Appendices

Appendix A – Biographies of Experts

Transforming your Practice

Integrated Design Charrettes for Sustainable Buildings

Biographies for Speakers, Facilitators, Simulators and Resource persons

Facilitator – Bob Bach is a Senior Consultant for Engineering Interface Limited, responsible for activities on energy codes and standards, utility demand side management, building energy and environmental assessments, energy and water conservation technology transfer, building energy intensity data collection and evaluation, and municipal energy and water efficiency programs. He is an engineering graduate of the University of Toronto and is a member of several organizations including ASHRAE and the Arbitration and Mediation Institute of Canada. Bob is an active participant in squash and skiing.

Resource person, water – Kingsley S. Blease is General Manager of Canadian Water Services, and has over 29 years experience in water and wastewater projects, across Canada and the United Kingdom. Kingsley has ten years experience as manager of water efficiency projects, covering all aspects from study, to program design and installation of devices, in both residential and commercial facilities. He is chair of the Ontario Water Works Association Water Efficiency Committee, and is a professional engineer in both Canada and the United Kingdom.

Resource person, MURB HVAC equipment – Larry Brydon is Vice President, and General Manager, Condo Comfort Division of OZZ Corporation. He is a specialist in HVAC and Utility management in hi-rise construction and application specialist for in suite HVAC equipment. Mr. Brydon was previously Vice President Sales and Marketing, Davie Environmental Equipment. He is responsible for research and market development for specialty, advanced integrated appliances.

Facilitator – R.L. Douglas Cane, P.Eng., Caneta Research Inc. has over 15 years of commercial / institutional energy efficiency and energy management experience. He was a member of the ASHRAE Standing Special Committee (SSPC) 90.1 HVAC Subcommittee which developed the HVAC equipment requirements for ASHRAE 90.1- 1999. He has recently worked with architects and engineers to improve building designs under the Enbridge Consumers Gas and Union Gas Design Advisory Programs and was Principal Investigator in the development of NRCan's CBIP Technical Guidelines for offices, hotels, schools and MURBs.

Facilitator – Stephen Carpenter is president of Enermodal Engineering, Canada's leading engineering firm in sustainable building design. Mr. Carpenter was the design facilitator for several of the best known green building projects in Canada including the Waterloo Green Home, Green on the Grand – the first C2000 office building, Niigon Technology Centre on the Moose Deer Point First Nation and Mountain Equipment Co-op – Ottawa store. Mr. Carpenter is the trainer for the Commercial Building Incentive Program (CBIP) and has provided design and energy simulation services on over 20 buildings that have achieved CBIP energy efficiency status.

Resource person, Commercial Building Incentive Program NRCan – Maria Cinquino has a degree in Building Engineering from Concordia University. She has been the Technical Advisor for the Office of Energy Efficiency's Commercial Building Incentive Program since October 1998. She is currently working on developing CBIP guidelines for several building types.

Resource person, solar energy – Per Drewes is a scientist and principal engineer of Sol Source Engineering, a consulting company specializing in photovoltaics. Prior to forming Sol Source Engineering, Per Drewes was a Senior Research Engineer with Ontario Power Technologies and worked in the utility business, specifically in the renewable energy sector, for more than twenty years. Specializing in solar and wind energy, he was project engineer for most of Ontario Hydro’s pioneering work in this technology. Per Drewes is currently teaching do-it-yourself courses at the Kortright Centre for Conservation to people wishing to install photovoltaic systems or small wind turbines at their remote home or cottage. He is also designing and installing photovoltaic systems for a staff building at a remote bird sanctuary and the CN Tower.

Resource person, Toronto Better Buildings Partnership – Heinrich Feistner was educated in Austria and started working as Designer of HVAC systems and specialized in energy conservation in the mid 70's. He worked for ESCO's and for ten years and had his own energy management consulting business. Heinrich started with the City of Toronto's Energy Efficiency Office as Senior Energy Consultant and was involved in the energy retrofit of City-owned buildings and the design and implementation of the Better Buildings Partnership.

Energy simulator – Brian Fountain is an energy engineer with Energy Advantage Inc. providing building simulations and energy performance analysis for a wide variety of commercial, institutional and industrial clients. He has more than 10 years of experience in the energy management services industry. He is recognized by Natural Resources Canada as a CBIP simulator, reviewer and design facilitator.

Speaker – Marion Fraser joined Enbridge Consumers Gas in September of 1998, after five years of independent consulting in the energy industry. She is currently redefining the market development function for the core utility as the entire energy industry is restructured in Ontario. Prior to 1993, Marion held a number of positions with Ontario Hydro including market planning, market research and manager of energy management the commercial sector. Marion has a master's degree in public administration from Queen's University at Kingston and a BA from Glendon College.

Speaker – Duncan Hill is a Senior Researcher with Canada Mortgage and Housing Corporation. Duncan investigates mechanical system performance, energy and water efficiency, indoor air quality and retrofit strategies in Highrise residential buildings.

Energy simulator – Christopher Jones has experience in the areas of energy simulation, design facilitation, mechanical engineering consulting, system controls, computer programming, and Web application programming. He is an approved facilitator for Enbridge Gas' Design Advisor Program and is on the Qualified Assessors List for NRCan's CBIP Program.

Mr. Jones graduated from the University of Victoria, British Columbia with a B.Eng. in Mechanical Engineering and is a registered Professional Engineer in the Province of British Columbia and is a member of ASHRAE.

Resource person, costing – Gerard McCabe MRICS, PQS, graduated in 1985 from the University of Ulster (Belfast, Ireland) with a Bachelor of Science degree in Quantity Surveying. He immigrated to Canada in 1987 and worked with A.J. Vermeulen, then Helyar & Associates, as an Associate in 1997, in charge of the Cost Planning and Estimating departments. Mr. McCabe is member of the Royal Institution of Chartered Surveyors, and is past president of the Ontario Institute of Quantity Surveyors.

Organizer – Sandra Marshall is a senior researcher with CMHC's Research Division. As part of the Highrise and Multiples Innovation Group, she manages a variety of multi-unit residential research projects aimed at the needs of design professionals and property managers. Among them are a condition survey of condominiums in the GTA, and Integrated Design Charrettes for Sustainable Design. New studies include the development of design strategies for MURBS that employ and redistribute alternative energy at the building envelope.

Sandra has also supported the development of the on-line environmental assessment of MURBS for building owners and managers.

Facilitator – Joanne McCallum has had a life long interest in environmental issues and has actively pursued an academic and professional career with a distinct environmental focus. After completing an undergraduate career in Urban Geography, Joanne subsequently pursued a Master's degree in Environmental Design in Architecture at the University of Calgary. After working with several firms in Calgary, Ottawa and Hamilton, Joanne began her own architectural practice in 1992 that later evolved into McCallum Sather Architects Inc. in 1996. The firm is a general practice architectural firm with a particular focus on environmental design.

Energy simulator – Craig McIntyre is a research engineer with Enermodal Engineering Ltd. in Toronto. He is a CBIP Qualified Assessor and has completed numerous simulations and assessments using EE4 and DOE2. He is LEED accredited by the USGBC and has been involved in the design and monitoring of several renewable energy and sustainable building projects.

Energy simulator – Andrew Morrison, P.Eng., Caneta Research Inc. is a DOE 2.1 building energy simulation specialist with over seven years experience. Mr. Morrison has extensive knowledge of the MNECB and CBIP performance path requirements and has undertaken numerous modelling assignments using EE4 as part of the Enbridge Consumers and Union Gas Design Advisory Program. Mr. Morrison was involved in the development of CBIP Technical Guidelines for offices, hotels, schools and MURBs. He has also consulted with CBIP to certify that designs/simulation results meet CBIP requirements.

Facilitator – Douglas Pollard maintained his own architectural practice in Toronto for thirty years prior to joining CMHC in 1998 as a senior researcher in sustainable community planning. His practice focused on housing and small institutional projects that demonstrated a potential for an intelligent use of land, resources and finances and that optimized the opportunities for user participation in the design process.

He has received several awards for sustainable design and his work has been published in Canada, the U.S. and Europe.

Douglas' current projects at CMHC include the development of a methodology for citizen participation in sustainable community planning, the development of site/building guidelines for the town of Banff and demonstration projects of sustainable neighbourhoods in first nations and manufactured home communities. Douglas also chairs the National Housing Research Committee's working group on sustainable communities.

Energy simulator – Stephen F. Pope has a degree in Environmental Studies and Architecture from the University of Waterloo. He is the principal of an Ottawa architectural practice concerned with green building, sustainable energy, and architectural professional cultures. He is currently working with the C-2000 Program for Advanced Commercial Buildings.

Resource person, costing – Manoj Ravindran graduated from the University of Waterloo with a Bachelor of Science degree in Mechanical Engineering. He is a member of the Professional Engineers of Ontario, the American Society of Heating, Refrigerating and Air-Conditioning Engineers, Inc. and also the Canadian Institute of Quantity Surveyors. Mr. Ravindran is now a director at curran mccabe ravindran ross inc. and is responsible for all mechanical and electrical estimating.

Facilitator – Peter Rowles is the Senior Vice President of Energy Advantage Inc. Peter has been working for Energy Advantage Inc. since its formation in 1996. Energy Advantage Inc. is a Canadian company providing independent, total energy management services to commercial, institutional and industrial energy users. As head of the Energy and Environmental Group at Energy Advantage, Peter is assisting many commercial clients develop and implement corporate energy management programs.

Resource person, building eco-assessment – Jiri Skopek designed the first active solar house in the U.K., in the early seventies. Now he manages ECD's projects including a suite of building assessment products. They include an ISO 14001 building sector module, the Green Leaf for municipal operations, for the design of new buildings and for existing office, industrial and multi-residential buildings. He adapted the BREEAM methodology for Public Works and Government Services Canada, currently used to assess federally owned buildings. Recently he conducted the CMHC multi-residential pilot using BREEAM Green Leaf, which included a survey of property managers.

As an architect and urban designer, Jiri Skopek has a strong interest in sustainable communities. He won several competitions for entries based on healthy buildings in a sustainable community including the CMHC/CANMET Multi-residential "Ideas" competition and the CMHC "Healthy Housing" Competition.

Resource person, developer – Alex Speigel is an architect and developer with 22 years of experience in design and development and a strong interest in sustainable design issues. Following 7 years of private practice in architecture and landscape architecture in Vancouver and Jerusalem, he joined General Leaseholds Limited to direct the development and redevelopment of retail, office and mixed-use projects in communities throughout Ontario. He is currently senior associate with Context Development Inc. developing residential loft projects in Toronto, both new construction and conversions on infill sites east and west of the downtown core.

Speaker – Tom Tamblyn has held senior positions in fee-for-service consulting and energy performance contracting businesses, both active in the building energy retrofit sector. He is an engineering graduate of the

University of Toronto, with an MBA from York University. Outside the office, Tom's activities include running, squash, mountain biking, skiing and scuba diving, and community activities that include assisting with volunteer groups and teaching part time at Queens University and the University of Western Ontario.

Resource person, financial implications – Steven D. Traub holds an M.B.A. from Queen's University graduating in 1979. Steven has been employed in various commercial lending positions within the Bank of Montreal since 1981. He has been employed with the Bank of Montreal Real Estate Lending Group in Toronto since 1987 and was actively involved with originating and under-writing real estate loans. Steven's present position, of Senior Manager, Real Estate Lending Group, involves managing three Real Estate Lenders, and the Manager of After Sales Service as well. Real Estate Assets under his administration exceeds approximately $600,000,000. He reports directly to the Vice-President of the Real Estate Lending Group for Ontario.

Appendix B – Overview of an Integrated Design Process

The Integrated Design Process (IDP)

The following is an excerpt from the *Transforming your Practice – Integrated Design Charrettes for Sustainable Buildings* participant information handout that was included in the participant kits. It provides an overview of an Integrated Design Process (IDP).

IDP can be used to develop advanced designs in any number of design areas.

"The keys to a successful IDP include the following:

- Full design team is introduced to IDP at the pre-concept stage and establishes higher performance goals to be met by the building, using the client's program and site requirements. The site and surrounding community are considered as an eco-system which contribute to the sustainability of the project.

