

CHALCOTS ESTATE PHASE 3 – WINDOW DESIGN CHRONOLOGY

DRAFT

November 2019

Window Design Journey

Review of existing Windows System

- Following approval of Cladding replacement and site investigation it was identified that works would be required to windows. Arup were commissioned to undertake intrusive survey and subsequent Options reviews.

January 2018

Options Review for Glazed areas

- **OPTIONS** considered:
- 1 – No Works to glazing
- 2 – Repair/ Refurbishment
- 3 – Replacement - preferred
- 3A – Stick Curtain Wall
- 3B – Unitised Curtain Wall
- 3C – Window frame system
- Replacement was selected as preferred option due to difficulty in retrofit and consideration on whole life cycle.

Arup report 'Chalcots Cladding Replacement – Glazing Options assessment', Feb'18

February 2018

Option Review for operable windows (in glazed areas)

- **8 OPTIONS** considered:
- 1 – top hung/tilt outward
- 2 – bottom hung/tilt inward
- 3 – bottom hung tilt & turn inward
- 4 – side hung turn outward
- 5 – sliding
- 6 – parallel opening
- 7 – centre pivot
- 8 – sash windows

Arup report 'Operable windows Options review', May'18

May 2018

Preferred Option:

- Options were narrowed down to 2
- Option 1 (as per existing configuration)
- Option 3 - bottom hung tilt & turn inward
- Prior to tender it was agreed the preferred option would be to Opt 3 due to considerations around current window repairs and betterment in relation to ventilation and purge.

Arup report 'Operable windows Options review - Update', September'18

September 2018

Cladding Replacement Cost


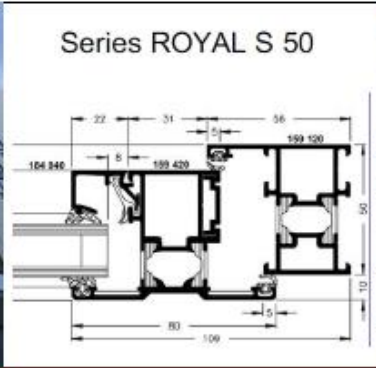



Project costs including Windows replacement

Project costs including Windows Final Costs

Windows Journey (January 2018)










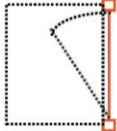
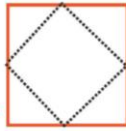


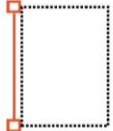
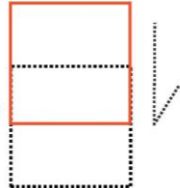

Windows Options



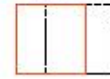
				
Option 1 - No Works of reglazing	Option 2 - Repair / Refurbishment	Option 3a - Stick curtain wall	Option 3b - Unitised curtain wall	Option 3c - Window frame system
<p>Pros:</p> <ul style="list-style-type: none"> • Zero cost implication. <p>Cons:</p> <ul style="list-style-type: none"> • Fire spread risk due to combustible materials used in window assembly. • Lower window performance. • Durability. • Warranty. • Non-compliance with current standards 	<p>Pros:</p> <ul style="list-style-type: none"> • Lower cost compared to Option 3. <p>Cons:</p> <ul style="list-style-type: none"> • Limited window performance (glass and frame are retained in this option). • Lower life time if compared to a newer system. • Warranty. 	<p>Pros:</p> <ul style="list-style-type: none"> • Lower cost compared to unitised curtain wall system. <p>Cons:</p> <ul style="list-style-type: none"> • Slower installation than unitised systems (about three times slower). • Higher impact on tenants during Works. • Lower quality control as the assembly of all elements is done on site. • Infill panels to be replaced from the outside even for glazing panels. • The initial lower cost gets increased if acoustic separation is considered or other Requirements such a special beaded system in order to replace glass from the inside. 	<p>Pros:</p> <ul style="list-style-type: none"> • Better quality control during fabrication. • Easiness of accommodation of vertical and horizontal differential movements. • Easiness to achieve a continuous pressure equalization. • High level of watertightness. • Units can be sized to avoid the use of a spider crane at top level for installation. • Reduces the number of Works on site as it comes already pre-assembled from factory. • Faster installation than stick curtain wall. • Better finish quality. <p>Cons:</p> <ul style="list-style-type: none"> • Higher cost. • Previous experience required for façade contractor. 	<p>Pros:</p> <ul style="list-style-type: none"> • Lower cost compared to other systems in this option. • A better frame system could be used <p>Cons:</p> <ul style="list-style-type: none"> • Longer time required for installation in comparison to unitised systems.

