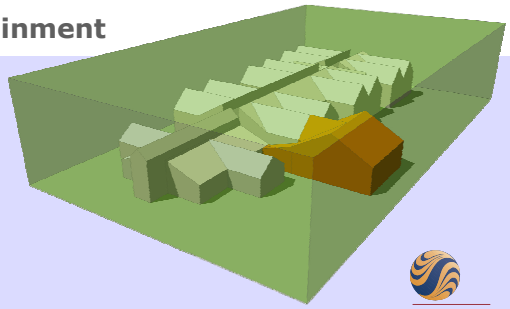
Containing the Cost of Containment



Stantec Architecture Ltd.
Wilfred Lach, MAIBC, *Principal*
Stantec Consulting Ltd.
R.A. Henry, R.P.T.(Eng), *Senior Mechanical Designer*

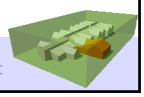
Stantec

Biocontainment Facility Purpose

To provide an isolated work environment **for protection of investigators** involved with manipulation of Risk Level 3 pathogens; **for protection of the environment and community** from infectious micro-organisms, encountered as part of the facility operating mandate.

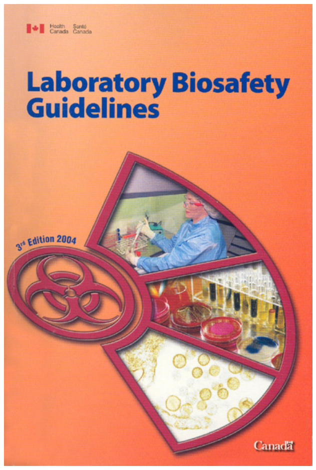
Definitions and Key Considerations

- Select Agent vs. Pathogen List
- Animal containment vs. confinement
- Indigenous vs. non-indigenous (Exotic)
- Chemical Usage
- Supply HEPA filters
- Body showers
- Continuous operation, redundancy



Biocontainment Regulations

Canadian Regulation's & certification process



Canadian Food Inspection Agency / Agence canadienne d'inspection des aliments

Biohazard, Containment and Safety Unit
Science Strategies
159 Cleopatra Dr.
Nepean, ON K1A 0Y9
Tel. (613) 221-7069
Fax (613)228-6129

Unité de confinement des biorisques et la sécurité
Stratégies Scientifiques
159 Promenade Cleopatra
Nepean, ON K1A 0Y9
Tel: (613) 221-7069
Fax: (613) 228-6129

Animal Pathogen Containment Level 3 Laboratory Certification Checklist

This checklist is provided to you as a tool to be used in conjunction with the *Containment Standards for Veterinary Facilities* (CSVF), *1st edition 1996.*

Institution:	*Institutional Biosafety Officer:*
Address:	*Address:*
Phone : *Fax :*	*Phone :* *Fax :*
Building / Laboratory / Room #:	

Containment Level 3 laboratories handling imported animal pathogens require a physical inspection by CFIA before they will be certified. This checklist is intended to assist laboratories in determining their compliance with the *Containment Standards for*

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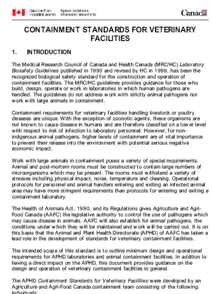


Canadian Food Inspection Agency / Agence canadienne d'inspection des aliments — Canada

CONTAINMENT STANDARDS FOR VETERINARY FACILITIES

1. INTRODUCTION

The Medical Research Council of Canada and Health Canada (MRC/HC) *Laboratory Biosafety Guidelines* published in 1990 and revised by HC in 1996, has been the recognized biological safety standard for the construction and operation of containment facilities. The MRC/HC guidelines provides guidance for those who build, design, operate or work in laboratories in which human pathogens are handled. The guidelines do not address work with strictly animal pathogens nor work with large animals in containment.

Containment requirements for veterinary facilities handling livestock or poultry diseases are unique. With the exception of zoonotic agents, these organisms are not known to cause disease in humans and are therefore classified on a lower level with respect to risk of infection to laboratory personnel. However, for non-indigenous animal pathogens, higher levels of containment are of vital importance to prevent their release into the environment with potential serious negative economic impact.