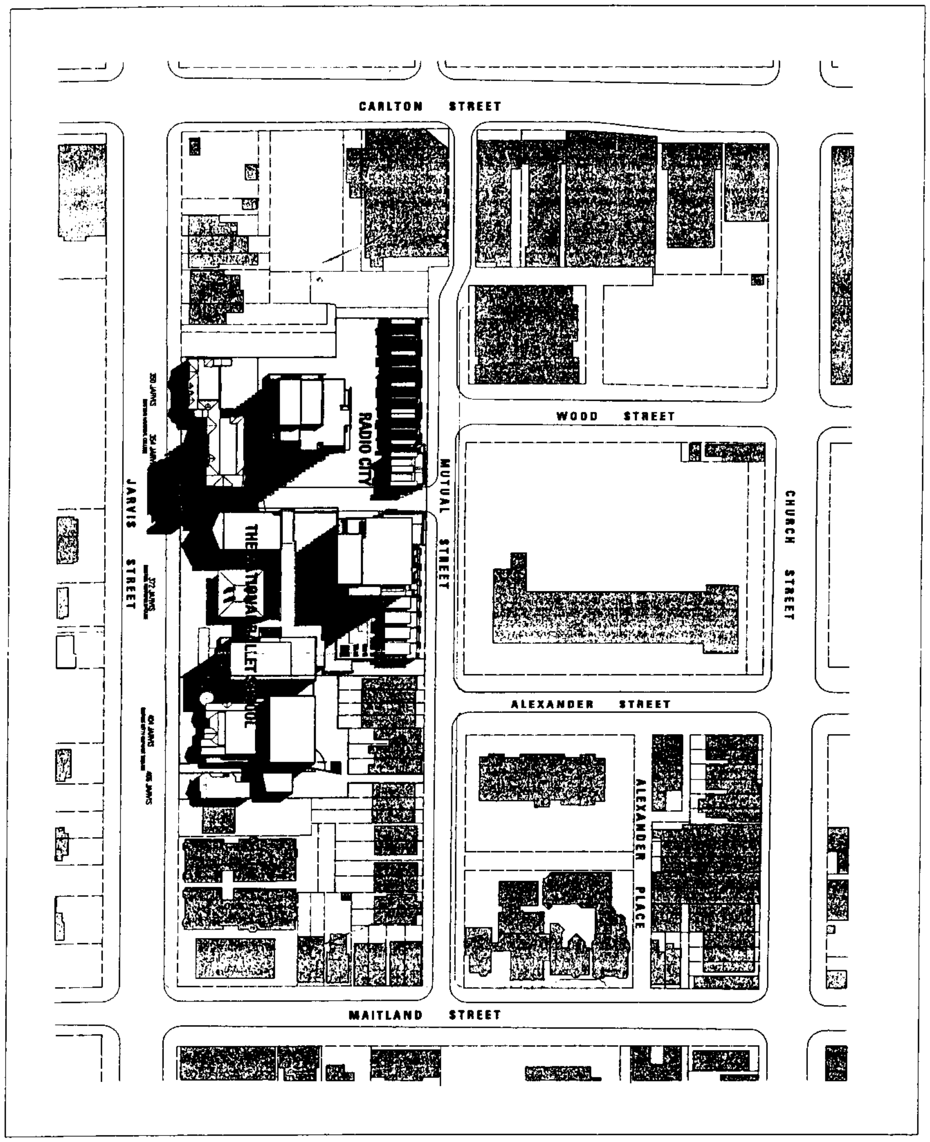
- Design issues are dealt with sequentially and build on each other for greater synergy. Team members share knowledge and test ideas, developing greater respect and understanding for each others' points of view. Simple, interdisciplinary and cost-effective solutions result. A Design Facilitator, who may be part of the traditional design team, and an Energy Engineer/Simulator are important members of a green design team.

- Review all aspects of the design, starting at the community, site and configuration levels in a methodical manner, including quality assurance from the concept to occupancy."[1]

---

[1] Participant information handout included in participant kits at *Transforming your Practice – Integrated Design Charrettes for Sustainable Buildings*, November 7th-8th, 2001, City of Toronto, Metro Hall, 55 John Street.

Appendix C – Charrette Event Site Plans



CBC LANDS

Official Site Plan Application

Architects Alliance
205-317 ADELAIDE STREET WEST, TORONTO, ONTARIO, M5V 1P9 Tel: 416.593.6500 Fax: 416.593.4911

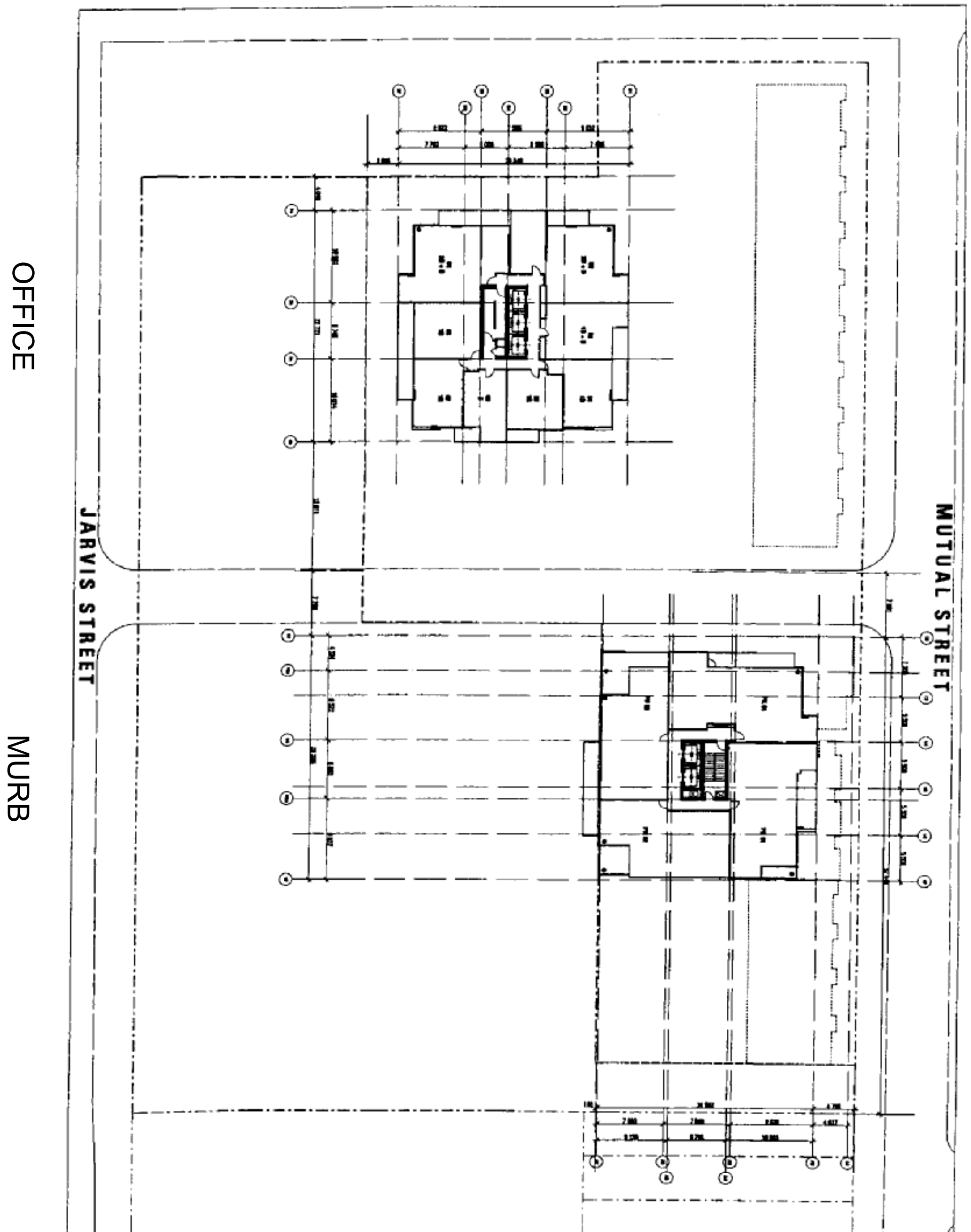
context
DEVELOPMENT INC.

PLAN
CONTEXT PLAN

DWG. NO.

SCALE: 1:1200
SEPTEMBER 14, 2000

1.03



CBC LANDS

Official Site Plan Application

Architects Alliance

205-317 ADELAIDE STREET WEST, TORONTO, ONTARIO, M5V 1P9 Tel: 416.593.6500 Fax: 416.593.4911

context

PLAN

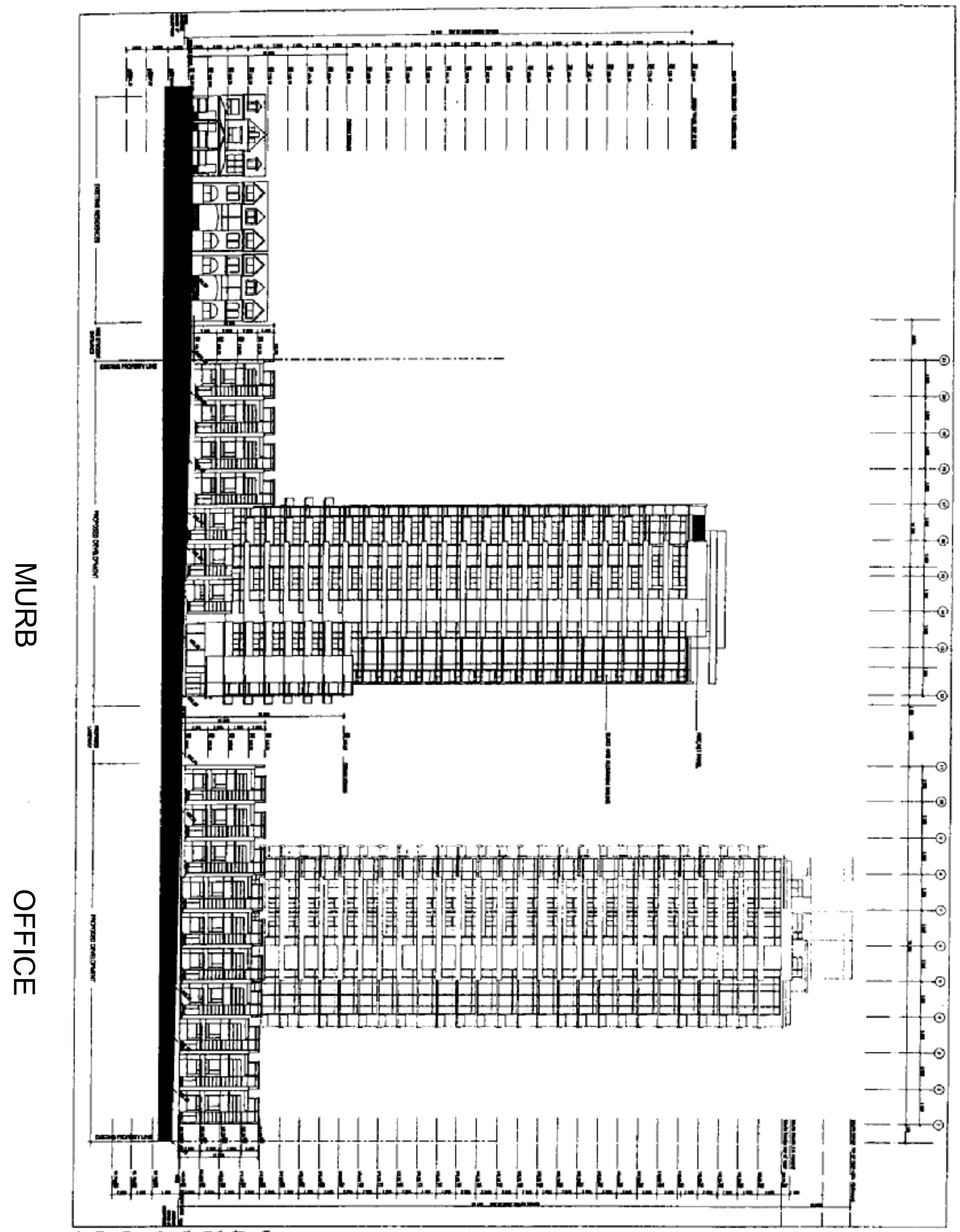
24TH - 25TH FLOOR

DWG. NO.

SCALE: 1:400

SEPTEMBER 14, 2000

2.12



CBC LANDS

Official Site Plan Application

Architects Alliance

205-317 ADELAIDE STREET WEST, TORONTO, ONTARIO, M5V 1P9 Tel: 416.593.6500 Fax: 416.593.4911

context

ELEVATIONS
WEST - MUTUAL ST

DWG. NO.

