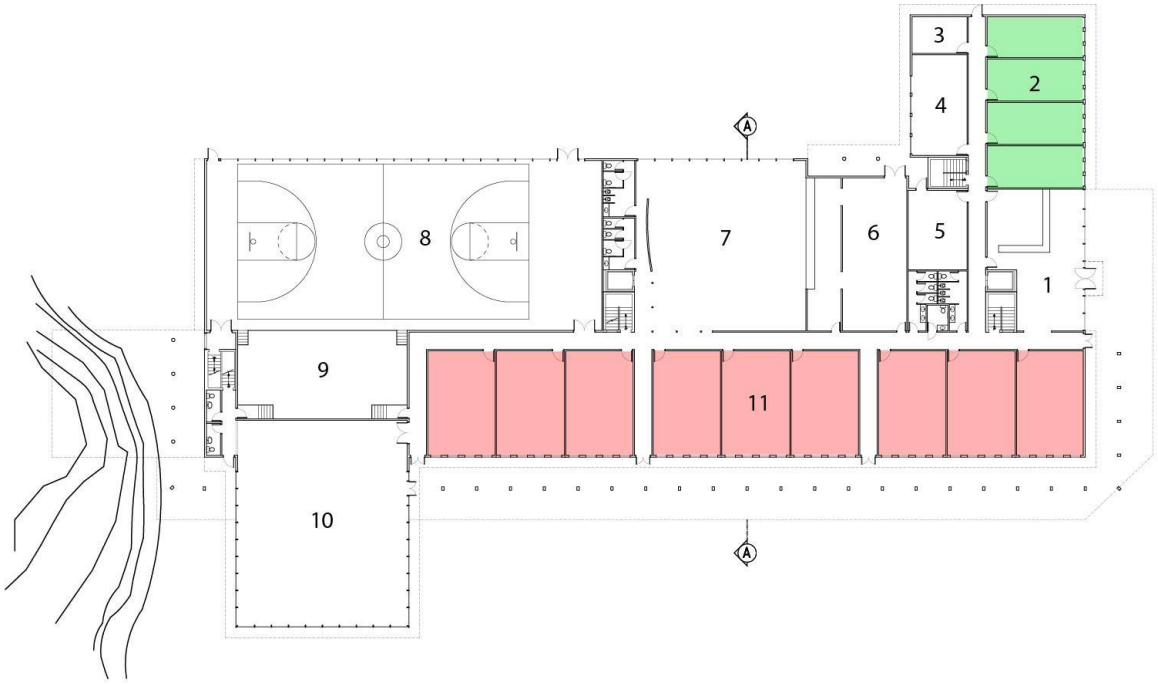
3. FROMME REVIVAL: NEW FROMME ELEMENTARY

New Fromme Elementary school's primary objective is to serve students, teachers and the community optimum quality of education experience. For students, it will be a school where they will spend six years of their primary education. For teachers, it will be a healthy, cheerful workplace. For the community, it will be a proud landmark. For the district, it will be a cost-efficient, sustainable building. New Fromme Elementary adheres to these clients' needs. The new school preserves the great advantages of the existing site location and the landscape the current offer. It also preserves the fundamental outline and the program layout of the existing in order to make the new familiar to the students and parents. The design motif of Fromme Revival promotes today's prime example of a public school; the school building is built on basis of today's students and social environment.



