80 Bloor Street West; Student Ideas Compeition

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Arch 384

The goal of the 80 Bloor St. West Student Ideas Competition was to give students a chance to realistically develop a new facade for 80 Bloor St. West. (See Figure 1) The competition brief outlined three main design goals; to improve technical performance and long-term sustainability, to add value and attract more high quality tenants, and to represent the building to the public as a place that promotes creativity and design excellence. (See Appendix A) There were three distinct parts of the design process; the initial concept, meetings with industry professionals, and the final design proposal.

The project began and developed with the idea of a double skin facade. The Telus Building, Vancouver, proved to be an excellent, Canadian case study. Busby and Perkins and Will were hired to carry out a renovation of an out of date telecommunications building as sustainably as possible. Although the project included gutting the entire building, and enhancing existing mechanical systems, its most innovative design feature was its facade.

The original operable wood windows of the telecommunications building were restored, and an additional layer of operable glass was added to the exterior of the building. This created a double skin facade system which could adapt to each season's climate. During the summer, stack effect would continuously bring cooler air through the air cavity, cooling the building. During the winter, the cavity would remain closed, and become a layer of insulation, and during the spring and fall, both layers of the facade could be open to allow for natural ventilationii. Our initial proposal was to add a second layer of glass to the facade, allowing it to act very similarly to the facade of the Telus building. (See Figure 2,3)

Figure 1: existing south facade of 80 Bloor Street West

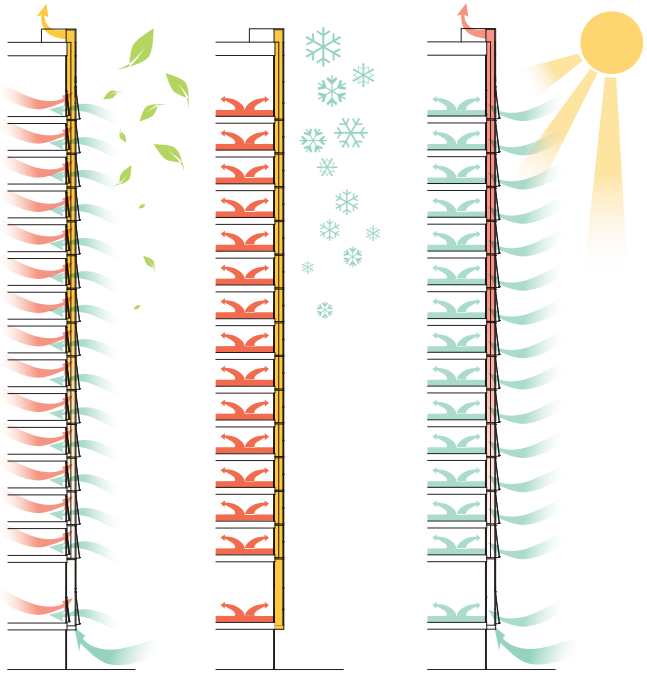

Figure 2: Telus building/initial proposal of facade. During the summer, the facade ventilates. During the winter the facade insulates and during shoulder seasons, natural ventilation is permitted.

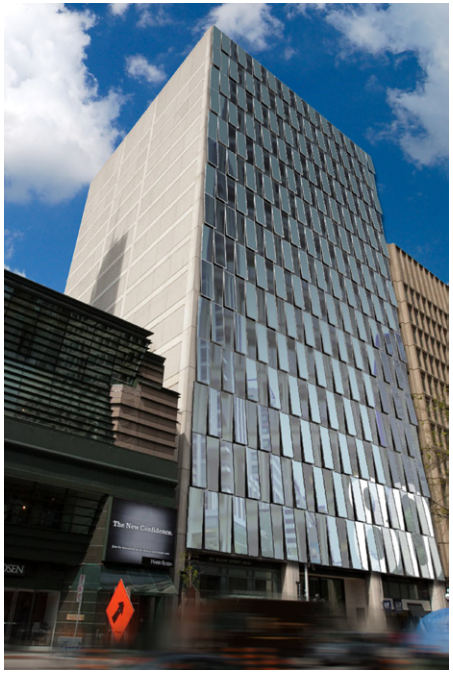

Figure 3: the operable windows (which span the entire floor plate) are located in a checkered pattern across the facade

Figure 4: the empire state building lit for national cancer awareness day

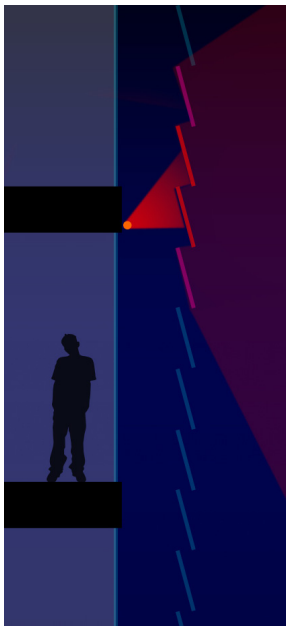

Figure 5: LED lights up cast on to glass panels

To attract more high quality tenants and to represent the building as a place which promotes creativity, we thought about ways to interact with the street life. The Empire State Building's recent incorporation of coloured lighting has allowed it to interact with politics, holidays, weather, and climate. (See Figure 4) We decided to incorporate a LED lighting system to allow the building to interact with the night life of the Young and Bloor intersection. The light would be up-cast from the existing building facade, and on to the outer layer of glass. This allows for the lighting equipment to be protected by the moderated temperature of the air cavity. (See Figure 5, 6)

The concept was submitted on a single board (See Appendix B) and was chosen as a finalist in the competition. The top three finalists then had the opportunity meet with structural engineer Dr. Ted Kesik and Mel Yungblut. Glen Boccini was contacted externally as a lighting consultant.

