RDH

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One Wall Centre

Glazing Replacement SGM

December 17th, 2011

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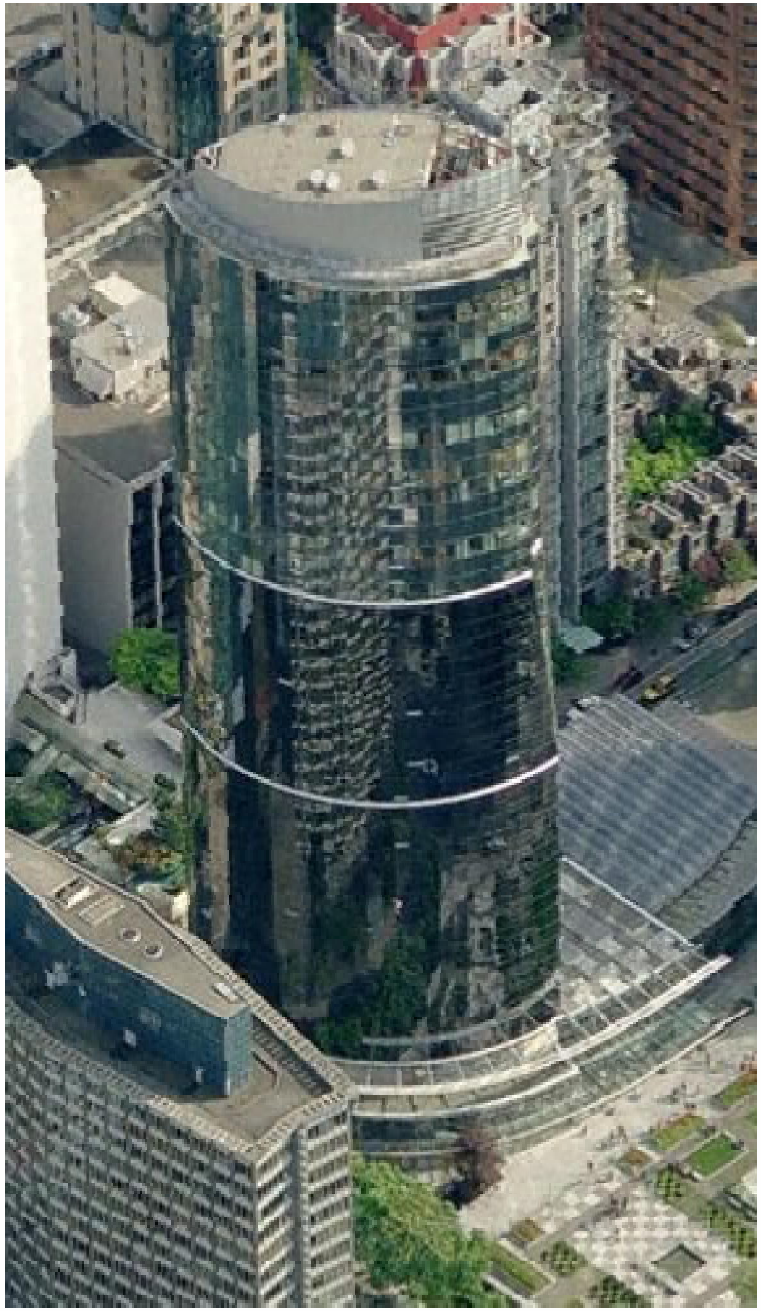


Agenda

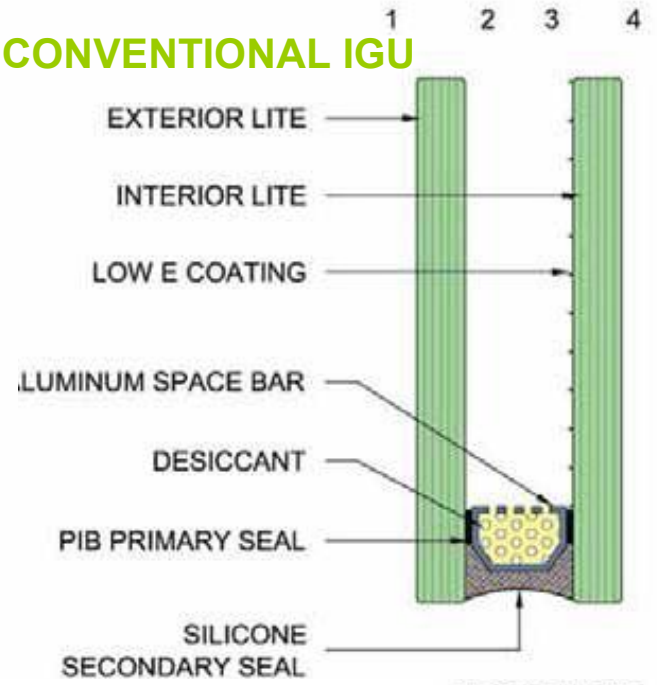
- Background
- Current status
- Glazing considerations
- Discussions with City on glass appearance
- Refinement of glazing selection
- Implementation
- Budget update
- Owner decisions
- Next Steps