SCALE: 1:500
SEPTEMBER 14, 2000

3.01

Appendix D – Charrette Event Agenda

Transforming your Practice
Integrated Design Charrettes for Sustainable Buildings
November 7th– 8th, 2001
City of Toronto, Metro Hall
55 John Street

Charrette Agenda

November 7

Metro Hall, Council Chambers (2nd Floor)

1:00 pm
Welcome and introduction
Summary of the event agenda

1:20 pm
Speaker: Marion Fraser, Enbridge Consumers Gas

1:40 pm
Top green and energy issues in apartment and office buildings
-MURB issues and examples
Speakers: Duncan Hill, CMHC; Andrew Pride, VP Energy Management, MintoUrban Communities
-Office building issues and examples
Speaker: Tom Tamblyn, Engineering Interface Ltd.
-Solar energy integration
Speaker: Per Drewes, Sol Source Engineering

Metro Hall, breakout rooms TBA

3:00-5:00 pm
Break out into design teams with facilitators and simulators
Introduce subject experts and most important issues
Design conflicts: e.g. cost vs. indoor air quality, equipment rental vs. ownership
Explain the different projects and design tool
Base case building performance and some options
Team set performance guidelines
Individual members choose a subject to bring forward to group the following day

November 8

Metro Hall, Council Chambers (2nd Floor)

8:00 am
Overview of the day's events and housekeeping

Metro Hall, breakout rooms TBA

8:15 am
Breakout into teams
Review of background material and presentation of some optional scenarios
Design Work begins

Noon Working Lunch
(buffet will be located at 2nd floor foyer — lunches can be taken into break out room)

Design work continues

2:30 pm
Teams finalize their plans

3:30 pm
Teams present their findings to the other groups (20 minutes per team)

5:30-6:00 pm
Discussion and wrap-up

Simulators, Facilitators & Resource Persons

The design teams will be led by a facilitator and energy simulator, based on the number of teams. Other experts will be available on call to assist with specific issues.

Greg Allen—Allen Kani Associates
Bob Bach—Engineering Interface Ltd.
Kingsley Blease—Canadian Water Services
Larry Brydon—OZZ Corporation Inc.
Doug Cane—Caneta Research Inc.
Stephen Carpenter—Enermodal Engineering Ltd.
Maria Cinquino—Natural Resources Canada
Per Drewes—Sol Source Engineering
Heinrich Feistner—Better Buildings Partnership
Chris Jones—EnerSys Analytics Inc.
Pat Lawson—Franklin Empire Inc.
Gerald McCabe—Curran McCabe Ravindran Ross
Joanne McCallum—Ontario Assoc. of Architects
Craig McIntyre—Enermodal Engineering
Andrew Morrison—Caneta Research Inc.
Michel Parent—Technosim
Doug Pollard—CMHC
Stephen Pope—CANMET
Andrew Pride—MintoUrban Communities
Manoj Ravindran—Curran McCabe Ravindran Ross
Peter Rowles—Energy Advantage Inc.
Jiri Skopek—ECD Energy and Environment
Alex Speigel—Context Developments
Steven Traub—Bank of Montreal

… along with others TBD

ENBRIDGE Consumers Gas · CANADIAN Energy Efficiency Alliance · BBP BETTER BUILDINGS PARTNERSHIP · Natural Resources Canada / Ressources naturelles Canada · CMHC SCHL HOME TO CANADIANS

Appendix E – Charrette Event Attendee List

CMHC Charrette Attendees

	First Name	Last Name	Company	Address	City	Postal Code	Phone	Fax	E-mail
1	James	Aeichele	Seneca College	1750 Finch Ave. E.	Toronto	M2J 2X5	416-491-5050 x	416-495-9178	james.aeichele@senecac.on.ca
2	Greg	Allen	Allen Kani Associates	292 Merton St., Suite 2	Toronto	M4S 1A9	416 488-4425	416 488-7608	alive@inforamp.net
3	Bob	Bach	Engineering Interface Ltd	90 Sheppard Ave. E. 7th Fl.	North York	M2N 6X3	416-218-2275	416-218-2288	bbach@duke-energy.com
4	Carlos	Baruco	Ryerson University						ksblease@attcanada.ca
5	Filippo	Biondi	LKM & Partners Inc				705-675-6881	705-675-8330	lkmeng@cyberbeach.net
6	Kingsley	Blease	Canadian Water Services	716 Colonel Sam Drive	Oshawa	L1H 7Y2			
7	Luke	Bond	Union Gas Ltd.	200 Yorkland Blvd	North York	M2J 5C6	416-491-1880		lbond@uniongas.com
8	Larry	Brydon	Ozz Corporation	89 Edilcan Dr.	Concord	L4K 3S6	905-669-6223	905-660-1341	lbrydon@ozzcorp.com
9	Marius	de Bruyn	Aesthetics+Design Landscape Architects	145 Genesee Dr	Oakville	L6H 5Y9	905-257-3205		charrette@plus-design.com
10	Dianne	Byam Grannum	Urban Development Services - City of Toronto						
11	Doug	Cane	Caneta Research Inc				905-542-2890		caneta@compuserve.com
12	Cathy	Capes	Moffat Kinoshita Architects Inc.				416-488-5811	416-488-5829	ccapes@mkai.com
13	Stephen	Carpenter	Enermodal Engineering				519-743-8777	519-743-8778	scarpenter@enermodal.com
14	Vito	Casola	POWERGENySYS	218 Goulding Ave.	North York	M2R 2P5	416-224-9339	416-224-9336	vcasola@powergenysys.com
15	Maria	Cinquino	Natural Resources Canada	580 Booth St.	Ottawa	K1A 0E4	613-947-015		mcinquni@nrcan.gc.ca
16	Don	Curcic	Ryerson University						
17	Judith	Dimitriu	Ryerson University						
18	Domenic	Dimuzio	Enbridge Consumers Gas	500 Consumers Rd.	North York	M2J 1P8		416-495-8350	domenic.dimuzio@cgc.enbridge.com
19	Per	Drewes	Sol Source Engineering	66 Lewis Drive	Newmarket	L3Y 1R7			perdrewes@home.com
20	Heinrich	Feistner	City of Toronto - BBP	City Hall, 100 Queen St. W., 20th Fl., East Tower	Toronto	M5H 2N2			hfeistne@city.toronto.on.ca
21	Brian	Fountain	Energy Advantage Inc	690 Dorval Dr.	Oakville	L6K 3W7	905-337-2205	905-337-2209	brian.fountain@energyadvantage.com
22	Marion	Fraser	Enbridge Services Inc	500 Consumers Rd.	North York	M2J 1P8		416-495-8350	marion.fraser@cgc.enbridge.com
23	Duncan	Hill	CMHC						dhill@cmhc-schl.gc.ca
24	Michael	Hunter	MCW custom Energy Solutions				416-598-2920	416-598-5394	mhunter@mcw-ers.com
25	Christopher R.	Jones	EnerSys Analytics Inc						cj@cr-jay.ca
26	K.	Kawagishi	K. Kawagishi	60 Shangarry St.	Toronto	M1R 1A6	416-757-7657		kawagishi@home.com
27	Gustav	Lang	Minto Urban Communities	655 Bay St., Suite 1001	Toronto	M5G 2K4	416-977-0777	416-596-6174	glang@minto.com
28	Glen	Leis	Enbridge Consumers Gas	80 Allstate Parkway	Markham	L3R 6H3	905-943-6823		gleis@enbridgeservices.com
29	Sandra	Marshall	Canada Mortgage and Housing Corporation	700 Montreal Road	Ottawa	K1A OP7			smarshal@cmhc-schl.gc.ca
30	Ron	Mazza	Read Jones Christoffersen Ltd	510 - 144 Front Street West	Toronto	M5J 2L7	416-977-5335	416-977-1427	rmazza@rjc.ca
31	Gerrard	McCabe	Curran McCabe Ravindran Ross	160 Bedford Rd, Suite 303	Toronto	M5R 2K9	416-925-1424	416-925-2329	gmccabe@cmzr.com
32	Joanne	McCallum	McCallum Sather Architects Inc	157 Catherine St. N.	Hamilton	L8L 4S4	905-526-6700		mccallum@mccallumsather.com
33	Craig	McIntyre	Enermodal Engineering				416-322-2482		cmcintyre@enermodal.com
34	Linda	McPhee	Canadain Wood Council	1400 Blair Place, Sute 210	Ottawa	K1J 9B8	613-747-5544	613-747-6264	lmcphee@cwc.ca
35	Richard	Morris	City of Toronto - BBP	City Hall, 100 Queen St. W., 20th Fl., East Tower	Toronto	M5H 2N2			rmorris@city.toronto.on.ca
36	Andrew	Morrison	Caneta Research Inc				905-542-2890	905-542-3160	caneta@compuserve.com
37	Joseph	Orlov	LKM Consulting Engineers	235 Lesmill Rd	Toronto	M3B 2V1	416-445-8255		lkm@lkm-eng.com
38	Kevin	Parent	Kevin Parent Architect	21 Grenville St, 2nd Fl.	Toronto	M4Y 1A1	416-531-7136		kparch@on.aibn.com
39	Michel	Parent	Technosim				418-839-2880	418-839-7052	mparent@technosim.com
40	Lalith	Perera	Ruks Engineering	18 Automatic Rd, # 18	Brampton	L6S 5N5	905-789-9652		ozone@rukseng.com
41	Doug	Pollard	CMHC				613-748-2338		dpollard@cmhc-schl.gc.ca
42	Stephen	Pope	CETC/NRCan	580 Booth St.	Ottawa	K1A 0E4	613-947-9823	613-996-9909	spope@nrcan.gc.ca
43	Michael	Presutti	MEP Design				416-781-9205	416-781-6085	studio@mep-design.com
44	Andrew	Pride	MintoUrban Communities	427 Laurier Avenue West, Suite 1010	Ottawa	K1R 7Y2			apride@minto.com
45	Laura	Rachlin	Rachlin Architect Inc				416-224-1022	416-250-8948	racharch@interlog.com
46	Farah	Rahman	Architects Alliance	205-317 Adelaide St. W	Toronto	M5V 1P9	416-593-6500	416-593-4911	frahman@architectsalliance.com
47	Manoj	Ravindran	Curran McCabe Ravindran Ross	160 Bedford Rd, Suite 303	Toronto	M5R 2K9			
48	Melissa	Rocchi	McCallum Sather Architects Inc	157 Catherine St. N.	Hamilton	L8L 4S4	905-526-6700		rocchi@mccallumsather.com
49	Mark	Rosen	Ryerson University						
50	Robert	Rousseau	Finn Projects				416-921-0900	416-921-0300	rousseau@finnprojects.com
51	Peter	Rowles	Energy Advantage Inc	690 Dorval Dr.	Oakville	L6K 3W7	905-337-2205 x	905-337-2209	rowles@energy.on.ca

52	Anna	Sawicki	Urban Development Services - City of Toronto						
53	Graeme	Scott	Halsall Engineers and Consultants	2300 Yonge St, Ste 2300, Box 2385	Toronto	M4P 1E4	416-487-5256	416-487-9766	
54	Melanie	Sherwood	Toronto Hydro	777 Bay St, Suite 423	Toronto	M5G 2C8	416-542-3226	416-542-3206	msherwood@torontohydro.com
55	Robert	Shute	The Mitchell Partnership Inc.				416-499-8000	416-499-7446	rshute@tmptoronto.com
56	Judy	Simon	IndEco						jsimon@indeco.com
57	Ian	Sinclair	MCW custom Energy Solutions				416-598-2920	416-598-5934	isinclair@mcw-ers.com
58	Mike	Singleton	CEEA						mike-singleton@home.com
59	Jiri	Skopek	ECD Energy and Environment	165 Kenilworth Avenue	Toronto	M4L 3S7			skopen@interlog.com
60	Alex	Speigel	Context Developments	229 Yonge St, Suite 500	Toronto	M5B 1N9	416-863-0202		aspeigel@context.ca
61	Jacqueline	Swaby	BBP	City Hall, 100 Queen St. W., 20th Fl., East Tower	Toronto	M5H 2N2	416-392-7706		jswaby@city.toronto.on.ca
62	Ruthann	Symons	Enbridge Consumers Gas	500 Consumers Rd.	North York	M2J 1P8	416-495-5795	416-495-8350	ruthann.symons@cgc.enbridge.com
63	Tom	Tamblyn	Engineering Interface Ltd.				416-218-2275		ttamblyn@duke-energy.com
64	Andy	Taylor	Weinstein Taylor and Associates				416-463-6662	416-461-8296	wta@interlog.com
65	Arran	Timms		390 Crawford St	Toronto	M6J 2V9	416-537-6799	416-899-5641	arran@timms.ca
66	Steven	Traub	Bank of Montreal-Personal & Commercial Finai	First Canadian Place, 11th Floor	Toronto	M5X 1A1	416-867-4950		steve.traub@bmo.com
67	Sidney	Tung	Urban Development Services - City of Toronto	City Hall, 100 Queen Street West, 20th Floor, East Tower	Toronto	M5H 2N2			
68	Nestor	Uhera	BBP	City Hall, 100 Queen St. W., 20th Fl., East Tower	Toronto	M5H 2N2			
69	Seema	Varma	IndEco						svarma@indeco.com
70	Doug	Webber	Halsall Associates				416-487-5256	416-487-9166	dwebber@halsall.com
71	Tery	Whitehead	Enbridge Consumers Gas				416-753-6269	416-495-6163	terry.whitehead@cgc.enbridge.com
72	Murray	Wilson	Enbridge Consumers Gas	500 Consumers Rd.	North York	M2J 1P8		416-495-8350	murray.wilson@cgc.enbridge.com

