

# THUNDERBIRD CENTRE RESORT

Transforming a Legacy of Olympic Burden

*Dustin Froese*





*Thunderbird is a supernatural animal of incredible spirit, authority, intelligence, and transformation.*

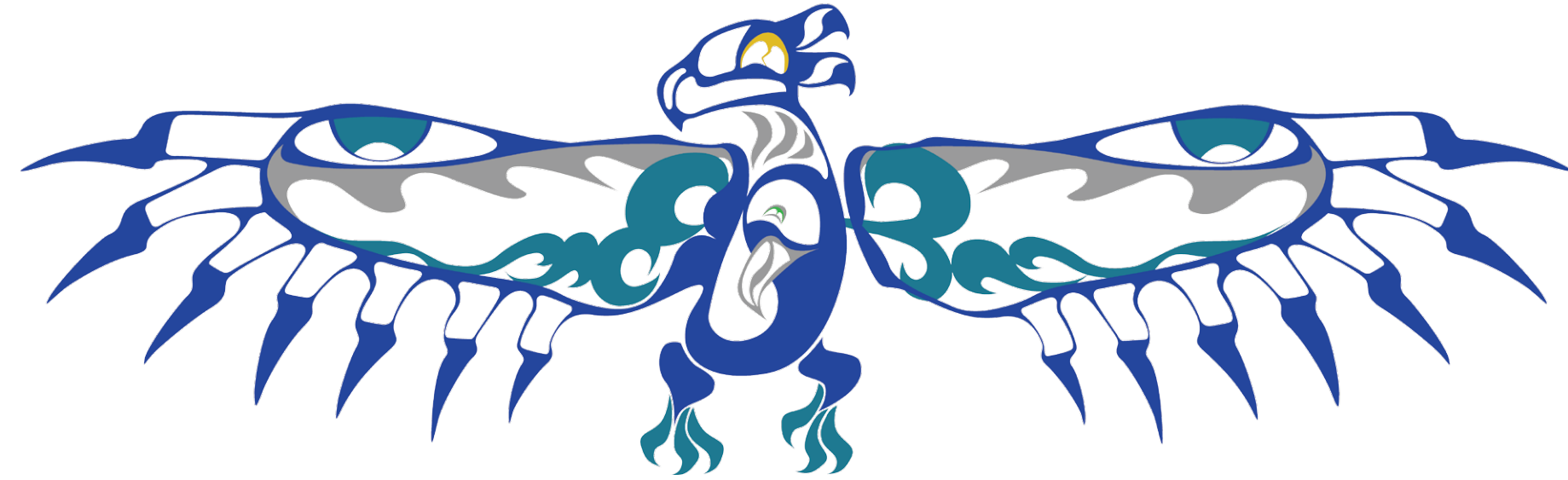
*His keen eyes flash with lightning and his beating wings are thunder incarnate!*



# FRONT MATTER

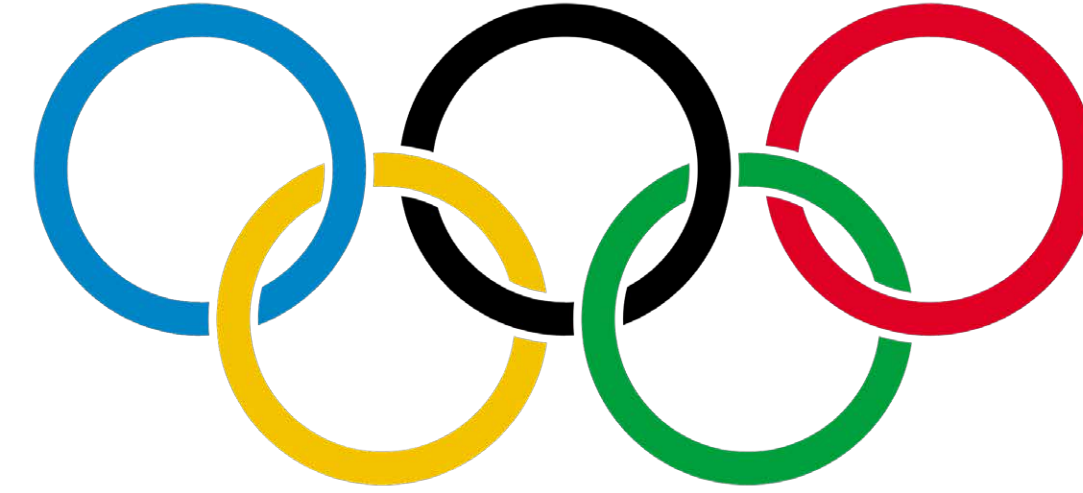
FRONT MATTER





### Thunderbird

“The story of the Thunderbird in Native American Mythology is popular among various Native American and First Nations peoples. Thunderbird is a giant supernatural bird who causes thunder and lightning. His weapons are lightning snakes which are carried beneath his wings. Lightning flashes when he throws the lightning snakes or when he blinks his eyes. He is powerful enough to hunt Killer Whale and is often depicted with one in his talons, he is also known to help the weak and poor by in some cases picking up large animals (killer Whale) and dropping them in a village of need. In many Coast Salish legends, Thunderbird is a mountain dweller and is a highly intelligent creature. From his home, he keeps a close eye over his dominion. Humans should beware not to try and outwit Thunderbird for they are most certain to have it backfire. In some Coast Salish myths, the peak Black Tusk in southern British Columbia, Canada is said to be his favorite perch. According to the Quileute people of Washington State, it is the Blue Glacier of Mount Olympus. Art designs vary by artist but some common features found in Northwest Coast are a hooked beak, often but not always larger than that of Eagle. Thunderbird is often shown with a crown or a curly top, showing supernatural powers. The Thunderbird represents the carrying out of law and protocol.” (Squamish Lil’wat Cultural Centre, 2011, The Thunderbird)



### The Olympic Games

“Modern Olympism was conceived by Pierre de Coubertin, on whose initiative the International Athletic Congress of Paris was held in June 1894. The International Olympic Committee (IOC) constituted itself on 23 June 1894. The first Olympic Games (Games of the Olympiad) of modern times were celebrated in Athens, Greece, in 1896. In 1914, the Olympic flag presented by Pierre de Coubertin at the Paris Congress was adopted. It includes the five interlaced rings, which represent the union of the five continents and the meeting of athletes from throughout the world at the Olympic Games. The first Olympic Winter Games were celebrated in Chamonix, France, in 1924.”

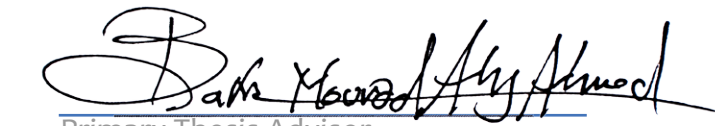
(International Olympic Committee, 2011, Olympic Charter, p. 9)

# THUNDERBIRD CENTRE

A Design Thesis Submitted to the Department of Architecture and Landscape Architecture of North Dakota State University

By Dustin Froese

In partial fulfillment of the Requirements for the Degree of Master of Architecture

  
Primary Thesis Advisor

 June 17, 2013  
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May 2013  
Fargo, North Dakota, USA





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## ABSTRACT

In the wake of the 2010 Winter Olympic Games in Vancouver, specialized sporting facilities such as the Whistler Sliding Center have become unused mementos that are expensive to maintain and are a burden to the local community. Transforming the Whistler Sliding Center into Thunderbird Centre is a step towards establishing a sustainable Olympic legacy that can become a model for the specialized sporting facilities of future Olympic Games.

Thunderbird Centre is a resort development that has been master planned to preserve the spirit of the original sliding center. Master Plan elements include intimate mountain lodging, adventure tourism activities in the backcountry, expansive public parks and many more amenities.

The sliding track itself will host an ornamentally planted bioswale that naturally treats the Centre's water runoff, effectively integrating the foreign concrete track into the local ecosystem.

Thunderbird Centre's flagship is a public health facility located in the final curve of the track, which has been named "Thunderbird". The fitness facility (which is the focal point of this thesis project) embodies the Olympic ideals of sport, it is influenced by the surrounding natural environment and it addresses the needs of the community in order to create a valuable community asset from an obsolete sporting facility.

**keywords:** 2010, architecture, bobsled, Canada, fitness, Olympics, re-use, sustainability, thesis, Thunderbird, tourism, Whistler

## PROBLEM STATEMENT

How can architecture transform obsolete Olympic facilities into valuable community assets?



# STATEMENT OF INTENT

STATEMENT OF INTENT

Figure 1 -Photo of the gondola view of the Whistler Sliding Centre

**Typology**

Thunderbird Centre is a master planned resort development that includes residential cabins on subdivided plots of land, as well as amenities such as a backcountry excursion centre, an arboretum event centre, an Olympic legacy museum and reception centre, public parks, walking paths and hiking trails. The focal point of the master plan and this thesis project is an athletic centre that facilitates strength training, swimming, group exercise classes, meditation, and personal training.

**Claim**

*Architecture can transform obsolete Olympic facilities into valuable community assets.*

**Actors:** Architecture

**Action:** Transformation

**Object acted upon:** Obsolete Olympic Facilities

**Manner of Action:**

Positive transformation within a post-Olympic environment.

**Theoretical Premises**

- 1. Some Olympic sporting facilities become obsolete after their Olympic Games come to a close.*
- 2. Obsolete sporting facilities can be harmful to the environment and the local economy.*
- 3. Simply removing an obsolete sporting facility is not enough to lift its financial and environmental burden of the past present and future.*
- 4. Architecture can be a valuable community asset when it meets the needs of the surrounding community.*

**Conclusion:**

Sometimes, a piece of architecture can be a burden to a community's social, financial, cultural and physical environment. In contrast, it can also be a source of significant benefits for these same environments. Thunderbird Centre hopes to replace financially burdensome post-Olympic structures (the Sliding Centre) with a beneficial one (a resort development), which doubly improves the state of the local community. By re-purposing obsolete Olympic facilities into new amenities and opportunities, in the tourist based economy of a post-Olympic environment, a proverbial Olympic 'white elephant' can be transformed into a sustainable and robust Olympic legacy. The example set by Thunderbird Centre will not only contribute to the Whistler community, it will set a precedent of successful Olympic legacy architecture and master planning for future Olympic Games.

### Project Justification

The Olympic Games are a global sporting sensation that entertain the world, encourage healthy competition, instill national pride and bolster the hosting nation's economy. Unfortunately this Olympic Effect achieves its national benefits by sacrificing the well being of the hosting cities and resorts. According to Nancy Wilhelm-Morden, the current mayor of the 2010 Winter Olympic Games Host Resort, the Resort Municipality of Whistler:

“There were quite a number of negatives arising from the Olympics as well: important decisions made without[sic] little or no local government consultation, increased property taxes in the years preceding and immediately following the Games, what appears to be a white elephant (the Sliding Centre), business outside of the Village suffered in the months preceding the Games and during the Games themselves. The municipal agenda was completely taken over by Games-related matters for months, in fact, years before the Olympics.” (N. Wilhelm-Morden, personal communication, September 27, 2012)

Unfortunately, the Olympic fallout is more of a rule than an exception. “Almost every [Olympic] Games of the past three decades has been accompanied by the claim that it would give a boost to investment, infrastructure and tourism, and in almost every case the prospectus has been false.” (Perryman, 2012, pp. 33)

Exploring the possibilities of obsolete Olympic facilities generates a model of pro-active Olympic sustainability initiatives that can be used as an example for future host cities. Demonstrating the positive transformation of an otherwise useless facility can help preserve the unique features of future host cities that make them such desirable and valuable destinations.

Whistler's mountain terrain and climate present many unique design challenges that will require smart vernacular structural systems, comprehensive passive and active system design solutions and responsible material choices. Whistler's symbiotic connection with the natural environment also places strict environmental standards on all structures in the Resort Municipality of Whistler, as outlined by “Whistler 2020”, a document stating Whistler's environmental protection policies. The responses this project makes to these conditions can be built upon in the designs of future Olympic facilities; Winter Olympic facilities in particular.

The preceding paragraphs speak of negating the ill effects of a burdensome bobsleigh track (the depth of which will be expanded on in the research results section). However, the cessation of a functioning bobsleigh track also leaves an unfilled void in the Whistler community.

Removing the function of ‘sliding centre’ from the site addresses the financial drain, but transforming it into a valuable community asset

not only takes it ‘out-of-the-red’, but brings the proverbial community ledger back into a positive state.

Therefore, I propose to address the economic and social needs of the Whistler community by transforming the Whistler Sliding Centre into something new; a process that is both subtractive and additive in nature.

### Unifying Idea

The athletic competitions of the Olympic games don't just promote health, which these days, can seem just akin to surviving. The games promote a robust and thriving lifestyle that encourages everyone, regardless of age, race, ethnicity, ability or sexuality to live life to the fullest and to be the best human being that you can be. Likewise, the approach to transforming the Whistler Sliding Center will surpass the status quo.

The pursuit of wholistic health, and alpine activities is a driving force in the lives of Whistlerites and was an incredibly attractive community attribute that brought the 2010 Winter Olympics into the mountain village. To a degree, the Olympics altered the Whistler Community's pursuit of these attributes by introducing the Olympic Games as the primary driving force in the community in the years preceding the games. When the Olympics ended, a vacancy was left in the figurative list of community goals. And, unsustainable and obsolete facilities were

left behind. In an effort to prevent further derailment of a communities goals, elements that detract from the pursuit of wholistic health, financial health and environmental health need to be removed and replaced with elements that reinforce a robust and healthy lifestyle in a manner that aligns with the needs of the community and the ideals of the Olympics.

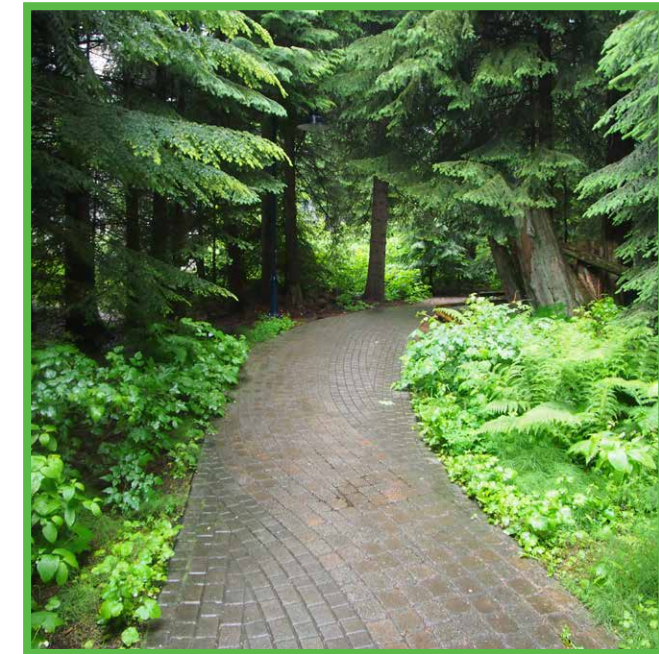


Figure 2 -Photo of Whistler's extensive Walk/Bike trails





Figure 3 -Photo of the Olympic Plaza at Dusk

# PROPOSAL

Narrative

One significant factor that helped convince the International Olympic Committee (IOC) to chose Vancouver and Whistler to host the Olympic Games is the beauty of the natural surroundings. Broadly speaking, Canada is known for being a place of wilderness and natural splendor. The Province of British Columbia itself boasts an incredible range of geographic and biological diversity. Framed by the Pacific Ocean to the West and the grand Rocky Mountains to the East, the lands in between contain a bright mosaic of peoples and places. The pinnacle of natural wonder summits in Whistler, British Columbia, Canada.

The vast mountain-scapes and island-studded ocean can be seen from many vantage points in the Whistler vicinity. The entire area can be described simply - It is a rich place; rich in natural beauty, rich in adventure, rich in history and culture, and rich in memory. It's no surprise that the provincial motto is 'Splendor without diminishment'.

British Columbians, myself included, have fond memories of fishing the Fraser river with our Fathers, camping in deep valleys with our families, skiing the mountains with our friends and visiting the Pacific beaches with our schools. Of all the fantastic places on the globe, this is our favorite and we are fiercely proud and protective of it.

The presence of the 2010 Winter Olympics in Whistler BC was an opportunity to show the world the land that we love so much. The 2010 Olympic theme 'With glowing hearts' alludes to a phrase in the Canadian National Anthem and it couldn't have been more appropriate.

Our Western jewel stood front and center on the world's stage and she performed brilliantly. But, with the closing ceremonies, the 2010 Winter Olympics became just a memory in the global consciousness. And, while the world



turned its attention to other matters, the inhabitants of Whistler were left to sweep the stage.

Currently, a 105 million dollar bobsled track sits like an abandoned castle at the head of Whistler Village. Since the Olympics, the track, which makes up the bulk of the Whistler Sliding Center has been seldom used and no hope exists for recovering its cost; a cost that has fallen onto the shoulders of the Vancouver Organizing Committee(VANOC) and the

Figure 4 -Photo of the Peak to Peak Gondola with Whistler Village in the background

inhabitants of the Resort Municipality of Whistler (RMOW). Though many Olympic legacy plans have been implemented, nothing has been done to address the enormous maintenance cost and waste of incredibly valuable land caused by the Whistler Sliding Center.

The Whistler Sliding Center has become a burden because its form no longer serves a financially viable function. Utilizing architectural design to subtract, add and modify the Whistler Sliding Center is its best chance at regaining a new life and a new purpose in the local community.

Where demolishing and completely re-designing the entire site would offer the largest range of possibilities, it would also be incredibly cost-prohibitive, environmentally destructive and wasteful.

The process of transformation uses the existing facility to its greatest capacity, then adds and subtracts as a thoughtful and sensitive design dictates. Transforming the Sliding Center also allows major facility elements to remain as reminders of the Olympic spirit, even though they may serve a new purpose.

Unfortunately, transformation isn't free. Investing more money into an over budget Olympic memento may seem like a poor idea to most, but, indefinitely paying for the costly symptoms of a derelict facility would probably prove to be even less desirable. Investing in Whistler's future is a pro-active way to help the community grow stronger, and to help it move beyond its post-Olympic shackles.

In a personal email, Whistler Mayor Nancy Wilhelm-Morden described her villiage as "Youthful, exuberant, adventurous, active, a hub for arts, culture and heritage". Any place bestowed with such a favourable description has something to offer everyone, so, I invite you to open your heart and your mind and follow this journey of transformation in Whistler; my home.



Figure 5 -Photo of the Froese boys in Whistler



**Client Description**

Whistler 2010 Sports Legacies will act as the clients in this project.

Whistler 2010 Sport Legacies is a non-profit organization that was formed in the summer following the close of the 2010 Winter Olympic Games. The organization owns, manages and

operates the three alpine Olympic venues: The Whistler Sliding Center, Whistler Olympic Park and the Whistler Athletes’ Center. Currently, when in season, Whistler 2010 Sports Legacies operates the Whistler Sliding Centre as a fully functioning Bobsled Luge and Skeleton track. It also offers a limited bobsleigh ride to paying tourists. The track’s operable season is about five months of the year. In the off season the track is closed.

Under the BC Society Act, Whistler Sport Legacies is responsible for:

- Providing world class facilities for athletes to discover, develop, and excel in their chosen sport.
- Encouraging a healthy lifestyle by developing programs that encourage participation in sports at a recreational level.
- Utilizing the venues to generate tourism visits and economic spin-off for the region.
- Developing a business model that ensures financial resilience over the long term. (Whistler 2010 Sport Legacies, 2012, Our Mission)

Whistler 2010 Sport Legacies is directed by a council that includes representatives from the Lil’wat Nation, the Squamish Nation (both are First Nations Peoples of Canada), the Canadian Olympic committee, the Canadian Paralympic committee, the Province of British Columbia, the Resort Municipality of Whistler and the Vancouver Organizing Committee. Each member comes with his or her own set of experiences, responsibilities and agendas, all of which create a robust sphere of influences that represent the community of Whistler. Whistler 2010 Sport Legacies shares the interests of the community with the RMOW though they also promote the Olympic brand and preserve the Olympic legacy. Their non-profit business model keeps costs down and helps make Olympic and Paralympic venues accessible to everyone. Their experience with the Whistler Sliding Center facility and practice as tourism operators make them ideal owners and managers of the transformed site.

**User Description**

The intended users of Thunderbird Centre fall into two distinct categories: permanent residents and visiting tourists. Permanent residents include any individual, group or family that identify Whistler as their permanent home. Visiting tourists include anyone who visits Whistler with a home outside the Resort Municipality of Whistler. This includes owners of timeshares, seasonal residents and any one who visits the resort temporarily.

Figure 6 -Whistler 2010 Sport Legacies logo (Whistler 2010 Sport Legacies, 2011)

**Permanent Residents:**

The 10,531 permanent residents of Whistler occupy 3,909 private dwellings (Whistler2020, 2011).

In a quirky *Pique Newsmagaine* article, journalist Lisa Powell describes three common stereotypes that can playfully categorize the inhabitants of Whistler.

The first group of Whistlerites are identified as “Lively Locals”. These people are young adults who have come to Whistler to experience the freedom and independence of mountain culture. They love the party scene and commonly frequent the bars and clubs that line the Village stroll. This exuberant group make up the major percentage of citizens.



The second group of Whistlerites are identified as “long Time Locals”. The Long Time Local is a citizen who has lived in Whistler for ten or more years. This group has fully established a life in the mountain village and frequently makes use of all the amenities the village has to offer. They



Figure 7 -Lively Locals at an outdoor concert in Olympic Plaza  
Figure 8 -Long time Locals marching in the Canada Day Parade  
Figure 9 -Newcomers try to establish themselves in the community

can easily be found walking pets through the trails, taking the kids to the park, skiing and snowboarding on the slopes, golfing in the summer or quietly reading in the brand new public library.

The third group of Whistlerites are identified as “Newcomers”. These people are new residents with the intent to quickly become a “Long Time Local”. Though they actively take part in mountain activities, they are primarily interested in investing into the community and establishing a life for themselves.



Powell ends her article with an insightful quote. “An important thing to remember is that everyone in Whistler has something in common. We all love our little village and for whichever reason we have come here its beauty unites us. Whoever you meet, you have that in common with.” (Powell, 2009)

**Visiting Tourists:**

The estimated daily tourist count is on average 14,837 people (Whistler2020, 2011, Whistler Population Equivalent) The annual number of visitors is around 2 million people.

**Concerning Both Major Users:**

The physical capacity of this population encompasses the fully abled to the physically challenged. This facility will embrace ADA guidelines ensuring that people of all abilities can make full use of each and every amenity.

The community at large has no single social, cultural, ethnic or cultural identity that requires special attention. However, two ethnic conditions do need to be addressed. Firstly, the broad range of diversity dictates a design of inclusion. The design should celebrate the diversity of the local population without offending visitors. Secondly, sensitivity to the rich First Nations heritage of the area should be observed. Relying on the representatives from the Lil'wat Nation and the Squamish Nation on the Whistler 2010 Sport Legacies council for direction in this area would be wise. Any symbols or references to First Nations culture and heritage should be handled with pride and sensitivity.

**The Resort Municipality of Whistler**

The Resort Municipality of Whistler is the local governing body that presides over the municipal region of Whistler. The RMOW is responsible for 10,531 permanent residents, 2 million annual visitors and 31,209 acres of land. The laws and bylaws are enforced by the Royal Canadian Mounted Police. The RMOW is led by an elected mayor and six councilors who are elected for three year terms. A General Manager of Infrastructure Services directs the Engineering, Roads,

Utilities, Wastewater treatment, Transit, Development and Energy systems departments. A General Manager of Resort Experience directs the Planning, Building Services, Environmental Stewardship, Parks and Trails Operations and Building Maintenance Services departments. (Resort Municipality of Whistler, 2011)

This municipal branch of the Canadian government directly serves the inhabitants of Whistler. Whistler follows the community charter dictated by the Province of British Columbia. The Charter charges council members "to consider the well-being and interests of the municipality and its community" (The Province of British Columbia, 1996)

Because the majority of the funding for the Whistler Sliding Centre comes from the government, political involvement is inevitable. Also, the publicly visible and potentially controversial nature of this project would require a close working relationship with the Mayor and council of the RMOW for it to 'get off the ground'.



Figure 10 -Photo of an RCMP Officer in Whistler Village

**Major Project Elements**

The transformation of the Whistler Sliding center into Thunderbird Centre Resort will be approached at two different scales: The urban design scale and the individual building scale. The urban design scale will manifest in the form of a diagrammatic master plan. The individual building scale will develop one of the buildings identified in the master plan of Thunderbird Centre Resort: The Thunderbird Fitness Centre.  
T=Transformed building. N=New Building

**Thunderbird Fitness Centre Building Elements:**

Primary Spaces:

- Heavy weight exercise area
- Light weight exercise area
- Cardiovascular training
- Short course lap pool
- Rock climbing wall
- Group exercise/dance studio

Secondary Spaces:

- Entry Vestibule
- Guest reception and check-in
- Personal training studio
- Training offices
- Administration offices
- Rock climbing desk
- Conference room
- Private gardens
- Work room

Service Spaces:

- Locker/shower/toilet rooms
- Laundry room
- Equipment storage
- Facility storage
- Custodial storage
- Mechanical space
- Accessible parking
- Outdoor secure garbage
- Vending

**Thunderbird Centre Resort Master Plan Elements:**

Building Assets:

- Welcome & reception centre (T)
- Olympic Museum (T)
- Private lots (N)
- Duplex and Quadraplex units (N)
- Arboretum event centre (T)
- Resort Maintenance (T)
- Resident's hot house (T)
- Public washrooms (T)
- Youth Hostel (N)
- Fitness Centre (N)

Site Assets:

- Parks (T)
- Walk/bike trails (T)
- Accessible Children's playground (N)
- Ornamentally planted bobsled track (T)
- Nodar Kumaritashvili Memorial (N)

## Description of Elements

### Thunderbird Fitness Centre Building Description:

Thunderbird Centre will be the focal building for this thesis project. It will feature prominently in the final presentation.

#### Primary Spaces:

##### Heavy weight exercise area

This space is primarily geared towards experienced athletes with experience. Equipment would include Squat racks, Smith machines and ample dumbbells and barbells ranging in weights from 5 lbs to 130 lbs and more.

##### Light weight exercise area

For the less experienced individual. Equipment would include isolated exercise machines, dumbbells and barbells in weights from 1 lb to 50 lbs and circuit training.

##### Cardiovascular training

This function would be spread throughout the whole facility. Equipment would include treadmills, stationary bikes, stair climbers, ellipticals and ergometers (rowing machines).

##### Short course lap pool

A 75'1" long lap pool offers exercise opportunities to people of all capabilities. It conforms to Olympic standards and can be used to host swim meets. The shallower half can host water aerobics. A public whirlpool creates a relaxing social space that can be shared by males and females together.

##### Rock climbing wall

To serve rock climbing enthusiast and beginners alike, the rock climbing wall provides a challenging activity that strengthens the body and increases coordination, agility and teamwork. The concrete wall itself acts as a heat sink, passively heating the open exercise areas by releasing warmth captured from sunlight.

##### Group exercise/dance studio

An open airy space with a hardwood dance floor facilitates group exercise classes such as yoga, aerobics, step class, Zumba™ and any other class offered by the fitness staff.

#### Secondary Spaces:

##### Entry Vestibule

A buffer zone between the interior and exterior spaces.

##### Guest reception and check-in

A security measure to ensure that all facility participants have

paid their fee and signed the limited liability waiver. This space will also act as the first point of contact for people visiting the facility. Comprehensive information and signage direct visitors from this point to their intended destinations.

##### Personal training studio

A small exercise space used for one-on-one training, small group training and fitness testing.

##### Training offices

Offices for fitness staff. Equipped for fitness consultations.

##### Administration offices

Offices for facility administration.

##### Rock climbing desk

Rock climbing supervision and equipment.

##### Conference room

A medium sized meeting room that can be used by employees and residents of the resort.

##### Private gardens

Separate male and female gardens offer outdoor social spaces that cater to relaxation and mental health.

##### Work room

An open work area used for group tasks or tasks too large to complete in a private office.

#### Service Spaces:

##### Locker/shower/toilet rooms

Separate male and female areas used for changing clothing, storing personal items and personal grooming. The space includes private whirlpools, saunas and steam rooms.

##### Laundry room

Sanitation and organization of facility towel service

##### Equipment storage

Fitness facilities tend to accumulate a significant amount of equipment that needs to be stored.

##### Facility storage

Ancillary storage that serves the functions of the building.

##### Custodial storage

A space for storing cleaning supplies and equipment.

**Mechanical space**

An unfinished space housing the mechanical equipment of the building.

**Accessible parking**

Covered parking with close proximity to the entry for the differently abled.

**Outdoor secure garbage**

An enclosed, covered storage space for facility garbage. It is easily accessed from the service spaces of the building as well as paved driveways for garbage and recycling pick-up.

**Thunderbird Centre Resort Master Plan Description:**

This master plan will contribute to this thesis project by addressing important periphery elements surrounding the new fitness centre. Due to the enormous scope of the Master Plan, these peripheral elements will be shown diagrammatically, and will not be taken to the same level of detail as the Thunderbird fitness Centre

*Building Assets:*

**Fitness Centre**

Replacing a bobsled/luge/skeleton track with a public fitness centre provides a place of exercise and health to the public. The myriad of small poorly equipped hotel exercise rooms leaves most athletic visitors wanting more. The growing community also lacks sufficient exercise facilities. Currently, only two fitness centers are available to the public.

**Welcome & Reception Centre**

Permanent residents and temporary visitors will find their first point of contact at the Welcome and Reception Centre. For people who are unfamiliar with the amenities of Thunderbird Centre Resort and their locations, the Welcome and Reception Centre can provide directions and information. The Welcome and Reception Centre will also house all the administrative functions needed to run the entire resort.

**Olympic Museum**

A small gallery documenting the 2010 Winter Olympics. Connected to the Welcome & Reception Centre, it is visible and accessible to everyone who enters the site. The displays and artifacts preserve the legacy of the Olympic games as well as educate visitors about the importance of sport, athletic training and teamwork.

**Private Residences**

Small subdivided pieces of property can be sold to help finance the transformation of the Whistler Sliding Centre. Revenue from the sales would create a significant amount of cash flow at the beginning of the transformation. Any short-fall can be supplemented by the revenue generated by the visiting tourists. Ideally, small environmentally sensitive residences would be built by the new owners. They would become permanent residents of Thunderbird Centre Resort. Their presence establishes a consistent year-round community.

**Backcountry Adventure Centre**

The Whistler Sliding Centre site is the Southernmost piece of property in the Fitzsimmons Valley, making it the closest buildable area to the Whistler Backcountry. Currently, the backcountry is inaccessible to most people, and is therefore an underutilized asset. Transforming the Men's starting house into a Backcountry Adventure Centre creates a gateway that will allow more people to be equipped and guided into Whistler's beautiful unregulated areas. Ziptrek tours, which offers Zipline excursions directly adjacent to the Whistler Sliding Centre site could also operate out of this location.

**Duplex and Quadraplex Units**

Duplex and Quadraplex cabin units create intimate community spaces for visiting tourists. The Alpine style cabins offer a mountain experience that the mid-rise hotels in Whistler Village cannot. Temporary visitors who stay in the Duplex and Quadraplex units would have full access to all the amenities of Thunderbird Centre Resort.

**Arboretum Event Centre**

A glass arboretum can be enjoyed daily by the public or rented out for special events. Raised Planters within the arboretum employ tidal basin wetland systems which treat the graywater and blackwater produced by all the buildings of Thunderbird Centre Resort. Also referred to as living machines, these constructed wetlands ensure that Thunderbird Centre Resort adds no additional burden to the wastewater treatment system of Whistler. Their aesthetic plantings add beautiful ground greenery to the year-round, tree filled arboretum.

**Resident's Hot House**

Private whirlpools, saunas and steam rooms are available to the permanent residents and temporary guests of Thunderbird Centre Resort. This building helps connect all resort users in a single place. In addition to the interior spaces, exterior fire pits and BBQ grills provide opportunities for shared meals and shared stories.

**Nodar Kumaritashvili**

Nodar Kumaritashvili was a Georgian (Country) luger who lost his life during a training run prior to the Luge competition of the 2010 Winter Olympics. A memorial dedicated to him would create a unique garden feature that is beautiful, yet respectful of the tragedy.

**Public Washrooms**

Whistler has a significant lack of public washroom facilities. Providing public access to these facilities helps ensure that anyone can comfortably enjoy a full day at the public parks or on the trails.

**Youth Hostel**

The expensive hotels of Whistler Village have left little to no accommodation available for younger visitors with small incomes. These young adults make up a significant percentage of the population. A Youth Hostel with mountain access and within walking distance of the main Village would be a convenient and affordable place for this group of tourists to stay. It would also be a consistent source of income for the resort.

*Site Assets:*

**Parks**

The park areas of Thunderbird Centre Resort effectively extend the existing park system of Whistler.

**Walk/bike trails**

Paved walking and biking trails connect the pedestrian to Thunderbird Centre Resort. A new path connecting the Resort to the centre of Whistler village would run approximately 1.7 km (1.1 miles), which would take approximately 30 minutes to walk at a

moderate pace, or 7 minutes to cycle.

**Children’s accessible playground**

A precedence of accessible children’s playgrounds was set with the construction of several ADA approved playgrounds for the 2010 Winter Olympics. This initiative will continue with the construction of another in the parks of Thunderbird Centre Resort.

**Ornamentally planted bobsled track**

The bobsled/luge/skeleton track will remain intact for the most part. Its large concrete mass will become a serpentine sculptural element that adds to the aesthetics of the parks. Filling the trough with aggregates, buffers, piping and specific plantings will turn the structure into a linear bioswale that filters the water runoff of the many roofs and roads in the resort. The environmentally sensitive initiatives of Thunderbird Centre Resort will act as an example for low-impact alpine living.



Figure 11 -Photo of natural elements integrated with the Whistler Village stroll

Whistler Sliding Centre  
4910 Glacier Lane  
Whistler, British Columbia  
Canada  
VoN 1B4

**Introduction**

In the North American country of Canada, in the Western Province of British Columbia into the Coast Mountain Village of Whistler sits the Whistler Sliding Center site.

The Whistler Sliding Center sits on the base of Blackcomb mountain. Its North-West facing topography has elevated views of the Village of Whistler. The property covers 52.61 Acres and has an elevation change of 210 m [690 feet] (Resort Municipality of Whistler, 2011)

A creek and waterfall run down the length of the site. The rocky terrain is populated with mountain grasses, shrubs and mighty coniferous trees. Nearby elements include Whistler Village, Blackcomb Mountain, Whistler Mountain, Fitzsimmons Creek and Fitzsimmons Creek Valley.

The proposed

PID: 027-528-294  
Zoning: RR1 (Rural Resource)

subdivision of the existing property would require permission from the RMOW. New property lines would need to be drawn in addition to new zoning.

The Whistler Sliding center sits on the traditional lands of the Lil'wat and Squamish Nations. The First Nations people make no legal claim to the property but their mythology of the legendary Thunderbird is intrinsically linked to this land. Thunderbird is a highly intelligent spirit of nature that protects its dominion. When Thunderbird flaps his wings, thunder echoes among the mountains and when he blinks his eyes lightning strikes. (Squamish Lil'wat Cultural Centre, 2011) The Icon of Thunderbird serves as the inspiration for the design of Thunderbird Centre Resort



Figure 12 -Map of the Lower Mainland (Google, 2012)



Figure 13 -Map of Whistler (Google, 2012)



Figure 14 -Map of the Whistler Sliding Centre





**Whistler Orientation**

Whistler Village sits at the base of Whistler Mountain and Blackcomb Mountain.

The Village can be accessed from Vancouver by driving up the Sea-to-Sky Highway, or, a luxury passenger train commutes twice daily between the two.

Multiple micro-communities have been developed within Whistler. The two most prominent are 'The Upper Village' (formerly Blackcomb Village) and Creekside. Chairlifts and gondolas take skiers, snowboarders, mountain bikers, hikers and tourists from Whistler up the mountain. A network of walk/bike paths make the entire area pedestrian friendly. The Whistler Sliding Centre is a three minute drive, an eight minute bike ride, or a 25 minutes walk from the main Village.

The Whistler Sliding Centre on the left page has been expanded on the right page.

Figure 15 -Graphic plan of Whistler Valley



Figure 16 -Graphic plan of the Whistler Sliding Centre

## Project Emphasis

Thunderbird Centre Resort emphasizes the following conditions (in order of importance):

**Economic Regenerative Design**  
(urban design scale)

**Designing for Physical and Mental Well-being**  
(building scale)

### **Economic Sustainability:**

At it's heart, Thunderbird Centre Resort is an experiment in sustainability. Common approaches in sustainability focus on harnessing sunlight and using products with a 'green' label. This project is different. While the design will harness sunlight, use environmentally responsible materials and employ other passive practices, its primary emphasis lies in macro re-use and economic sustainability. Instead of focusing on lowering a monthly energy bill, Thunderbird Centre Resort attempts to lift the burden of a financially un-sustainable facility from the shoulders of an entire community by transforming it into a revenue generating development that not only generates income for itself, but for the entire community (in an indirect way). In general, this will be accomplished by attracting tourists from outside of

Whistler, providing tourism opportunities for a fee, and allowing that outside money to percolate into the Whistler community. This entire effort is born of the obsolete facilities left behind by the 2010 Winter Olympics.

The proposed Thunderbird Centre Resort will be explored and presented in the form of a Master Plan that diagrams the transformation.

### **Designing for Physical and Mental Well-Being:**

The decision to include a secondary focus in this project was based on two factors. First: in order to fulfill the requirements for the M.ARCH degree at NDSU, proficiency of all aspects of building design must be demonstrated. Second: developing an athletic facility is directly aligned with the goals of the International Olympic Committee.

The high cost of maintaining a bobsled track and its inaccessibility to most of the people who are paying for it make it obsolete. Developing Thunderbird Fitness Centre is effectively replacing an athletic facility that doesn't work with one that does.

To fully demonstrate a working athletic facility, the design of this building will be taken to completed presentation drawings, diagrams and some details.



Figure 17 -Photo of vacant Sliding Centre in Summer

**Definition of Research Direction:**

The development of Thunderbird Centre Resort will pursue further knowledge in the areas of its theoretical premises, its typologies, historical context, micro and macro site elements and programmatic requirements. The two distinct scales that this project approaches will be pursued jointly in the interest of a unified design, however deviations into separate interest areas is unavoidable.

**Plan of Design Methodology:**

Both quantitative and qualitative information will be pursued. This information will be gathered for the purpose of:

- Graphic Analysis
- Digital Analysis
- Physical model Analysis
- Conceptual Analysis
- Interview Preparation

Quantitative and qualitative data will be gathered simultaneously following the topics defined by the theoretical premise with priority being given to the topics (in order) as listed in the project emphasis section of this proposal.

Data will be analyzed and applied to the design of Thunderbird Centre Resort and Thunderbird Fitness Centre as their results

dictate within the guidance of the theoretical premises.

Collected information will be not only be utilized during appropriate segments of the design process, but the comprehensive body of gathered knowledge will be interpreted and presented through text and graphics in the form of a final presentation board.

Quantitative data includes information of relative values. It includes statistical data, scientific data and all other numerical sets of data. Quantitative data can be gathered through measurements, experimentation or from archived resources published by another reputable source. Qualitative data includes descriptive information that can be simple, complex, tangible and intangible in nature. It can be gathered through direct observation, surveys, personal interviews and from archived resources published by another reputable source.

**Plan for Documenting the Design Process:**

A comprehensive collection of all design process documents will be compiled into a compendium in digital format.

This compendium will be preserved both in digital copy and hard copy. Digital copies will be stored in quadruplicate; one copy on a computer hard disk drive, one copy on an external hard disk drive, one copy 'burnt' onto a Digital Versatile Disk (DVD) and one copy to be uploaded onto the servers of the Carbonite online backup service ([www.carbonite.com](http://www.carbonite.com)). A hard copy will remain in the possession of the

author and of the administrating University (NDSU).

The compendium of information, being a comprehensive collection of information cannot be appropriately presented in its entirety. Instead, the most important information will be discerned and presented in the time allotted. Unrepresented data will remain in the compendium to give the presented data credibility and will act as a reference for any and all questions and inquiries.

Once the design process has begun, all documents will be digitally scanned, then chronologically and topically named once a week. This process will allow for efficient searchability and organization.

To the right is a proposed schedule of the design process for the Spring Semester, 2012.

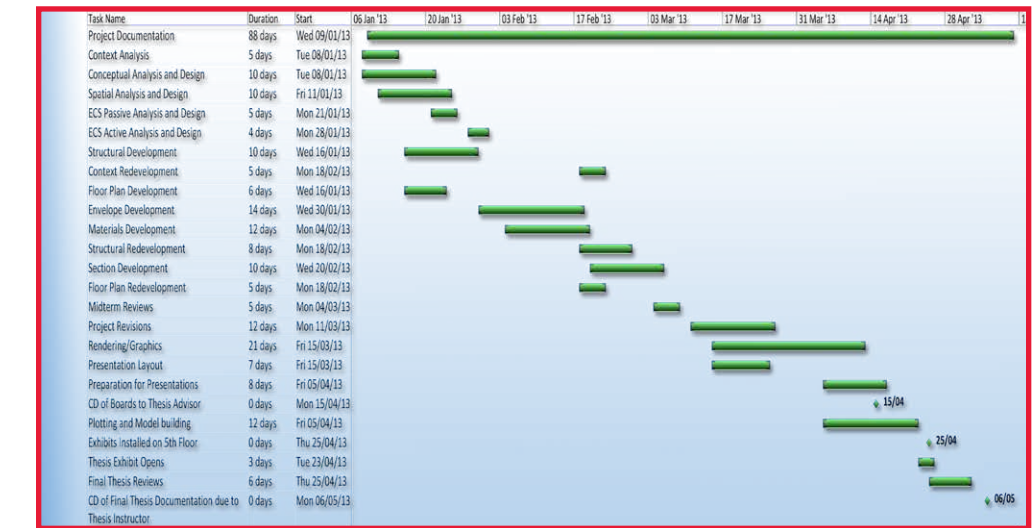


Figure 18 -Proposed Project Schedule in October 2012



# PROGRAM

Figure 19 -Photo of Garibaldi Provincial Park, adjacent to Whistler

**Introduction:**

The Olympic Games are a global sporting sensation that entertain the world, encourage healthy competition, instill national pride and bolster the hosting nation's economy. Unfortunately this Olympic Effect achieves its national benefits by sacrificing the well being of the hosting cities and resorts.

Olympic fallout is more of a rule than an exception. "Almost every [Olympic] Games of the past three decades has been accompanied by the claim that it would give a boost to investment, infrastructure and tourism, and in almost every case the prospectus has been false." (Perryman, 2012)

Andy Holloway concurs in his Canadian Business cover story.

"But all too often the real Olympic legacy is a sea of red ink that taxpayers have to pay off, with underused or bankrupt sporting facilities and little if any lasting change to the local economy.