Preferred Option - 3C Window Frame System

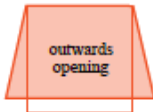
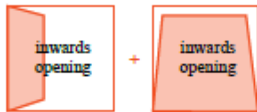

Operable Windows Options

1. 		Top-hung window, tilt outwards As existing	5. 		Sliding
2. 		Bottom-hung window (Hoppers), tilt inwards	6. 		Parallel opening
3. 		Bottom hung, tilt and turn inward	7. 		Pivot
4. 		Side hung, turn outward	8. 		Sash

8 Options for windows operation (existing - Option 1; preferred - Option 3)



	Option 1. Top-hung window, tilt outwards	Option 2. Bottom-hung window (Hoppers), tilt inwards	Option 3. Bottom hung, tilt and turn inward	Option 4. Side hung, turn outward	Option 5. Sliding	Option 6. Parallel opening	Option 7. Pivot	Option 8. Sash
Description	Hinges are positioned on the upper part of the sash to let the window tilt. Window opening is usually limited by using restrictors on both sides.	Hinges are positioned on the lower part of the sash to let the window tilt. This type of window opening is useful to ventilate from an upper level of the room.	Tilt and turn windows open inwards in two actions — swinging like a casement window or tilting like hoppers.	Turn windows open outwards only.	Sliding window Feasibility study on current glazing module to be confirmed	The casement parallel to open outward. Opening along all four sides Feasibility study on current glazing module to be confirmed	Window hung on one hinge on each of two opposite sides which allows the window to revolve when opened.	Sliding window Feasibility study on current glazing module to be confirmed
Opening diagram								
A) Residents safety	Even if the window opening is limited to a certain degree, safety is a concern for this option.	For a tower building it may be safer that window openings are limited to a certain degree. Window opening is usually limited by using restrictors on both sides	A higher degree of opening flexibility may be opposed to a safer operation of the window. Window restrictors and key operation can be added.	Even if the window opening is limited to a certain degree, safety is a concern for this option as the user will have to reach out to close the window.	Safety is a concern for this option. Window restrictors and key operation can be added.	Even if the window opening is limited to a certain degree, safety is a concern for this option.	Safety is a concern for this option	Safety is a concern for this option. Window restrictors and key operation can be added.
B) Public safety	Additional window restraints should be added to hold the window in case of failure.	Safe option in terms of prevention of falling down	Safe option in terms of prevention of falling down	Additional window restraints should be added to hold the window in case of failure.	Safe option in terms of prevention of falling down	Additional window restraints are difficult to be integrated with this opening type	Additional window restraints are difficult to be integrated with this opening type	Safe option in terms of prevention of falling down
C) Purge Ventilation	The purge ventilation assessment based on BR Part F shows that not all the apartments pass the criteria assuming 16° opening angle.	Windows with less 10° opening angle do not provide enough ventilation to meet BR part F criteria	Windows with opening angle equal or more than 30° will provide enough ventilation to meet BR part F criteria.	Windows with opening angle equal or more than 30° will provide enough ventilation to meet BR part F criteria.	Based on experience, sliding window opening area is not enough to provide enough ventilation to meet BR part F criteria.	Based on experience, the opening area is not enough to provide enough ventilation to meet BR part F criteria	Windows with opening angle equal or more than 30° will provide enough ventilation to meet BR part F criteria	Based on experience, sliding window opening area is not enough to provide enough ventilation to meet BR part F criteria.
