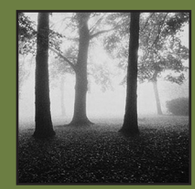
APPENDIX C. WINNIPEG CITY CROSSING – LIGHT FOREST FEASIBILITY STUDY

LIGHT FOREST



FEASIBILITY STUDY
WINNIPEG CITY CROSSING

CITY OF WINNIPEG
Summer 2006

Prepared for:

City of Winnipeg
Planning, Property & Development Department
Planning and Land Use Division

TABLE OF CONTENTS:

Janet Rosenberg + Associates Landscape Architects + Urban Designers
416.656.6665 www.jrala.ca

Corbett Cibinel ARCHITECTS

Marshall Macklin Monaghan
PROJECT MANAGERS • ENGINEERS • SURVEYORS • PLANNERS

epp siepman engineering inc.
mechanical engineers
303-100 Osborne St. South
Winnipeg, MB
R3L 1Y5
p 204.453.1080
f 204.453.1335
ese@eppsiepman.com

CROSIER KILGOUR & PARTNERS LTD.
Consulting Structural Engineers
300-275 Carlton Street, Winnipeg, MB R3C 5R6
Tel: (204) 943-7501 Fax: (204) 943-7507

WARDROP | Engineering Inc.

J.W.McEVOY ASSOCIATES INC.
Professional Quantity Surveyors

EXECUTIVE SUMMARY:

The re-design of the Portage and Main intersection is paramount to the very identity of the City of Winnipeg. The winning "City Crossing" design proposal, by Janet Rosenberg with Corbett Cibinel Architects, is more than a mere design of an urban intersection. The proposed redevelopment provides a unique opportunity to re-structure and transform the very heart of the City, and to implement a design that could act as a catalyst, resonating throughout the downtown area.

The scope of this portion of the project required the feasible examination of the "City Crossings" design competition winning entry. Initial fact finding and technical assessment required the overlay and analysis of the existing plans for the Portage and Main Intersection both at the ground and concourse levels. Based in principle on the competition winning entry, design development was undertaken with the goal not to exceed the $10,000,000.00 budget figure set forth by City Officials and stakeholders.

Upon analysis of the existing conditions it was determined immediately that an expansion of the concourse below would be outside the limitations of the proposed budget. An effective solution would therefore demand a minimal intervention at the stairwell entrances.

At a broader, more urban scale, the goal of the design involves the reseeding of the adjacent downtown areas through a planting and lighting strategy. This "Light Forest" approach will fundamentally begin to re-structure the city through the creation of new social spaces. At the smaller more immediate scale and scope of this report, the design intent begins to challenge the existing structure of the Portage and Main site. While upholding and maintaining existing traffic patterns and strengthening access between the street level and concourse, the design allows for the creation of a more pedestrian friendly event space.

The Portage and Main intersection is unique to both the City of Winnipeg and to the country as a whole for it's cultural/historical legacy. The following report outlines a design strategy that responds to this special relationship by providing guiding principles that will build upon its history, while ensuring the site as a dynamic social event space for generations to come.

ORIGINAL PLAN FROM THE "CITY CROSSINGS" DESIGN SUBMISSION

HERITAGE SIGNIFICANCE:

Understood as Western Canada's most famous intersection, Portage and Main has been elevated to near fabled status. Immortalized in songs, photographs, stamps and pins, the corner has developed as the city's common thread.

Known in contemporary times for its high wind velocity and traffic volumes, the intersection has always been the vortex of Winnipeg's most significant cultural events and celebrations. From Peace Day and the General Strike of 1919 through the War Bonds and victory parades of the 1940's, Royal visits and spontaneous sporting celebrations, Portage and Main represents the symbolic heart of Winnipeg's collective body.

An ancient place of trade, the junction of the Red and Assiniboine rivers was the impetus for Winnipeg's creation. With time the city grew and adopted increasingly modern modes of transportation. In the 1840's the route currently known as Main Street was established as a connection between the Upper and Lower Forts. Portage Avenue, historically known as the Portage Trail, brought plains trade to the upper fort, while a fork in the road brought traffic to the lower fort. With this, the hub began to shift away from the river junction to a new intersection that flourished with frontier activity. The breadth of Portage and Main seen today can be traced back to these humble beginning where a streets girth was determined by the volume of Red River ox carts traveling down the muddy route, side by side.

1872

1873

1884

1900

1919

1940

During the building boom of the early 1880's specialized uses of land were established in Winnipeg. Historic land value records illustrate that even in its infancy Portage and Main was the epicenter of Winnipeg. In the years to come the intersection would attract the city's most substantial new buildings as there was a direct correlation between the value of the building and the value of the land.

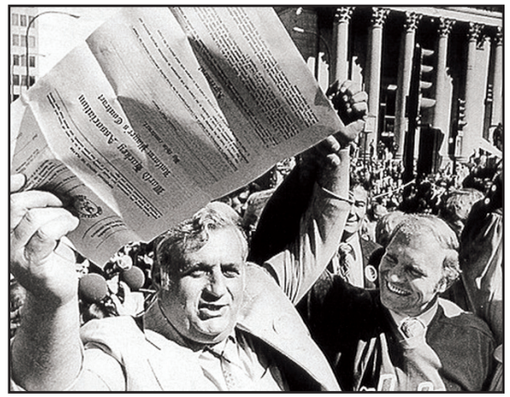
In and around the turn of the 20th Century, frontier shops lining the street at Portage and Main where replaced by larger prominent structures of steel and stone. The structures that later became known as 'Banker's Row' where among the many buildings that where the centre of Western Canada's financing and commercial core. Commercial activity flourished along Main Street far north of City Hall. It took a store built in 1905 by one Timothy Eaton, encompassing an entire city block along Portage Avenue, to facilitate the same commercial flurry that had occurred on Winnipeg's Main Street.

The Panama Canal, First World War and the Great Depression all contributed to the end of tremendous growth in Winnipeg. Property values declined and commercial businesses began to disappear from Main Street as what was left of the mercantile district shifted to Portage Avenue. Large scale projects like the Richardson's 16 storey office tower were put on hold, buildings fell into disrepair, and the intersection at Portage and Main seemed locked in time for the next fifty years.

Into the later half of the 20th Century major demolition of historic properties occurred and the scale of new buildings exploded at this intersection. Skyscrapers of steel and glass rose 30 stories in height giving Winnipeg its distinct prairie skyline, while at ground level, pedestrians where forced underground.

In the 1970's a tunnel system interconnecting the four corners allowed for the addition of shops beneath the street. In order for the businesses to flourish barricades where erected to close pedestrian crossings at street level.

Today, historic and contemporary sculptures and vestiges dot the plazas at Portage and Main, however the intersection itself is neither an artifact nor monument. The site currently fuses historic symbols with new technology, poised and anticipating an important place in Winnipeg's future.



BOBBY HULL CONTRACT SIGNING

DALE HAWERCHUK CONTRACT SIGNING

UNDERGROUND CONCOURSE AT PORTAGE & MAIN

"SAVE THE JETS" RALLY

Credits:

Imagery sources:
City of Winnipeg Heritage Department. Planning, Property and Development.
Provincial Archives of Manitoba.
Destination Winnipeg 2005 e postcard gallery.

Segments of above text derived from:
Portage and Main A Short History. City of Winnipeg. Historic Buildings Committee. R.R. Rostecki. 2003

EXISTING CONDITIONS:

For Winnipeg 'The Crossing' has many meanings. It is symbolic of the crossing of the great Red and Assiniboine Rivers, the crossing of cultures, and the crossing of two major roads at the financial center of the city, Portage and Main Street. Winnipeg is a city built out of the crossing of trade routes and the movement of natural resources along its magnificent forested river systems. Today the intersection of Portage and Main is simply a crossing of arteries, where endless streams of cars meet, flowing through the barren plans and austere vertical landscape of the modern city. People have become secondary to the steady flow of traffic, their movement hindered by the shear scale of traffic and the extreme environmental conditions – amplified by the current condition of concrete barriers and dead spaces.

Winnipeg, founded at the forks of two great rivers, along whose banks cool forests thrived has had a strong history of proactive urban forestry. Yet, today the downtown exists as a sea of concrete and asphalt thoroughfares with many urban voids and under utilized spaces. There exists an inherent disconnect between the city's inhabitants and the street level downtown.

While urban models of densification and street-edge development are the current trend, Winnipeg's climate, urban patterns, and past redevelopments do not encourage much street activity. Winnipeg's City Crossing presents a very specific problem. As the financial heart of the City, the Crossing must speak of the character and aspirations of the City as a whole. This is not the place to look elsewhere for models, nor is this the place for a conventional urban plaza. This is the place to delve into the essence of Winnipeg, capitalizing on both its past and strong future. Our team proposes a bold but simple solution – grounded in the history and culture of Winnipeg, using the rivers to inspire our design metaphor.

IMAGES OF PORTAGE & MAIN: CONCRETE BARRICADES, SIDEWALKS AND ENTRANCES

PROJECT OVERVIEW:

Design objectives:

> ***Respect and augment the functions of the intersection*** - ensure the fluid movement of vehicular traffic and create a secure and pedestrian-friendly crossing. As this intersection is the convergence of two major arteries, the design must ensure that all types of transportation flow with consistency and safety.

> ***Create further connections to the city as a whole*** - set landscape and architectural principles that can resonate into the surrounding neighbourhoods. Establishing new linkages to other destinations will reinforce the intersection as a significant symbol to the city as a whole.

> ***Construct visual connections between vertical layers of the intersection*** - create identifiable markers to provide connections between above and below ground levels. The design intends to improve access to the underground while providing visual markers for users to easily gauge their location and point of orientation.

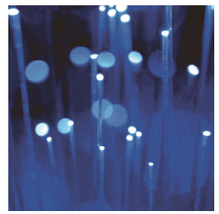
> ***Reforest the downtown core*** - reconnect the city to its ecological history of forested riverbeds and prairie vegetation. The design intends to use native species of tree and grass stands throughout the intersection and plans to create a revised palette of vegetation that could spread throughout the city as a whole.

> ***Utilize light as an identifying feature*** - the conceptual "Light Forest" is developed as a broader gesture of 'light mapping' throughout the city. The design issues spectacular and dramatic up-lighting and under-lighting within this intersection and beyond. This is done for the purposes of creating a luminous cultural tributary of significant features in the city.

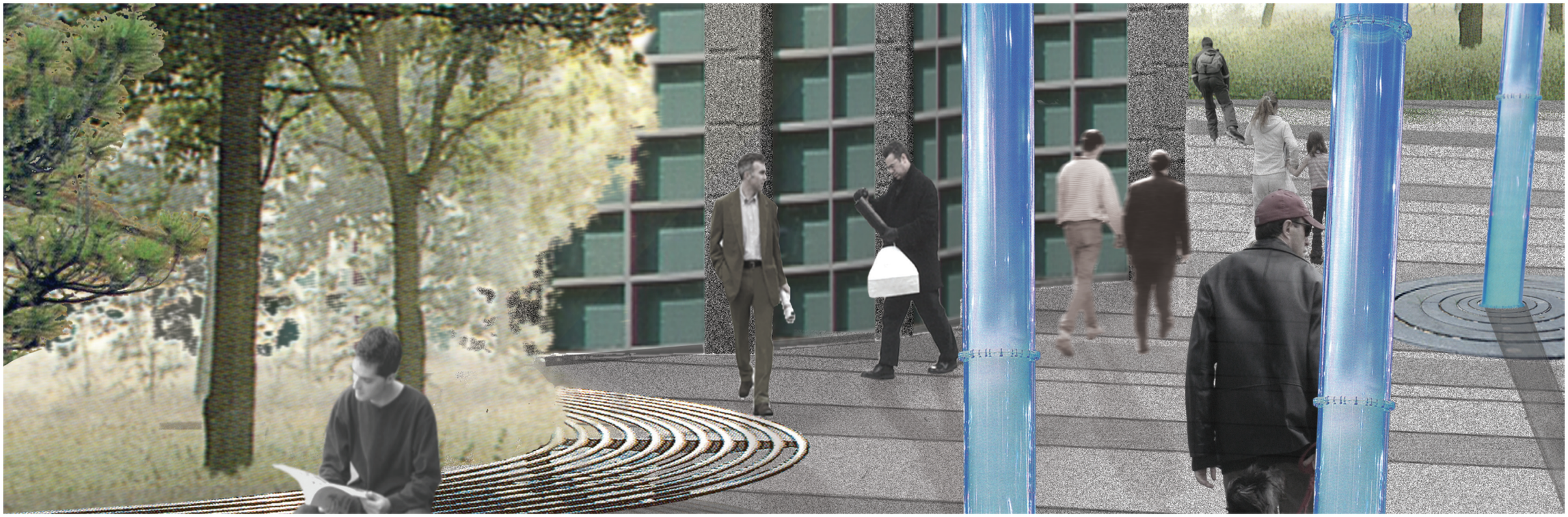
> ***Tap into existing passive resources*** - utilize the defining features of the existing micro-climate within this intersection - namely its wind and sun. The plan makes use of wind turbines and solar panels, allowing the intersection to be a powerful display of alternative and progressive energy sources.

> ***Involve stakeholders and activate the public*** - the development of design, site maintenance and stages of implementation should comprise the comprehensive inclusion of local stakeholders and the broader public.

> ***Create a site of landmark quality*** - ensure that the overall design enhances and augments the features of the site to revitalize the heart of the city. Allow for enhanced social activities throughout the daily patterns and seasons, while creating a dynamic and active place to increase civic pride and unity within the city.



PRECEDENT IMAGES



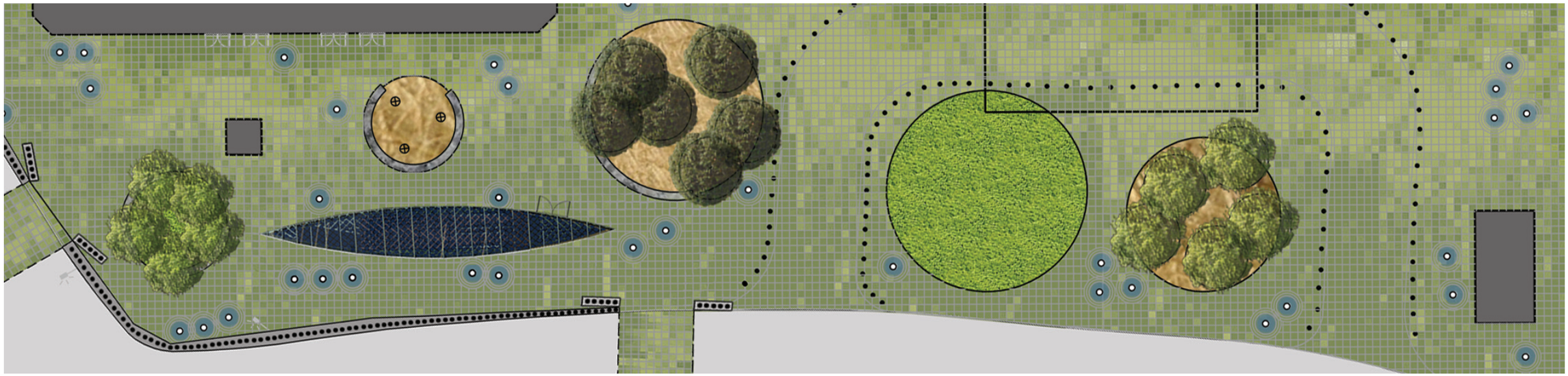
ORIGINAL PERSPECTIVE VIEW FROM THE “CITY CROSSINGS” DESIGN SUBMISSION

LANDSCAPE DESIGN PRINCIPLES:

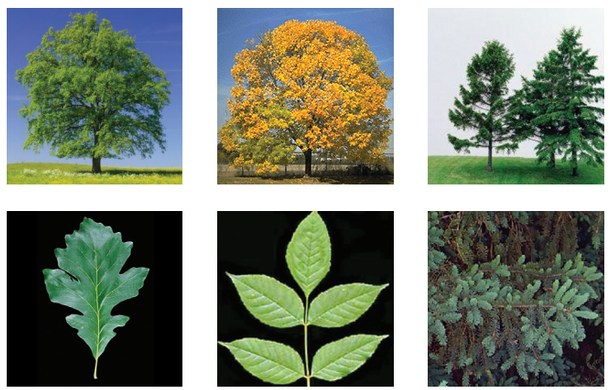
The Landscape design approach for the Portage and Main Intersection involves a strategic re-organization of the overall space through the demolition and removal of the existing concrete barricades, the expansion of pedestrian social space, and the transformation of the harsh vehicular dominated streetscape through the introduction of new pavement materials, scheduled pedestrian crossings, proposed re-forestation, and a proposed “Light Forest” lighting strategy.