'There's no measurable economic growth that happens from an event or from a sports team' says Jeff Owen, an assistant Professor at Indiana State University, who specializes in sports economics. 'Either the impact is zero or slightly negative if anything. The economic benefits are a fraction of what economic impact studies project.'" (Holloway 2006)

Exploring the possibilities of obsolete Olympic facilities generates a model of pro-active Olympic sustainability initiatives that can be used as an example for future host cities. Demonstrating the positive

transformation of an otherwise useless facility can help preserve the unique features of future host cities that make them such desirable and valuable destinations.

The research that sets the foundation for the design of Thunderbird Centre Resort and Thunderbird Fitness Centre is expanded on in the following section. The following is not an exhaustive reproduction of this research, rather, it highlights the most pertinent points and draws connections and conclusions. This research is presented as a series of answers to questions I asked about each theoretical premise. Analysis is integrated into each answer as a way to discern why this information is important and how it can be used to inform the design.



Figure 20 -Photo of Whistler and the base of the Whistler Sliding Centre

## Theoretical Premises

1. *Some Olympic sporting facilities become obsolete after their Olympic Games come to a close.*
2. *Obsolete sporting facilities can be harmful to the environment and the local economy.*
3. *Simply removing an obsolete sporting facility is not enough to lift its financial and environmental burden of the past present and future.*
4. *Architecture can be a valuable community asset when it meets the needs of the surrounding community.*

1

### What is the value of a bobsled track?

The Whistler Sliding Centre is an ammonia refrigerated half-tube of ice-covered concrete that athletes slide down in their respective competitions. Bobsled teams can be two or four people. The athletes ride a bobsled, which resembles the body of a small plane without wings. Luge has individuals and doubles categories while skeleton athletes make the slide individually. Luge athletes make the slide feet first. Skeleton athletes make the slide headfirst.

In pertinent literature, the intangible value of the Whistler Sliding Centre is passionate, but vague. Gary Kingston, a reporter for the *Vancouver Sun* Newspaper wrote an informative article including an interview with Whistler Sport Legacies' CEO Keith Bennett. Whistler Sport Legacies is the non-profit company that has managed all Olympic venues in Whistler since the conclusion of the 2010 games. In the article, CEO Bennett says "Our mandate is really about maintaining the legacies of the 2010 Olympic Games, developing sport and providing a venue for international and national competitions. The sliding centre is critical to our success in Sochi (at the 2014 Olympics) and beyond" (Kingston, 2012). In a separate interview with *Pique Magazine*, Whistler's local newspaper, Mr. Bennett said "We think we really add some diversity in the community" (Taylor, 2012).

Since the close of the 2010 Winter Olympics, the Whistler Sliding Centre has hosted a handful of national and international sliding events. A vocal enthusiast of such events, Doug Garnett, wrote a letter to

Question Magazine. He exclaimed:

"Prior to these games, few Canadians were avid followers of luge, bobsleigh, and skeleton competitions, and for many of us, the Olympics introduced us to these exciting sliding sports for the first time. In Europe, tens of thousands of spectators attend competitions in these sports, but here in Canada, due to



Figure 21 -Photo of a two-man bobsled at the track exit

our relatively new exposure to these winter sports, attendance is not comparable to that at European venues. This means that here you can get up front and close as a spectator, and enjoy all the action." (Garnett 2012)

Mr. Garnett's letter went on to describe the glory of sliding competition. He also mentioned the upcoming FIBT World Cup races. I personally attended the second day of the World Cup. Admittedly, I, the author of this book, only made the two hour trip to take pictures of the site. The promise of large crowds seemed daunting, but time restrictions made a visit on this day an absolute. Never the less, I was pleased to find the track being used. Mr. Garnett was right, it is exhilarating to be up close to the action. I found a spot mere feet from the apex of the final turn in the track. I was able to stand so close to the track because, surprisingly, other than myself and the Sliding Centre staff, there were only two other people there, tourists who, after a brief conversation, revealed that they had no idea there was a World Cup race in full swing.

Though the presence of an international competition failed to draw any spectators, the Whistler Sliding Centre was thoroughly enjoyed by the athletes themselves. Dave Smith, the brakeman for Great Britain's 2014 Bobsled team reminisces "My experience of Bobsleigh is one of pure adrenalin, speed, and excitement. I stand by my word that all roller-coasters have been ruined because of my involvement in Bobsleigh" (Smith 2012).

The action of the bobsled, luge and skeleton races during the Olympics were an important part of the Olympic experience, an experience that was viewed by 3.5 million television spectators from around the world during the 17 days of sport (PricewaterhouseCoopers 2011). There is no doubt that the national pride felt by those watching swelled as they cheered for their country's athletes. The 2010 Olympic motto 'With Glowing Hearts' is a line taken directly from the Canadian National Anthem and it couldn't be a truer expression of the spirit of celebration and unity that was felt all over the world. Without the bobsled, luge and skeleton events, the Olympics would have lacked three events that excite and energize Olympic spectators. Without them, the 2010 Winter Olympics could not have been the successful mega-event that they were.

The tangible value of the Whistler Sliding Centre in terms of cold hard cash begins at \$104.9 million Canadian dollars, which was the price tag attached to the Sliding Centre when its construction was completed back in 2007 (Sportsnet 2007). Other sources claim this number to be as high as \$110 million dollars (this project will use the more conservative number). Currently, tax assessments value the Sliding Centre at just \$29 million dollars. The Centre provides jobs for 26 permanent staff members and 124 seasonal staff members (Taylor 2012). These jobs could be fairly easily integrated into a new kind of facility were the Sliding Centre to be re purposed.

The Whistler Sliding Centre will be forever linked to the spirit and pride of the Winter Olympics. However, it is difficult to assign sentimentality a

quantitative value. Whistler City Councilman Duane Jackson remarked "You could argue [The Whistler Sliding Centre] has no value" (Taylor 2012). Two questions can be asked to help quantify the worth of the Whistler Sliding Centre. Was it worth the \$104.9 million dollars? And, is it worth the \$2.7 million dollar annual operating bill that keeps the Centre open in the post-Olympic environment?

### How many people use the Whistler Sliding Centre?

The Whistler Sliding Centre puts up a brave face, but signs of its decline are becoming evident. In a personal email, Whistler Mayor Nancy Wilhelm-Morden, when asked about the negative effects of the Olympics in the Whistler community exclaimed:

"Important decisions made without little or no local government consultation, increased property taxes in the years preceding and immediately following the Games, what appears to be a white elephant (the Sliding Centre), business outside of the Village suffered in the months preceding the Games and during the Games themselves. The municipal agenda was completely taken over by Games-related matters for months, in fact, years before the Olympics."  
(Wilhelm-Morden, 2012, personal correspondence)

Evidently the local government is feeling the burden of the Whistler Sliding Centre.

However, the challenge of finding users in a post-Olympic environment should be no surprise. In an article titled "The Reuse of Sports Facilities after the Winter Olympic Games", author Heike C. Alberts, with references of his own states:

"Problems with reusing facilities built for the Winter Olympic Games were first reported for Grenoble (1968). The Games themselves were judged to be a great success, but the ski jump has since rarely been used, and several other facilities such as the bobsled tracks were completely abandoned (kikawka 1999; Terret 2006). Since 1968, the problem has become even worse. Changes in the sports themselves, such as the equipment used and the level of competition, require ever more specialized facilities (Essex and Chalkley 2004). For example, bobsled tracks have become much faster, and consequently more dangerous, over the years, further limiting their reuse outside elite athlete training and international competition (figure 2) [Not a part of this document]. This has led some commentators to criticize the Games as elitist. The facilities are not only built for the competition of a small global elite of athletes, but their subsequent uses are also limited to this elite group of people. (Hiller 1990)." (Alberts 2011)

The small group of elitest athletes that Alberts refers to is even smaller than you may think. The FIBT (Federation internationale de Bobsleigh et de Tobogganing) is the governing body of competitive

bobsled, luge and skeleton racing. Their website (www.fibt.com) lists all active athletes that are members of the federation. Canada is represented by a minuscule 336 total athletes in all three sliding events combined (FIBT 2012). According to StatsCan (Statistics Canada), Canada has a population of 34.9 million people as of 2012. Tax dollars gathered at a Federal level were given to VANOC (Vancouver Organizing Committee) in order to help fund the Olympic effort, an effort which included the construction of the Whistler Sliding Centre. Of the 34.9 million people who paid federal taxes, which were used in part to pay for the track, only 0.00096% are qualified to use it to its full capability. For clarity, only 9.6 people out of one million are able to slide. Nine point six ten-thousandths of a percent does appear to exclude quite a few people. Additional funding was given by the Provincial Government of British Columbia. The total number of sliding athletes only accounts for 0.0073% of the Provincial population (4.62 million people) (StatsCan 2012). Even with a smaller population considered, the number is still incomprehensibly small. Compared to the countless child, adult, amateur and professional leagues of sports such as ice hockey, soccer, American football and baseball, the numbers hardly justify the need for a bobsled, skeleton and luge track.

To say that the ability to slide down the track is impossible for the average person would not be entirely accurate. For the four months of the year that the track is in operation, the general public may book bobsled and luge rides. This service is provided at an additional cost of \$159.00+tax per person. Those interested should not expect the full Olympic experience. The ride, piloted by a WSC staff member

only uses the last half of the track and will last approximately 60 seconds(Whistler Sliding Centre 2012). To put this into perspective, an adult full-day park-hopper ticket to Disneyland and California Adin California costs \$125.00 (Disneyland Resort 2012)

### What is the future of the Whistler Sliding Centre?

The Future plans of the Whistler Sliding Centre are “...to continue to capitalize...on the opportunity that the Olympics has given the community”, according to Whistler Councilman Jack Crompton (Taylor 2012).

Currently, the track is getting a 1.7 million dollar upgrade due to the fatal death of Georgian luger, Nodar Kumaritashvili in 2010. The track, which was determined to be too fast is effectively being shortened and lowered. A new starting ramp and a new two story start house are being constructed, which duplicates the existing start ramp and two story start house. Annual operating costs are upwards of 2.76 million dollars. In 2011, the Center suffered a 2.2 million dollar shortfall since it only generated \$578,000.00 CAD in revenues from public sled rides, competition fees and training fees. This deficiency will be taken from Provincial tax revenues.

Locally, the taxes the Centre should pay annually amount to approximately \$500,000.00, just under its total income. Fortunately for the Sliding Centre, it has been granted tax exemption for all five years it has been in operation (Taylor 2012). With a tax exemption being granted every year, no path exists for Centre revenue to ever

make it back to the Provincial Government- even if it could afford it.

Plainly speaking, the Whistler Sliding Centre is losing millions of dollars every year during normal operation, and has invested an additional 1.7 million to ensure that this un-profitable operation can continue, albeit in a safer manner. The high cost of running the Centre and its general lack of usefulness have made it an obsolete sporting facility.

### Can obsolete sporting facilities be physically harmful?

The day before the opening ceremonies of the 2010 Winter Olympics, Georgian luger Nodar Kumaritashvili was killed when he was thrown from the track of the Whistler Sliding Centre and hit a column that supported the tracks separate roof structure. “Officials immediately closed the controversial run, which is known for its high speeds, often reaching 150km/h. (Longley 2010). In another article, Australian born luger Hannah Campbell-Pegg said “I think they are pushing it a little too much...To what extent are we just little lemmings that they just throw down a track and we’re crash-test dummies? I mean, this is our lives.” (Snyder, 2010) Though I am relatively certain that no one ever tried to throw Ms. Campbell-Pegg down the sliding track, her outrage and alarm at not only the death of Nodar Kumaritashvili, but at the now lethal speed of the track was also felt by all the athletes and the general

2



Figure 22 -Photo of Nodar Kumaritashvili’s death at the Whistler Sliding Centre (Parks, 2010)





Figure 23 -Photo of abandoned Olympic Plaza in Torino, Italy . (Burkett, 2012)

public. The death of Mr. Kumaritashvili was in no way a consequence of an obsolete sporting facility, rather, it demonstrates its potential for causing injury. After all, Mr. Kumaritashvili was a trained athlete performing a practice run under the scrutiny and supervision of a fully operational sliding centre; should the Whistler Sliding Centre ever fall into ruin, it could never be left intact and unsupervised, it would be too great a liability.

### Can obsolete sporting facilities harm the environment?

According to WorksafeBC, ammonia refrigeration plants (the system used to keep the sliding track frozen) can be potentially dangerous if the ammonia finds its way into a person's body. However, ammonia is a natural and environmentally compatible chemical that can be recycled or neutralized (WorksafeBC, 2007). With no major chemical threat, the second biggest concern would be dealing with the massive track itself and the various buildings and roads on the site. Ultimately, a decision would need to be made concerning the future of the facility, were it to be deemed obsolete to the point of closing down- a point that seems inevitable.

One option for addressing the obsolete facility would be to dump the 2000m<sup>3</sup> (2616yd<sup>3</sup>) of concrete track into a landfill. Its volume would amass to a little more than a staggering 41'x41'x41' solid cube of concrete. Other, more responsible options include demolishing and crushing the concrete track to be recycled as aggregate in another concrete application. Various degrees of full or partial disposal

and recycling could be possible based on cost vs. benefit models. Alternatively, the disposal of the entire track could be avoided if another use for it could be found.

### In what state are bobsled tracks worldwide?

In Cesana, Italy's 2006 Winter Olympic equivalent to Whistler, the Italian sliding centre has been scheduled for closure and demolition. "A faltering economy and distance from a major population centre were factors in Cesana's demise." (Kingston, 2012). An article in alpMedia gives more information.

"It costs 1,500 euros a day to maintain the bobsleigh run that was built specially for the 2006 Winter Olympics. That equates to over 40,000 euros a month for a facility that is scarcely ever used.... Its building alone cost 120 million euros. Demolition including the disposal of the 48 tonnes of ammonia required for producing and cooling the ice will devour another 220 million euros....It is ultimately always the taxpayer who slumps up for infrastructure projects of this kind. The people of Piemonte have now paid dearly for the lesson. Will a gold medal at the next Winter Olympics be suitable compensation?" (alpMedia, 2012)

In conclusion, the harm caused by an obsolete sporting facility can be subtle, but significant. The harm it will do is not singularly catastrophic, but its slow consumption of millions of dollars, and its wasteful existence need to be countered. Fortunately, these problems



Figure 24 -Photo of abandoned Bobsled Track at Sarajevo. (Nisbett, 2012)

Olympic Bobsled Tracks from 1980

1980	Lake Placid, USA	Operating (training and tourism- \$80.00USD/ride)
1984	Sarajevo, Yugoslavia	Abandoned
1988	Calgary, Canada	Operating (training and tourism- \$169.00CAD/ride)
1992	Albertville, France	Operating (training & tourism- €118.00/ride)
1994	Lillehammer, Norway	Operating (training and tourism- NOK 975/ride [approx \$170.00USD])
1998	Nagano, Japan	Operating (competition, training and tourism- JPY 1,500/ride [approx. \$15.00USD])
2002	Salt Lake City, USA	Operating (training and tourism- \$50.00USD/ride)
2006	Turin, Italy	Closed. Demolition Proposed.
2010	Vancouver, Canada	Operating (competition, training and tourism- \$149.99CAD/ride)
2014	Sochi, Russia	Completed in 2012. Operating (competitive)
2018	TBD on 31 July 2015	

can be anticipated and countered if addressed in a proactive way. It is important to note that the Whistler Sliding Centre is not only a problem

Figure 25 -Table of Olympic bobsled tracks

to be taken care of, it is also an opportunity to be taken advantage of.

### What are the future options (and their consequences) of an obsolete sporting facility?

As mentioned before, some options for the future of an obsolete sporting facility could be:

- complete demolition and disposal
- complete demolition and recycling
- partial demolition and disposal
- partial demolition and recycling
- complete demolition and creation of something new
- partial demolition and creation of something new

The first four of these options effectively end the problem, but they offer no way for the losses to be recovered. The last two options begin to address the losses by providing an opportunity for something new to make use of the property, to address local issues and to generate a profit.

The financial situation of the Whistler Sliding Centre broadly resembles the economics of obsolete buildings in Detroit, Michigan.

Due to the closure and relocation of major industrial production facilities, many thousands of people have been left without jobs. As a consequence, these people have moved away or fallen into poverty. This social and economic upheaval has left roughly 90,000 homes and

residential lots vacant. Mayor Dave Bing plans to address the rapid down sizing of the city by demolishing abandoned property with federal bailout money.

“When it’s all over, said Karla Henderson, director of the Detroit Building Department, ‘There’s going to be a lot of empty space.’

Mr. Bing hasn’t yet fully articulated his ultimate vision for what comes after demolition, but he has said entire areas will have to be rebuilt from the ground up. For now, his plan calls for the tracts to be converted to other uses, such as parks or farms.” (Kellogg 2010)

The approach Detroit Government officials are taking involves spending a great deal of money on erasing the symptoms of a bigger problem. The implementation of a plan that not only halts the harm, but also reverses it has yet to be put in place.

In similar fashion, simply ending the expenses of the Whistler Sliding Centre is not enough. A plan to transform the Sliding Centre into a revenue generating entity can not only recover lost money, but could also be a major source of profit once its debts have been paid.

### How can Olympic Legacy be preserved?

The legacy left by the Olympics in Whistler is one of debt and disuse. These qualities are vehemently antagonistic to the vibrant spirit and excitement that came with the 2010 Winter Games.

It can be argued that preserving the Olympic spirit can be best achieved by transforming one of its facilities into something other than its intended use, something that is more aligned with the spirit of the Olympics.

An excellent example of a positive and lasting Olympic Legacy is the Whistler Olympic Plaza. The large covered stage was originally where Olympic champions were presented with their medals. After the Olympics ended, the large outdoor stage is used for concerts in the summer and becomes an ice skating rink in the winter. Large screens can be set up and used to broadcast the Olympic games every two years as they occur. The Plaza has become a focal point for the village of Whistler. It is surrounded by boutique style shops and restaurants and includes an ADA playground that is enjoyed by children and adults of all abilities.

### What is a valuable community asset?

This project will define a valuable community asset as something that sustains, contributes to, or furthers a group of people who identify themselves as belonging together. The specific areas addressed will include:

4

- Environment
- Governance
- Establishment
- Economics

### What does Whistler need?

#### Environmental Needs:

“In Whistler, over 70 percent of our original wetlands have been lost to development or draining. The Millar Creek and Alpha Creek wetlands (found South of Creekside and in an area often referred to locally as the Zen lands) represents the largest remaining wetland within Whistler’s developed boundaries. As with all environmental systems, these areas cannot be considered in isolation, and wetlands in particular, are extremely sensitive to changes in the areas that surround them or have impacts upon them.” (Ruddy, 2012)

Introducing two natural purification systems into the master plan of Thunderbird Centre Resort is an excellent opportunity to offset the destruction of natural wetlands in Whistler. Natural purification systems such as bioswales and constructed wetlands also make for excellent park and garden areas. Populating these areas with informative signs can educate the public about wetlands and their importance in the ecosystem.



#### Governance Needs:

The stone walls, wood burning hearths and timber framed hotels of Whistler allude to Swiss Chalets, Half-timbered Houses, Romanesque architecture and French Châteaux of the 17th century. The end result is a mix of very modern hotels robed in the romantic styles of fable, fairytale and history.

Figure 26 -Photo of remaining wetlands in Whistler

Whistler Village is a modern manifestation of the quintessential European village. It has followed this style in an all encompassing manner; however, it still lacks an incredibly important feature common to most villages of antiquity: a castle.

“In the late eleventh and early twelfth century, the impressive appearance of [castles] (in particular those with towering mottes) served as cultural markers, proclaiming and legitimating territorial control and expressing the cultural identity of a new elite” (Creighton, 2002)

Like the buildings that populate Whistler Village, an allusion to style and purpose is what is important rather than a literal duplication of the medieval castle. This symbol of authority and direction has become necessary because of one thing: the Olympics. An organization called *One Whistler* is a conglomeration of four entities: The Resort Municipality of Whistler; Tourism Whistler; The Whistler Chamber of Commerce; and Whistler Blackcomb Holdings Inc. During one of the organization’s meetings, chairman Ray Longmuir said:

“As a community we are all moving in the same direction. It used to be we were moving towards the Olympics and we had that defined goal in mind. Now we’re all moving toward something and I truly believe it is a greater Whistler, but we don’t have that common vision of what that greater Whistler is.” (French 2011)

The pro-active transformation of the Whistler Sliding Centre would be a visible gesture that everyone in the Village could observe. Establishing a resort that addresses economic shortfalls is evidence of financial responsibility and demonstrates that Whistler is a community worth investing in. This is an important step for the city as they transition from being a place defined by the Olympics to being a place that is defined in and of its own unique nature, of which the Olympics were just a small part. In this way, Thunderbird Centre Resort can become a castle through its ideals and design considerations, showing leadership in areas of financial stability, bodily health, recreation, community, and responsible and environmentally sensitive lifestyles.

**Establishment:**

Whistler’s ever growing community has surpassed the definition of a rural or remote community. Amenities such as movie theaters, higher education, diverse places of worship and fitness facilities will continue to be added to the Village. Currently, there are only four fitness centres in Whistler; three are privately owned and one is run by the Resort Municipality of Whistler. The Municipal facility, named the Meadow Park Sports Centre lies 5km (3 miles) to the North of the main Village. In anticipation of the growing city, Thunderbird Fitness Centre would be added to the Municipal city fitness program.

**Economic Needs:**

The need to recover money lost to the expenses of the Whistler Sliding Centre require no further explanation; however, the means to accomplish this do. Since tourism is the biggest source of revenue in

Whistler, attracting and retaining tourists is very important. In the same *One Whistler* meeting previously mentioned, past mayor of Whistler Ken Melamed exclaimed “The resort is sized to accommodate about 75,000 people and Whistler currently experiences about 55 percent occupancy. The goal is to move to 65 percent occupancy” (French, 2011). One of the ways that this group of leaders plans to do this is by broadening its services. Fiona Famulak, president of Whistler’s Chamber of Commerce said “We want to broaden the impact of service so that its embraced by as many people as possible and that doesn’t just mean the folks in the business community but it means the community at large.” (French 2011) One excellent way to broaden the available services is to tap into underutilized resources, and there is one such resource that comes to mind.

**Are there untapped resources?**

The Whistler backcountry is an underutilized area bursting with potential. The opportunities for Whistler’s dual seasons, summer and winter, are vast. Hiking, camping, mountaineering, rock climbing and glacier skiing are all excellent summer activities in the backcountry. Winter, with its abundance of snow makes skiing, snowboarding, hiking, snowshoeing dog sledding, cat-skiing and heli-skiing a perfect to-do list outside the patrolled boundaries of Whistler Blackcomb. (Baldwin, 2004)

By addressing Whistler’s needs as a community, Thunderbird Lodge can become a valuable community asset.



Figure 27 -Photo of Whistler’s untamed backcountry



# CASE STUDIES

Figure 28 -Photo of the Westin Resort and Spa. A good example of Whistler Architecture

Introduction

This thesis project was originally going to be a hotel. It seemed to be the right decision, but the more I learned about Whistler, Whistler’s needs and the Whistler Sliding Centre site, I reluctantly conceded that the project I wanted to design wasn’t actually going to work. After putting my personal wants aside, the Thunderbird Centre Resort was born.

The first design, called Thunderbird Lodge, was to be a hotel/day lodge/youth hostel/adventure tourism outpost/event centre. Complex programs such as the one proposed for the original Thunderbird Lodge are common in the hotels of Whistler Village. Unfortunately, this model is not universal. Instead, a more reserved approach was taken. The functions of these complex programs were split up and allocated to individual buildings on the Whistler Sliding Centre Site. This gesture more efficiently re-used the existing buildings, saving all but one of them from demolition.

Some of the following case studies were chosen to inform the design of the original Thunderbird Lodge, not its successor, Thunderbird Centre Resort and the Thunderbird Fitness Centre. Yet, their merit stands. Instead of excluding them, I have elected to leave them in this document as milestones that mark the evolution of the project.

The first three meet specific case study requirements assigned for this thesis. Those that follow are more casual and explore aspects of design that closely relate to Thunderbird Centre Resort.

Caltrans District 7 Headquarters by Morphosis best shows the relationship between

varied public spaces and more specific private spaces. The public spaces need to be exposed and visible where the private spaces need to be efficient and orderly.

Murcia Town Hall by Rafael Moneo is a good example of strong but not dominant government presence. Visible leadership shows active leaders and softens the relationship between government and the public.

The Atheneum by Richard Meier exhibits efficient circulation for a tourist building. People who are unfamiliar with a place need to be told where to go.

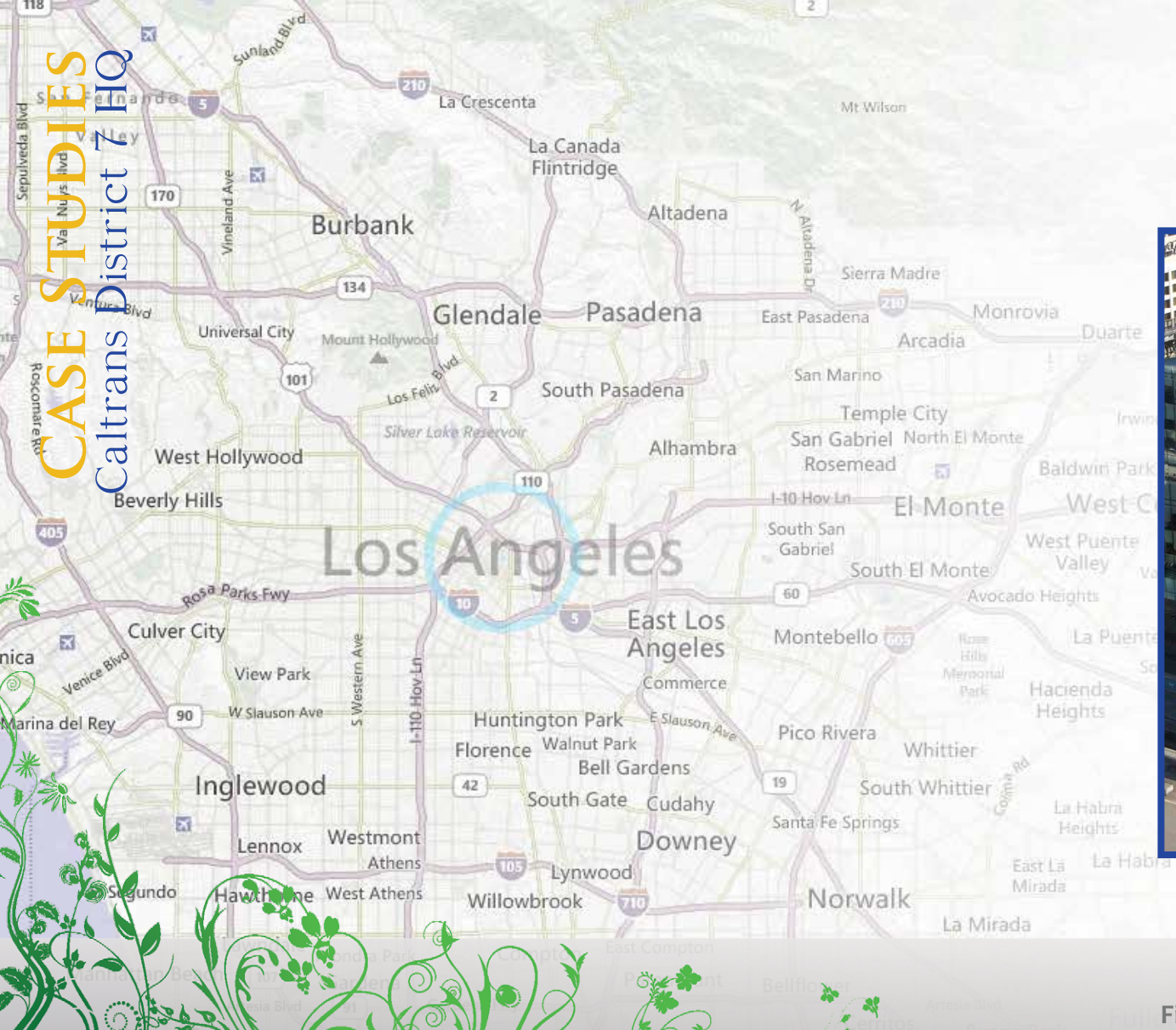
The Hilton Garden Inn gives insight into the functions and their interrelationships of a place of hospitality, accommodation and amenity.

The Squamish Adventure Centre exhibits the beautiful possibilities of West Coast Timber.

The Queen of the Valley Hospital Wellness Center provides a thorough example of a fitness facility plan giving examples of its necessary spaces and how they are arranged.

Whether directly or indirectly, each building contributed to its community in some significant way. Each building is also quite unique which goes to show that a community needs many things and anything that can meet those needs has great value.





## Caltrans District 7 HQ by Morphosis



Figure 29 -Map of Los Angeles (Bing Maps 2012)

Figure 30 -Caltrans District 7 HQ Building (Geographer, 2009)

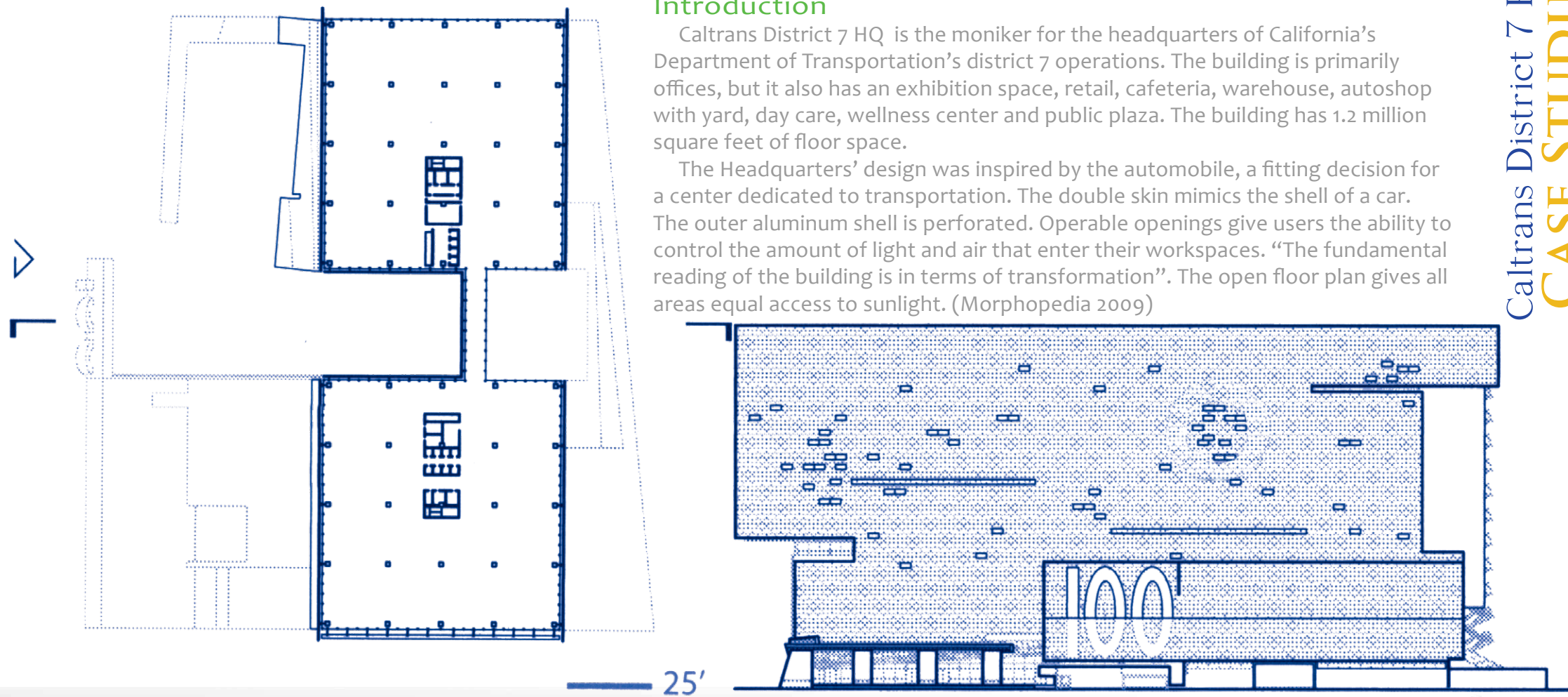
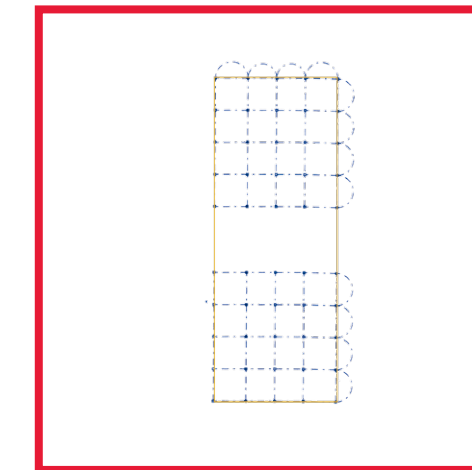
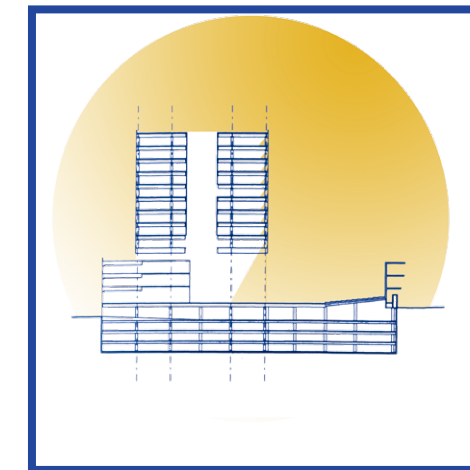
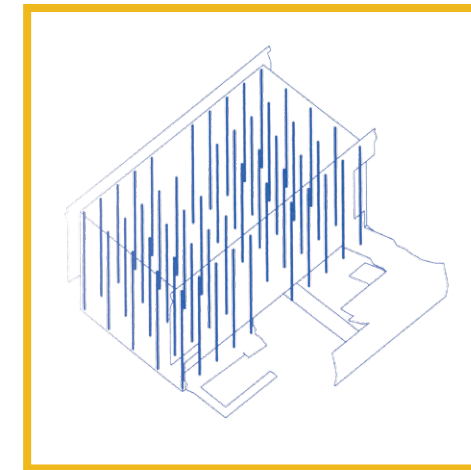
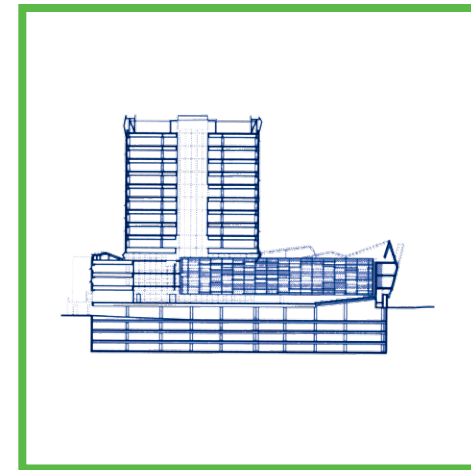
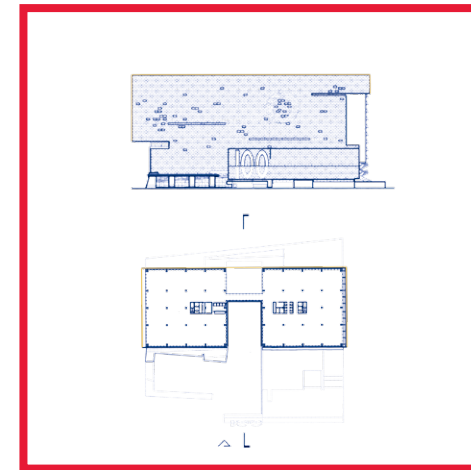
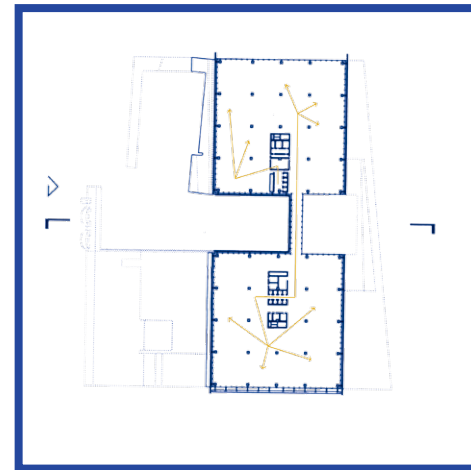
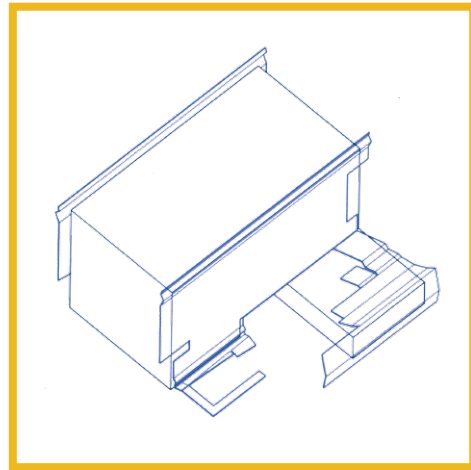
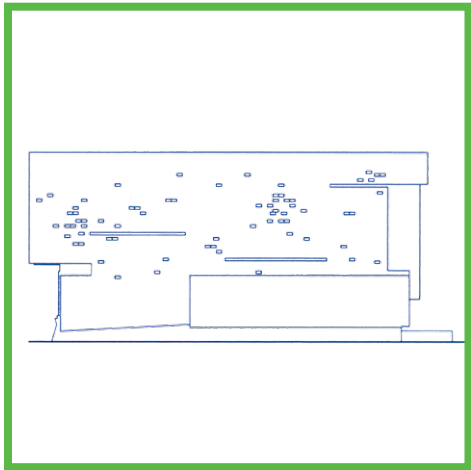


Figure 31 -Caltrans District 7 HQ Vignettes (Borden, 2010)

### Introduction

Caltrans District 7 HQ is the moniker for the headquarters of California's Department of Transportation's district 7 operations. The building is primarily offices, but it also has an exhibition space, retail, cafeteria, warehouse, autoshop with yard, day care, wellness center and public plaza. The building has 1.2 million square feet of floor space.

The Headquarters' design was inspired by the automobile, a fitting decision for a center dedicated to transportation. The double skin mimics the shell of a car. The outer aluminum shell is perforated. Operable openings give users the ability to control the amount of light and air that enter their workspaces. "The fundamental reading of the building is in terms of transformation". The open floor plan gives all areas equal access to sunlight. (Morphopedia 2009)



### Analysis

The Caltrans District 7 Headquarters building stood out to me because its ability to transform; a mechanism that allows it to adapt to the tastes of individual users. The transformations that Thunderbird Lodge will attempt are more or less permanent changes, but this building shows that transformation can continue to touch the individual users long after construction has been completed. Caltrans' second outer skin's primary purpose is to limit the amount of sunlight that can enter the building. In Whistler, the site, which sits between two mountains, will have no such problem. A skin that amplifies the amount of natural light that penetrates the building would be much more advantageous.

The hierarchy of the Caltrans

building is almost non-existent as far as surface material conditions are concerned. This is quite opposite to the decorated exteriors of Whistler hotels which have a very elaborate set of hierarchies.

The massing is ultimately monolithic, a rule that is broken near ground level. While this fits into the urban LA environment, it would have no place on the slopes of a mountain. It also limits the views as you approach the interior of the building.

The circulation in the above drawing shows the openness of the Caltrans floor plan. Since Thunderbird Lodge's program is broader than a generic single-use building, the openness would be a great way to make the different program elements available from a central space. Like the Caltrans building, the cluster of varied program elements tend to be near the ground where they can be most easily and quickly

accessed. As the programmatic elements become more specialized and exclusive (the office spaces), they tend to radiate away from the entry point since exposure to them is not necessary. Thunderbird Lodge's hotel rooms could be similarly placed.

Caltrans employs a skip-stop elevator, which only stops at every three floors. Employees then take the stairs through a series of gathering spaces/lobbies to get to the desired floor. Though this encourages social interaction in an office building, it would be burdensome to the patrons of a hotel, many of whom will be constantly transporting skiing, snowboarding and mountain biking equipment.

In section, it is easy to see the variety of space near ground level and the repetitive office spaces in the tower that rises above.

Structurally, the load bearing columns in a grid do not inform an

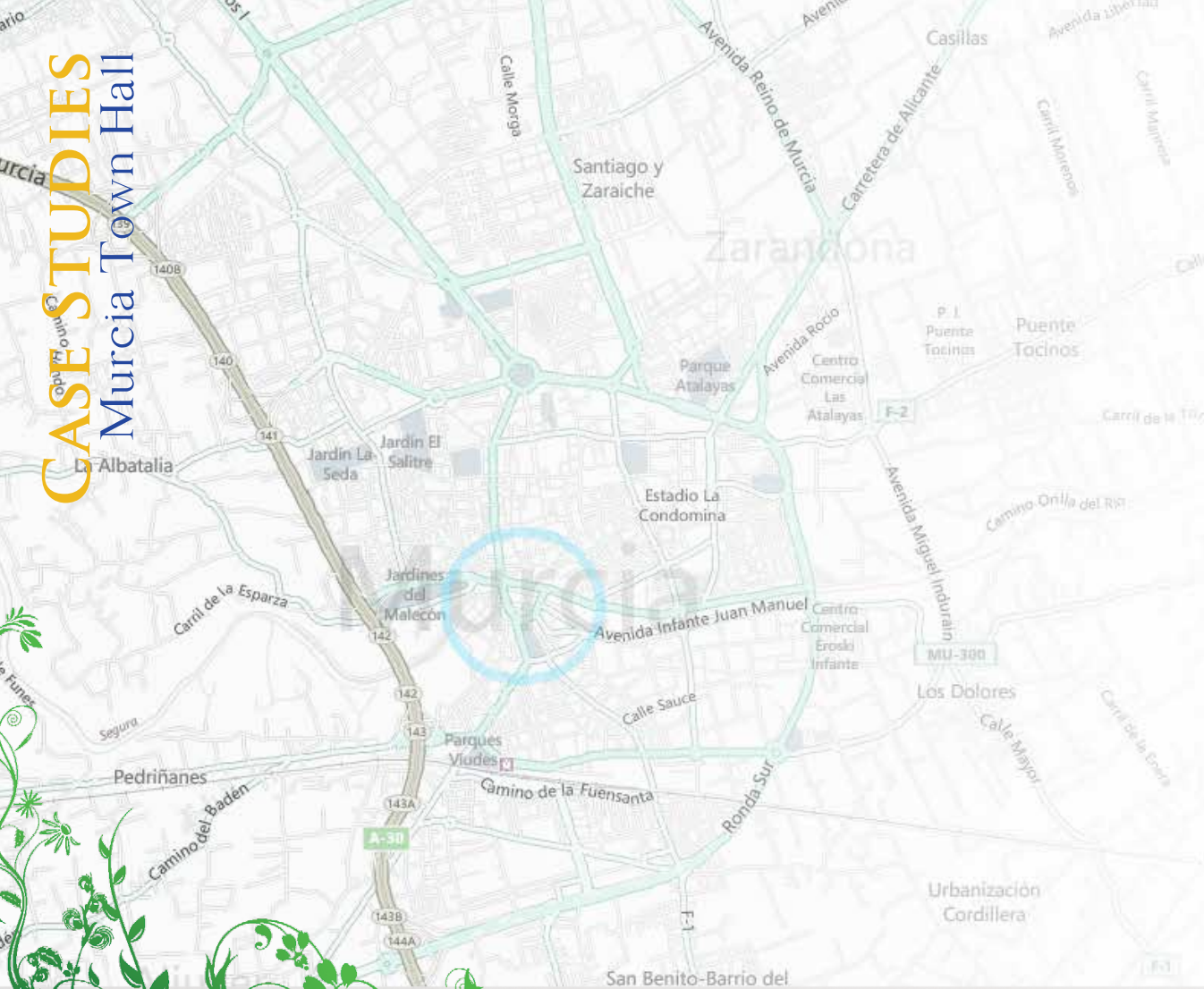
exterior condition with varying form, however such variations are still possible with such a structure.