During the first meeting with Dr. Kesik, issues concerning maintenance, construction methods, facade performance, energy savings, payback period, and Ontario Building Code requirements were discussed. The most significant flaw in our concept was that the facade, although acceptable in Vancouver, did not meet the requirements of the Ontario Building Code. Because the facade would act as a chimney in the event of a fire, the closed cell facade could not be built legally. We now had to research further into different double skin possibilities and prepare a more final proposal for our meeting with Mel Yungblut.

Types of double skin facades that were researched include box windows, corridor facades, shaft-box facades, and multistory facades were looked at in greater depth. The box window system consists of two layers of glass, to create an air cavity, but is divided horizontally per floor, and by room or area. Both layers of glass are usually operable, thus giving each room or area its own control over ventilation and temperature. Corridor facades run horizontally, like box windows, but are not divided between zones. Shaft-box facades incorporate box windows with a continuous shaft which extends over the height of the building. These shafts use stack effect to pull the hot air out of each of the box windows, and may result in an increased air exchange rate in the facade cavity. By dividing the air cavity, occupants may have more control over their desired temperature and ventilation, also clear strategies of fire prevention and smoke barriers may be employedi. However, these double skin systems are best implemented in new facade construction.

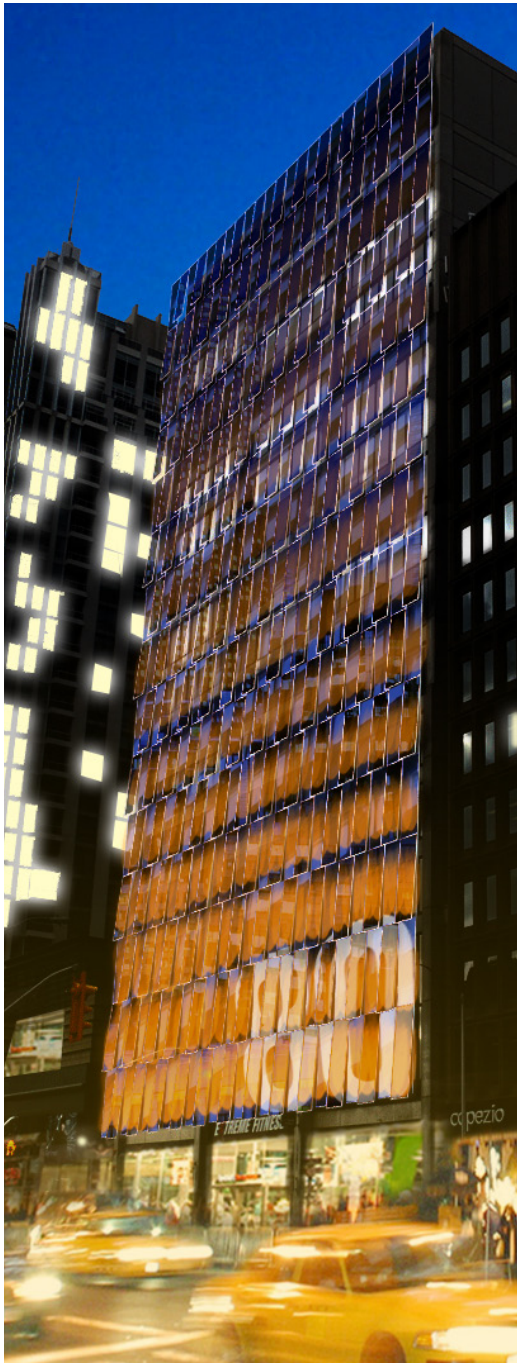

Figure 6: the facade is playfully lit for Halowe'en night, interacting with surrounding street life

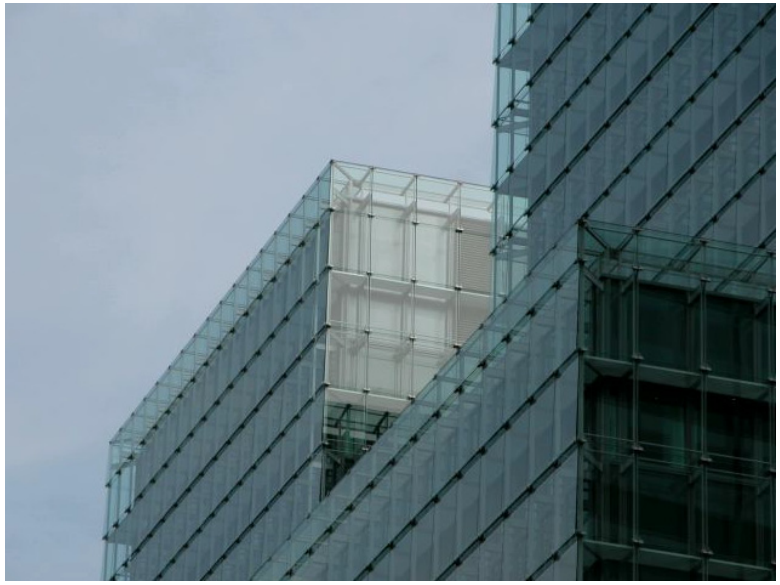

Figure 7: images of an existing fish scale facade located in Germany. Building name/date of construction, unknown

Multistory double skin facades have no barriers in the air cavity over their entire facade. The original design concept and the Telus Building falls into this category. A less expensive way to build a multistory double facade would be to use a fish scale system. Debis Headquarters, Berlin, uses a corridor facade system, but it's exterior glass is not air tight. Instead the building uses a fish scale system of glass louvers which open and close depending on various climate conditionsi. Stationary fish scale systems are also possible. (See Figure 7)

In order to simplify the project, a stationary exterior fish scale system of glass louvers was designed. The fish scale system would act as a rain screen, and would meet the requirements of the O.B.C..