A1 - Site Plan

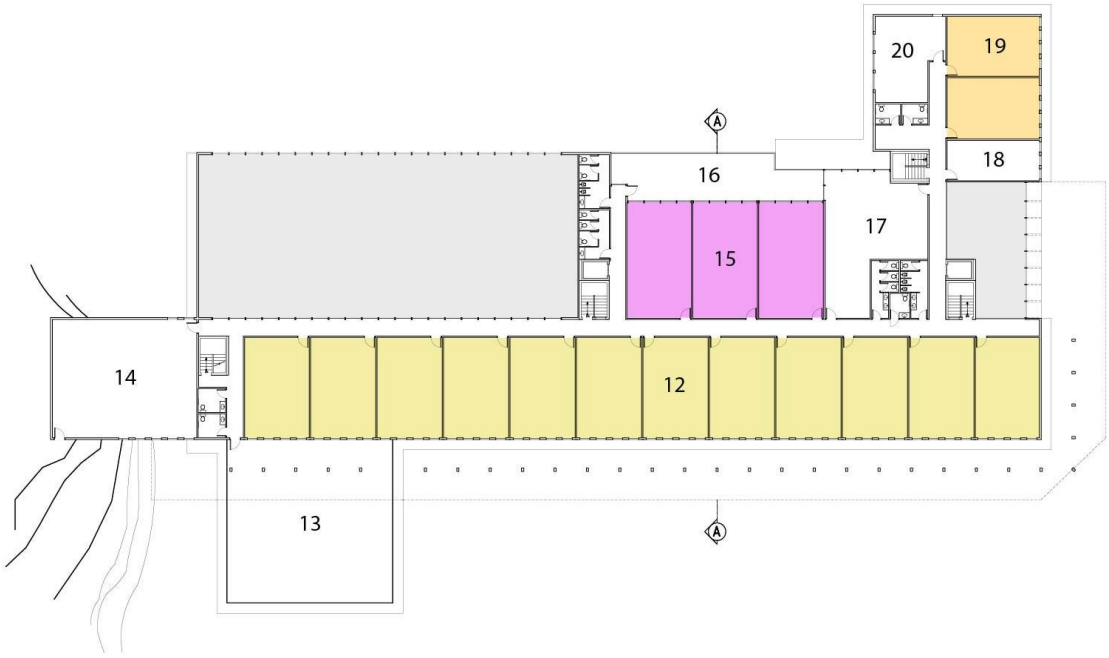
The landscape plan for the new school remains the same as the existing with minor replacement of the trees. The laneway from the street to the school entrance has been re-designed. Since it offers such an experience as a long walk in trees, it needs to be addressed more importantly than it is now. The roundabout offers an ideal drop-off area and an entrance to the parking lot. The forest remains the same except where the new music room is to be located; the elevations will be re-adjusted accordingly to match the second floor level of the building. The playground and the track field remains the same. The trees between the field and the school have been re-positioned to offer the front façade of the school the optimum view and light from South.



A2 – Main Floor Plan

1 Reception & Entry
2 Staff offices
3 Storage
4 Clinic
5 Mail & copy room
6 Kitchen & Serving
7 Cafeteria
8 Gym
9 Stage
10 Library
11 Classes (1-3; each grade has three classes)

The program layout begins with the main, rectangular mass of the school. It is halved by south part and north part. The north part is dedicated to the spaces mostly occupied in the afternoons where the sunlight from North is ideal. The latter is where it receives the maximum natural light throughout the day, which is dedicated to the classes and the library. The reception is located at east end, and it is the centre of the building that connects classes, the kitchen and the offices. Its location also offers a direct entry where guests have to pass the reception before entering any other room in the school. The circulation of the building is kept to the simplest to avoid confusion for young students. Washrooms and staircases are placed at both ends and in the centre to be within easy reach from any room. The north-east wing is dedicated to the office administration and the clinic. It divides the education space and the teachers' work place. The west wing is dedicated to the multi spaces such as the library, the stage and the gym. In the design process, it was important to consider the assimilation of all these different-purpose spaces coherently while still being able to divide them individually for clearer space organization. Furthermore, the separation between the north half and the south half clarifies the optimum amount of natural light for different spaces as well as the views. The north half; the gym, the cafeteria and the offices, looks to the forest whereas the south half; classes and the library, acquires the view to the field and beyond.



A3 – Upper Floor Plan

12 Classes (4-6; each grade has three classes)
13 Outdoor Balcony (top of the library)
14 Music room
15 Special Education classes
16 Outdoor Balcony
17 Arts & Crafts room
18 Staff office
19 Principal & Vice Principal offices
20 Conference room

The upper floor is dedicated to the senior students and other special classes. The classes are located on the south side whereas the elective classes such as special education and arts are located in the north side. In the north-east wing, the principals and the conference room are situated. In the west corner of the building is an extension of the music room which sits on top of the rising elevation of the forest. The gym and the entry rise up to the second floor. The gym requires high ceiling height in regards to the building code. The entry has a high ceiling that reaches up to the skylights for natural light but also to arouse a spacious sense. The existing entry roof structure has an interesting feature that is wasted by being purposeless. The new design developed the idea. Another valued feature of the upper floor is the two outdoor balconies; the main balcony is located on the top of the library, and the other is located outside the special education classes. The existing school offers the dark, unlit outdoor play grounds in the main floor. The new school offers students a certain, exciting higher elevation and an ample natural light for the outdoor spaces. Easy access to these balconies from the hallway also helps in directing these spaces as leisure area for students.