The landscape design actively re-structures the site, supplying a framework that will have an immediate transformation at the historic intersection, while operating as a prototype for transformation at the larger urban scale.

DESIGN PLAN: PORTAGE & MAIN INTERSECTION



DETAIL PLAN OF NORTH-EAST CORNER OF PORTAGE AND MAIN



i PLANTING STANDS:

The reforestation of the downtown is an extension of the vast forests that line the Assiniboine and Red Rivers. These forests are comprised of species that not only mimic a river-basin forest, but also perform under the harsh climatic conditions created by this micro-environment.

This combination of aesthetics, performance, and representation provides the opportunity to induce native river-bottom tree species such as Bur Oak (Quercus macrocarpa), Green Ash (Fraxinus pennsylvanica) and the Discovery Elm (Ulmus davidiana 'Discovery'). The establishment of native coniferous species such as the provincial tree White Spruce (Picea glauca), will allow for texture and colour throughout the seasons. Arranged in a series of variably-sized circular islands, the forest stands mitigate the wind and provide a strong visual softening against the backdrop of the buildings throughout the year.

The floor of these new forests will be covered in a blanket of native perennials and grasses in different forms and combinations. Plantings of prairie grasses will reinforce and recall Winnipeg's rich agrarian history.

TREE SPECIES:
Fraxinus pennsylvanica - Green Ash
Quercus macrocarpa - Bur Oak
Ulmus davidana 'Discovery' - Discovery Elm
Picea glauca -White Spruce

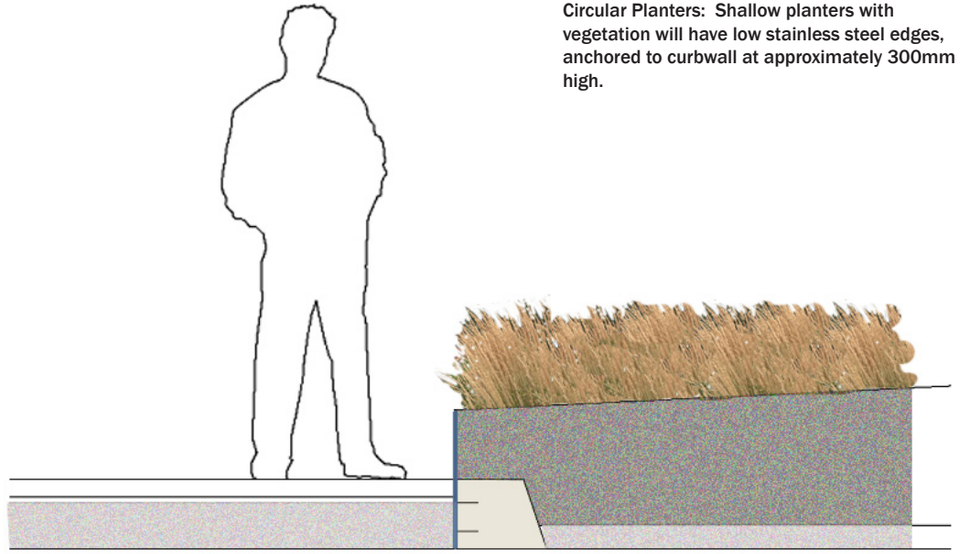
SHRUB SPECIES:
Amelanchier alnifolia. - Saskatoon
Cornus sp.- Dogwood
Viburnum sp. - Viburnum

GRASSES:
Andropogan sp. - Bluestem
Elymus sp. - Canada Wild Rye
Panicum sp. - Columbine
Aster sp. - Aster

The circular planters will be constructed of reinforced concrete with a stainless steel exterior brushed finish. The planters will be constructed of reinforced 8" thick concrete retaining walls with a full 12" thick concrete base. The planter structures will be supported on either the underlying concourse or plaza structures by 450mm diameter piers bearing on the concrete substructure or where not located above the existing substructures by 4 – 400mm diameter piles x 6500mm long. All planters will be equipped with drainage and irrigation systems.

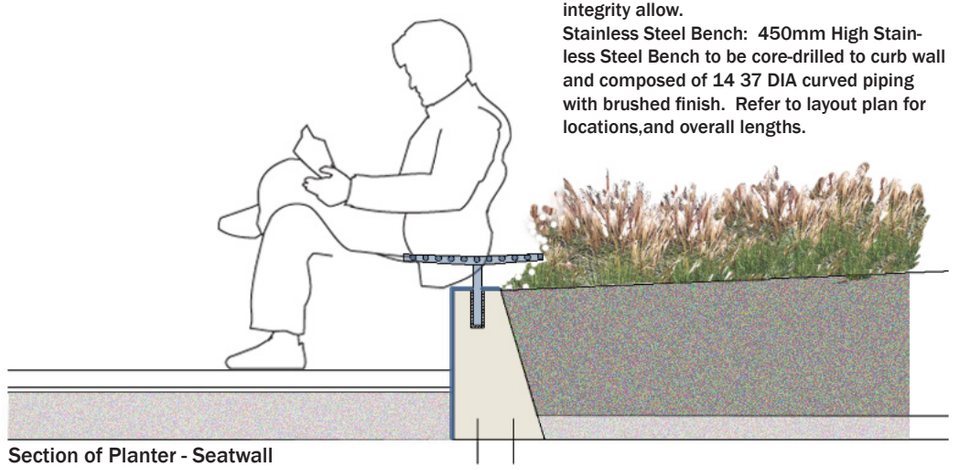
A stainless steel seat constructed of solid steel supports and solid rod slats will be anchored to various sections of the planters.

Circular Planters: Shallow planters with vegetation will have low stainless steel edges, anchored to curbwall at approximately 300mm high.



Section of Planter - Edge

Circular Planters: Trees will be located within circular planters where depth and structural integrity allow.
Stainless Steel Bench: 450mm High Stainless Steel Bench to be core-drilled to curb wall and composed of 14 37 DIA curved piping with brushed finish. Refer to layout plan for locations,and overall lengths.



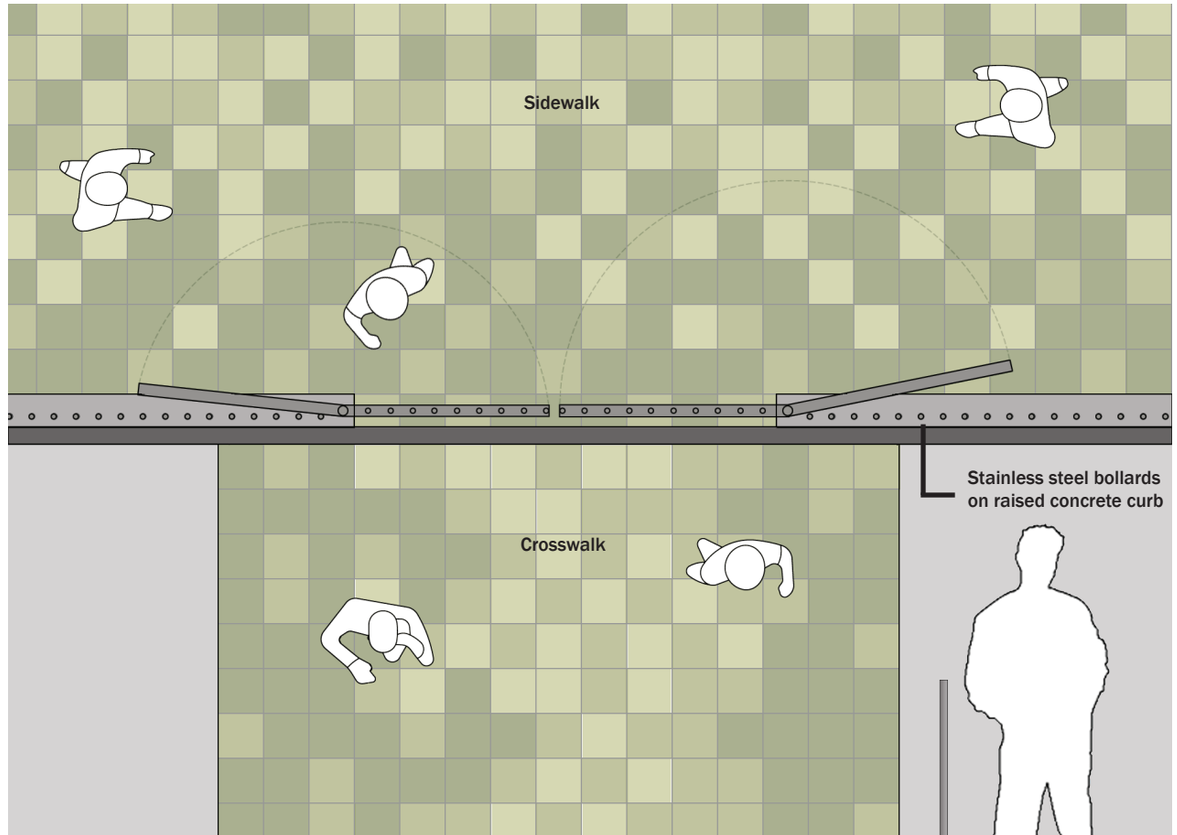
Section of Planter - Seatwall

ii PEDESTRIAN CROSSINGS:

Fundamental to the proposed intersection transformation is the creation of a pedestrian friendly intersection, that will allow for the creation of smaller social spaces, an increase in fluid pedestrian movement, and the provision for safe pedestrian crosswalks at three points throughout the intersection (refer to Site Plan on page 07).

An important part of the design involves the removal of the existing concrete barricades that line all sides of the intersection. The removal will allow for both an enlarged pedestrian realm, and the potential for future safe pedestrian crossings. The removal of the existing barricade would be the first step in psychologically liberating the intersection from its present vehicular dominated condition.

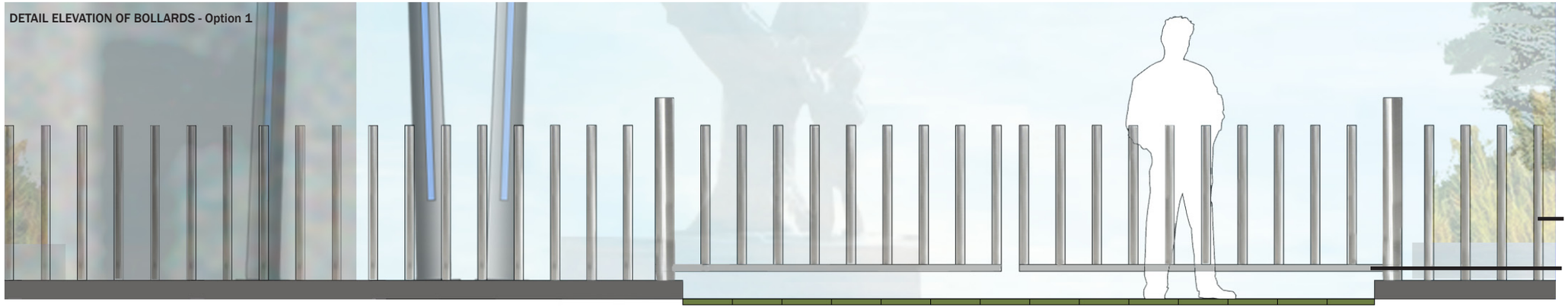
The proposed design will maintain the prescience of a guard/barrier system through the creation of a series of new stainless steel balustrades and the installation of “timed” pedestrian control gates that will regulate pedestrian traffic at specified times (Refer to Traffic Report on page 27). The new guard system will operate in a similar way as the existing structure, while offering an improved visual condition, and maximizing potential pedestrian space.



DETAIL PLAN OF BOLLARDS + CROSSWALK

DETAIL SECTION OF BOLLARDS + CROSSWALK

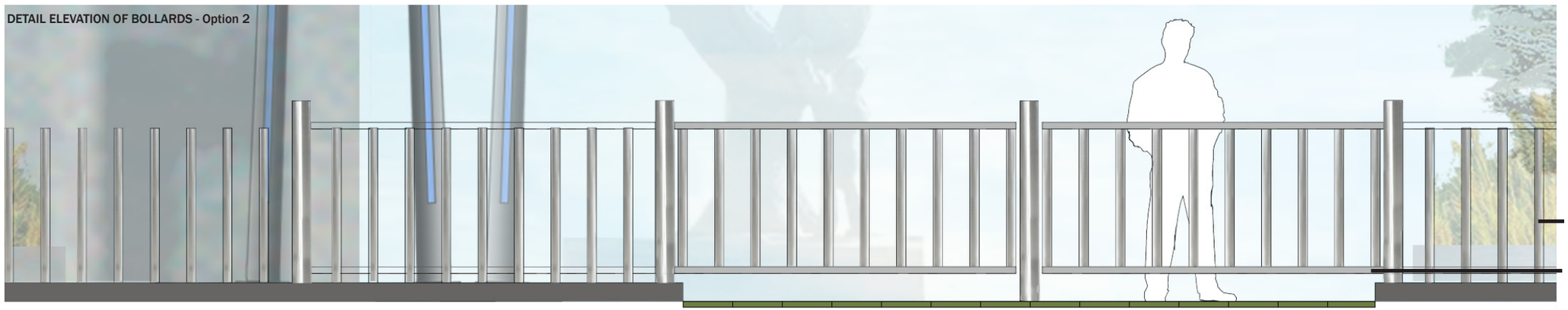
DETAIL ELEVATION OF BOLLARDS - Option 1



Stainless steel bollards on raised concrete curb

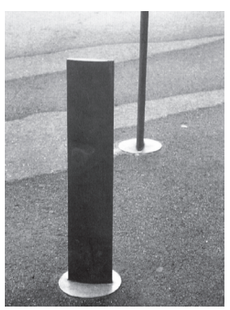
Stainless steel bollards with manually-operated gate

