DALHOUSIE UNIVERSITY
FACULTY OF ENGINEERING
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Embassy Towers Maintenance Planning

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EMBASSY TOWERS

1. Background

Embassy Towers, a 162-unit condominium built in the early 1960's, and home to over 400 residents, is situated in downtown Halifax. Over the years, aging infrastructure and a gradual lack of understanding of some of the building's critical systems (water in particular) has led to several costly incidents.

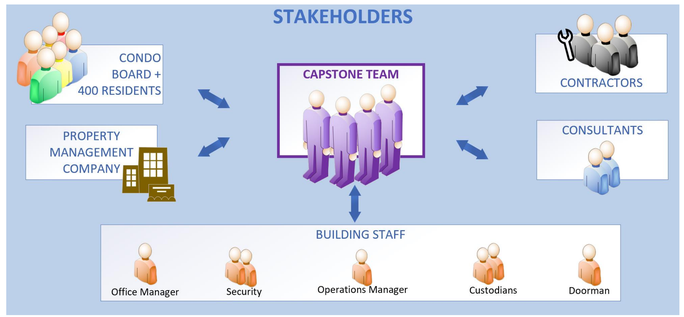
This situation is well-understood by the current Board of Directors, and in a bid to modernize their maintenance approach, the Capstone Project was initiated to begin the transition from a purely reactive to a proactive maintenance program.

2. Project Scope

Provide understanding of the Water & Electrical Systems:

- System Mapping
- Preventive Maintenance Plans
- Emergency Procedures
- Computerized Maintenance Management System
- Best Practices/Training

3. Design Process & Methodology

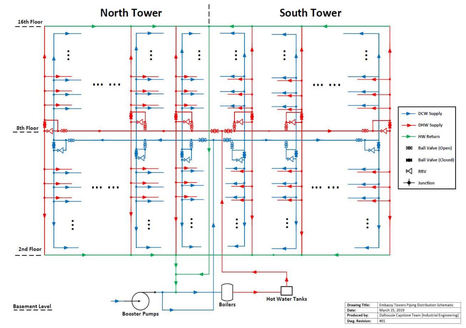


Work with stakeholders to validate investigative field work:

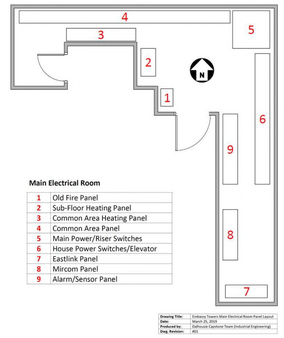
- Consult with Subject-Matter Experts
- Catalogue Critical Systems and Components
- Review and Update Existing Documentation
- Develop Maintenance/Emergency Plans
- Develop Computerized Maintenance Management System

4. Details of Deliverables

Piping Distribution Schematic



M.E.R. Panel Layout



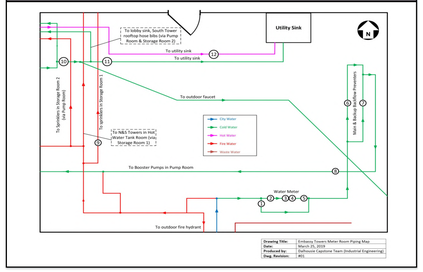
Preventive Maintenance Plan Guidelines

Description	Comment	Maintenance Frequency			Owner	Reference Documents
		Daily	Quarterly	Annually		
Overall Visual Inspection	Ensure all equipment is operating and safety systems are in place.	X			ET staff	W01-Daily Checklist W02-Quarterly Checklist W04-Annual Checklist
	Listen for high-pitched or other abnormal sounds.	X			ET staff	
Motor Condition	Check the condition of the motor through vibration analysis.		X		ET staff	
Check Mountings	Ensure all pump mountings are secure.		X		ET staff	
Complete Maintenance	Align coupling, inspect bearings, drive belts, lubrication, etc.			X	Qualified Technician	
	Adjust, repair or replace parts as necessary.			X	Qualified Technician	

System Labeling

Embassy Towers Maintenance Management System

Meter Room Piping Map



Emergency Procedure Guidelines

- Catalogue of critical valve functions and locations
- Validation of Emergency Procedures during building-wide shut-down tests
- Documentation can be used in emergencies and as a Preventive Maintenance Plan tool
- Step-by-step procedures to minimize damage in the event of plumbing and electrical emergencies

Option	Type of Shut-Down	System
1	Quick Building-Wide	Hot and Cold Water
2	Building-Wide	Hot and Cold Water
3	North Tower	Hot Water
4	North Tower	Cold Water
5	South Tower	Hot Water
6	South Tower	Cold Water
7	"Typical" Unit Drop	Hot Water
8	"Typical" Unit Drop	Cold Water
9	Component or Fixture	Hot or Cold Water

5. Conclusions & Recommendations

- Embassy Towers' lack of a concrete contingency plan puts occupants at risk, but the combined implementation of a Preventive Maintenance Plan and Emergency Procedure Guide is their best approach to continual, cost-effective and safe operations.
- All staff should develop familiarity with the tools provided and undergo regular "hands-on" training to enact the Emergency Procedures with confidence and to follow Preventive Maintenance protocols.
- Archiving work orders, schematics and other procedures is critical to building up a maintenance history which will inform future work.
- Process owners will play a critical role to assure sustainability and compliance with updating and auditing maintenance information and training.
- Planned maintenance must remain a priority and we recommend that Embassy Towers initiate future Capstone Projects to continue work on documentation of other critical systems and further development of the computerized maintenance management system.