4. FEATURES OF NEW FROMME

Building materials play a crucial role in designing a sustainable building in order to prevent the building from weathering. Another important aspect is the glazing system for maximum natural light penetration through the building. Without exposing the entire building to a naked sunlight, the glazing system is met by long overhangs to control the amount of light seasonally.

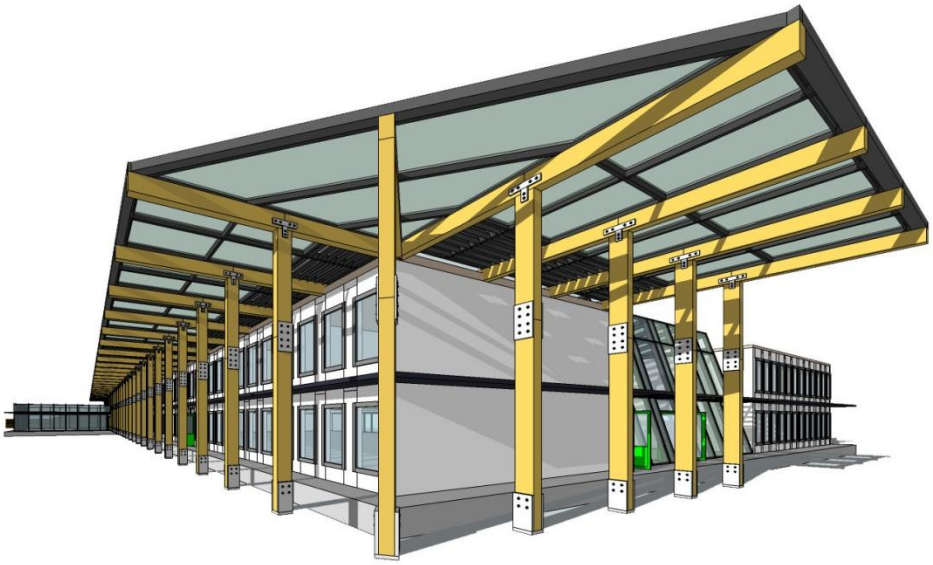
FRONT ELEVATION - SOUTH

REAR ELEVATION - NORTH

RIGHT ELEVATION - EAST

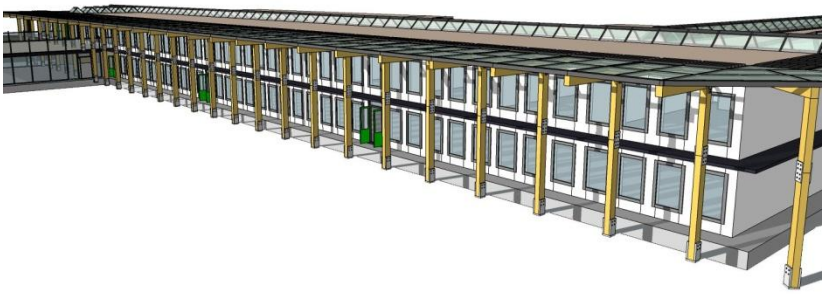
A4 – Elevations

Exterior walls of New Fromme is the architectural-concrete with white stucco veneer. The stucco wall generates a smooth clay-like material to brighten up the atmosphere around the school, and it harmonizes with the glazing system. Its rigidity prevents the walls from soaking up the rainwater better than the existing wooden veneers. The stucco walls are quite common to be found in old residences around the school, and the school blends in with the neighbourhood smoothly. The glazing system employs Kawneer's aluminum framing. Mainly, the school building comprises of Kawneer window systems and curtain wall system. For the classes in South, 3'-0" x 5'-0" windows allow the natural light in the classes. Windows offer a better privacy for the classes than the fully-glazed wall does, and they offer great ventilation throughout the classes. Moreover, the uniform set of windows in the horizontally-long façade create an orderly appearance. In the rear façade, the gym and other classes comprise the Kawneer curtain walls to maximize the use of light from North. The roof material is metal-corrugated that handles rain effectively. The roof also contains a long triangular skylights that follow the hallways and allow natural light in. For the overhang supports, the exterior weather-stripped Glulam beams and posts are used. It is common to find these Glulam structures in Vancouver recently as they are manufactured locally. The Glulam offers great flexible sizes and rigidity. The Glulam beams connect right to the beams of the building while the posts are installed right on the grade.