The size of the glass panels was directly informed by the existing Mies inspired facade. Thus, the width of the glass was determined by the horizontal mullions, and the height of the glass was determined by the depth of the floor plate. This resulted in 4 louvers per floor; 1 opposite the floor plate, and 3 opposite the adjacent glass. The panel opposite to the floor plate would be fritted, which would prevent thermal gain during the summer months, and also provide a translucent surface on which to cast light. The existing layer of single pane glass would remain, and all air exchange within the building would take place mechanically.

During the summer, the facade would naturally ventilate, pulling cooler air over the existing single pane glass. At the top of the facade, mechanical systems would be used in order to enhance stack effect, flushing out hot air from the top of the building. During the winter, the top and bottom of the facade would close, and trapping warmer air inside the air cavity. Although the facade is not air tight, the airspace would still act as insulation against the most extreme winter temperatures. (See Figure 8)

The air space between the existing and the rain screen would be 800 mm, which falls within the allowable 900mm setback. This is done in order to allow maintenance personnel access to the space as well as satisfy the O.B.C..

Anchor ties would be used to connect the structural framework of the second skin to the existing concrete. Adding this extra weight is possible because the building's structure was over designed, typical of many buildings of the 1970's.

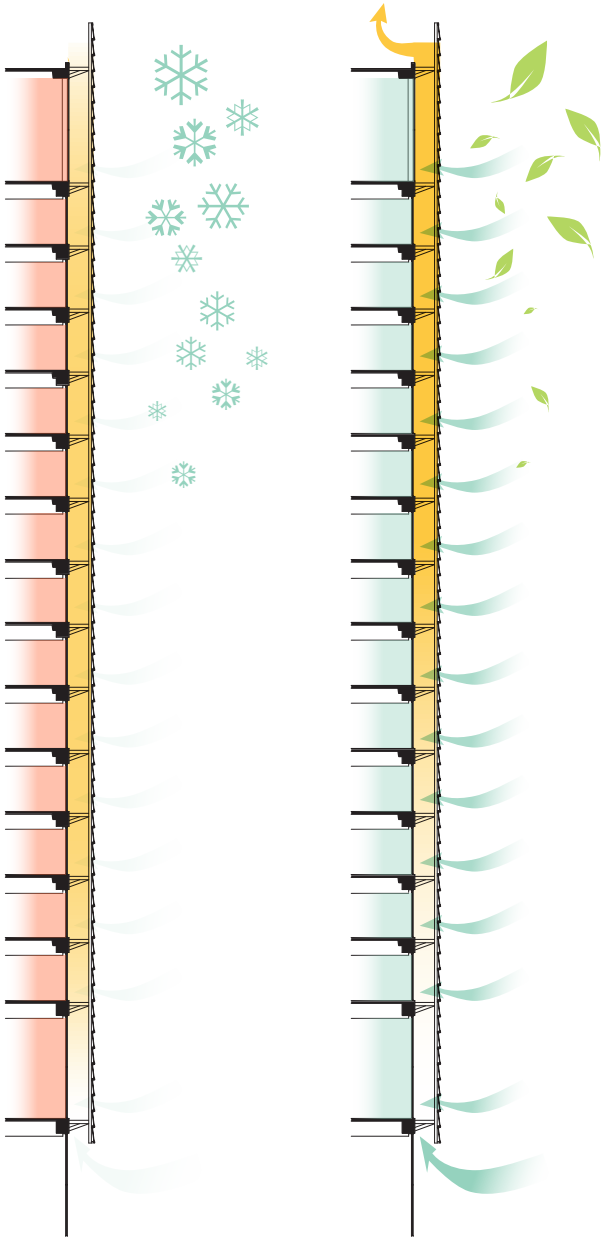

Figure 8: the new simplified fish scale facade system. Heated air is held over the facade during the winter, providing additional insulation. During the sumer, vents at located at the top of the facade emphasize stack effect, continuously pulling cooler air across the facade.

The project was then re-generated and a presented to Dr. Kesik, WorkSHOP staff (Larry Richards, Cleo Buster), the judging panel (Brian Curtner, Caroline Fung, and Kin Yeung), as well as cost consultant Mel Yungblut. A rough cost estimate was presented, based on the previous meetings with Dr. Ted Kesik (See Appendix C). The main source of feedback from this meeting was the need to produce technical details. Research had to be done in order to determine the overall effectiveness and detail of the lighting. After the meeting, Mel sent a finalized budget for the project (See Appendix D)

Glenn Boccini was then consulted as to what type of lighting would be necessary. Glenn suggested using an MC Blade (See Appendix E); an exterior grade LED light which would be able to produce and colour of light. The LEDs would be used at approximately ten percent efficiency at night. this would increase their lifespan. Also, by locating the LED lights inside the air cavity, the buffered temperature would also protect them. The MC blade can cast light at any specified angle, and would be adjusted to shine only on the translucent fritted glass, located adjacent to the exposed floor plate. The fritted 80 was added in the lower corner of the building as a signature to the facade, and increase the building's marketability. (see figure 9)

The final design panel consisted of renders, sections, and a construction detail (See Figure 10). The proposal project was designed to interact with the street life of Bloor St, add value and increased marketability to the building, as well as improve the efficiency of the building. The judges believed the project's "[the minimal impact on occupant views and provocative luminosity would likely prove highly marketable]"i.

The 80 Bloor st. West Student Ideas Competition was an excellent way to study types and approaches of double skin facades in Toronto. By having the ability to develop our design with industry professionals, constraints allowed us to design more effective solutions for the given design problem. The project was a unique, eye opening experience which has drastically developed my understanding of architecture.