Work with large animals in containment poses a variety of special requirements. Animal and post-mortem rooms must be constructed to contain large numbers of microorganisms which may be present. The rooms must withstand a variety of stresses including physical impact, noise, temperature and cleaning. Operational protocols for personnel and animal handlers entering and exiting an infected animal area may have more stringent requirements than protocols for entering and exiting a containment laboratory.

The Health of Animals Act, 1990, and its Regulations gives Agriculture and Agri-Food Canada (AAFC) the legislative authority to control the use of pathogens which may cause disease in animals. AAFC will also establish for animal pathogens, the conditions under which they will be maintained and work will be carried out. It is on this basis that the Animal and Plant Health Directorate (APHD) of AAFC has taken a lead role in the development of standards for veterinary containment facilities.

The intended scope of this standard is to outline minimum design and operational requirements for APHD laboratories and animal containment facilities. In addition to having a direct impact on the APHD, this document provides guidance on the design and operation of veterinary containment facilities in general.

The APHD *Containment Standards for Veterinary Facilities* were developed by an Agriculture and Agri-Food Canada containment team consisting of the following individuals:

CL3 Case Study

CL3 Laboratory Addition
Abbotsford Agriculture Centre (AAC)
Abbotsford, British Columbia, Canada

Project Overview & Metrics

Purpose:

Design and construct a facility to enable diagnostic work with CL3 (indigenous and non-indigenous) pathogens.

Owner / User:

Ministry of Citizen's Services, Accommodation of Real Estate Services.

Ministry of Agriculture and Lands

Initial Program Area

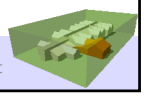
Total gross area = 7,107sf, (660 sm)

Final Program Area:

Total gross area = 12,500 sf, (net laboratory spaces = 2,050 sf, net mechanical / service spaces = 7,300 sf, other non lab spaces = 3,150 sf)

Regulatory compliance:

Canadian Food Inspection Agency (CFIA), Public Health Agency of Canada (PHAC)



Project Overview & Metrics

Estimate after Feasibility Study:

Construction cost = C$ 3,200,000.00 (January 2005)

Estimate after Design Development Stage

Construction cost = C$ 8,912,660.00 (October 2005, including escalation allowance and contingencies)

Tendered Cost:

Construction cost = C$ 10,100,000.00 (October 2006), ($ 808.00 / gross sf,

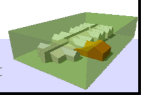
$ 4,926.00 / net laboratory sf.)

Final Cost:

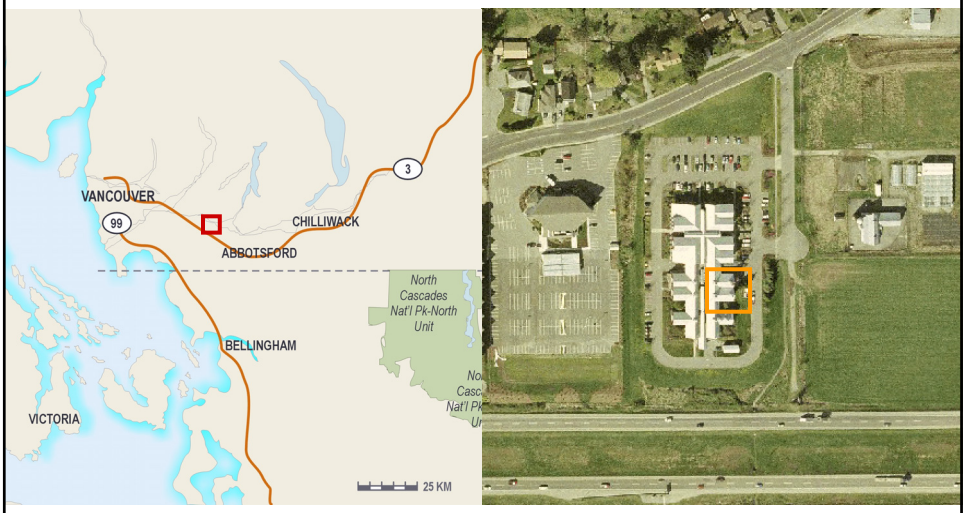
To be determined.

Time (including approvals):

Design = 7 mo, Construction Documents = 11 mo, Construction = 18 mo (est.), Commissioning = 2 - 4 mo (est.)



