Fishburn Sheridan London Inc.

Carol Minuti

Cladding, Window and Door Replacement

450 SUNSET DRIVE, ST THOMAS, ON

Project Background

- The County of Elgin Administration Building located at 450 Sunset Drive, St Thomas, Ontario was constructed in 1939 as a nurses' residence to support the former St. Thomas Psychiatric Hospital and was purchased by the County in 1985. The current occupants range from County staff to private business tenants.
- The buildings exterior walls are made up of 3 main components:
  - Stone Masonry (Ground Floor)
  - Brick Masonry (Upper Floors)
  - Exterior Insulation and Finished System (EIFS) (Elevator Additions)
- The stone masonry at the ground floor is in good condition; however, the steel lintels above the windows are showing signs of corrosion and are in need of replacement.
- The brick masonry (upper floors) has been repaired numerous times since the buildings original construction. The majority of the bricks are broadcasting failure modes of cracking and spalling. Steel lintels above windows are showing signs of corrosion and are in need of replacement. The existing wall assembly does not have an air and vapour barrier (AVB) membrane, which has a negative impact in the building's energy efficiency. To provide an AVB membrane, the brick masonry layer is to be removed and a new cladding option is to be installed.
- The majority of the windows are aluminum framed and dated to 1984. The seals of the windows are worn, and the glazing is inefficient. The windows have exceeded their useful service life.
- The exterior doors are steel framed and dated to 1984. The frames and doors are observed to be corroding and have reached the end of their useful service life.

Project Objective

- To extend the life span of the building asset through repairs and/or replacement of cladding, windows and exterior doors.
- Enhance the buildings structural integrity, energy efficiency, improve aesthetics and the overall functionality of the outdated or deteriorated items captured in the project description.
- Dependant on the option selected the following qualitative functions will improve:
    - **Increased Occupant Comfort** - by a reduction in air leaks/air drafts, improved thermal control and consistent building temperature.
    - **Reduced Stress on HVAC System** - increased air tightness and R-value mean less frequent use of the heating and cooling systems. Therefore, lowering the cost of use and increasing the life span of equipment.
    - **Reduced Maintenance Costs** - current lack of air barrier leads to increased brick and mortar deficiencies such as spalling and cracking. Increased air tightness can reduce brick spalling and damages.
    - **Structural Stability -** defective bricks, mortar joints and corroded steel lintels lower the stability of the building's exterior elements. By improving the structural integrity of the deteriorated items, the buildings longevity is extended.

Cladding Observations

- Widespread brick and mortar deterioration is observed throughout the exterior cladding, most notably at the upper floors.

- Photos 1 & 2 show examples of spalled bricks. This type of deficiency is typically a result of repeat freeze-thaw cycles, moisture in the brick and/or long-term exposure to UV radiation.

- In photo 3, a typical view of a cluster of open and weathered mortar joints is shown. Repointing is required to secure loose bricks and prevent free water from entering the wall.

- A general observation outlined in photo 4 highlights differing drainage methods of the brick wall. Multiple repaired areas were provided with weep vents to allow moisture to drain from behind the brick to the exterior. Whereas the original brick wall is faced sealed with no available drainage path.

Photo 1

Photo 2

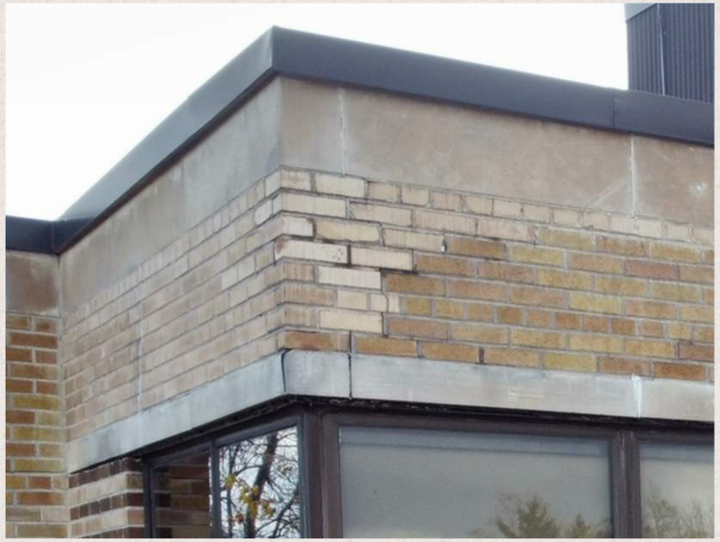


Photo 3

Photo 4

Cladding Observations - Cont'd

- Photos 5 & 6 show examples of deteriorated mortar joints and spalled brick. As well as a horizontal line in parallel with the windows steel lintel, caused by rust jacking.

- Photos 7 & 8 show a close up view of a typical window steel lintel at the building.

- The steel lintels are expanding due to the formation of rust (rust jacking) resulting in cracked bricks and mortar joints.

- The steel lintels were also noted to be deflecting, indicating a potential reduction in their structural capacity.

- No protective moisture barrier was noted to be installed on the top of the steel lintels.

Photo 5

Photo 6

Photo 7

Photo 8

Window Observations

- The windows are 41 years old and are showing signs of failure such as loss of insulating properties between the windowpanes, leaking seals and aging mechanisms resulting in difficulty opening and closing operable windows.

- Photo 9 shows the typical existing windows are aluminum frame, single pane with no coating. This window type has poor insulating properties in comparison to modern assemblies, which causes an inefficient thermal transfer and higher use of energy to heat and cool the building.

- Photo 10 is an example of strip window frames that are weathered due to failed seals.

- The sealant surrounding the windows is noted to be at the end of its useful service life with signs or cracking, adhesive and cohesive failure due to prolonged UV exposure.

Photo 9

Photo 10

Exterior Door Observations

- The exterior doors are steel framed and dated to 1984. The frames and doors are observed to be corroding and have reached the end of their useful service life.

- The existing weather seal surrounding the doors has deteriorated and is not performing to current standards. This causes an inefficiency in the building envelope thermal barrier which allows cold or warm air to enter the building between the doorframe and door.

- The existing doors have a single pane transom window incorporated into the frame as seen in Photo 11. These windows have a poor thermal performance rating and are not up to current construction standards.

- Sealant surrounding the door frames was noted to be deteriorating and at the end of its useful service life.

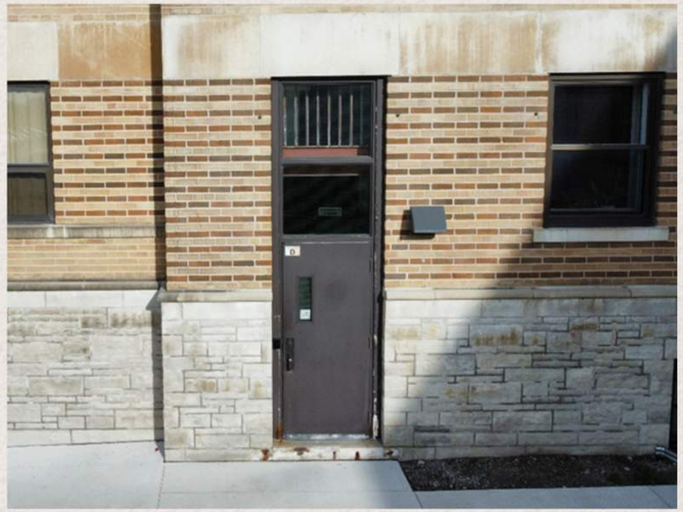


Photo 11

Photo 12

CLADDING
BASE CASE

Overview of Wall Assembly

- Structure is a reinforced cast-in-place concrete frame with a structural clay tile infill.