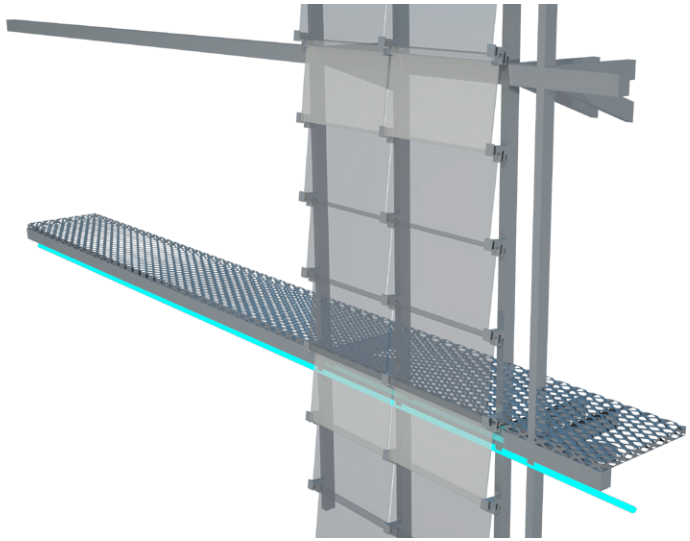

Figure 10: construction detail included in final submission

Figure 9: the address '80' is faintly visible on the glass fritting, acting as a signiture to the dramatically lit facade.

Figure 10: Day and night render of facade included in final submission

Endnotes:

i Oikos; Green Building Library; Project Showcase; Telus Revitalization of an Office Building <http://oikos.com/library/showcase/telus/index.html>

ii Busby, Peter, Jim Taggart, and Kathy E. Wardle. Busby: Learning Sustainable Design. Gatineau, QC: Janam Publications, 2007. 48

iii Oesterle, Eberhard, and Rolf-Dieter Lieb. Double Skin Facades Integrated Planning. Munich: Prestel, 2001. Print. Pg. 12-21

iv Oesterle, Eberhard, and Rolf-Dieter Lieb. Double Skin Facades Integrated Planning. Munich: Prestel, 2001. Print. Pg.170-172

v Kesik, Ted, Is Marketability Only Skin Deep?, Aug. 16, 2011, Toronto

Images:

Figure 1: 80 Bloor Street West. Web. 25 Aug. 2011. <http://www.80bloorstreetwest.com>.

Figure 2: Dennis Tang/Aidan Mitchelmore

Figure 3: Dennis Tang/Aidan Mitchelmore

Figure 4: Hartley, Kirk. "Cancer : GlobalTort." GlobalTort : Commentary from Lawyers and Experts on Mass Torts, Law, Insurance and Sci ence. GlobalTort, 4 Feb. 2011. Web. 25 Aug. 2011. <http://www.globaltort.com/articles/cancer/>.

Figure 5: Dennis Tang/Aidan Mitchelmore

Figure 6: Dennis Tang/Aidan Mitchelmore

Figure 7: Boake, Terri M. "Double Facade Movie." Arch 226: Environmental Building Design. 16 Nov. 2010. Web. 16 Dec. 2010. <http://www.architecture.uwaterloo.ca/faculty_projects/terri/lecture_movies/double-facade.mov>

Figure 8: Dennis Tang/Aidan Mitchelmore

Figure 9: Dennis Tang/Aidan Mitchelmore

Figure 10: Dennis Tang/Aidan Mitchelmore

Bibleography

Busby, Peter, Jim Taggart, and Kathy E. Wardle. Busby: Learning Sustainable Design. Gatineau, QC: Janam Publications, 2007. 48

Hausladen, Gerhard, Michael De. Saldanha, and Petra Liedl. Climate Skin: Building-skin Concepts That Can Do More with Less Energy. Basel: Birkhäuser, 2008. Print.

Kesik, Ted, Is Marketability Only Skin Deep?, Aug. 16, 2011, Toronto

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Appendicies

Appendix A

Oringinal Comeptition Outline:
Released Wednesday October 13, 2010

80
Student Ideas Competition For
A New Face for 80 Bloor Street West

Architecture students in the undergraduate and graduate programs at Ryerson University, the University of Toronto, and the University of Waterloo, along with students in the Building Science program at Ryerson, are invited to participate in an ideas competition for the rejuvenation of the south facade of 80 Bloor Street West, a 19-storey office tower in Toronto's Yorkville district. Sponsored and coordinated by Krugarand Corporation, this two-stage design competition seeks proposals that are innovative, pragmatic, and capable of generating a progressive new identity for 80 Bloor Street West.

Designed by Peter Carter of the Toronto firm Bregman and Hamman and completed in 1973, the building is conceptually "Miesian," flowing from the knowledge and inspiration that Carter gained while studying, then working with Mies van der Rohe. The underlying symmetry, the central core and rational structural system, the subtly stepped-back columns marching up the north and south facades, the large expanses of glass, and the vocabulary of materials and detailing in the lobby (such as Travertine) owe a debt to Mies van der Rohe. The building has "good bones," but it is now 37 years old and its face on Bloor Street requires rejuvenation and a new identity.

Krugarand Corporation is seeking an intervention that will significantly and elegantly transform the south, public facade of 80 Bloor West and: 1) improve technical performance and long-term sustainability, 2) add value and attract more high quality tenants, and 3) represent the building to the public as a place that promotes creativity and design excellence. For many years 80 Bloor West was the home of the Toronto offices of Canada's most famous architect of the 20th century, Arthur Erickson; and it currently houses the imaginative design centre called WORKshop. Krugarand aspires to attract more offices, agencies, and studios focusing on contemporary design and expects the new facade to represent and reinforce this goal. At the same time, Krugarand is seeking ideas that are realizable, pragmatic, and cost effective.

In Stage One, students are invited to submit their facade proposal on one A-1 sheet (594mm high x 841mm long; or 23.4 inches wide x 33.1 inches long) by 5pm, Wednesday, November 10, 2010. A jury will then select three finalist projects for further development in Stage Two, which is due by 5pm, Wednesday, December 8, 2010.