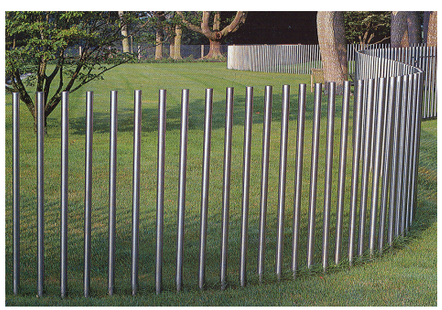
DETAIL ELEVATION OF BOLLARDS - Option 2



Stainless steel bollards on raised concrete curb

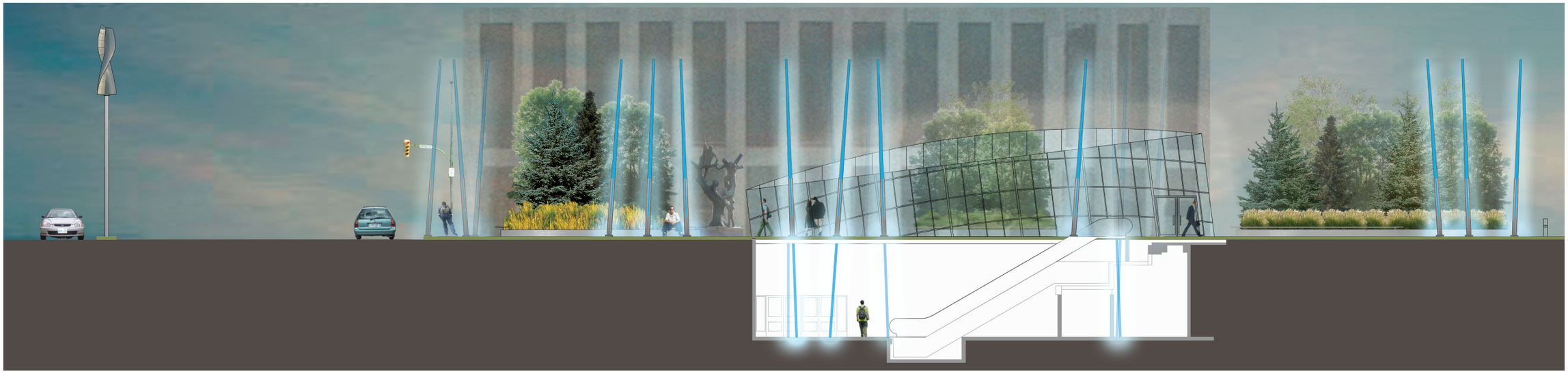
Stainless steel bollards with automated gate system





This new system will incorporate a reinforced concrete base structure that is supported on concrete piers bearing onto the existing concourse roof structure. Where possible, the existing piers supporting the planter walls will be reused. Small diameter (approximately 65 mm) stainless steel vertical guards will be placed at a predetermined spacing to direct pedestrian traffic, and mitigate unscheduled crossings. The vertical guards will be anchored to a new raised concrete curb to ensure easy maintenance and protection from snow plough operations.

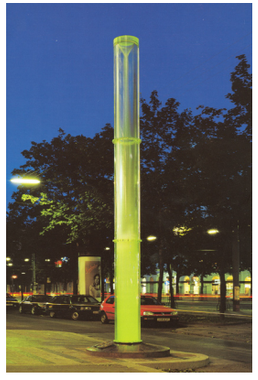
The at grade crossings would be proposed in addition to the existing pedestrian traffic patterns that exist in the concourse level, and would be operational after 5:30 pm during weekdays, and on weekends. Scheduled opening of the crosswalks during these times would not conflict with the existing daytime operations of the concourse area or with the traffic flows and would create safer options for pedestrians crossing the intersection in the late evening. In addition, the pedestrian crossings would respond to the City's current desire for change in the downtown area. Recent trends reflect this atmosphere with new residential/entertainment projects populating the historic exchange district and waterfront.



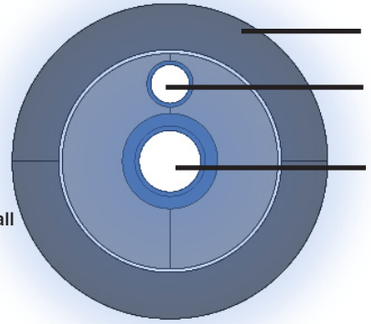
NIGHT-TIME VIEW OF NORTH-EAST CORNER

iii LIGHTING POLES:

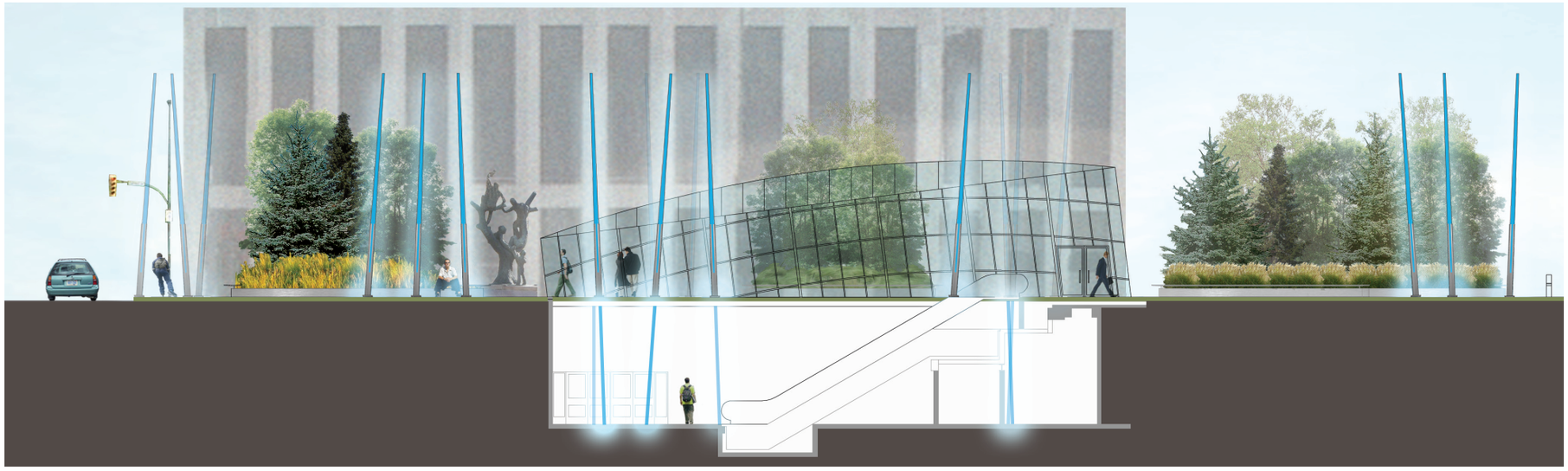
A proposed Light Forest composed of high-tech polymer tubes and 3M light spreading films of varying heights, will randomly line the streets and concourse level, providing a visual connection between street level and concourse below, and will speak to a Winnipeg of the 21st century. The Light Forest lining the street in random arrangements is a direct metaphor for the rich tree-lined riverbanks. Whether looking down at the Crossing from one of the adjacent buildings, driving past at any speed, or walking amongst them, these light columns extend the idea of the forest across the intersection. At any time of year and any time of day the forest fills the space with a playful and dynamic element – a rhythm of light – animating spaces in the urban fabric and offering a unique identifying feature.



Light Pole Elevation

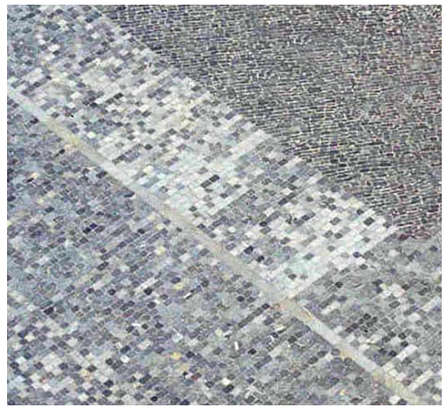


Light Pole Plan



DAY-TIME VIEW OF NORTH-EAST CORNER

The proposed light poles will require a single concrete foundation system per installation to support the weight of the units as well as providing the appropriate stiffness to resist the wind loads and the potential impact loads. Large diameter (600mm to 1000mm) reinforced concrete piers will be installed at each pole location. Depending on their location the foundations will either bear onto the existing concourse roof structure, similar to the existing planter walls, or if not located above the concourse will be drilled to a depth of approximately 6.0 metres. Light poles located within 3m of proposed curbs will be designed to have break-away bases.



iv PAVING PATTERN

One of the primary design moves involved in the Portage and Main proposal includes the installation of a new unifying pavement material that will extend from Notre Dame Ave. to Lombard Ave., and to the eastern edge of the Fairmont property. This new pavement will be composed of pre-cast concrete pavers, and will be comprised of 3-4 green colour variations that will cover the entire surface area from the existing curbline to each building face at the intersection. The colour will be intergral to the paver. The darker pavers will be located along the edges of the pedestrian walkways, with the lighter pavers marking the main passageway and travel routes for the visually impaired.

These durable pre-cast concrete pavers will be 600 mm x 600 mm x 75 mm thick and will be dry laid on a high performance setting bed and granular base, or on a structural slab at all crosswalks. The pavers can be installed in either a uniform pattern or random pattern. The pavement layout will create a mosaic pattern that will be reminiscent of the prairie grasses that define the lower portion of the province.

v WIND TURBINE SYSTEM

The proposed enhancement of the intersection at Portage Avenue and Main Street incorporates the integration of urban wind turbines as a source of environmentally friendly energy. The energy is slated to supplement power for the architectural and landscaping elements proposed in the design. For this study the current conditions of the budget restrict the quantity of turbines to fifteen.

Vertical axis turbines have been utilized in urban environments for decades. Typical installations at past and present have been above the roofline, atop a mast, free of building generated wind turbulence. Current versions have adapted to suit turbulent wind conditions and generate energy with lower wind speeds associated at, or near, ground level. Conditions present at, what has been reputed as, 'the windiest corner in Canada'.

Due to Winnipeg's extreme climate, a suitable turbine has been selected from a Finnish manufacturer (Windside Turbine model WS-4). In use around the world for over twenty years the Windside Turbine operates from the Antarctic to the Sahara to the Pacific Ocean with an estimated fifty-year lifespan.

The average annual wind speed in the City of Winnipeg is 17.8 km/h with record wind speeds and gusts reaching in excess of 100 km/h. The Windside Turbine will produce energy with a minimum wind speed of 7 km/h up to and above Winnipeg's highest recorded wind speed with no detrimental effects to the turbine. In addition the Windside turbine is soundless operating at 0 decibels. As the turbine rotates atop a mast it appears as a solid form and presents no surprises to birds. In the history of the company there are no reported cases of 'bird strikes'.

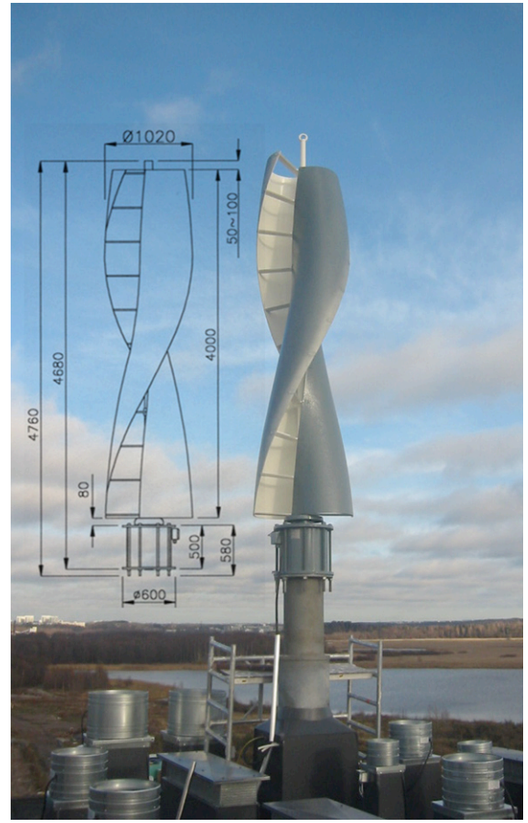
Ice build-up is a concern as it reduces the productive capabilities of the turbine and has the potential of dislodging and becoming a projectile. The manufacturer claims that the product's field testing in Finland, Greenland and Antarctica has shown no ice build-up on this type of turbine. As an additional safety precaution the turbines of Winnipeg will employ an ice-phobic material or type of Teflon paint. A recent design for a Darrieus vertical axis turbine in Quebec, produced by the Genivar engineering, incorporated the identical application of an ice-phobic material to prevent ice adhesion. This precedent is relatively new yet had favorable results.

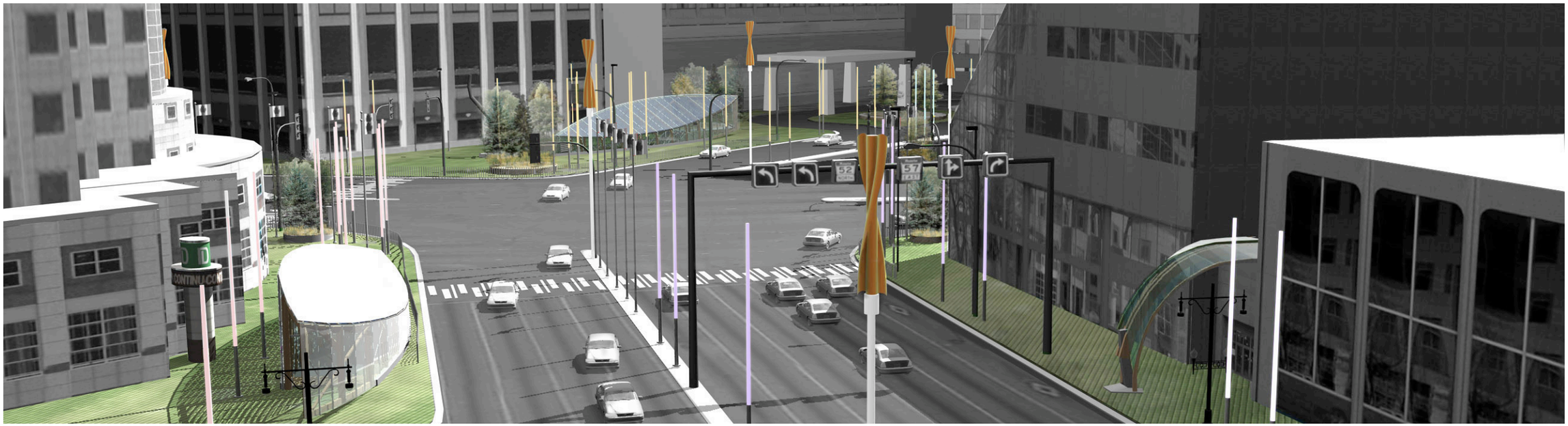
The design utilizes the median of Portage Avenue and Main Street as high visibility locations for the masts and turbines and includes a City of Winnipeg specified safety curb to ensure the protection of the investment from stray vehicles and/or snow removal machinery.

It would be the desire of the design team that a public interactive display (or multiple display locations) be incorporated with the alternative energy concepts. This would consist of computer LCD flat screens located in public areas that will graphically display the amount of power being generated by photovoltaic and wind turbines.

It should be noted that the alternative energy measures proposed will only supplement the new amount of electrical energy required. The power generated will be fed directly into the Manitoba Hydro grid system similar to the photovoltaic array at the Red River College Princess Street campus. This concept allows Manitoba Hydro to sell generated power not utilized by Manitobans to out-of-province markets at a higher rate. The photovoltaic and wind generation concepts are seen as a 'demonstration research initiative' by Provincial and Municipal Governments, and not a capital cost recovery scenario.