Existing Wall Assembly (Upper Floors)

- 4” Clay Brick (Exterior) - Common Bond
- 1” Air Space (Approx. 50% Mortar Filled)
- 8” Clay Tile Infill (4" Structural Clay Tile at every 6th course per common bond pattern)
- 5/8” Plaster (Interior)

R-3.80 / RSI-0.67

Existing Wall Assembly (Ground Floor)

- 6” Masonry Stone (Exterior)
- 1” Air Space (Approx. 50% Mortar Filled)
- 8” Clay Tile Infill
- 5/8” Plaster (Interior)

R-3.63 / RSI-0.64

Existing Wall Assembly (Total) - Base Case

Energy Consumption = 4451 GJ

OPTION 1

LIKE FOR LIKE + AVB

This first option aims to preserve the existing identity of the location, maintaining its original character and atmosphere. The project focuses on restoring certain elements that reflect the historical and cultural significance of the space while introducing new aspects that seamlessly blend with the existing design. The goal is to ensure a harmonious integration of the old and new, so the location maintains its identity while adapting to modern needs. This approach ensures continuity, respecting the past while providing a fresh perspective.

LIKE FOR LIKE + AIR & VAPOUR BARRIER MEMBRANE

OPTION 1

PROPOSED WALL ASSEMBLY (UPPER FLOORS)

- New 4" Clay Brick (Exterior)
- 1" Air Space
- New Air & Vapour Barrier
- New 1/2" Glass Faced Gypsum
- Existing 8" Clay Tile Infill
- Existing 5/8" Plaster (Interior)

R-3.86 / RSI-0.68

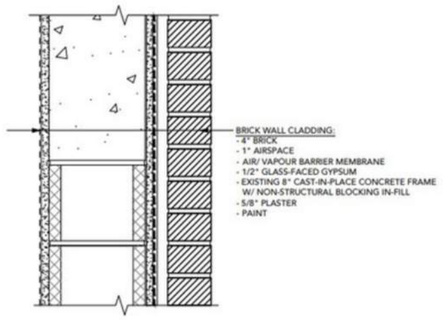
Change from Existing = +R-0.06 / +RSI-0.01

PROPOSED WALL ASSEMBLY (GROUND FLOOR)

- Localized 6" Masonry Stone with Steel Lintel Replacement (Exterior)
- Existing 1" Air Space
- Existing Air & Vapour Barrier
- Existing 8" Clay Tile Infill
- Existing 5/8" Plaster (Interior)

R-3.70 / RSI-0.65

Change from Existing = No Change



BRICK WALL CLADDING
UPPER FLOORS - OPTION 1

PROPOSED WALL ASSEMBLY (SUMMARY)

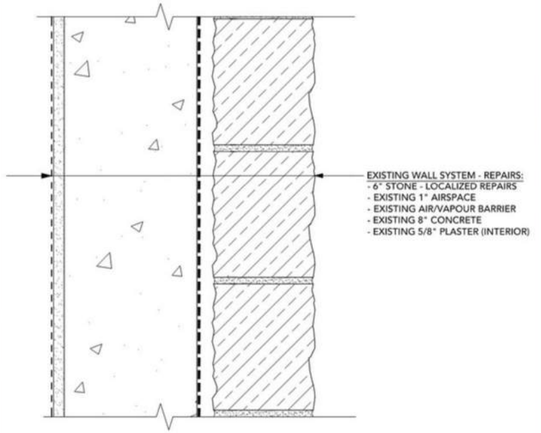
Energy Consumption = 2,519 GJ

Energy Consumption Savings from Base Case = 43.40%

Cost = $ 4,100,000 + HST

Construction Schedule = 24 months

Life Expectancy = 75 years



EXISTING WALL SYSTEM - REPAIRS
LOWER FLOOR- OPTION 1


Note: Existing brick to be removed to the buildings substrate and new brick to be installed
Continue with the existing texture and colour
Replace existing brick
Replace existing brick
Existing main entrance to remain
Precast concrete bands
Replace lintels, ground floor stone to remain or replace

OPTION 2 - DRAINED EIFS

This option seeks to maintain the location's original identity, preserving its unique character and atmosphere. The focus is on restoring key elements that highlight the historical and cultural value of the space, while introducing new materials that seamlessly integrate with the existing design. The aim is to achieve a balance between the old and the new, ensuring the location's identity is preserved while meeting contemporary needs. This approach respects the past and provides a refreshed perspective, with the appearance remaining unchanged despite the material updates.

EXTERIOR INSULATION AND FINISH SYSTEMS (EIFS)

OPTION 2A

PROPOSED WALL ASSEMBLY (UPPER FLOORS)

- Top/Base Coat with Fiberglass Reinforcement
- 5" EPS Insulation
- Air & Vapour Barrier
- 1/2" Glass Faced Gypsum
- Existing 8" Clay Tile Infill
- Existing 5/8" Plaster (Interior)

R-20.60 / RSI-3.62

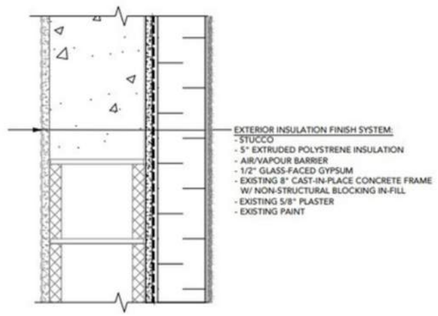
Change from Existing = +R-16.80 / +RSI-2.95

PROPOSED WALL ASSEMBLY (GROUND FLOOR)

- Top/Base Coat with Fiberglass Reinforcement
- 7" EPS Insulation
- 1/2" Glass Faced Gypsum
- Existing Air & Vapour Barrier
- Existing 8" Clay Tile Infill
- Existing 5/8" Plaster (Interior)

R-28.10 / RSI-4.94

Change from Existing = +R-24.50 / +RSI-4.30



EXTERIOR INSULATION FINISH SYSTEM
UPPER FLOORS - OPTION 2A & 2B

PROPOSED WALL ASSEMBLY (SUMMARY)

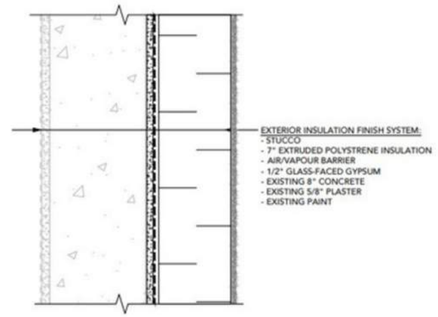
Energy Consumption = 1,540 GJ

Energy Consumption Savings from Base Case = 65.40%

Cost = $ 3,765,000 + HST

Construction Schedule = 18 months

Life Expectancy = 30 years



EXTERIOR INSULATION FINISH SYSTEM
LOWER FLOORS - OPTION 2A

EXTERIOR INSULATION AND FINISH SYSTEMS (EIFS)

OPTION 2B

PROPOSED WALL ASSEMBLY (UPPER FLOORS)

- Top/Base Coat with Fiberglass Reinforcement
- 5" EPS Insulation
- Air & Vapour Barrier
- 1/2" Glass Faced Gypsum
- Existing 8" Clay Tile Infill
- Existing 5/8" Plaster (Interior)