Competition Announced: Wednesday, October 13, 2010
Stage One Due: 5pm, Wednesday, November 10, 2010
Stage Two Finalists Announced: by Monday, November 15, 2010
Stage Two Due: 5pm, Wednesday, December 8, 2010

Awards ($3,700):
Stage One: three finalists will each be awarded $500 and invited to participate in Stage Two
Stage Two: First: $1000; Second: $700; Third: $500

Stage One and Stage Two Jury:
Brian Curtner, Partner, Quadrangle Architects, Toronto
Caroline Fung, Chief Financial Officer, YCSE, Hong Kong
Kin Yeung, Founder, Blanc de Chine, Hong Kong

Stage Two Technical Advisors:
Dr. Ted Kesik, Associate Professor of Building Science; John H. Daniels Faculty of Architecture, Landscape, and Design, University of Toronto
Mel Yungblut, Professional Quantity Surveyor and Senior Partner, A.W. Hooker Associates, Ltd., Toronto

Competition Guidelines and Regulations:
1) Participation in the competition is limited to undergraduate and graduate students in the architecture programs at Ryerson University, the University of Toronto, and the University of Waterloo. This includes students officially enrolled in architecture as an undergraduate major, as a pre-professional undergraduate in architecture, or in a program of professional architecture studies at the undergraduate or graduate level. Students in Ryerson's Building Science program are also eligible. Persons thus qualified may participate individually or as a member of a team of two competitors. A team may not consist of more than two people.

2) 80 Bloor Street West is a 19-storey, concrete frame building consisting of three levels of retail (grade, second, and third floors), 15 levels of office space, and a top mechanical floor. The building's Lower Concourse connects directly to the TTC Bay station. The south facade is 116 feet wide (35.36 meters) and 229 feet tall (69.80 meters). The building currently has single-pane glazing. The competition site is defined as the south facade envelope: 116 feet (35.36 meters) wide, 229 feet (69.80 meters) tall, and projecting no more than 4 feet (1.22 meters) from the face of the building. The competition does not involve the north facade of the building.

3) Drawings of the north elevation, a typical office floor plate, and other information about 80 Bloor West can be downloaded at www.80bloorstreetwest.com

4) The current lobby/entrance portion of the facade may be considered as part of the competition "site" and transformed. Competitors may also include proposed changes to the facades of the
retail spaces housing Gap Kids and Banana Republic.

5) The new face for 80 Bloor West should give consideration to the address and the number "80" in particular. How can the address be a key feature and prominent without being overpowering?

6) The owner of the building is open to a broad range of ideas for rejuvenation, from notions of "beautification" to more substantial interventions that improve the building's performance (e.g. energy consumption) and longer-term sustainability. It is important to understand that the owner is ultimately seeking a solution that can be developed and possibly implemented and thus expects considerable practicality and cost effectiveness. Students whose entries are selected as finalists for Stage Two will be required to review their Stage One idea with a professional cost consultant and an expert in building science (provided by the competition sponsor and as listed above as Technical Advisors) and to develop their final submission based on feedback and assistance from these experts. The Stage Two submission must include a credible cost estimate.

7) Employees of Krugarand, WORKshop, Inc., and any of the jurors or technical advisors are excluded from participation in the competition.

8) The owner of the building holds no obligation to implement the winning design or any of the other finalist projects. If the winning design or any of the finalist designs are deemed worthy of further development and actual implementation, a licensed architect and project management team will be engaged to refine and realize the project. In such case, the student will be invited to collaborate with these professionals and will receive appropriate recognition for her/his design concept.

9) For promotional purposes, Krugarand Corporation maintains the privilege and right to reproduce any drawings submitted in Stage One and Stage Two of the competition.

10) Stage One will be juried anonymously. The names of participants will be in sealed envelopes, to be opened at the completion of the Stage One jury process. The Stage Two finalists will be notified of the Stage One results by Monday, November 15, 2010.

11) The selection of the finalists for Stage Two and the winner of Stage Two is under the sole direction of the Jury, and the results are not subject to challenge by any of the competitors.

12) All drawings submitted by participants in the competition become the property of Krugarand Corporation and will not be returned.

13) WORKshop, Inc., located on the Lower Concourse at 80 Bloor Street West, will present a public exhibition of the Stage One and Stage Two submissions.

14) Krugarand Corporation, jury members, and technical advisors will not respond to inquiries or questions during Stage One. A process will be established during Stage Two through which the three finalists can submit questions to Krugarand Corporation and the technical advisors.

Submission Requirements:
Stage One: Participants are required to submit one A-1 size drawing (either vertical or horizontal format) representing her/his idea(s) for the facade rejuvenation. TWO HARD COPIES (PRINTS) OF THIS DRAWING MUST BE SUBMITTED. Any media or drawing technique is acceptable, and the drawing can be in colour or black and white. The drawings must each have an envelope securely attached to the back, containing a sheet with the following information: a) name of participant, b) institutional affiliation, title of architecture program, and year/level in the program, c) daytime telephone number, d) evening telephone number, and e) e-mail address. The Stage One submission is due by hand-delivery or by pre- paid courier at WORKshop, C-1, Lower Concourse (adjacent to TTC Bay station), 80 Bloor Street West, by 5pm on Wednesday, November 10, 2010. Late submissions will not be accepted.