Systems of this kind represent a major step to reduce greenhouse gases and slow global warming, which will help to meet the requirements of the Kyoto protocol. As an energy efficient strategy, the project is highly visible and becomes an enduring symbol of an environmentally responsible attitude by a city as a whole on an unprecedented national scale.





AERIAL VIEW EAST

ARCHITECTURE DESIGN SUMMARY:

Based on the budget constraints, heritage data and jury comments, the stair enclosure circular “silo” design, from the winning competition entry, was reworked to suit the existing concourse stair footprints.

Communal elevator access provided by an elevator at the Bank of Montreal plaza was ruled out as not feasible due to the concourse structure and public use of the Bank of Montreal plaza space. Analysis was undertaken to determine the suitability of the existing barrier free access to the underground concourse level and is included with this report.

The National Building Code of Canada NBC requires the categorization of space into occupancy types for guidance in terms of construction parameters. The nature of the underground concourse is immensely complex as it deals with multiple interconnected properties. The exit doors, stairs and escalators are combined with the mercantile occupancies in the ‘round about’ portion of the concourse and will be classified as a Group ‘E’ occupancy. Subject to part 3.2.2.62 (2) the load bearing walls and columns of the new construction will have a fire resistance rating no less than 45 minutes.

The proposed design is an above ground alteration and addition that will not alter existing occupancy types or loads.

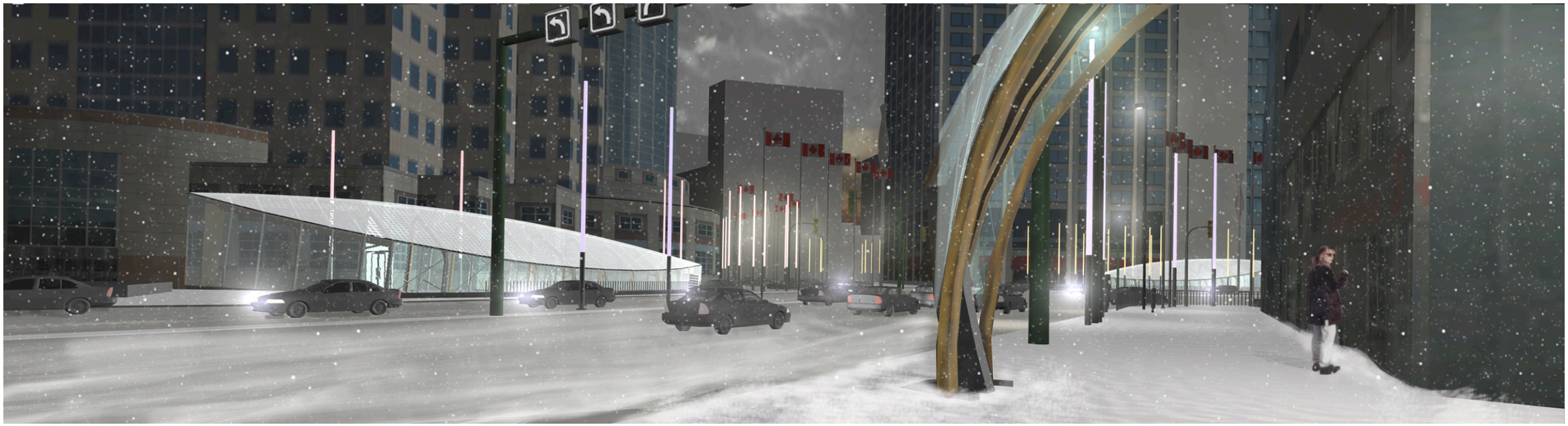
NORTH + SOUTH EAST CORNERS

BUILDING CODE CONFORMANCE:

Fire protection for the stair enclosure glazing in close proximity to existing buildings will incorporate a dedicated sprinkler deluge head system designed in accordance with the National Research Council.

Glulam beams utilized in the design will be large enough to be classified as heavy timber, or as an equivalency, be treated with intumescent paint for fire protection. Doors installed in the new stair enclosures will be provided with appropriate emergency exiting hardware.

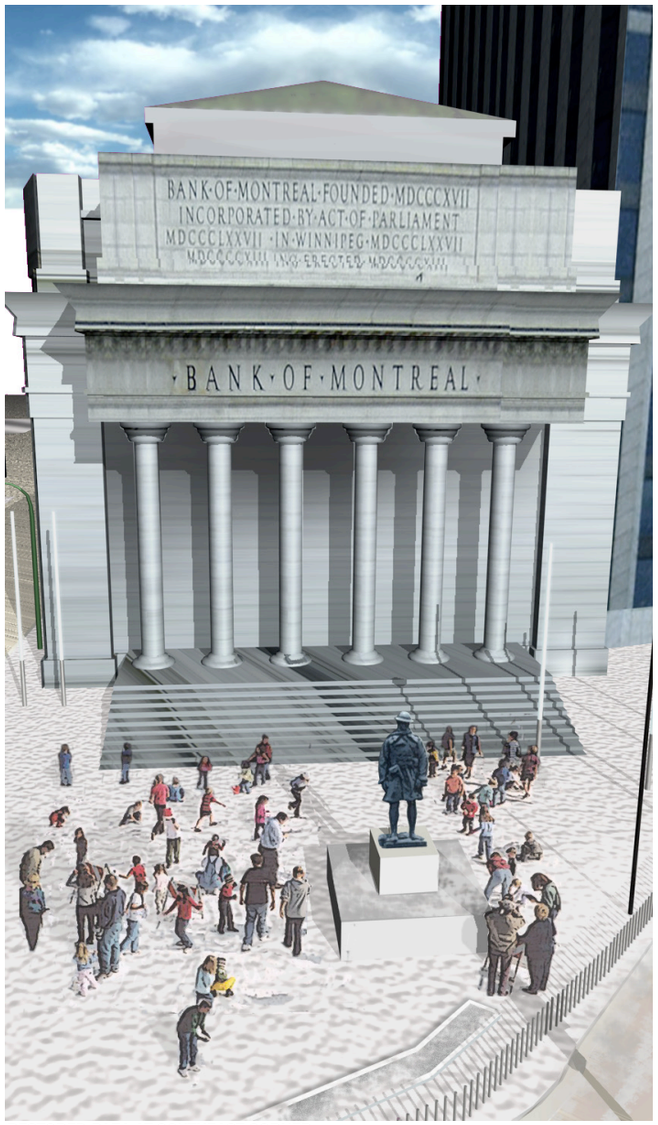
Complications brought about by the removal of the exiting corridor at the Bank of Montreal include the reduction of egress stairs in the underground 'round about' from two to one. In the event that simultaneous fire alarms triggered fire doors to completely seal the 'round about' from horizontal egress, pedestrians would be required to use the stair adjacent to the Canwest Global Place or the escalators at the Lombard plaza. As the newly calculated 'maximum travel distance' would be acceptable (3.4.2.5(1)), the architects, using the objective-based code, would be required to come to an agreement with the City of Winnipeg to approve escalators in stopped motion as sufficient or equivalent means of egress. In the case an agreement could not be reached, the architect of record will have to design an alternate stair exit in place of the proposed escalators.



NORTH + SOUTH WEST CORNERS

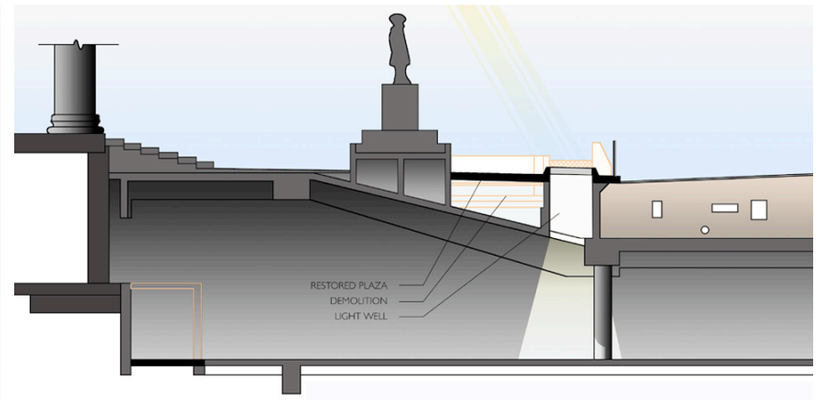
ARCHITECTURAL DESIGN PRINCIPLES

1.) Respectful interpretation for the qualitative cultural aspects at Portage and Main and architectural stewardship for the quantitative character defining elements.
2.) Unify the four distinct corners of the intersection. Produce an architecture whose language is consistent, adaptive and responsive to the unique nature of the site.
3.) Visually indicate a connection to the underground concourse through an architecturally intuitive gesture.
4.) Utilize materials that can provide natural light, visibility and safety to the underground and its connections to ground level. Materials will be easy to maintain by limiting by limiting construction details to functional and washable, urban solutions.
5.) Enrich the concourse below by establishing visual connectivity with the architectural landmarks above to achieve way-finding and delight.
6.) Develop a Manitoba vernacular solution respective of the past, present and future.
7.) Conceive the use of the site under daytime, evening, weekends and celebratory conditions.



RESTORED PAZA AT SOUTHEAST CORNER

SOUTHEAST PLAZA HERITAGE IMAGE circa 1940



PLAZA AND CONCOURSE BELOW

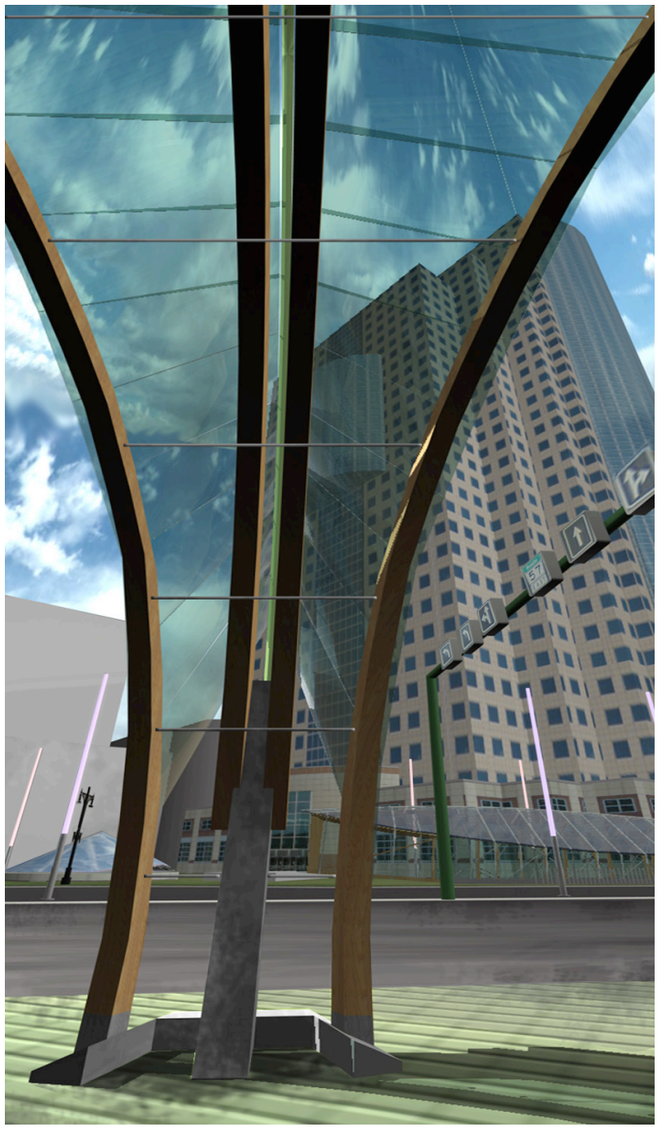
i SOUTHEAST BANK OF MONTREAL PLAZA RESTORATION

The plaza in front of the Bank of Montreal currently behaves primarily as a skateboarding destination and pedestrian thoroughfare. The sunken and terraced nature of the plaza is a result of access provided to the underground concourse at that location. The 1975 renovation to the plaza provided an entry stair, corridor, concrete retaining wall and barricade. The consequence being the complete elimination of the plaza as a gathering place for the citizens of Winnipeg. The restoration proposed would restore the plaza's heritage quality. The plaza would be in filled and raised to street level elevation consistent with traditional times.

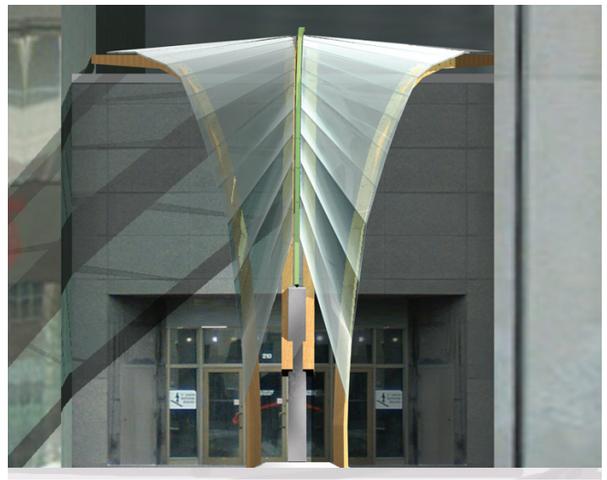
Concrete infrastructure built adjacent to the curb in 1975 was intended to sustain a high level of planting; this infrastructure would be adapted to the new design. The planters share their base with the ceiling of the concourse below. The planters would be shortened to an elevation just above that of the plaza. The top would then be capped with a glass bullet system[1]. Light would pass into the former planter box and through perforations made in the concourse ceiling below. This strategy delivers crucial day lighting to a depressed underground quadrant of the concourse. The glass bullets can be coloured and incorporated graphically into a larger scheme for signage and identity building at that corner.

The Bank of Montreal would maintain access to the underground with a current system of escalators inside the bank and the shared lobby at MTS Place. The removal of the plaza stair and corridor passing behind the commercial occupancy below ground, in the concourse, up to the point of the bank entrance, would allow for the expansion of this concourse commercial rental unit.

