

3. Chimney Repairs - (Revised Update)

Further to our initial report dated March 30, 2018, we have found out some additional information that impacts our approach to the chimney repair work. The mechanical contractor advises us that as per the Natural Gas Code the chimney needs to be 15.25 metres (50') above the breeching in the basement mechanical room. This means that the chimney can be lowered by approximately 4 metres (13'). This leaves significantly more chimney standing than originally thought.

Working within a reasonable budget to complete stabilization and repointing work on the chimney we have looked at pinning or placing steel belts around the chimney, and deep repointing the outer face brick. The structural engineer has provided a brief description of findings and suggested means of repair work, as per the following:

The details of the brick chimney stack construction, including the interior liner, are unknown at this time. The brick and mortar construction appears to have deteriorated. The deterioration is probably due to a number of issues:

- general freeze-thaw damage due to normal weather exposure
- general thermal expansion / contraction due to normal weather, as well as operation of the boiler / chimney gas,
- flue gas near the top cooling, infiltration, condensation, freeze-thaw effects
- leakage from within the length of the flue liner / chimney, resulting in flue gas infiltration, condensation, freeze-thaw effects

Flue gas leakage (condensation) was visible along the height of the chimney, as well as moisture on the exterior surface of the bricks. Brickwork appears to be displaced along the height of the chimney.

It is proposed to remove the existing deteriorated chimney liner and replace it with new full height rated chimney flue. The brickwork would then be repaired. (*The chimney liner cost has been added to the cost summary below.*)

Assuming the new chimney does not have to be as high as the existing, from a structural perspective, it would be beneficial to remove the upper portion of the brickwork no longer required. The deterioration is most pronounced in the upper sections. There would be less wind exposure area, and thus less vertical and lateral loading on the brick chimney construction. There would be less area required to replace / repoint / reinforce.

Attached are a few conceptual sketches for consideration. There were several assumptions noted in developing the sketches. Materials and finish of materials will need to be reviewed. Stainless steel offers the most protection to the elements. Galvanized or epoxy coated would be next, but all damaged surfaces need to be repaired or the corrosion concentrates at the point of the imperfection. Rusting surfaces will stain the brick. It may be preferable to match the color / finish / profile to be as least visible as possible.

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The reinforcing could be installed in pair, staggered vertically and rotated. It would be prudent to tie the chimney back to the roof.

Note: *The chimney liner replacement has been added to the cost summary below. The cost is based on a quote from Walters Mechanical for removal of the deteriorated liner and replacement with a Class B chimney liner. We have included the applicable taxes in the quote.*

The Heritage Incentive Policy objectives include "... upgrading of designated heritage properties to ensure their long-term conservation, extend their effective life and/or to ensure their structural integrity." The chimney liner is required to prevent further deterioration of the brick masonry chimney due to escaping combustion gases.

Eligible Work, as described in the Heritage Incentive Policy, includes "Improvements required to meet National Building Code (NBC) or City of Regina bylaw requirements, including the repair or upgrading of mechanical and electrical systems." The repair of the mechanical system in this case includes the vital component of the chimney flue, which is part of the heating system in the building. The following Codes and Standards refer to chimney liners being required.

NBC Article 6.3.3.2.2) Masonry or concrete chimneys ... shall be designed and installed in conformance with the appropriate requirements in NFPA 211...

NFPA 211 – Article 7.2.2.1 Masonry chimneys shall be lined.

CSA B149.1 – Article 8.12.10 A metal chimney liner shall provide a continuous lining from the base inside the space where the appliance is located to the top of the masonry chimney flue, and it shall comply with the requirements of ULC S635. It shall be installed in accordance with the manufacturer's instructions.

Chimney Repairs (Priority 1) revised

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| Replace chimney liner with Class B vent | \$10,361.85 |
| Remove upper 13 feet of chimney (salvage good bricks) | \$11,275.00 |
| Repointing all except lower 22 feet (includes scaffold) | \$46,200.00 |
| Through-rod pinning or strapping | \$8,000.00 |
| Sub-Total | \$65,475.00 |
| General Contractor OH and General Requirements 15% | \$9,820.00 |
| Sub-Total | \$85,656.85 |
| Contingency 15% | \$12,848.53 |
| Sub-Total Costs | \$98,505.38 |
| Estimated fees 12.5% | \$12,313.17 |
| TOTAL ESTIMATED COST | \$110,818.55 |

Summary (Priority 1)

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| Tree removals | \$11,902.00 |
| Masonry repointing and stone repairs - partial | \$111,585.00 |
| Chimney repairs | \$110,818.55 |
| Foundation waterproofing – partial | \$46,270.00 |
| Wood window repairs | \$18,630.00 |
| Lighting energy efficiency upgrades | \$28,000.00 |
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| TOTAL ESTIMATED COST | \$327,205.55 |