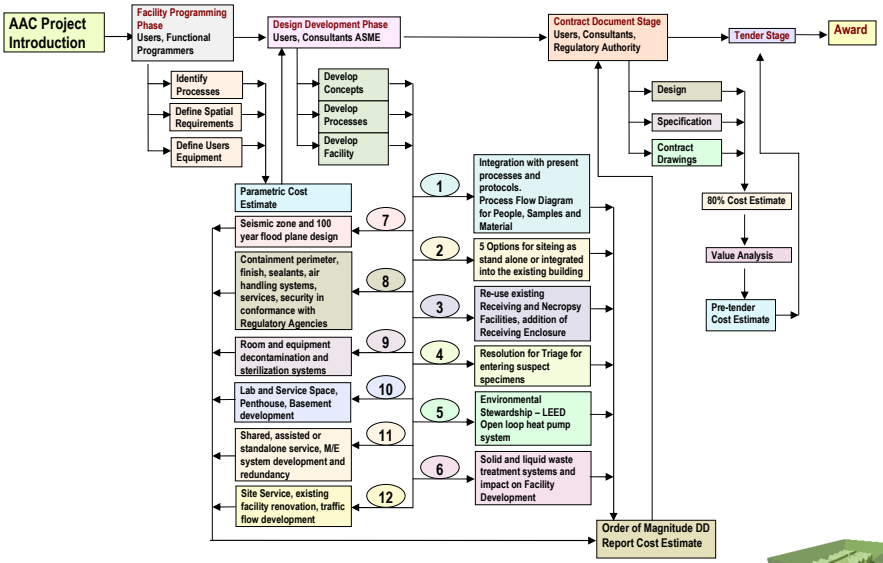
Location



Location

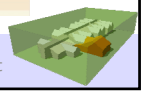
Existing Facility

Design Process



Functional Program Requirements

No.	Departments	Occupants	Space Type	Equipment	Qty	SF	SM	Comments
	Level 1 Containment							
1	Bact / Virus Lab-1 Module	1	o	1 sink	1	251.56	23.37	Renamed to Bact / Virus Lab-1
2	Bact / Virus Lab Module	1	o	1 sink	2	392.14	36.43	Renamed to Bact / Virus Lab-2
3	Molecular Lab Modules (Extraction; Set-up; Amp.)	1	c	1 sink	1	383.32	35.61	Separated into 3 Molecular Labs (3@11.87sm)
4	Equipment Lock		o		1	108.83	10.11	
5	Washroom		o		1	39.83	3.70	HC accessible WC provided
6	Fume Hood		o		1	0.00	0.00	FH in equipment area
7	Lab Equipment		o		1	139.94	13.00	
8	*Procedure Room*		c		1	116.69	10.84	Renamed to Procedure Room from Necropsy
9	Tool Room / Repair / Storage		c		1	57.48	5.34	
10	PPE Storage					70.08	6.51	Added during Design Development
						0.00		
	Level 1 Partial Containment					0.00		
10	Autoclave Lock		c	autoclave, dunk tank, pass thru	1	229.60	21.33	
11	Change Area / Shower & Dry / Inner Change		c		1	208.72	19.39	HC accessible change area + shower provided
11A	*Air Lock*					51.56	4.79	Added for HVAC pressure management
	Net area total					**2049.74**	**190.42**	
	Dept. gross up / circulation				0.25			
	Total Dept. area							
	Containment Floor gross up				1.25			
	Containment Floor Gross area					**2614.97**	**242.93**	
	Level 1 Non Containment							
12	Ring corridor		c	3.5 ft wide	1	536.28	49.82	1220mm wide corridor shown
13	Link to AAC		c		1	201.72	18.74	Separate link to Necropsy and lab areas provided
14	*CL3 Vestibule*					175.03	16.26	Added to program
15	*Cool Holding*		c			118.95	11.05	Relocation of existing cool room to create link
16	*Covered Loading*		c			782.13	72.66	Added to program to shelter loading from weather
	Net area total					**1814.11**	**168.53**	
	TOTAL LEVEL 1 GROSS AREA					**5136.72**	**477.20**	
	Level 0 Mechanical Room (net area)					3653.71	332.97	excl. stairs; incl. shafts
	Level 2 Mechanical Penthouse (net area)					3702.37	330.79	excl. stairs; incl. shafts
	TOTAL BUILDING GROSS AREA					**12492.80**	**1140.96**	
16	*Link from CL3 to Necropsy*		c			128.04	11.90	Existing cold room relocated and link created
17	*Upgrade to Ante room*		c			184.21	17.12	HVAC air supply proposed to pressurize room
	TOTAL RENOVATED AREA					**312.26**	**29.02**	