[1] *A glass bullet & cast iron panel system is designed to replace existing vault light sidewalk areas to preserve the historic value of an area. Hundreds of tiny 1-1/2" solid glass bullets are incorporated into cast iron panels. Each panel is custom molded, cast and prefabricated.*



RESTORED PAZA AT SOUTHEAST CORNER



PORTAGE AVENUE CANOPY ELEVATION

YORK BOAT CONSTRUCTION

ii SOUTHWEST WINNIPEG SQUARE ENTRY CANOPY

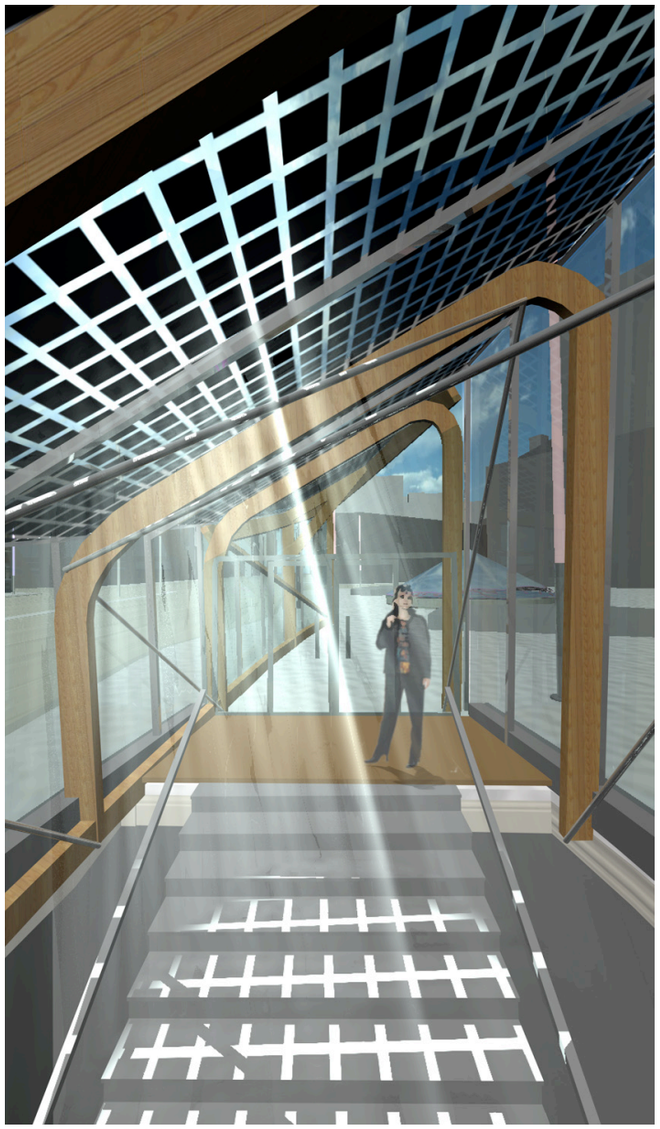
Largely unused as a primary means of accessing Winnipeg Square and the underground path of travel, this entry is located at the midpoint of a city block and is removed from typical paths of pedestrian travel due to a pedestrians inability to cross the intersection at Portage and Main.

Grand in nature, the entrance maintains a link between multiple buildings. A barrier-free elevator and escalators descend to the level below. Directly in front of the entry vestibule is a transit observation shelter. To increase the visibility of the entrance it is proposed that the transit observation shelter be redesigned and moved a short distance towards the west. At the request of Winnipeg Transit the new design is to be economical yet subtle in appearance. The design intent will be to blend in with materials used on the Royal Bank building to reduce disruption to transit employees from schedule queries of transit users.

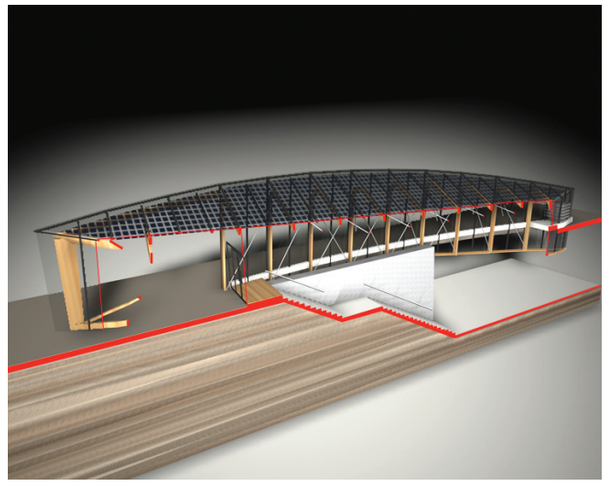
Inspired by local boat building traditions, a large canopy with butt-joint glazing[2], glulam beams and steel mullions will mark this entry with the same language, materials and prominence. Acting as a form of signage and shelter the canopy will be strongly enhanced by artificial lighting. With a location on the north side of a building this entry will receive a minimal amount of direct natural sun light throughout the year and therefore be illuminated 24 hours to fulfill its roll as a beacon.

The canopy will employ a City of Winnipeg safety curb along Portage Avenue to protect from errant vehicle damage. Additional concrete provided at the base for the glulam beam connection will ensure snow removal machines passing under will not compromise the structural integrity of the canopy if a collision was to occur.

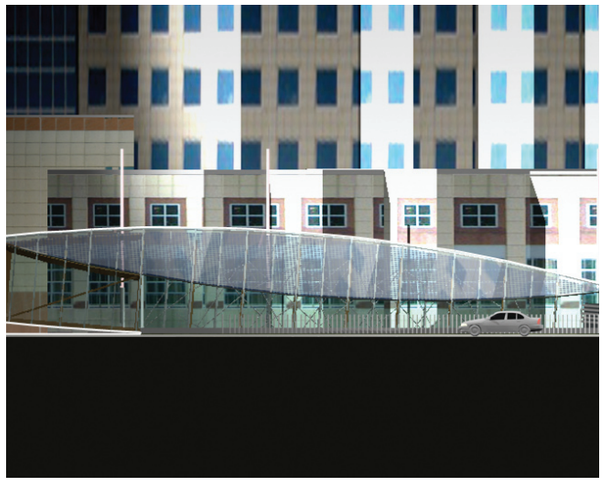
2 *Butt-joint glazing applications typically involve the use of 3/8" and thicker float glass in applications where the glass is retained at the head and sill with no support on the vertical edges. The vertical butt joints between the lites of glass are typically filled with a silicone sealant for a weather seal.*



INTERIOR PERSPECTIVE



PERSPECTIVE SECTION



PORTAGE AVENUE ELEVATION

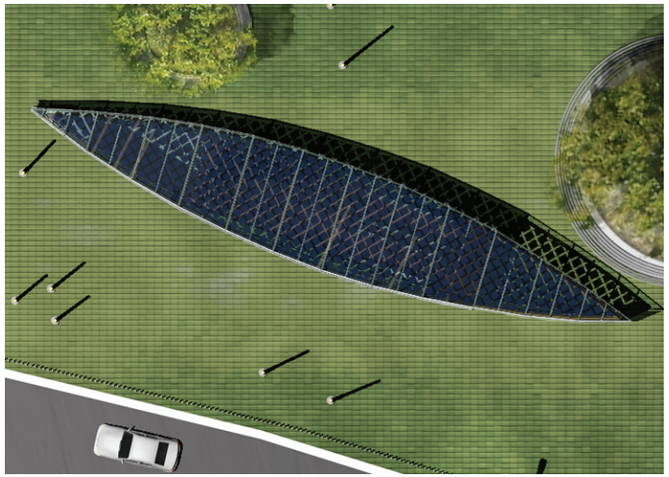
iii GLAZED ENTRIES AT NORTHEAST AND NORTHWEST LOCATIONS

The forms take their inspiration from the birch bark canoes that traveled Manitoba's historic transportation routes. They tilt slightly towards the ground at one end to intuitively imply underground access. The roof pitch emulates the bottom of a boat up-side-down, but is sloped with a strategic angle of 30 degrees to optimize the production of energy by photovoltaic cells[3]. The PV cells are laminated between glass layers incorporated into high performance sealed units[4].

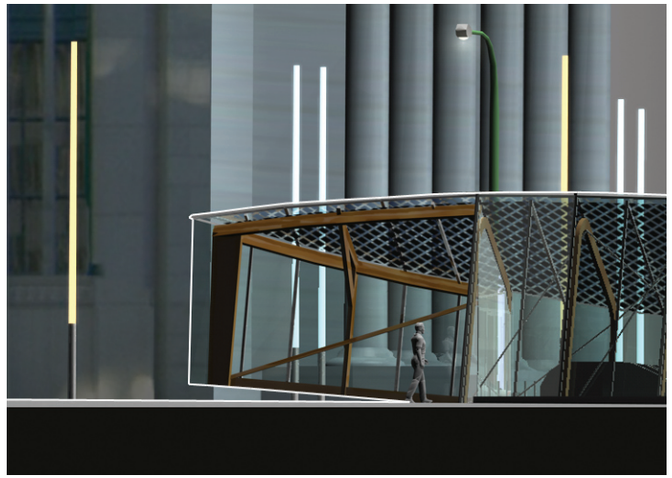
Custom design features include a copper seam (used in canoe construction) along the crest of the glazed structure with heavy timber glulam ribs supporting an interior steel mullion system.

The use of structural silicon glazing[5] prevents people from climbing the structure. The absence of graspable mullions ensures a slippery continuous surface. This continuous surface also provides maintenance advantages as time spent cleaning can be reduced. Maintenance is essential to ensuring clear views and power generation from PV cells. Additionally, a clean, transparent surface at underground entry points will enhance the perceived level of safety with artificial light emanating into the street throughout evening hours. Glazing used will be high-tec with spectrally selective coatings to achieve maximum thermal resistance and heat gain coefficients[6].

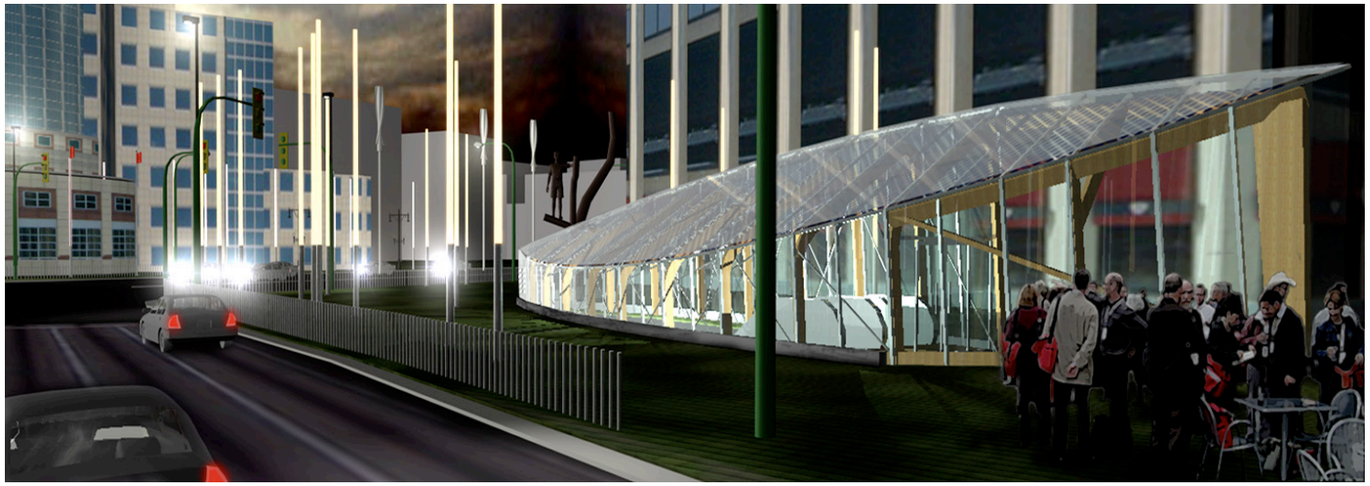
3 *Sun studies where performed by computer modeling annual day lighting conditions at the site to determine the optimum angle of solar cells.*
4 *Photovoltaic modules are assembled using silicon cells. When the silicon absorbs direct sunlight the PV cells convert photon energy from the sun into electrical current.*
5 *Structural silicone glazing depends on special structural silicones to secure glazing panels or units to a back-up framing system.*
6 *Cardinal Glass. 2 pane - Lo E 172 #2 surface argon (SHGC 0.41) (R=4.0).*



PLAN



ENLARGED ELEVATION



PERSPECTIVE WEST

NORTHWEST CANWEST GLOBAL PLACE UNDERGROUND ENTRY (IMAGERY PREVIOUS PAGE)

With some impact on existing infrastructure the new entry adjacent to Canwest Global Place will require the demolition of the existing 'return' stair and a substantial portion of the concourse roof slab. The new design will rest lightly over the opening and allow for natural light to pass into the space below. A new 'straight run' stair will allow visitors a clear line of site into the underground concourse and promote a safe and secure path of travel.

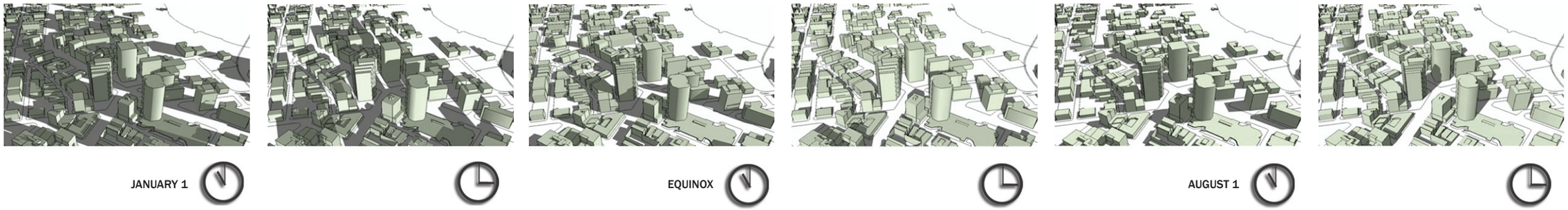
Passing beneath the opening one will have the ability to way-find using the skyscraper above as a reference.

NORTHEAST LOMBARD PLAZA UNDERGROUND ENTRY (IMAGERY ADJACENT)

With minimal impact to the existing infrastructures of the underground concourse and plaza, the new enclosure will lightly rest over a moderately enlarged opening through the ground plane. Existing escalators currently servicing a sunken section of the plaza will be replaced with new escalators to transport visitors directly to and from ground level.

The intent of a clear transparent structure is to:
1.) Allow persons traveling in motor vehicles to observe plaza functions.
2.) Delight in views of the historic bank while participating in plaza functions.
3.) Way-find through the underground concourse by using the skyscraper reference above.

SUN STUDY SAMPLE IMAGERY



MECHANICAL

The intent of the mechanical system for each of the stairwell shelters is to temper the air conditions in these transition areas by electric-resistance heating in winter and forced-air circulation in summer. No mechanical cooling to the entrances will be provided.

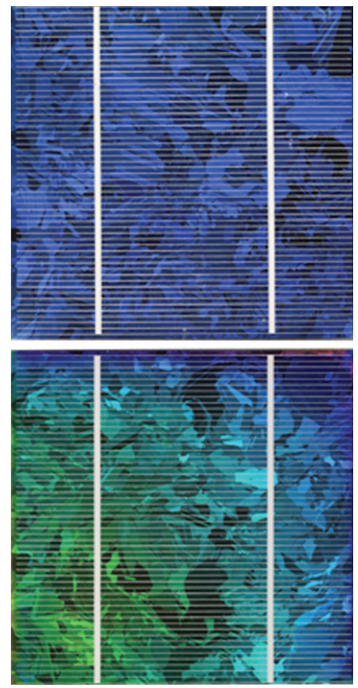
The entrance shelters will be separated from the concourse by automatically-closing doors at the base of the stairs or escalators. This will separate the air conditioning zones of the concourse from the glass entrance structures.

The ventilation system for each of the two entrances will consist of a duct blower connected to spiral ducting located at high level under the glulam beams of each entrance structure. The ducting will run at high level under the glulam beams of each structure, with diffusers to direct airflow along the glass wall and the ceiling. In the winter this air will be tempered by an electric duct heater with modulating or staged control. In warmer condition a motorized damper and louver at the fan intake will draw outdoor air to prevent heat build-up in the space. A second damper and louver will be interlocked with the fan control for relief air.

The heating system will consist of high-density sloped-top architectural baseboard heaters (approximately 350 W/linear ft) running continuously between the glulam beams at low level. The heaters will be on pedestals to allow a gap between the heater and the floor, and will have a finished back-pan behind the heater where exposed to the exterior glass. Each heater shall have an integral controller to minimize wiring, provide redundancy, and ease of maintenance. Adjacent to the exterior doors at each entrance an additional electric force-flow heater will provide additional heating control.