R-20.60 / RSI-3.62

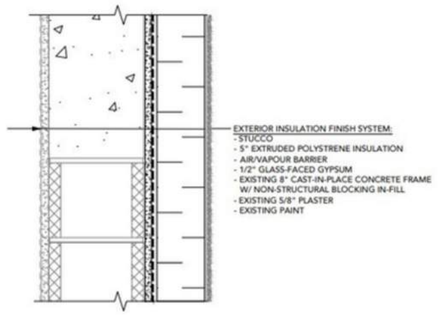
Change from Existing = +R-16.80 / +RSI-2.95

PROPOSED WALL ASSEMBLY (GROUND FLOOR)

- Localized 6" Masonry Stone with Steel Lintel Replacement
- Existing 1" Air Space
- Existing Air & Vapour Barrier
- Existing 8" Clay Tile Infill
- Existing 5/8" Plaster (Interior)

R-3.63 / RSI-0.64

Change from Existing = No Change



EXTERIOR INSULATION FINISH SYSTEM
UPPER FLOORS - OPTION 2A & 2B

PROPOSED WALL ASSEMBLY (SUMMARY)

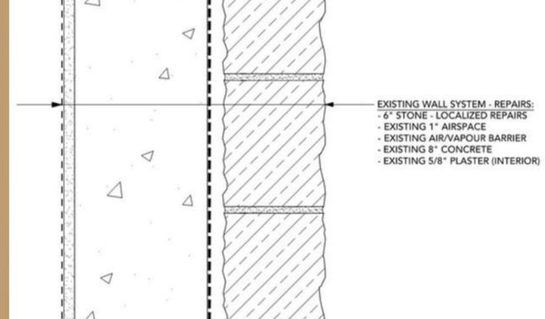
Energy Consumption = 2,007 GJ

Energy Consumption Savings from Base Case = 54.90%

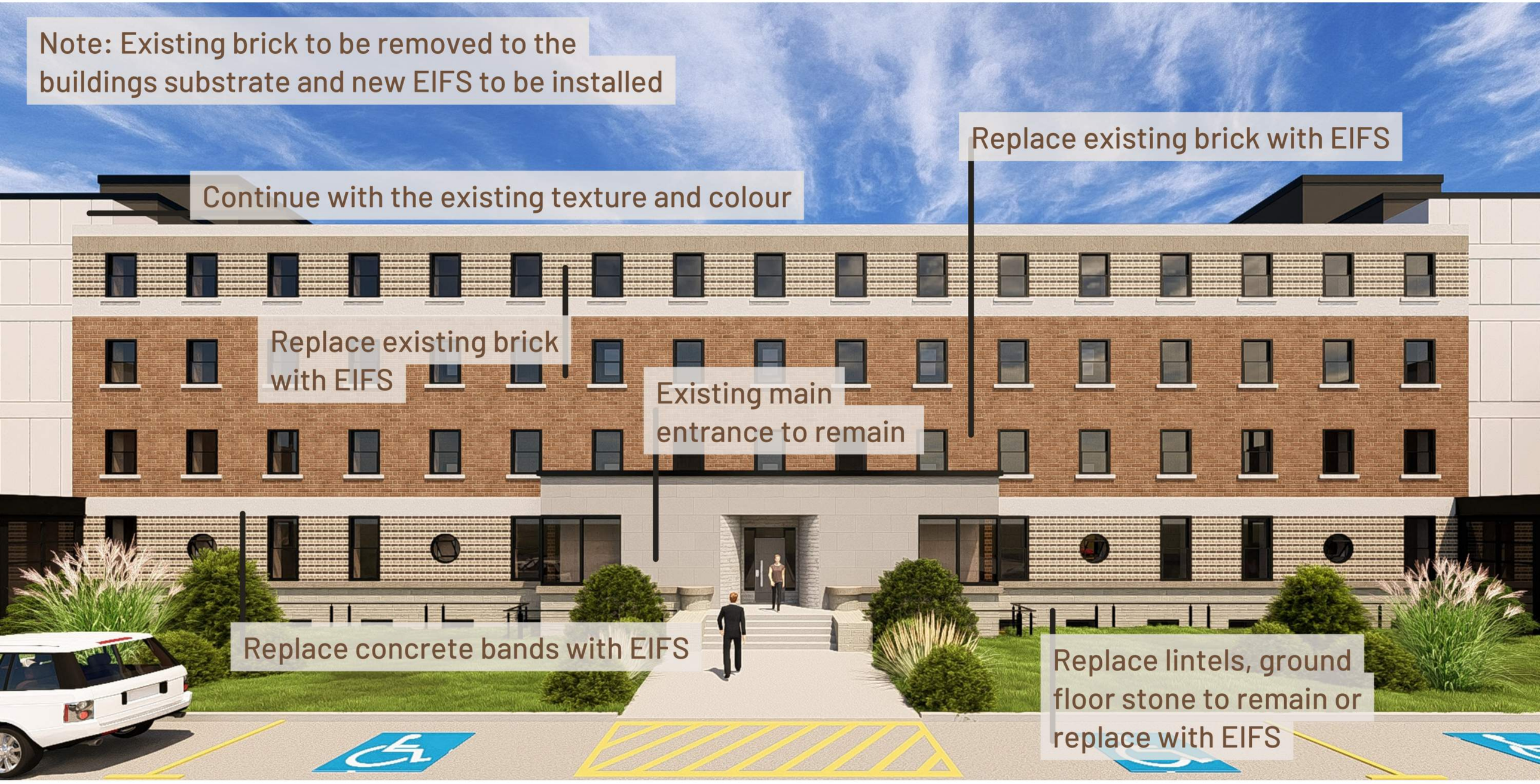
Cost = $ 3,155,000 + HST

Construction Schedule = 16 months

Life Expectancy = 30 years



EXISTING WALL SYSTEM - REPAIRS
LOWER FLOOR- OPTION 1


Note: Existing brick to be removed to the buildings substrate and new EIFS to be installed
Replace existing brick with EIFS
Continue with the existing texture and colour
Replace existing brick with EIFS
Existing main entrance to remain
Replace concrete bands with EIFS
Replace lintels, ground floor stone to remain or replace with EIFS

The brick veneer is made up of singular thin preformed brick units that are brought to site. The brick units are than pressed into a thin bed of mortar spread across the wall assembly. Once in-place the mortar joints are tooled to create a joint profile.

OPTIONS 2A & 2B HAVE THE SAME APPEARANCE AS THE FIRST OPTION. HOWEVER THE DIFFERENT MATERIAL ASSEMBLY IS AS SHOWN IN THE ABOVE IMAGE.

OPTION 3 -ACP

The third option introduces a more dramatic transformation, especially in terms of colour. The overall tone is darker, with shades of gray and black dominating the design. While the materials change, replacing bricks with ACP aluminum panels in varying sizes and colours, the modern, bold aesthetic remains intact. These panels create a sleek, contemporary look, offering a fresh take while preserving the building's structural integrity. The contrast between the dark tones and the new materials provides a striking visual impact, highlighting a more urban, industrial aesthetic.