WORKshop, Inc., C-1

80 Bloor Street West

Toronto, ON M5S 2V1

Tel: 416-925-1323

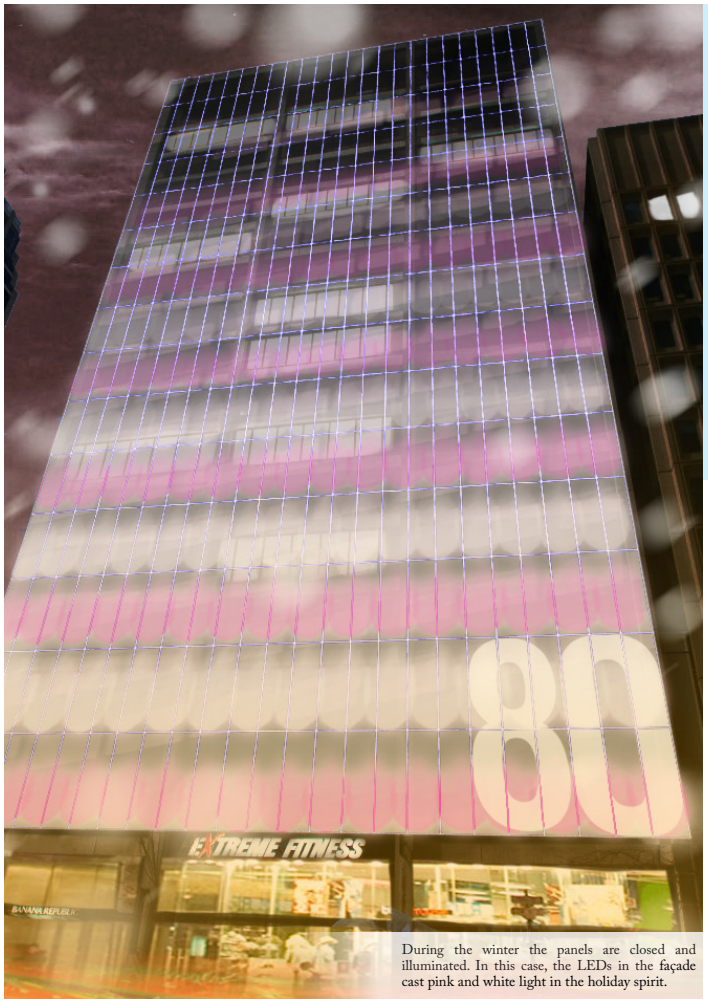
Stage Two: Finalists selected for Stage Two will be asked to develop their idea further, to consult with a cost consultant and building scientist provided by the sponsor, and to submit supporting technical information and a cost estimate as explained in point no. 5 above. The Stage Two submission is due by hand-delivery or by pre-paid courier at WORKshop (see address above) by 5pm on Wednesday, December 8, 2010. The winner will be announced in mid-December, 2010.

Appendix B

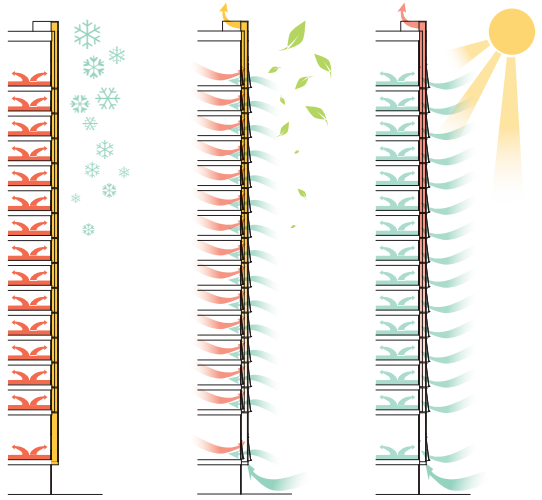
Initial Concept Panel:
Submitted Wednesday, November 10, 2010

80 bloor west

The panels are open during the warm months of the year, and the façade distorts the current appearance of the Bloor West streetscape.



During the winter the panels are closed and illuminated. In this case, the LEDs in the façade cast pink and white light in the holiday spirit.



In the fall, the panels provide natural ventilation, even at night. In this example, the LEDs have lit the façade orange for Hallowe'en.

An interior view out to the façade during the summer. The exterior façade is opened and the interior façade is closed maximizing the use of stack effect.

Yorkville is becoming one of Toronto's architectural centres, housing an architectural boom occurring since the mid-noughties. Bloor Street is the home of the Royal Ontario Museum, the Royal Conservatory of Music, and will be the site of Toronto's newest façade.

Firstly, the façade will work as a system to provide natural heating, cooling, ventilation, and insulation; all working to save on operating costs and begin to cover the principal cost of the façade. In summer the dual facade allows for increased stack effect, flushing the hot air out of the building. During the winter, the air space in between the glass stores heat and can be accessed if desired with the operable windows. During the fall and spring months, stack effect and natural ventilation improve the quality of the workspace.

During the day, even though the mirror like façade is fractured with operable windows, the glass fritting of the '80' is still clearly visible. As day turns to night, the building comes alive as LED lights play with the fritting in the glass; reacting to an event, weather, or season.

The new façade on 80 Bloor Street West will reduce the operating costs of the building significantly, it will create a more comfortable work environment for the occupants, and it will interact with the existing street life of Yorkville.

The 80 Bloor Steet West façade will add value to the existing building and serve as an example of design excellence.

Appendix C

Approxtimate Cost Analysis:
Completed for presentation meeting Friday,
November 26, 2010

Credible Cost Estimate:

Curtain wall cost per square foot (principal and installation):			
Cost per area:	$ 80 square '	($861.11 m squared)	
Square footage of facade:			
Length/width:	129' 1 1/2" X 229'	(39.36m X 69.80 m)	
Area:	29 572' squared	(2 747.328 square m)	
Total curtain wall cost:			$ 2 365 760.00
LED lighting system			
Number of lit floor slabs:	16		
Width of building:	129' 1 1/2"	(39.36m)	
Total Linear lighting:	2066' 3"	(629.76m)	
Budget per linear dimension:	$300.00 per '	$984.26 per m	
Predicted total cost and installation:			$ 619 875.00
Energy			
Costs per year: Heating (Nat. Gas)	$231 694.00		
Cooling	$187 200.00		
Predicted energy reduction:	1/3		
Predicted energy savings:	$77 231.00 + $62 400.00 =		$139 631.00
Increasable Rent			
Dimensions of floor	107'4" X 118'4"	(351.87m X 387.96m)	
Floor Area	12 682' squared		
Rent increase:	$2 square'	($21.53m squared)	
Floors for rent:	16		
Total Profits:			$405 824.00
Total Cost:			
Curtain wall + LED system	$ 2 365 760.00 + $ 619 875.00=		$2 985 635.00
Total Savings:			
Energy + Rent Savings	$405 824 + 139 631.00=		$545 455.00
Payback period:			
Total Cost/Total Savings	$2 985 635.00/$545 455.00=		5.47 years.