Logic Diagram as a Basis for Design

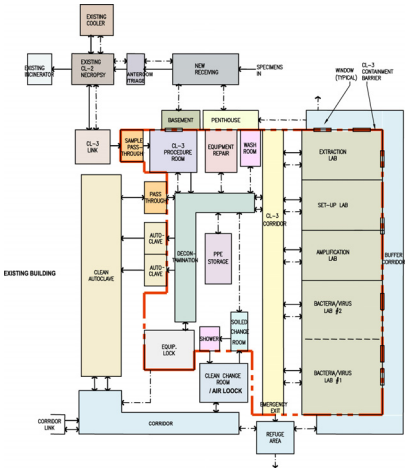
Regulatory Compliance

+

Standard operating procedures

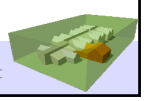
=

Logic diagram as basis for planning

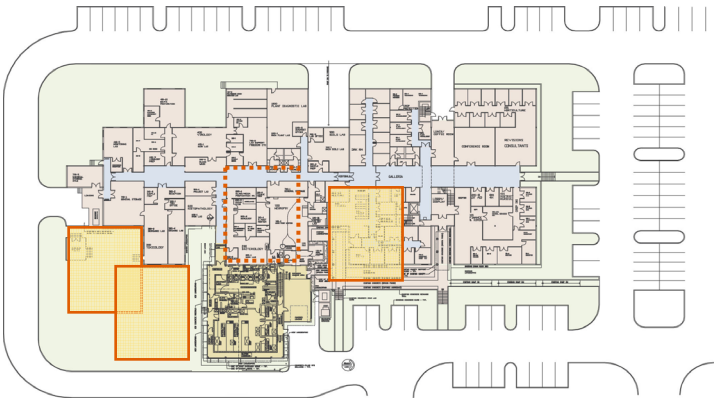


Top 5 Operational considerations

- **Sample Entry**
- **Sample Disposal**
- **Staff Entry / Exit**
- **Emergency Exit**
- **Equipment Entry / Exit**



Site Plan

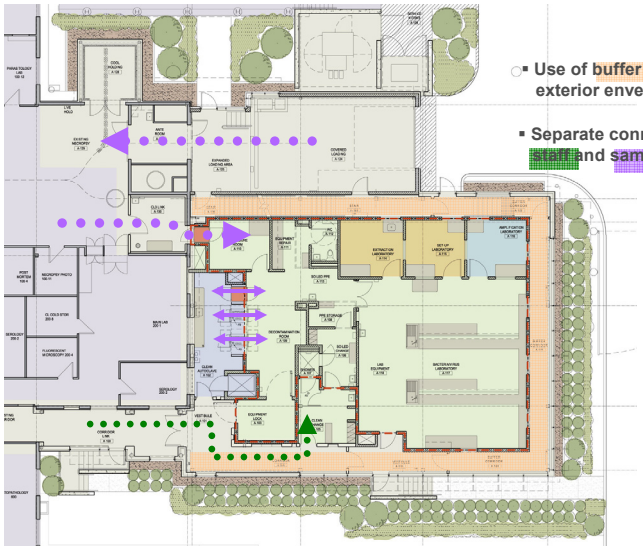


- CL3 location criteria include vehicular access, internal connection points, sample flow, views, space requirements, cost, architectural expression.