Background – Fogging and Overheating

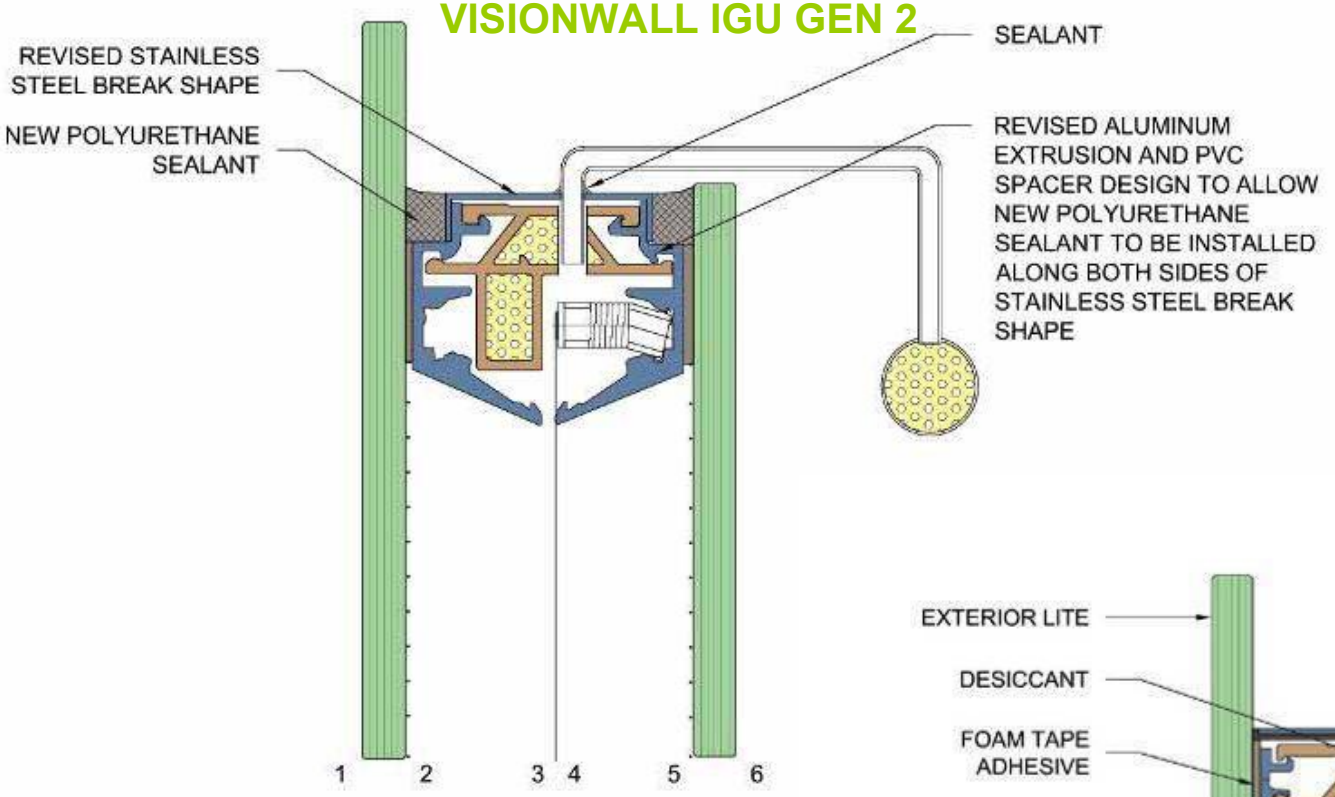
- *Fogged glazing unit and overheating problems since construction:*
- *Fogging problem is worse on some units and better on others*
  - *Severe – Any visible condensation, large corrosion spots, or permanent haze visible from 3m*
  - Moderate – Any corrosion/oxidation of the low-e coating visible from 3m
  - Minor – visible corrosion visible only less than 3m away
  - Clear – No visible corrosion