Appendix F – Charrette Event Day 1 Plenary Presentations

Presentations on Top Green Issues in Apartment and Office Buildings

- MURB Issues and Examples by Duncan Hill, CMHC and Andre Pride, MintoUrban Communities
- Office Building Issues and Examples by Tom Tamblyn, Energy Interface Ltd., Duke Solutions
- Solar Energy Integration by Per Drewes, Sol Source Engineering

Integrated Design Charrettes For Sustainable Buildings

Multi-Unit Residential Buildings Issues and Examples

Andrew Pride
MintoUrban Communities
Duncan Hill
Canada Mortgage and Housing Corporation

Andrew to present

Agenda

- Sustainable Design – Challenges
- Energy use in Apartments
- Topics for design review
- Looking into the future
- Wrap-Up

Andrew to present

Sustainable Design - Challenges

- Capital Cost
  - No cash for “frills” !
  - Will occupant pay a premium?
- Uncertainty
  - Innovation = cost with no reward
  - Contractors don’t understand = Higher Cost
  - Who will be the “test ground”?
- Architects and Engineers
  - Sustainable Design is contrary to “blue print” design

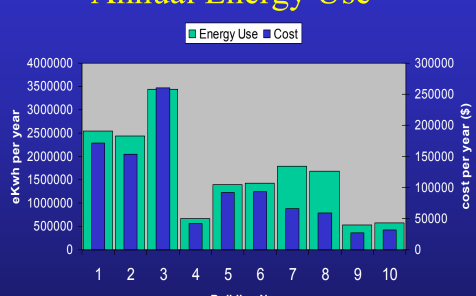
Duncan to present

Energy Use in Apartment Buildings

- Most apartment buildings constructed in 1960’s - 1970’s
- poorly insulated, poor sealed building envelopes
- inefficient mechanical-electrical systems

Duncan to present

Annual Energy Use



Duncan to present

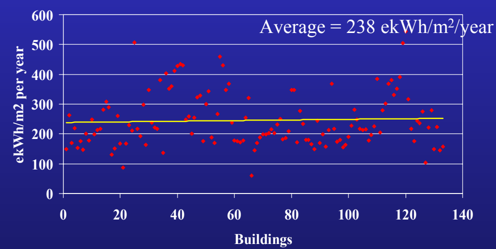
Annual Energy Use

- $1,247 per year per apartment (±$630)
- 20,665 ekWh per apartment
- 222 kWh/m2 (±60 kWh)
- 0.04885 kWh/m2/degree-day

CMHC SCHL | minto

Duncan to present

Energy Use - 133 bldgs



CMHC SCHL | minto

Duncan to present

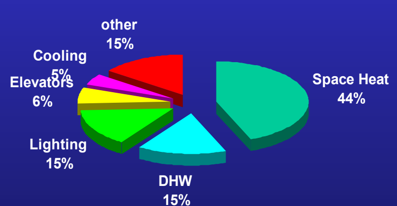
Energy Use Trends (per m^2)

- Family buildings consume more than seniors
- Older buildings consume more than newer
- Larger buildings consume more than smaller
- Metro Toronto buildings generally consume more than any other type

CMHC SCHL | minto

Duncan to present

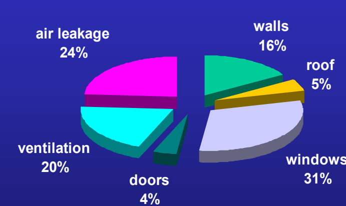
Where Energy is Used:



CMHC SCHL | minto

Duncan to present

Where the Heat Goes:



CMHC SCHL | minto

Duncan to present

Air Leakage in Multis

Airtightness testing has been done on 23 MURBs:

0.83 L/s/m2 @ 75 Pa to 10.00 L/s/m2 @ 75 Pa

1995 NBC Appendix recommends 0.10 L/s/m2 @ 75 Pa

BUILDINGS ARE VERY LEAKY!

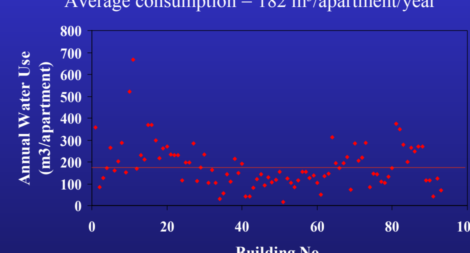
Well insulated buildings with high efficiency mechanical Equipment that are leaky WILL NOT PERFORM

CMHC SCHL | minto

Duncan to present

Water Consumption

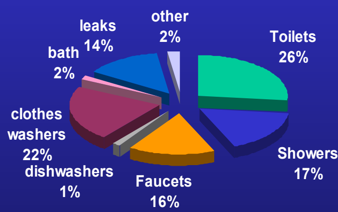
Average consumption = 182 m^3/apartment/year



CMHC SCHL

Duncan to present

Where the Water Goes:



CMHC SCHL

Duncan to present

And another thing…..

Corridor Air Systems are NOT suite ventilation systems

Delivering fresh air to a suite by a corridor by a constant Volume system defies:

- physics
- smoke control efforts
- occupant expectations for integrity of space

CMHC SCHL

Duncan to present

Conventional Ventilation

CMHC SCHL

Duncan to present

Conventional Ventilation

CMHC SCHL

Duncan to present

Conventional Ventilation

CMHC SCHL

Duncan to present

Conventional Ventilation

Conventional Ventilation

Duncan to present

Integrated Design Charrette MURB ISSUES & EXAMPLES NOV 7, 2001

Conventional Ventilation

Duncan to present

Integrated Design Charrette MURB ISSUES & EXAMPLES NOV 7, 2001

Topics of Design Review

Andrew to present

- Building Envelop
  - Systems
  - Orientation
- Mechanical & Electrical
  - Indoor Air Quality versus Energy Use: Make up air
  - Efficiency at source: Heating Plant; Domestic Plant
  - Illumination Levels & Switching: hall & stair lighting
- Consumption Savings versus Operating Cost
  - Fuel Selection
  - Life Cycle (energy & maintenance)

Integrated Design Charrette MURB ISSUES & EXAMPLES NOV 7, 2001

Building Envelop

Andrew to present

- Wall Systems
- Window Glazing
- Wall Insulation
- Penetrations & Building Commissioning

Integrated Design Charrette MURB ISSUES & EXAMPLES NOV 7, 2001

Air Leakage Control Savings

Duncan to present

- CMHC-Ontario Hydro Study:

Building 1: 30 years, 21 storeys, 240 apts

Building 2: 29 years, 10 storeys, 95 apts

Building	Annual energy Savings	Peak Load Reduction (kW)	Annual Cost Savings	Retrofit Cost	Payback (years)
1	164,870	85	$9,656	$54,816	5.7
2	63,340	42	$6,107	$38,000	6.2

Integrated Design Charrette MURB ISSUES & EXAMPLES NOV 7, 2001

Mechanical Systems

Andrew to present

Heating Plant Upgrade

- Convert at source with higher quality Equipment sized appropriately

Domestic Hot Water Plant

- Use condensing boiler technology (90%+)

Automate Common Area Systems

- Can be done with little – no impact on capital

Automate Fans & Pumps

- Use Variable Speed Drive technology & BAS
- Match Speed to Occupancy/Load

Integrated Design Charrette MURB ISSUES & EXAMPLES NOV 7, 2001

Mechanical Systems

Andrew to present

Considerations for Improved Ventilation Strategies:

1. Incremental cost
2. Aesthetics, noise, envelope penetrations
3. Building Codes

Water

Andrew to present

Toilet Conversion & Shower Retrofit

- ASHRAE 90.1 requirements good

Waste water & Storm water Management

- Rainwater collection
- Green Roofs
- Where does the developer benefit?

Electrical Reductions

Andrew to present

Lighting Retrofit

- Age old story – new twist
- Relight with higher output product
- Standard 13W CFL is no longer the only way to go
- Relight with emphasis on quality & energy

Looking Into the Future

Andrew to present

- Sustainable Sources
  - Fuel Cells
  - Distributed power generation
  - Photovoltaic Power
  - Solar Heat Recovery
- Can these be justified without subsidies?

WARNING:

Andrew to present

Complex & Innovative systems

+

Conventional MURB O&M Practices

=

Failure, Disappointment, Unrecoverable costs

Wrap up

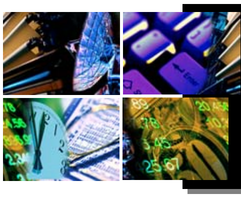
Andrew&Duncan to present

- Where do we go from here?
- Where can change be influenced?
  - Design?
  - Installation?
  - Commissioning?
- How to create a integrated design team?

Integrated Design Charrettes For Sustainable Buildings

Multi-Unit Residential Buildings Issues and Examples

Andrew Pride
Minto Developments Inc.
Duncan Hill
Canada Mortgage and Housing Corporation



Design
And
Energy

Creating Power Through Energy.℠

DukeSolutions.

Volatility of Price

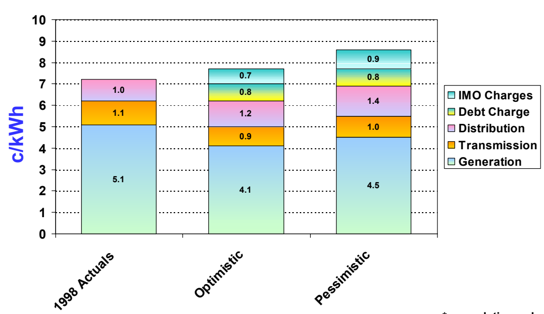
%Change:

Stocks:	10%
Oil:	30%
Natural Gas:	50%
Electricity:	**200%**

Pessimists: Look what's happened in other markets!

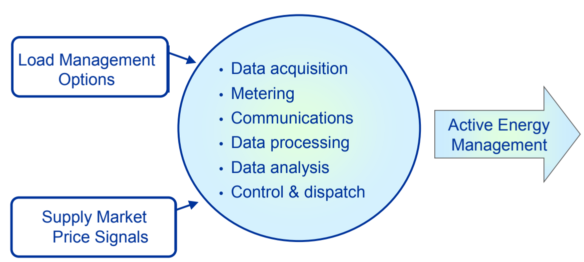
Optimists: Synthetic & inherent buffers will mitigate volatility during opening years

Unbundled Price of Electricity

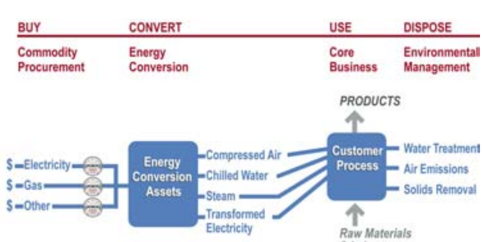


* speculation only

Active Energy Management



Energy Delivery Chain



Deregulation connects Planning Cycle

DISPOSE
- Waste
- Compliance
- Emissions
- Insurance
- Regulatory Risk

USE
- Productivity
- O&M
- Labor / Training
- Efficiency
- Opportunity Cost
- Penalties

BUY
- Fuel
- Transportation
- Price Risk
- Administration
- Taxes
- Rate Structures

CONVERT
- Capital Budget
- Labor / Training
Repair / Maintenance
- Permitting
- Water treatment
- Debt

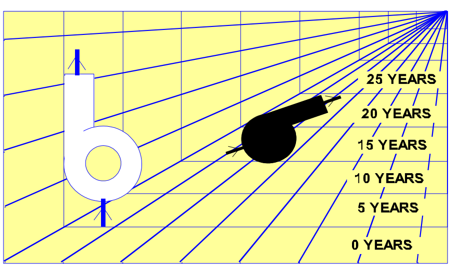
Example of Dependent Relationship

- Installation of a dimming ballast or non-dimming ballast for lighting
- What will be the “buying” savings for option to shed electrical load when we can buy electricity in an open market????