ALUMINUM COMPOSITE PANEL (ACP)

OPTION 3A

PROPOSED WALL ASSEMBLY (UPPER FLOORS)

- ACP
- 5" Spray Foam Insulation
- Existing 8" Clay Tile Infill
- Existing 5/8" Plaster (Interior)

R-20.10 / RSI-3.53

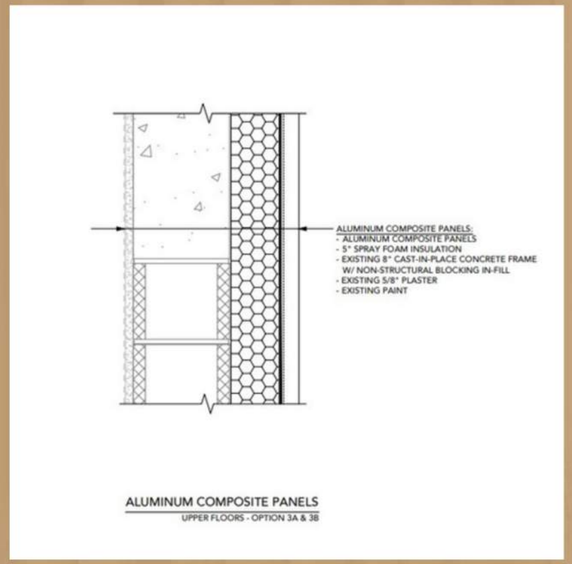
Change from Existing = +R-16.30 / +RSI-2.86

PROPOSED WALL ASSEMBLY (GROUND FLOOR)

- ACP
- 7" Spray Foam Insulation
- Existing 8" Clay Tile Infill
- Existing 5/8" Plaster (Interior)

R-27.30 / RSI-4.81

Change from Existing = +R-23.70 / +RSI-4.17



PROPOSED WALL ASSEMBLY (SUMMARY)

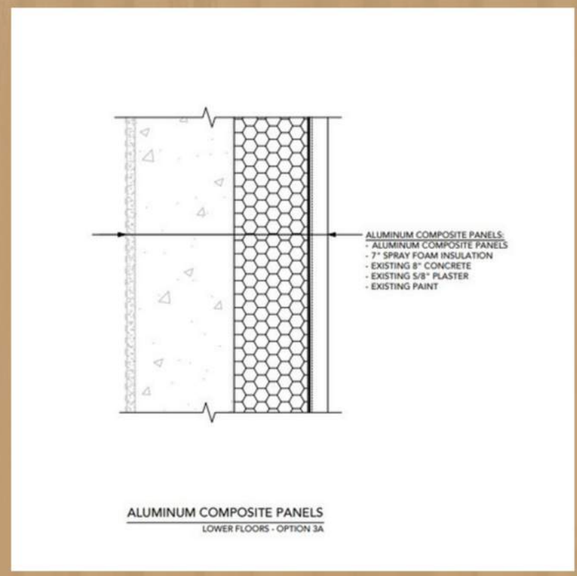
Energy Consumption = 1,546 GJ

Energy Consumption Savings from Base Case = 65.30%

Cost = $ 3,513,000 + HST

Construction Schedule = 18 months

Life Expectancy = 40 years



ALUMINUM COMPOSITE PANEL (ACP)

OPTION 3B

PROPOSED WALL ASSEMBLY (UPPER FLOORS)

- ACP
- 5" Spray Foam Insulation
- Existing 8" Clay Tile Infill
- Existing 5/8" Plaster (Interior)

R-20.10 / RSI-3.53

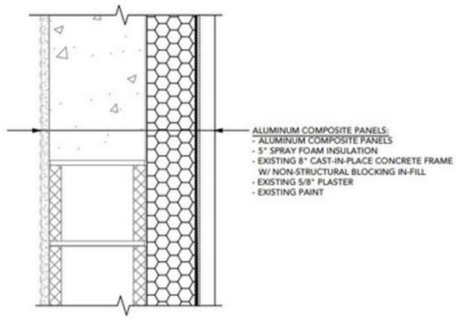
Change from Existing = +R-16.30 / +RSI-2.86

PROPOSED WALL ASSEMBLY (GROUND FLOOR)

- Localized 6" Masonry Stone with Steel Lintel Replacement
- Existing 1" Air Space
- Existing Air & Vapour Barrier
- Existing 8" Clay Tile Infill
- Existing 5/8" Plaster (Interior)

R-3.63 / RSI-0.64

Change from Existing = No Change



ALUMINUM COMPOSITE PANELS
UPPER FLOORS - OPTION 3A & 3B

PROPOSED WALL ASSEMBLY (SUMMARY)

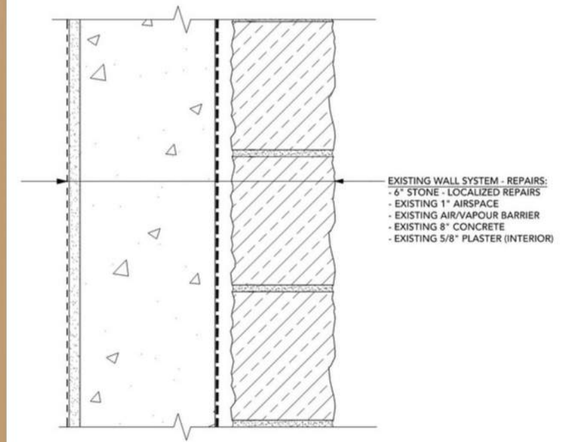
Energy Consumption = 2,011 GJ

Energy Consumption Savings from Base Case = 54.80%

Cost = $ 2,944,000 + HST

Construction Schedule = 16 months

Life Expectancy = 40 years



EXISTING WALL SYSTEM - REPAIRS
LOWER FLOOR- OPTION 1

ALUMINUM COMPOSITE PANEL (ACP) OVERCLAD

OPTION 3C

PROPOSED WALL ASSEMBLY (UPPER FLOORS)

- ACP Overclad
- Existing 4" Clay Brick with Localized Repairs
- Existing 1" Air Space
- Existing 8” Clay Tile Infill
- Existing 5/8” Plaster (Interior)

R-3.80 / RSI-0.67

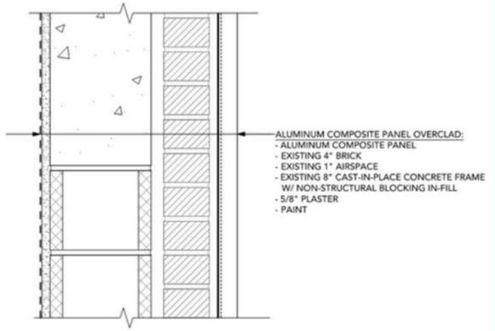
Change from Existing = No Change

PROPOSED WALL ASSEMBLY (GROUND FLOOR)

- Localized 6” Masonry Stone with Steel Lintel Replacement
- Existing 1” Air Space
- Existing Air & Vapour Barrier
- Existing 8” Clay Tile Infill
- Existing 5/8” Plaster (Interior)

R-3.63 / RSI-0.64

Change from Existing = No Change



ALUMINUM COMPOSITE PANEL OVERCLAD

UPPER FLOORS - OPTION 3C

PROPOSED WALL ASSEMBLY (SUMMARY)