Background - Vision Wall IGU

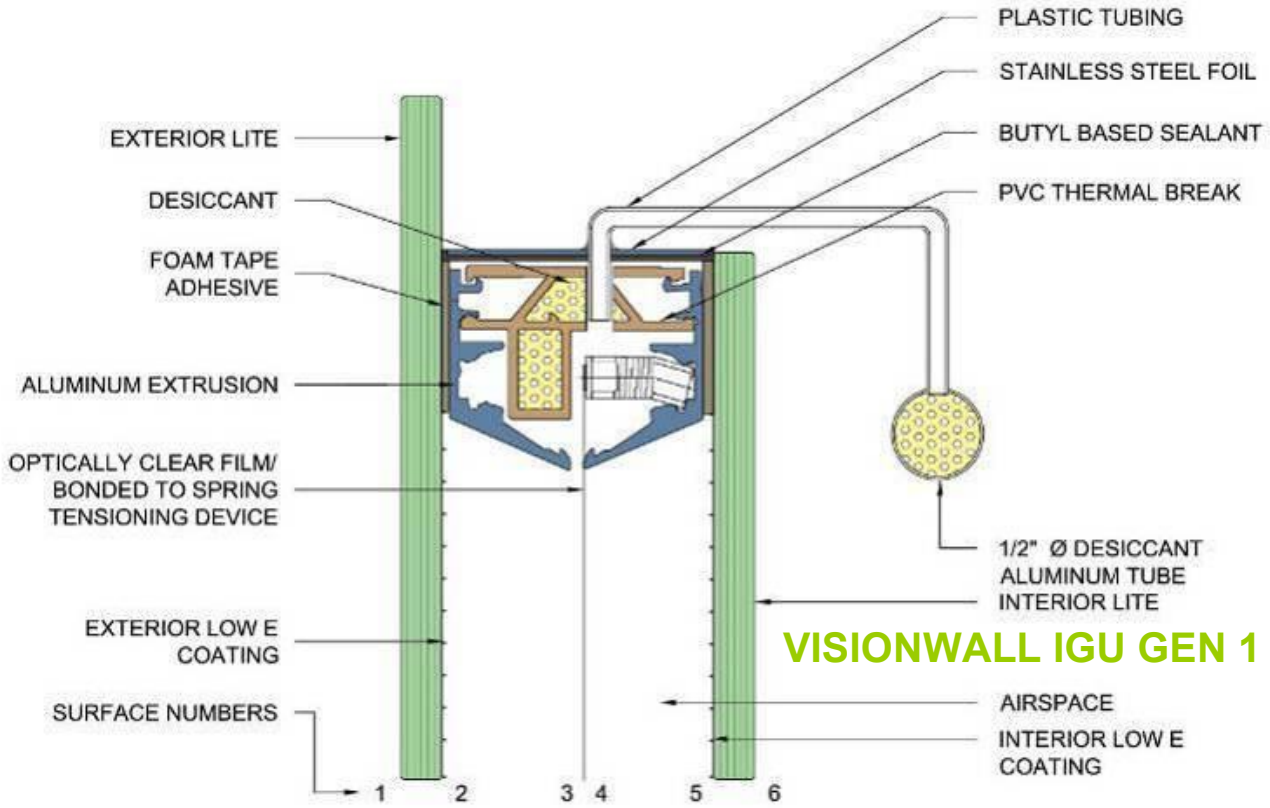
CONVENTIONAL IGU



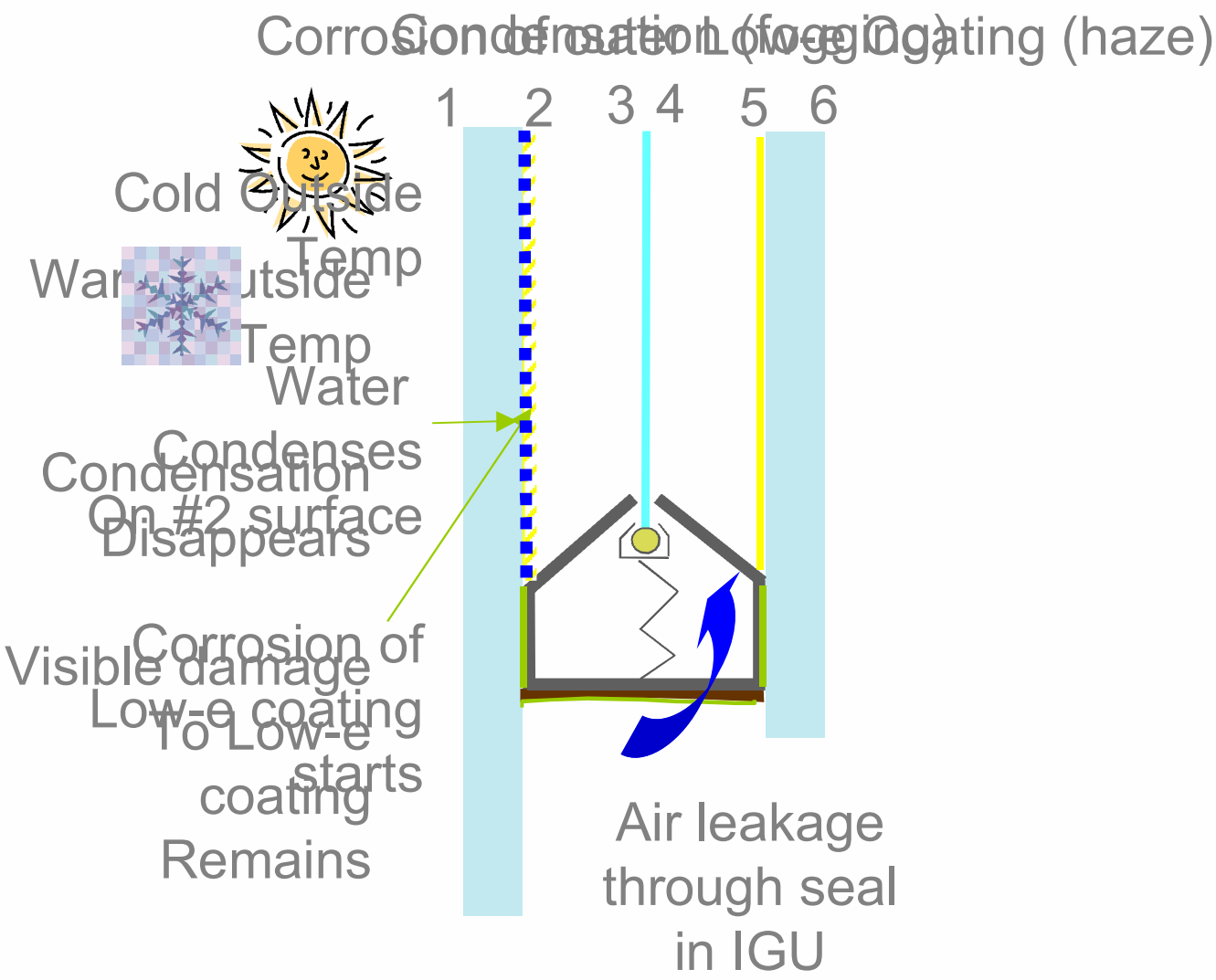
VISIONWALL IGU GEN 2



VISIONWALL IGU GEN 1



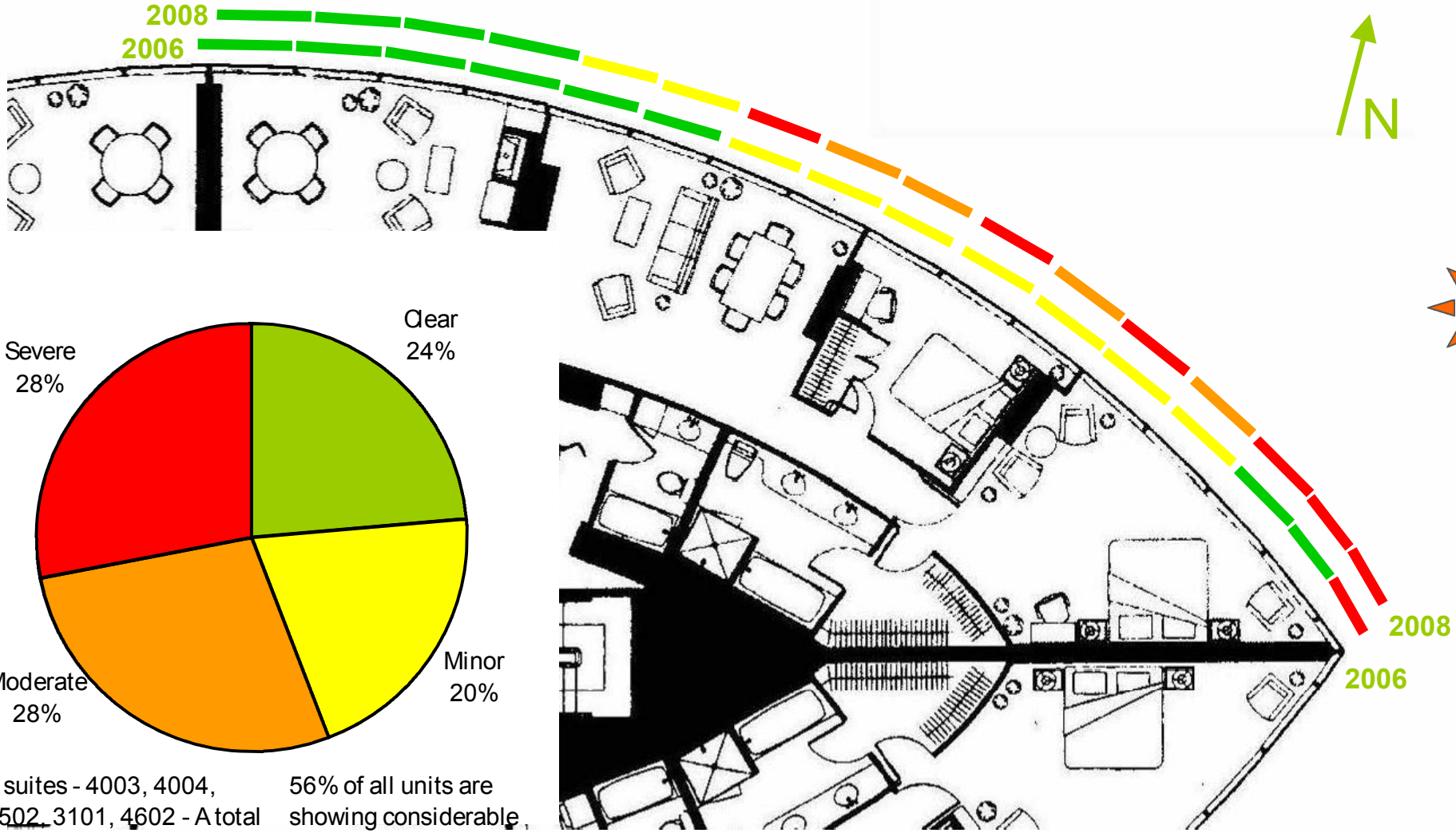
Background - Fogging Mechanism



Background - Failure

Background - Failure

Background - Increased Fogging with Time – Suite 4502



5 suites - 4003, 4004, 4502, 3101, 4602 - A total of 93 IGUs reviewed

56% of all units are showing considerable low-e corrosion

2010 to 2011

- Mechanical study to determine the cause of the overheating problem and if it could be resolved by the use of high performance clear or dark glazing.
- Design drawings and specification for glazing replacement and more accurate pricing
- Submission to the City for dark glass replacement units to match Hotel
- Investigation of Hotel Glass for Wall Financial
- Mechanical Study is the critical path since both the design drawings and submission to the City will rely on the results.