Planning Issues in Buildings

- Renewal
- Productivity
- Environmental

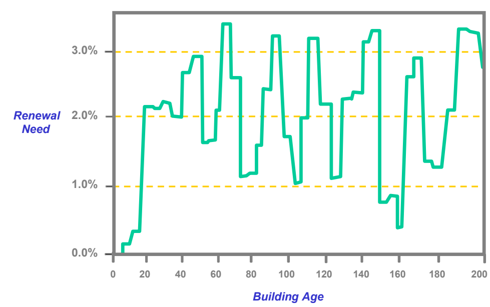
Building Components Cast A Time Shadow



Renewal of a Pump

Commercial Building Time Shadow

- As a % of Total Building Cost



Renewal Problems

- No reserve funding
- Budget squeeze
- Environmental legislation
- No long range planning for assets
- Deferred maintenance increases capital required

Productivity

- Energy costs are $ 2.50 per sq. ft. per year
- Leasing costs are $25.00 per sq. ft. per year
- Knowledge worker payroll is $250.00 per sq. ft/year

A 1% change in productivity equals energy cost

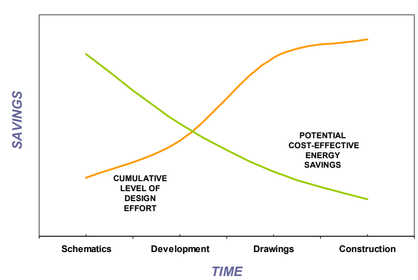
West Bend Productivity Case Study

- Rensselaer University research circa 1992
- Linked productivity to environment
- Measured increase of 15% due to facility
- Minimum of 3% attributed to individual control
- Changes maintained for 3 years after study

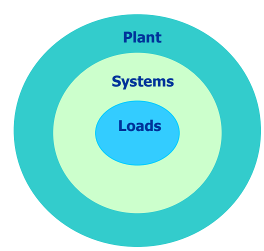
Environmental Issues

- Timing of Design Leverage
- Load dependency
- Silo thinking

Design Leverage

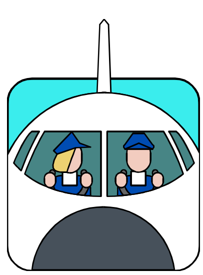


Load Dependency



Silo Thinking

"I'm sure happy to see that bad tire is on your side of the airplane"



Creating Power Through Energy.SM

DukeSolutions
A Duke Energy Company

Photovoltaics – renewable, environmentally-friendly power
by Per Drewes, Sol Source Engineering

Solar energy can be utilized to passively heat air and water in buildings as well as providing daylighting that can significantly reduce a building's lighting requirements. Energy from the sun can also be used as fuel to generate electricity. Photovoltaics (PV) is the technology which generates electricity directly from sunlight. Most people are familiar with PV cells from their consumer product application such as solar powered calculators. People may also be aware of its use as a source of electricity for space satellites. Photovoltaics technology is well established as a source of power for small remote applications. The Canadian Coast Guard has over 5,000 PV installations providing electricity for navigation and communication systems. In 1981, Ontario Power Generation, formerly Ontario Hydro, installed a 2.5 kW photovoltaic power supply to operate an air quality monitoring station near Atikokan. It was the largest system in Canada at that time. Today, there are tens of thousands of PV systems in Canada providing electricity to remote cottages and homes but there are only about 5 MW of grid-connected PV systems.

Photovoltaics has been a very practical source of energy for remote applications for years - the electricity being delivered free of charge by the sun - PV technology uses that renewable, environmentally-friendly source of energy to generate electricity. This direct conversion from sunlight to electricity produces no atmospheric emissions or other unwanted waste by-products. Furthermore, with no moving parts, PV systems should last practically forever. PV is absolutely silent and is generally sited on rooftops where aesthetics are not a major concern. This makes PV suitable for development in high-density areas where it is quickly becoming a reliable and clean source of urban-based electricity supply.

Appendix G – Analysis of a Cogeneration System

Proposed Cogen Plant for Office / MURB

Date: January 17, 2002

1) IDENTIFICATION:

Customer:
Address:
Contact:

Phone:
Fax:
email:

Ozz Corp.: Vito Mike Casola, P.Eng.
Larry Brydon

Date: 2002-01-17
File Name:

2) ENERGY PROFILE:

(The Electrical Profile for the new facility in 2005 is an estimate based on a 0% load increase from the current load & consumption levels in the old facility)

		Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals
OFFICE / MURB 2005	OFFICE Electricity: kWhr	216,938	194,966	209,767	198,323	219,975	210,742	238,986	234,494	190,456	197,262	186,945	202,478	2,501,329
	MURB Electricity: kWhr	103,774	93,720	104,179	102,363	110,313	113,611	121,526	119,601	109,279	105,980	100,697	103,654	1,288,697
	OFFICE Demand: kW	625	617	680	805	931	797	796	755	729	689	590	631	720
	MURB Demand: kW	214	216	229	247	251	268	293	287	255	237	221	214	244
	OFFICE Gas: mmBTU	1,258	1,047	754	376	143	70	69	72	97	342	719	1,148	6,094
	MURB Gas: mmBTU	1,598	1,378	1,131	607	246	124	118	118	169	525	975	1,445	8,435
BOTH 2005	Electricity: Both Bldg's, kWhr	320,712	288,686	313,946	300,685	330,287	324,353	360,513	354,095	299,735	303,241	287,643	306,132	3,790,027
	Total Demand, kW	838	833	908	1,052	1,182	1,065	1,088	1,042	984	926	811	844	965
	TOTAL Natural Gas, mmBTU	2,856	2,425	1,885	984	388	194	186	190	266	867	1,694	2,593	14,529

3) ENERGY COSTS:

A) ELECTRICAL:

FIXED BLOCK RATE STRUCTURE

	Electrical Rates			
	Consumption (Avg.)		Demand	
2000-2001 Avg. (at current facility)	9.00	c/kWh	Unknown	$/KW
2005 Avg. (at new facility)	10.18	c/kWh		

	Please Enter Y or N
Standby Charge Applicable	y
Charge per KW / month ?	y
STANDBY CHARGE per kW	
1.50	$/kW

C) EMISSIONS:

Emission Credits		
Net of genset emissions		
Pollutant	kg/MWhr	Credit ($/kg)
CO_2	907	0.0000
NO_x	0.6	0.00

B) THERMAL:

i.) Gas Rates (average)		
Cost Component	$/GJ	$/m3
Alberta Border Price	-	-
TCPL Charges (no fuel)	-	-
TCPL compressor fuel	-	-
Enbridge Costs**	-	-
Total Cost	"	7.000

ii.) Purchased Steam Rate	
Cost Component	$ / 1000 lbs
Steam Cost	-

iii.) Self Generated Steam Cost *		FIXED	VARIABLE
Cost Component	Formula	$ / year	$ / 1000 lbs
Natural Gas	gas consumption / 1000lbs x price / m3		N/A
Water	Hypochlorite + Polymer + Pumping + Surcharge		N/A
Boiler Chemicals	Nalco chemicals + Ammonia		N/A
Labour	6 employees x $60,000/yr x 1.25 for benefits	N/A	
Maintenance	5.0% of capital cost: $ (estimate)	N/A	
Capital Depreciation	6.3% of capital cost: $ (estimate)	N/A	
SUBTOTAL - Variable			N/A
SUBTOTAL - Fixed	$/1000lbs = (Total Fixed Costs/yr) * (Total Steam/yr)	$0	N/A
Acceptable Mark-Up			N/A
TOTAL STEAM VALUE: *			0.00

* Value of self generated steam is estimated as equal to cost to produce

4) INFLATION:

Enter 1-3 (1=Low, 2=Med., 3=High)

		OPTION	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017 - 2024
1-3	**Electricity** (see Elec. Rate Forecast)	2	5.4%	3.0%	-1.0%	-1.0%	0.0%	1.0%	1.5%	1.5%	1.5%	1.5%	1.5%	1.5%
Enter 0-4	**Natural Gas**	1	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
	Fuel Oil (Diesel No.2)	2	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
	Emission Reduction Credits	3	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
	Maintenance & Labour	2	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%

UNHIDE NEXT 6 ROWS TO EDIT OPTIONS

Change yearly escalation values here

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017 - 2024
Option 0:	10.0%	10.0%	-5.0%	-4.0%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Option 1:	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Option 2:	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Option 3:	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%	2.5%
Option 4:	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%	4.0%

5) COGENERATION PLANT SELECTION & PARAMETERS:

(Enter Option: "1" or "2") **Option No.** 1
Number of Gensets: 1
Proposed Genset Model: cummins/wartsila CW12V220

Technical Specifications		
Electrical Power Rating:	651	kW
Fuel Consumption:	5,218	MBtu/hr
Hot Water Thermal Output:	1,043	MBtu/hr
Steam Thermal Output @ 130 psig:	1,145	MBtu/hr
Steam Flow @ 130 psig:	1,085	lbs/hr
Oil Consumption:	1.05	L/hr
Oil (SAE 40W) Cost per Liter:	0.84	$/L
Avg. Maintenance Cost/kWhr:	$0.012	$/kWhr.
Anticipated Availability:	95%	

6) OPERATING PARAMETERS:

Expansion Factor:	1.00	
Boiler Efficiency:	80%	
Natural Gas Lower Heating Value:	905 Btu/cu.ft.	
No.2 Diesel Oil Heating Value:	37,880 Btu/L	
CAPITAL & OPERATING COSTS		
Installed Cost **per kW**:	$1,800	
Total Installed Cost: (Rounded)	$1,200,000	
Operating Engineers (Labour):	$0	$/yr
Aux. Equip.& DH (Materials / Labour):	$30,000	$/yr
Admin., Lease, Insurance, etc.	$30,000	$/yr
FINANCIAL		
Corporate Tax Rate:	40.00%	
Discount Rate (D.R.) for NPV Calc's:	8.00%	
After Tax D.R. = D.R. x (1-Corp. Tax Rate):	4.80%	

7) RESULTS OF SIMULATION: (Base Case)

COGEN PLANT OUTPUT	
ELECTRICAL	THERMAL
0.65 MW	0.64 MW

Marginal Cost / kWhr

= Operating Cost - Thermal Revenue / kWhrs Generated

= 7.24 cents / kWhr

IRR: 7.30%

NPV: ($50,581)

8) OPERATING SCHEME:

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Total Days per month (2000)	31	28	31	30	31	30	31	31	30	31	30	31	365
Available Hours per Month	744	672	744	720	744	720	744	744	720	744	720	744	8,760
PLANT Operating hours / day (avg.):	24	24	24	24	24	24	24	24	24	24	24	24	

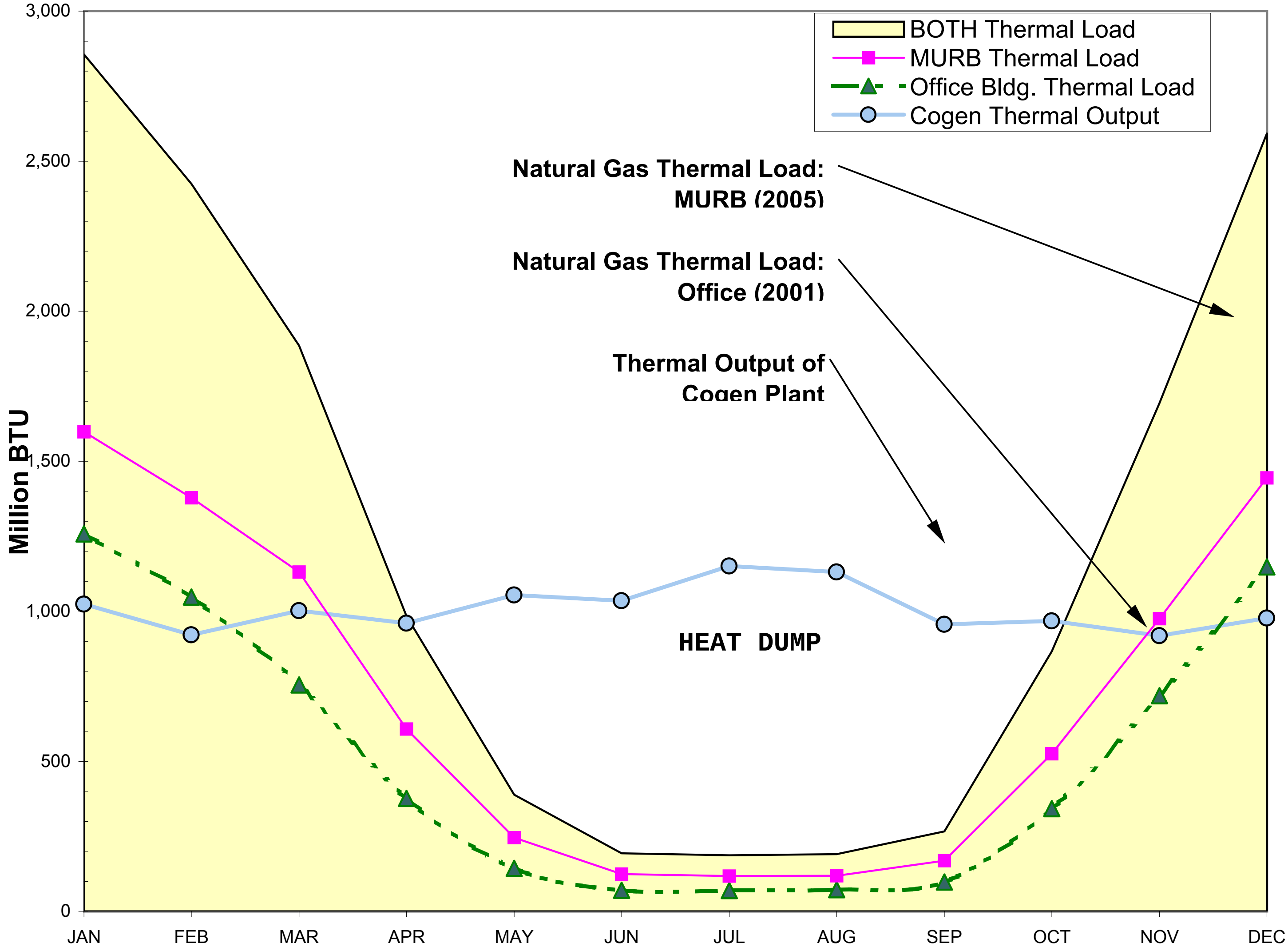
HOURS PER DAY REQUIRED (for a 1 genset plant, running at 100% load, to meet projected year 2005 electric consumption of the new facility)