As mentioned before, getting adequate natural light into the building may be a challenge because the mountains adjacent to the site as well as the commonly occluded climate offer little light to begin with. Caltrans' careful light control would be counterproductive in a setting such as the Whistler Sliding Centre.

Geometrically speaking, Caltrans is unremarkable. Structural bays form perfect squares which are repeated until the general shape of the site has been more or less covered.

In conclusion, Caltrans District 7 Headquarters is most valuable as a study in spatial organization. Its exposed public spaces and enclosed private spaces are a model for Thunderbird Lodge.





## Murcia Town Hall by Raphael Moneo



Figure 32 -Map of Murcia, Spain (Bing Maps 2012)

Figure 33 -Murcia Town Hall (Thomasson, 2011)

### Introduction

The city of Murcia lies on the Southeast coast of Spain. The town hall is actually an annex that supplements a larger municipal building. The plan below shows the open entryway, offices and the main lecture hall and its projection box. It also shows the lowered deck below the main facade. The elevation shows the building's most prominent feature, a face that forms part of a wall that defines a city plaza. The face competes with two ornate churches in the square it borders.

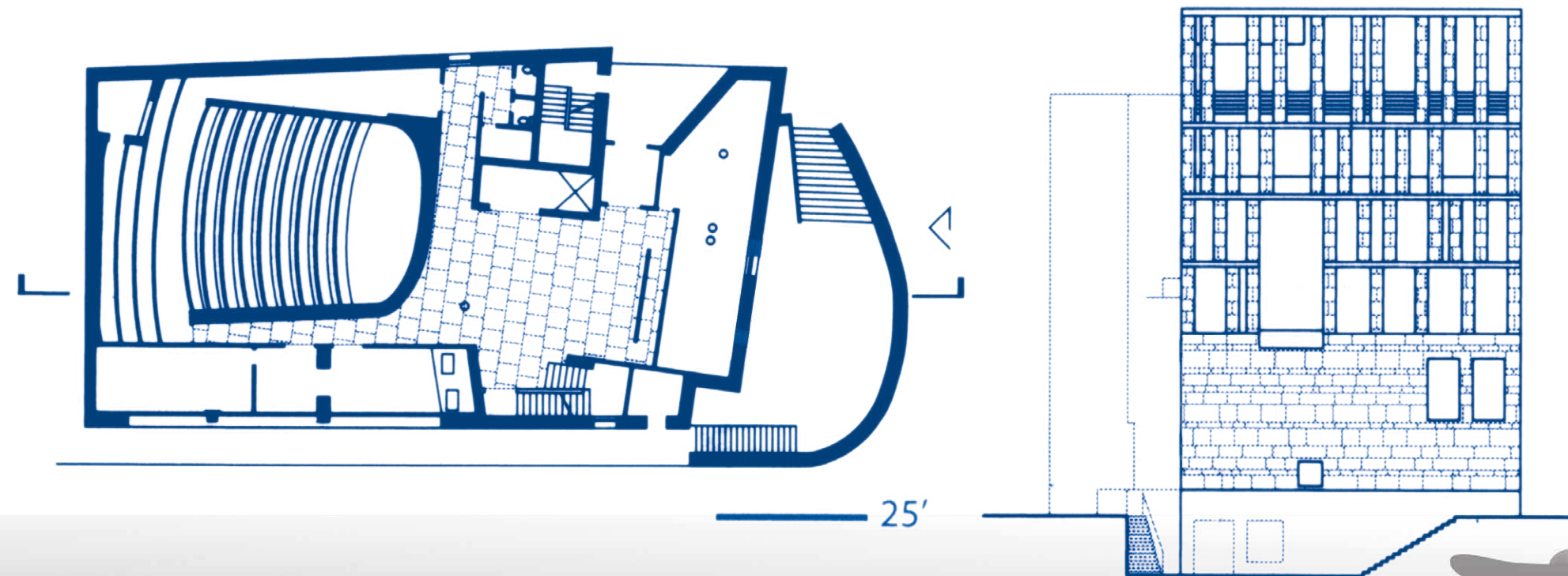
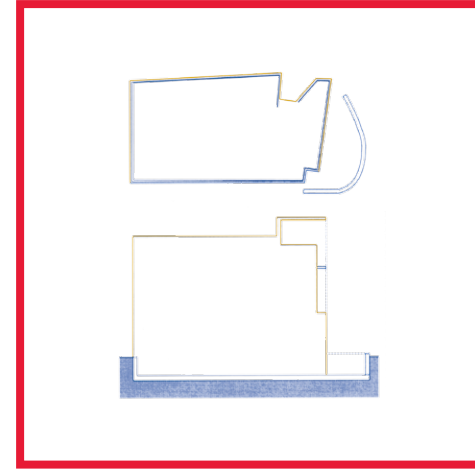
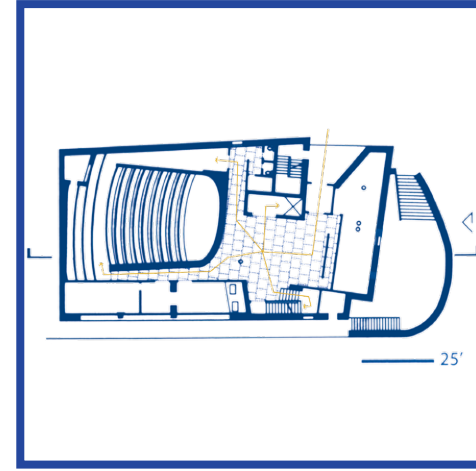
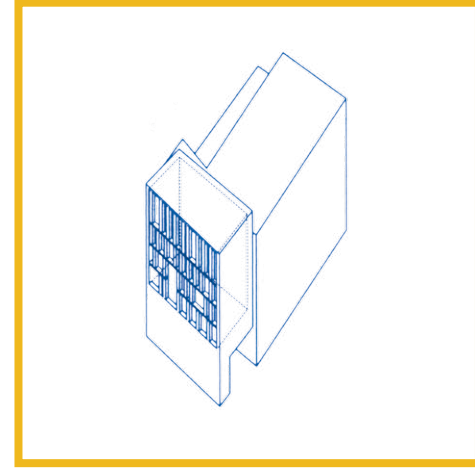
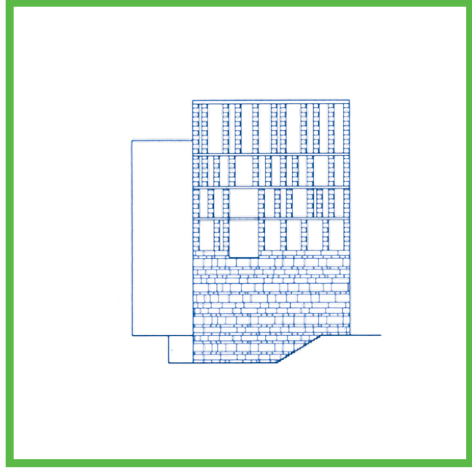


Figure 34 -Murcia Town Hall Vignettes (Borden, 2010)



### Analysis

Murcia Town Hall very closely represents the same presence of authority that Thunderbird Lodge will have in order to meet the governance needs of the people of Whistler.

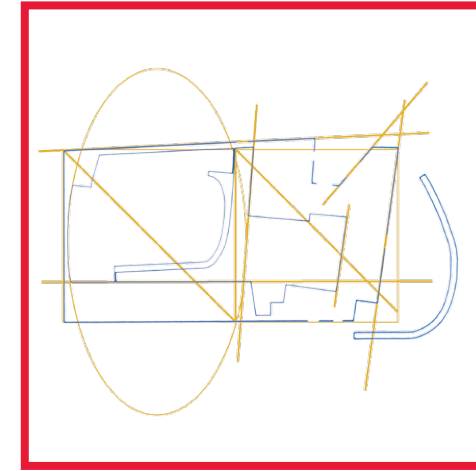
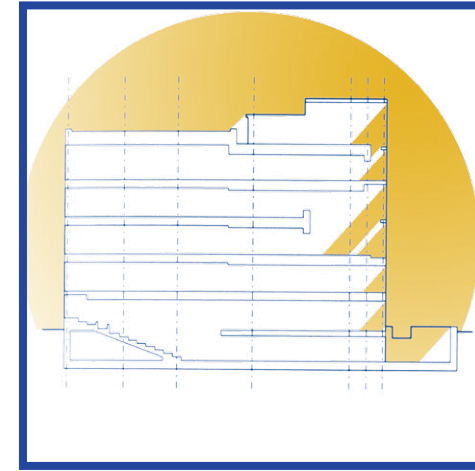
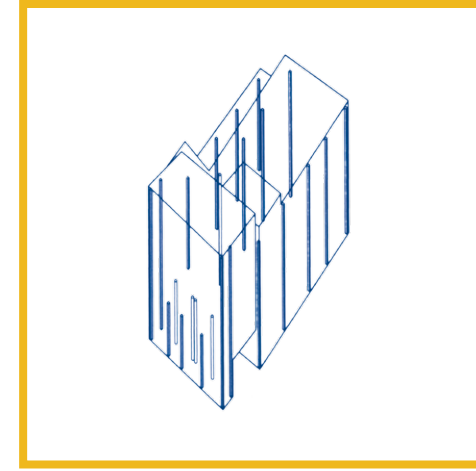
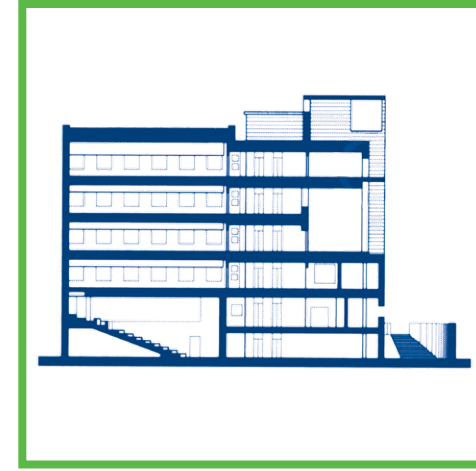
Murcia's greatest asset to this end is its central location, something absolutely necessary when public visibility is important.

The main facade of the Town Hall is simple yet interesting. The implied lines are consistent, but broken up, creating interesting irregularities. Its materials are soft, yet their staunch arrangement maintains the buildings institutional sense. This sense of soft yet strong is a good way to show strength without dominance and would be a good way to surround the glazing of the event space in Thunderbird

Lodge, the space meant to hold city council meetings in a visible and transparent way.

Murcia Town Hall can be broadly described as two rectangular prisms intersecting each other at a slight angle even though the geometry diagram shows greater detail. No direct massing or geometric correlations need to be made.

Like the Caltrans building, Murcia Town Hall gathers users into a large space and displays multiple program elements at a time. From this main space, users can chose which space they need to visit and then go there with ease. It is also worth noting that the building's primary function is located on the ground floor. Unfortunately, users in wheelchairs or users with mobility issues are forced into the front row of the small auditorium. It is also worth noting the lack of toilets (2)



considering the amount of people this building can hold.

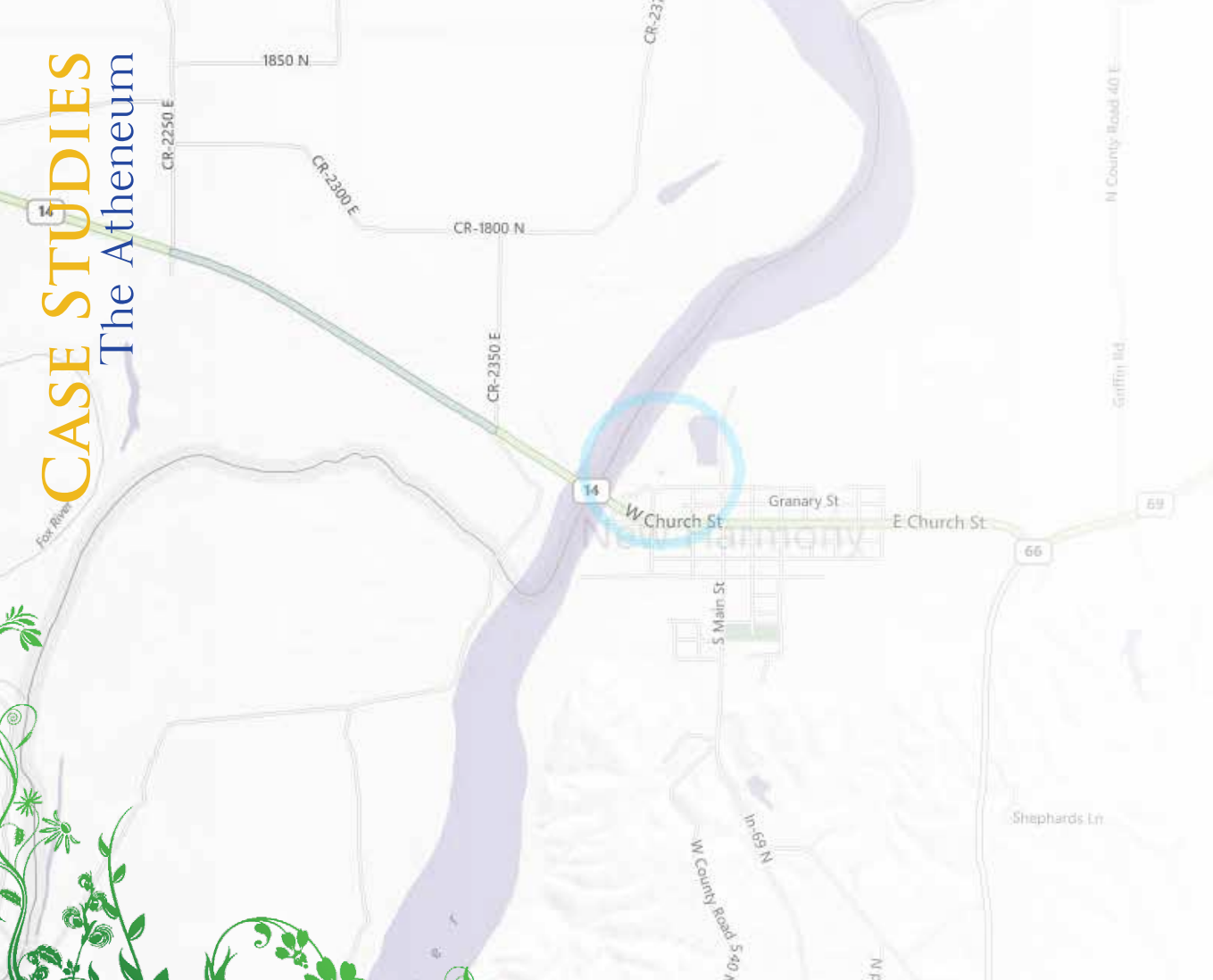
Murcia also resembles Caltrans in section, with the variety of individual and public functions near the ground and the more private and specific spaces repeatedly stacked above. This doubly reinforces my inclination to utilize a similar layout.

A tiered auditorium allows for better views of the stage, but limits versatility. Where Murcia's council meeting space is dedicated to that purpose, Thunderbird Lodge's is not, it will need to facilitate events of varying natures. To this end, a flat floor is best. Removable risers and other such seating arrangements can be further researched once the design has progressed to that point.

Structurally, columns are placed on the exterior walls allowing beams to span in the short dimension. This has freed up the floor plan

to allow for an open space such as an auditorium.

Murcia Town Hall's auditorium, like most presentation spaces, requires darkness to facilitate projection. Therefore it has no windows. This cannot be the case with the event space in Thunderbird lodge since visibility and transparency are an integral part of using the space as a city council meeting place. The need for views in and out, as well as the need for clear projection will need to be addressed in the design phase.



The Atheneum  
by Richard Meier



Figure 35 -Map of Murcia, Spain (Bing Maps 2012)  
Figure 36 -Murcia Town Hall (Thomasson, 2011)



Introduction

The Atheneum is a visitor center in the historic town of New Harmony, Indiana. It orients and educates tourists about the city. A continuous ramp directs users through the building. Tourists may arrive by boat on the Wabash River, or by car. The path ends with a long exterior ramp that propels visitors into the city of New Harmony. (Svieven 2011)

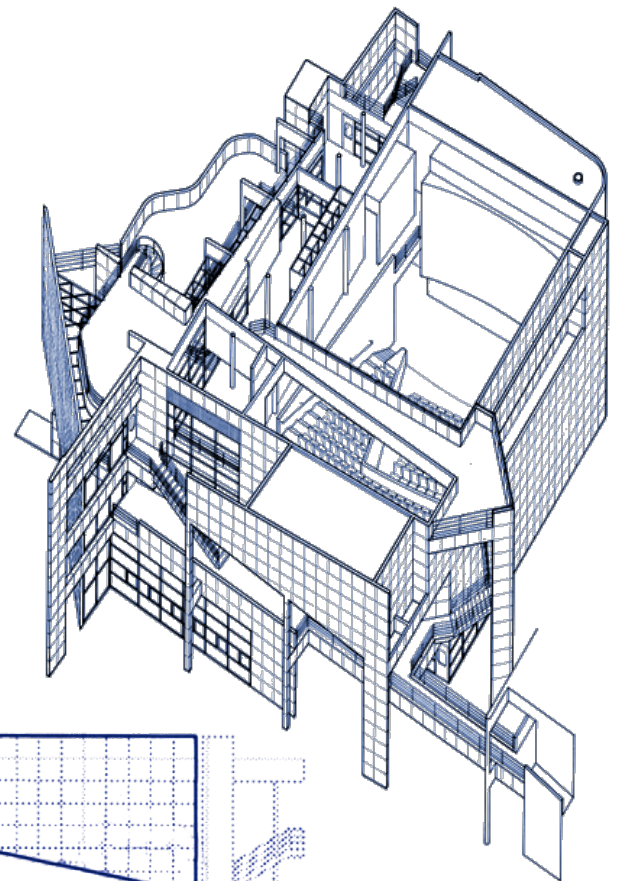
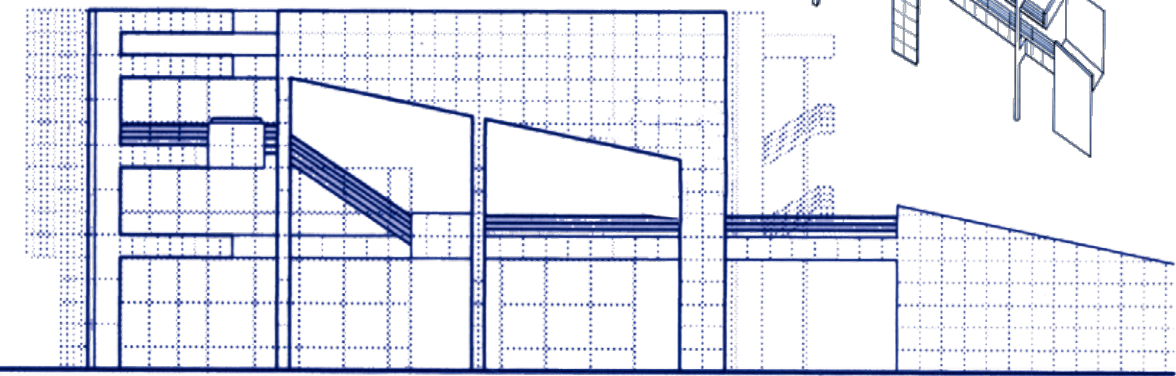
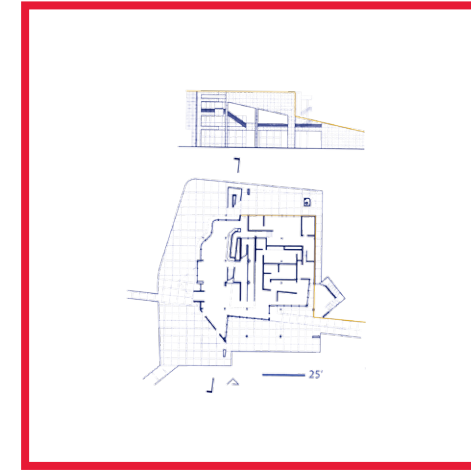
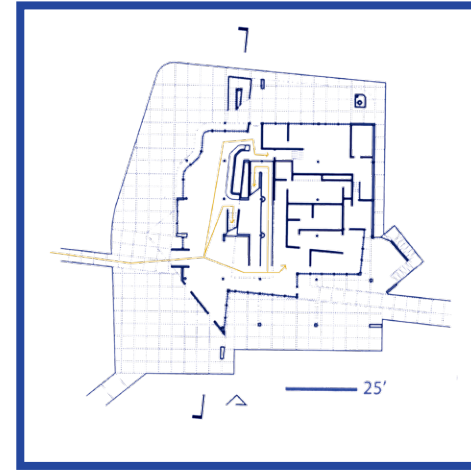
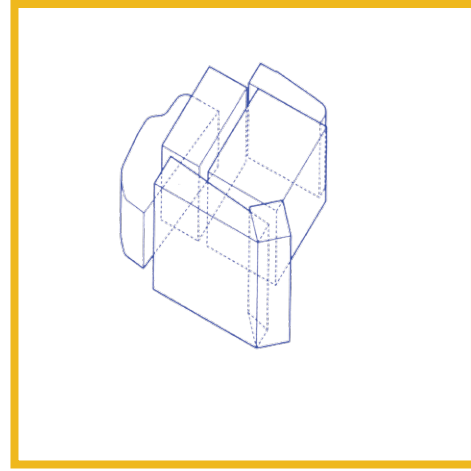
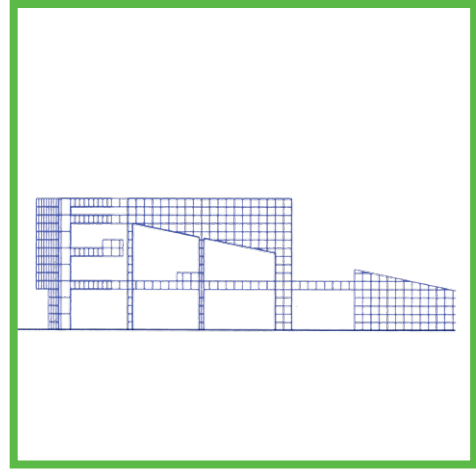


Figure 37 -Murcia Town Hall Vignettes (Borden, 2010)



### Analysis

The Atheneum's focus on tourists makes it a good study of spaces dedicated to tourism. The entire project is a clustered organization of singular spaces. In this sense it resembles the Caltrans and Murcia building, but without the repetitive private spaces on top.

Oddly, the center is owned and run by the University of Southern Indiana instead of the city itself.

The most noticeable features of this building are its ramps. The coiled interior ramp brings tourists to each space in a very controlled way. They exit the building at a small balcony where a great view of the city can be had. Coiled staircases continue to control the path of movement downward until the last length which straightens out

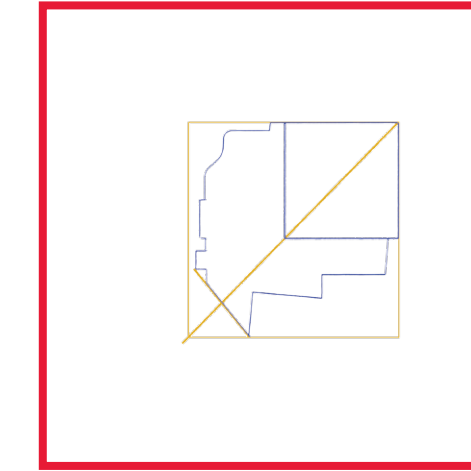
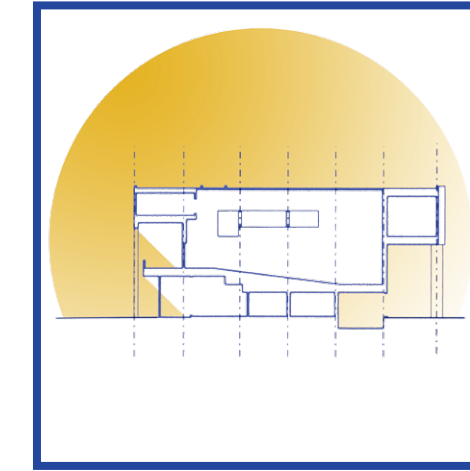
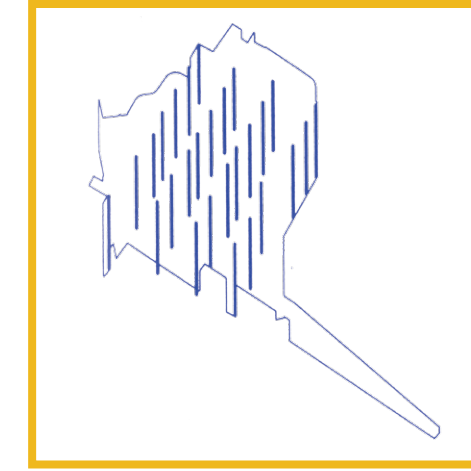
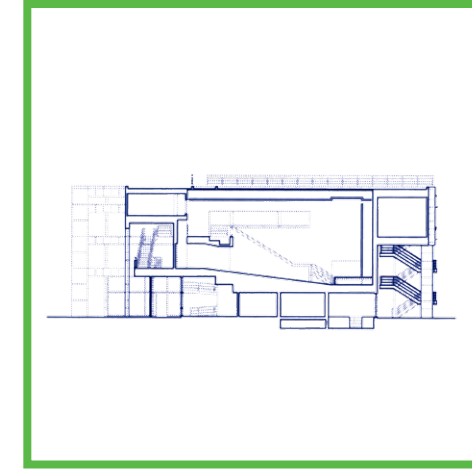
and practically shoots the tourists into the main part of the city.

The controlled nature of the Atheneum's pedestrian path seems restrictive, but for the purpose it serves, its quite effective.

Visitor centers primarily want to advertise local amenities. They hope to bolster local business. Controlling exactly how their city is perceived is a clever marketing strategy. Naturally, the large service desk can be clearly seen from the entrance of the building.

Thunderbird Lodge doesn't need to be nearly as controlled. Local Tourist centers such as the Squamish Adventure Centre and the Lil'wat Cultural Centre do this well enough. A smaller degree of control is still required. I can foresee the possibility of chaos in an open entry space were it to lack any pedestrian guiding elements.

The massing of the Atheneum appears clustered in the diagram,



but in plan, a series of grids make the building much more unified. The result is an exterior that lacks repetition with many unnecessary decorative elements that only lend themselves to Meier's aesthetic inclinations.

The Atheneum's building section shows a large open space near the center of the building. This space seems to be quite grand and enjoyable to be in. The entry space in Thunderbird Lodge would benefit from a similar concept.

Structurally speaking, the grid layout of the columns have not informed a monolithic building form. Instead, Meier was able to create his angled protrusions within an ordered framework. A similar approach will be taken towards the structure of the Lodge.

The many large open spaces are naturally bathed with ample

sunlight. Not only do they let the direct sun reach farther into the building, they also let indirect light travel with less reflections. The reflective nature of the abundant white surfaces also helps with this, which is a good reminder about using a material's colour to affect light.

The form of the building responds to instinct and Richard Meier's own design vocabulary rather than a set of geometric rules. This works to their advantage since unique buildings seem to attract people, which is a very good thing when you are trying to attract tourists.

The white angular building also contrasts beautifully with its green and blue surroundings. In this case, standing out from the environment seems to be a good way to look like it belongs.

Hilton Garden Inn  
by VanDeWalle Associates LLC



Figure 38 -Hilton Garden Inn perspective rendering (VanDeWalle, 2012)



Figure 39 -Hilton Garden Inn 8th Street perspective looking East (VanDeWalle, 2012)

Introduction

The Hilton Garden Inn is a hotel and conference center in Sioux Falls, South Dakota being constructed on the bank of the Big Sioux River. The Hotel is part of the East Bank Redevelopment Project, which is an expansion of the Big Sioux River Greenway. The East Bank Redevelopment Project involves the removal of a river ramp, which is a very wide bridge that spans the river. The River Ramp was used as a parking lot.



Analysis

The Hilton Garden Inn is a good example of architecture that adds assets to a community through transformation. The Existing site once served a purpose (parking), but has become a burden on the local community. Its aesthetic ugliness didn't need to be tolerated anymore because the development of the area created sufficient parking at alternative sites.

Immediately obvious are the exterior articulations which respond to the different room types on the interior. The connection between room type and articulation is interesting, but without a building plan, the connection would likely never be made by any guests of the hotel. Perhaps in this situation an obvious connection isn't what's important, rather, the important lies in an exterior aesthetic that responds to

programmatic requirements instead of a more arbitrary reason such as 'it looks good'.

Three primary materials are used. Brick, in red and brown; metal paneling; and stucco in tan and brown. The composition of so many materials can be complicated to balance, but VanDeWalle Associates managed to pull it off. This building's composition was successful because they appear to have set up a hierarchy of materials, which is a set of rules that govern the placement of materials. The two colours of brick are consistently placed near the base of the building. By putting the heavier material near the bottom, the building has a sense of a heavy bottom and a lighter top, which phenomenologically aligns with our understanding of gravity. This logical approach to hierarchy is common in the vernacular architecture of Whistler, which is based on European Alpine village construction techniques, which wasn't based on anything other than the simple construction techniques known

at that time and the materials available. As a result, strong stone foundations support timber frames with interior and exterior partitions placed between the structural columns. Currently, new buildings mimic this hierarchy by attaching stone and wood elements to the exterior of a steel frame or concrete frame building. In the pursuit of the Health, Safety and Welfare of a community, a truthful building with expressive structure that closer resembles original Alpine Village construction techniques. Adhering to a more traditional approach to structure and material choice creates a building of great quality and character- a building that would likely be re-modeled or 'transformed' should its first function ever cease to be viable. Were the building constructed in a cheaper and faster way, it might set a precedent of brevity, rather than a precedent of long lasting legacy.

When it comes to spatial organization, a very clear and logical floor plan is employed. Hotel guests enter through a vestibule on the North

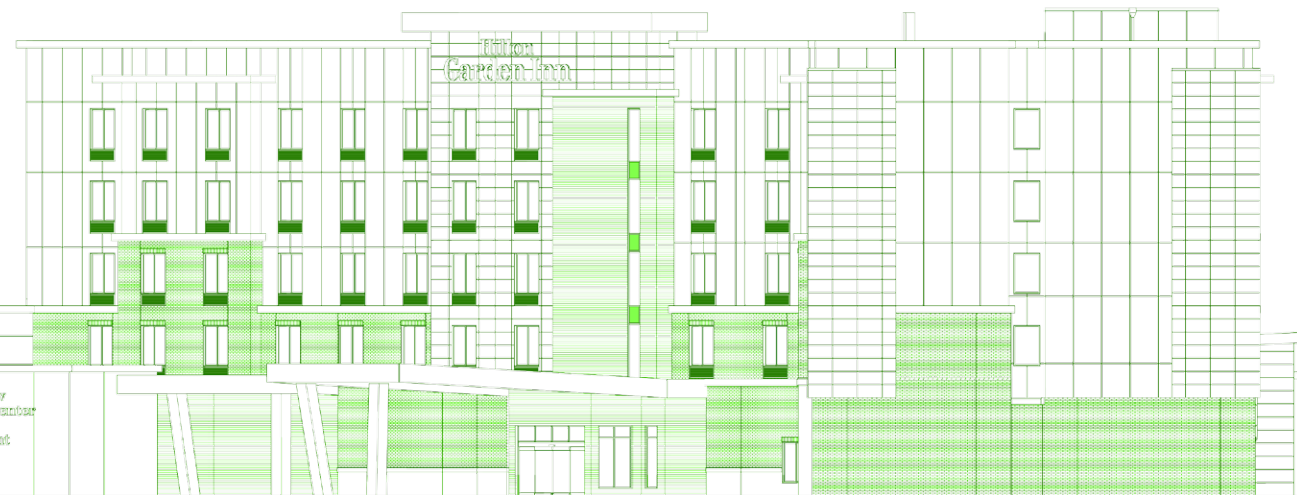


Figure 40 -Hilton Garden Inn map location (Google, 2012)  
 Figure 41 -Hilton Garden Inn North Elevation (VanDeWalle, 2012)

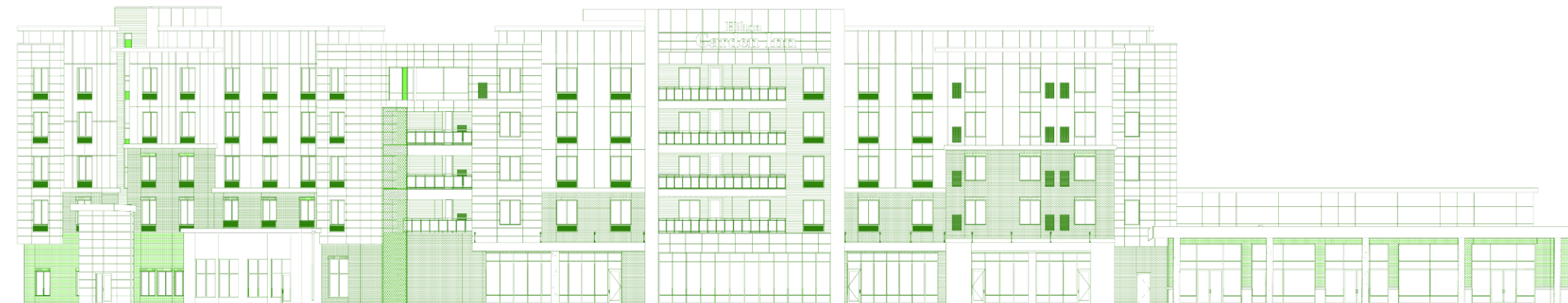


Figure 42 -Hilton Garden Inn South West Elevation (VanDeWalle, 2012)

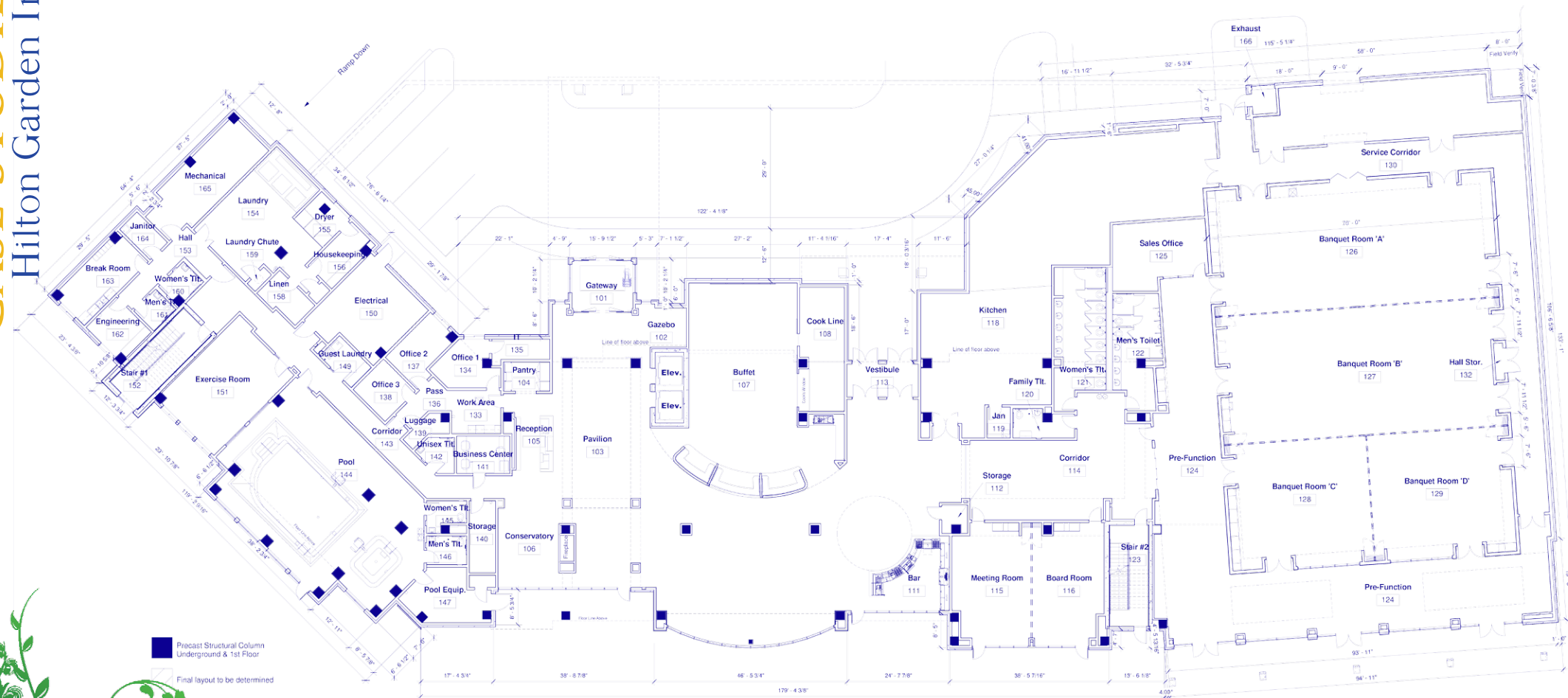


Figure 43 -Hilton Garden Inn First Floor Plan (VanDeWalle, 2012)

side of the building. A secondary entrance exists to accommodate traffic to and from the banquet rooms. Having separate entrances for the two main functions of the building (hotel and event centre) ensures smooth traffic flow without the two getting in the way of each other.

Hotel guests first enter a pavillion area which acts as a circulation hub of the building. From the pavillion, all major areas accessible to hotel guests can be easily accessed. The circulation diagram below

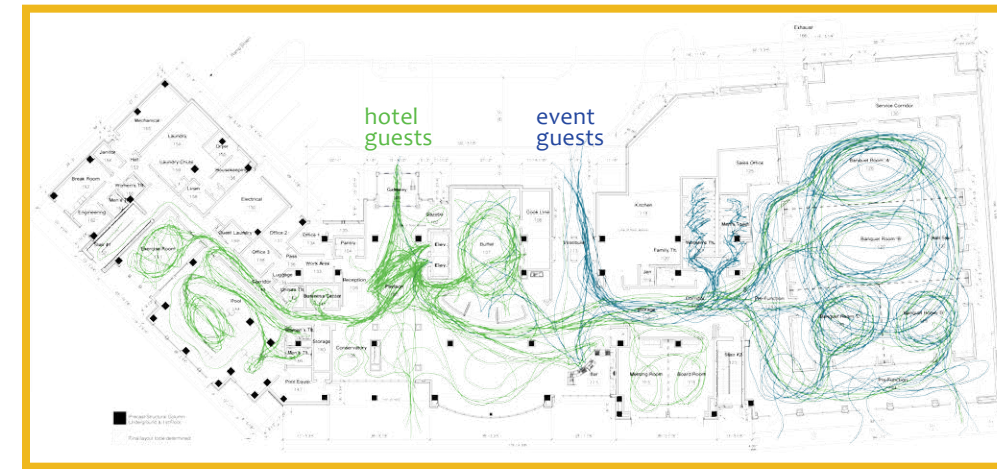


Figure 44 -Hilton Garden Inn circulation study

Figure 45 -Hilton Garden Inn North Elevation (VanDeWalle, 2012)

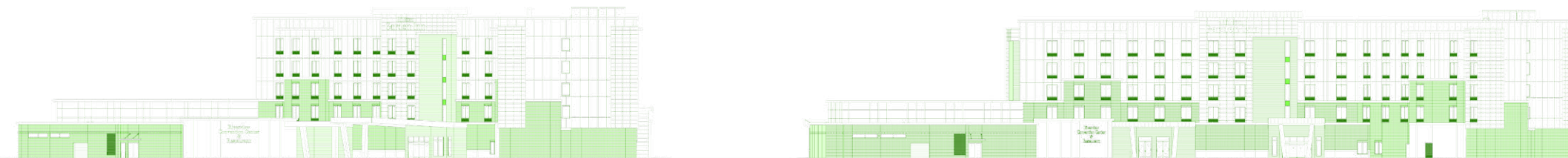
Figure 46 -Hilton Garden Inn South East Elevation (VanDeWalle, 2012)

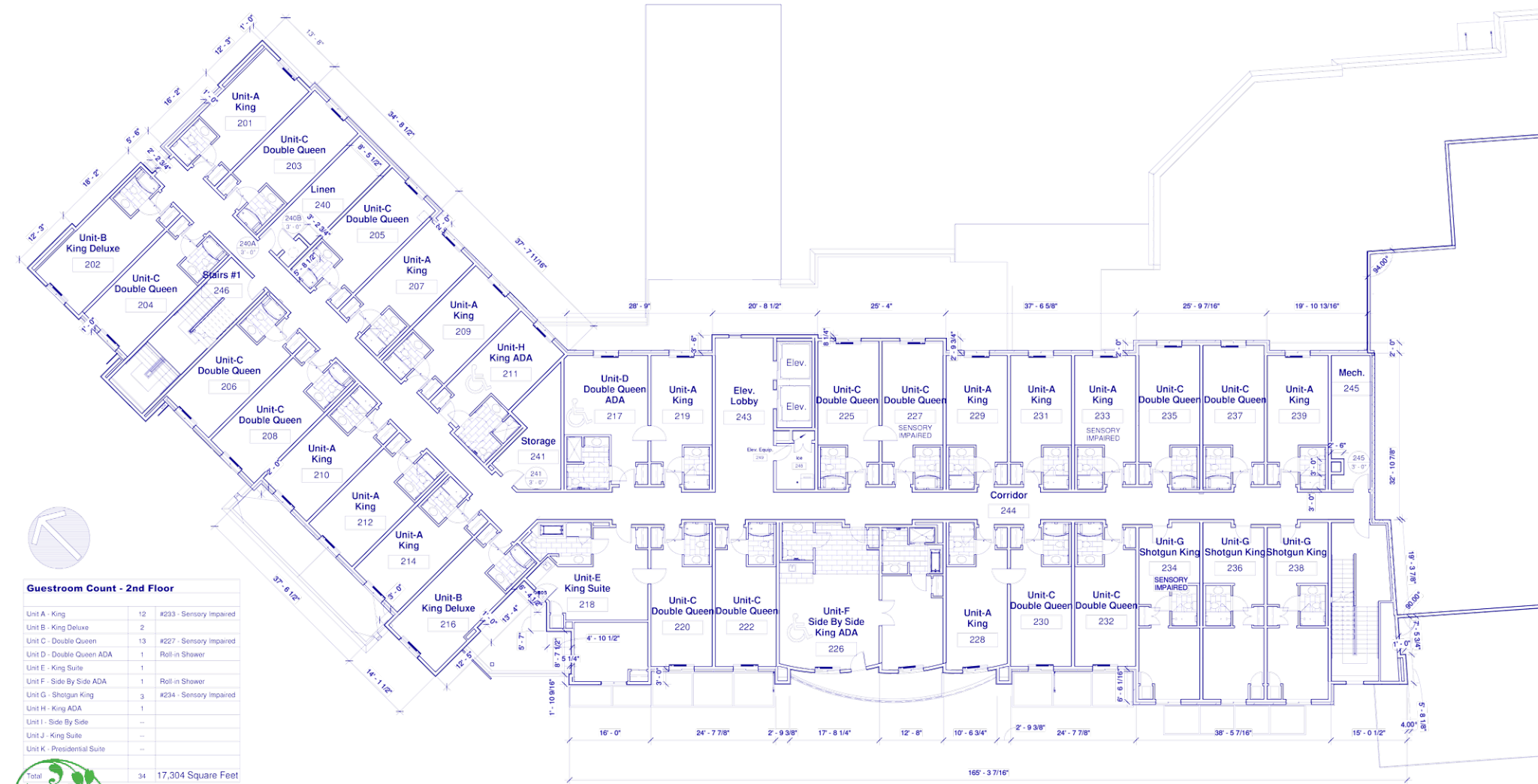
shows how the building's two functions have been given their own half of the building, with shared function spaces in the middle. When applied to a fitness centre, this same approach can be used. Instead of individual hotel/event functions, individual male/female changeroom functions will equally divide the building's spaces. Between the two would lie the shared function spaces such as exercise areas, rock climbing areas, reception areas and swimming areas.