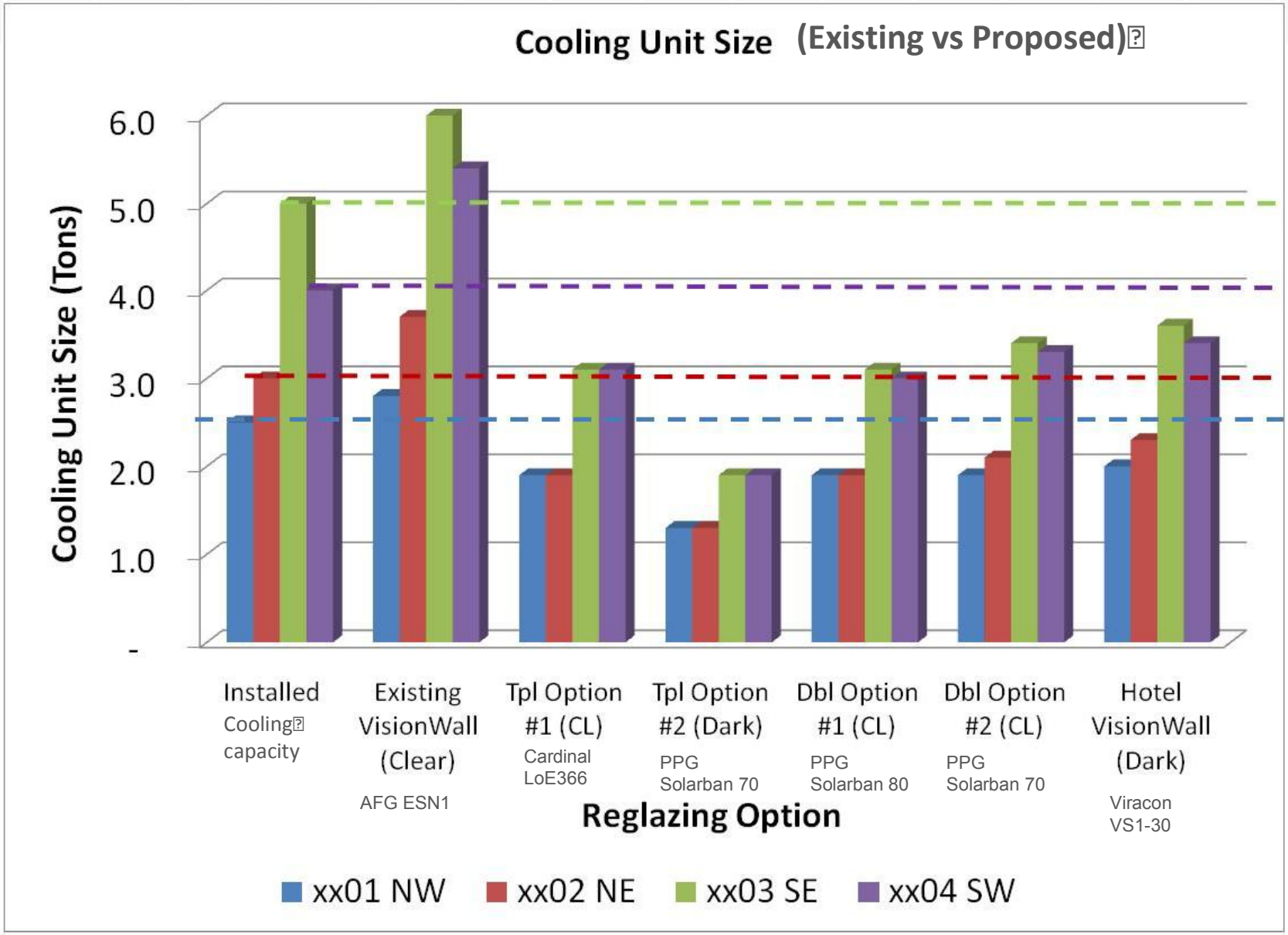
Hotel – Results from 2010 investigation

- RDH investigated the hotel windows in 2010.
- Same problem as residential but less visual corrosion as a result of:
  - Lower on the building (Less wind and stack pressure)
  - Different (more corrosion resistant) Low E coating
- Wall Financial is now aware that premature failure of their windows will occur.
- They have a much longer timeframe before they will need a full replacement program.
- Wall Financial has become much more engaged in our project now they understand that the issues are building wide.