D) Overheating	The overheating assessment shows that not all the apartments pass the CIBSE TM59 criteria with the existing window type	The overheating assessment shows that not all the apartments pass the CIBSE TM59 criteria with this window type	The overheating assessment shows that most of the apartments pass the CIBSE TM59 criteria with the proposed window type and assumptions considered.	The overheating assessment shows that most of the apartments pass the CIBSE TM59 criteria with the proposed window type and assumptions considered.	The free area of the sliding window will be less than the existing scenario. Based on our experience, not all the apartments will pass the CIBSE TM59.	The free area of the parallel opening window will be less than the existing scenario. Based on our experience, not all the apartments will pass the CIBSE TM59.	Based on experience, most of the apartments will pass the CIBSE TM59 criteria	The free area of the sash window will be less than the existing scenario. Based on our experience, not all the apartments will pass the CIBSE TM59.
E) Ease of operation	Easy reach. Handle on bottom transom	Easy to operate. Handle min 1/3 up the vertical framing member. Extended reach required.	Easy to operate. Handle min 1/3 up the vertical framing member. Extended reach required.	Window has to be restricted to an opening angle to maintain the handle in a reachable location	Easy to operate. Handle min 1/3 up the vertical framing member. Extended reach required	Easy reach. Handle on bottom transom	Easy to operate. Handle min 1/2 up the vertical framing member. Extended reach required.	Easy reach. Handle on bottom transom
F) Solar Protection	Internal blinds could be deployed when window is open	Blind may clash with window when open. However the overheating assessment has considered blinds deployment in the fixed windows areas only	Blind may clash with window when open. However the overheating assessment has considered blinds deployment in the fixed windows areas only.	Internal blinds could be deployed when window is open.	Internal blinds could be deployed when window is open.	Internal blinds could be deployed when window is open.	Blind may clash with window when open.	Internal blinds could be deployed when window is open
G) Performance, Weather, Acoustics	Good performance. However all windows can let water in if they are open.	Good performance. However all windows can let water in if they are open.	Good performance. However all windows can let water in if they are open.	Good performance. However all windows can let water in if they are open.	Reduced performance in comparison to other types. All windows can let water in if they are open.	Reduced performance in comparison to other types, especially over the time. Mechanism maintenance onerous.	Opening mechanism does not achieve satisfactory levels of weather, acoustic performance and air tightness.	Opening mechanism does not achieve satisfactory levels of weather, acoustic performance and air tightness.
H) Cleaning / Maintenance	Not possible to clean the outside of the glass from the inside. Fully-reversible solutions not recommended though this possibility could be offered.	Not possible to clean the outside of the glass from the inside. Fully-reversible solutions not recommended though this possibility could be offered.	Great advantage for cleaning by turning the window and cleaning it from the inside. Fixed windows would not be possible to be cleaned from inside though.	Not possible to clean the outside of the glass from the inside.	Not possible to clean the outside of the glass from the inside	Not possible to clean the outside of the glass from the inside	Great advantage for cleaning by turning the window and cleaning it from the inside.	Not possible to clean the outside of the glass from the inside
I) Residents Feedback								