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
Hours per Day	15.9	15.8	15.6	15.4	16.4	16.6	17.9	17.5	15.3	15.0	14.7	15.2	191.3
Cogen Plant Operating Hours per Month	468.0	421.3	458.1	438.8	482.0	473.3	526.1	516.7	437.4	442.5	419.8	446.7	5,530.8
Electricity Generated (kWhrs)	304,676	274,252	298,248	285,651	313,773	308,135	342,487	336,390	284,748	288,079	273,260	290,826	3,600,525
Hospital Thermal Load / Mo. (mmBTU)	2,856	2,425	1,885	984	388	194	186	190	266	867	1,694	2,593	14,529
Cogen Thermal Output / Mo. (mmBTU)	1,024	922	1,002	960	1,054	1,035	1,151	1,130	957	968	918	977	12,099
Heat Displaced / Mo. (mmBTU)	1,024	922	1,002	960	388	194	186	190	266	867	918	977	7,895
Equiv. Gas Displaced / Mo. (mmBTU)	1,024	922	1,002	960	388	194	186	190	266	867	918	977	7,895

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Average
Electrical Outpurt Capacity Utilization (%):	63%	63%	62%	61%	65%	66%	71%	69%	61%	59%	58%	60%	63.1%
Heat Dump (%):	0%	0%	0%	0%	63%	81%	84%	83%	72%	10%	0%	0%	32.8%

FIGURE B.1	DESCRIPTION: **PROJECTED ANNUAL THERMAL LOAD PROFILE**
DATE: NOV. 2001	PROJECT: Office / MURB: PROPOSED COGENERATION PLANT

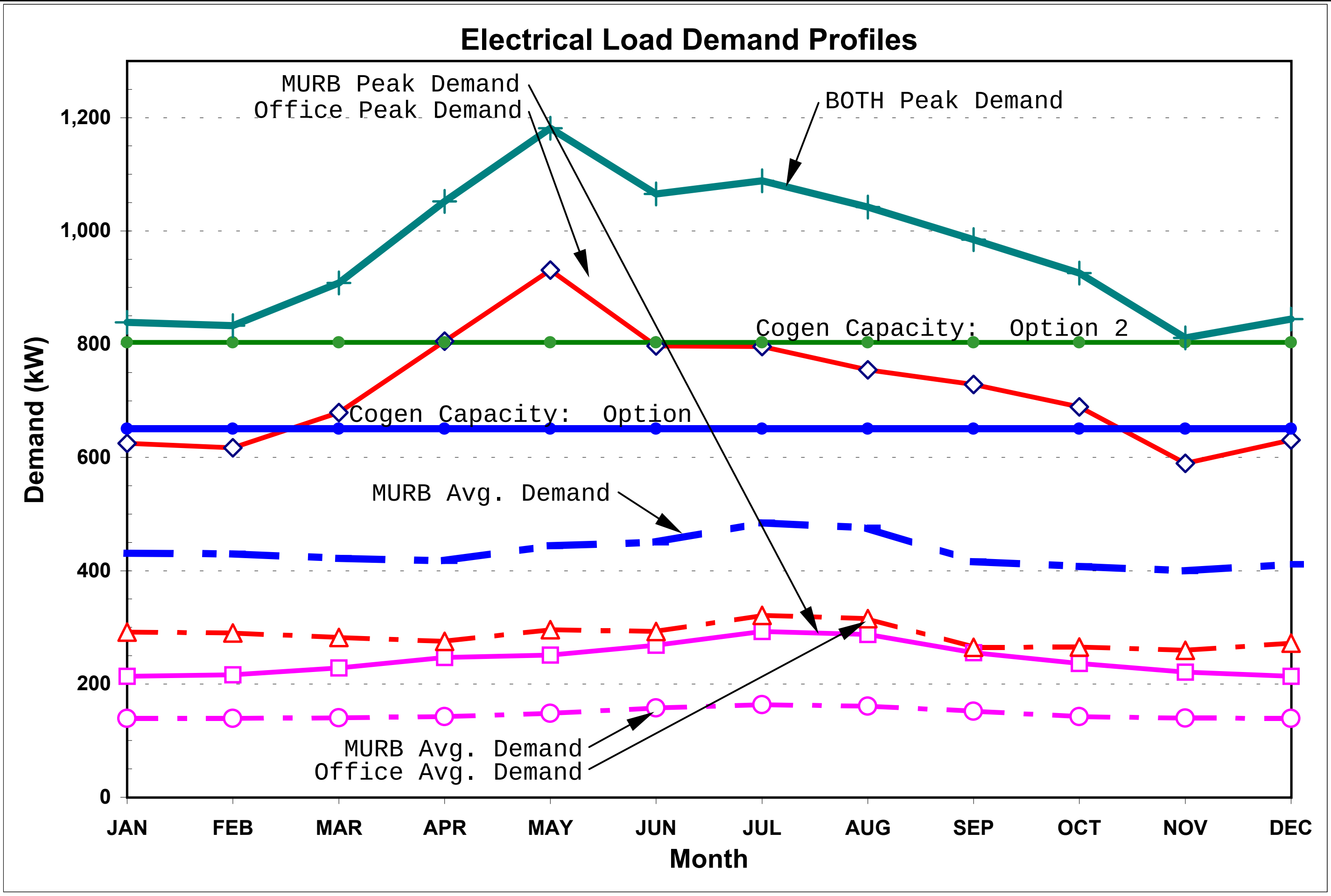
OFFICE / MURB HEATING SYSTEM - PROJECTED THERMAL LOAD PROFILE



MONTH	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Total Natural Gas Consumption, mmBTU					(For details refer to Gas Data Sheet)							
Office	1,258	1,047	754	376	143	70	69	72	97	342	719	1,148
MURB	1,598	1,378	1,131	607	246	124	118	118	169	525	975	1,445
BOTH	2,856	2,425	1,885	984	388	194	186	190	266	867	1,694	2,593
Equivalent Total Thermal Load in Million BTU					(assuming existing boiler plants are 80% efficient)							
Office	1,258	1,047	754	376	143	70	69	72	97	342	719	1,148
MURB	1,598	1,378	1,131	607	246	124	118	118	169	525	975	1,445
BOTH	2,856	2,425	1,885	984	388	194	186	190	266	867	1,694	2,593
Cogeneration Plant Thermal Output in Million BTU						(based on 1 cummins/wartsila CW12V220 @ 651 kWe output)						
Thermal output from cogen plant following the estimated year 2005 electrical load	1,024	922	1,002	960	1,054	1,035	1,151	1,130	957	968	918	977

DATA : from Spreadsheet provided by

FIGURE A.1	DESCRIPTION: ANNUAL ELECTRICAL DEMAND PROFILES
DATE: NOV. 2001	PROJECT: Office / MURB: PROPOSED COGENERATION PLANT



YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Estimate Facility Consumption in MWhr (Year 2005)												
Office	217	195	210	198	220	211	239	234	190	197	187	202
MURB	104	94	104	102	110	114	122	120	109	106	101	104
BOTH	321	289	314	301	330	324	361	354	300	303	288	306
Estimated Peak Demand in kW (Year 2005) (from Spreadsheet provided by)												
Office	625	617	680	805	931	797	796	755	729	689	590	631
MURB	214	216	229	247	251	268	293	287	255	237	221	214
BOTH	838	833	908	1,052	1,182	1,065	1,088	1,042	984	926	811	844
Average Load in kW												
Office	292	290	282	275	296	293	321	315	265	265	260	272
MURB	139	139	140	142	148	158	163	161	152	142	140	139
BOTH	431	430	422	418	444	450	485	476	416	408	400	411

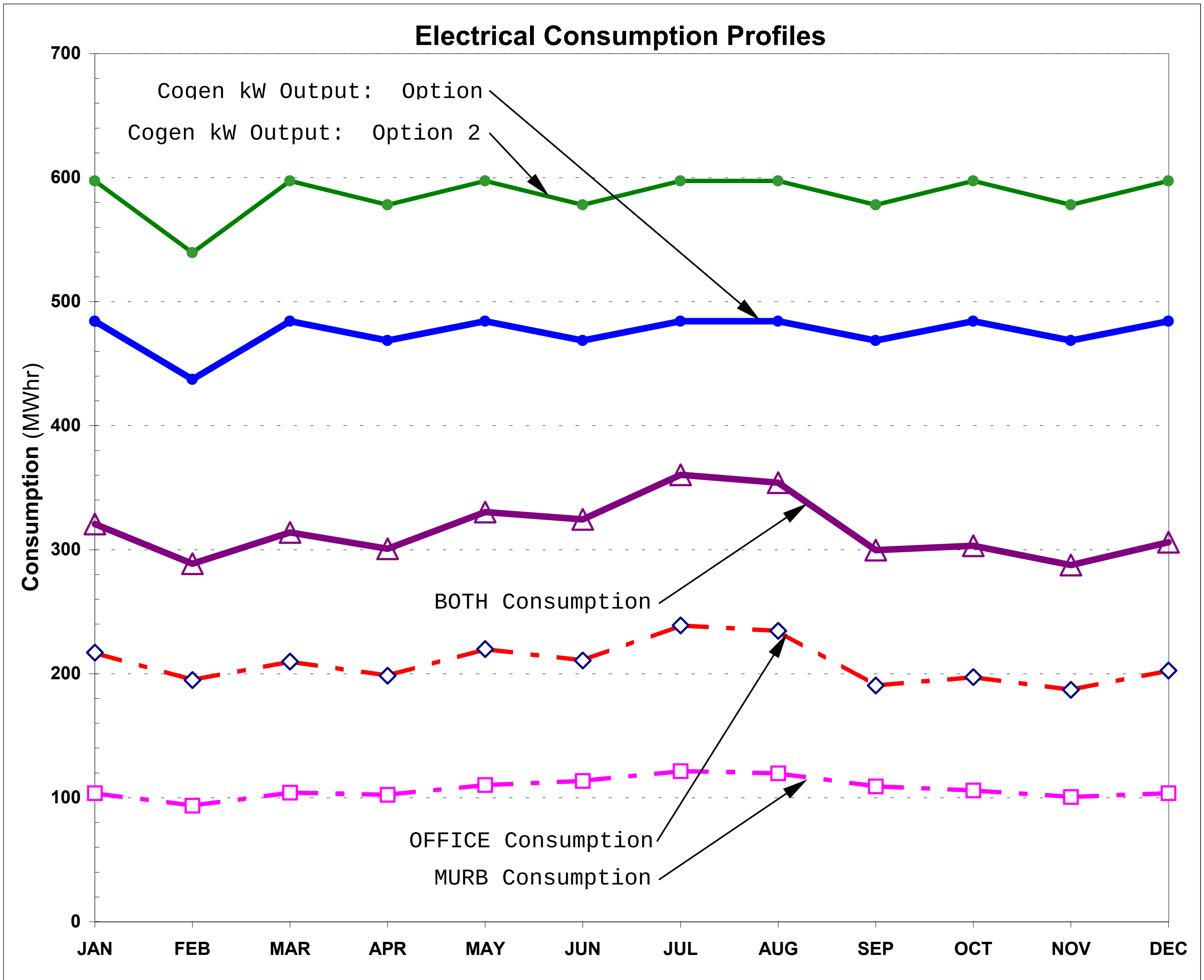
* The Electrical Profile for 2005 is an estimate based on a 0% load increase from the current load & consumption levels at the present building

Cogeneration Plant Output Capacity (kW)

Option 1	651	651	651	651	651	651	651	651	651	651	651	651
Option 2	803	803	803	803	803	803	803	803	803	803	803	803

DATA : from Spreadsheet provided by

FIGURE A.2	DESCRIPTION: ANNUAL ELECTRICAL CONSUMPTION PROFILES
DATE: NOV. 2001	PROJECT: Office / MURB: PROPOSED COGENERATION PLANT



Total Consumption in MWhr (Year 2005) (from Spreadsheet provided by)

YEAR	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	OCT	NOV	DEC
Office	217	195	210	198	220	211	239	234	190	197	187	202
MURB	104	94	104	102	110	114	122	120	109	106	101	104
BOTH	321	289	314	301	330	324	361	354	300	303	288	306

* The Electrical Profile for 2005 is an estimate based on a 0% load increase from the current load & consumption levels at the present building

Cogeneration Plant Monthly kWhr Output (based on gensets running 24hrs per day 100% output)

Option 1	484	437	484	469	484	469	484	484	469	484	469	484
Option 2	597	540	597	578	597	578	597	597	578	597	578	597