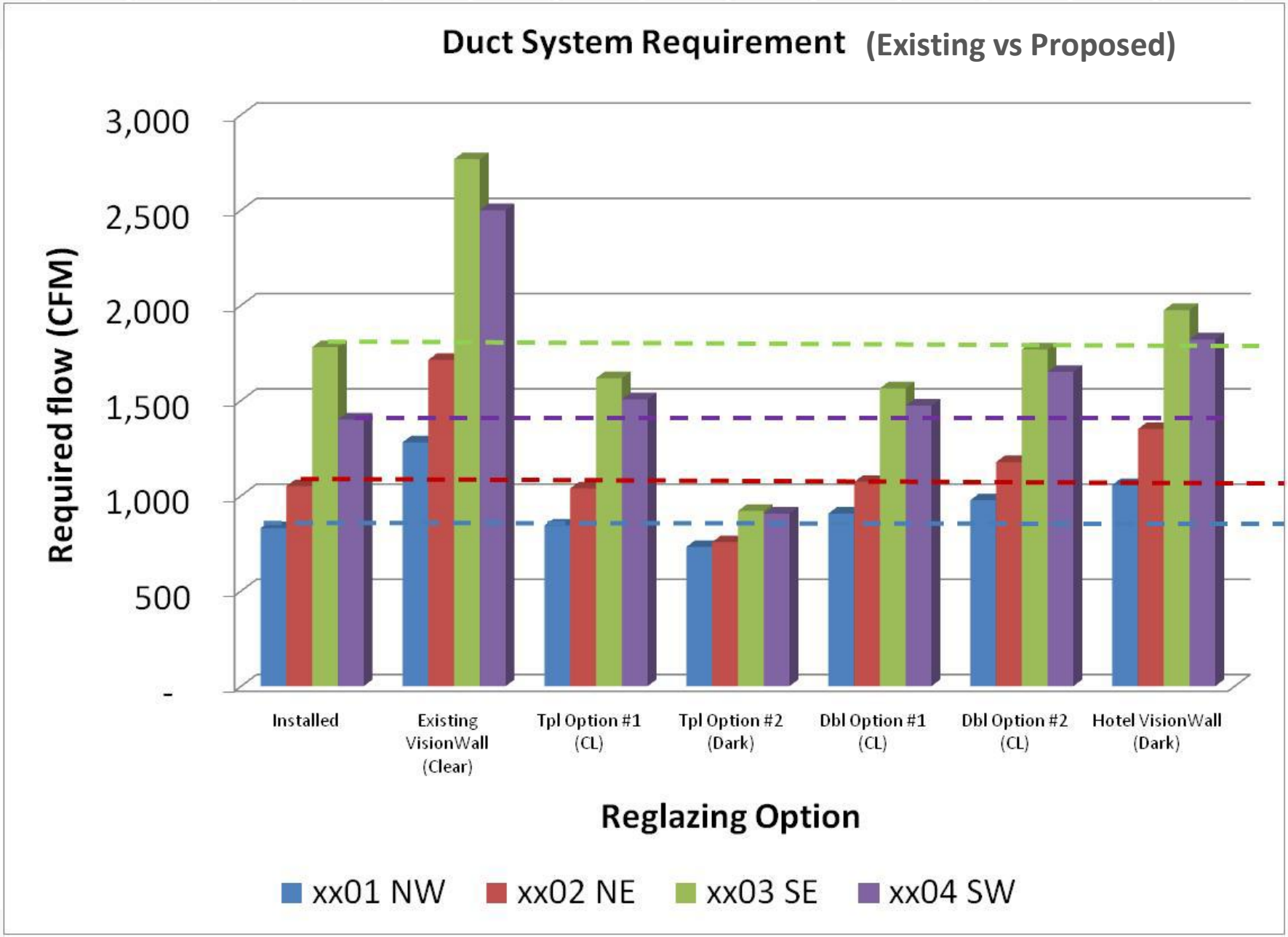
Mechanical - Results from 2010 Study

- Critical path
- Required to determine if dark glass is required to resolve overheating problem.
- No mechanical as-built drawings were ever produced. Information had to be field measured for all suites.
- Building energy model was completed for a typical floor using DOE analysis program by a forensic mechanical engineering company.