Under Construction

Under Construction

Main Floor - Laboratory Zone

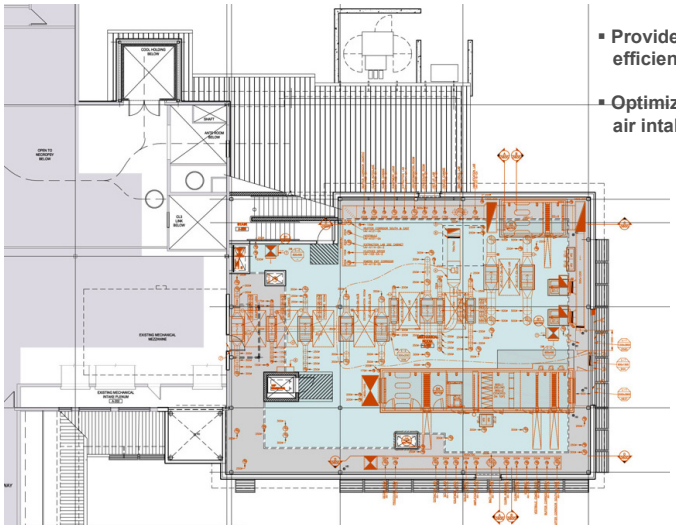


- Use of buffer corridor to manage exterior envelope and enhance safety.
- Separate connection points for staff and samples

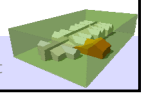
Under Construction

Under Construction

Mechanical Floor – Air Management Zone



- Provide service access for efficient maintenance.
- Optimize location of air intakes / exhaust.



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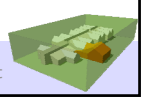
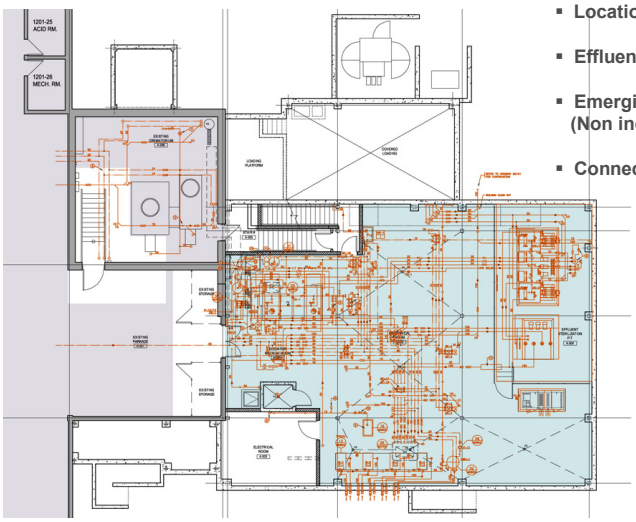
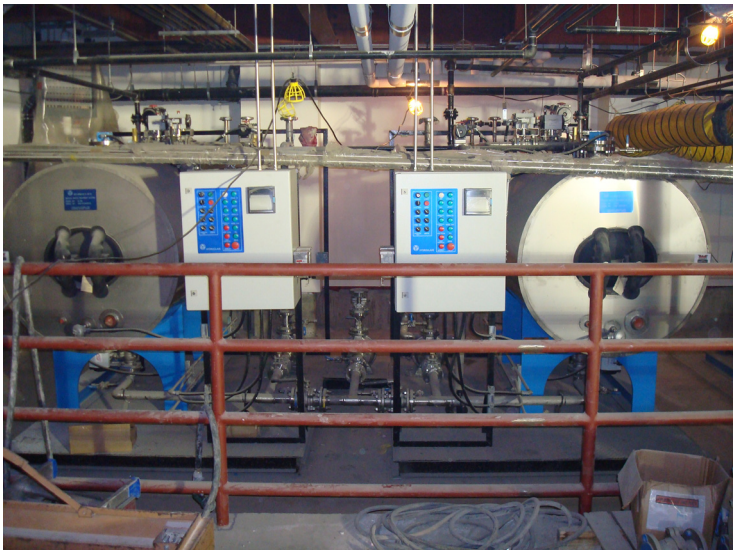


Basement – Waste Management Zone



- Location of all “Wet” services.
- Effluent treatment system.
- Emerging in Canada for CL3 use (Non indigenous pathogens)
- Connection to existing services.