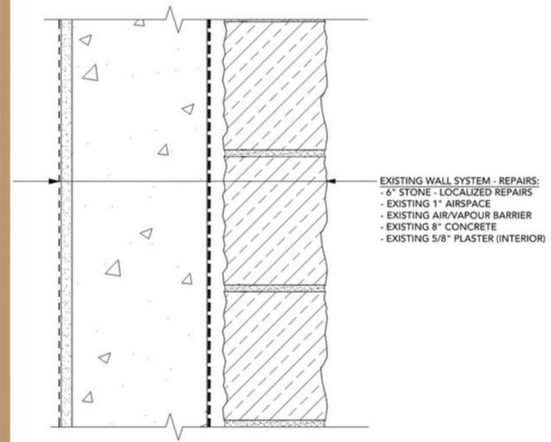
Energy Consumption = 4,451 GJ

Energy Consumption Savings from Base Case = 0%

Cost = $ 1,800,000 + HST

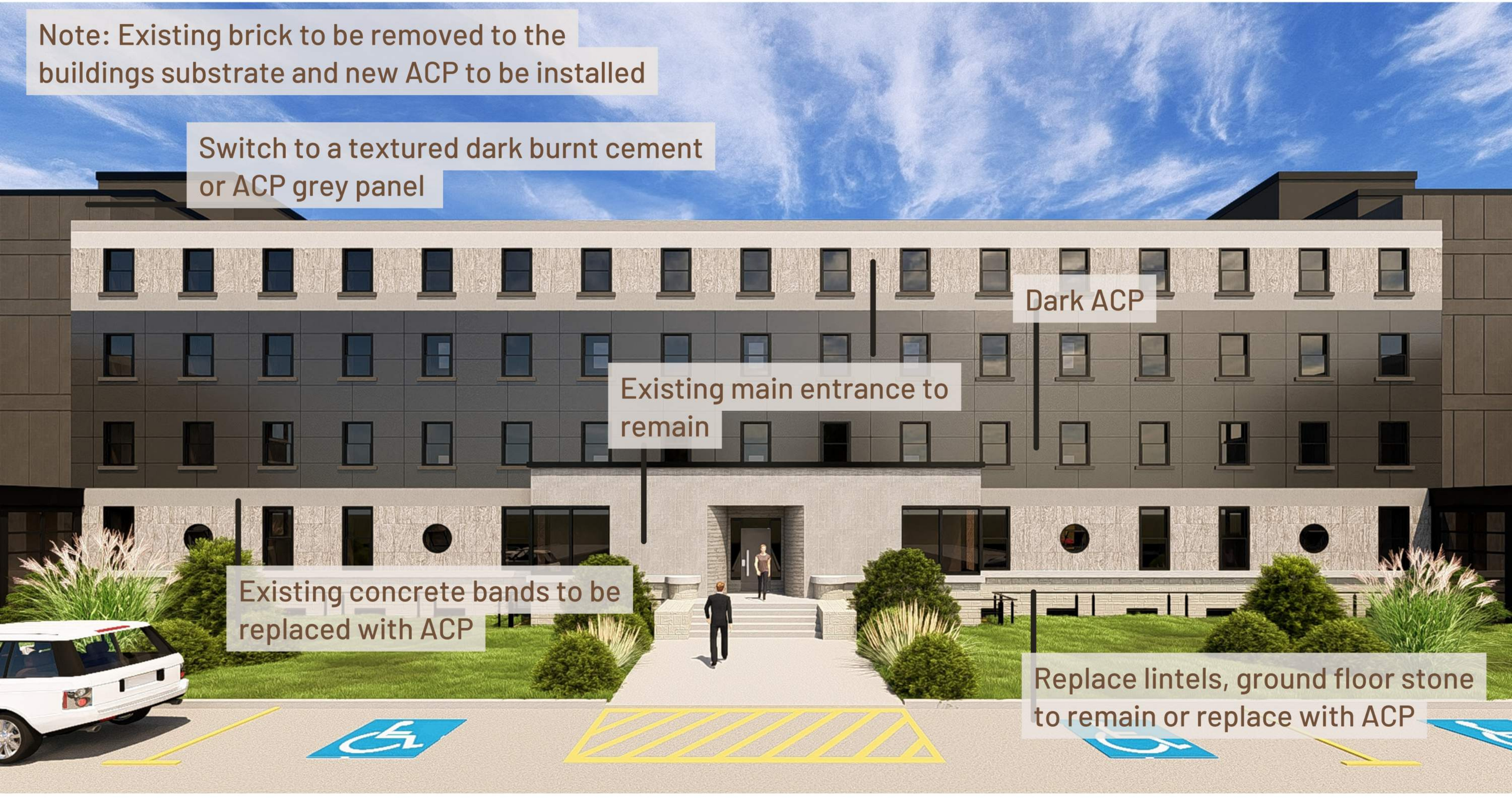
Construction Schedule = 12 months

Life Expectancy = 40 years



EXISTING WALL SYSTEM - REPAIRS

LOWER FLOOR- OPTION 1


Note: Existing brick to be removed to the buildings substrate and new ACP to be installed
Switch to a textured dark burnt cement or ACP grey panel
Dark ACP
Existing main entrance to remain
Existing concrete bands to be replaced with ACP
Replace lintels, ground floor stone to remain or replace with ACP

WINDOWS

Base Case for Energy Modelling

<u>Existing Double Pane Window</u>
Beyond Useful Service Life

U-Value = 3.0 w/m^2/°C
Energy Consumption = 4451 GJ

WINDOWS

Option 1A

- Aluminum Frame
- Insulating Glass Units: Double Glazed
- Argon Filled
- Low E-Coating

U-Value = 1.4 w/m^2/°C
Energy Consumption Savings from Base Case = 32.2%

Cost = $ 3,130,000 + HST
Life Expectancy = 40 years

WINDOWS

Option 1B

- Aluminum Frame
- Insulating Glass Units: Triple Glazed
- Argon Filled
- Low E-Coating

U-Value = 0.8 w/m^2/°C
Energy Consumption Savings from Base Case = 35.0%

Cost = $ 3,847,000 + HST
Life Expectancy = 40 years

WINDOWS

Option 2A

- Vinyl Frame
- Insulating Glass Units: Double Glazed
- Argon Filled
- Low E-Coating