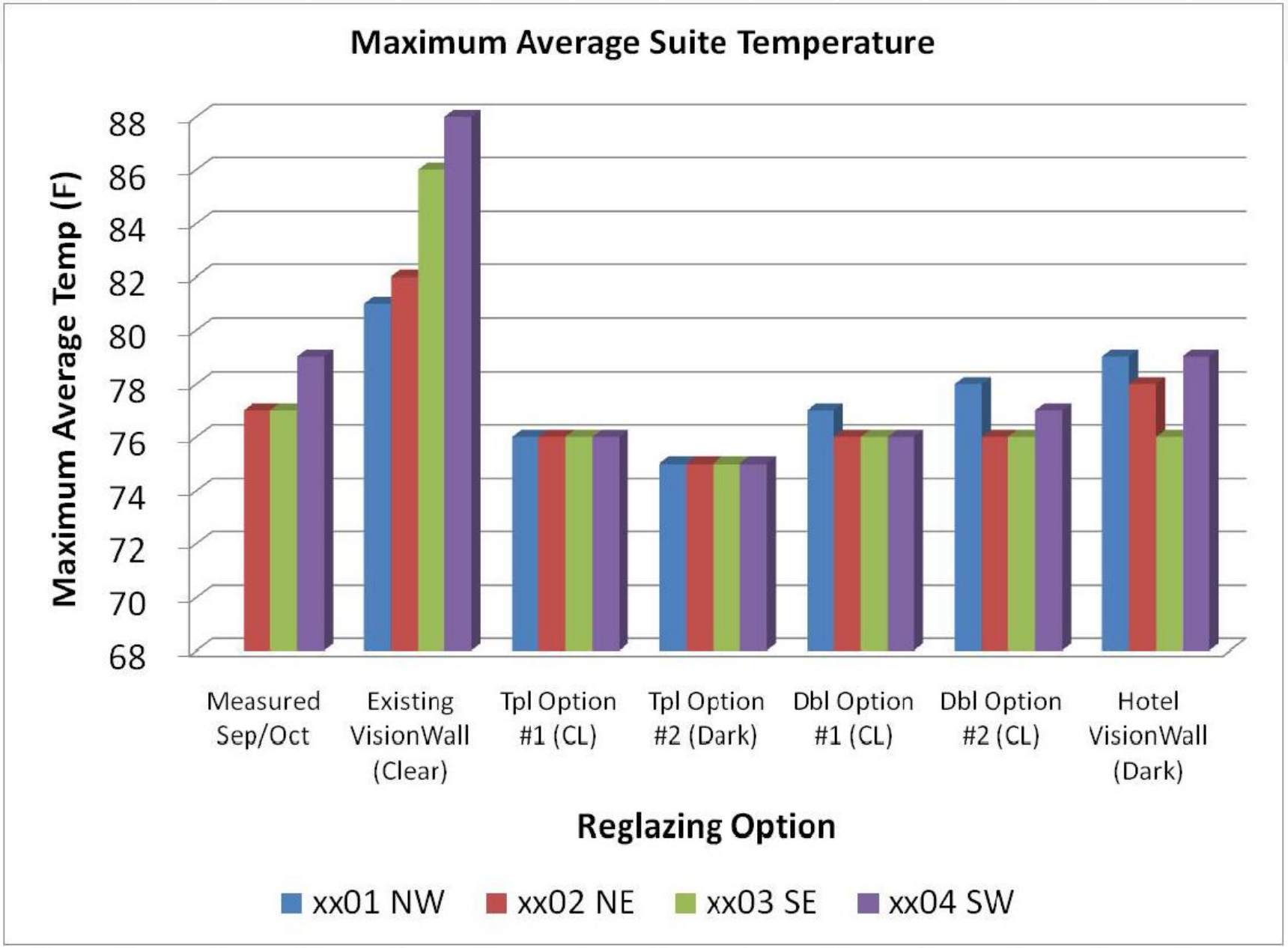
Mechanical - Results from 2010 Study



Mechanical - Results from 2010 Study



Mechanical - Results from 2010 Study



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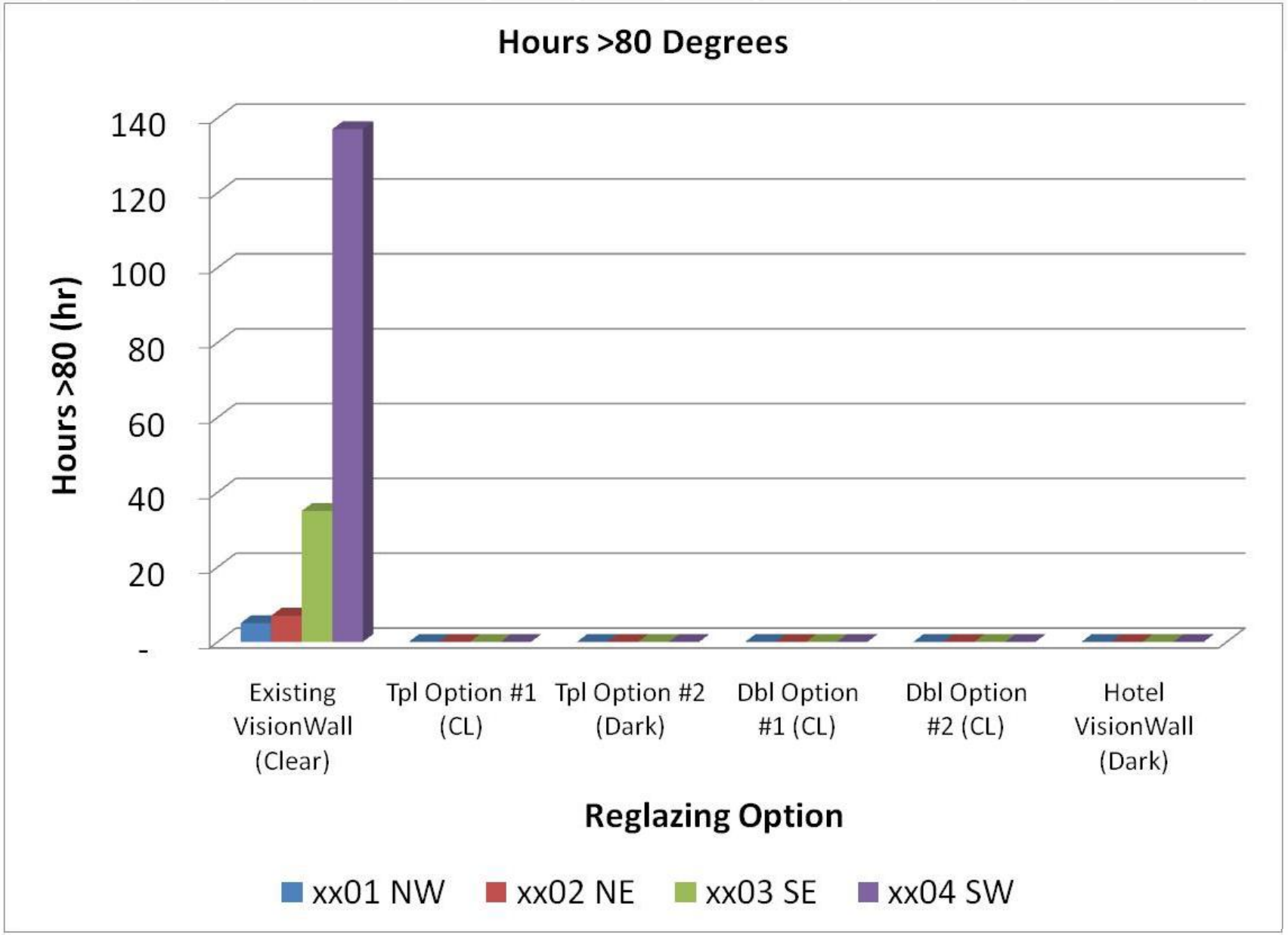
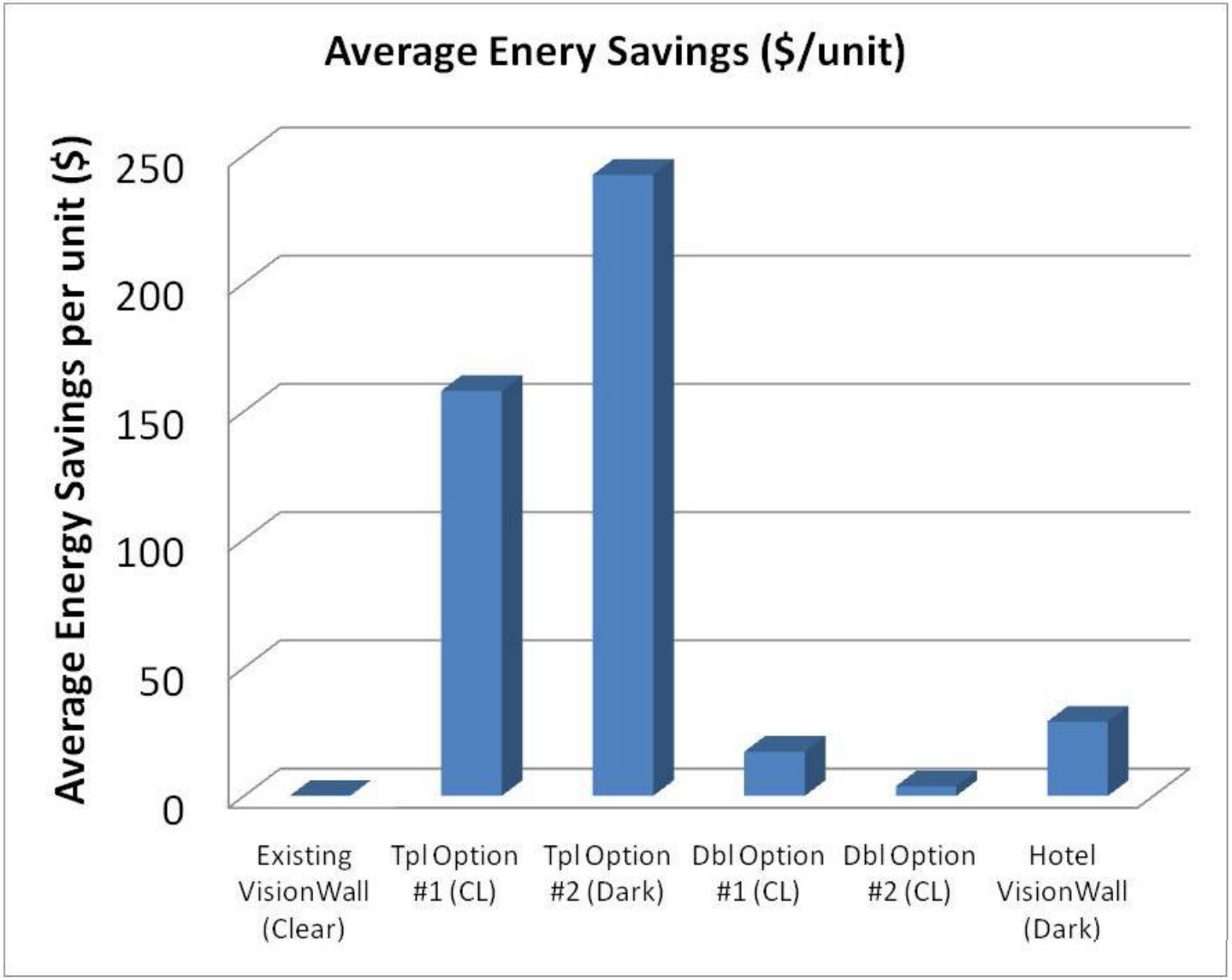


Mechanical - Results from 2010 Study



Mechanical - Results from 2010 Study

- Cooling units are generally undersized
- Ducting is significantly undersized (was not upgraded)
- New high performance clear glazing will provide similar or better performance to hotel dark glass.
- Mechanical under design can be resolved using high performance clear glazing in most suites
- Energy savings from glass replacement will be possible with triple glazed

Current Project Status

- Concepts for stage system were completed and included in the contract documents
- Final glazing options selected and incorporated into the contract documents after meetings with City and council
- Drawings and Specifications have been completed and were issued for pricing by stage and glazing contractors last month
- Pricing has been recently received for staging and glazing replacement
- Glazing choices have been further refined from the contract documents mainly for appearance

