

# ROTORUA LAKES COUNCIL ROTORUA MUSEUM SEISMIC STRENGTHENING-STRUCTURAL ELEMENT DESCRIPTION

DEVELOPED DESIGN-J000949

GDC CONSULTANTS



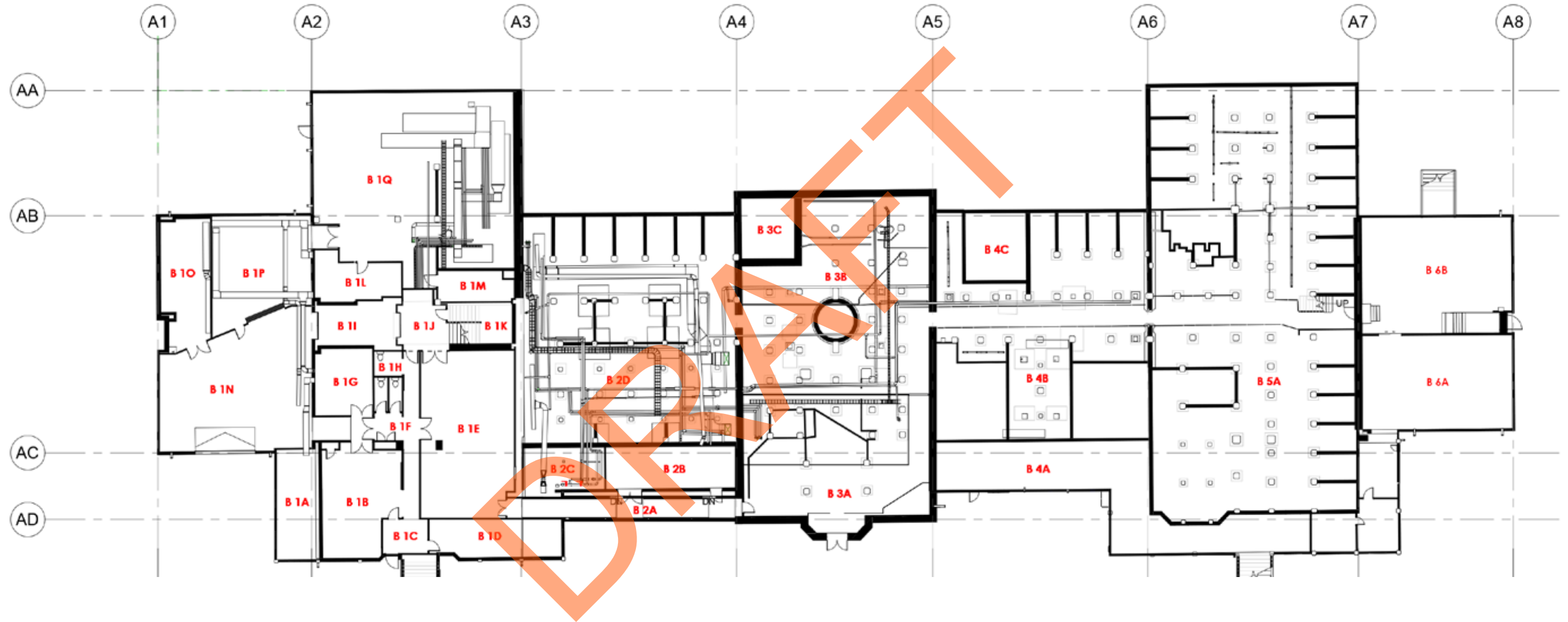
## SCOPE

This document outlines the extend of structural strengthening proposed for the Rotorua Museum. This document needs to be read in conjunction with the Architectural developed design document.