U-Value = 1.53 w/m^2/°C
Energy Consumption Savings from Base Case = 31.60%

Cost = $ 2,804,000 + HST
Life Expectancy = 30 years

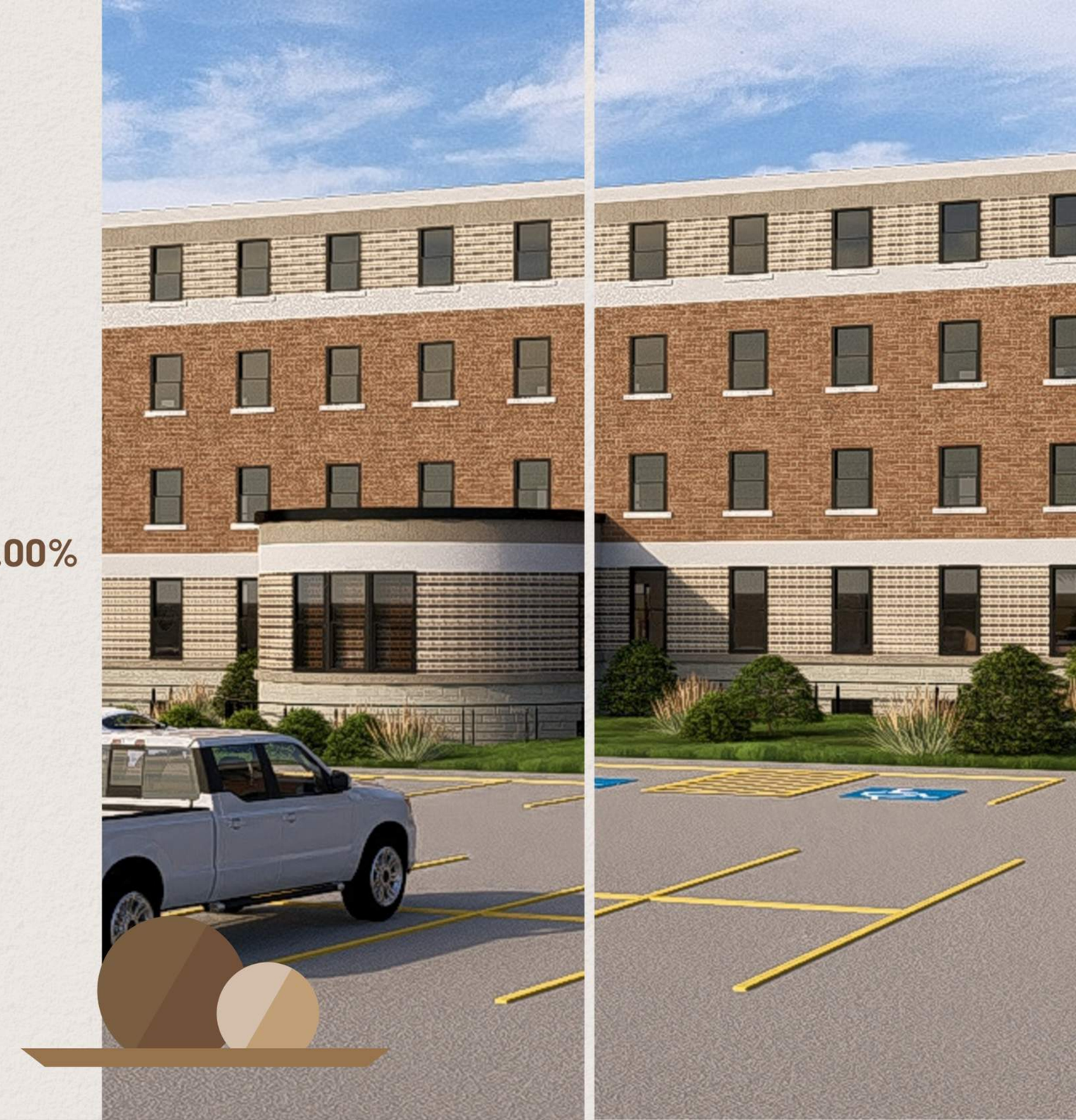
WINDOWS

Option 2B

- Vinyl Frame
- Insulating Glass Units: Triple Glazed
- Argon Filled
- Low E-Coating

U-Value = 1.02 w/m^2/°C
Energy Consumption Savings from Base Case = 34.00%

Cost = $ 3,364,000 + HST
Life Expectancy = 30 years



EXTERIOR DOORS

Base Case for Energy Modelling

<u>Existing Metal Doors</u>
Beyond Useful Service Life

U-Value = 1.8 w/m^2/°C
Energy Consumption = 4451 GJ

EXTERIOR DOORS

Option 1 - Hollow Metal Door –
1.75" Extruded Polystyrene Infill

U-Value = 0.94 w/m^2/°C
Energy Consumption Savings from Base Case = 30.5%

Cost = $ 73,000 + HST
Life Expectancy = 30 years

EXTERIOR DOORS

Option 2- Hollow Metal Door –
1.75” Polyurethane Infill

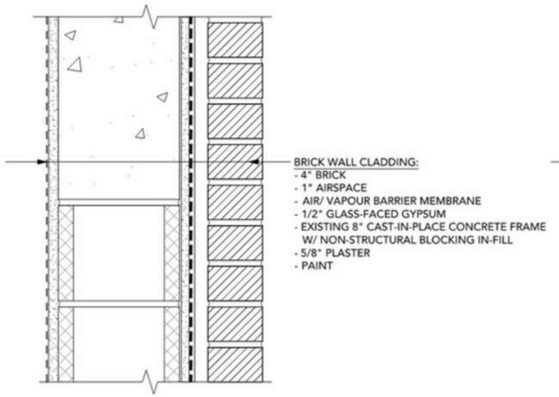
U-Value = 0.52 w/m^2/°C
Energy Consumption Savings from Base Case = 32.5%

Cost = $ 93,000 + HST
Life Expectancy = 30 years

SUMMARY - CLADDING COMPARISON

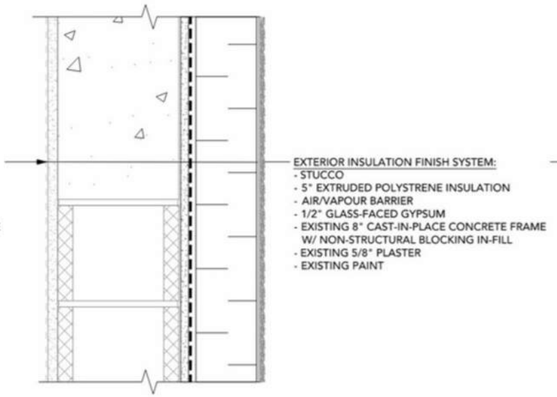
Exterior Cladding Option	Option 1	Option 2A	Option 2B	Option 3A	Option 3B	Option 3C
Cladding Type	Clay Brick	EIFS Incl. Ground Floor	EIFS	ACP Incl. Ground Floor	ACP	ACP Overclad
Energy Consumption (Giga Joules)	2,519	1,540	2,007	1,546	2,011	4,451
Energy Consumption Saving from Base Case	43.40%	65.40%	54.90%	65.30%	54.80%	0.00%
Cost (plus HST)	$ 4,100,000	$3,765,000	$ 3,155,000	$ 3,513,000	$ 2,944,000	$ 1,800,000
Contruction Schedule (months)	24	18	16	18	16	12
Life Expectancy (years)	75	30	30	40	40	40
Cost/Life Expectancy per Year ($)	$ 54,667	$ 125,500	$ 105,167	$ 87,825	$ 73,600	$ 45,000
Energy Savings per Year ($)	$ 3,800	$ 5,730	$ 4,810	$ 5,720	$ 4,800	$ 0
Net Cost Per Year ($)	$ 50,867	$ 119,770	$ 100,357	$ 82,105	$ 68,800	$ 45,000