Glazing Considerations

Factors considered in the selection of glazing:

- Colour/tint/opacity
- How much light the glass transmits through (VLT)
- How much solar heat is allowed through (SHGC)
- Thermal Performance (U value)
- Reflectivity inside and outside
- Double glazed versus triple glazed
- Sound transmission
- UV transmittance
- Cost

Glazing Considerations

- The existing glazing for the hotel portion of the building is only available from one NA source
- The type of low E coating used for the hotel portion is not as readily available and will become more difficult to obtain in the future
- Matching the hotel glazing is difficult and more expensive
- The residential portion of the building a relatively clear glass with a slight green tint and is not a problem to match

Glazing Considerations

- The search for appropriate glazing choices started with five different glazing supply companies in North America. At this time there were approximately 40 to 50 possible choices in triple and double glazed.
- Narrowed the list down three suppliers and 10 to 15 choices after viewing samples and data sheets.
- After viewing larger samples with the strata council, on site viewing, discussions with the City, and considering the availability, costs, thermal properties and heat gain we narrowed it down to the four glazing choices specified in our contract documents.

Glazing Considerations

Glazing as specified:

	Specified	Current	Effect
VLT	> 30% and <45%	65%	
Less light			
SHGC	<0.27	0.50	Cooler
U value	TG<0.14	0.17	
Less energy			
	DG<0.27	0.17	More energy
Reflectivity	Low	Low	No change
STC	To match existing		No
change			
UV trans	8%	1%	More UV
Weighted UV trans	30%	44%	Less WUV
Colour	Grey/blue	Slight Green	

Glazing Considerations

Glazing Options as specified:

Triple Glazed:

- Viracon VS1-40 + VE1-85
- Guardian N50 + SN62
- Viracon VS1-30 + VE1-85 (for Level 31)

Double Glazed

- Guardian SN62 on Crystalgray
- AGC TiAC23

Additional operable vents option (at bedrooms) later voted down by owners

Discussions with City on glass appearance

- Nick Milkovich, representing the Hotel and the Strata Corporation, along with RDH has met with the City Planning department several times to discuss the possibilities of different glazing tints/colours and darkness
- City feedback provided by Planning Department to help the glazing selection process

Refinement of Glazing choice by Owners

- Over the past two weeks, large size mockups of glazing units have been reviewed by RDH, the Strata Council, Nick Milkovich, and the City. The glass was installed in a real building and viewed from the exterior and interior in different weather conditions.
- This process has led to the final selection of a triple glazed unit with two low-E coatings and an outer tinted glass lite.
- The selected glass type meets all of the performance criteria and has the best thermal rating of any glazing unit we reviewed. The glass type has been approved by the City. The glass type is darker than the existing residential level glass but lighter than the hotel and has a slight grey colour.

Refinement of Glazing choice by Owners

Refinement of Glazing choice by Owners

Implementation

- Given the issues at hand, and the need to remedy the existing problems, a construction process is necessary

RDH Construction Management

- RDH has a team of specialists
- Seasoned superintendents and project managers
- Solid track record and reputation
- All construction activity performed by experienced trade contractors
- All work bid to trade contractors on a competitive basis

Typical RDH CM Rehabilitation Projects

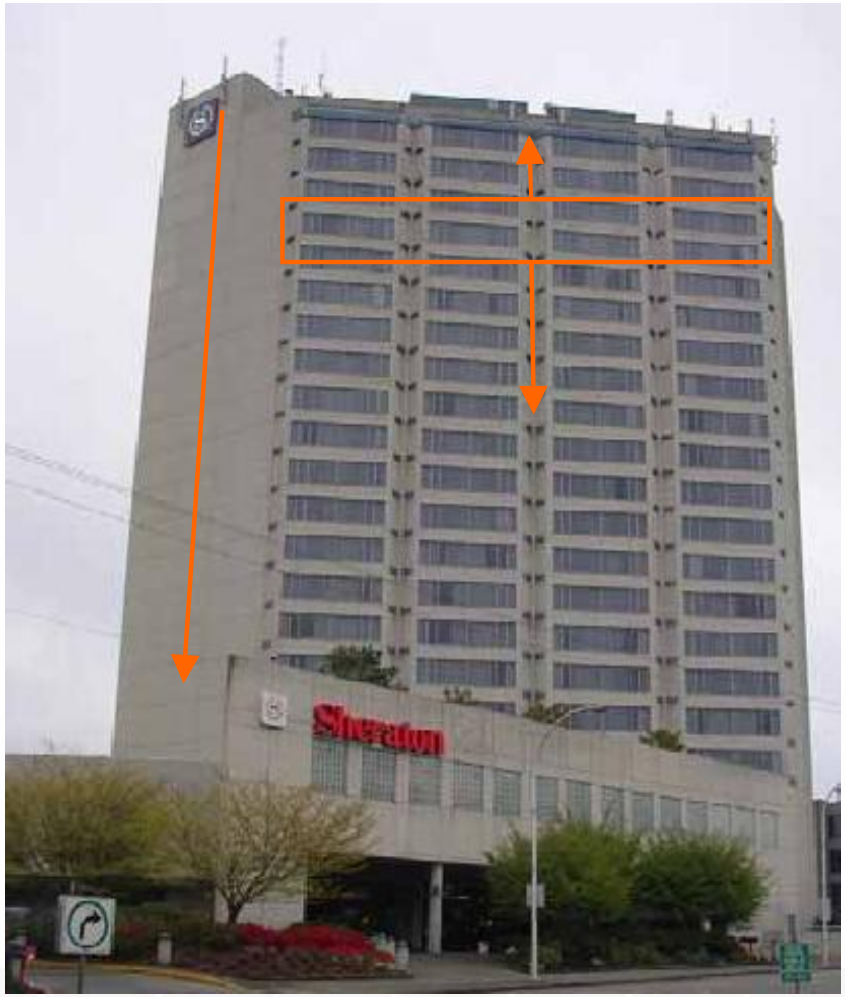
- Governor's Tower and Villas; one of the largest and most complex building envelope rehabilitations undertaken to date.
- While RDH works on projects of all types and sizes, if the issues are large, complicated, and challenging, RDH gets the call.
- Project costs initially budgeted at $30 million by others.
- Final RDH rehabilitation costs less than $26 million.

Typical RDH CM Rehabilitation Projects

- Royal Quays and Pacific Point. Complex and varied.

Typical RDH CM Rehabilitation Projects

The Sheraton Guildford had some issues similar to One Wall



Typical RDH CM Rehabilitation Projects

- RDH managed a cladding replacement program on the Sheraton Guildford Hotel while it carried on business as normal.
- RDH developed a rehabilitation strategy based on utilizing mast-climbers during the off-season to minimize disruption to hotel activities.

Typical RDH CM Rehabilitation Projects

- Project complete.
- The owners of the property indicated no year/year loss of volume and minimal disruption to commercial activity throughout the process.