	Option 1. Top-hung window, tilt outwards	Option 3. Bottom / Side hung, tilt and turn inward	Option 3. Bottom / Side hung, tilt and turn inward & dropped sill
DESCRIPTION	Hinges are positioned on the upper part of the sash to let the window tilt outwards. The window opening is limited to 100 & 300 mm by using restrictors.	Tilt and turn windows open inwards in two actions — they tilt inwards (restricted to 100 mm) and also turn inwards. This function is initially restricted to 300 mm but the restrictor can be released with a special tool to open the window fully (900 or 800 mm).	Tilt and turn windows open inwards in two actions — they tilt inwards (restricted to 100 mm) and also turn inwards. This function is initially restricted to 300 mm but the restrictor can be released with a special tool to open the window fully (900 or 800 mm). The sill has been dropped to 1100 below the opening window.
OPENING DIAGRAM			
PURGE VENTILATION	Windows with an opening angle between 15° to 30° will not provide enough ventilation to meet BR part F Criteria in all rooms. This window type therefore does not comply with current requirements.	Windows with an opening angle equal or more than 30° will provide enough ventilation to meet BR part F criteria. This window type complies with current requirements.	Windows with an opening angle equal or more than 30° will provide enough ventilation to meet BR part F criteria. This window type complies with current requirements.
OVERHEATING	As this window type would be required to be restricted at 300mm, some of the rooms would not pass the CIBSE TM59 criteria. This window should not be opened further than 300 mm as it would encourage residents to reach out too far to close the window. Deployed blinds have been considered only on the fixed glazed portion of window type B and C.	This window provides the opportunity to pass all criteria if it is allowed to fully open. A window restricted to 300mm would only pass the CIBSE TM59 criteria if the glass had a G-value of 0.33. The opening direction of windows will need to be considered. (reveal / no reveal) Deployed blinds have been considered only on the fixed glazed portion of window type B and C.	This window provides the opportunity to pass all criteria if it is allowed to fully open. A window restricted to 300mm would only pass the CIBSE TM59 criteria if the glass had a G-value of 0.33. The opening direction of windows will need to be considered. (reveal / no reveal). Deployed blinds have been considered only on the fixed glazed portion of window type B and C.
PERFORMANCE WEATHER, ACOUSTICS	Window performance is assessed for a closed window only. The window complies with all weather and acoustic performance requirements. All windows can let water in if they are open. The extent of water ingress will depend on wind speed and direction.	Window performance is assessed for a closed window only. The window complies with all weather and acoustic performance requirements. Open windows in tilt mode may be less likely to let rain in than in the turn mode but any variation will depend on wind speed and direction.	Window performance is assessed for a closed window only. The window complies with all weather and acoustic performance requirements. Open windows in tilt mode may be less likely to let rain in than in the turn mode but any variation will depend on wind speed and direction.
RESIDENT SAFETY	Key operation required to release the 100 mm restriction. Window stays will be set to restrict the maximum window opening to 300mm as an option to open the window further might encourage residents to lean out too far. As a result opening the window further will not be possible.	Tilt position to 100mm can be operated without key. Key operation required to open window in the turn function. Turn function is initially restricted to an opening of 300 mm. This can be released with a special tool if required, to open the window fully. NOTE: Safety could be improved by lowering the sill.	Tilt position to 100mm can be operated without key. Key operation required to open window in the turn function. Turn function is initially restricted to an opening of 300 mm. This can be released with a special tool if required, to open the window fully. NOTE: To improve safety the sill has been lowered to 1100 mm below opening window.
CLEANING AND MAINTENANCE	It is not possible to clean the outside face of the opening windows from the inside. Maintenance and checks of the additional window restraints will be required.	The outside face of openable windows could easily and safely be cleaned from the inside. Fixed windows could not be cleaned from the inside.	The outside face of openable windows could easily and safely be cleaned from the inside. Fixed windows could not be cleaned from the inside.
EASE OF OPERATION	Handle on bottom transom. Easy to operate and reach. However any window opening beyond 300 mm would make the handle hard to reach.	Easy to operate. Handle max 1/3 up the vertical framing member. Slightly extended reach required.	Easy to operate. Handle max 1/3 up the vertical framing member. Slightly extended reach required.
SOLAR PROTECTION	Internal blinds / curtains do not interfere with the opening element of the window	Blinds / curtains may clash with the window when open. However the overheating assessment has considered blinds deployed in the fixed window areas only.	Blinds / curtains may clash with the window when open. However the overheating assessment has considered blinds deployed in the fixed window areas only.
PUBLIC SAFETY	Additional window restraints should be added to restrain the window in case of failure.	Very low risk of façade elements falling.	Very low risk of façade elements falling.
RESIDENT FEEDBACK	41% Why residents have chosen this option: <ul style="list-style-type: none"> Same as existing window Considered a safe option Good ventilation However <ul style="list-style-type: none"> Concerns about noise Concerns about cleaning and maintenance: open out window gets dirtier from substances being thrown from higher floors 	47% Why residents have chosen this option: <ul style="list-style-type: none"> Excellent ventilation Easy to clean Multituse function allows residents to adapt window operation mode to their necessities. Open inward option would prevent stains on windows due to substances being thrown from higher floors. However <ul style="list-style-type: none"> Safety concerns—more clarity on restrictor option Concerns that it could be complicated to use 	