DATA : from Spreadsheet provided by

OZZ CORPORATION™
Take The **Insight** Track

FINANCIAL ANALYSIS for Proposed Office / MURB Cogen Plant

Date: January 17, 2002

TECHNICAL AND OPERATING ASSUMPTIONS:

OPTION No.	1	
Number of Gensets:	1	
Proposed Genset Model:	**cummins/wartsila CW12V220**	
Electrical Power Rating:	651	kW
Fuel Consumption:	5,218	MBtu/hr
Hot Water Thermal Output:	1,043	MBtu/hr
Steam Thermal Output @ 130 psig:	1,145	MBtu/hr
Steam Flow @ 130 psig:	1,085	lbs/hr
Oil Consumption:	1.05	L/hr
Oil (SAE 40W) Cost per Liter	0.84	$/L
Hospital Electrical Expansion Factor	1.00	Load Increase

CAPITAL COST ASSUMPTIONS:

	Tax Class		'000s CDN$
Foundations & Equipment Installation	1	estimate	Capital Cost estimated at $1800 per kW
Reciprocating Engine / Generator Set	43.1	estimate	
Heat Recovery - Steam Generator	43.1	estimate	
Heat Recovery - Hot Water	43.1	estimate	
Mechanical Tie-ins to existing plant	44.1	estimate	
Electrical Protection, Controls & Tie-ins	43.1	estimate	
Commissioning	43.1	estimate	
Miscellaneous	43.1	estimate	
Engineering and Permits	43.1	estimate	
Contigency	43.1	estimate	
Total Project Cost (BASE CASE = sum of figures above)			$ 1,200
Total Project Cost (used for sensitivity analysis)			$ 1,200

PRICING ASSUMPTIONS:

Electricity Rate	10.18	cents/kWhr
Gas Rate	7.00	$/mmBTU
Steam Value	3.50	$/1000lbs
CO_2 Reduction	907.0	kg/MWhr
CO_2 Credit	0.00	$/kg
NOx Reduction	0.60	kg/MWhr
NOx Credit	0.00	$/cT

OPERATING COSTS:

Genset Maintenance Contract	0.0120	$/kWhr
Operating Engineers (Labour)	0	$/yr
Aux.Equip.&DH (Materials & Labour)	30,000	$/yr
Admin., Lease, Insurance, etc.	30,000	$/yr

TAX PARAMETERS:

Provincial Income Tax Rate		15.50%
Federal Income Tax Rate		28.00%
Federal Surtax		4.00%
Federal Tax Credit		0.00%
Provincial Tax Credit		0.00%
Equivalent Tax Credit		0.00%
Class 43 Investor?		Y

CCA Class Allocation as a % of Total Costs:

Class 43:	30% (Declining Balance	95.00%
Class 1:	4% (Declining Balance	5.00%
	Total	100.00%

RESULTS: ('000s CDN$)

Discounted Payback	Net Present Value (before tax)	Pre-Tax Equity IRR	Net Present Value (after tax)	After-Tax Equity IRR
20 years	**$201,005**	**10.27%**	**($50,581)**	**7.30%**

Marginal Cost / kWhr	
= Net Operating Costs - Thermal Savings	
kWhrs Generated	
= 72.45	$ / MWhr
= 7.24	cents/kWhr

YEAR 2000 PROJECTIONS:

	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals	Averages
Days per month	Days	31	28	31	30	31	30	31	31	30	31	30	31	365	
Hours per month	Hours	744	672	744	720	744	720	744	744	720	744	720	744	8,760	
Cogen Operating Hours per Month	Hours	468	421	458	439	482	473	526	517	437	443	420	447	5,531	

Year 2005 UTILITY COSTS Without COGENERATION

	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals	Averages
Electricity Consumption	MWhrs	321	289	314	301	330	324	361	354	300	303	288	306	3,790	316
Electricity Charge (Consumption & Demand)	$	32,636	29,377	31,948	30,598	33,611	33,007	36,687	36,034	30,502	30,859	29,271	31,153	385,683	32,140
Electricity Demand	kW														
Demand Charge	$														
Gas Consumption	mmBTU	2,856	2,425	1,885	984	388	194	186	190	266	867	1,694	2,593	14,529	1,211
Gas Consumption Charge	$	19,993	16,975	13,195	6,887	2,719	1,357	1,305	1,331	1,864	6,068	11,858	18,150	101,702	8,475
Fuel Oil Consumption	L														
Fuel Oil Charge	$														
Labour (Operating Engineers)	$	0	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTAL MONTHLY UTILITY COSTS	$	52,630	46,353	45,143	37,486	36,330	34,364	37,991	37,365	32,366	36,926	41,129	49,303	487,385	40,615

Year 2005 UTILITY COSTS With COGENERATION

	Units	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Totals	Averages
COGEN OUTPUTS															
Electricity Generated	MWhrs	305	274	298	286	314	308	342	336	285	288	273	291	3,601	300
Electricity Savings	$	31,005	27,909	30,350	29,069	31,930	31,357	34,852	34,232	28,977	29,316	27,808	29,595	366,398	30,533
Gas Displaced	mmBTU	1,024	922	1,002	960	388	194	186	190	266	867	918	977	7,895	658
Displaced Gas Savings	$	7,166	6,451	7,015	6,719	2,719	1,357	1,305	1,331	1,864	6,068	6,427	6,841	55,263	4,605
CO_2 Displacement	kg	276,341	248,746	270,511	259,085	284,592	279,479	310,636	305,106	258,266	261,288	247,847	263,779	3,265,676	272,140
CO_2 Credits	$	0	0	0	0	0	0	0	0	0	0	0	0	0	0
NOx Displacement	kg	183	165	179	171	188	185	205	202	171	173	164	174	2,160	180
NOx Credits	$	0	0	0	0	0	0	0	0	0	0	0	0	0	0
COGEN EXPENSES															
Electrical Demand (2005)	kW	838	833	908	1,052	1,182	1,065	1,088	1,042	984	926	811	844		965
Electrical Standby Charges	$	1,258	1,250	1,362	1,578	1,772	1,598	1,633	1,563	1,477	1,389	1,217	1,266	17,361	1,447
Cogen Gas Consumption	mmBTU/hr	2,442	2,198	2,391	2,290	2,515	2,470	2,745	2,697	2,283	2,309	2,190	2,331	28,862	2,405
Cogen Gas Consumption	m^3	76,426	68,794	74,814	71,654	78,708	77,294	85,911	84,381	71,427	72,263	68,546	72,952	903,167	75,264
Gas Charge	$	17,096	15,389	16,735	16,028	17,606	17,290	19,218	18,876	15,978	16,165	15,333	16,319	202,033	16,836
Genset Lubricating Oil - Changes	$	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	3,000	36,000	3,000
Genset Lubricating Oil - Consumption	L	491	442	481	461	506	497	552	543	459	465	441	469	5,807	484
Lubricating Oil Consumption Cost	$	413	372	404	387	425	417	464	456	386	390	370	394	4,878	407
Genset Maintenance Costs	$	3,656	3,291	3,579	3,428	3,765	3,698	4,110	4,037	3,417	3,457	3,279	3,490	43,206	3,601
Auxiliary Equipment Maintenance	$	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	30,000	2,500
REMAINING COSTS															
Additional Electrical Purchases	MWhrs	16	14	16	15	17	16	18	18	15	15	14	15	190	16
Additional Electrical Cost	$	1,632	1,469	1,597	1,530	1,681	1,650	1,834	1,802	1,525	1,543	1,464	1,558	19,284	1,607
Additional Gas Purchases	mmBTU	1,832	1,504	883	24	0	0	0	0	0	0	776	1,616	6,634	553
Additional Gas Cost	$	12,827	10,525	6,180	168	0	0	0	0	0	0	5,430	11,309	46,439	3,870
Labour (Operating Engineers)	$	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Admin., Lease, Insurance, etc.	$	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	2,500	30,000	2,500
Debt Financing (Interest Costs)	$														
TOTAL MONTHLY EXPENSES		42,381	37,794	35,358	28,619	30,750	30,154	32,758	32,233	28,282	28,444	32,593	39,836	399,202	33,267

COGEN PLANT OUTPUT	
ELECTRICAL (MW)	**THERMAL** (MW)
0.65	**0.64**

OZZ CORPORATION™
Take The **Insight** Track

FINANCIAL ANALYSIS for Proposed Office / MURB Cogen Plant

Date: January 17, 2002

20 YR. CASH FLOW PROJECTIONS		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
(ALL FIGURES are in 1000's of Canadian Dollars)		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024
WITHOUT COGENERATION																					
Electricity Charges		385.7	406.3	418.5	414.3	410.2	410.2	414.3	420.3	426.4	432.6	438.8	445.2	451.7	458.2	464.8	471.6	478.4	485.4	492.4	499.5
Gas Charges		101.7	104.2	106.9	109.5	112.3	115.1	117.9	120.9	123.9	127.0	130.2	133.4	136.8	140.2	143.7	147.3	151.0	154.8	158.6	162.6
Fuel Oil Charges		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Labour (Operating Engineers)		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total COSTS without COGEN		487.4	510.6	525.4	523.8	522.4	525.2	532.2	541.2	550.3	559.6	569.0	578.6	588.4	598.4	608.5	618.9	629.4	640.1	651.0	662.1
WITH COGENERATION																					
Savings / Revenues:																					
Displaced Gas Savings		55.3	56.6	58.1	59.5	61.0	62.5	64.1	65.7	67.3	69.0	70.7	72.5	74.3	76.2	78.1	80.0	82.0	84.1	86.2	88.3
CO_2 Credit		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
NOx Credit		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total SAVINGS / REVENUES		55.3	56.6	58.1	59.5	61.0	62.5	64.1	65.7	67.3	69.0	70.7	72.5	74.3	76.2	78.1	80.0	82.0	84.1	86.2	88.3
Operating Expenses:																					
Electrical Standby Charges		17.4	17.4	17.4	17.4	17.4	17.4	17.4	17.4	17.4	17.4	17.4	17.4	17.4	17.4	17.4	17.4	17.4	17.4	17.4	17.4
Cogen Gas Consumption		202.0	207.1	212.3	217.6	223.0	228.6	234.3	240.2	246.2	252.3	258.6	265.1	271.7	278.5	285.5	292.6	299.9	307.4	315.1	323.0
Oil Changes		36.0	36.9	37.8	38.8	39.7	40.7	41.7	42.8	43.9	45.0	46.1	47.2	48.4	49.6	50.9	52.1	53.4	54.8	56.1	57.6
Oil Consumption		4.9	5.0	5.1	5.3	5.4	5.5	5.7	5.8	5.9	6.1	6.2	6.4	6.6	6.7	6.9	7.1	7.2	7.4	7.6	7.8
Genset Maintenance Contract		43.2	44.3	45.4	46.5	47.7	48.9	50.1	51.4	52.6	54.0	55.3	56.7	58.1	59.6	61.0	62.6	64.1	65.7	67.4	69.1
Auxiliary Equipment Maintenance		30.0	30.8	31.5	32.3	33.1	33.9	34.8	35.7	36.6	37.5	38.4	39.4	40.3	41.4	42.4	43.4	44.5	45.6	46.8	48.0
Additional Electricity		19.3	20.3	20.9	20.7	20.5	20.5	20.7	21.0	21.3	21.6	21.9	22.3	22.6	22.9	23.2	23.6	23.9	24.3	24.6	25.0
Additional Gas		46.4	47.6	48.8	50.0	51.3	52.5	53.9	55.2	56.6	58.0	59.4	60.9	62.5	64.0	65.6	67.3	68.9	70.7	72.4	74.2
Operating Labour		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Total OPERATING EXPENSES		399.2	409.3	419.2	428.5	438.1	448.1	458.5	469.3	480.4	491.8	503.4	515.3	527.5	540.1	552.9	566.0	579.5	593.3	607.4	621.9
Total COSTS with COGEN		343.9	352.7	361.1	369.0	377.1	385.5	394.4	403.7	413.1	422.8	432.7	442.8	453.2	463.9	474.8	486.0	497.5	509.2	521.3	533.6
NET SAVINGS (Operating Cash Flow)	-1,200	**143**	**158**	**164**	**155**	**145**	**140**	**138**	**138**	**137**	**137**	**136**	**136**	**135**	**135**	**134**	**133**	**132**	**131**	**130**	**129**
Present Value (Net Savings)	-1,200	133	135	130	114	99	88	80	74	69	63	58	54	50	46	42	39	36	33	30	28
NET PRESENT VALUE (before tax)	**$201**	201																			
AFTER-TAX CASH FLOW SCHEDULE																					
Net Income Before Tax and Depreciation		143	158	164	155	145	140	138	138	137	137	136	136	135	135	134	133	132	131	130	129
CCA Depreciation (see schedule below)		172	322	370	350	297	223	134	36	26	18	13	10	7	5	4	3	3	2	2	2
Allowable CCA Depreciation for Tax Purposes		143	158	164	155	145	140	134	36	26	18	13	10	7	5	4	3	3	2	2	2
Taxable Income		0	0	0	0	0	0	3	101	111	118	123	126	128	129	130	130	129	129	128	127
Provincial Income Tax	15.50%	0	0	0	0	0	0	1	16	17	18	19	20	20	20	20	20	20	20	20	20
Federal Income Tax	28.00%	0	0	0	0	0	0	1	28	31	33	34	35	36	36	36	36	36	36	36	36
Federal Surtax	4.00%	0	0	0	0	0	0	0	1	1	1	1	1	1	1	1	1	1	1	1	1
Total Income Tax Payable (Benefits)		0	0	0	0	0	0	1	45	50	53	55	56	57	58	58	58	58	57	57	57
Large Corporations Tax	0.000%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Provincial Capital Tax	0.000%	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Available Surtax Credit Against Large Corporations Tax		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Capital Taxes		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Net Cash Distribution		143	158	164	155	145	140	138	138	137	137	136	136	135	135	134	133	132	131	130	129
Less Total Income Tax Payable (Tax Benefits)		0	0	0	0	0	0	1	45	50	53	55	56	57	58	58	58	58	57	57	57
Less Capital Taxes		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Net After-Tax Cash Flows	-1,200	143	158	164	155	145	140	136	92	87	84	81	80	78	77	76	75	74	73	73	72
Present Value (Net After-Tax Cash Flows)	-1,200	133	135	130	114	99	88	80	50	44	39	35	32	29	26	24	22	20	18	17	15
NET PRESENT VALUE (after tax)	**($51)**	-51																			
After-Tax Rate of Return (20-Years) =	**7.30%**																				