Logistical Considerations - Access

Accessing the work area is not straight forward

The height, exposure, and tight location makes this project especially challenging

Logistical Considerations - Access

Swing stages are the conventional method for maintenance work however they aren't suitable for an extended construction project of this nature.

Swing stages have significant limitations with respect to efficiency, weight capacity, inclement weather, and wind.

Logistical considerations – Access Safety

Logistical considerations – Material Movement

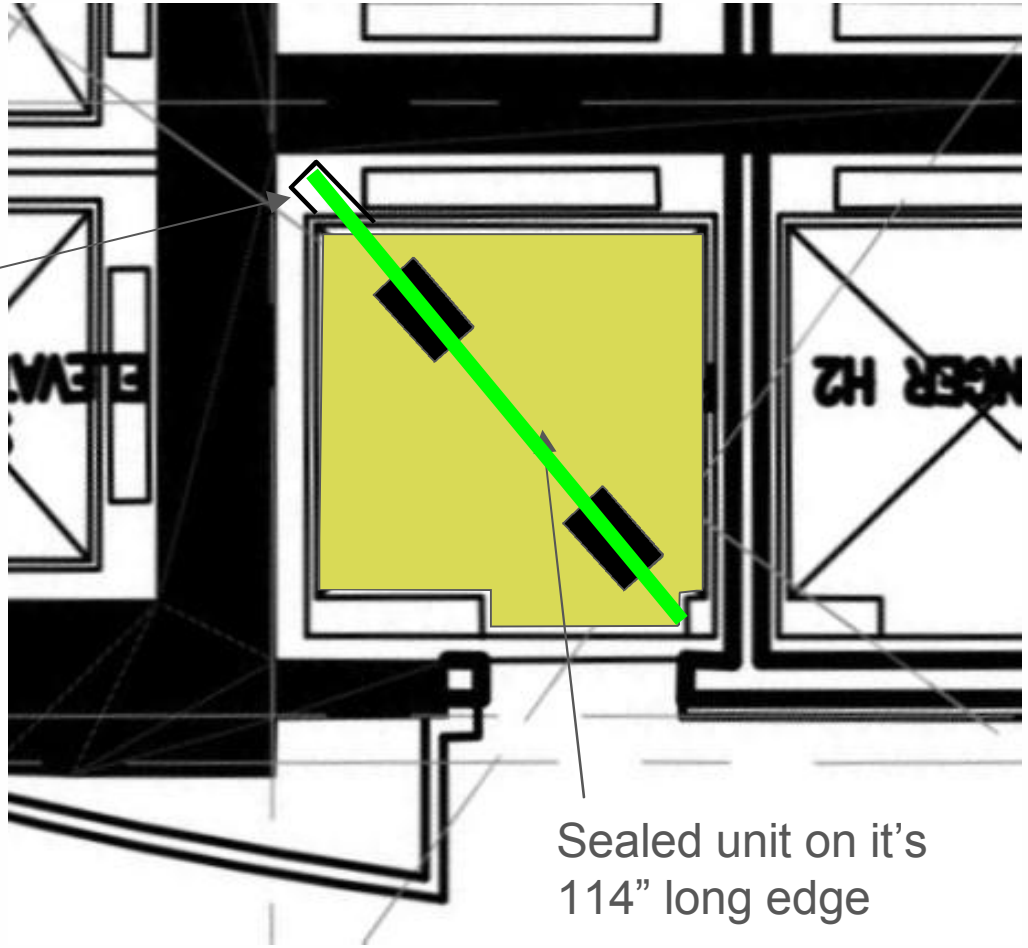
The sealed glazing units are very large, heavy, and difficult to handle.

Special methods will be required to remove, install, and transport these components.

Logistical considerations – Material Movement

Using the elevator to move the large sealed units requires modification of the R6 elevator cab.

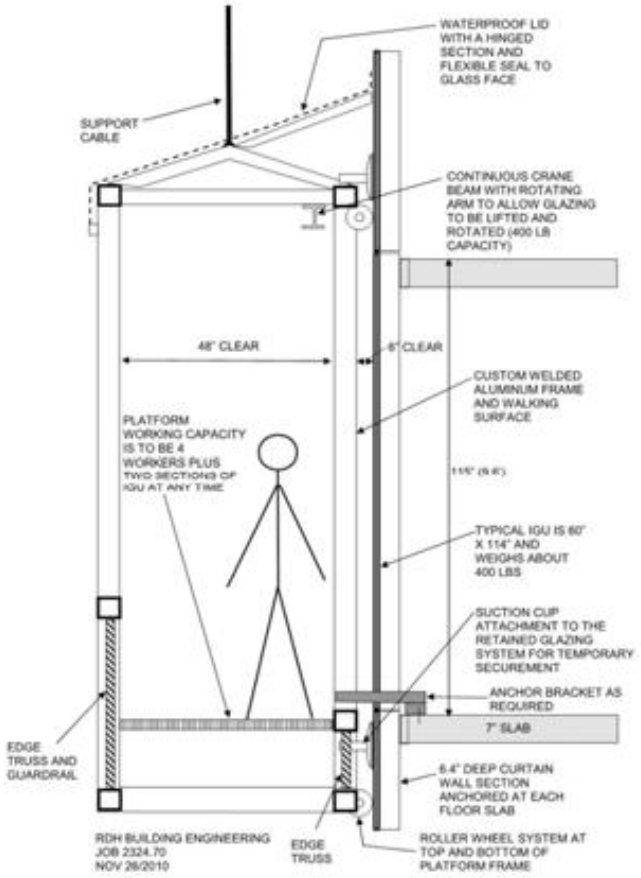
Cut out back of cab and create metal lined extension



Sealed unit on it’s 114” long edge

Logistical considerations – Access Concept

We needed to explore custom solutions to save time and money and to reduce the risk.



Call for Proposals

- We have received proposals from a total of 8 contractors to perform the work
- We have excellent concepts for the suspended work platform
- We have strong proposals from glazing contractors to replace the failed sealed units

RFP Results – Revised Budget

Construction Costs		$5,634,446
Construction Contingency		300,000
Construction Sub Total		**$5,934,446**
Permit fee		Waived
Engineering		250,000
HST on Const and Engineer		742,134
Warranty		196,984
Project Total	**(Rounded)**	**$7,120,000**

The contractors are prepared to sign price contracts on these numbers. Costs do not include admin fees or admin cont.

Owner Decisions

Decisions have been made on the following items:

- Additional operable vents are out
- Level 31 is included in the scope of work
- Final glazing selection is made and approved by the City

Owners decisions yet to be made:

- Is the repair work going to move forward?

If this problem is going to get resolved next year, the owners need to approve the work to proceed very soon.

Next Steps

- Design and concept refinement to be completed
- Level 31 confirmation of glass type
- Complete contract negotiations
- Full scale proof of concept mock-ups
- Preliminary construction activities
- Prepare for construction to start March 2012

Construction Implementation

Discussion