It is also interesting to note that from the guests entrance, the first thing seen is a hearth which is a classic symbol of the home and hospitality. No doubt this is a welcoming gesture that hopes to set the scene for the guests of the hotel. Funnily enough, the first thing that event guests will see is the bar. This makes sense though; a hotel intends to make money, and alcohol sales to guests who are not staying in the hotel are almost pure profit. The lesson here is to place money making functions in prominent places to ensure the financial success of a facility.

From the main doorways, hallways generally decrease in width the farther into the building they run. Presumably, hallway widths are determined by predicted volume of traffic.

Assume for a moment that the organization of this hotel can exist

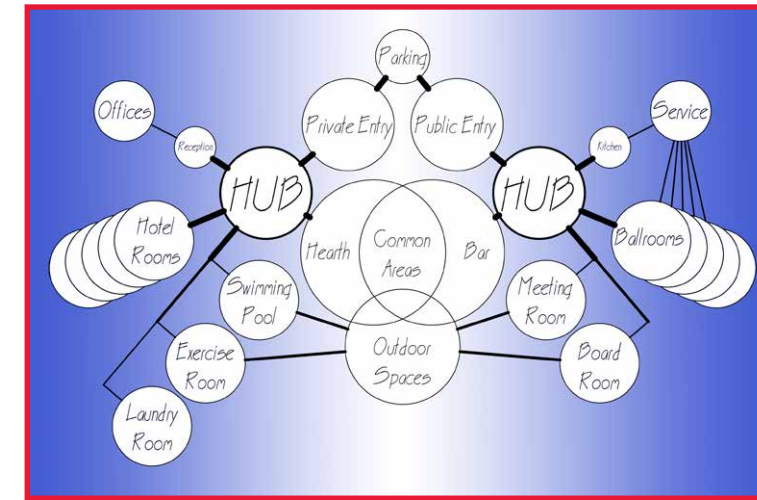




**Guestroom Count - 2nd Floor**

Unit A - King	12	#233 - Sensory Impaired
Unit B - King Deluxe	2	
Unit C - Double Queen	13	#227 - Sensory Impaired
Unit D - Double Queen ADA	1	Roll-in Shower
Unit E - King Suite	1	
Unit F - Side By Side ADA	1	Roll-in Shower
Unit G - Shotgun King	3	#234 - Sensory Impaired
Unit H - King ADA	1	
Unit I - Side By Side	--	
Unit J - King Suite	--	
Unit K - Presidential Suite	--	
<b>Total</b>	<b>34</b>	<b>17,304 Square Feet</b>

Figure 47 -Hilton Garden Inn Second - Fourth Floor Plan



without shared walls. Could the organization be extrapolated to inform the design of an entire resort? I think it can. Both Hilton Garden Inn and Thunderbird Centre Resort have an entry, a reception area, public space and private units. Hallways become roads, rooms become buildings and instead of walls dividing space, a piece of tree-covered land.

The spatial organization of the Hilton Garden Inn can even be

abstracted into a bubble-diagram that can be used to inform any project of similar typology. This generalization can be seen in the diagram to the left.

The second floor consists of hotel rooms and their support spaces. Stair towers for egress are properly located at the extremities of the building, providing the most opportunities for escape in case of a fire.

Pulmbing wet walls are located near the centre of the building, away from the cold exterior and the valuable exterior surface that is best used to hold windows.

When considering the profitability of a design, repetitive elements help bring down the cost of design and construction. Repetition of hotel rooms and cabins alike can achieve this.

The Hilton Garden Inn is a great example of efficient hospitality design, and its framework of organization is a good model to use as a template for the Thunderbird Centre Resort

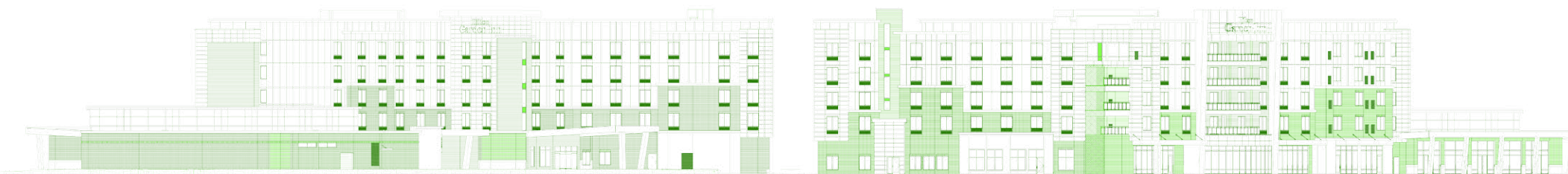
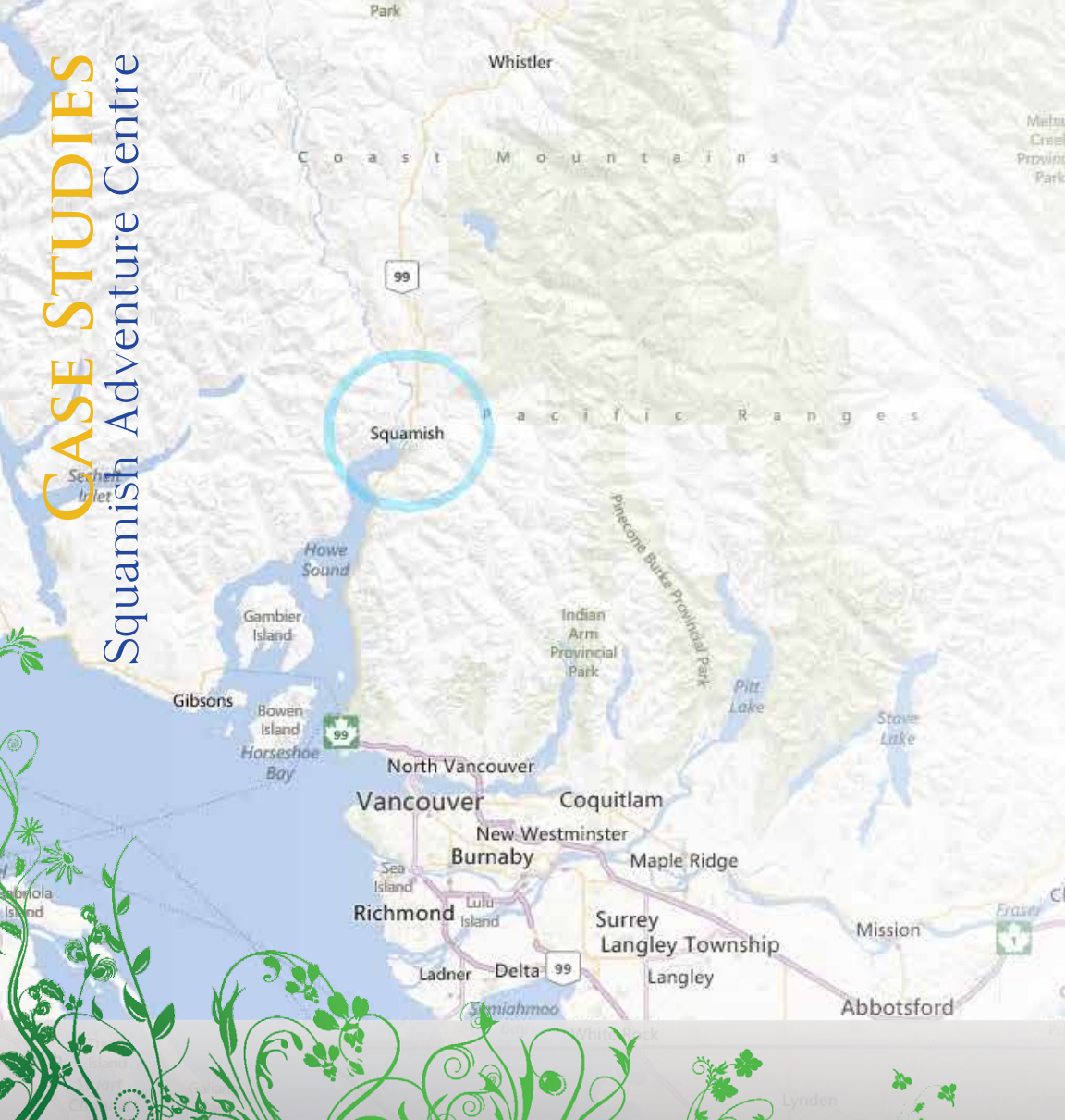


Figure 48 -Hilton Garden Inn Spatial Organization

Figure 49 -Hilton Garden Inn East Elevation (VanDeWalle, 2012)

Figure 50 -Hilton Garden Inn West Elevation (VanDeWalle, 2012)





## Squamish Adventure Centre by Iredale Group



Figure 51 -Map of Squamish (Bing, 2013)  
Figure 52 -Photo of the Squamish Adventure Centre



The Squamish Adventure Centre can be found in the middle of the Sea-to-Sky highway that connects Whistler to Vancouver. The Centre is a cafe and gift shop as well as cultural museum, excursion booking centre and offices. The two additive cylindrical forms are interesting and attract many tourists who drive by.

The Squamish Adventure Centre is a good example of the possibilities of timber and glue-laminated timber construction. Softwood lumber is one of the Province of British Columbia's most plentiful natural resources. It is a vernacular building material, it is renewable and it is incredibly expressive.

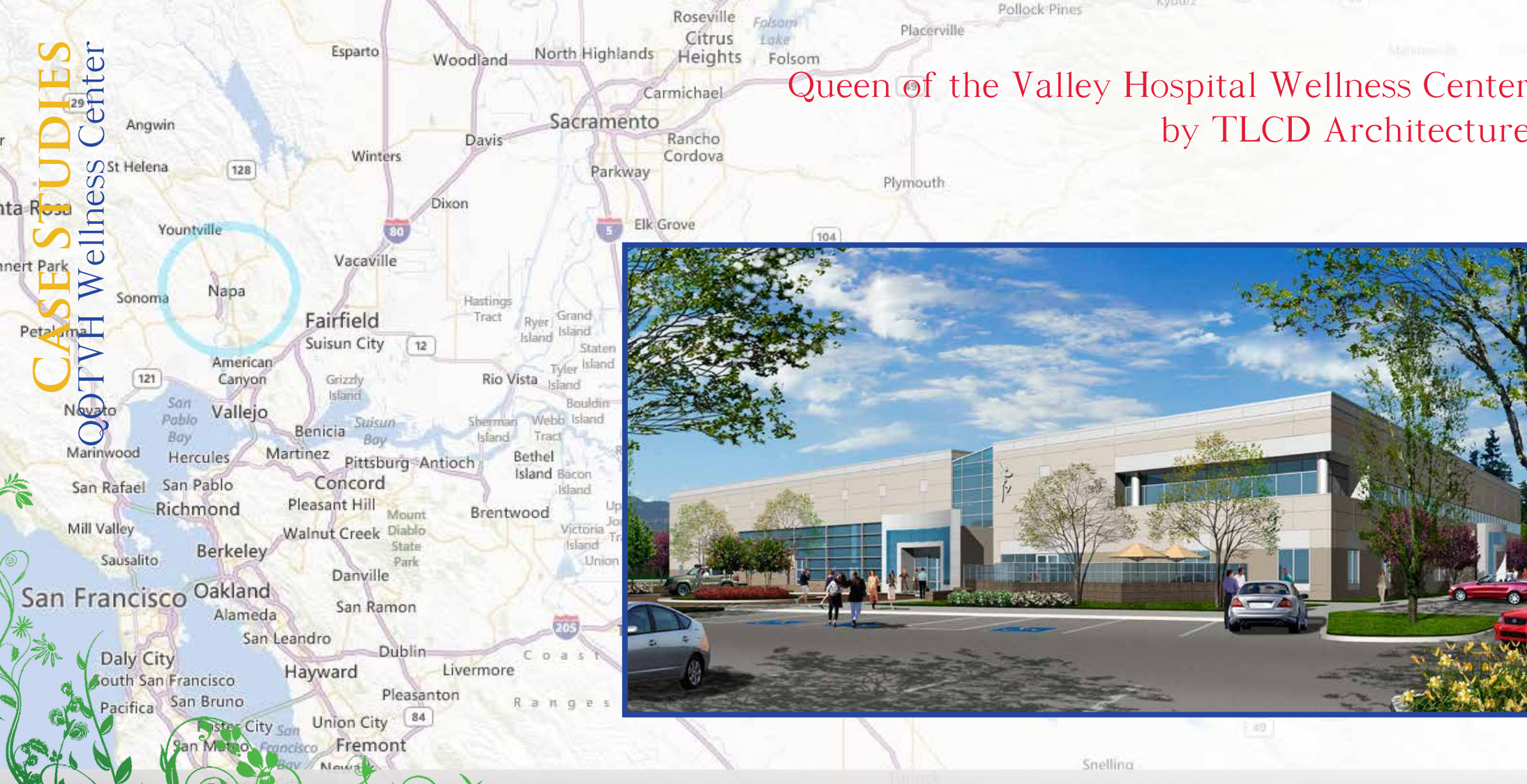
Even in a circular building, a hierarchy of columns, girders, beams, purlins and decking have been used to establish order and repetition.

Figure 53 -Photo of Squamish Adventure Centre Cafe  
Figure 54 -Photo of Squamish Adventure Centre timber frame hierarchy  
Figure 55 -Photo of Squamish Adventure Centre column and wall joint



Unfortunately, the picture on the top right shows what can happen when trying to place square rooms into a building with radially placed beams; Awkward corners and connections can be created.

The warm tones of the wood are aesthetically beautiful. The wood itself is pound for pound stronger than steel and is naturally fire rated for one to two hours. Glulam members are incredibly environmentally friendly because even the largest mass is made up of smaller dimensional lumber that can be harvested from third or fourth growth forests. The pre-dried lumber in combination with the adhesive makes the members strong and resistant to warping or checking. The members are also very water resistant. (American Institute of Timber Construction, 2012)



Queen of the Valley Hospital Wellness Center  
by TLCD Architecture



Figure 56 -Map of Napa, California (Bing, 2013)

Figure 57 -Rendering of QOTVH Wellness Center (TLCD Architecture, 2013)

Introduction & Analysis

Spatial organization of this fitness facility is centered on the reception area, which acts as a hub of traffic that connects the lesser spaces. The circular reception area even influences floor material patterns and wall articulations beyond its own defined space. Connecting spaces in this manner helps unify the design.

The locker rooms provide direct access to the pool areas as well as the other fitness areas. This helps separate wet areas from the rest of the building. Fitness desks and customer service desks can see and be seen by every freely public fitness area. Its also important to note the social spaces in the locker rooms, an area that facilitates the social aspects of a wellness center.

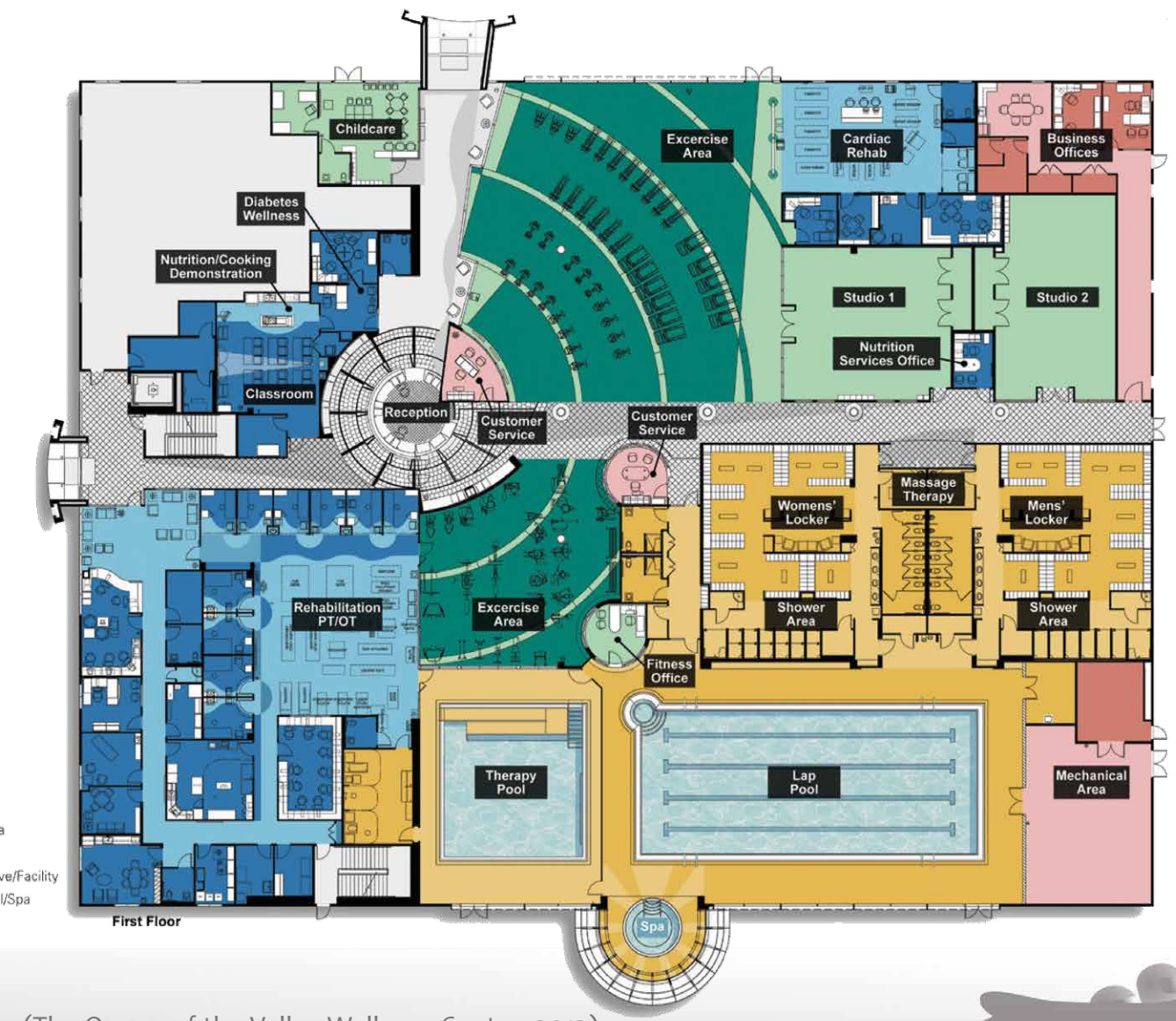


Figure 58 -QOTVH Wellness Center First Floor Plan (The Queen of the Valley Wellness Center, 2013)

## NDSU Wallman Wellness Center by Ohlson Lavoie Collaborative addition by EAPC Architects Engineers



### Introduction & Analysis

North Dakota State University's Wallman Wellness Center is home of campus recreation, exercise, medical services and disability services.

In addition to the fitness facilities, the building includes a small medical center and pharmacy, as well as disability services and childcare for the students and faculty of NDSU.

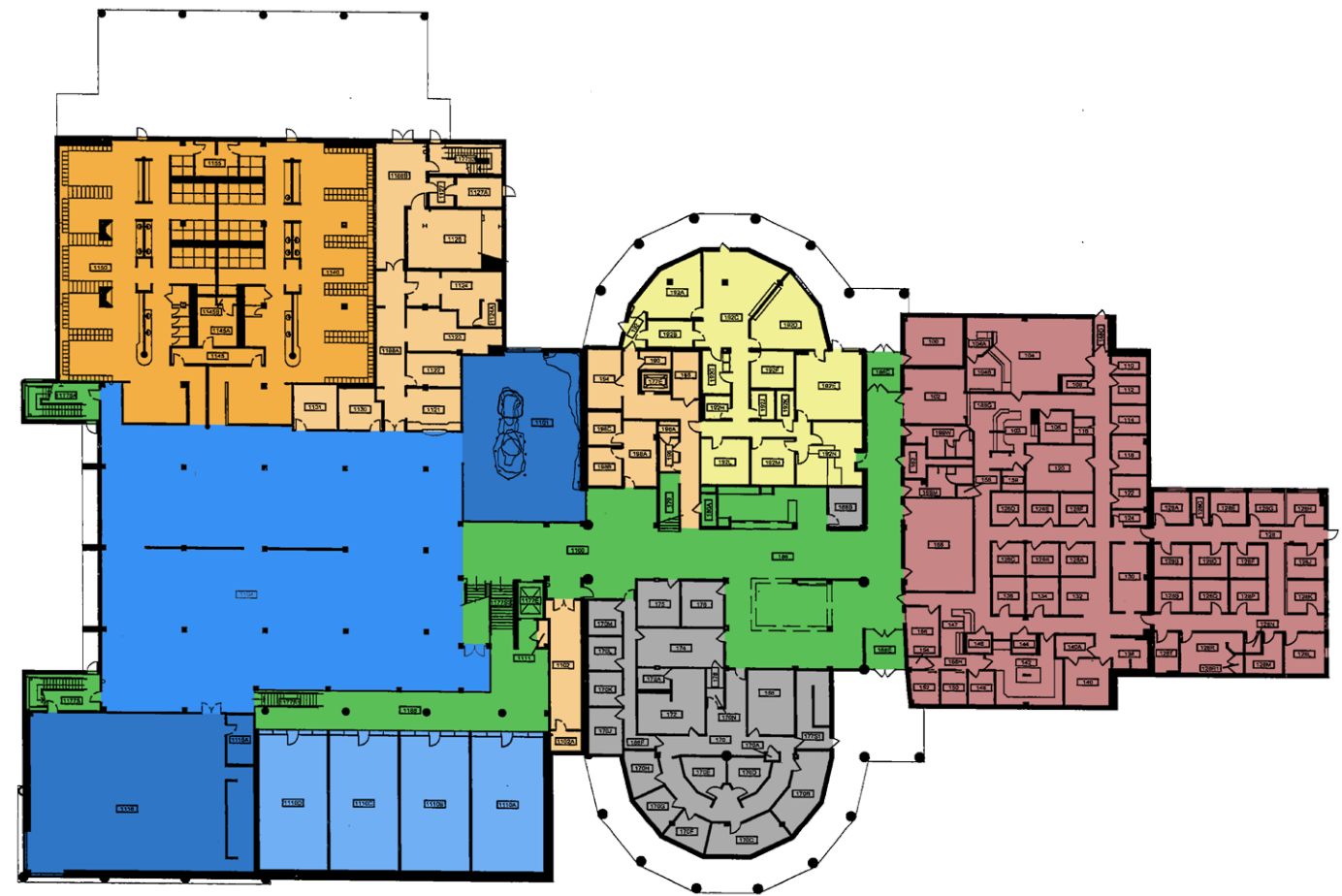
The Fitness areas themselves are large enough to accommodate the 2500 students and faculty members that access the building per day. (Fisher, 2013) The Fitness areas include large weightlifting areas, cardiovascular exercise areas, a three story rock climbing wall (Fig. 61), three basketball courts, a multiple activity gym for indoor soccer and roller hockey, spinning studios, personal training studios, martial arts studios, dance studios, four squash courts and two indoor running tracks.

In an effort to create a natural and energy efficient environment, daylight is carefully captured and controlled. Overhead skylights have been treated to diffuse the light that enters the building through the roof. As a result, no direct beams of light create distracting hot spots on the courts, floors, sports equipment or other active surfaces. However, I feel as if a great opportunity has been missed. The large rock climbing wall, which is constructed of shotcrete and mesh on a steel structure could be used as a large heat sink which could very effectively harness direct solar radiation during the day, and re-radiate that heat during the night, passively heating the building. Direct light on the rock climbing wall would also make the experience closer to real rock climbing in the outdoors.



Figure 59 -Map of Fargo, North Dakota (Bing, 2013)

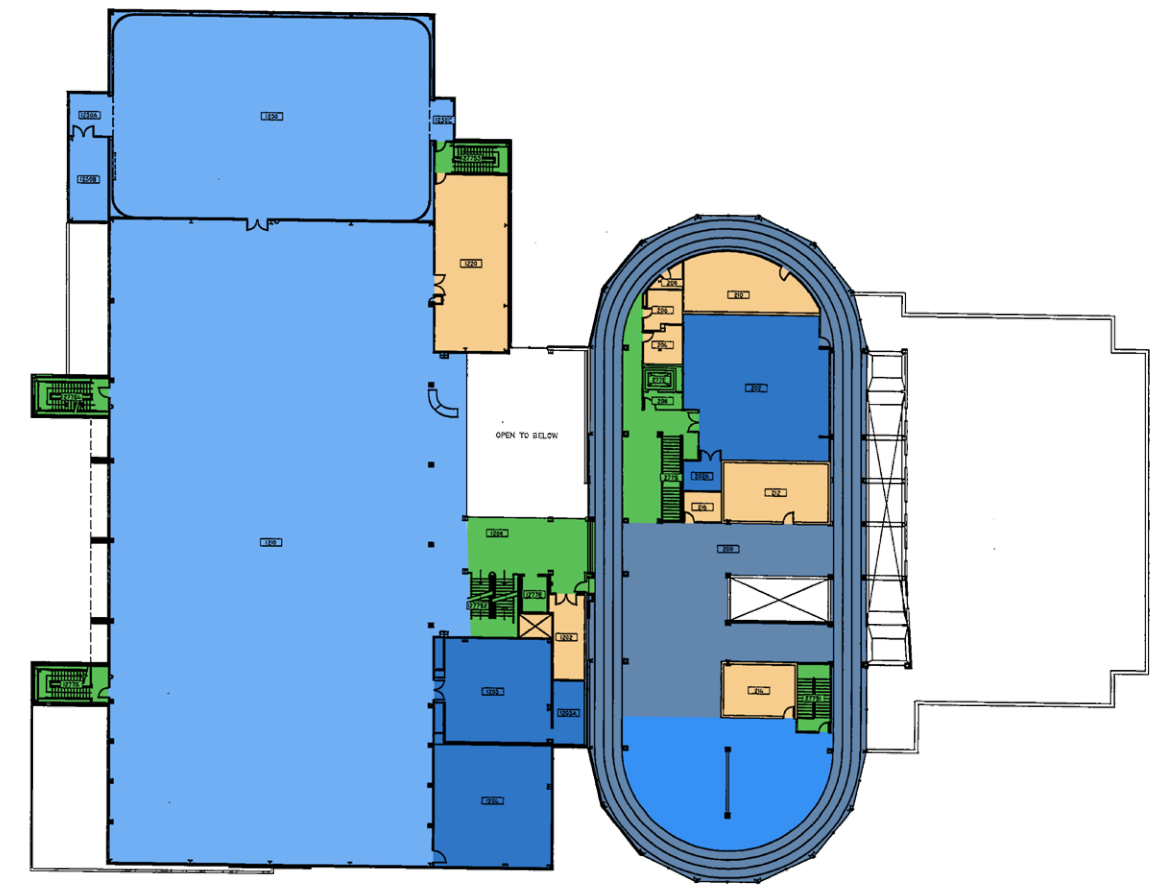
Figure 60 -Photograph of the NDSU Wallman Wellness Center



NDSU FACILITIES MANAGEMENT PLANNING DEPARTMENT  
WALLMAN WELLNESS CENTER  
A050 FIRST FLOOR



8 Jan 2013



NDSU FACILITIES MANAGEMENT PLANNING DEPARTMENT  
WALLMAN WELLNESS CENTER  
A050 SECOND FLOOR



10/30/2008

In a conversation with Gary Fisher, the Wellness Center's Director, I asked about the planning and construction of the building which he was a part of. The building was designed to be as efficient and cost effective as possible. This is evident by the lack of circulation. Though this has saved them money, athletes have to walk through other dedicated areas to get to their area of interest. For example, the spinning studio and martial arts studio can only be access by walking across the gymnasium floor. Additionally, people constantly cut through the large weight lifting area to access the locker rooms, which is bothersome to those exercising.

- Red-Medical Center
- Green-Circulation
- Yellow-Childcare
- Gray-Administration
- Orange-Lockers, showers, changing areas.
- Light Orange- Support areas
- Dark Blue- Studios and rock climbing
- Blue- Weight Lifting
- Light Blue- Sports Courts

## LESSONS LEARNED

Comprehensive way-finding that can be clearly seen from as many areas as possible

Natural daylight without distracting views

Trainer desk that has views to all exercise areas

Open floor space gives freedom for exercises that require a large area

Large circulation areas allow for high traffic volumes



Even and consistent lighting

Mirror walls on just one side of a space to prevent the infinity effect

Safety equipment (like this AED) in a visible and accessible place

Durable flooring with smooth transitions to prevent tripping

Seating that facilitate the social aspects of exercise yet doesn't interfere with others



Mechanical systems should be hidden or expressive, not placed for convenience



Water fountains and washrooms should be plentiful and easy to see



Equipment storage should be organized and easy to access



Orientation is important when placing equipment



Each piece of equipment requires ~50 sq.ft. movement on and around equipment should not affect others.



Personal training studios need to be large, even if they are serving just one person.



## Grand Targhee Resort Master Plan by DESIGNworkshop

### Introduction & Analysis

DESIGNworkshop is a multidisciplinary firm based in Aspen, Colorado, USA. The firm, which designed this master plan for Grand Targhee Resort also designed the original plan for Whistler Village as well as all subsequent major community plans since then.

Grand Targhee shares a similar climate and separation from major metropolitan areas with Whistler.

In the master plan for Grand Targhee Resort, prominent ski-ways cut through the landscape in much the same way that roads do. Its important to note that while roads can direct traffic in two directions up and down the slope of the terrain, a ski way can only direct skiers and snowboarders in one direction- the downslope direction.

Integration with nature, in this plan, seems a secondary consideration. Take for example the presence of a ski lift station in the midst of a wetland, or the variable angles of the repeated buildings oriented to fit the curve of the road rather than to take advantage of the available solar energy.

The residences surround a central hub of activity, much like the suburbs of a large city. Though this compartmentalization of activities is efficient, it seems to discourage interaction and diversity at the macro scale. Thunderbird Centre Resort will employ a degree of separation between the more public and private spaces, but the presence of activity areas will be placed throughout the master plan to encourage a localized interaction of the residents, temporary and permanent.

Figure 61 -Map of MidWestern Grand Teton National Park, Wyoming (Bing, 2013)

Figure 62 -Rendering of Grand Targhee Ski base (Grand Targhee Resort, 2004)



Figure 63 -Rendering of Grand Targhee Master Plan (Grand Targhee Resort, 2004)



Figure 64 -Photo of Whistler welcome sign

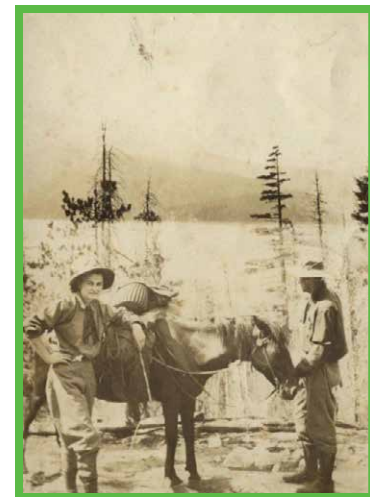
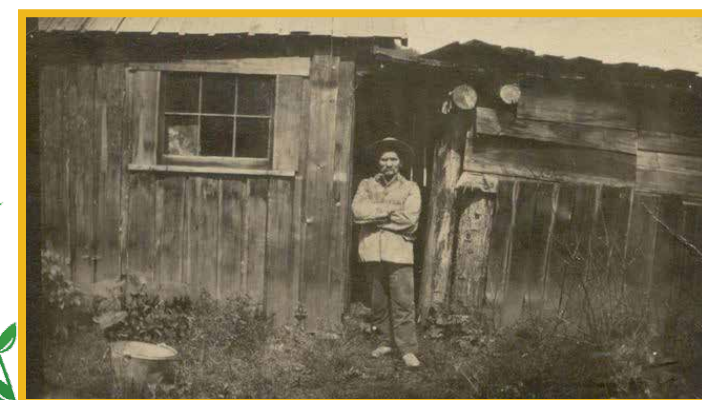
# HISTORIC CONTEXT

**History of Whistler**

The first people to settle the area now known as Whistler were the Squamish and Lil'wat First Nations peoples. Their ancestors continued to live in the area till this day.

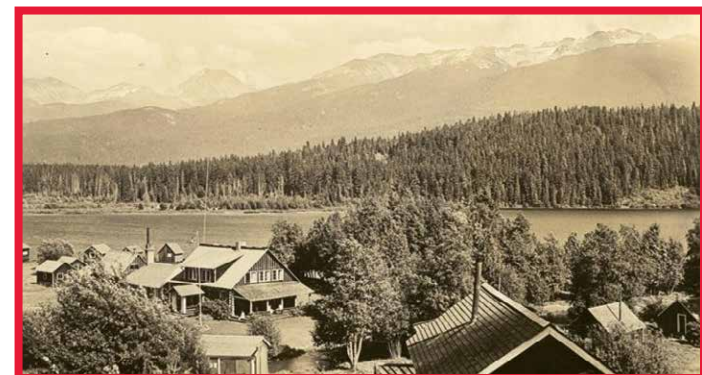
In 1858, the first Europeans came to the area. This group was led by two men, William Downie and Joseph Mackay. Downie was of Scottish descent and was interested in gold. He had previously participated in the California gold rush in 1849. Mackay used to be a fur trader for the Hudson's Bay Trading Co. (which continues to be one of Canada's major department stores today). The two men, along with their assistants and Lil'wat guides were commissioned by the colonial government to search for access routes between the coast and the gold rich interior of British Columbia. Downie and Mackay didn't stay in the area, instead, they briefly recorded their visit and continued on to other ventures.

It took over twenty years for the first permanent European settlers to arrive in Whistler, which was then referred to as Summit Lake. One of the first to arrive was a man named John Millar who came from Texas. Millar supported himself by fishing and trapping and



and fish. Finally, in 1913 the young couple spent \$700 on their own ten acres of land on Alta Lake. This Philips, with some help from family from Maine, completed the Rainbow Lodge Fishing Resort in 1914.

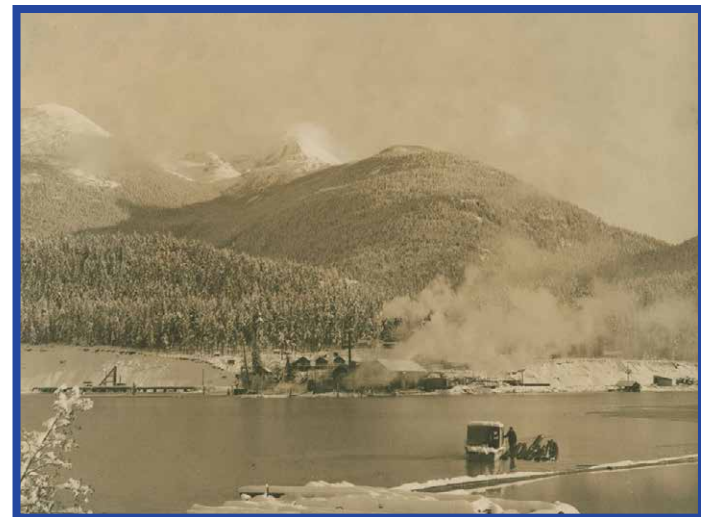
As fortune would have it, the Pacific Great Eastern Railway from Vancouver managed to lay



selling his furs. Once he collected enough furs, he would hike two days to the Squamish Inlet, then take a steam boat into Vancouver to sell them.

In 1911, on one of Millar's trips to Vancouver, he met a man named Alex Philip and his wife Myrtle. The couple were from Maine in the United States, and had moved to the West coast of Canada in order to pursue their dream of opening their own fishing lodge. Naturally, John Millar invited them up to Summit Lake to try out the great fishing near his home. Over the next three years, the couple would visit John

**Figure 65** -Photo of John Millar at his Cabin in 1911 (Whistler Museum, 2012)  
**Figure 66** -Photo of Myrtle and Alex Philip in 1911 (Whistler Museum, 2012)  
**Figure 67** -Photo of Rainbow Lodge in the 1930's (Whistler Museum, 2012)



successfully expanded the Rainbow Lodge Fishing Resort to a capacity of one hundred people. By the end of the 1920s, the resort was the most popular one in the entire Province.

As the area grew, its founders began to leave their mark. Alex Philip was an incurable romantic who gave local landmarks whimsical names such as the bridge of sighs and the river of golden dreams and romance. His wife, Myrtle, was involved in the new community. She instigated many developments including the areas first school.

Into the 1930s, the success of Alta Lake couldn't be contained to just one resort. Several competing lodges, resorts and cabins were built to keep up with the demand of tourists in the area. The scale of

**Figure 68** -Photo of Parkhurst Mill 1936 (Whistler Museum, 2012)  
**Figure 69** -Photo of Alex and Myrtle Philip 1965 (Whistler Museum, 2012)  
**Figure 70** -Photo of construction of the Roundhouse Lodge 1965 (Whistler Museum, 2012)

track as far as Alta Lake. Now, instead of a day aboard a steam ship and a two day hike, people could get from Vancouver to Alta Lake in a single day aboard a train.

With the new found accessibility, the beautiful Alta Lake quickly began to grow. Alex and Myrtle Philip

development was large enough to support a handful of saw mills and various lumber operations. Naturally, the abundance of trees led to logging. The mineral rich land of British Columbia also brought several mining operations.



Alex and Myrtle Philip ran Rainbow Lodge Fishing Resort until 1948. They sold the lodge to another couple, Alec and Audrey Greenwood. The Philips, though retired, decided to continue to live on Alta Lake for the rest of their lives.

Alex, who passed away in 1968 lived to be 86. Myrtle lived to be 95. One of Whistler's elementary schools still bears her name.

In the 1960s,

a group of Vancouver business men had the ambitious notion to bring the Olympics to British Columbia. These men formed the Garibaldi Olympic Development Association and were led by Franz Wilhelmson. The group chose London Mountain in Garibaldi Provincial Park (just minutes south of Alta Lake) as an ideal site. Unfortunately, the area didn't have a many buildings, any infrastructure or public services.







The Garibaldi Olympic Development Association created a sister organization called Garibaldi Lifts Ltd. which began to raise funds and build a ski area.

In 1965, London Mountain was officially renamed with its local nickname, Whistler Mountain. Hoary marmots (which look similar to gophers) were found in abundance there. The mountain was called whistler after the marmots whistle-like call.

At this time, the Provincial government had completed a gravel road between Vancouver and Alta lake. They also, finally, brought electricity to the area.

On January 15, 1966, the Whistler Mountain ski area opened. And, with the new ski area, local development around Alta Lake exploded.

The mix of new buildings among the older pioneer lodges left many of the older buildings to ruin. However, these buildings were quickly occupied by ski loving squatters.

On September 6, 1975, the Provincial Government of British Columbia created

Canada's first resort municipality, the Resort Municipality of Whistler. The new municipality was established to bring local government to the quickly expanding area.

In 1977, development proposals for a ski area on Blackcomb mountain began. Soon after, a community plan to create a tourist village at the intersection of Whistler Mountain and Blackcomb Mountain was created. At this time, the intersection of these mountains was the municipal garbage dump.

In 1980, Blackcomb Mountain opened as a separate ski resort. Together, Blackcomb and Whistler became North America's largest ski complex. Naturally, the area's rapid rate of expansion accelerated yet again.

In 1998, Whistler and Blackcomb were unified under a single company: Intrawest.

In the summer of 1999, the mountain bike park opened, establishing Whistler as a year-round resort. Mountain biking grows with increasing popularity to this day.

Between 1968 and 2003, Whistler was put forth as an Olympic host city four separate times. On February 12, 2003, it was Vancouver that won the bid to host the 2010 Winter Olympics with Whistler as the host mountain resort. Again, development in Whistler accelerated. Now, almost three years since the Olympics were in Vancouver, Whistler is unsure of its future. Yet, Whistler's growth continues. Its hard to say in which direction it is growing, but soon enough, a new venture will emerge and Whistler will again have a dream to pursue.

Figure 71 -Photo of construction of the current Whistler Village (Whistler Museum, 2012)

### Historic Context of the Olympics

Though the Olympic Games are said to have mythological origins, they first appear in history as a vehicle of peace. The Olympics are first documented as the means to achieve a "Sacred Truce". Around 824 B.C.E., the Greek King Iphitos invented the games as a way to establish peace between the warring states of Greece. The Sacred Truce's definitive statement said "May the world be delivered from crime and killing and be freed from the clash of arms".

The Olympic games began with events like the foot race, wrestling, the pentathlon and chariot races. Women were not only forbidden from competing, they were also forbidden from watching.

The ancient Olympic Games were held every four years for twelve centuries.

In Paris, 1894, a group of delegates voted to re-instate the Olympic Games. Athens, in Greece, was chosen to be the first host city of the modern Olympic Games, which were to occur two years later in 1896.

The rebirth of the Olympic Games was the dream of a French aristocrat named Pierre de Coubertin. His love of sport, especially rowing, fueled his dream. Coubertin was named the first president of the IOC (International Olympic Committee), a position he held for twenty nine years.