At the Lombard Plaza, the existing entrance shelter is located above a fan room which serves the Concourse. Incorporated into this entrance shelter will be the air well to maintain the existing conditions for the exhaust fan below. The construction of the new entrance will incorporate a vertical exhaust shaft at one end, terminating with architectural louvers along a portion of the wall or with an open grille at the top of the shaft.

Each entrance shelter will have a sprinkler system to meet limiting distance equivalency to the Code requirement. The sprinkler piping for each shelter will be run as a separate zone from the nearest main in the Concourse wet sprinkler system.



PHOTOVOLTAIC CELL PRODUCT SAMPLE

STRUCTURAL

Existing Structural System

The existing Portage & Main Concourse Facility is a subterranean structure providing underground access below Winnipeg's most famous intersection.

Built circa 1976/77, the Concourse is a reinforced concrete structure supported on deep belled caissons bearing on the underlying glacial till. The original construction drawings, dated 1976, indicate that the Concourse level is constructed primarily of one-way slabs supported on reinforced concrete grade beams and walls. The slabs were cast on permanent metal deck forms. The concrete roof is a heavily reinforced concrete slab ranging in thickness from 14" and 18" and is supported on concrete beams on the interior and 16" thick perimeter foundation walls. The roof structure is designed for a combined live and dead load of 1,440 lbs per square foot, which includes the surcharge of the fill material and the roadway traffic.

There are three external concrete stairwells at the north-west, north-east and south- east corners of the intersection. At the south west corner, the concourse accessed through the lower level of the Trizec Building. The stairwell at the south-east corner is the only original stairwell structure. The remaining two were modified to suit revised access to the concourse at the Richardson Building as well as CanWest Global Place. The existing concrete guards/planter walls located on all four corners of the intersection are independent concrete structures that bear onto the concourse roof. Removal or modifications to the walls will not affect the concourse structure.

Proposed Structural System

The structural components of the "City Crossings" proposal involves the demolition of the existing concrete enclosures for the access stairways to the concourse level at the CanWest Tower and at the Lombard Plaza. The existing concrete structures will be replaced with glazed structures incorporating a combination of a glu-laminated wood main superstructure with a steel girt and bracing system supporting the glazing and providing structural stiffness to the new enclosures. The new structures will be designed to utilize the existing network of substructures and foundation currently in place. Modifications and reconfiguring of the existing concrete stairs will be required and it too will be accomplished using the existing substructure. The existing stair at the Bank of Montreal will be infilled with the installation of new light wells that will provide natural light to the subterranean structure below. Lightweight fill material will be used to infill the existing recessed stairway. The new light wells will utilize new reinforced concrete retaining wall/shaft structures supported off the existing concourse roof. New openings will be cut into the existing concourse roof structure at strategic locations and to appropriate sizes to best accommodate the existing support system.

The proposal further involves the installation of a series of wind turbines, as well as light pole both which will require a single concrete foundation system per installation to support the weight of the units as well as providing the appropriate stiffness to resist the wind loads and the potential impact loads. Large diameter (600mm to 1000mm) reinforced concrete piers will be installed at each pole and turbine location. Depending on their location the foundations will either bear onto the existing concourse roof structure, similar to the existing planter walls, or if not located above the concourse will be drilled to a depth of approximately 6.0 metres.

A new canopy structure is proposed for the north entrance to the Trizec Building. The new structure will be of similar construction as the stairwell enclosures and incorporate a main glu-laminated wood frame with steel purlins and girts. The structure will primarily be founded on a new reinforced concrete caisson bearing on the underlying glacial till (similar to the existing concourse structure) and will derive additional support and stability from the existing Trizec superstructure. The new canopy will be clad in glazing.

ELECTRICAL

Power Distribution

The proposed power distribution conceptual schematic in shown on Figure. 1 (see page 26). Power service to the project is estimated at 600A, 120/208V, 3-phase, 4-wire. It is expected that the service will be delivered underground from the nearest available utility transformer. The main distribution will be housed within one of the two stairwell shelters, likely in a service room underneath stairs. The main distribution will consist of a main disconnect device, utility metering, and a main distribution panel.

The main distribution panel will contain circuit breakers feeding shelter lighting, shelter electric heating, mechanical equipment, escalator, exterior lighting, exterior receptacles, lighting for the new Winnipeg Square entrance canopy, and a sub-panel in the other stairwell shelter. Inverters/controllers for wind generation, and photovoltaic system will also be tied to this panel. The sub-panel in the other stairwell shelter will be located similarly in a service room underneath the stairs and will contain breakers feeding shelter lighting, shelter electric heating, mechanical equipment, exterior lighting, and exterior receptacles. An inverter/controller for the photovoltaic system in the shelter roof will also be connected to this panel.

Circuits feeding exterior lighting will be controlled by the City of Winnipeg pilot relays, which will ensure that the decorative lighting is turned on simultaneously with street lighting. Alternatively, a separate photocell/time clock could be installed to control exterior lighting in this project. A photocell/time clock assembly could also control the stairwell interior lighting in order to maximise use of daylight.

Weatherproof receptacles equipped with ground fault circuit interrupters are proposed to be integrated in the new planters. These receptacles could be used for additional decorative illumination during public events, for vendor carts, and for other purposes.

Cogeneration

The proposed cogeneration system will consist of a series of vertical axis wind turbines in the street median and two photovoltaic arrays integrated in the stairwell shelter glass roofs. The cogeneration system will be synchronized and connected in parallel with the utility power service in order to reduce the amount of energy consumed from the utility. Such connection creates a potential for reversing the flow of energy back to the utility grid during periods of low internal demand. Such low demand periods may occur during warm summer days, when exterior lighting is off and electric heating is not in use.

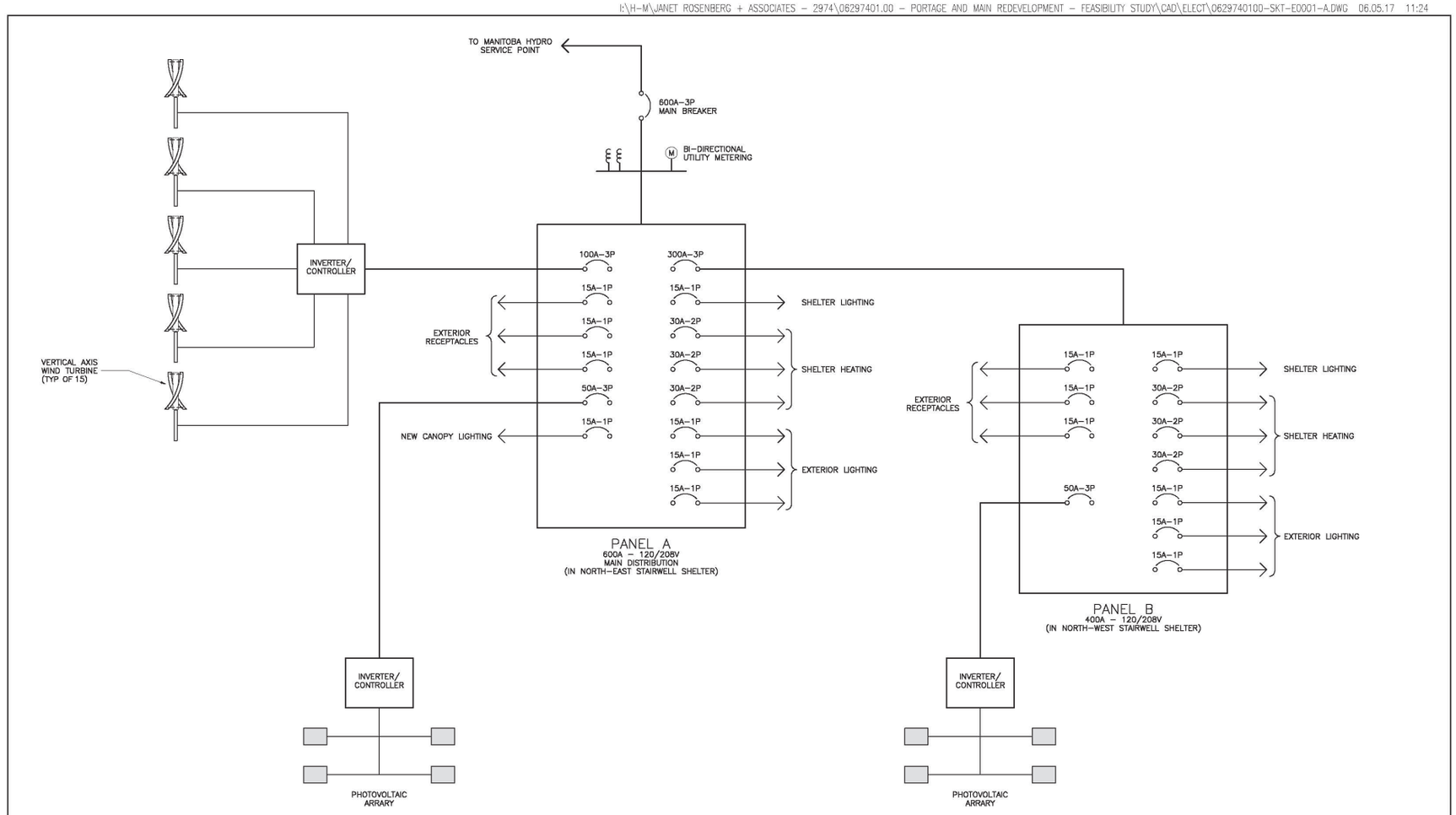
Manitoba Hydro's policy applies the same rates for sale and purchase of power. The power service for this project is classified as General Service Small and the applicable electric energy rate is currently 3.936 cents per kWh. Should be noted that this rate is for the energy only and does not include distribution and metering charges, which are nonreversible. In order to allow the reverse energy sale, Manitoba Hydro will supply a bidirectional revenue meter for this project. The cogeneration system will be tied to the power distribution via utility interactive inverters equipped with all necessary safety circuitry. The integrated safety provisions will allow safe servicing of power distribution equipment by disabling cogeneration when the utility side power is shut down. In addition, every cogeneration unit will be equipped with a means of disconnect to facilitate servicing.

The cogeneration controller will be equipped with a graphical display indicating the state of the system, the amount of energy produced, and other parameters. Such display could be installed in a glass cabinet in the stairwell shelter and could become a valuable tool in demonstrating the City's commitment to environmental responsibility and in educating public about sustainable design solutions. The cogeneration control and monitoring system could also have an Internet connection to a website that would indicate the system status and could be open to the City staff and to the general public. The system could also integrate local weather monitoring by installing appropriate meteorological equipment on one of the turbine poles and tying it to the cogeneration controller.

Life Safety Systems

The new stairwell enclosures will become an extension of the existing concourse public area and will require all the appropriate life safety measures. Such measures will include extension of the concourse fire alarm system and provision of emergency lighting and exit signage to meet requirements of the Manitoba Building Code and the Local Inspection Authorities.

I:\H-M\JANET ROSENBERG + ASSOCIATES - 2974\06297401.00 - PORTAGE AND MAIN REDEVELOPMENT - FEASIBILITY STUDY\CAD\ELECT\0629740100-SKT-E0001-A.DWG 06.05.17 11:24



NO.	DESCRIPTION	DATE	BY
A	ISSUED FOR REVIEW	06.05.17	L.K.

REVISIONS/ISSUE

WARDROP | Engineering Inc.

CLIENT: Winnipeg CITY OF WINNIPEG

DRAWING DESCRIPTION: PORTAGE AND MAIN REDEVELOPMENT REPORT
PROPOSED POWER DISTRIBUTION
CONCEPTUAL SCHEMATIC - FIGURE 1

DESIGNED BY: L.K.	DRAWN BY: H.P.C.C.	DRAWING NO.	REV.
CHECKED BY:	DATE: 06.05.17		A

TRAFFIC ANALYSIS COMPONENT

Winnipeg Design Feasibility Study
Portage Avenue/Main Street

City of Winnipeg

Prepared for:
Janet Rosenberg + Associates Landscape Architects

July, 2006
16-05187-01-T01

July 14, 2006
16-05187-01-T01

Mr. James Roche, OALA, CSLA
Janet Rosenberg + Associates
Landscape Architects + Urban Designers
148 Kenwood Avenue
Toronto, ON, M6C 2S3

Dear Mr. Roche:

Subject: Traffic Analysis Component
Winnipeg Design Feasibility Study
Portage Avenue/Main Street

Marshall Macklin Monaghan is pleased to present the findings of our Traffic Analysis Component of the design feasibility study related to the Portage Avenue/Main Street Intersection Reinvigoration, in the City of Winnipeg.

This intersection is currently designed to prevent all street level pedestrian crossings. Pedestrians crossing this intersection need to use the underground walkways, or through accesses/egresses of the below grade commercial developments.

The findings indicate that the re-introduction of at-grade crosswalks on south and east legs of the Portage Avenue/Main Street intersection is not expected to detrimentally impact the operations of this intersection, nor the 8 adjacent upstream/downstream intersections.

We thank you for the opportunity to undertake this study. We would be pleased to respond to any questions, should they arise.

Yours very truly,
MARSHALL MACKLIN MONAGHAN LIMITED

Marshall Macklin Monaghan
PROJECT MANAGERS • ENGINEERS • SURVEYORS • PLANNERS

Geri Kozorys-Smith, MCIP, RPP
Senior Project Manager
Transportation Planning
Partner

C. Alan Mihalj, P.Eng
Senior Project Manager
Transportation Planning
Associate Partner

Tina Wang, M.A. Sc
Transportation Designer
Transportation Planning

REGISTERED PROFESSIONAL ENGINEER
C.A MIHALJ
PROVINCE OF ONTARIO

1.0 INTRODUCTION:

Marshall Macklin Monaghan Limited was retained by Janet Rosenberg + Associates Landscape Architects to undertake the Traffic Analysis component of the design feasibility study related to the Portage Avenue/Main Street intersection, the key downtown intersection in the City of Winnipeg.

The City of Winnipeg would like to reinvigorate this prominent intersection. One element being considered as part of this is the re-introduction of at-grade crosswalks. Currenly, this intersection is designed to preclude all street level pedestrian crossings, and all pedestrian crossings are required to use the underground walkways or through access/egress of the below grade commercial developments. The study is to identify the impacts of the proposed at-grade crosswalk introduction on the operations of this intersection, as well as the upstream/downstream intersections.

With the assistance provided by City staff, the study has been completed, with the associated analysis and findings outlined herein.

2.0 EXISTING TRAFFIC CONDITIONS:

2.1 EXISTING TRAFFIC DATA:

The original intent of the study was for traffic conditions to be examined for 6 time periods as noted below:

- ☐ Weekday p.m. peak hour (Fall/Winter/Spring)
- ☐ Weekday evening peak hour (Fall/Winter/Spring)
- ☐ Saturday peak hour (Fall/Winter/Spring)
- ☐ Weekday p.m. peak hour (Summer)
- ☐ Weekday evening peak hour (Summer)
- ☐ Saturday peak hour (Summer)

It is acknowledged that the City would like to have the entire downtown network analyzed in order to comprehensively review the impact of the re-introduction pedestrians at the Portage Avenue/Main Street intersection. However, due to the limited study budget, a total of 8 upstream/downstream signalized intersections have been identified to be most directly impacted in the vicinity of the study area. These have been analyzed within the available study resources.