View of 15' long overhang

In order to minimize the rainwater from reaching the exterior façade and also to prevent the excessive sunlight in the summer, the 15' long overhang serves as both canopy and shade. The overhang has 3' Kawneer shading system and the rest is comprised of the glazing system. There is already a 2' overhang for the main floor that divides it from the upper floor. Considering the rainfall frequency in the city, the space under the overhang canopy can serve students for leisure outside on rainy days. Likewise, in the winter, the sun angle from South enables the light to reach the end of the classes. In the summer, the overhang prevents the light entering the classes.



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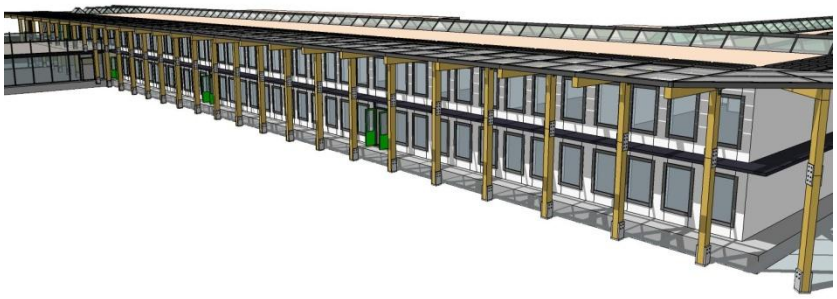

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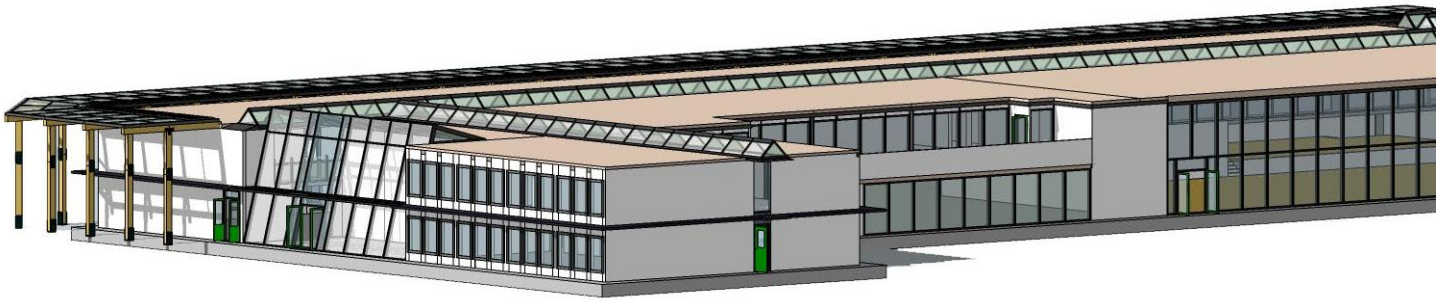

Axonometric view of the entry and the rear façade

Perspective view of the library and the front façade

Kawneer competition seeks a modern school design that accommodates today's students' needs and promotes the sustainability. Through site visits and research, Fromme Elementary is an ideal example of an ineffective, deteriorated school building that requires such attention. Fromme Revival project preserves the valuable key aspects of the existing and develops the original scheme to meet the competition requirements. Through using appropriate building materials and effective structures, the building efficiently manages the frequent rainfalls and the strong summer sunlight. The project also contends the amount of natural light in relation to each different space. Fromme Revival project studies various conditions that contribute important considerations; students, clients, climate, environment and problems of the existing, and generate a design that works for everyone as an ideal modern public school.

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*All photographs in this essay are personally taken by the author.

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