Depreciation Schedule	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Equivalent First Year Tax Credit																				
Depreciation - Class 43	171	291	203	142	100	70	49	34	24	17	12	8	6	4	3	2	1	1	1	0
Depreciation - Class 1 (4% Decl. Balance)	1	2	2	2	2	2	2	2	2	2	2	2	2	1	1	1	1	1	1	1
Available Depreciation Balance (Opening Balance)	172	293	206	145	102	72	51	36	26	18	13	10	7	5	4	3	3	2	2	2
Depreciation Taken Against Project Income	172	293	206	145	102	72	51	36	26	18	13	10	7	5	4	3	3	2	2	2
Available Depreciation Balance (Closing Balance)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0

Discounted Payback Calculation

Year No.	0	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20
Cummulative PV Cashflows (after tax)	($1,200)	($1,067)	($932)	($801)	($688)	($589)	($501)	($421)	($371)	($328)	($289)	($254)	($222)	($193)	($167)	($143)	($121)	($101)	($83)	($66)	($51)
Discounted Payback	**20.00**	years																			

Appendix H – Attendees Questionnaire

Transforming your Practice – Integrated Design Charrettes for Sustainable Buildings

Participant Questionnaire –to be completed at the end of the sessions

Name: ______________________________

Occupation: ______________________________

Organization/Firm: ______________________________

Address: ______________________________

Email: __________ Tel: __________ Fax: __________

How would you rate your knowledge of IDP prior to attending this workshop?

____

How would you rate your knowledge of green design prior to attending this workshop?

____

How would you evaluate the workshop overall?

1	2	3	4	5
Poor	Met some expectations	Met most expectations	Met my expectations	Went beyond expectations

Did you gain insight or knowledge that would be useful for your work?

____

What improvements would you like see in future workshops? ______________________________

____

What was your experience in your team charrette? What would you like to see improved in the future? ______________________________

____

Part of your commitment in attending this charrette was to use the Integrated Design Process in your practice. Will you use the IDP in your next design projects? Yes (_) No (_)

____

____

Will you use whole building energy simulation in your future projects? If not, why not?

____

____

Have you experience or expertise with LEED, Breeam/Greenleaf or other green design guidelines or tools?

____

____

Have you ever participated in an integrated design charrette previously? Yes (_) No (_)

Do you use integrated design techniques in your regular practice? Yes (_) No (_)

If yes to the above, please describe the process you use and identify the key players:

____

____

Transforming your Practice – Integrated Design Charrettes for Sustainable Buildings

Participant Questionnaire – to be completed at the end of the sessions

Have you ever used whole building energy simulation:

- in building design? Yes (_) No (_)
- in building performance audits? Yes (_) No (_)

If yes to either of the above, have you performed these tasks with :

- in-house staff Yes (_) No (_)
- hired consultants Yes (_) No (_)

Have you submitted any projects for the Commercial Buildings Incentive Program (CBIP) grants? Yes (_) No (_)

If yes, how many?

- one or two (_)
- just the best ones? (_)
- What percentage? ____%

Have you ever used the CBIP Screening Tool? Yes (_) No (_)

If yes, where did you first hear of it? ____________________________

Do you use it:

- regularly (_)
- only on projects with an energy design focus (_)
- infrequently (_)

Have you ever used the ASHRAE 90.1 Energy Cost Budget approach for compliance with that standard? Yes (_) No (_)

Have you (or your consultants) ever done detailed energy simulations for a project using the following (Circle the programs used in the past):

Carrier HAP Trane TRACE

DOE-2.1 PowerDOE, VisualDOE, PC DOE or other variants not including EE4.CBIP

Merriweather BLAST TRNSYS Other ________________

Have you ever done whole building energy simulations using EE4.CBIP? Yes (_) No (_)

Do your consultants do EE4.CBIP whole building energy simulations? Yes (_) No (_)

Who does design and document coordination in your office?

- Principal in charge? Yes (_) No (_)
- Project Architect/Engineer? Yes (_) No (_)
- Job Captain / Sr. Technologist? Yes (_) No (_)

Do you have any quality assurance processes to demonstrate consultant design and document coordination? Yes (_) No (_)

Any other comments or suggestions? ____

____

Appendix I – Written testimonials

Developer: *Alex Speigel, Context Development Inc.*

Energy/HVAC Specialist: *Larry Brydon, OZZ Corporation*

Note-taker: *Arran Timms*

The following are the written testimonials received from developer, Alex Speigel of Context Development Inc., resource specialist on energy/HVAC, Larry Brydon of OZZ Corporation, and note-taker for MURB Team A, Arran Timms.

Developer, Alex Speigel, Context Development Inc.

"From the beginning, I was intrigued by the concept of charrette based on a "real life" scenario—especially on a project that was in its formative stages of design.

As a developer with a strong interest in green design strategies, I often encounter resistance from my other associates in the firm, from marketing people or from the design team regarding the value of designing green buildings. Since the builder/developer is not the long term owner of the project, investment in design improvements cannot simply be justified based on life-cycle costing or payback periods as they can in owner-occupied projects. As a result, the economics of residential condominium development generally tends to focus on the selling price of the unit and not its operating costs, which produces a barrier to providing greener design solutions.

As purchasers become better educated about these issues and start asking questions about energy and operating costs, indoor air quality, health and comfort issues and environmental responsibility, developers will respond with greener buildings in order to gain a competitive advantage. To begin the process, however, developers must start to lead by example.

To encourage this shift to more sustainable buildings, critical analysis of various design strategies is required. What could be better than to have a group of committed and creative professionals from diverse disciplines focusing on a real project on a real site, offering their collaborative design skills to improve the quality of the project design?

I welcomed the opportunity to participate in this integrated design approach to explore practical greener design solutions that could actually be implemented. It was particularly useful to have the energy simulation people on each team to advise on the impacts of each design decision as they were being discussed.

Since many aspects of the project were already designed and commitments made to purchasers (approximately 50% of the units are already sold and the rezoning already approved), the scope for major design changes was somewhat limited. As a result, I think that the approach of creating three different teams to look at various levels of intervention was quite useful. Although I understand the educational benefit of adding an office building to the "theoretical" program, it was obviously the work on the residential component of the exercise that interested me the most.

The work of Team A, in particular, was most useful. In maintaining the parameters of building shape and orientation, the interventions proposed were of real interest, and I hope to be able to incorporate some of the suggestions into the building design. The architectural, mechanical and structural consultants who are actually working on the project all attended this session and were wholly engaged in the process. It is a tribute to the collaborative spirit of the group that the design discussions were embraced by the consultants and not treated as a criticisms to which they might otherwise have responded defensively. The team leader was particularly skilled in both technical knowledge and in guiding the group dynamics. His final presentation was clear, focussed and convincing.

The design work of Team B, in exploring more aggressive approaches, was of less practical use for this particular project, but was nevertheless educational in highlighting a wider range of measures. It is interesting to note that, in the end, this group maintained the original shape and orientation of the building although their mandate allowed them to question this aspect of the design. Although I found the work of the group very informative, the presentation of the work was rather vague and not nearly as convincing as that of Team A. Some of the presentation also seemed to focus unnecessarily on number crunching. Nevertheless, lessons learned from this group will be useful in informing work on future projects.

Team C, of course, got to have "all the fun", with its wider ranging parameters. Its work was, by definition, more theoretical, but was also useful in exploring the boundaries of the possible. The group's presentation was more of a vision than a design, but as an educational process provided a strong statement of the direction that projects should strive to go in order to be truly sustainable.

Generally, I thought the organization of the event into the three distinct groups was quite useful. In working with a range of "givens", the solutions offered ranged from immediate suggestions that could certainly be implemented in this project, as well as providing some more general directions that will inform future projects that are in a more formative stage of design.

I think the size of the groups was good—not too large to be cumbersome, but with enough people to provide an array of professional advise. The central location was convenient and accessible.

I thought the event could have been more widely publicized, especially within the architectural community. I don't think the lists available through the RAIC, OAA or TSA were used; they could have generated a larger turnout. Although a larger event may have been more cumbersome to organize, it would have provided the benefit of exposing more architects and owners/developers to the integrated design approach.

I would like to thank the entire team who organized the event for including Context Development and for using the Radio City site as the base for the charrette. In directing the green agenda to a very practical level, the charrette has provided me with "do-able" solutions for the Radio City project as well as with innovative suggestions for other projects in the immediate future."[1]

---

[1] Correspondence from Alex Speigel of Context Development Inc., to Seema Varma of IndEco Strategic Consulting Inc., November 14, 2001.

Energy/HVAC specialist, Larry Brydon, OZZ Corporation

"OZZ Corporation, through our CSE Energy group has been in partnership with the BBP since nearly it's inception and has been represented at most workshops and design charrettes sponsored wholly or in part through the City of Toronto, Enbridge, Union Gas and Hydro One. OZZ Corporation Inc. provided the Client for the most recent charrette.

A common and recurring theme, the reference to " talking heads " and " preaching to the converted " was conspicuously absent at the most recent design charrette sponsored by CMHC, NRCan BBP and Enbridge.

In this charrette, unlike those in the past, a " real world " approach was taken. An actual site, a building to be constructed, a curious developer, a skeptical design team and a cynical marketing department all came together to meet with the brightest and best in the energy efficiency business.

A true win-win-win scenario emerged. For those in the business, it was an opportunity to network, meet the builder and his designers, and demonstrate their products and crafts. For the developer, a $ 60,000 cash incentive was available, along with tens of thousands of dollars worth of consultancy fees (had he hired these experts). An enlightening experience for the design teams, who saw the simulated, real-time impact of the various changes one discipline can have on the other, and the substantial impact an integrated design process can have on overall energy efficiency and social impact. Marketing people, usually skeptical of any thing " green ", came to recognize that improved occupant comfort, individual control and productivity are just as " sellable" as a panoramic view.

The real winner however is the City of Toronto and the BBP partnership. From this exercise, a framework to deliver on the energy efficiency mandate within the new construction, multi residential marketplace can be defined."[2]

---

[2] Excerpt from correspondence prepared by Larry Brydon of OZZ Corporation to the City of Toronto, December 2001.

Note-taker, Arran Timms

“I found most of the workshop very instructive, even though I already had a good understanding of the issues from both a design and resource management perspective.

The workshop benefited greatly from:
a) the depth of knowledge of each respective participant on my team, in addition to the various experts "on call", and
b) its practical focus on a real case study development project.

I also think that our group was able to focus quickly on problem solving as a result of the very pragmatic design restrictions we faced. It was an added benefit to have the real world developer/builder present to comment on our ideas. Finally, the ability to produce drawings such as building details from existing design documents was essential, in my opinion.

Unfortunately, I thought many of the final group presentations were difficult to follow (often for the simple reason that you couldn’ t hear or see the content) and, in a few cases, proved to have disappointing findings or at least those were not effectively demonstrated. Audio-visual technology could have been better deployed.

I highly recommend that you make an attempt to repeat the charrette on a periodical basis. Perhaps a keynote address by an architect or developer of a successful and high profile "green" building in North America or Europe could add more substance to the program.”[3]

---

[3] Correspondence from Arran Timms, note-taker for MURB Team A, to Sandra Marshall of Canada Mortgage and Housing Corporation, November 15, 2001.