Again, due to the budgetary limitations, updated turning movement counts could not be undertaken for the 9 intersections during the 6 time periods. Therefore, the available data from the City of Winnipeg has been reviewed, and the most recent traffic counts for these intersections used to reflect the "existing" traffic volumes. All the intersections which were analyzed and the dates for all base traffic counts for each intersection are summarized as follows:

☐ Main Street/Bannatyne Avenue	October, 2004 (Fall)
☐ Main Street/McDermot Avenue	January, 1998 (Fall)
☐ Portage Avenue/Main Street	March, 2004 (Spring)
☐ Main Street/Pioneer Avenue	October, 2004 (Fall)
☐ Main Street/Graham Avenue	June, 1999 (Summer)
☐ Portage Avenue/Fort Street	March, 2004 (Spring)
☐ Portage Avenue/Garry Street	January, 1995 (Winter)
☐ Portage Avenue/Smith Street	April, 2004 (Spring)
☐ Portage Avenue/Donald Street	June, 1999 (Summer)

In the absence of more specific traffic count data to reflect the various conditions noted above, the historical 24-hour AADT traffic counts available along Main Street and Portage Avenue in the vicinity of the study area have been used to assess the traffic relationships between different time periods, as well as seasonal variations based on the available weekday p.m. peak period automatic counts. Despite attempts to extrapolate off peak (e.g. evening and weekend) traffic volumes, it was found not possible to develop accurate off peak estimates. Therefore, intersection operations have been analyzed during weekday p.m. peak period only.

Imbalance issues related to the traffic volumes between adjacent intersections were also found since the available traffic counts are from various dates and time periods. Traffic volumes have been balanced by an Excel Spreadsheet called "Balance-It" provided by the City of Winnipeg. The resulting traffic volumes during the p.m. peak hour are illustrated in **Figure 1**.

On the basis of the base lane configurations and the traffic and parking regulations information provided by the City's staff, the existing road network and lane configurations for the weekday p.m. peak hour have been illustrated in **Figure 2**.

2.2 HEAVY VEHICLE PERCENTAGES

Table 1 summarizes the historical truck percentages from the 1990's on road segments in the vicinity of Portage Avenue and Main Street, as provided by the City.

Table 1
Historical Truck Counts

ID	Street	From	To	% Trucks	Average
11213	Main Street	William Avenue	Portage Avenue	0.69	0.69%
11221	Main Street	Portage Avenue	Pioneer Avenue	0.69	
12452	Portage Avenue	Fort Street	Main Street	2.48	2.09%
20663	Portage Avenue	Main Street	Westbrook Street	1.70	

On this basis, 1 percent and 2 percent have been used as the truck percentages along Main Street and Portage Avenue, respectively.

2.3 EXISTING INTERSECTION OPERATIONS

The operations of the Portage Avenue/Main Street intersection and the 8 adjacent intersections were analyzed on the basis of the traffic volumes illustrated in Figure 1 during p.m. peak periods. The signalized intersections were analyzed using Synchro Traffic Software Version 6.0, reflecting the approach outlined in the Highway Capacity Manual 2000, Transportation Research Board, 2000.

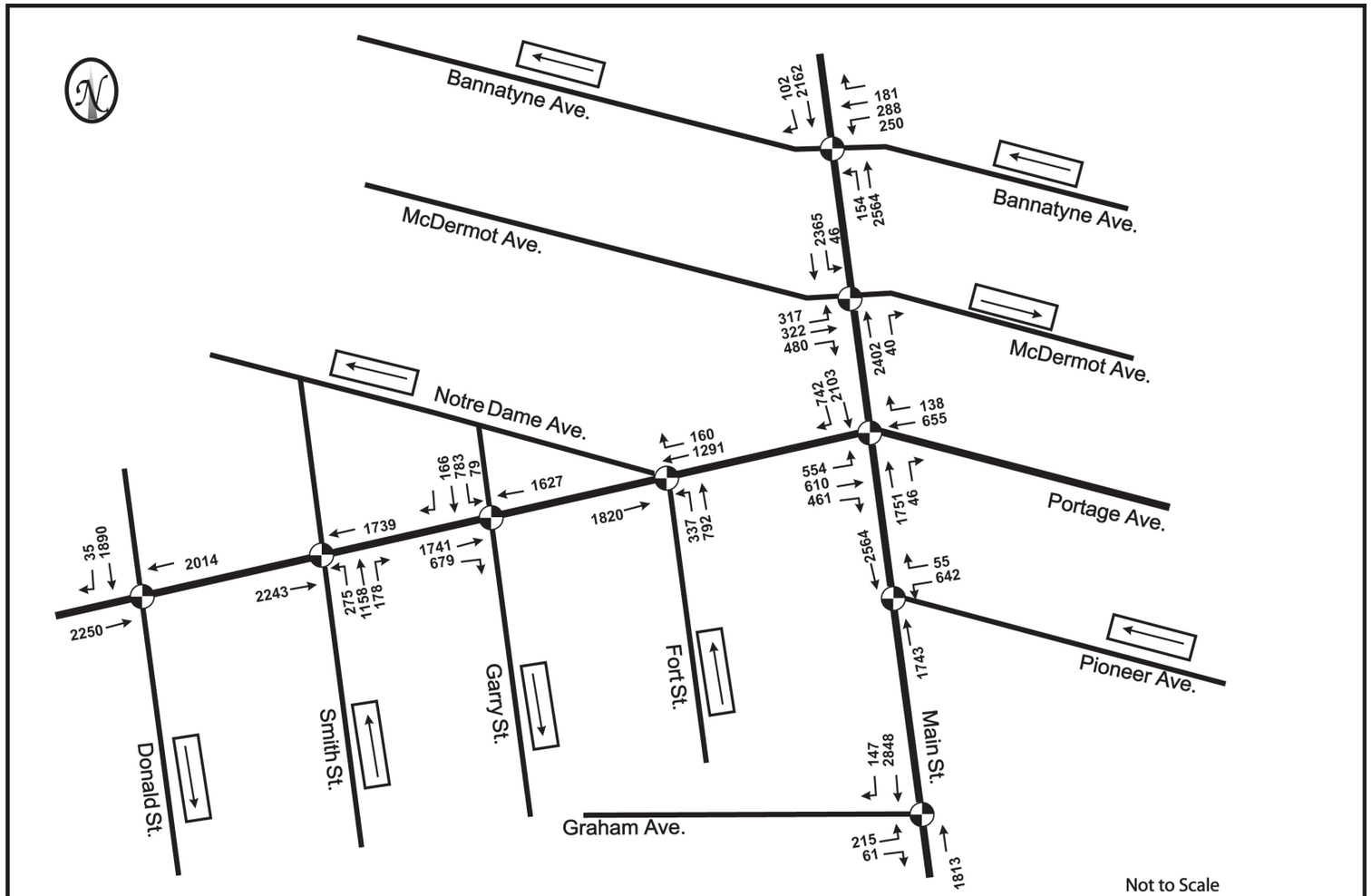
Table 2 outlines the existing levels of service under fall/winter/spring conditions.

Table 2
'Existing' Intersection Levels of Service
Weekday PM Peak hour (No At-grade Pedestrian Crossings at Portage/Main)

Intersection	Levels of Service (delay in seconds) / [v/c ratio]	
	LOS	Critical Movements v/c ratio
Main St./Bannatyne Ave. (1)	**D (47.6 sec/veh) [0.95]**	**NB-T: 1.00 SB-T: 1.08**
Main St./McDermot Ave. (1)	**E (74.3 sec/veh) [1.18]**	**EB-L: 0.89 EB-R: 1.52 NB-T: 1.07 SB-T: 1.04**
Portage Ave./ Main St. (1)	**F (95.8 sec/veh) [1.20]**	**EB-L: 1.18 WB-T: 1.14 NB-T: 1.21 SB-T: 1.25**
Main St./Pioneer Ave. (1)	**B (19.7 sec/veh) [0.97]**	**WB-L: 0.85 SB-T: 1.02**
Main St. /Graham Ave. (1)	**D (47.7 sec/veh) [0.90]**	**SB-T: 1.13**
Portage Ave./ Fort St. (1)	**B (13.9 sec/veh) [0.69]**	**NB-L: 0.85**
Portage Ave. /Garry St. (1)	**C (20.9 sec/veh) [0.92]**	**EB-R: 0.86 SB-T: 0.98**
Portage Ave. /Smith St. (1)	**D (44.8 sec/veh) [1.09]**	**EB-T: 1.03 NB-T: 1.19**
Portage Ave. /Donald St. (1)	**F (97.9 sec/veh) [1.15]**	**EB-T: 1.25 WB-T: 1.12 SB-T: 1.05**

(1) For signalized intersections, levels of service are based on the overall intersection delay.

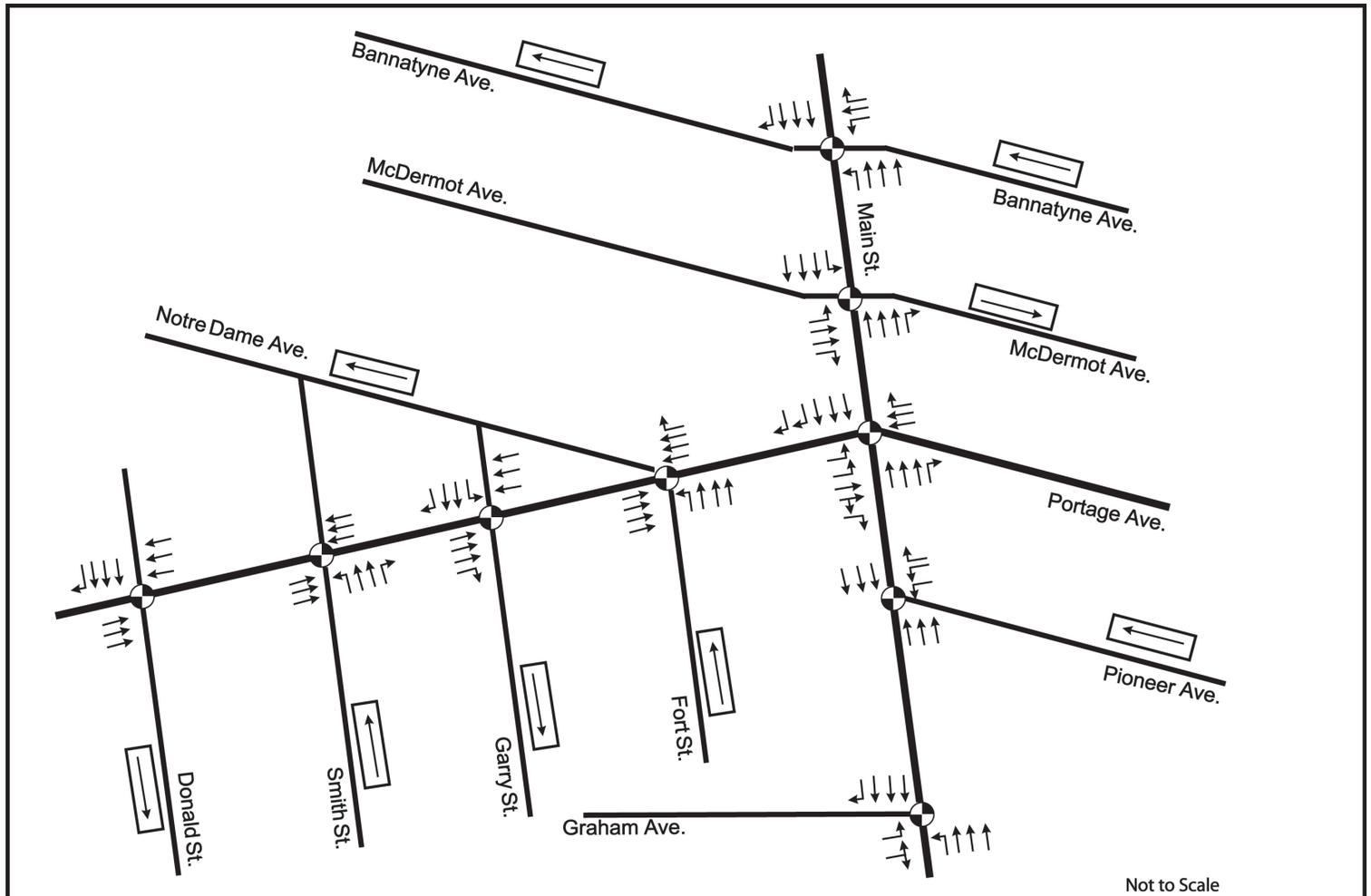
As indicated in Table 2, during the p.m. peak hour under fall/winter/spring conditions, most intersections currently operate at Level of Service 'D' or better. The exception is that the both Portage Avenue/Main Street and Portage Avenue/Donald Street intersections operate at Level of Service 'F', and the Main Street/McDermot Avenue operates at Level of Service 'E'. It is acknowledged that during the p.m. peak hour, some critical movements have volume-to-capacity ratios over 0.85.



Marshall Macklin Monaghan

Signalized

Figure 1
Adjusted Existing Traffic Volumes
Fall / Winter / Spring
Weekday PM Peak Hour



Marshall Macklin Monaghan

Figure 2
Existing Lane Configurations
For Weekday PM Peak Hour

3.0 FUTURE TRAFFIC CONDITIONS

3.1 TIME FRAME

A 5-year horizon was chosen for analysis purposes, since it becomes difficult to forecast growth in traffic beyond 5 years, unless a travel demand forecast model is developed.

3.2 FUTURE TRAFFIC VOLUMES

A 1 percent per annum growth rate was applied to the existing peak hour traffic volumes for all movements at all the intersections to forecast the traffic growth related to a 5-year horizon. It is acknowledged that traffic growth may be higher or lower than this at specific intersections, depending on the locations and magnitude of new development in the area. Again, it was outside of the scope of this study to prepare detailed forecasts related to traffic growth.

The resulting future traffic forecasts related to the five year horizons during the Fall/Winter/Spring weekday p.m. peak periods are illustrated in **Figure 3**.

3.3 FUTURE 'BACKGROUND' INTERSECTION OPERATIONS

The intersection operations with no introduction of pedestrians at the Portage Avenue/Main Street intersection (i.e. no at-grade pedestrian crossing permitted), were analyzed on the basis of the traffic volumes illustrated in Figure. It should be noted that this condition with no pedestrian introduction at the Portage Avenue/Main Street intersection was assumed to be the future 'background' condition, and basis of comparison with a scenario which would see the introduction of pedestrians.