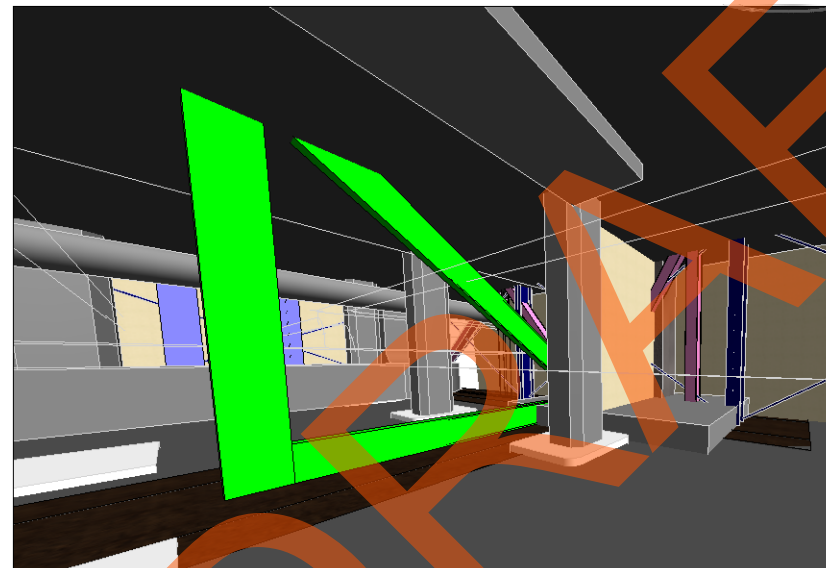
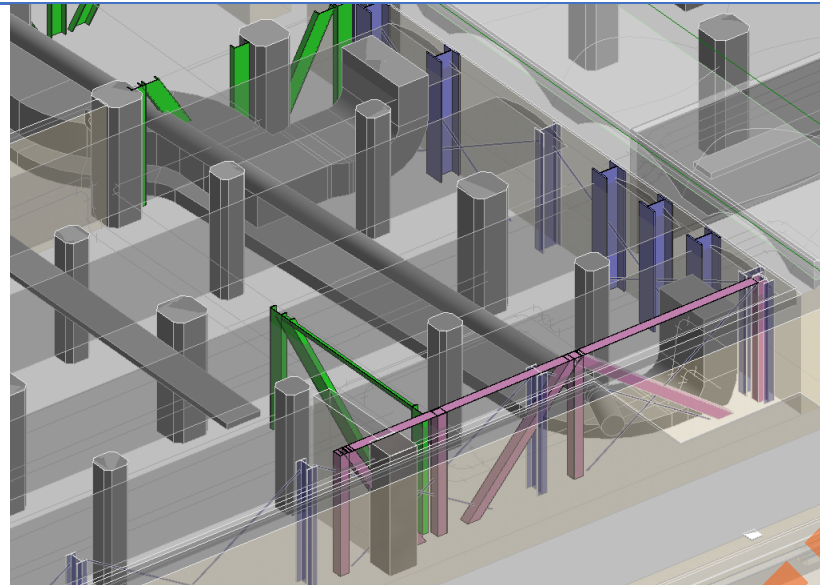
This document is a part of the structural document which contains the Design Feature Report, Construction methodology proposal document, Calculations and Structural drawings.