Pierre de Coubertin continued to forbid women from competing in the Olympics, but he also continued to establish the Games as an event of international peace. (LA84 2007)

Figure 72 -Photo of Hitler opening the 1936 Olympic Games (United States Holocaust Memorial Museum, 2012)

*"The most important thing in the Olympic Games is not to win but to take part, just as the most important thing in life is not the triumph but the struggle. The essential thing is not to have conquered but to have fought well."*  
-Baron Pierre de Coubertin

The Olympic ideals of Peace were not always upheld to Pierre de Coubertin's standards. In 1936, Berlin, Germany hosted the Summer Olympic Games. Hitler, the antisemitic dictator of Germany used the Games as global propaganda, proclaiming the greatness and strength of Germany while hiding his racist and tyrannical agendas. The torch relay, which is a publicity event that covers the entire host country was invented by the Nazis, and it continues to be a popular Olympic tradition to this day. (United States Holocaust Memorial Museum, 2012)





# SITE ANALYSIS

Figure 73 -Aerial Photo of the Whistler Sliding Centre, looking North East



Figure 74 -Photo of Olympic garden art

### Narrative

The picture on the opposite page depicts a decaying remainder of the 2010 Winter Olympics. This piece of land-art sits on an earth berm that separates the Visitor Centre of the Whistler Sliding Centre from its mountain access road. It is a near perfect metaphor of the impact the Olympics had on this land.

The Olympic Symbol, cast from concrete, sits as a foreigner on the small hill in much the same way the concrete sliding track sits on the base of Blackcomb Mountain. Both stood as proud monuments to the spirit of the Olympics, but now, two years later, the weeds have begun to set in.

The land may be overtaking the foreign monuments, but nature cannot reclaim the memories these monuments represent. Even if these objects were to disappear completely, people would remember the Olympics. Memories that are tied to land have a strong presence in the minds of those who remember them, but the memories tied to the base of Blackcomb mountain are much older than the Olympics. In the infinite scale of time, the 17 days of Olympic events were a mere moment. Other feature, such as the bedrock, the soil, the trees and the views of this particular site have a much greater claim to the legacy of this land than the Olympics do.

It is for these legacies, the true nature of the land, that Thunderbird Centre Resort is to be ultimately allied with. The very name 'Thunderbird Centre Resort' is an allusion to a spirited creature acknowledged by Canada's First Nations people. Thunderbird's verisimilitude is not in question. The creature is much more than

an ancestral fairytale. Thunderbird's spirit, authority, provision, intelligence and transformative nature are all qualities of the land. Thunderbird does not represent the land, he is the land. I included the graphics in the front matter of this book to help illustrate this. Thunderbird personifies the land. He helps us give words to the sublime qualities of rocks, trees and dirt.

In this site analysis you will find many quantitative values that describe these rocks, trees and dirt in a reasonably predictable way. These numbers help define a set of criteria that a building must meet for it to survive and succeed. For example, the walls of Thunderbird Lodge must be able to mitigate the warmth of summer or the cool of winter in order to maintain an interior temperature that is livable for humans. These insulated walls must be strong enough to bear the weight of heavy snow fall as well as remain impenetrable to the incredibly moist environment of the Pacific Northwest. Building materials must be hardy and beautiful. They must be hardy to survive the abrasive elements of the Coast Mountain climate and they must be beautiful in order to even begin to compliment the unsurpassable natural beauty of the forest covered mountains.

It is important to note that controlling the site would destroy the wild character that makes it so attractive as a tourist destination. Integrating the new resort elements into existing infrastructure and natural processes is in the best interest of everyone and everything involved. One way to do this could include harvesting the rainwater that falls on the building. It could even be taken from the small creek that runs through the top (South) of the site. After being used in

the building, it could be directed into the purifying bioswale system being proposed. In the end, the same water that would have flown uninterrupted through the site is instead temporarily redirected to serve a human function, then returned into the ecological path it was originally on.

The few examples given in this narrative show the opportunities of the site as well as the lengths I intend to take the integration of Thunderbird Lodge into the site. The following information and its analysis will further explore the quantitative and qualitative aspects of the site and how this information should inform the design of Thunderbird Centre Resort and the Thunderbird Fitness Centre.



Figure 75 -Whistler Sliding Centre Site Map



Figure 76 -Photo panorama of proposed building site  
Figure 77 -Whistler Sliding Centre site diagram

**Proposed Building Site**

This is a panoramic photograph of the land enclosed by the final turn of the bobsled track. On the upper left hand side of the image, Blackcomb Mountain continues to rise in elevation. Whistler Mountain can be seen in the top middle of the image. The final turn, named Thunderbird, of the Bobsled/luge/skeleton sliding track encloses the space in a near perfect circle.





Refrigeration Plant



Welcome Centre



Track Exit Building



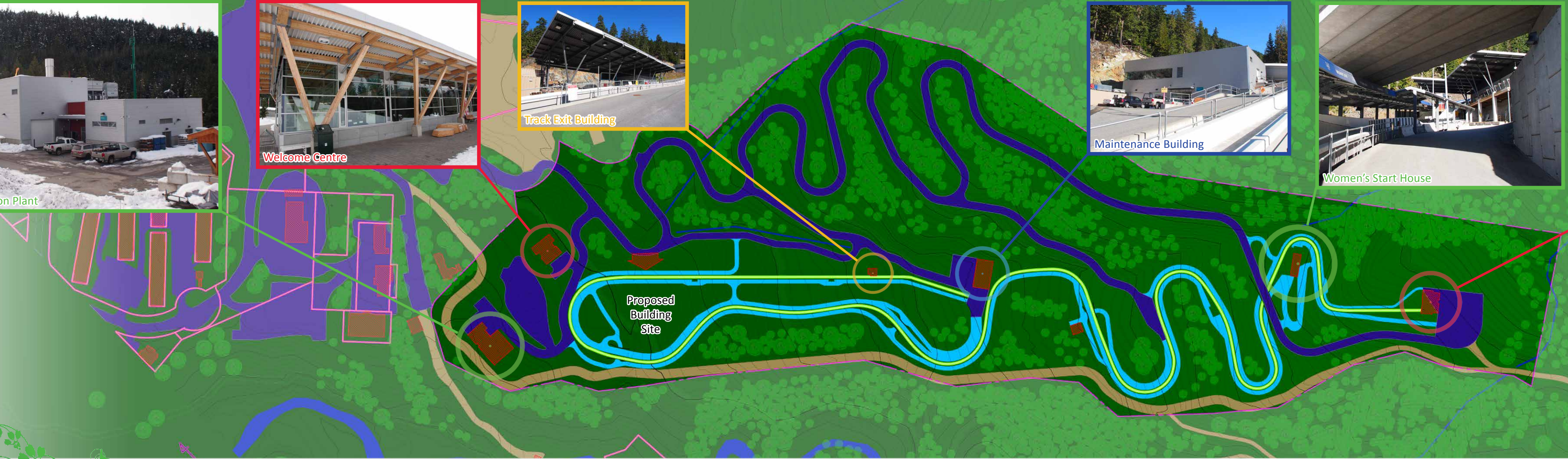
Maintenance Building



Women's Start House



Men's Start House



Proposed  
Building  
Site

The Whistler Sliding Centre and its six main buildings were designed by Stantec Inc., which is an international multi-disciplinary design firm. The existing buildings will be transformed to facilitate new functions pertinent to a resort development.

Figure 78 -Building Inventory Diagram



Figure 79 -Photo of Bobsled making final turn

Figure 80 -Section of of the Sliding Track (American Shotcrete Association, 2008, p.37)

## The Whistler Sliding Track by Stantec Inc.

### Sliding Track Analysis

The 1700m (1860 yd) long sliding track is a concrete chute with intensive interior reinforcing and over 100 km (62.5miles) of coolant pipe. The section profiles vary from a simple trough 26” in height to large curved walls that stand 11’-6” tall. As it stands, the track is uninterrupted from start to finish; Crossing the track is done through three tunnels and one bridge. (American Shotcrete Association, 2008)

The yellow image to the right shows the large impact the construction of the track had on the environment.

The Tracks ‘U’ shape and relatively shallow slope make it an excellent conveyor of water. With minimal modifications, the track could be turned into a linear bioswale that naturally detoxifies roof and road run-off before returning to the natural watersystem of the surrounding terrain. This uniquely shaped piece of infrastructure is not suited for blackwater treatment that a living machine system could provide. Nor is it suited for intense water treatment that a natural or constructed wetland can achieve.

Cutting sections of the track out to allow for walking paths makes circulation much more efficient. The large track form can be filled with functional and ornamental plants to help integrate it into the landscape as a sculptural memento of the 2010 Winter Olympics.



Figure 82 -“Fig 7: Formwork and finishing screeds (plastic pipes) installed” (American Shotcrete Association, 2008, p.39)

Figure 83 -“Fig 5: Refrigeration piping being installed on jig assemblies” (American Shotcrete Association, 2008, p.39)

Figure 84 -“Fig 9:Shotcrete being applied under the watchful eye of David Baranowski (VBFA)” (American Shotcrete Association, 2008, p.39)

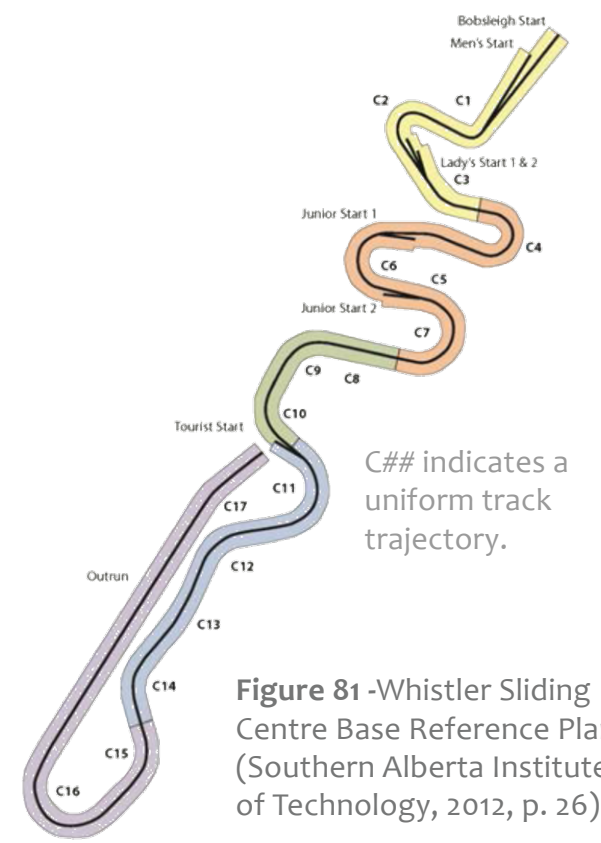
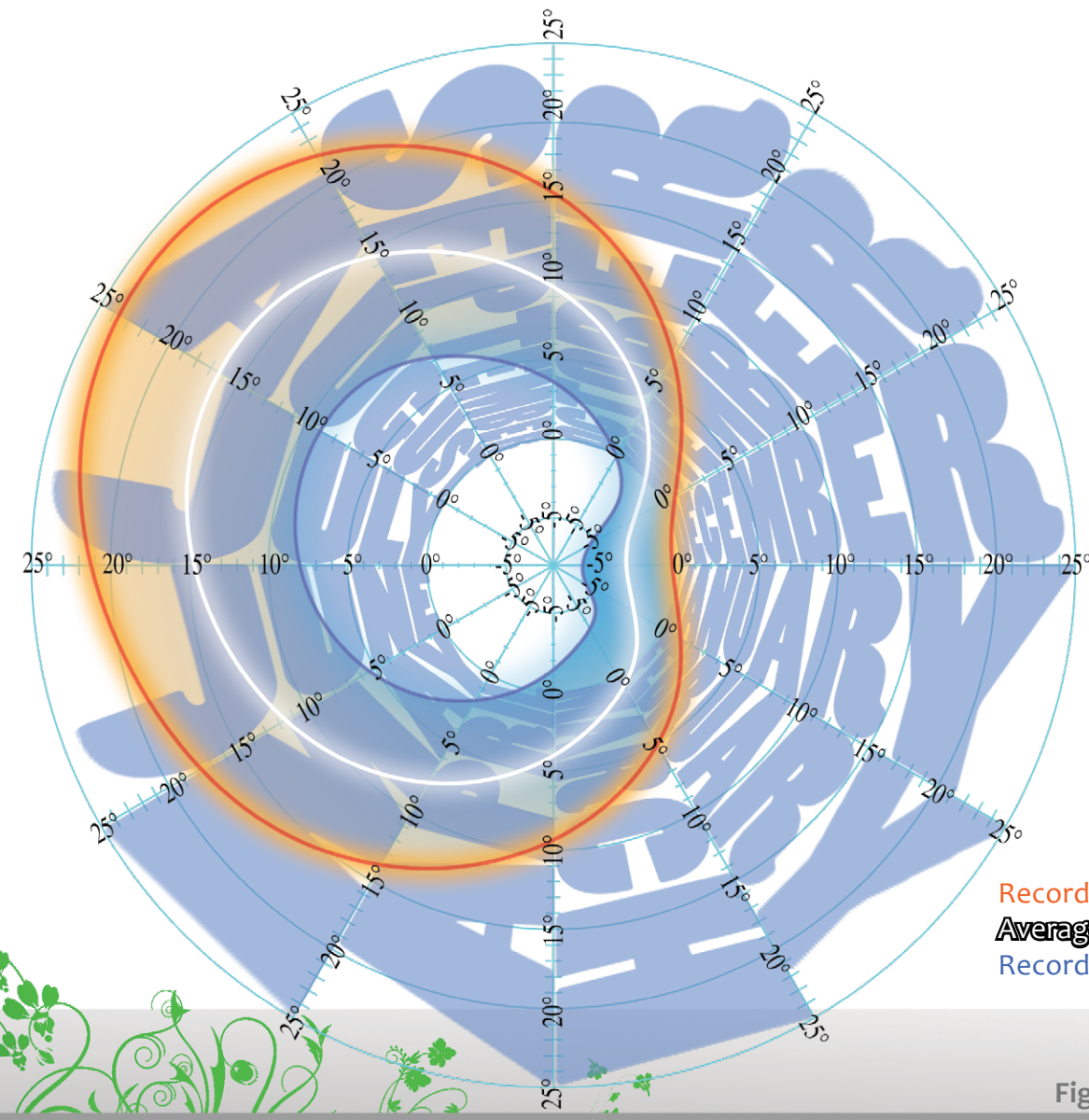


Figure 81 -Whistler Sliding Centre Base Reference Plan (Southern Alberta Institute of Technology, 2012, p. 26)



## Temperature Graph

Temperature conversion chart	
°C	°F
-5	23
0	32
5	41
10	50
15	59
20	68
25	77
30	86

Figure 85 -Annual temperature graph for Whistler, BC

## Temperature Analysis

Whistler has a possible temperature range of 32°C (57°F). The lowest record temperature is -8°C (18°F) in December/January and the highest record temperature is 24°C (75°F) in July/August.

This is a relatively mild climate without excessive heat or cold. No extreme conditions need to be taken into account. As far as temperature is concerned, this gives a relatively great amount of freedom when it comes to choosing wall types, insulation thicknesses, structural systems and exterior materials.

The temperature graph on the left shows monthly extremes and averages, but doesn't convey the temperature swings that can occur in the frame of a 24 hour period. In Whistler's mountain environment, cold mornings can easily become very warm evenings. Like most coastal cities, the locals are used to saying 'If you don't like the weather... wait five minutes.'

Heating, ventilation and air conditioning (HVAC) units must be incredibly efficient and versatile in this kind of environment since the need for heating and/or cooling is present year round.

A fitness facility needs to be kept between 18°C - 22°C (68°F - 72°F) to ensure that participants won't overheat during exercise and won't be chilled after exercise (Sawyer, 1999, p. 253).

Employing passive systems that stabilize the interior environment would help keep energy consumption to a minimum.

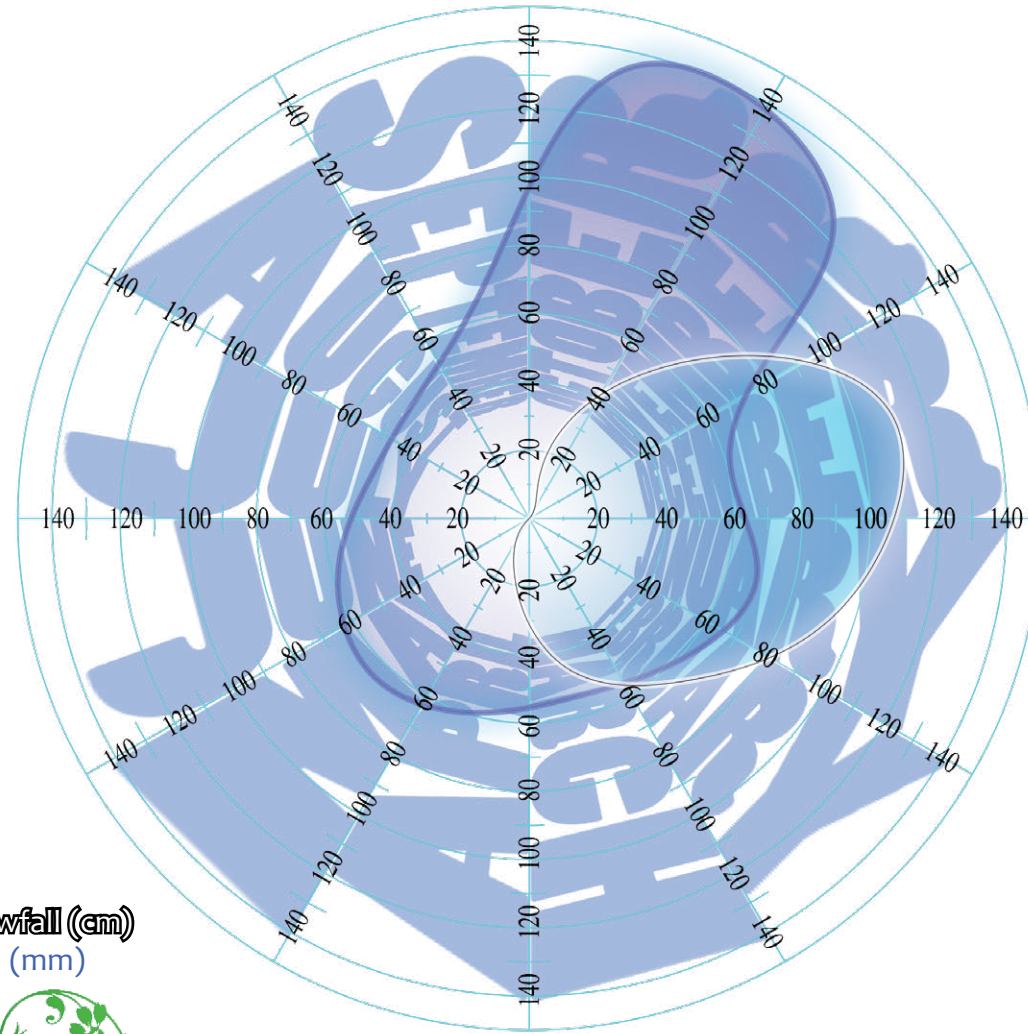
Norbert Lechner, in his book "Heating, Cooling, Lighting: Sustainable Design Methods for Architects" places the West Coast of North America (which includes Whistler, BC) in climate region 6, an area

that has a large variation of microclimates. Lechner remarks that the frequently overcast skies can still provide a suitable amount of solar energy due to the mildness in the temperature. He lists three climatic design priorities:

- “1st- Keep the heat in and the cold temperatures out during the winter. (I)
- 2nd- Let the winter sun in (mostly diffused sun because of the clouds). (III)
- 3rd- Protect from the cold winter winds. (II)” (Lechner, 2009, p.98)

Lechner suggests a few design strategies to achieve his climatic design priorities:

- Use Earth sheltering in the form of underground or bermed structures.
- Use evergreen vegetation to create windbreaks
- Use long sloping roofs, as in the New England saltbox houses, to deflect the wind over the building and to create sheltered zones on the sunny side.
- Use South facing clerestories or dormers instead of skylights (Lechner, 2009, pp. 122-123)



Snowfall (cm)  
Rain (mm)

## Precipitation Graph & Humidity Chart

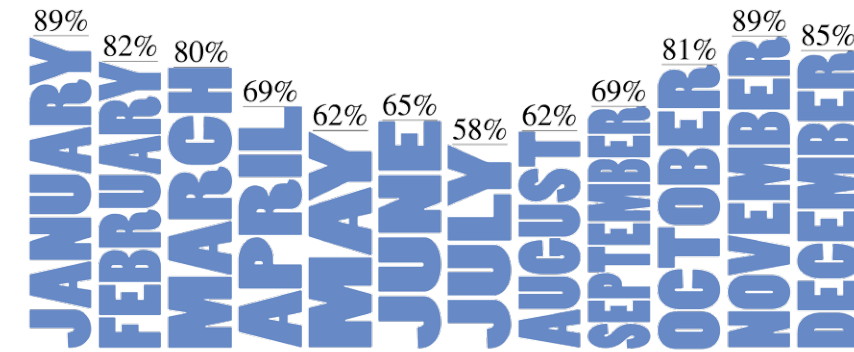


Figure 86 -Annual precipitation graph for Whistler, BC  
Figure 87 -Monthly humidity averages for Whistler, BC

## Precipitation Analysis

The mild climate of the BC coast means plenty of overcast skies, rainy falls and springs, and ample snow in the higher elevations. This presents three main issues: One, potentially destructive moisture penetration; Two, Weight of snow on the building's roof; and Three, managing large volumes of water that fall onto and run down the building and the site.

Moisture penetration occurs through kinetic energy, Surface tension, gravity, capillary action and pressure differential (Bassler [Ed.], 2008, p.82)

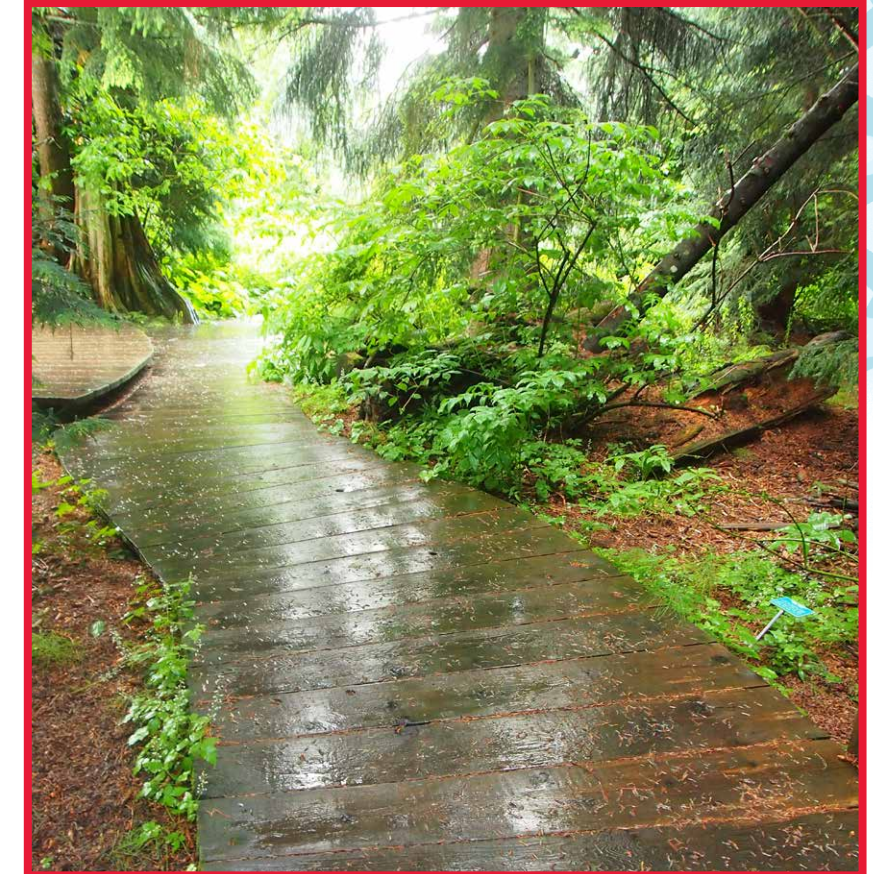
Preventing moisture from entering the building is best accomplished with a rain screen-type wall assembly. The rain screen refers to a shell of material that is separated from the main mass of the wall by an airgap.

Managing the snow load means designing appropriately sized structural members to handle the extra weight. A structural engineer would best solve this issue, but sizing members based on simplified calculations would help create the interior spaces of the building.

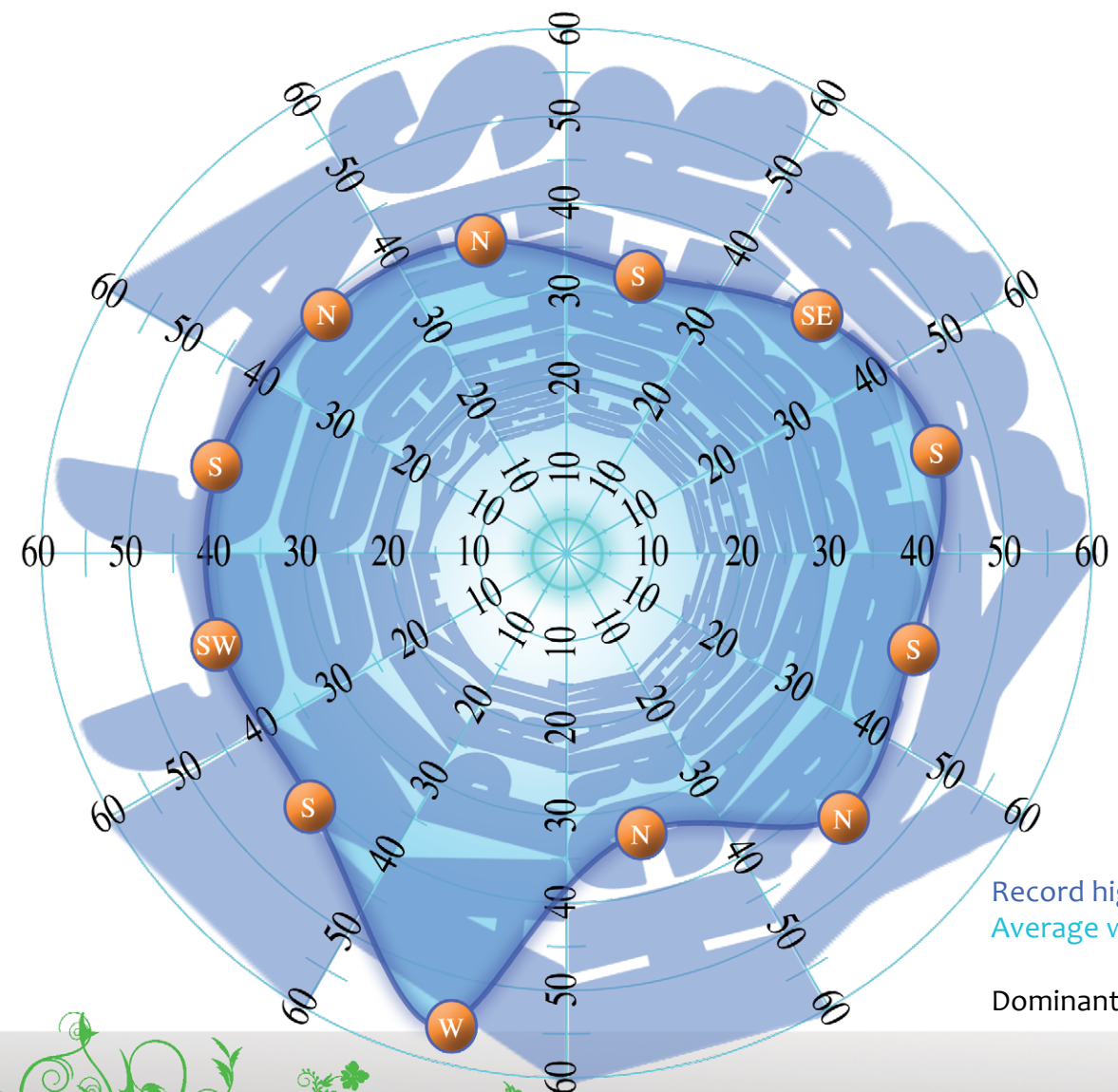
Water will always flow downhill, and when it cant, it will pool. Designing proper draining and site topography is essential to keep a building from flooding. Utilizing ponds, bioswales and rain gardens is an aesthetically pleasing way to manage rain water.

**Annual Total Precipitation: 1,215mm**  
**Moisture Index: 0.99**  
**Snow Load: 160 psf**

Figure 88 -Photo of forest paths after a summer rain







Record high wind speed (km/h)  
Average wind speed ~4km/h  
Dominant wind direction ●

### Wind Graph

The average wind velocity in Whistler is around 4km/hr (expressed as the small light blue circle in the center of the graph). Occasionally, weather phenomenon cause this number to rise dramatically. The dark blue line represents record high speeds and their prevailing direction. Though these speeds are uncommon, they are possible, and any built structure must be able to withstand them. It is also worth mentioning that these winds may be coupled with rain or snow, which increase the likelihood of moisture infiltrating a building or snow building up on non-horizontal surfaces.

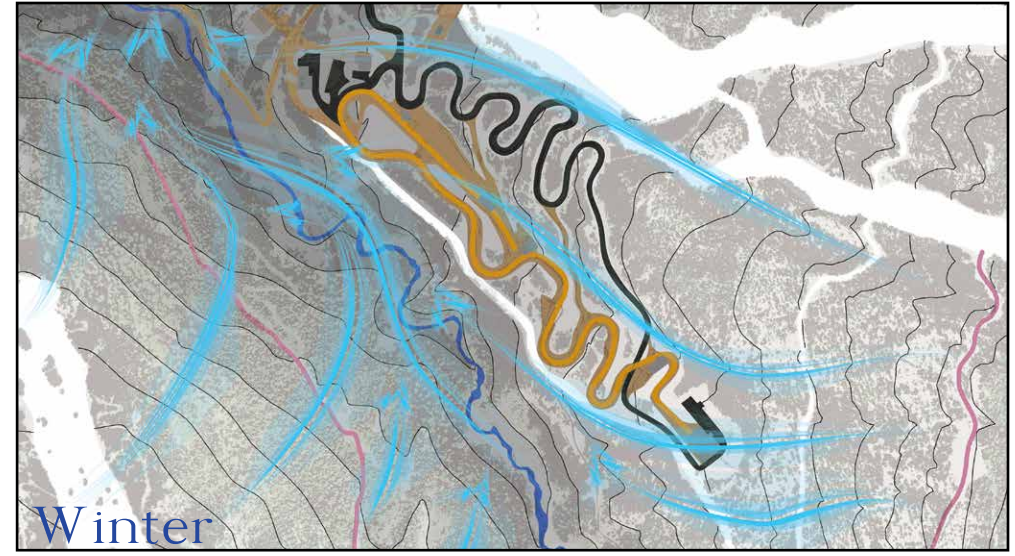
Figure 89 -Annual wind graph for Whistler, BC



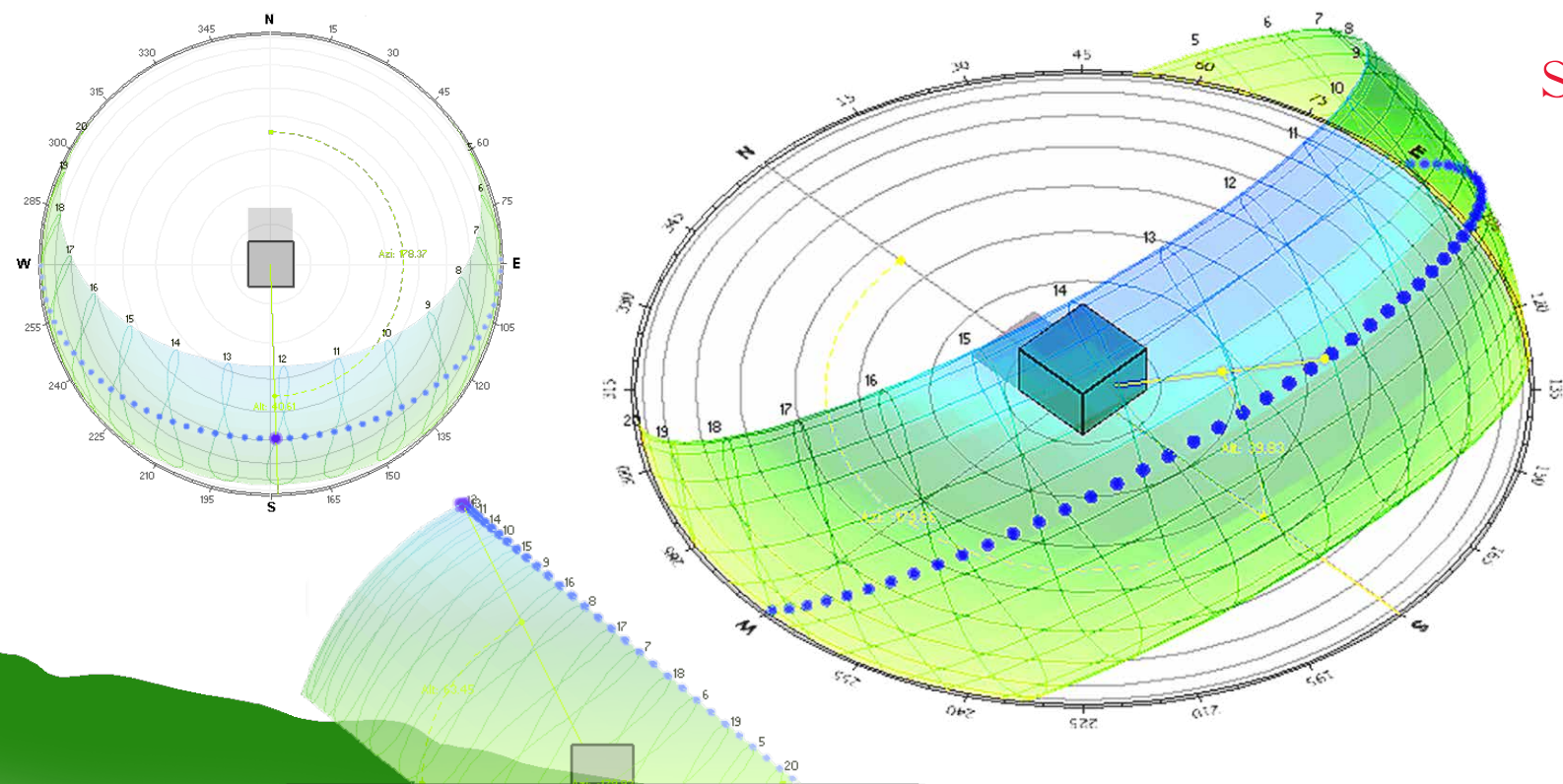
### Wind Analysis

Though Whistler sits in the heart of the Coast Mountains, the Pacific Coast shore line is 90 km away. The tall mountains that lie between practically nullify the prevailing Westerlies common to this latitude of coast. Any wind that does make it over Whistler mountain into the Fitzsimmons valley would be turbulent due to the mountain wave effect. Instead, the wind's behaviour primarily follows a pattern common to valleys. When the valley's sloped surfaces become cooler than the adjacent air (heat loss due to radiation), the adjacent air that come into contact with the mountain is also cooled as a result and this cooler, denser air travels down the slope creating katabatic wind,

Figure 90 -Anabatic wind diagram  
Figure 91 -Katabatic Wind diagram



which is also called mountain breeze. The opposite effect happens when the valley surfaces become warmer than the adjacent air (heat gain from solar radiation). The air that comes into contact with the warmer surface is also warmed. This lighter, less dense air travels up the mountain side and is called anabatic wind, or valley breeze. It is important to note that during the summer months, anabatic wind will be present during the warming hours (day) and katabatic wind will be present during the cooling hours (night). During the winter months, the lack of solar radiation in addition to the presence of snow make the cooler katabatic winds the only type of wind. (Peppler, 2000)



Sun Path Diagram

Figure 92 -Sun path diagrams for Whistler, BC  
Figure 93 -Region section cut: South to North

Solar Analysis

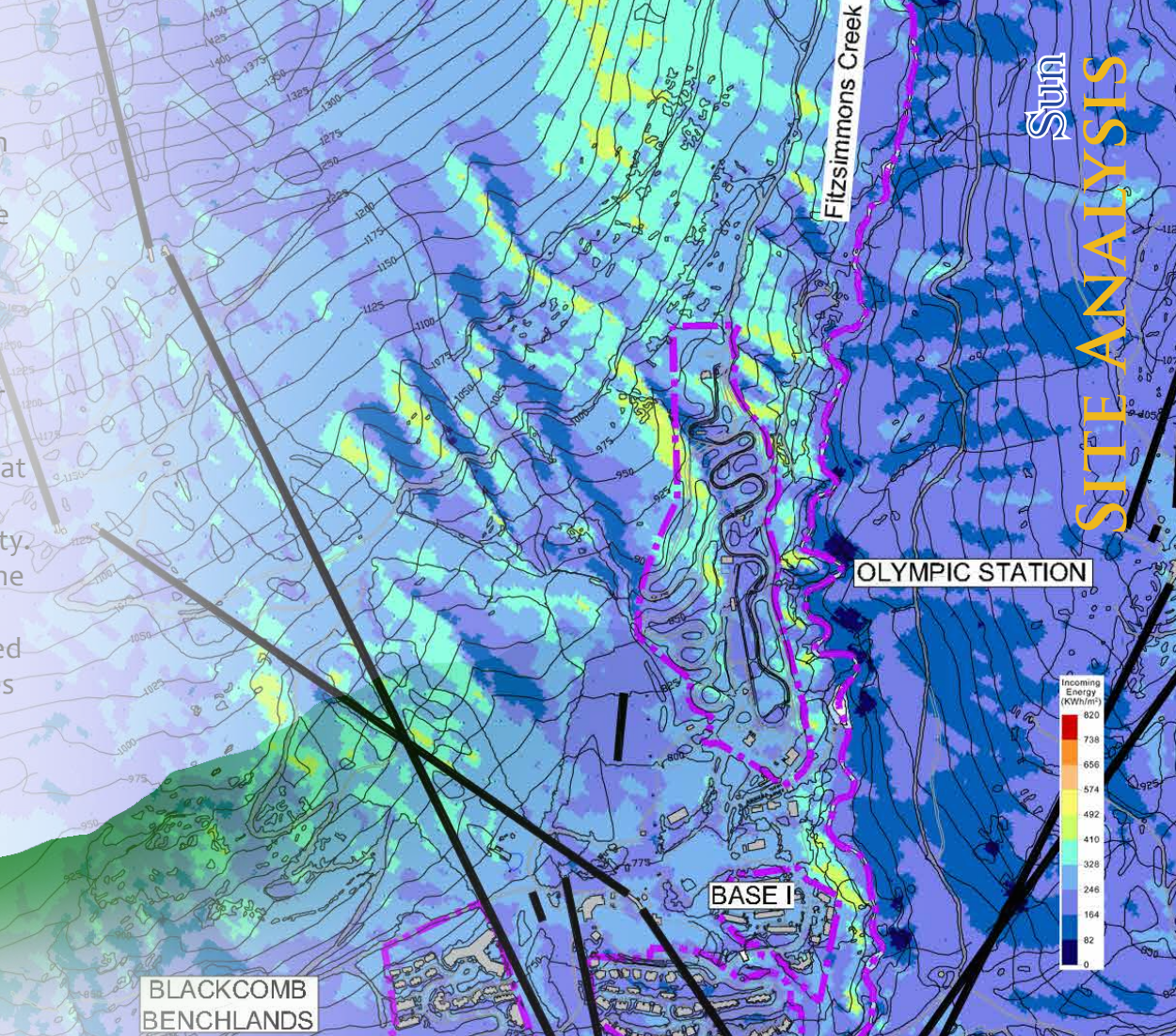
The Whistler Sliding Centre sits near the lowest point of a valley on a North facing slope surrounded by tall coniferous trees. Needless to say, the amount of direct sunlight that falls on the site is minimal. The frequently overcast skies further limit access to direct solar energy.

Photovoltaics on this site would only generate minimal amounts of electricity; far too little to offset their cost and are therefore not a viable source of energy.

Storing available solar energy into heatsinks to stabilize an interior environment would be a much better strategy to harness sunlight.

A building design and a site design that takes full advantage of what little sunlight is available is important. Especially in a facility that is meant to embody the spirit of nature and environmental responsibility. Also, the quality of indoor and outdoor spaces is directly related to the amount of natural light. Allowing sunlight to be the major source of light in a space helps accomplish this. Utilizing light sensors connected to artificial lights in order to provide the required 75 - 100 foot candles in all exercise spaces would be a good way to do this. (Sawyer, 1999, p.253)

Figure 94 -Site solar Analysis (Ecosign, 2010)



### Shadow Analysis

The following graphic demonstrates the extreme and the median amount of light that falls on the Whistler Sliding Centre site in a qualitative way. The extreme examples, being the Solstices at 1:30pm (When the sun is closest to, and farthest from the location) indicate extreme shadow and some shadow respectively. Even on the warmest summer day, shadows will fall due to the Northern latitude and north facing slope.

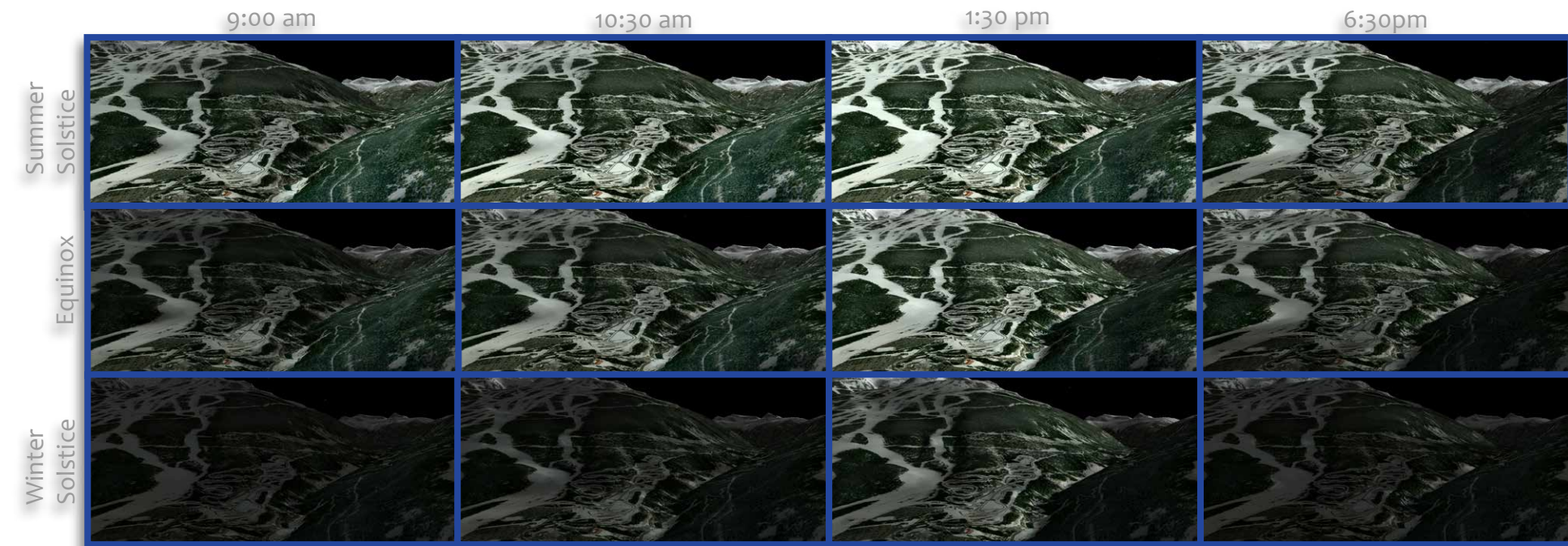


Figure 95 -Shadow Study array (Google, 2012)

### Biogeoclimactic Analysis

Whistler, BC is part of the ‘Coastal Western Hemlock’ Biogeoclimactic Zone. The Coastal Western Hemlock Zone is identified by its temperate rainforests, which can be found in abundance in Whistler. Temperate rainforests are vast and complex ecosystems. This makes them fairly resilient to human interference, but not invincible.