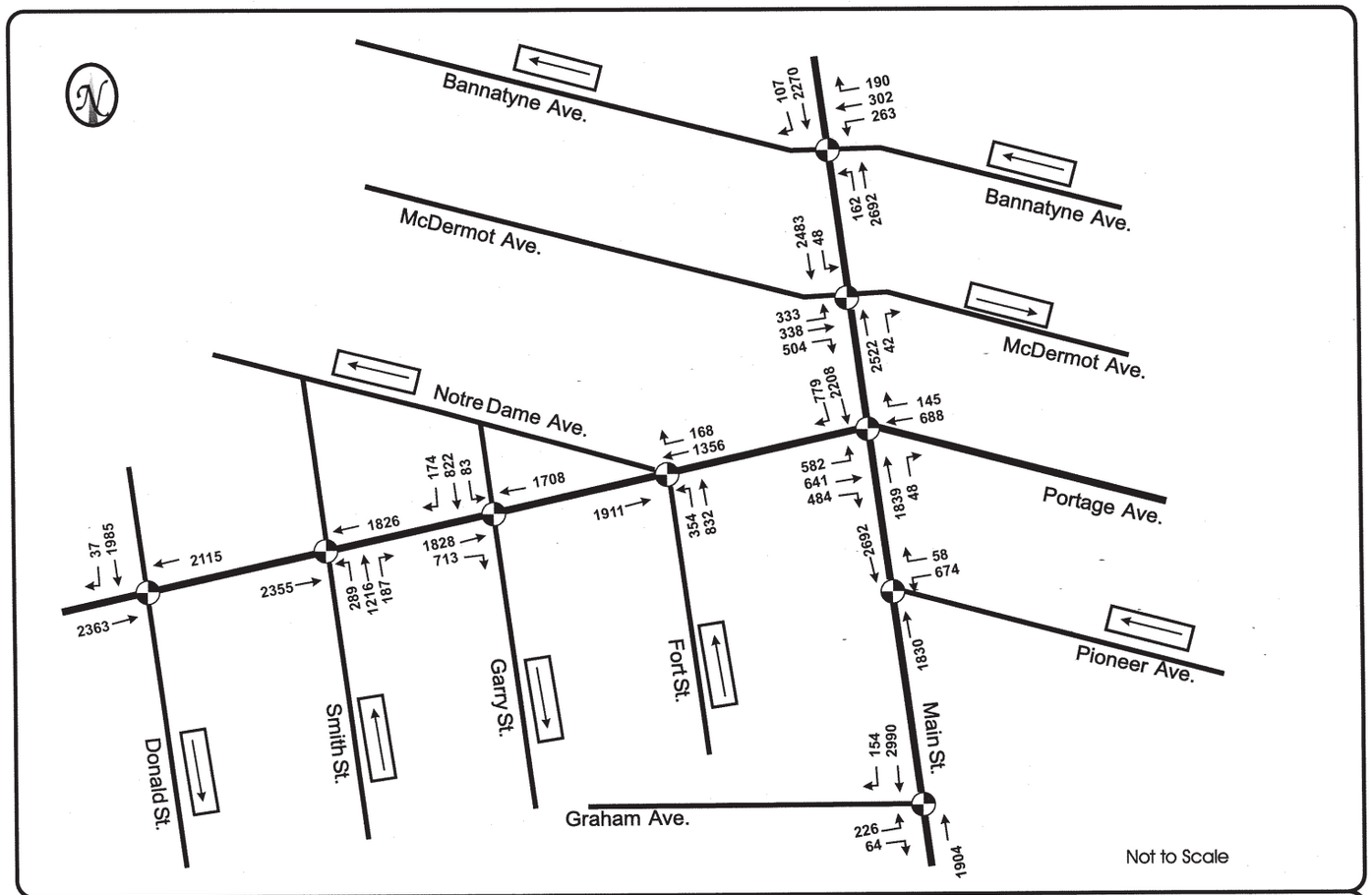
Table 3 outlines the future 'background' levels of service during the weekday afternoon peak hour under fall/winter/spring conditions, respectively.

Table 3
'Background' Intersection Levels of Service
Weekday PM Peak Hour (No At-grade Pedestrian Crossings at Portage/Main)

Intersection	Levels of Service (delay in seconds) / [v/c ratio]	
	LOS	Critical Movements v/c ratio
Main St./Bannatyne Ave. (1)	D (44.2 sec/veh) [0.97]	NB-L: 1.05 NB-T: 1.05 SB-T: 1.07
Main St./McDermot Ave. (1)	F (106.9 sec/veh) [1.23]	EB-R: 1.22 NB-T: 1.23 SB-T: 1.24
Portage Ave./ Main St. (1)	F (121.6 sec/veh) [1.26]	EB-L: 1.24 WB-T: 1.19 NB-T: 1.27 SB-T: 1.31
Main St./Pioneer Ave. (1)	C (29.6 sec/veh) [1.02]	WB-L: 0.97 SB-T: 1.04
Main St. /Graham Ave. (1)	E (62.2 sec/veh) [0.95]	SB-T: 1.19
Portage Ave./ Fort St. (1)	B (13.3 sec/veh) [0.72]	NB-L: 0.89
Portage Ave. /Garry St. (1)	B (16.0 sec/veh) [0.96]	EB-R: 0.95 SB-T: 0.99
Portage Ave. /Smith St. (1)	E (56.1 sec/veh) [1.14]	EB-T: 1.08 NB-T: 1.24
Portage Ave. /Donald St. (1)	F (122.9 sec/veh) [1.21]	EB-T: 1.32 WB-T: 1.18 SB-T: 1.11

(1) For signalized intersections, levels of service are based on the overall intersection delay.

The analyses indicate that with the forecast traffic increases, the intersection levels of service on the basis of delay are generally expected to deteriorate, as compared to the existing traffic conditions. It should be noted that the 'background' traffic conditions analyses include optimization of the intersection splits and network offset values within the established parameters. As such, some of the levels of service noted might be better than those noted under the existing conditions.



Marshall Macklin Monaghan

Signalized

Figure 3
Future Background Traffic Volumes
Fall / Winter / Spring
Weekday PM Peak Hour

4.0 ASSESSMENT

Two scenarios have been tested to assess traffic impacts associated with re-introduction of at-grade pedestrian crossings at the Portage Avenue/Main Street intersection. These scenarios include:

- ☐ Base Case Scenario (as detailed in Section 3.0)
- ☐ Scenario with at-grade pedestrian crossings on all approaches at the Portage Avenue/Main Street intersection

For the scenario with at-grade pedestrian crossing on all approaches, it is assumed that the Portage Avenue/Main Street intersection would accommodate up to 500 pedestrians per hour across each leg of the intersection. This represents a potential maximum scenario, recognizing that pedestrians would not be precluded from continuing to cross underground.

To accommodate pedestrians at the street level, the WALK time and FLASH DON'T WALK time need be identified. This is to ensure a long enough walking time to provide for a safe crossing. As discussed with the City's staff, a guideline for WALK time in the City of Winnipeg is generally 10 percent of the background system cycle length (especially as it relates to shorter off-peak background cycles) or less WALK time where traffic conditions dictate. Therefore, 8 seconds for the WALK interval were applied at the Portage Avenue/Main Street intersection. Accordingly, the Flash Don't Walk time was calculated based on the associated crossing distance and the vehicular clearance time, assuming a walking speed of 1.2 metre per second.

Table 4 outlines the forecasted levels of service under this scenario (500 Pedestrians on each approach at the Portage Avenue/main Street intersection).

Table 4
'Future' Intersection Levels of Service
Weekday PM Peak Hour (500 Pedestrians/Approach at Portage/Main)

Intersection	Levels of Service (delay in seconds) / [v/c ratio]	
	LOS	Critical Movements v/c ratio
Main St./Bannatyne Ave. (1)	D (43.8 sec/veh) [0.97]	NB-L: 1.05 NB-T: 1.05 SB-T: 1.07
Main St./McDermot Ave. (1)	F (98.2 sec/veh) [1.23]	EB-R: 1.26 NB-T: 1.21 SB-T: 1.22
Portage Ave./ Main St. (1)	F (170.0 sec/veh) [1.26]	EB-L: 1.48 WB-T: 0.87 NB-T: 1.39 SB-T: 1.42 SB-R : 1.46
Main St./Pioneer Ave. (1)	D (36.7 sec/veh) [1.02]	WB-L: 0.90 SB-T: 1.07
Main St. /Graham Ave. (1)	E (62.1 sec/veh) [0.95]	SB-T: 1.19
Portage Ave./ Fort St. (1)	B (12.5 sec/veh) [0.72]	NB-L: 0.89
Portage Ave. /Garry St. (1)	B (14.6 sec/veh) [0.96]	EB-R: 0.95 SB-T: 0.99
Portage Ave. /Smith St. (1)	E (57.5 sec/veh) [1.14]	EB-T: 1.08 NB-T: 1.24
Portage Ave. /Donald St. (1)	F (121.9 sec/veh) [1.21]	EB-T: 1.32 WB-T: 1.18 SB-T: 1.11

(1) For signalized intersections, levels of service are based on the overall intersection delay.

As indicated in Table 4, the overall levels of service and all the critical movements are expected to be same or virtually the same as those under the base case scenario (i.e. future 'background' condition). The exception is that for the Portage Avenue/Main Street intersection, the volume to capacity ratio for the eastbound left turn and southbound right turn movement are most significantly impacted by the introduction of at-grade pedestrian on the north and west approaches, respectively.

Therefore, an additional scenario was tested to reflect the impact with pedestrian movements on two legs (i.e. no pedestrian movement allowed on the north and west legs). **Table 5** outlines the forecasted levels of service under the additional scenario (500 Pedestrians on the south and east approaches at the Portage Avenue/main Street intersection).

Table 5
'Future' Intersection Levels of Service
Weekday PM Peak Hour (500 Pedestrians on South and East Approaches at Portage/Main)

Intersection	Levels of Service (delay in seconds) / [v/c ratio]	
	LOS	Critical Movements v/c ratio
Main St./Bannatyne Ave. (1)	D (43.8 sec/veh) [0.97]	NB-L: 1.05 NB-T: 1.05 SB-T: 1.07
Main St./McDermot Ave. (1)	F (97.7 sec/veh) [1.23]	EB-R: 1.26 NB-T: 1.21 SB-T: 1.22
Portage Ave./ Main St. (1)	F (114.0 sec/veh) [1.26]	EB-L: 1.24 WB-T: 1.19 NB-T: 1.27 SB-T: 1.31
Main St./Pioneer Ave. (1)	C (33.3 sec/veh) [1.02]	WB-L: 0.90 SB-T: 1.07
Main St. /Graham Ave. (1)	E (63.8 sec/veh) [0.95]	SB-T: 1.19
Portage Ave./ Fort St. (1)	B (13.2 sec/veh) [0.72]	NB-L: 0.89
Portage Ave. /Garry St. (1)	B (15.4 sec/veh) [0.96]	EB-R: 0.95 SB-T: 0.99
Portage Ave. /Smith St. (1)	E (56.0 sec/veh) [1.14]	EB-T: 1.08 NB-T: 1.24
Portage Ave. /Donald St. (1)	F (122.2 sec/veh) [1.21]	EB-T: 1.32 WB-T: 1.18 SB-T: 1.11

(1) For signalized intersections, levels of service are based on the overall intersection delay.

As indicated in Table 5, without the at-grade crosswalk on the north and west approaches, the levels of service for the Portage Avenue/Main Street intersection as well as v/c ratios of all the critical movements are expected to be same as those under the base scenario (i.e. future 'background' condition).

Accordingly, two legs of the intersection (the south and east legs) can potentially accommodate some pedestrian movements on the basis of the traffic analysis.

5.0 SUMMARY AND CONCLUSIONS

The reintroduction of at-grade pedestrian crossings at the Portage Avenue/Main Street intersection would be a bold step in reinvigorating this key intersection, which is known throughout the country and beyond. However, it is recognized that this is a pivotal intersection, not only to the downtown, but also to traffic passing through the downtown, so the traffic operations and capacity of this intersection cannot be jeopardized.

The analysis which was undertaken suggests that the Portage Avenue/Main Street intersection currently operates at Level of Service 'F' based on delay, with a number of movements are shown to operate close to or at capacity during the weekday p.m. peak hour. If traffic growth materializes as forecast in this assessment, the levels of service are expected to deteriorate, and over capacity operations would result.

The analysis suggests that the introduction of at-grade pedestrian crossings on two approaches (south and east legs) would not have any material impact on these operations. It must also be recognized that not all pedestrians who currently cross below grade, will now cross on surface. Some, particularly in inclement weather, will continue to cross below grade.

The reintroduction of at-grade pedestrian crossings has significant merit including:

- ☐ The elimination of unsightly barriers
- ☐ Increased activity on the street
- ☐ The potential to encourage revitalization

If it is found that the introduction of pedestrians on these two legs is satisfactory as anticipated, consideration could then be given to the introduction of pedestrians on one or both of the remaining legs, subject to monitoring and further study by the City.

REVISED CONCEPTUAL/SCHEMATIC STAGE CONSTRUCTION COST ESTIMATE
(Revision to February 22, 2006 estimate)

Prepared By: J.W.McEvoy Associates Inc. Professional Quantity Surveyors
202-698 Corydon Avenue Winnipeg, MB R3M 0X9

		Amount $
1.	Demolish & Remove	
	a. Concrete/asphalt paving,curbs, and barricades	172,000
	b. Planters c/w sod, trees, fill, etc.	32,000
	c. Concourse structures above grade c/w stairs, etc.	70,000
	d. Stairs & steps (add additional fill)	19,000
	e. Trees & sod	12,000
	f. Miscellaneous/protection of existing work	20,000
2.	Relocate flagpoles	24,000
3.	Light poles (115 No.) (see electrical also)	1,250,000
4.	Wind Turbines (15 No.supply only) (Type WS-4C) (see electrical also)	850,000
5.	Planters (including seating)	410,000
6.	Bollards (115 No.)	82,000
7.	Sidewalk guard rails	233,000
8.	Canopy (Winnipeg Square)	100,000
9.	Glass block skylights (10 No.)	50,000
10.	Miscellaneous work, demolition, etc. in existing concourse	220,000
11.	Traffic monitoring station	50,000
12.	Unit paving c/w curbs	790,000
13.	New cross walks	53,000
14.	Trees	124,000
15.	Perennials, shrubs, etc.	113,000
16.	Concourse structure - Canwest (including stairs)	550,000
17.	Concourse structure - Lombard (including 2 No. escalators)	950,000
18.	Mechanical	260,000
19.	Electrical	1,090,000
	SUB-TOTAL	$7,524,000
20.	G.C.'s OH & Fee	927,000
	SUB-TOTAL	$8,451,000
21.	Design Contingency (15%)	1,297,650
22.	Design Fees for Architect/Landscape Architect (10%)	752,400
	TOTAL	**$10,501,050**
	(Summer 2006 Current Dollars)	

Exclusions:
- Professional disbursements
- Construction Contingencies
- GST(PST & RST are included)
- Traffic control system upgrades
- Escalation beyond Summer 2006 (anticipated at 10-12% per year)

CONCLUSION:

The “City Crossings” design proposal involves the strategic restructuring of the Portage and Main intersection surface and its connections to the concourse level. All of the design elements outlined in this report, both Architectural and Landscape, have been conceptually developed to work with the existing physical infrastructure of the site, and to have a minimal impact on the operations of the concourse area, vehicular traffic flow, and pedestrian movement through all phases of construction.

As outlined in the Costing report (Refer to page 39), the proposed construction budget for the current design is achievable within the established budget figure put forth by City officials (Approximately $8.45 million prior to contingency, required maintenance budgets, and design fees). As part of this portion of work, our team was to review the possibility of phasing the work. After careful review and consultation with the City of Winnipeg, stakeholders, steering committee, and the technical advisory committee, our team recommends that the project be implemented entirely in one phase. Construction of the design as one project would minimize continual traffic and pedestrian conflicts, and would avoid construction cost escalation, and mobilization and phasing costs.

As outlined in the attached traffic report, scheduled pedestrian crossings are possible without having a detrimental effect on the existing or projected traffic patterns. Based on the findings, it is our recommendation that the City of Winnipeg strongly consider at-grade pedestrian crosswalks to be operational on weekdays after 5:30 pm and on weekends. Initially, crosswalks at the south and east intersection should be operational, with the remaining crosswalks to be opened once further traffic studies have been conducted.

This report and design provides a unique opportunity to build upon the strong cultural/historical legacy of Portage and Main. Implemented, this design will allow for the realization of dynamic and flexible pedestrian spaces that would transform the very heart of Winnipeg.