DRAFT

## PROPOSED BASEMENT FLOOR PLAN



| ROOM NUMBER                            | STRUCTURAL APPROACH                                                                                                                                                                                                               | SPACES AND ELEMENT                                                                                                                                                                                                                                                                                      |
|----------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| B 1A - Store Room                      | There is no structural strengthening required in this space                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                         |
| B 1B - New Staff Meeting Room          | There is no structural strengthening required in this space                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                         |
| B 1C - New Entrance Foyer              | There is no structural strengthening required in this space                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                         |
| B 1D - New Staff Kitchen and Lunchroom | There is no structural strengthening required in this space                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                         |
| B 1E - New Exhibition Space            | There is no structural strengthening required in this space                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                         |
| B 1F - New Corridor                    | There is no structural strengthening required in this space                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                         |
| B 1G - Receiving Room                  | There is no structural strengthening required in this space                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                         |
| B 1H - New Staff Unisex Toilet         | There is no structural strengthening required in this space                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                         |
| B 1I - Lift / Elevator                 | There is no structural strengthening required in this space                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                         |
| B 1J - Stairwell / Lift Landing Area   | There is no structural strengthening required in this space                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                         |
| B 1K - Stairwell                       | There is no structural strengthening required in this space                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                         |
| B 1L - South Wing Data Room            | There is no structural strengthening required in this space                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                         |
| B 1M                                   | There is no structural strengthening required in this space                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                         |
| B 1N - Loading Dock                    | There is no structural strengthening required in this space                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                         |
| B 1O                                   | There is no structural strengthening required in this space                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                         |
| B 1P - Store Room                      | There is no structural strengthening required in this space                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                         |
| B 1Q - Plant Room                      | There is no structural strengthening required in this space                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                         |
| B 1R                                   | There is no structural strengthening required in this space                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                         |
| B 2A - New Glazed Link                 | There is no structural strengthening required in this space                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                         |
| B 2B - Switchboard Room                | There is no structural strengthening required in this space                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                         |
| B 2C - Plant Room                      | There is no structural strengthening required in this space                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                         |
| B 2D - Basement                        |                                                                                                                                                                                                                                   |                                                                                                                                                                                                                                                                                                         |
| B 2D-1                                 | <p>Vertical bracing to support the mezzanine floor in the southern side.</p> <p>Because of the heritage importance for the walls in central atrium/zone 3 the vertical braces are provided in the eastern end wall of zone 2.</p> | <p><b>Southern End Mezzanine:</b> 200PFC vertical framing under the mezzanine floor.</p> <p><b>Northern End:</b> 250 UC 89.5 Strongback to be embedded 100mm into the existing concrete pumice wall.</p> <p><b>Eastern End Wall:</b> 125X6 SHS vertical shear walls are placed inside the end wall.</p> |



**Ceiling:** Shortcrete to be sprayed from underneath the floor after the temporary removal of the existing services.

**Foundation:**

- For Vertical elements: A pad footing is to be designed which will pick up the residual axial load.
- Elements with diagonal struts: A ground beam is to be designed between the pad footing to pick up the residual shear.
- Vertical Strong Backs to strengthen the out-of-plane of the concrete walls: Base strip footing is to be designed under the strongbacks to resist the overturning moments.

**B 2D-2**

Vertical bracing to support the mezzanine floor in the northern side.

Because of the heritage importance for the walls in central atrium/zone 3 the vertical braces are provided in the eastern end wall of zone 2. These are chased to the basement level.