Whistler is covered primarily in Western hemlock and Western redcedar. Other species include Amabilis fir, yellow-cedar, Douglas fir, Grand fir, Western white pine and bigleaf maple.

The Coastal Western Hemlock Zone is the most diverse Zone in British Columbia because it encompasses so many types of ecosystems. Coast lines, wetlands and mountainous forests are all part of this Zone. Whistler is predominantly upland forest, though it used to have a healthy wetland system before Whistler village began to expand on the valley floor. Ensuring that all water that leaves the site of Thunderbird Centre Resort is near-potable would greatly lessen the burden of what wetlands remain.

In Whistler, the soils are thick with organic matter, but nutrients are quickly swept away by the wet climate. Consequently, deep foundation systems must be utilized to achieve stability in the viscous soil, which is susceptible to erosion and sedimentation, especially on the sloped surface. (Egan, 1999)

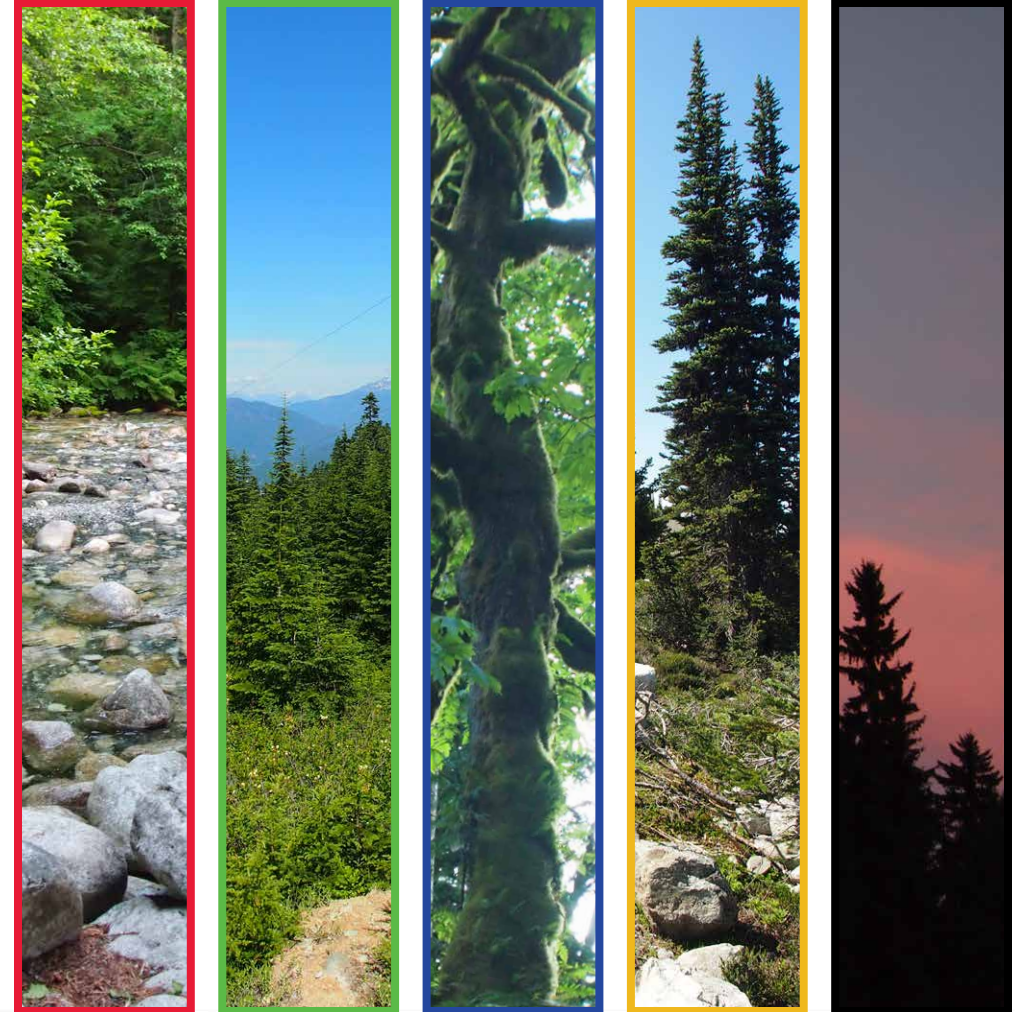


Figure 96 -Photo montage of the Coastal Western Hemlock Biogeoclimactic Zone



# PROGRAMMATIC REQUIREMENTS

Figure 97 -Photo of Garibaldi Provincial Park from Whistler Mountain

**FITNESS CENTRE SPACES . . . . .**

Circulation . . . . .	21%
Vestibule . . . . .	.300 sf
Entryway Atrium . . . . .	3000 sf
Reception + Check-in . . . . .	.300 sf
Circulation (15%) . . . . .	.9000 sf
Support . . . . .	15%
Men's Main Locker Room . . . . .	3000 sf
Women's Main Locker Room . . . . .	3000 sf
Public Washroom . . . . .	2500 sf
Group Exercise/Dance Studio Coat Area . . . . .	.400 sf
Aquatics . . . . .	9%
Short Course Lap Pool . . . . .	3000 sf
Public Spa Pool . . . . .	.600 sf
Rinse Showers . . . . .	.100 sf
Pool Deck . . . . .	2000 sf
Exercise . . . . .	23%
Heavy Weight Strength Training . . . . .	2000 sf
Light Weight Strength Training . . . . .	2000 sf
Cardiovascular Exercise . . . . .	2500 sf
Rock Climbing . . . . .	4000 sf
Group Exercise/Dance Studio . . . . .	2500 sf
Personal Training Studio . . . . .	.820 sf

Administration . . . . .	2%
Director's Office . . . . .	.150 sf
Administration Offices (2) . . . . .	.200 sf
Training Offices (2) . . . . .	.250 sf
Conference Room . . . . .	.500 sf
Work Room (3 workstations) . . . . .	.240 sf
Service . . . . .	30%
Group Exercise/Dance Studio Storage . . . . .	.500 sf
Laundry Service . . . . .	.400 sf
Equipment Storage . . . . .	.600 sf
Facility Storage . . . . .	1000 sf
Custodial Storage . . . . .	.640 sf
Loading and Unloading . . . . .	.500 sf
Covered Accessible Parking . . . . .	2000 sf
Building and Pool Mechanical (15%) . . . . .	.9000 sf
Contingency . . . . .	3000 sf

**TOTAL . . . . . 60,000 SF**

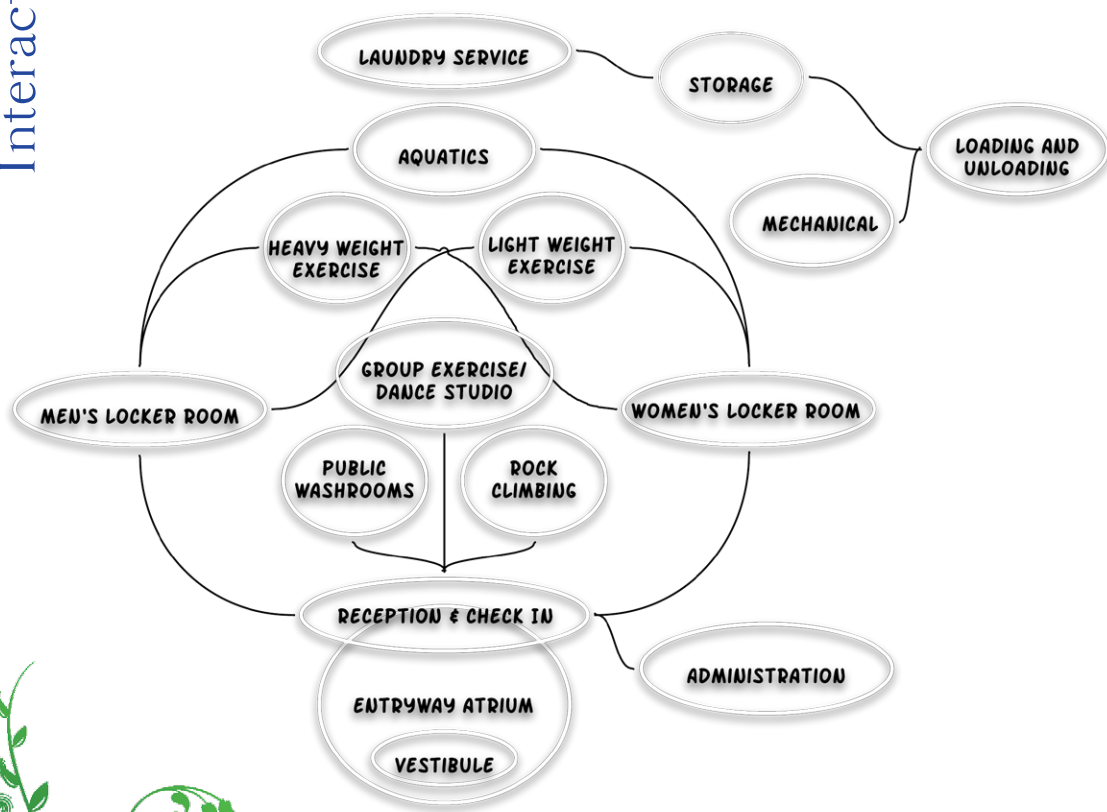
**RESORT SPACES. . . . .**

Transformed Functions. . . . .	
Welcome Centre + Reception + Olympic Museum . . . . .	
Event Arboretum . . . . .	
Resident's Hot House . . . . .	
Public Washrooms . . . . .	
Resort Operations + Maintenance . . . . .	
Backcountry Adventure Centre . . . . .	
New Functions . . . . .	
Road & Infrastructure improvements . . . . .	
Duplex & Quadraplex Units . . . . .	
Private Lots . . . . .	
Youth Hostel . . . . .	
Public Parks . . . . .	
Walk/Bike Trails . . . . .	
Ornamentally Planted Sliding Track . . . . .	
Children's Accessible Playground . . . . .	
Fitness Centre . . . . .	

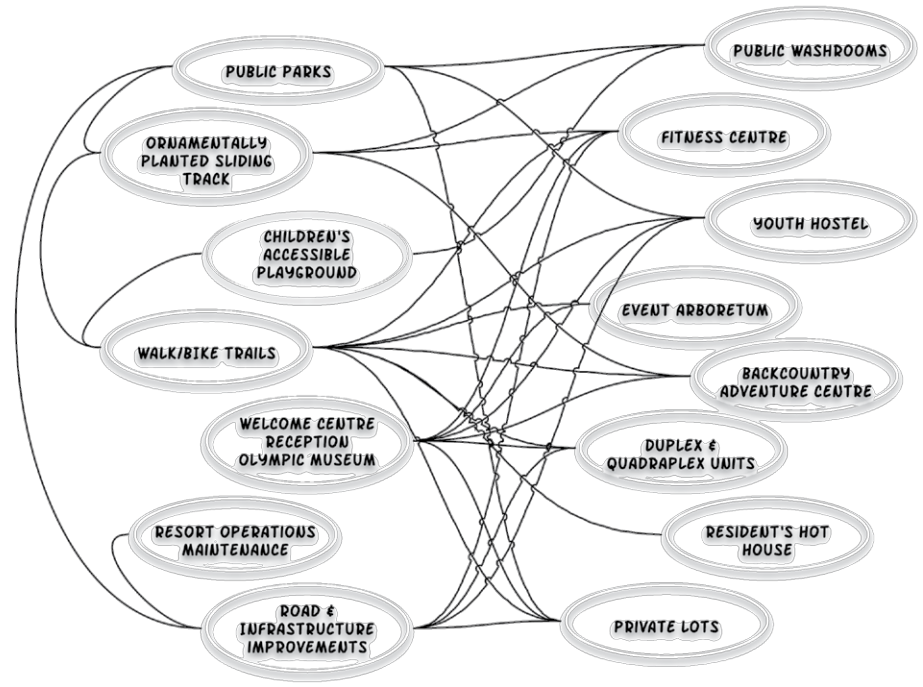


Figure 98 -Photo of Whistler Sliding Centre Entrance

Fitness Centre Interaction Net



Resort Interaction Net



Fitness Matrix

	Vestibule	Entryway Atrium	Reception + Check In	Men's Main Locker Room	Women's Main Locker Room	Public Washroom	Group Exercise/Dance Studio Coat Area	Short Course Lap Pool	Spa Pool	Rinse Showers	Pool Deck	Heavy Weight Strength Training	Light Weight Strength Training	Cardiovascular Exercise	Rock Climbing	Group Exercise/Dance Studio	Personal Training Studio	Director's Office	Administration Offices	Training Offices	Conference Room	Work Room	Group Exercise/Dance Studio Storage	Laundry Service	Equipment Storage	Facility Storage	Custodial Storage	Loading & Unloading	Covered Accessible Parking	Mechanical	
Vestibule																															
Entryway Atrium																															
Reception + Check In																															
Men's Main Locker Room																															
Women's Main Locker Room																															
Public Washroom																															
Group Exercise/Dance Studio Coat Area																															
Short Course Lap Pool																															
Spa Pool																															
Rinse Showers																															
Pool Deck																															
Heavy Weight Strength Training																															
Light Weight Strength Training																															
Cardiovascular Exercise																															
Rock Climbing																															
Group Exercise/Dance Studio																															
Personal Training Studio																															
Director's Office																															
Administration Offices																															
Training Offices																															
Conference Room																															
Work Room																															
Group Exercise/Dance Studio Storage																															
Laundry Service																															
Equipment Storage																															
Facility Storage																															
Custodial Storage																															
Loading & Unloading																															
Covered Accessible Parking																															
Mechanical																															

Resort Matrix

	Welcome Centre	Resort Reception	Olympic Museum	Event Arboretum	Resident's Hot House	Public Washroom	Resort Operations	Maintenance	Backcountry Adventure Centre	Public Roads	Duplex Cabins	Quadruplex Cabins	Private Lots	Youth Hostel	Public Parks	Walking/Biking Trails	Ornamentally Planted Sliding Track	Children's Accessible Playground	Fitness Centre	
Welcome Centre																				
Resort Reception																				
Olympic Museum																				
Event Arboretum																				
Resident's Hot House																				
Public Washroom																				
Resort Operations																				
Maintenance																				
Backcountry Adventure Centre																				
Public Roads																				
Duplex Cabins																				
Quadruplex Cabins																				
Private Lots																				
Youth Hostel																				
Public Parks																				
Walking/Biking Trails																				
Ornamentally Planted Sliding Track																				
Children's Accessible Playground																				
Fitness Centre																				

Necessary	Green
Desirable	Blue
Non-Interacting	Black
Undesirable	Yellow
unacceptable	Red

Figure 99 -Project Interaction Nets

Figure 100 -Project Interaction matrices



Figure 101 -Photo of the results of Production week

# DESIGN PROCESS

I love Whistler and the incredibly beautiful land it occupies. In the summer before the thesis project was to start, I made six dedicated trips into Whistler, exploring the city, the mountains and the backcountry. On these excursions, I identified three potential project sites. This photograph shows my descent down the East side of Whistler Mountain with Site #2 covered in lingering snow below. None of them included the bobsled track. Each was mapped, photographed and analyzed. School started, and research into the project began. Through research, I realized that building on such virgin land was irresponsible. So, I began to look for opportunities with a similar natural environment but with existing construction that needed transformain.

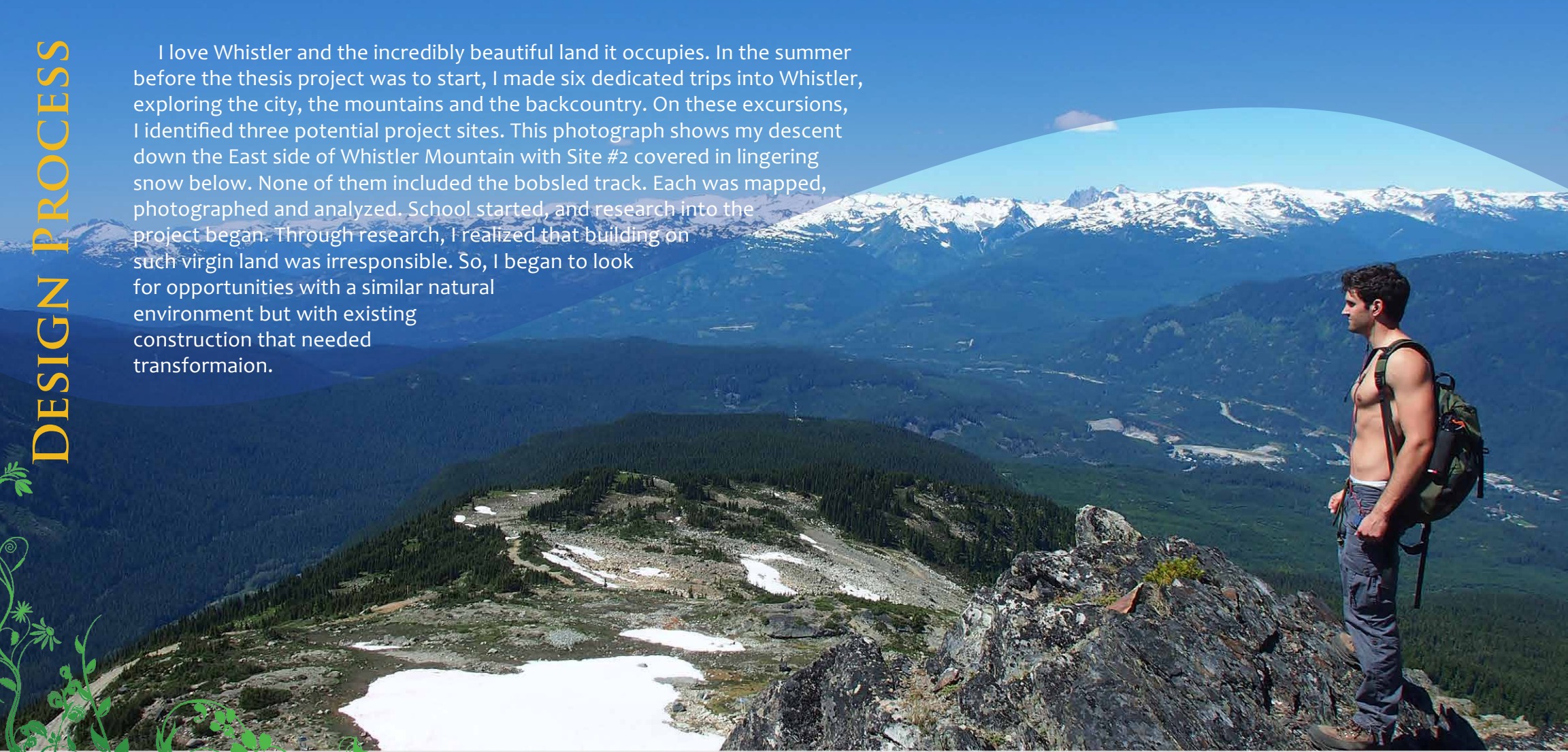
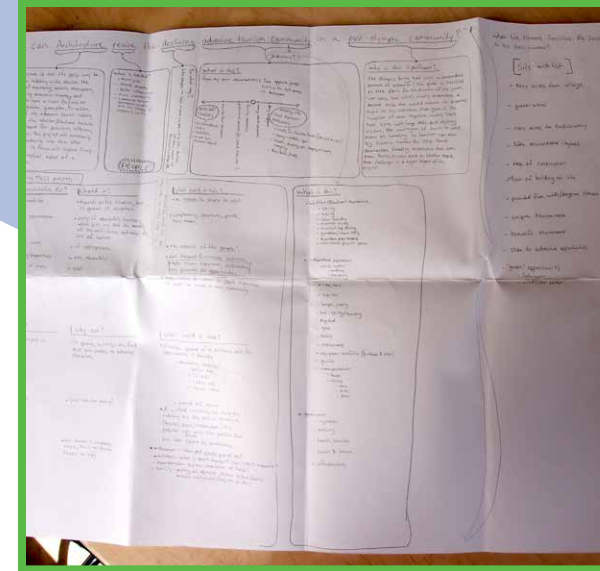
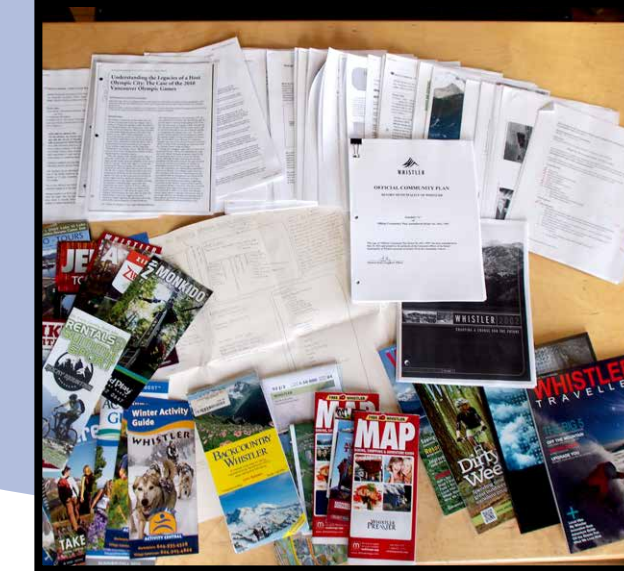


Figure 102 -Photo of author exploring site options on Whistler mountain



Right before returning to North Dakota for the school year, I sat in my kitchen for a few hours and diagrammed the situation in Whistler with respect to the effect the Olympics had on the economy, the population and the environment in general. This was the beginning of a thesis question that would guide a year long process.

Figure 103 -Process photo- initial ideas map  
 Figure 104 -Process photo- Research spread  
 Figure 105 -Process photo- Early thesis book

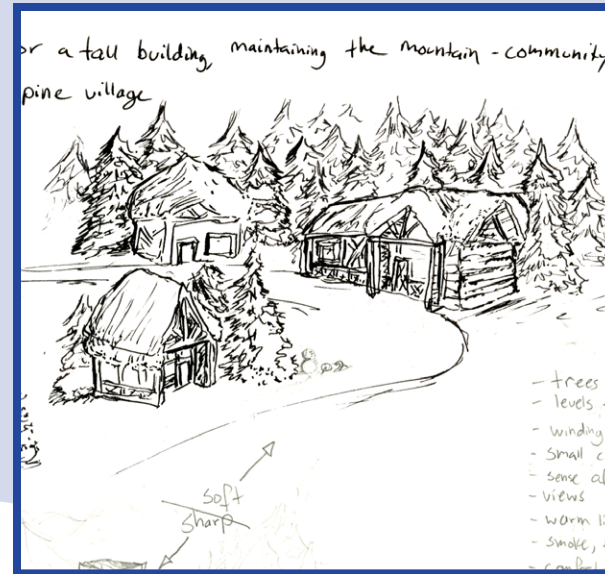


Even before arriving at school, I had gathered an incredible amount of resources from Whistler and from online journals. The spread of pages across the top of this image is just a small portion of the journal articles I collected. The Whistler community plan as well as Whistler 2020 (a long term community plan) were important elements that helped define the thesis question.

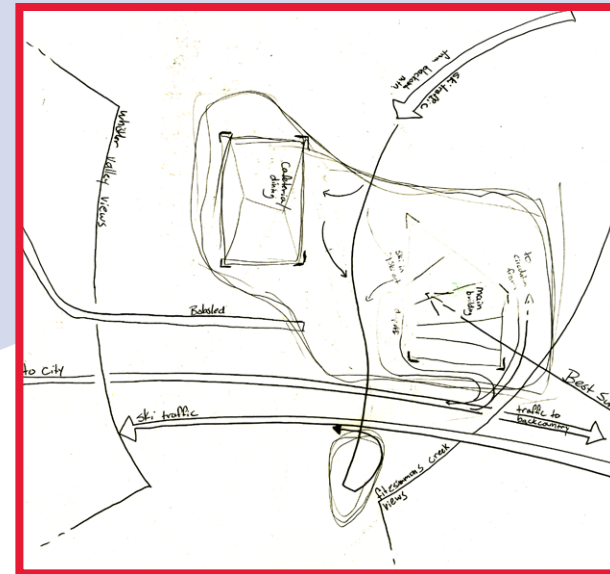


This is the first iteration of the thesis document that you are currently looking at. Even before Thunderbird Lodge, there was Whistler Citadel, a concept that was quickly changed due to its enormous scope.





After pursuing the research pertinent to Whistler and Bobsled tracks, the first step of the design process was to explore the local vernacular of design. Alpine communities of Europe act as inspiration for most aesthetic decisions. The trees, the switch backs of the roads and the quality of cabins create a very unique atmosphere.

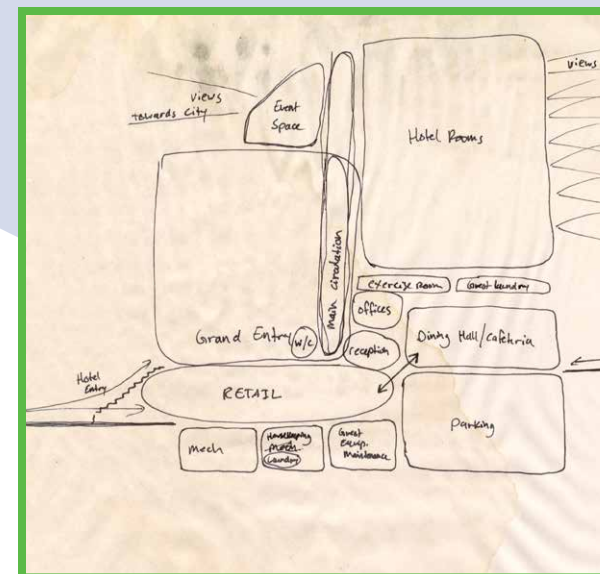


Determining patterns of traffic through my site and arranging them around a building was necessary to help inform the shape of the building. Because the traffic flow included skiers and snowboarders, the paths had to be largely uninterrupted. The above drawing shows how this particular part of the site acts as a node of many traffic types. At first this appeared to be an asset, but it was more like designing on top of a busy highway intersection.



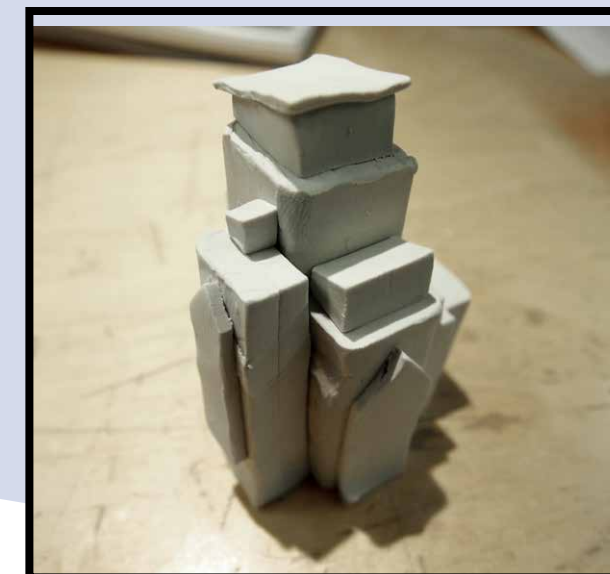
Above is a small section of the topography of the top of the site. It was used to explore the slope and the quality of the surrounding land. A small plateau had already been cleared of trees in order to building the Men's Start House of the bobsled track. With the best views of Whistler Village in the valley below, this appeared to be the best location for a building.

Figure 106 -Process photo- Alpine architecture vernacular  
 Figure 107 -Process photo- Paths of movement map  
 Figure 108 -Process photo- Sketch topography model



The very first attempt at organizing the program elements resulted in a seemingly manageable project. Shown above is a spatial organization diagram showing how the spaces relate to each other vertically.

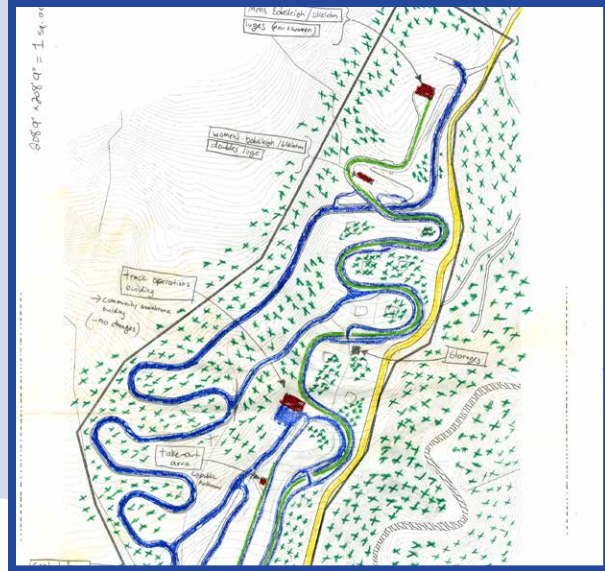
Figure 109 -Process photo- Vertical space planning  
 Figure 110 -Process photo- Oil Clay model #1  
 Figure 111 -Process photo- Oil clay model #2



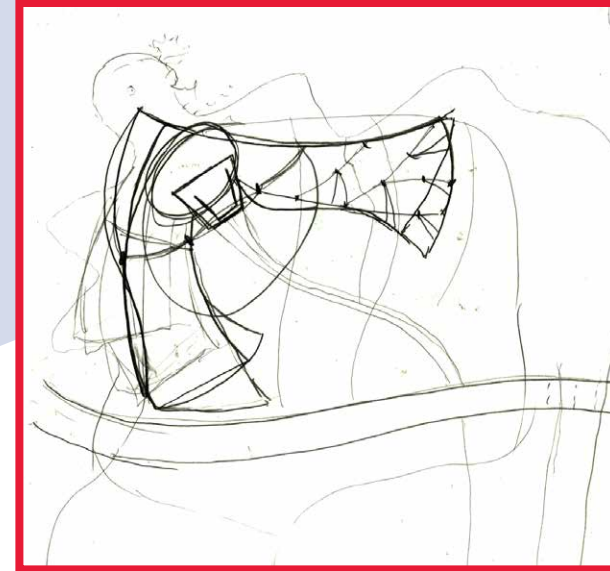
This project began as 'Thunderbird Lodge', which was to be a large hotel complex, complete with underground parking, conference center, public cafeteria for skiers, fitness facility and hospitality. The oil-clay model above was an exercise in building form. While its additive form was articulative like many other buildings in Whistler, it appeared too modern and would have not fit as a single building on a mountain.



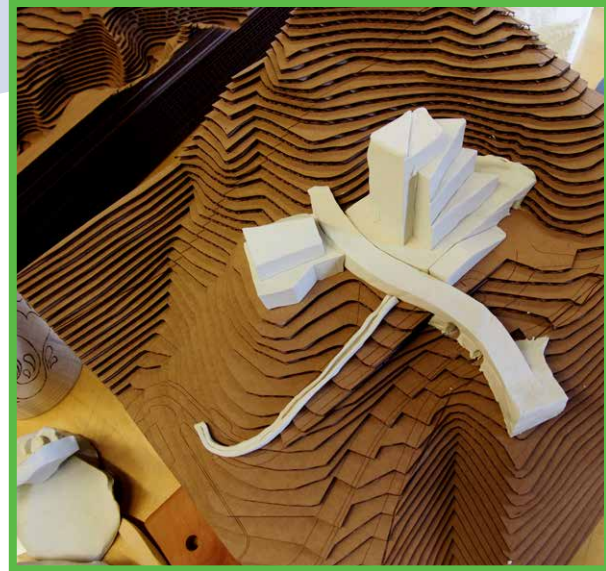
The third oil-clay model had an expanded lower section, which exposed more of the surface area to the sun, however the need for stacking hotel room floors efficiently demanded that the rectangular prism form remain. The complex program was starting to make building form a nightmare to coordinate with a smart orientation and other passive systems.



With my focus still on building Thunderbird Lodge at the top of the property (The Southern tip), I began to explore opportunities for the rest of the site. This map outlines roads (dark blue), the sliding track (green), and a ski run (yellow). The existing buildings (red) needed to transform into community assets.



Returning to the building form, a more organic shape that integrated better with the land was encouraged by classmates and my adviser. This plan exercise took advantage of the two sharp slopes with two buildings wings and the main atrium between them. The buildings wings began to represent literal wings of the Thunderbird that informs this project. The literal representation lacked maturity and elegance.



The form evolved into a single winged building that terraced down the South side in order to capitalize on the solar exposure. A constructed ramp bisected the building allowing skiers to pass through without being interrupted or interrupting other paths of movement. The cafeteria had vehicle, pedestrian and skier access as well as excellent views of Whistler valley. While this form worked, the sheer size of the project on the site was overwhelming.

Figure 112 -Process photo- Site inventory map

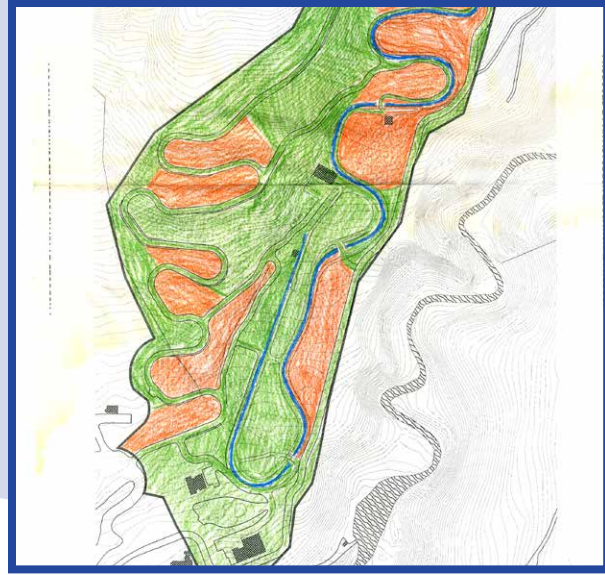
Figure 113 -Process photo- Early form sketch

Figure 114 -Process photo- Initial Oil clay and topography model

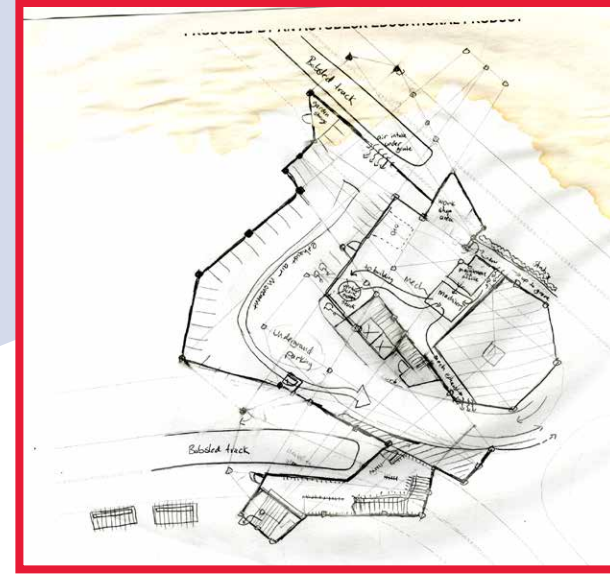


Figure 115 -Process photo- iterations of form

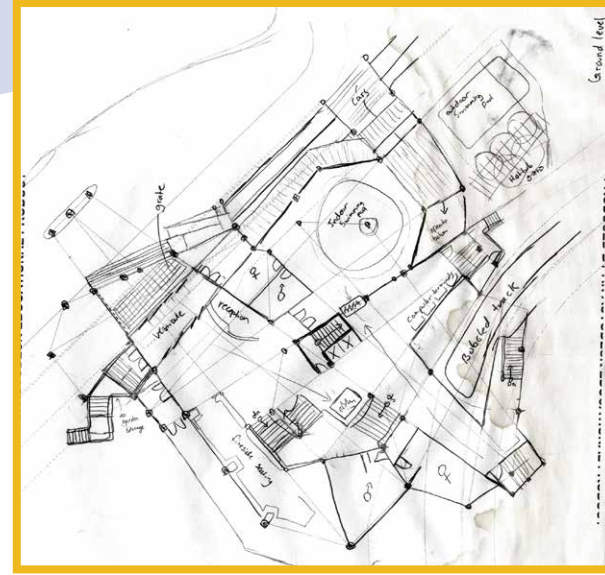
In an effort to capitalize on the views, the height and location remained. Having invested so much time into this particular location and program, I was reluctant to make large changes, however, frustrations grew as I was trying to force a building to be something that wasn't going to work. I needed new solutions or a change.



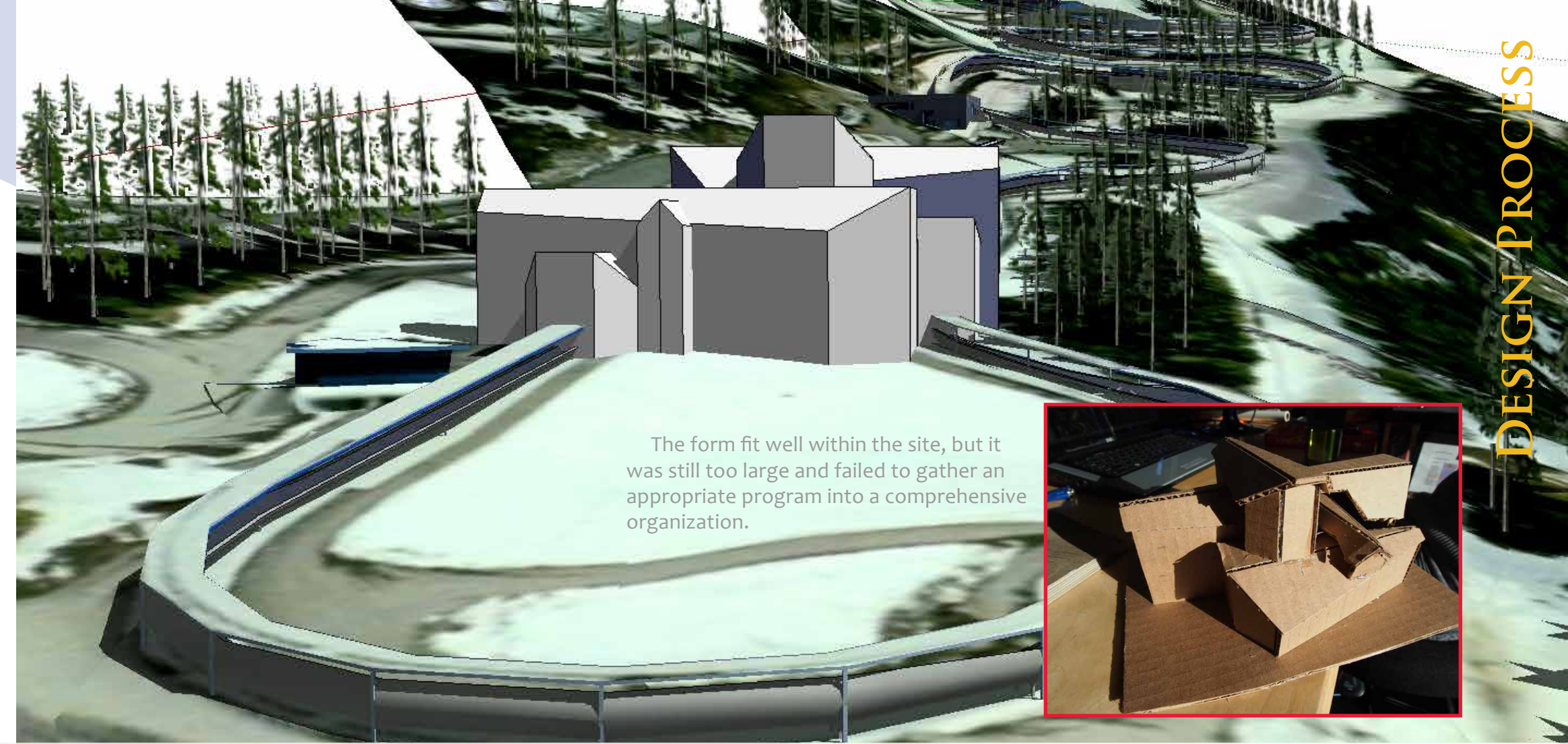
After making no progress on the large hotel at the top of the site, I decided to change locations. With the intent of better interacting with the bobsled track, I chose the narrow section of land between two parts of the track. I also continued to identify public and private areas of the developing master plan.



New floor plans proposed a new building typology in the new site. The typology did away with the hotel part of the original program but retained all the public amenities such as the cafeteria, fitness facilities and conference spaces. Above is the lower floor plan which includes parking, ski storage and mechanical spaces.



The second floor arranges a grand front entrance, circulation, public bathrooms and indoor pool. The complexity of the structure and the many sharp corners make this design a poor solution to the program extracted from the thesis question.

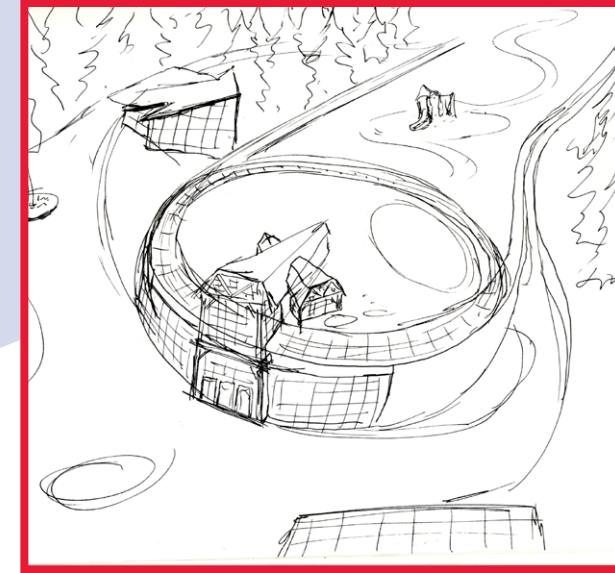
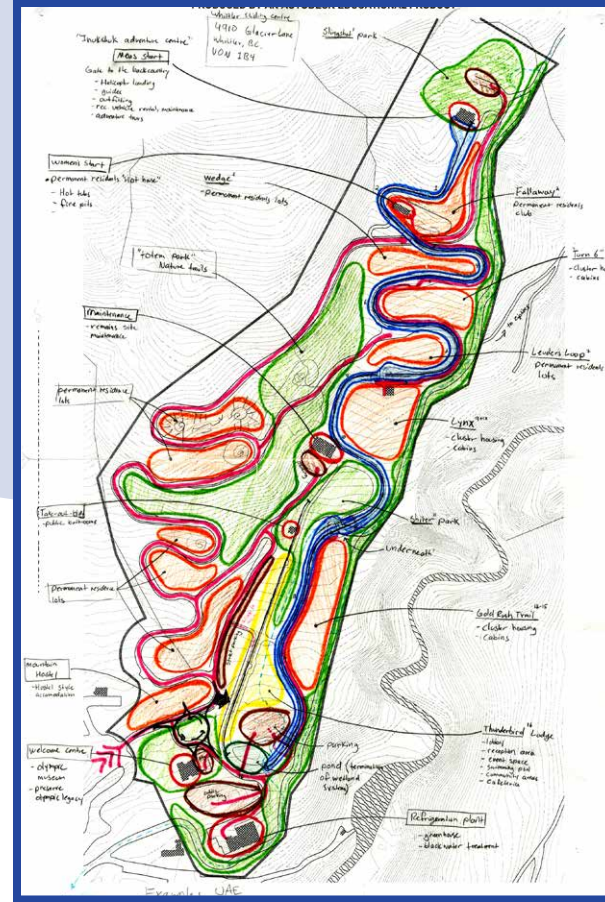


The form fit well within the site, but it was still too large and failed to gather an appropriate program into a comprehensive organization.