Appendix D

Final Cost Analysis:
Recieved from Mel Yungblut, submitted with
final proposal Thursday, December 30, 2010

Team 3 - University of Waterloo - Rainscreen with horizontal openings and LED ligh

	Item Description	Quant	Unit
	Alumimum framed glass rainscreen		
	Design assumptions:		
	- premanufactured aluminum framed glass panels - aluminum mounting framing and hardware - aluminum grating at every other floor - LED lighting to each panel with colour changing control		
1	Aluminum framed glass panels	20,270	SF
2	Aluminum mounting framing, approx. 3'0" wide including service catwalks	20,270	SF
3	Upper and lower vent system and controls	330	LF
4	LED lighting with controls	20,270	SF
	Subtotal	20,270	SF
5	Design fees, shop drawings, mock up, warranties and manuals (2%)		
6	General Conditions (including scaffolding, hoisting, supervision, etc) (10%)		
7	Office Overhead and Fee (5%)		
	Total Estimate Hard Construction Cost	20,270	SF

ECONOMIC ASSESSMENT of FACADE RETROFIT - 80 LIGHTS AT BLOOR ST WEST

Building GFA (sq. ft.)	218212.5	Façade Areas (sq. ft)	
Rent Increase ($/ft)	$1.00	Lobby/Mezzanine	5,849
Annual Revenue Increase	$218,212.50	Intermediate Floors	20,270
		Penthouse	2,760
			28,880

Building GFA (sq. ft.)	218212.5
Rent Increase ($/ft)	$2.00
Annual Revenue Increase	$436,425.00

	Retrofit Cost
80 Lights	$5,265,800

Economic Assessment Parameters
Two interest (discount) rate and fuel/material escalation rate scenarios are considered in this analysis.

	Current	***High***
Interest Rate	3.5%	5.0%
Energy Escalation Rate	6.0%	11.0%
Study Period (yrs)	10	10
	20	20
	30	30

	Annual Energy Cost	**Life Cycle Energy Savings**		**Total Annual Energy Cost**	**Present Worth of Energy**		**Energy Savings Payback Period**	**Energy + Rent$1 Payback Period**	**Energy + Rent$2 Payback Period**	**Life Cycle Savings (NPV)**	
		Current	***High***		***Current***	***High***	***(years)***	***(years)***	***(years)***	***Current***	***High***
Existing Condition											
		$0	**$0**	**$420,797**	$4,809,536	$5,785,299	**N/A**	**N/A**	**N/A**	$0	$0
Electricity (Cooling)	$189,103				$10,915,558	$15,869,991				$0	$0
Natural Gas (Heating)	$231,694				$18,667,554	$33,449,204				$0	$0
80 Lights											
		$937,568	$1,127,782	**$338,767**	$3,871,969	$4,657,517	**64.2**	**17.5**	**10.2**	-$2,146,107	-$1,955,893
Electricity (kWh)	$141,827	$2,127,871	$3,093,684		$8,787,687	$12,776,306				-$955,804	$10,009
Natural Gas (GJ)	$196,940	$3,639,039	$6,520,563		$15,028,514	$26,928,640				$555,364	$3,436,888

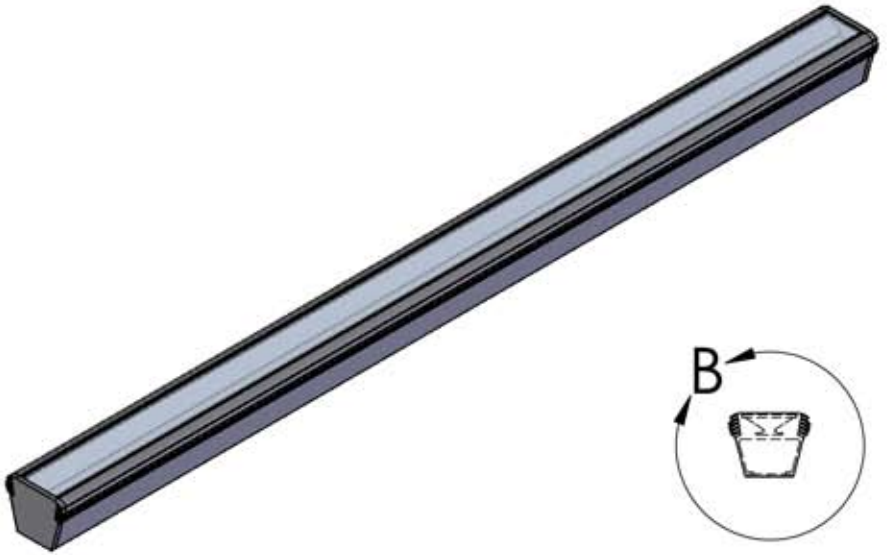
Appendix E

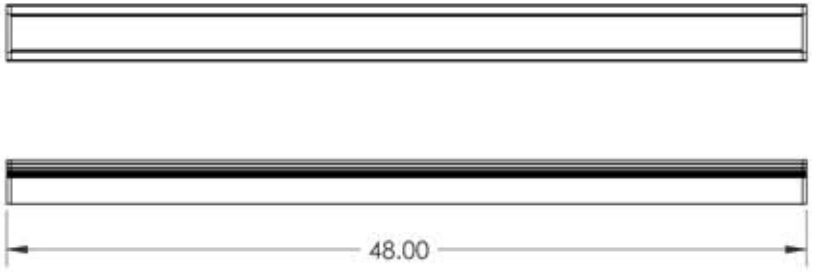
Lighting Specifications:
Recieved Thursday, December 16, 2010