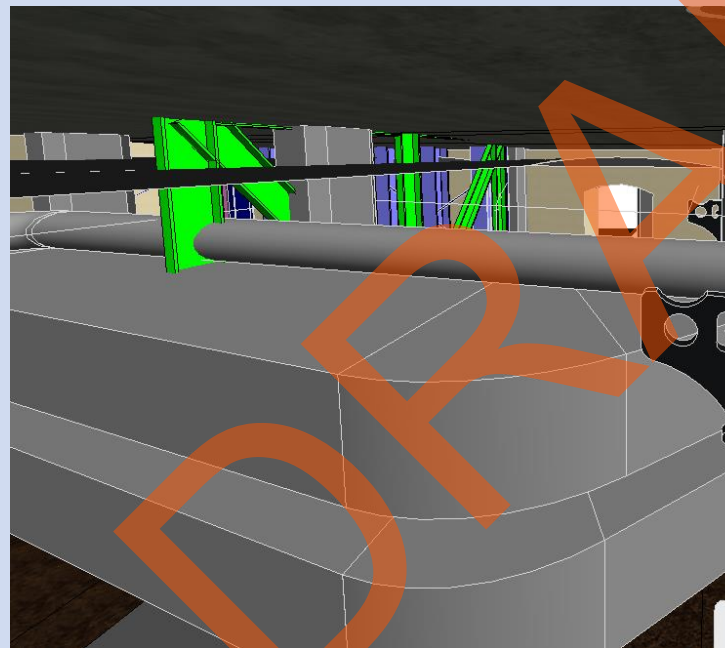
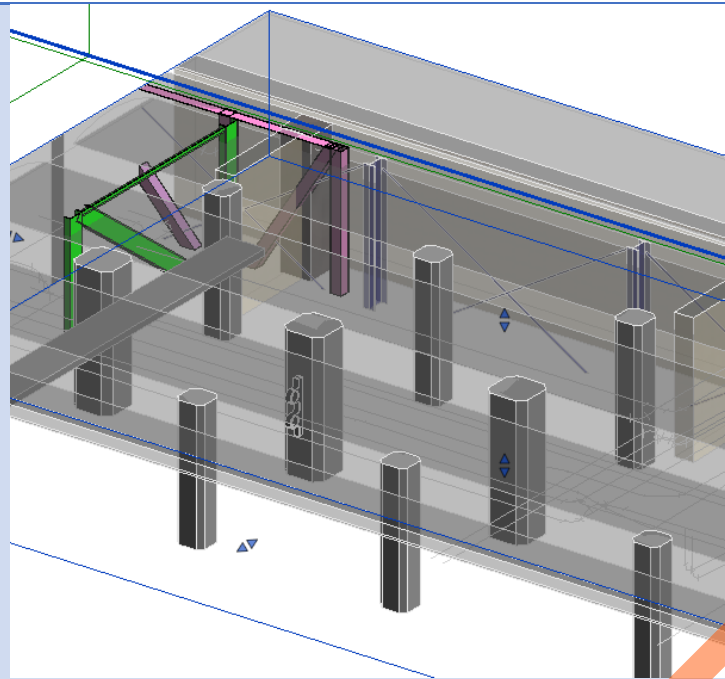
**Northern End:** 200PFC vertical framing under the mezzanine floor.

**Eastern End Wall:** 125X6 SHS vertical shear walls are placed inside the end wall. These cut through the existing basement

**Ceiling:** Shortcrete to be sprayed from underneath the floor after the temporary removal of the existing services

**Foundation:**

- For Vertical elements: A pad footing is to be designed which will pick up the residual axial load.
- Elements with diagonal struts: A ground beam is to be designed between the pad footing to pick up the residual shear.



- Vertical Strong Backs to strengthen the out-of-plane of the concrete walls: Base strip footing is to be designed under the strongbacks to resist the overturning moments.

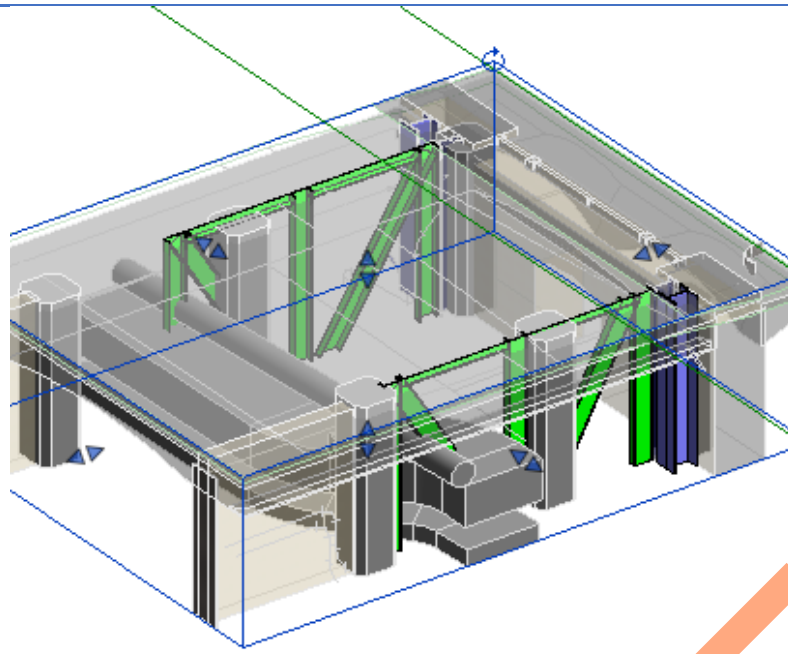
#### B 2D-3

The new vertical truss designed to brace the ceiling is chased down to the basement.