SUMMARY - CLADDING CROSS-SECTION OPTIONS



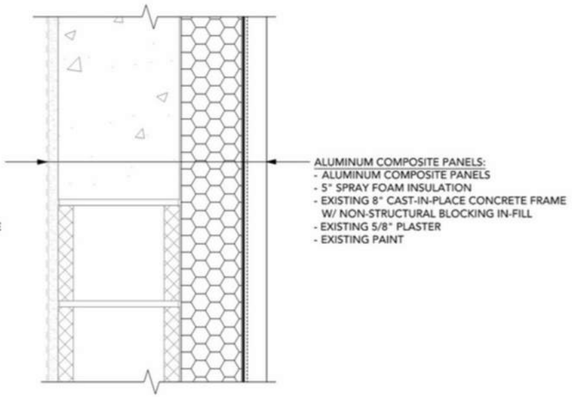
BRICK WALL CLADDING

UPPER FLOORS - OPTION 1



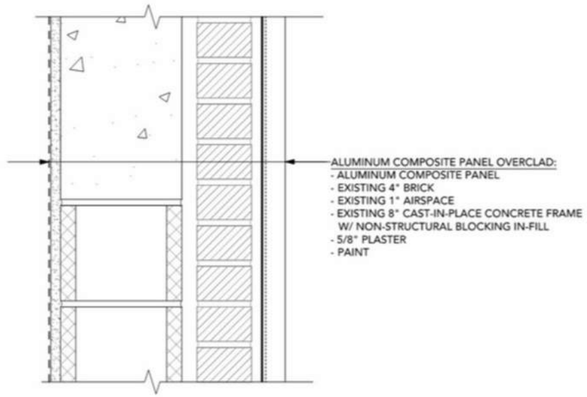
EXTERIOR INSULATION FINISH SYSTEM

UPPER FLOORS - OPTION 2A & 2B



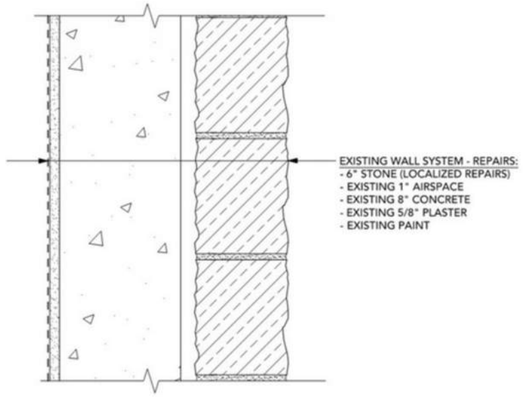
ALUMINUM COMPOSITE PANELS

UPPER FLOORS - OPTION 3A & 3B



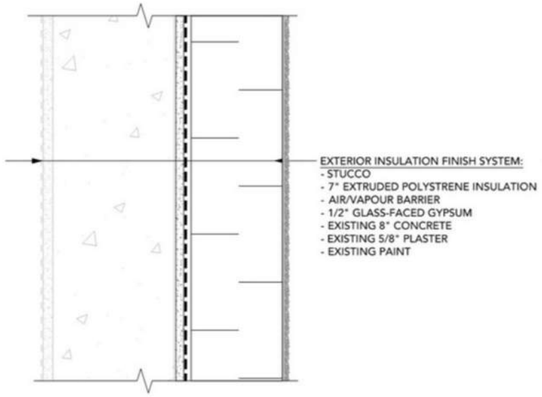
ALUMINUM COMPOSITE PANEL OVERCLAD

UPPER FLOORS - OPTION 3C



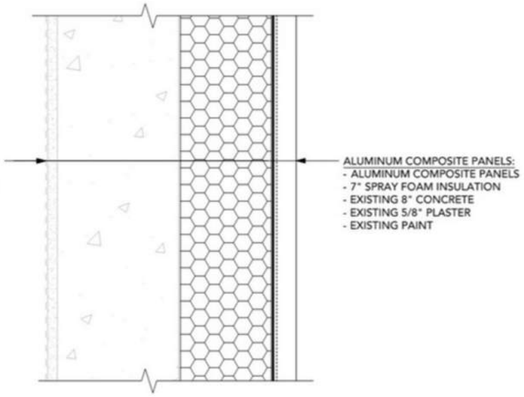
EXISTING WALL SYSTEM - REPAIRS

LOWER FLOOR - OPTION 1



EXTERIOR INSULATION FINISH SYSTEM

LOWER FLOORS - OPTION 2A



ALUMINUM COMPOSITE PANELS

LOWER FLOORS - OPTION 3A

SUMMARY - CLADDING KEY PERFORMANCE FACTORS

1. Durability

Aspect	EIFS	ACP	Brick
Resistance to Weather	Good with proper installation but can degrade under impacts.	Excellent weather resistance but prone to dents or scratches under impact.	Extremely durable and resistant to weather.
Lifespan	30 years with maintenance.	40 years with maintenance.	75 years, with minimal upkeep.
Impact Resistance	Moderate; vulnerable to damage from hail, tools, or vandalism.	Moderate; susceptible to dents but not as fragile as EIFS.	High; can resist significant impacts like hail or accidental force.

2. Energy Efficiency

Aspect	EIFS	ACP	Brick
Insulation	Excellent; provides continuous insulation, minimizing thermal bridging.	Very good; mineral wool adds high thermal resistance, but ACP itself has minimal insulating value.	Poor; brick has high thermal mass but is a poor insulator.
Thermal Mass	Low; insulation focuses on reducing heat transfer rather than storing heat.	Low; ACP systems don’t provide thermal mass.	High; helps regulate indoor temperature by absorbing and releasing heat slowly.

SUMMARY - CLADDING KEY PERFORMANCE FACTORS

3. Moisture Management

Aspect	EIFS	ACP	Brick
Moisture Resistance	EIFS systems with drainage layers are effective, but proper installation is critical.	Excellent; vapour barriers and mineral wool resist moisture infiltration.	Brick is porous and can absorb water.
Maintenance	Sealants and drainage systems must be inspected regularly.	Joints and seals need regular inspection to prevent leaks.	Minimal, but periodic repointing of mortar may be needed.

4. Aesthetic Flexibility

Aspect	EIFS	ACP	Brick
Design Options	Highly flexible; mimics stucco, stone, and decorative elements.	Modern, sleek finishes in a wide variety of colours and textures.	Classic and timeless but limited to brick aesthetics.
Customization	Easy to create curves, decorative shapes, and unique finishes.	Limited to flat or curved panels with clean, modern lines.	Limited customization; relies on brick shapes and colours.

SUMMARY - CLADDING KEY PERFORMANCE FACTORS

5. Fire Resistance

Aspect	EIFS	ACP	Brick
Fire Performance	Modern systems meet fire codes, but combustible insulation layers carry risk.	Mineral wool is non-combustible; fire-rated ACP cores are safe.	Brick is inherently non-combustible and offers the highest fire resistance.

6. Installation

Aspect	EIFS	ACP	Brick
Ease of Installation	Lightweight and fast to install but requires skilled application.	Faster than brick but requires precise joint and seal installation.	Labour-intensive and slow due to heavy materials.
Labour Costs	Moderate; skilled labour needed for sealing and finishing.	Moderate; requires precise installation.	High; requires skilled masons and significant labour time.

SUMMARY - CLADDING KEY PERFORMANCE FACTORS

7. Cost

Aspect	EIFS	ACP	Brick
Material Cost	Lower compared to ACP and brick.	Higher due to composite panels and insulation.	Moderate to high; bricks and mortar are relatively costly.
Installation Cost	Moderate; installation is faster but requires expertise.	Moderate; installation time and labour are balanced.	High; labour-intensive and time-consuming to install.

8. Sustainability

Aspect	EIFS	ACP	Brick
Recyclability	Limited; some components are difficult to recycle.	Panels and mineral wool are recyclable but may involve additional processing.	Highly sustainable; bricks can often be salvaged and reused.
Environmental Impact	Moderate; manufacturing insulation has a carbon footprint.	Moderate; aluminum production is energy-intensive but recyclable.	High; brick manufacturing is energy-intensive but offset by long lifespan.

SUMMARY - CLADDING KEY PERFORMANCE FACTORS

Summary

System	Best For	Limitations
EIFS	Energy-efficient projects requiring design flexibility, lightweight construction, and cost savings.	Vulnerable to impact damage and moisture issues if not properly installed or maintained.
ACP	Modern, sleek designs where fire resistance, thermal efficiency, and weather durability are essential.	More expensive than EIFS and susceptible to dents or scratches.
Brick	Timeless aesthetics, durability, and fire resistant.	Heavy, expensive, and requires additional insulation for energy efficiency.