Figure 116 -Process photo- Site divisions, public and private  
 Figure 117 -Process photo-Design #2 Lower floor plan  
 Figure 118 -Process photo- Design #2 Upper floor plan

Figure 119 -Process photo- 3D representation of design #2

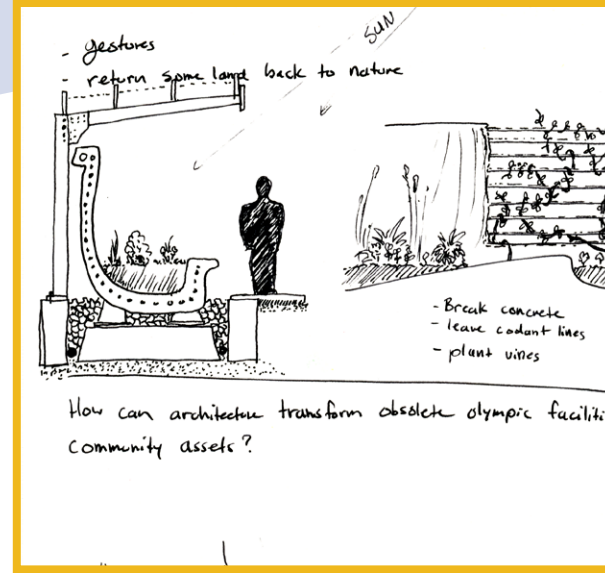


After mid-term presentations, I decided to once again change my typology and site location to something that would better address the question I had posed earlier in the thesis process. The implied circle created by turn #16, called thunderbird, at the bottom of the track was chosen since the circle has a strong connection to the five rings of the Olympic symbol. From this point on, rings and circles became an important element of the design.

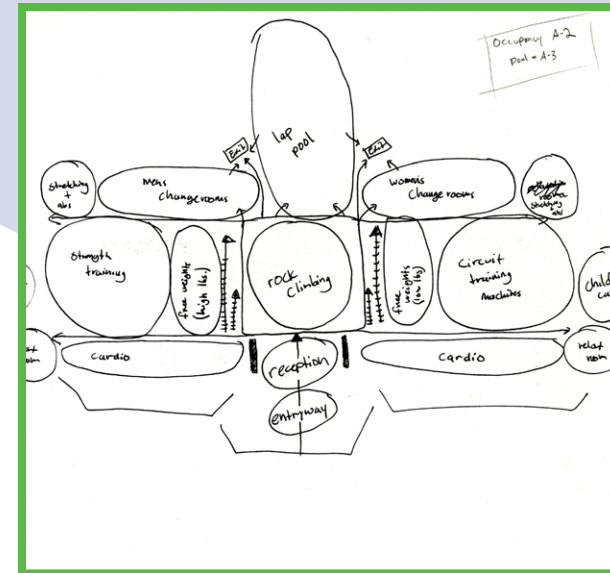
Figure 120 -Process photo- comprehensive master plan exploration

Figure 121 -Process photo- Form explorations, Design #3

Figure 122 -Process photo- Bobsled track opportunities



The sliding track, which plays a central role in this project needed to be addressed. The concept of turning it into a decorative garden element and linear wetland was conceived. Eventually, the wetland concept would be replaced with a bioswale, which can function better with running water, where a wetland works best with still or slow moving water.



The typology had been changed from mega-hotel, to community ski lodge, to fitness centre. Each decision significantly reduced the scale of the project, which allowed for greater detail to be explored, especially since the project was beginning to take on two aspects: the Master plan and the building. From this point on, those two areas would be developed to work together in order to address the thesis question.

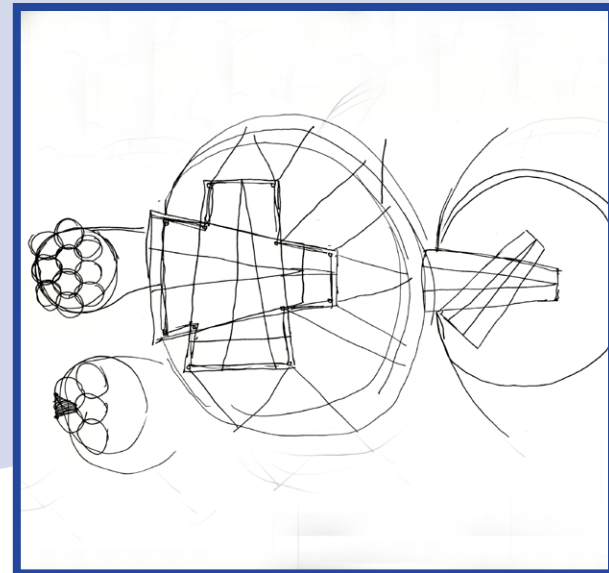
Figure 123 -Process photo- Design #3 space planning

Figure 124 -Process photo- Design #3 Form exploration

Figure 125 -Process photo- Plan and site exploration



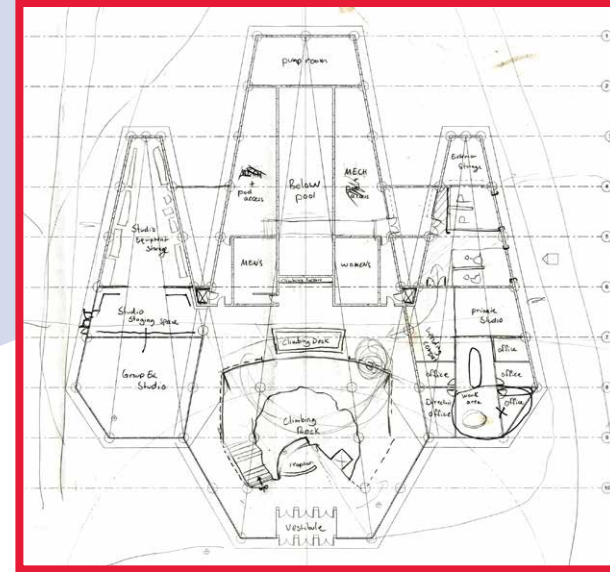
Settling on a final form that facilitated the program, spatial organization as well as the broader master plan was finally reached. A low sloping roof form that took advantage of Southern solar exposure, while rising in height on the North side to create expansive views was found to be the best solution. It solved all the orientation issues of the first two typologies.



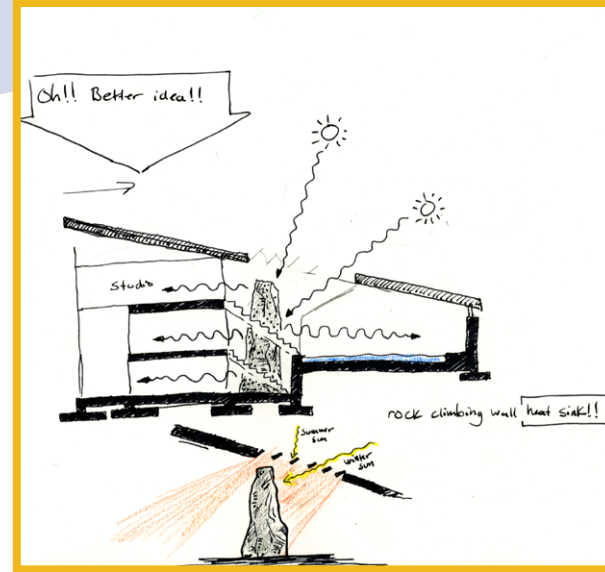
Organizing the building masses with respect to the site and the bobsled track was done with the intent to convey a sense of pride in the bobsled track and the symbols of the Olympics.



Composition of the exterior began once the spaces had been defined.



Floor plans that established the program spaces were developed.



In section, I explored passive systems and the use of the rock climbing wall as a heat sink in order to passively heat the building during the cold nights.

Figure 126 -Process photo- Exterior composition exploration  
 Figure 127 -Process photo- Space planning development  
 Figure 128 -Process photo- Passive systems exploration

In order to coordinate the complicated structure, I developed an autoCAD 3d model that established the heights and dimensions of all structural members. It is through this model that I explored the structural system.

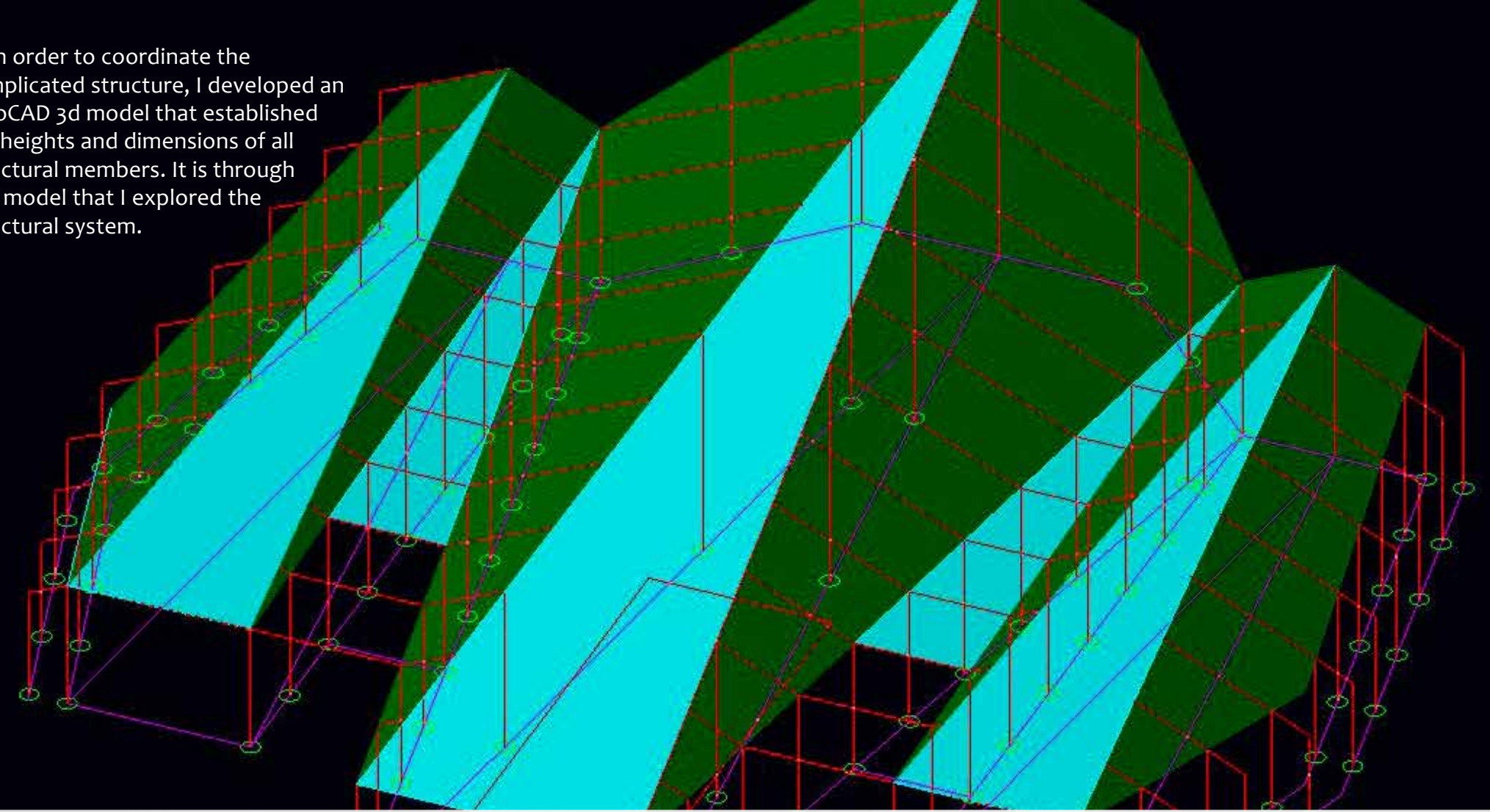
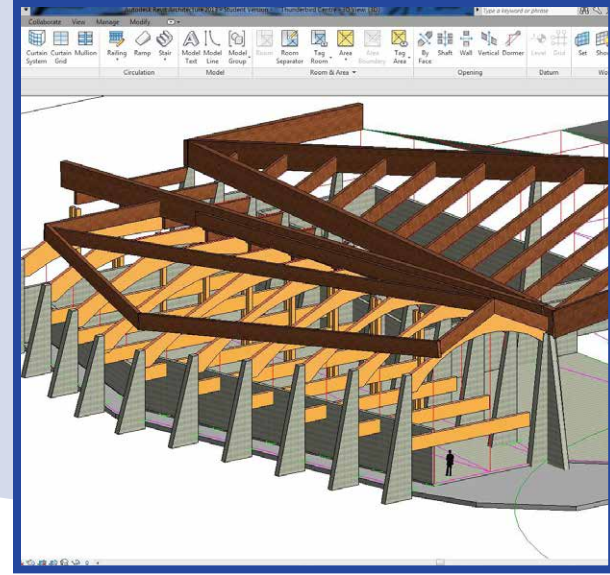
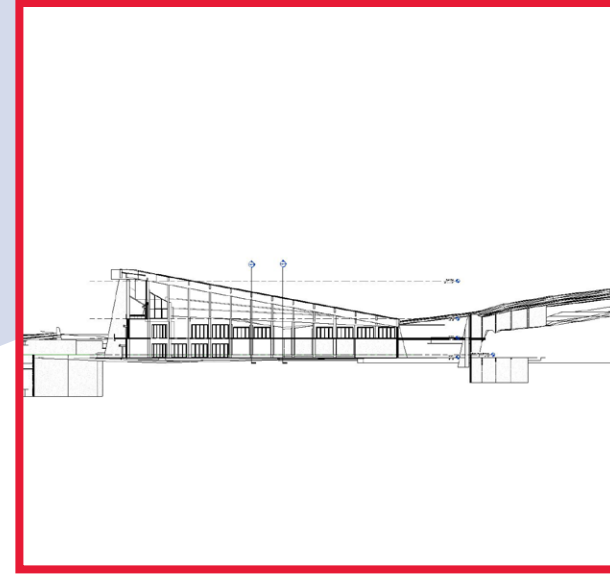


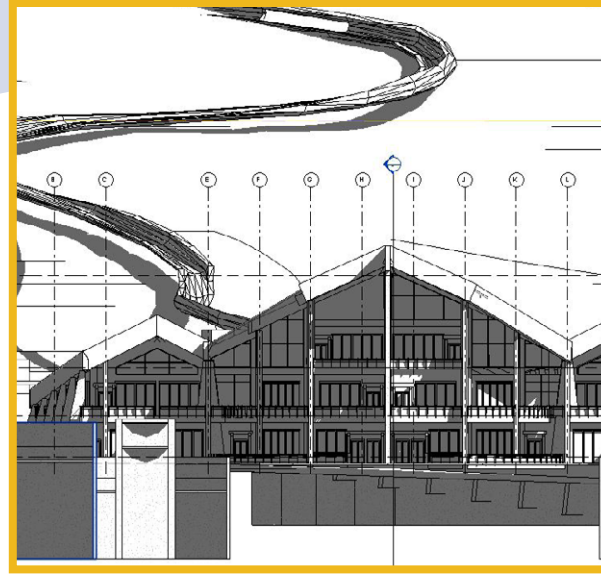
Figure 129 -Process photo- Digital analytical structure model



I started to build the structure in Revit 2013 using the previously developed autocad model as a reference. The arched glulam beams shown in the screen shot above were replaced with a more sensible system of beams and girders.



Integrating the building with the topography allowed the cold winds moving down the mountain slope to pass up and over the building with little turbulence and almost no lateral forces. The warmer winds traveling up the mountain slope were captured like a wind scoop so that they could pass through the building, cooling it passively in the summer time.



Final exterior composition was finalized. The large percentage of North Wall is operable glazing, allowing for unobstructed views and the ability for natural winds to pass through the building.



The Revit model was complete. It was time for the final presentation!

Figure 130 -Process photo- Inputting structure into Revit  
 Figure 131 -Process photo- Refining building section in Revit  
 Figure 132 -Process photo- Developing exterior composition in Revit

Figure 133 -Process photo- Unrendered Revit model

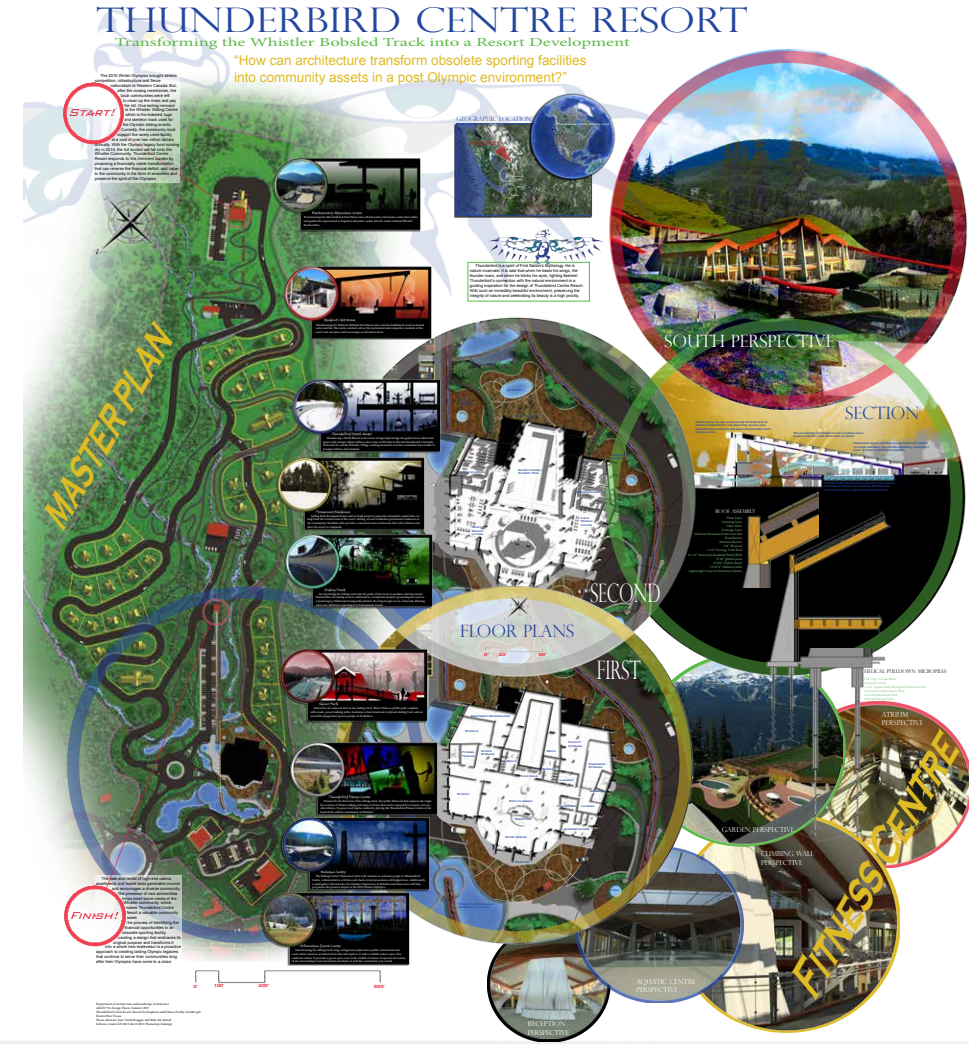
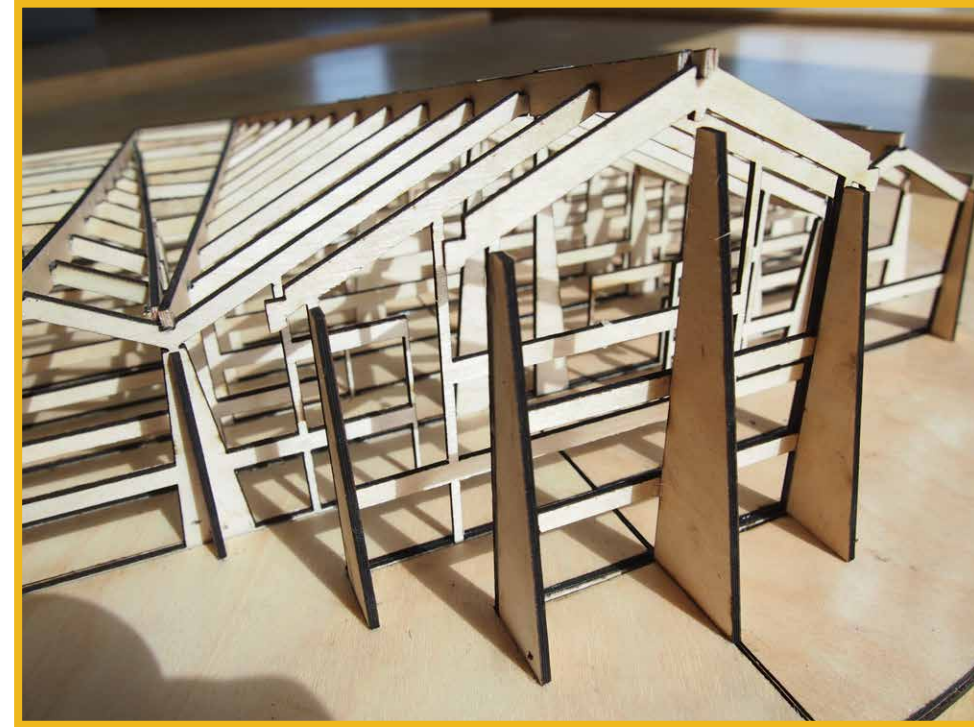


Figure 134 -Final model  
Figure 135 -Final boards

# PROJECT SOLUTION

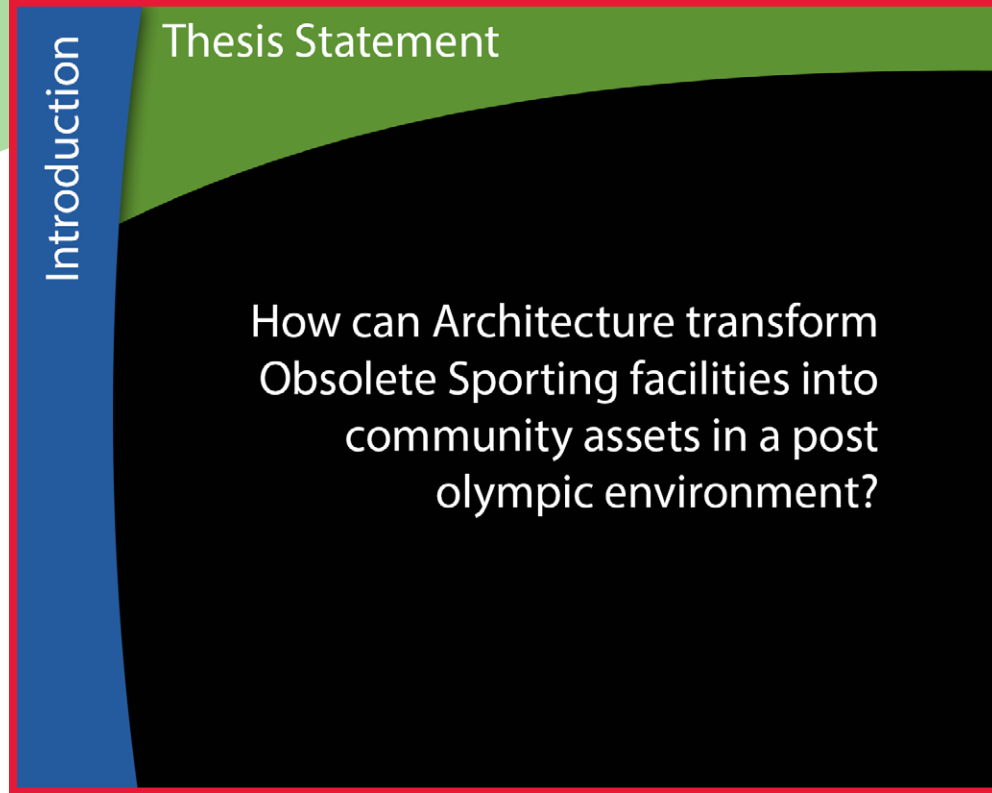
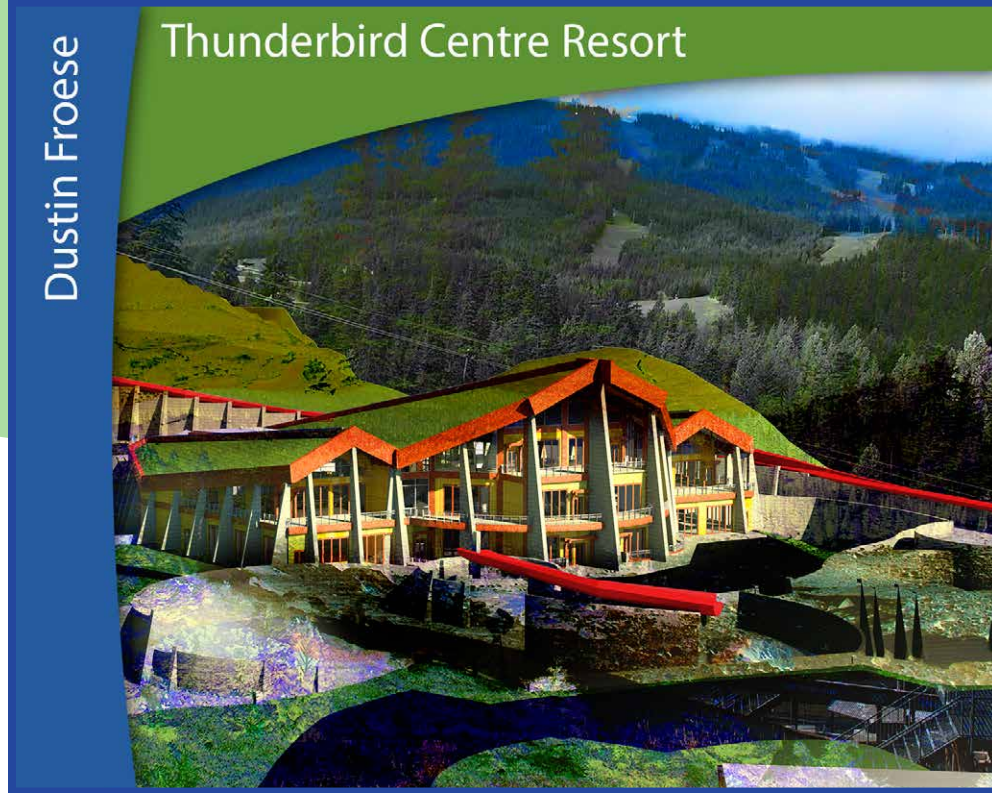


Figure 136 -Presentation slide 1  
Figure 137 -Presentation slide 2

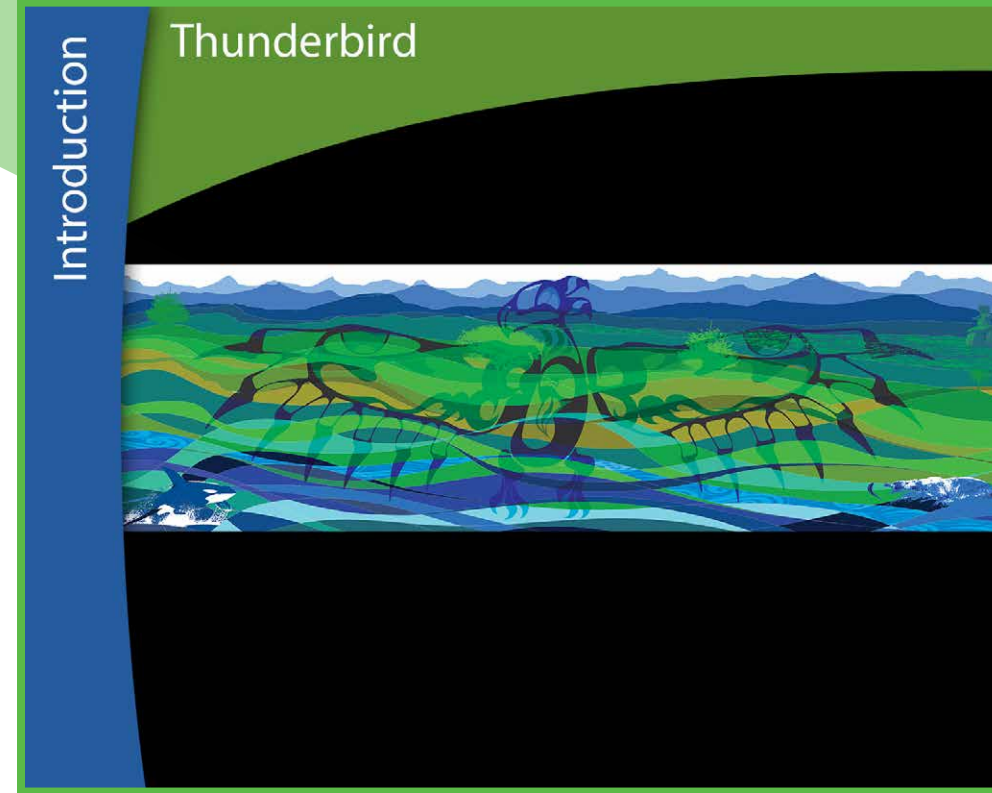


Figure 138 -Presentation slide 3  
Figure 139 -Presentation slide 4



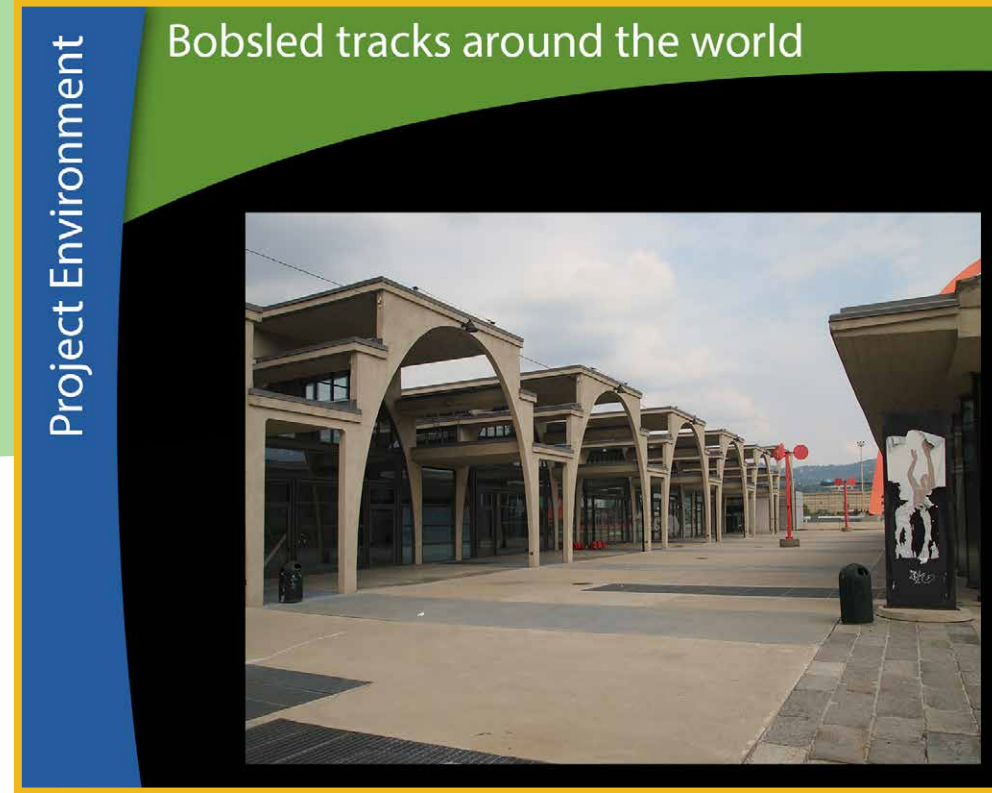




Figure 140 -Presentation slide 5  
Figure 141 -Presentation slide 6



Figure 142 -Presentation slide 7  
Figure 143 -Presentation slide 8



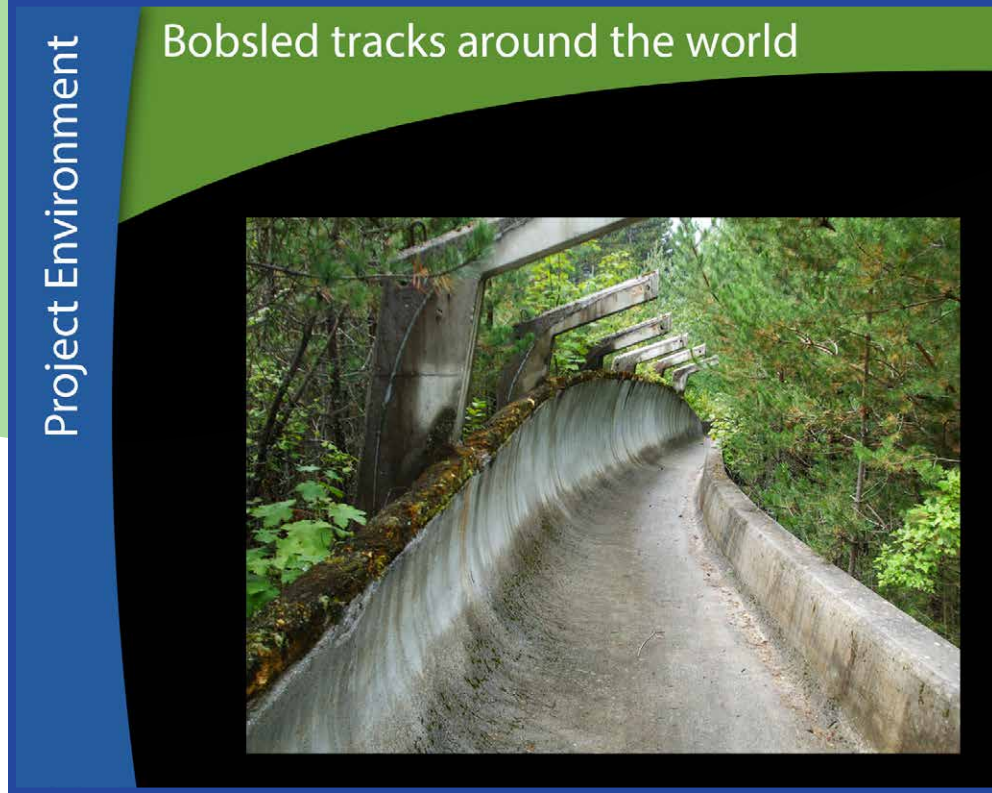


Figure 144 -Presentation slide 9  
Figure 145 -Presentation slide 10

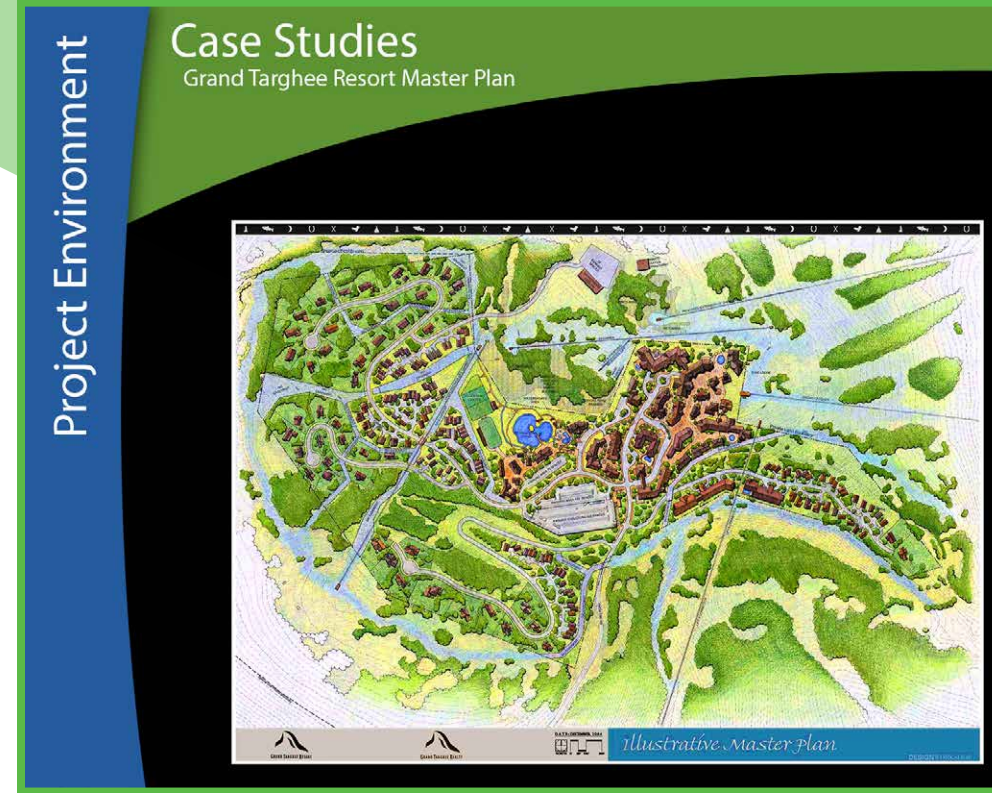


Figure 146 -Presentation slide 11  
Figure 147 -Presentation slide 12



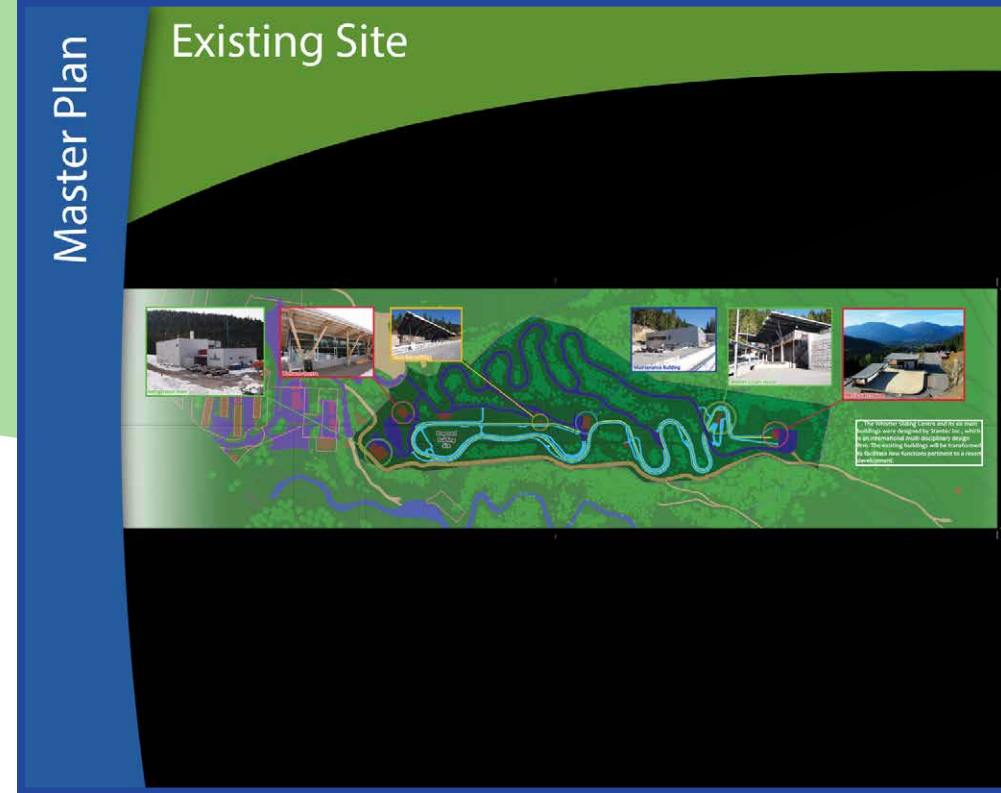
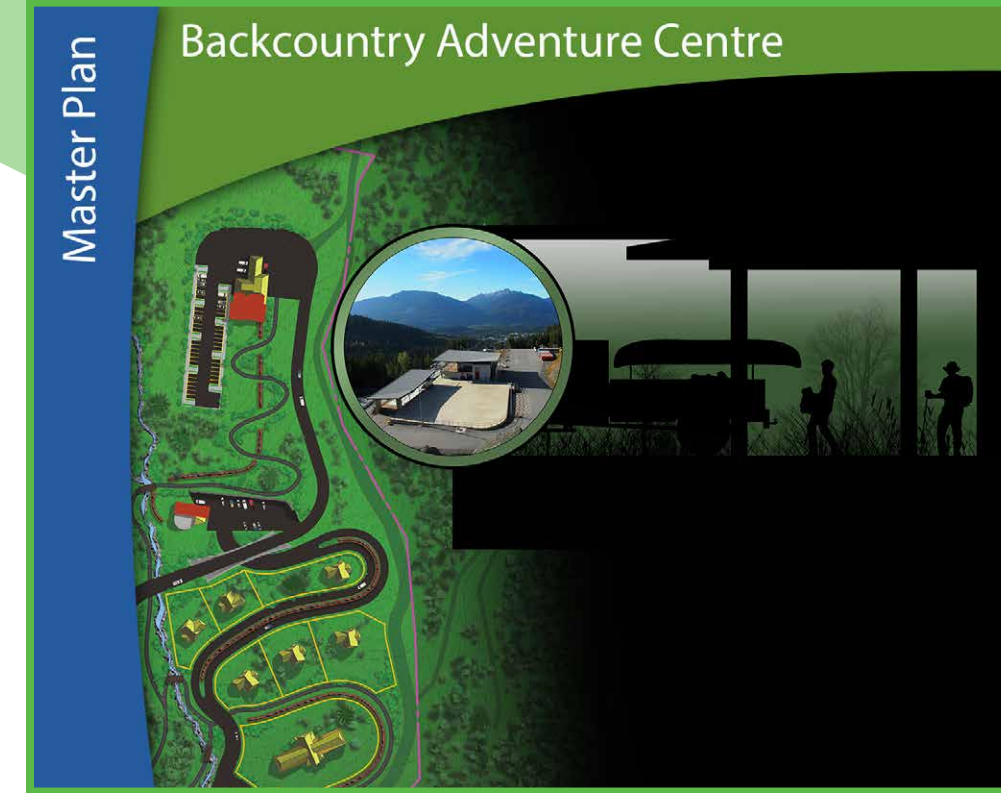