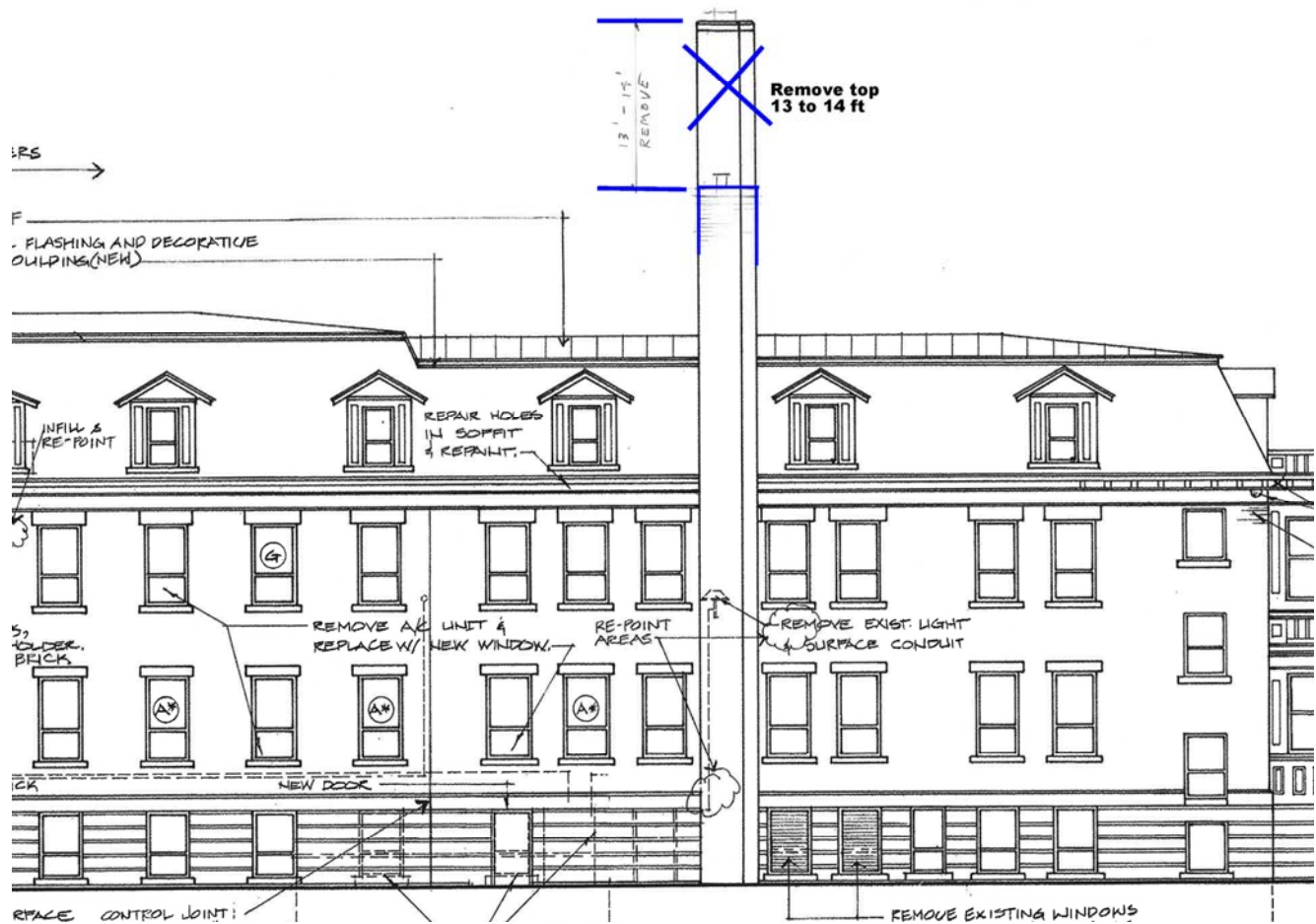
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| Consulting Services related to Conservation Plan | \$8,388.50 |
| Consulting Services related to Water Infiltration Study | \$1,500.00 |
| Sub-total | \$9,888.50 |
| GST (PST not applicable this phase of work) | \$494.43 |
| TOTAL FEE FOR PREPARATION OF SUBMISSION | \$10,382.93 |

The client cost limit has been established at \$270,000. This means that some cost-saving measures are still required on the current Priority 1 work. The current cost estimate contains a 15% contingency. Working with the General Contractor we can determine where further cost-saving measures may be obtained. If this is not possible or practical to do given the scope of work identified, then we will have to determine if some of the work identified can be deferred.

As discussed with the City, the Foundation Waterproofing work may be scaled back initially to save money. The work would include mud-jacking to fill voids below the existing concrete apron, re-grading of site south of the building to ensure there is a positive slope away from the building, and adjustment of some rain water leaders to direct water away from the area prone to water infiltration.

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