SUMMARY - WINDOW COMPARISON

Window Option	Option 1A	Option 1B	Option 2A	Option 2B
Frame Type	Aluminum	Aluminum	Vinyl	Vinyl
Glazing Type	Double Glazed	Triple Glazed	Double Glazed	Triple Glazed
U-Value ($w/m^2/°C$)	1.4	0.8	1.53	1.02
Energy Consumption Saving from Base Case	32.2%	35.0%	31.6%	34.0%
Cost (plus HST)	$ 3,130,000	$ 3,847,000	$ 2,804,000	$ 3,364,000
Life Expectancy (years)	40	40	30	30
Cost/Life Expectancy per Year ($)	$ 78,250	$ 96,175	$ 93,467	$ 112,133
Energy Savings per Year ($)	$ 1,834	$ 1,993	$ 1,800	$ 1,936
Net Cost Per Year ($)	$ 76,416	$ 94,182	$ 91,667	$ 110,197

SUMMARY - WINDOW KEY PERFORMANCE FACTORS

1. Durability

Aspect	Aluminum Window Frames	Vinyl Window Frames
Strength	Extremely strong and resistant to warping or cracking.	Durable but less than aluminum; can warp under extreme heat.
Longevity	Long-lasting, but prone to corrosion in salty or humid environments unless treated.	Long lifespan with minimal maintenance, resistant to moisture and rust.
Impact Resistance	High impact resistance, suitable for high-traffic or commercial areas.	Moderate; less impact-resistant than aluminum.

2. Energy Efficiency

Aspect	Aluminum Window Frames	Vinyl Window Frames
Thermal Conductivity	Aluminum is a poor insulator and conducts heat/cold easily; however, by adding a thermal break the thermal bridge is greatly reduced.	Vinyl is a natural insulator, providing excellent energy efficiency.
Weather Performance	Susceptible to condensation and heat transfer without thermal breaks.	Performs well in all climates, preventing heat loss or gain.

SUMMARY - WINDOW KEY PERFORMANCE FACTORS

3. Maintenance

Aspect	Aluminum Window Frames	Vinyl Window Frames
Care Requirements	Low maintenance.	Very low maintenance; resistant to peeling, cracking, and fading.
Surface Finishes	May require repainting or refinishing over time.	No repainting needed; colours are integrated into the material.

4. Aesthetics

Aspect	Aluminum Window Frames	Vinyl Window Frames
Appearance	Sleek, modern, and minimalistic; available in a range of finishes and colours.	More traditional look; fewer colour options than aluminum.
Customization	Can support larger windows and slimmer profiles due to structural strength.	Limited to standard sizes and shapes; not ideal for large panes.

SUMMARY - WINDOW KEY PERFORMANCE FACTORS

5. Cost

Aspect	Aluminum Window Frames	Vinyl Window Frames
Initial Cost	Higher initial cost due to material and installation expenses.	Lower cost, making more cost effective.
Long-Term Value	Higher value in modern and commercial buildings.	Good long-term value for energy savings.

6. Environmental Impact

Aspect	Aluminum Window Frames	Vinyl Window Frames
Sustainability	Aluminum is highly recyclable and eco-friendly.	Vinyl is less eco-friendly; production involves PVC, which has a higher environmental impact.
End of Life	Recyclable, reducing waste. Framing can be reused with new profile matching glazing.	Limited recyclability, leading to higher environmental waste.

SUMMARY - WINDOW KEY PERFORMANCE FACTORS

7. Weather Resistance

Aspect	Aluminum Window Frames	Vinyl Window Frames
Moisture Resistance	Excellent; doesn't warp, but untreated frames may corrode in salty environments.	Outstanding; highly resistant to moisture and ideal for humid climates.
UV Resistance	Susceptible to fading or chalking under prolonged sun exposure.	Resistant to UV damage; colour stays consistent over time.

Summary

Feature	Aluminum Window Frames	Vinyl Window Frames
Best For	Modern aesthetics, large windows, and commercial or high-traffic buildings.	Energy efficiency, affordability, and low maintenance. Typically used in residential.
Drawbacks	High cost, low insulation without thermal breaks, and potential for corrosion if untreated.	Limited aesthetics and customizability, less durable for large-scale applications.
Cost Range	Higher initial cost	Lower initial cost

SUMMARY - EXTERIOR DOOR COMPARISON

Exterior Door Option	Option 1	Option 2
Door Type	Hollow Metal with EPS	Hollow Metal with PU
U-Value ($w/m^2/°C$)	0.94	0.52
Energy Consumption Saving from Base Case	30.5%	32.5%
Cost (plus HST)	$ 73,000	$ 93,000
Life Expectancy (years)	30	30
Cost/Life Expectancy per Year ($)	$ 2,433	$ 3,100
Energy Savings per Year ($)	$ 100	$ 110
Net Cost Per Year ($)	$ 2,333	$ 2,990

SUMMARY - DOOR KEY PERFORMANCE FACTORS

Summary Comparison Table

Feature	Hollow Metal Door with EPS	Hollow Metal Door with PU
Thermal Efficiency	Moderate	Excellent
Soundproofing	Moderate	Good
Strength	Excellent	Excellent
Fire Resistance	Basic fire ratings achievable.	Higher fire ratings achievable.
Moisture Resistance	Good	Excellent
Cost	Lower	Higher

CLADDING

FSA recommends Option 3C – ACP Overclad as the preferred choice due to its cost-effectiveness, minimal intrusiveness, and reduced risk of unforeseen cost overruns. This option also limits the construction schedule and minimizes noise disruption for building occupants. Additionally, it offers an estimated 40-year lifespan, aligning with the projected durability of the recommended window option.

WINDOWS

FSA recommends Option 1A – Aluminum Double Glazed as it provides the lowest total cost over its lifespan when factoring in energy savings. Additionally, the more robust aluminum frame is better suited for commercial applications, ensuring durability and performance. This option also aligns with the expected lifespan of the wall assembly, facilitating future project planning and minimizing long-term disruptions.

EXTERIOR DOORS

FSA recommends Option 1 – Hollow Metal Door with EPS as it is the most cost-effective choice while offering a durable material suitable for a commercial environment. This option ensures long-term performance and reliability at the lowest cost.

FSA PROJECT RECOMMENDATION

Option 3C - ACP Overclad

Upper Floors

- **ACP Overclad**
- **Existing 4" Clay Brick with Localized Repairs**
- **Existing 1" Air Space**
- **Existing 8” Clay Tile Infill**
- **Existing 5/8” Plaster (Interior)**

Ground Floor

- **Localized 6” Masonry Stone with Steel Lintel Replacement**
- **Existing 1” Air Space**
- **Existing Air & Vapour Barrier**
- **Existing 8” Clay Tile Infill**
- **Existing 5/8” Plaster (Interior)**

Sub Total = $ 1,800,000 + HST

Option 1A - Aluminum Double Glazed

- **Aluminum Frame**
- **Insulating Glass Units: Double Glazed**
- **Argon Filled**
- **Low E-Coating**

Sub Total = $ 3,130,000 + HST

Option 1 - Hollow Metal Door with EPS

Hollow Metal Door –
1.75” Extruded Polystyrene Infill

Sub Total = $ 73,000 + HST

Total Project Cost = $ 5,003,000 + HST