Figure 148 -Presentation slide 13  
Figure 149 -Presentation slide 14



Figure 150 -Presentation slide 15  
Figure 151 -Presentation slide 16



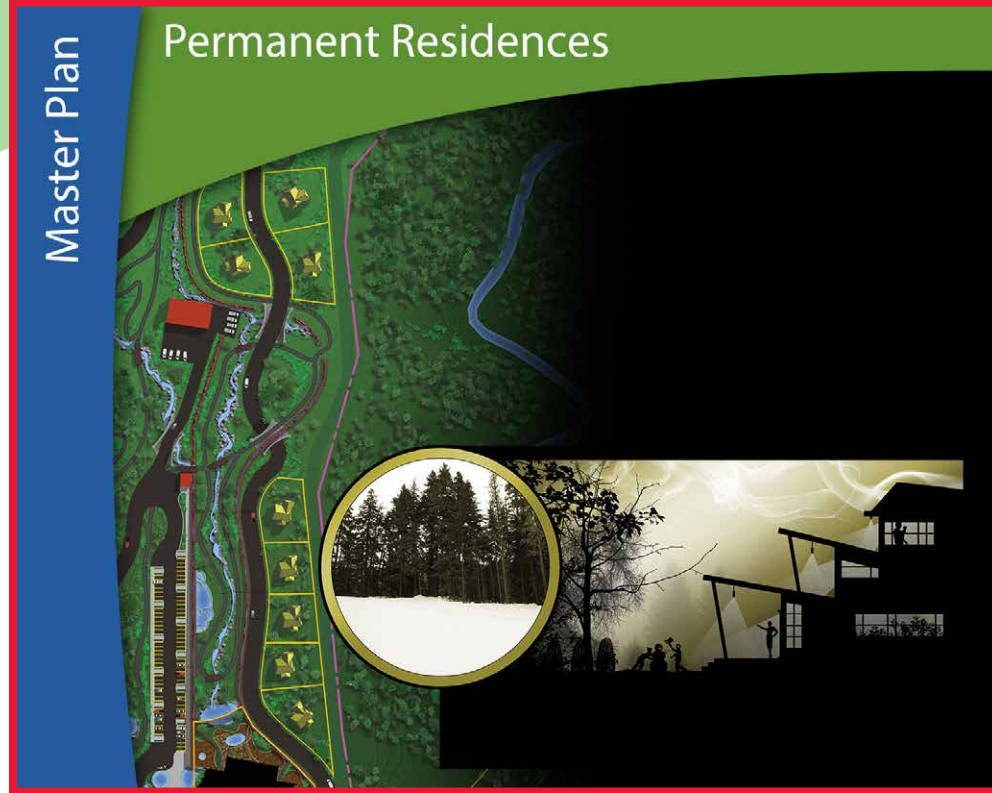


Figure 152 -Presentation slide 17  
 Figure 153 -Presentation slide 18

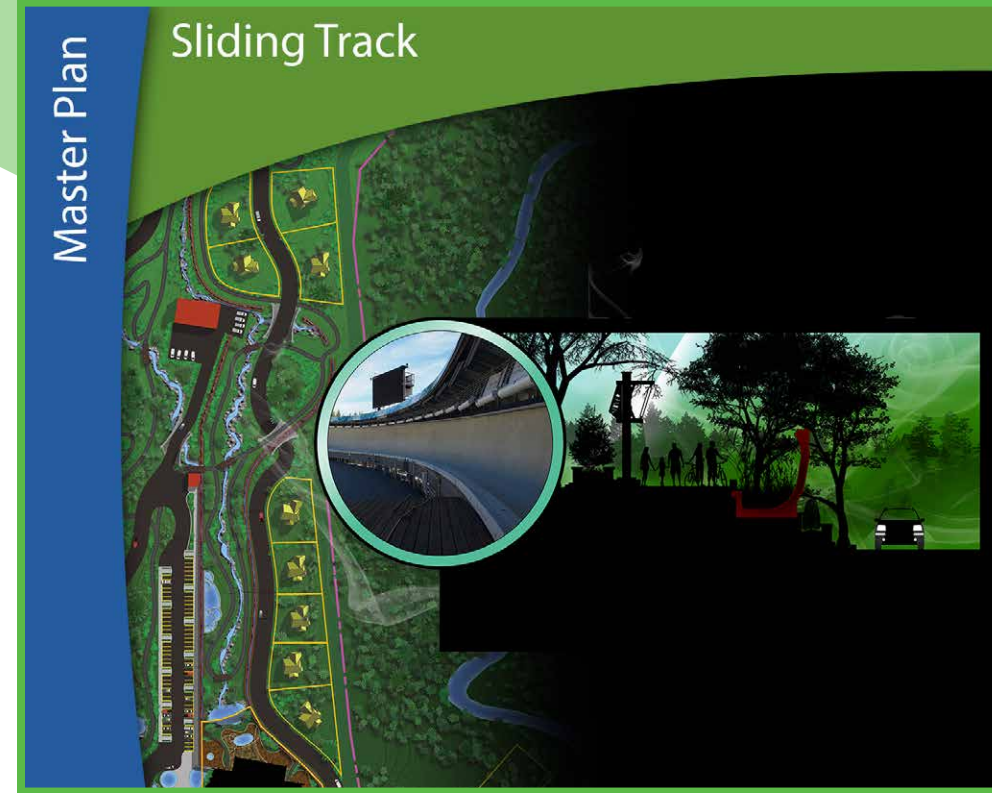


Figure 154 -Presentation slide 19  
 Figure 155 -Presentation slide 20

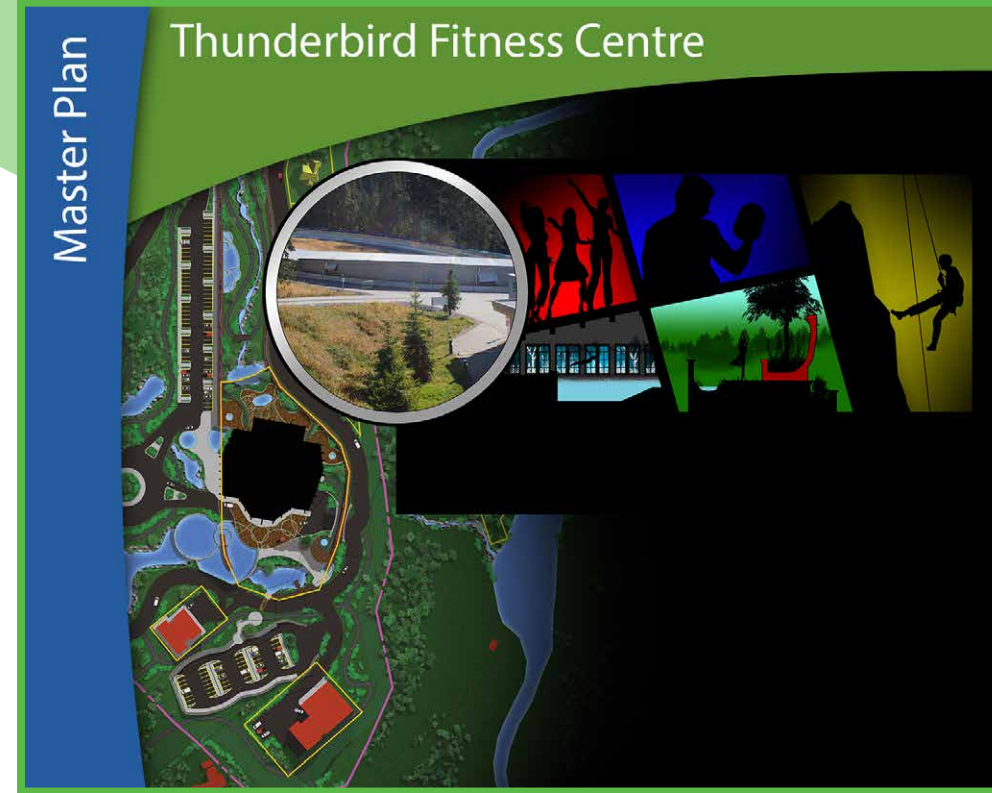




Figure 156 -Presentation slide 21  
Figure 157 -Presentation slide 22



Figure 158 -Presentation slide 23  
Figure 159 -Presentation slide 24



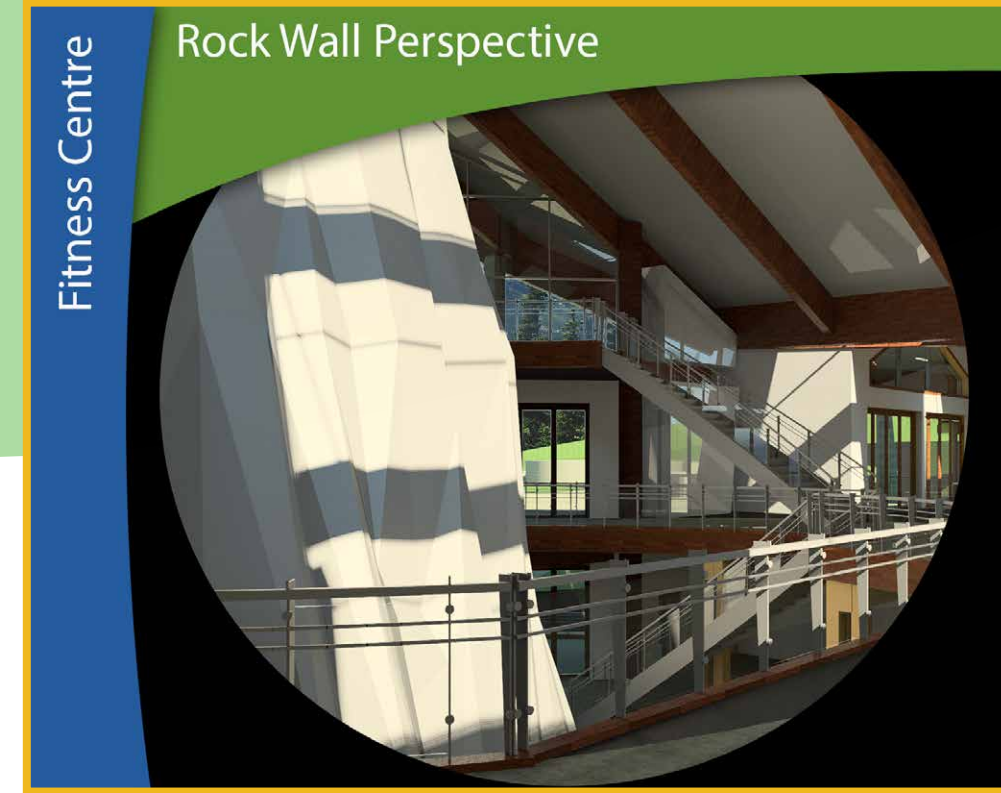


Figure 160 -Presentation slide 25  
 Figure 161 -Presentation slide 26

Figure 162 -Presentation slide 27  
 Figure 163 -Presentation slide 28

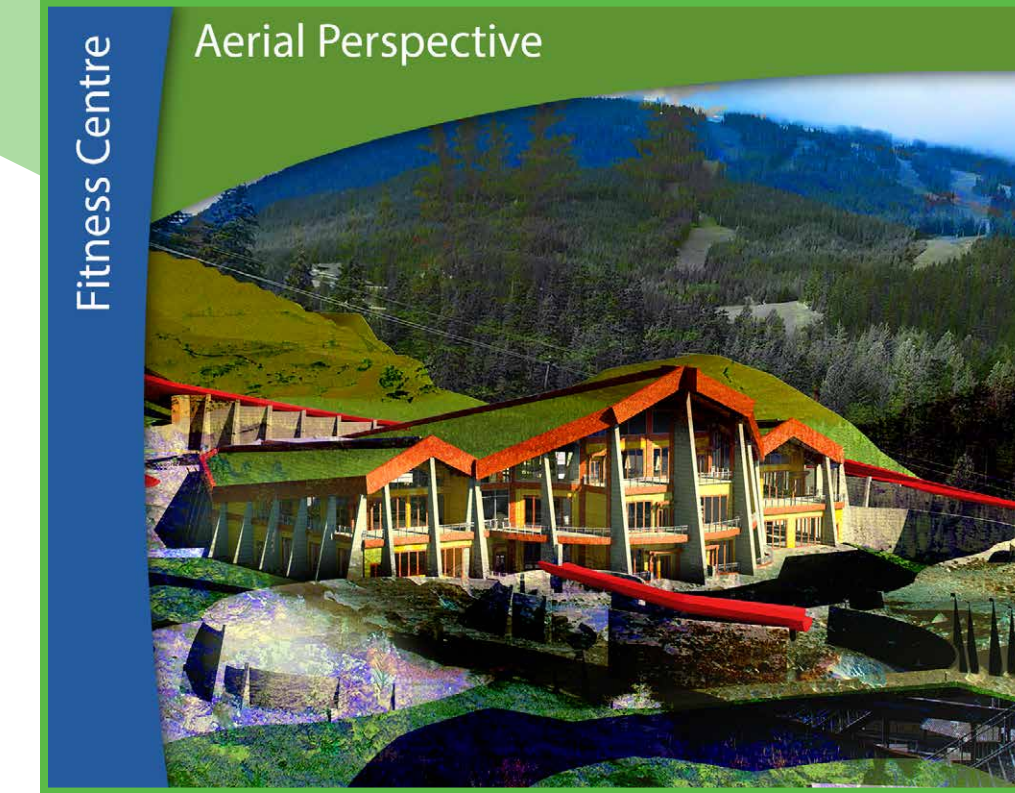
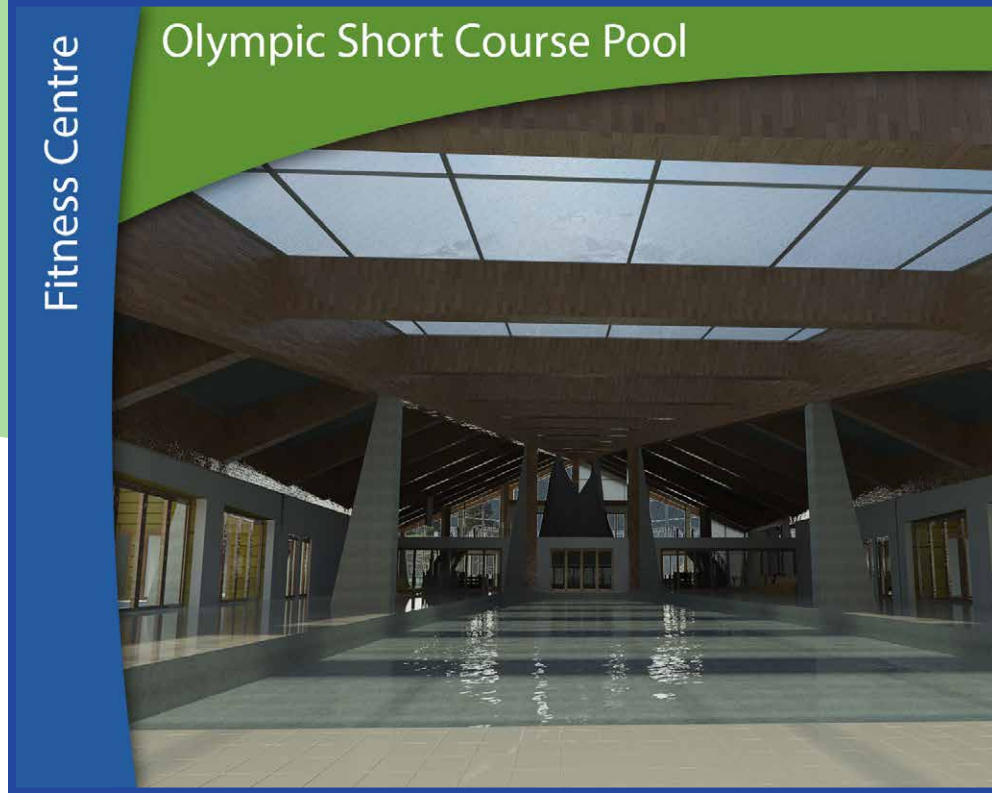


Figure 164 -Presentation slide 29  
 Figure 165 -Presentation slide 30

Figure 166 -Presentation slide 31  
 Figure 167 -Presentation slide 32

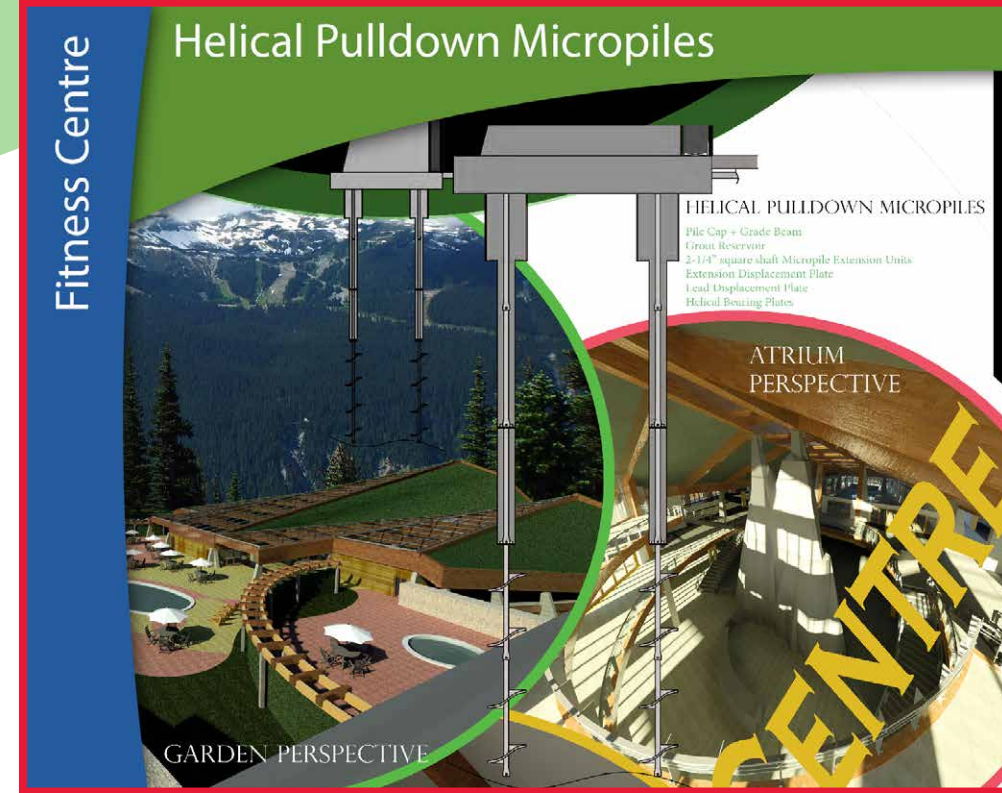
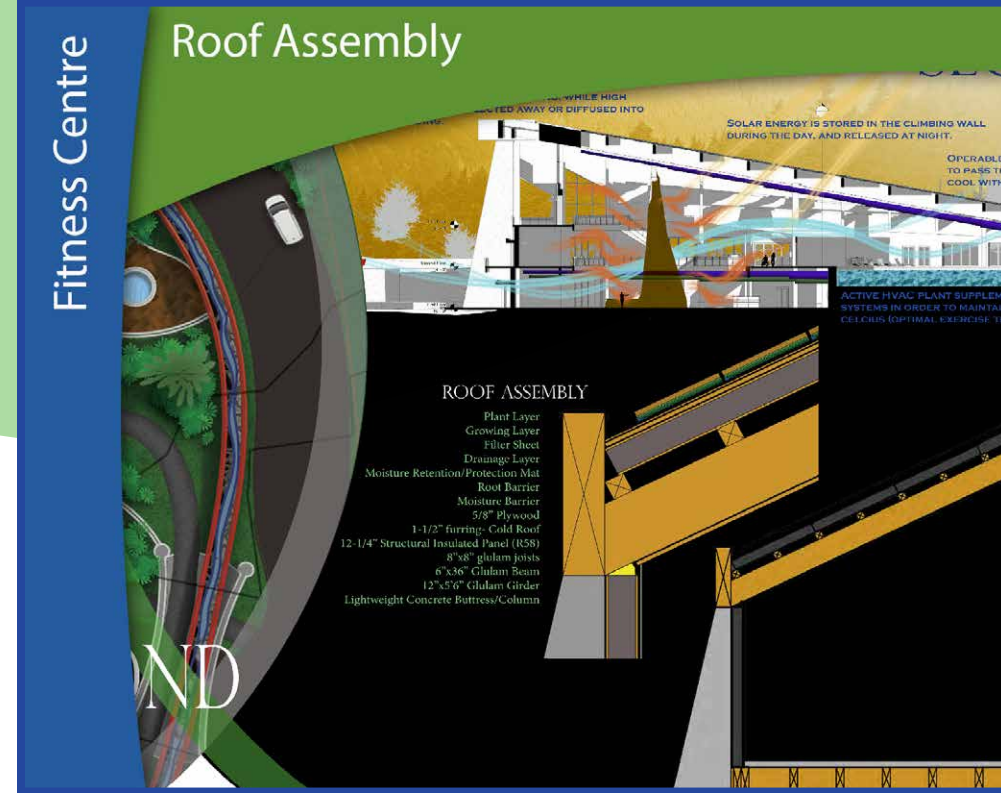


Figure 168 -Presentation slide 33  
Figure 169 -Presentation slide 34

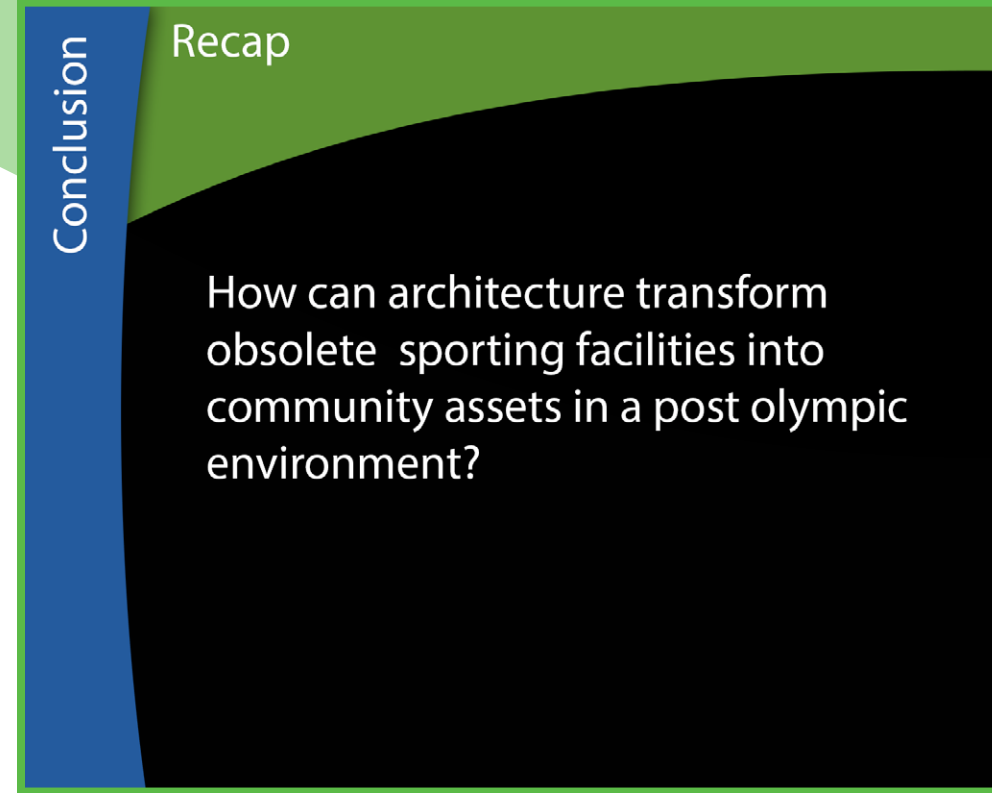
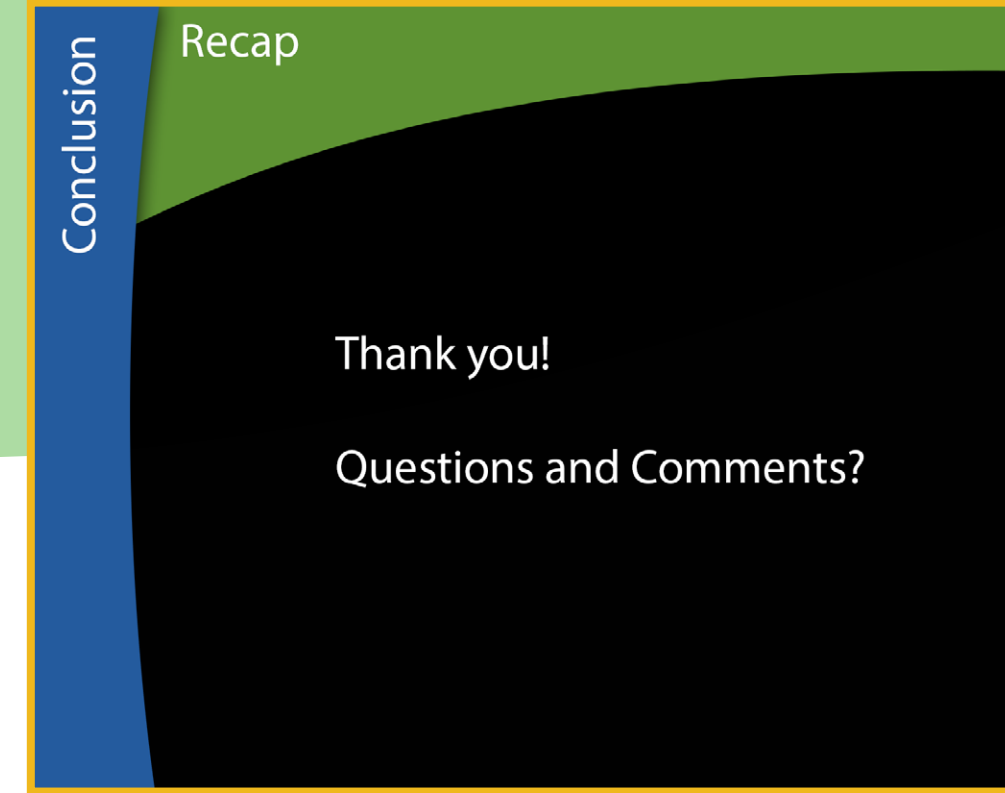


Figure 170 -Presentation slide 35  
Figure 171 -Presentation slide 36







# END MATTER

Figure 172 -Photo of Peak to Peak Gondola Connecting Whistler and Blackcomb



Figure 173 -Photo of author Dustin Froese on Black Tusk; Whistler Mountain in the background

## Dustin Peter Froese

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*NDSU's comprehensive architecture program has prepared me for a successful career in Architecture  
-Dustin Peter Froese*

Figure 174 -Photo of author Dustin Froese at the Olympic Cauldron in Vancouver, 2010



Figure 175 -Example of previous work: Highrise (With partner Sara Lillegaard)



Figure 176 -Example of Previous work: Square Foché Urban Design Project

- 2009**  
Fall (2nd year)  
Professor Joan Vorderbruggen  
+Tea House  
+Boat House
- 2010**  
Spring (2nd year)  
Professor Darryl Booker  
+Montessori Elementary School  
+Unconventional Dwelling
- Fall - (3rd year)**  
Professor Milton Yergens  
+Celebration Center  
+Masonic Lodge
- 2011**  
Spring (3rd year)  
Professor Steve Martens  
+Agricultural Research Center  
+Snow Sculpture Competition  
+Fossil Museum
- Fall (4th year)**  
Professor Bakr Aly Ahmed  
+Highrise  
+Trash to Treasure
- 2012**  
Spring (4th year)  
Professor Paul Gleye  
+Square Foché Urban Design
- Fall (5th year)**  
Professor Mark Barnhouse  
+Water Analysis Research Station
- 2013**  
Spring (5th year)  
Professor Joan Vorderbruggen  
+Thunderbird Centre Resort

Alberts, Heike C. (2011). The Reuse of Sports Facilities after the Winter Olympic Games. *FOCUS on Geography*, 54(1) 24-32

alpMedia. (2012). Torino 2006: a hard lesson - but nothing learned. CIPRA. Retrieved from <http://www.cipra.org/en/alpmedia/news-en/4681>

American Institute of Timber Construction. (2012) Timber Construction Manual [ebook] (Loc 468-509). Hoboken, New Jersey: John Wiley & Sons, Inc.

American Shotcrete Association. (2008, Summer). 2007 Outstanding Infrastructure Project: Whistler Sliding Centre. Farmington Hills, Michigan.

Baldwin, John. (2004) Backcountry Whistler [map]. Vancouver, BC, Canada. Self Published.

Bassler, Bruce. (2008). Architectural Graphic Standards. Hoboken, New Jersey: John Wiley & Sons, Inc.

Borden, Gail Peter. (2010). Caltrans District 7 HQ. Material Precedent: The Typology of Modern Tectonics (pp 78-79) Hoboken, New Jersey: John Wiley & Sons, Inc.

Borden, Gail Peter. (2010). The Atheneum. Material Precedent: The Typology of Modern Tectonics (pp 68-69) Hoboken, New Jersey: John Wiley & Sons, Inc.

Borden, Gail Peter. (2010). Murcia Town Hall. Material Precedent: The Typology of Modern Tectonics (pp 44-45) Hoboken, New Jersey: John Wiley & Sons, Inc.

Burkett, Bryce. (May, 2012). [photograph] Olympic Village in Torino Italy. Used with Permission.

Creighton, O.H.. (2002). Castles and Landscapes: Power, Community and Fortification in Medieval England (pp 67-68) London and New York: Continuum International Publishing.

Disneyland Resort (2012) Tickets and Packages: 1 day Theme Park Tickets. Retrieved from <http://disneyland.disney.go.com/tickets/>

Ecosign. 2010. Solar Radiation Analysis - Blackcomb. Retrieved from [http://www.for.gov.bc.ca/ftp/resort\\_development/external!/publish/web/resort\\_plans/proposed/Blackcomb/Fig\\_7\\_Solar\\_Radiation\\_Analysis\\_Blackcomb.pdf](http://www.for.gov.bc.ca/ftp/resort_development/external!/publish/web/resort_plans/proposed/Blackcomb/Fig_7_Solar_Radiation_Analysis_Blackcomb.pdf)

Egan, Brian. (1999). The Ecology of the Coastal Western Hemlock Zone. The British Columbia Ministry of Forests. Victoria, BC: Ministry of Forests Research Branch. Retrieved from: <http://www.for.gov.bc.ca/hfd/pubs/docs/Bro/bro31.pdf>

Ferreras, J. (2011, October). Whistler sees big post-Olympics drop in hotel occupancy. The Hook. Retrieved from <http://theyee.ca/Blogs/TheHook/Labour-Industry/2011/10/13/whistler-olympics-hotel/>

FIBT. (2012) Athletes Finder. Retrieved from <http://www.fibt.com/index.php?id=35>

Fisher, Gary. (May, 2013). NDSU Wallman Wellness Center personal interview. Gary Fisher, Wellness Center Director. Fargo, North Dakota.

Frances, Scott. (2011). The Atheneum. Retrieved from <http://www.archdaily.com/106367/ad-classics-the-atheneum-richard-meier-partners-architects/atheneum-2c/>

French, John. (2011, Feb 2). Whistler's Post-Games Future Re-Examined: Resort leaders agree more guests are needed. Question Magazine Retrieved from <http://www.whistlerquestion.com/article/20110202/WHISTLER01/302029951-1/WHISTLER/whistler-146-s-post-games-future-re-examined>

Froese, Dustin. (2012) \*All photographs unless otherwise credited are the sole property of the author\*

Geographer [user name]. (2009, June 2) Wikipedia. Retrieved from [http://en.wikipedia.org/wiki/File:Cal\\_Trans\\_District7\\_HD.jpg#globalusage](http://en.wikipedia.org/wiki/File:Cal_Trans_District7_HD.jpg#globalusage)

Grand Targhee Resort. (September, 2004). Master Plan Top View. Alta, Wyoming. Retrieved from [http://www.grandtarghee.com/media/downloads/Resort/The\\_Future/Rendering/Master\\_Plan\\_Top\\_View.jpg](http://www.grandtarghee.com/media/downloads/Resort/The_Future/Rendering/Master_Plan_Top_View.jpg)

Grand Targhee Resort. (September, 2004). Master Plan Main Gathering Area. Alta, Wyoming. Retrieved from [http://www.grandtarghee.com/media/downloads/Resort/The\\_Future/Rendering/Master\\_Plan\\_Main\\_Gathering\\_Area.jpg](http://www.grandtarghee.com/media/downloads/Resort/The_Future/Rendering/Master_Plan_Main_Gathering_Area.jpg)

Hollis, S. (2011, June). A Bright-ish Outlook: Economic Symposium Looks at General Trends. Pique Newsmagazine. Retrieved from <http://www.piquenewsmagazine.com/gyrobase/a-bright-ish-outlook/Content?oid=2175027&showFullText=true>

Holloway, Andy. (2006). Vancouver 2010: Will the Games be a golden goose or black hole? Canadian Business, 79.5, 60-67.

International Olympic Committee. (2011, July) Olympic Charter. Lausanne, Switzerland: International Olympic Committee. Retrieved from [http://www.olympic.org/Documents/olympic\\_charter\\_en.pdf](http://www.olympic.org/Documents/olympic_charter_en.pdf)

Kellogg, Alex P. (2010, May 14) Detroit Shrinks Itself, Historic Homes and All. The Wall Street Journal. Retrieved from <http://online.wsj.com/article/SB10001424052748703950804575242433435338728.html>

Kingston, Gary. (2012, November 22) Olympic Track in Turin Slated for Demolition. The Vancouver Sun. Retrieved from <http://www.vancouversun.com/sports/winter-sports/Whistler+Sliding+Centre+steers+course+financial/7597183/story.html>

LA84. (2007). An Olympic Games Primer. LA84 Foundation. Los Angeles. Retrieved from [http://www.la84foundation.org/6oic/primer\\_frmst.htm](http://www.la84foundation.org/6oic/primer_frmst.htm)

Lechner, Norbert. (2009) Heating, Cooling, Lighting: Sustainable Design Methods for Architects. Hoboken, New Jersey: John Wiley & Sons, Inc..

Longley, Rob (2010, February 12) Georgian Luger Killed in Training: Officials meeting to decide future of competition. Toronto Sun. Retrieved from <http://www.torontosun.com/sports/vancouver2010/news/2010/02/12/12857041-qmi.html>

Morphopedia. (2009, Feb 22nd). Caltrans District 7 Headquarters. Retrieved from <http://morphopedia.com/projects/caltrans-district-7-headquarters>

Nisbett, Darren (Photographer). Date picture taken. "Photographs of Sarajevo Bobsled Track". ©Darren Nisbett. Used with Permission. Retrieved from [www.darkoptics.net](http://www.darkoptics.net)

Olympic.org. (2012) Berlin, 1936. Olympic.org. Retrieved from <http://www.olympic.org/berlin-1936-summer-olympics>

Parks, Peter. (2010) [photograph] Georgian luger Nodar Kumaritashvili crashes during practice Friday at in Whistler, British Columbia. NPR Online. Retrieved from <http://www.npr.org/templates/story/story.php?storyId=123655588>

Peppler, Isabel L & MacDonald, "Sandy" A.F. 2000. From the Ground Up. Ottawa, Ontario: Aviation Publishers Co. Limited.

Perryman, M. (2012). Why the Olympics Aren't Good for us, and How They Can Be. London, New York: OR Books.

Powell, Lisa (2009, December 4th) Making Friends in Whistler: Making a home means starting over. Pique. Retrieved from <http://www.piquenewsmagazine.com/whistler/making-friends-in-whistler/Content?oid=2166551>

PricewaterhouseCoopers. (2011) The Games Effect: Report 7: Global Summary of the Impact of the 2010 Olympic and Paralympic Winter Games on British Columbia and Canada 2003 to 2010. Ontario. Retrieved from [http://www.fin.gov.bc.ca/reports/PwC\\_The\\_Games\\_Effect\\_Summary\\_Report\\_7\\_2010\\_EN\\_FINAL.PDF](http://www.fin.gov.bc.ca/reports/PwC_The_Games_Effect_Summary_Report_7_2010_EN_FINAL.PDF)

The Province of British Columbia. (1996). The Statutes and Regulations of British Columbia, Chap. 26, Part 5, Division 1, section 115, subsection A. Victoria, British Columbia: Crown Publications. Queen's Printer. Retrieved from [www.bclaws.ca](http://www.bclaws.ca)

the Queen of the Valley Hospital Wellness Center. (2013) the Queen of the Valley Hospital Wellness Center First Floor Plan. Retrieved from [http://www.wellnesscenternapa.com/TheCenter/PDF/WellnessCntr\\_FlrPln.pdf](http://www.wellnesscenternapa.com/TheCenter/PDF/WellnessCntr_FlrPln.pdf)

Resort Municipality of Whistler. (2011) About the Resort Municipality of Whistler. Retrieved from [www.whistler.ca/residents/about](http://www.whistler.ca/residents/about)

Ruddy, Claire. (2012, May 3). Letters to the Editor. Pique Magazine. Retrieved from <http://www.piquenewsmagazine.com/whistler/letters-to-the-editor-for-the-week-of-may-3rd-2012/Content?oid=2299863&showFullText=true>

Sawyer, Thomas H. (Ed.). (1999). Facilities Planning for Physical Activity and Sport: Guidelines for Development: Ninth Edition. American Association for Active Lifestyles. Dubuque, Iowa: Kindall/Hunt Publishing Company

Smith, Dave. (2012) About. Retrieved from <http://davesmithbobsleigh.co.uk/wordpress/about/>

Snyder, Whitney. (2010, April 4) Nodar Kumaritashvili Crash VIDEO: Luge Slider DEAD in Olympics Accident (GRAPHIC PHOTOS). Huffpost Sports Canada. Retrieved from [http://www.huffingtonpost.com/2010/02/12/nodar-kumaritashvili-cras\\_n\\_460474.html](http://www.huffingtonpost.com/2010/02/12/nodar-kumaritashvili-cras_n_460474.html)

Southern Alberta Institute of Technology. (2012, October). Whistler Sliding Centre Sled Trajectory and Track Construction Study: Final Report. Calgary, Alberta.

Sportsnet. (Dec 14, 2007) Wraps come off Whistler Venues. The Canadian Press. Retrieved from [http://www.sportsnet.ca/more/2007/12/14/oly\\_whistler/](http://www.sportsnet.ca/more/2007/12/14/oly_whistler/)

Statistics Canada. 2007. Whistler, British Columbia (Code5931020) (table). 2006 Community Profiles. 2006 Census. Statistics Canada Catalogue no. 92-591-XWE. Ottawa. Released March 13, 2007. <http://www12.statcan.ca/census-recensement/2006/dp-pd/prof/92-591/index.cfm?Lang=E> (accessed October 10, 2012).

Statistics Canada. (2012) Population by year, by province and territory. Table 051-0001. Retrieved from <http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/dem002a-eng.htm>

Squamish Lil'wat Cultural Centre. (2011) Bc Aboriginal Legends & Symbology: The Thunderbird. Retrieved from <http://shop.slcc.ca/node/718>

Svieven, Megan. (2011, Jan 24). AD Classics: The Atheneum / Richard Meier & Partners Architects. Arch Daily. Retrieved from <http://www.archdaily.com/106367/ad-classics-the-atheneum-richard-meier-partners-architects/>

Taylor, Allison. (November 4, 2012) Could Whistler's track suffer Torino's fate?: sliders lament decision to dismantle 2006 track. Pique Publishing Inc. Whistler. Retrieved from <http://www.piquenewsmagazine.com/whistler/could-whistlers-track-suffer-torinos-fate/Content?oid=2384786>

Taylor, Allison. (2012, October 8) Sliding Centre spared big tax bill: Council Outlines all the Reasons why Whistler Sport Legacies get Break. Pique Magazine. Whistler, BC. Retrieved from <http://www.piquenewsmagazine.com/whistler/sliding-centre-spared-big-tax-bill/Content?oid=2328425>

United States Holocaust Memorial Museum. (2012). The Nazi Olympics Berlin 1936. Retrieved from <http://www.ushmm.org/museum/exhibit/online/olympics/detail.php?content=olympics&lang=en>

Washington Post, the. (October 25th, 2012). Turin 2006 Olympics luge and bobsled track dismantled because of \$2 million in operating costs. [Associated Press]. Retrieved from [http://www.washingtonpost.com/sports/olympics/turin-2006-olympics-luge-and-bobsled-track-being-dismantled-due-to-high-operating-costs/2012/10/25/88570488-1ec3-11e2-8817-41b9a7aaabc7\\_story.html](http://www.washingtonpost.com/sports/olympics/turin-2006-olympics-luge-and-bobsled-track-being-dismantled-due-to-high-operating-costs/2012/10/25/88570488-1ec3-11e2-8817-41b9a7aaabc7_story.html)

Squamish Lil'wat Cultural Centre. (2011). The Thunderbird. Retrieved from: <http://shop.slcc.ca/symbology>

Thomasson, Joshua. (May 7, 2011). Moneo's City Hall of Murcia. Retrieved from <http://jtarch.blogspot.com/2011/05/cardinal-belluga-square-mixing-modern.html>

TLCD Architecture. (2013). Wellness Center, Queen Of The Valley Hospital. Retrieved from <http://www.tlcd.com/queenofthevalley.html>

Urban Land Institute. (June 18, 2012). Resort Development, Second Edition. Urban Land Institute. Retrieved from: [http://www.dunnandkiley.com/documents/uli\\_resortdev.pdf](http://www.dunnandkiley.com/documents/uli_resortdev.pdf)

Whistler2020. (2011) Population and Demographics: Population. Retrieved from <http://www.whistler2020.ca/whistler/site/genericPage.acds?instanceid=2985334&context=2985223>

Whistler Centre for Sustainability. (2011). Whistler 2020: Visitor Number. Retrieved from: <http://www.whistler2020.ca/whistler/site/indicator2.acdsinstanceid=10188506&context=1018809>

Whistler Museum. (2012) Whistler- A Brief History. Retrieved from <http://blog.whistlermuseum.org/whistler-a-brief-history/>

WorksafeBC. (2007). Ammonia in Refrigeration Systems. WorksafeBC Publications. Retrieved from [http://www.worksafebc.com/publications/health\\_and\\_safety/by\\_topic/assets/pdf/ammonia\\_refrigeration\\_bk1.pdf](http://www.worksafebc.com/publications/health_and_safety/by_topic/assets/pdf/ammonia_refrigeration_bk1.pdf)

Figure 177 -Panorama Photo of Whistler Valley