Under Construction



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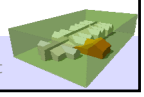
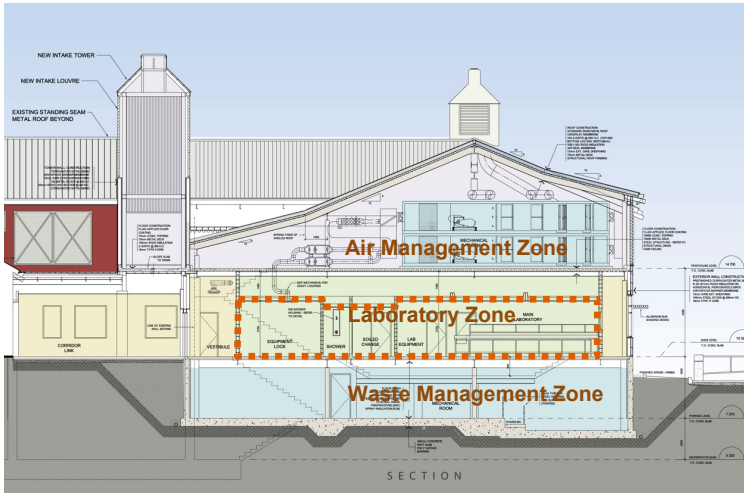
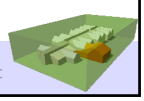


Section





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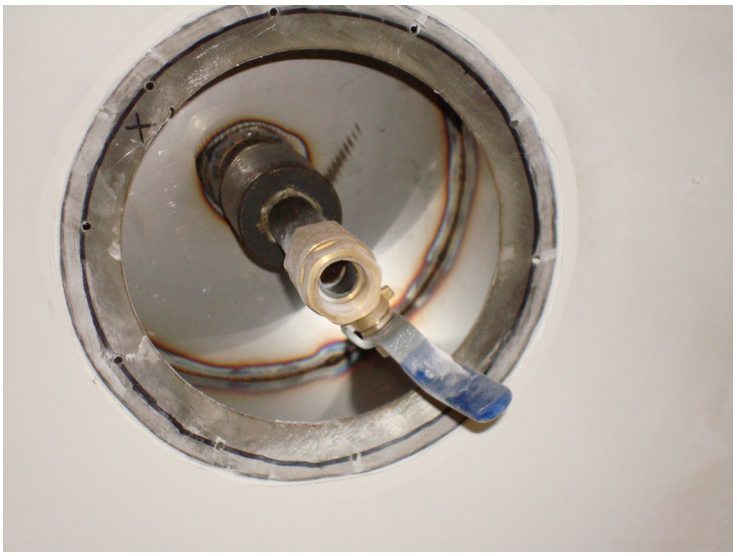

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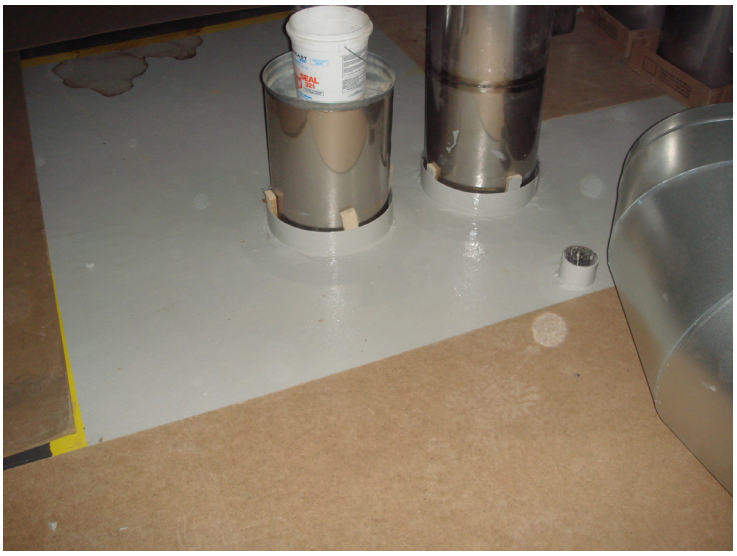


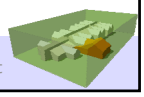
Lessons Learned

Each CL3 laboratory project has unique circumstances and constraints.

Solving the process flow was the essential "first step" and decision driver of the CL3 lab location, mechanical systems integration and setting the cost parameters.

Mechanical systems are 35 – 50% of the project complexity / cost and will drive critical decisions.

Using an "Integrated Design Process" involving the client / owner group, user group, design team, commissioning agent, facility manager, quantity surveyor and regulatory agencies was a critical factor in achieving a successful design, mitigating risk and containing the cost.



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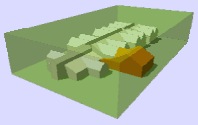

Thank You

Stantec