**Western/Eastern Side:** 200PFC vertical framing under the horizontal truss which are hidden is the ground-floor partition walls. The vertical brace cut through the existing basement column. The existing columns need to be locally cut and re-grouted after placement of new elements. Concrete reinstated after.

**Ceiling:** Shotcrete to be sprayed from underneath the floor after the temporary removal of the existing services

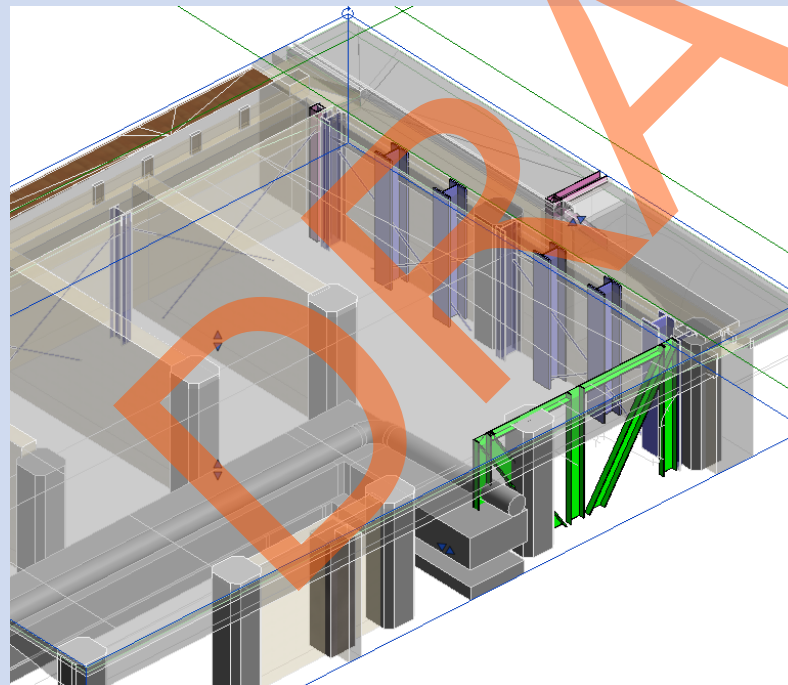
**Foundation:**



- For Vertical elements: A pad footing is to be designed which will pick up the residual axial load.
- Elements with diagonal struts: A ground beam is to be designed between the pad footing to pick up the residual shear.
- Vertical Strong Backs to strengthen the out-of-plane of the concrete walls: Base strip footing is to be designed under the strongbacks to resist the overturning moments.

#### B 2D-4

250 UC 89 strongbacks embedded 100mm into the south full height concrete wall, grouted in place and a new partition wall built in front



**Northern End:** 250 UC 89.5 Strongback to be embedded 100mm into the existing concrete pumice wall.

**Ceiling:** Shortcrete to be sprayed from underneath the floor after the temporary removal of the existing services

#### Foundation:

- For Vertical elements: A pad footing is to be designed which will pick up the residual axial load.
- Elements with diagonal struts: A ground beam is to be designed between the pad footing to pick up the residual shear.
- Vertical Strong Backs to strengthen the out-of-plane of the concrete walls: Base strip footing is to be designed under the strongbacks to resist the overturning moments.