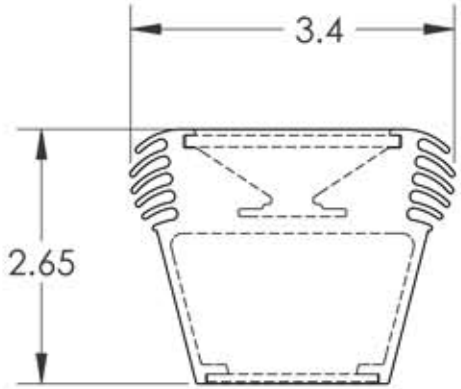
MC BLADE

LINEAR GRAZING AND WASHING SYSTEM

- *Narrow band linear wall wash graze fixture*
- *Available in natural white, warm white, RGB and static colours*
- *120-240 VAC universal input voltage*
- *Industry leading Cree emitters*
- *Industry leading holographic optical technology*
- *50 degree by 10 degree output (fwhm)*
- *Minimum output of 2900 lumens in 1.2m (4') fixture*
- *Minimum usable output > 2100 lumens in 1.2m (4') fixture*
- *Minimum usable efficacy > 40 lumens/watt*
- *12 watts per foot power consumption*
- *350mA constant current operation for long life and consistent performance*
- *All aluminum construction for optimal heat dissipation*
- *Easy installation and adjustability via quick connects and adjustable mounting brackets*
- *Multiple finishes available (anodized, enamel, powder coat) including custom colours as required.*







DETAIL B
SCALE 1 : 2

		NAME	DATE
UNLESS OTHERWISE SPECIFIED:	DRAWN		
DIMENSIONS ARE IN INCHES TOLERANCES: FRACTIONAL ±1/16 ANGULAR: MACH ± .5 BEND ± .5 TWO PLACE DECIMAL ± .01 THREE PLACE DECIMAL ±.005			
MATERIAL			
FINISH			
DO NOT SCALE DRAWING			

M.C. Laser WERKS Inc.

TITLE:
48" OUTDOOR FIXTURE

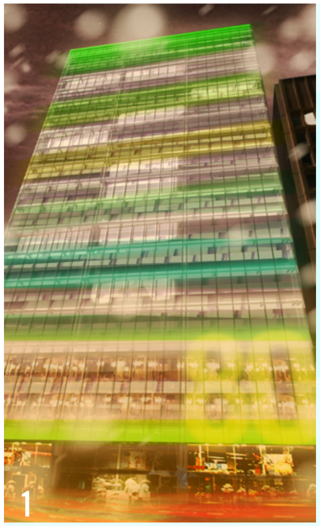
SIZE	DWG. NO.	REV
A	MC BLADE	
SCALE: 1:8	WEIGHT:	SHEET 1 OF 1

5 4 3 2 1

Appendix F

Final Submission:
Submitted Thursday December 30, 2010

80 lights
AT BLOOR ST WEST



Yorkville is becoming one of Toronto's architectural centres, hosting an architectural boom occurring since the mid-noughties. Bloor Street is the home of the Royal Ontario Museum, the Royal Conservatory of Music, and will be the site of Toronto's newest façade. This new façade consists of an additional layer of glazing which would be held 1.2 meters away from the existing one. *80 Lights* allows for savings in cooling and heating of the building, as well as provides the opportunity for dramatic street interaction.

Built with glass in a 'fish scale' system, the façade allows for the control of air in the created space between the old and the new. During the winter, *80 Lights* acts as a layer of insulation; the glass traps warm air in between the existing curtain wall, and the new façade. The top of the façade would be closed, preventing the heat from rising and escaping: this will greatly reduce the amount of heat loss over the facade. During the summer, *80 Lights* takes advantage of the height of the building with stack effect. Hot air is continuously being flushed out of the façade with cooler air, as the top of this skin is open. Fritted glass would be used to cover the existing exposed concrete spandrels to prevent excessive thermal gain.

This fritted glass, white during the day, would undergo a dramatic transformation during the night. The fritted glass would provide a surface for which up-cast LED lights would shine. *80 Lights* would be ever changing, responding to the events, weather and seasons which take place in Toronto.

80 Lights at Bloor St. West would perform as a system to reduce operating costs in the building, as well as become a responsive and ever changing icon of Bloor St.

1 On the 17th of March, *80 Lights* is playfully lit green for St. Patrick's Day.
2 The tower is a glimmering beacon during the day; the iconic '80' stands out from the busy Bloor St. traffic.
3 At night the building interacts with the street life; constantly changing, *80 Lights* provides a different experience throughout the seasons.
4 Stack effect vents the hot air away from the building, pulling cooler air up the façade.
5 The hot air is trapped inside the airspace, heating the façade.
6 During the day the façade allows for clear, unobstructed views out towards the city, whilst cooling the building through the use of stack effect and the fritted panels over the floor slabs.
7 An exploded detail of the curtain wall system: Glass is held in place with a connection detail which allows for the expansion of the glass. These connections are attached to a mullion system, which is held 1.2 meters away from the existing building, with the system attached to the existing concrete spandrels. Metal grates sit atop of the horizontal mullions, which allow access for cleaning. LED Lights are placed near the bottom of the spandrel to shine upon the fritted glass.