#### B 2E - Plant Room

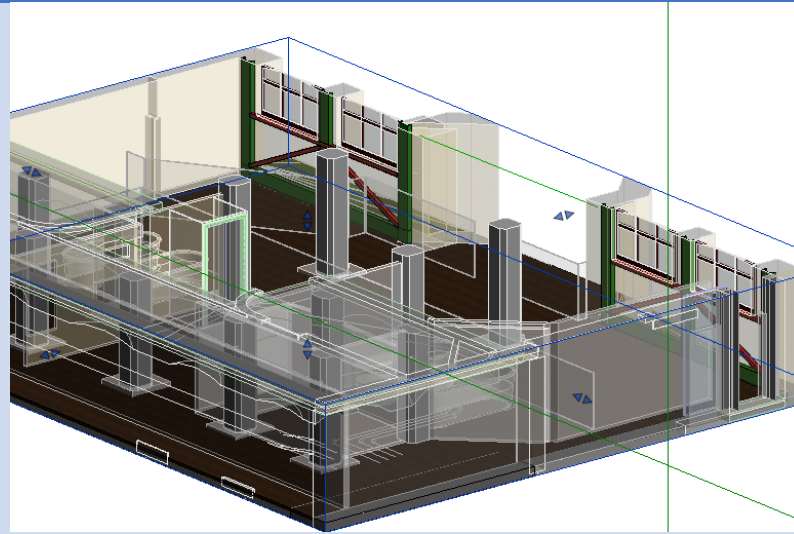
There is no structural strengthening required in this space

#### B 3A - Mud Bath Exhibition Area

Vertical truss at the end wall which takes the laterall load in the North-South direction.

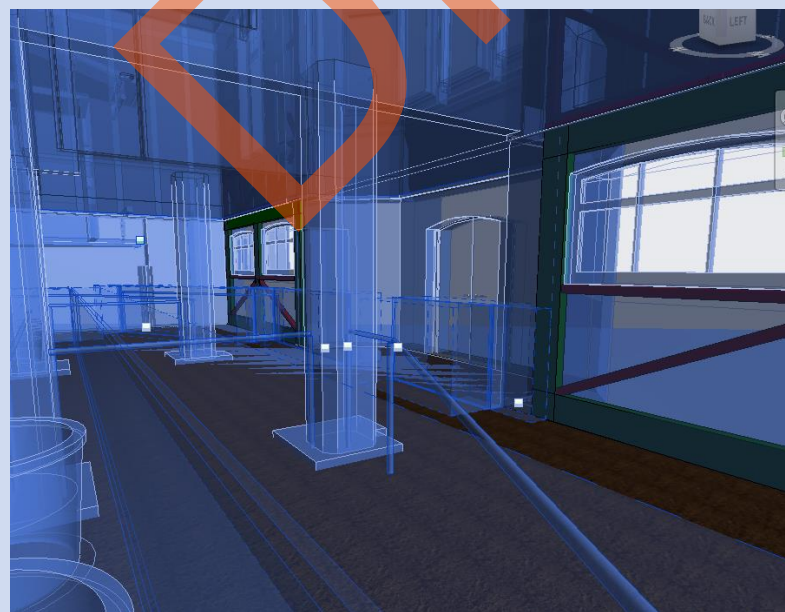
**Eastern Side:** 200PFC portal is designed around the basement window with 89SHS beam and 75 SHS diagonals. They are chased through the concrete pumice wall.

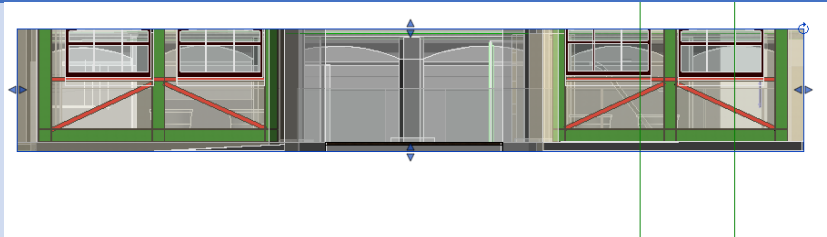
**Ceiling:** FRP to be installed from both above and below the floor after the temporary removal of the existing services.



#### Foundation:

- For Vertical elements: A pad footing is to be designed which will pick up the residual axial load.
- Elements with diagonal struts: A ground beam is to be designed between the pad footing to pick up the residual shear.

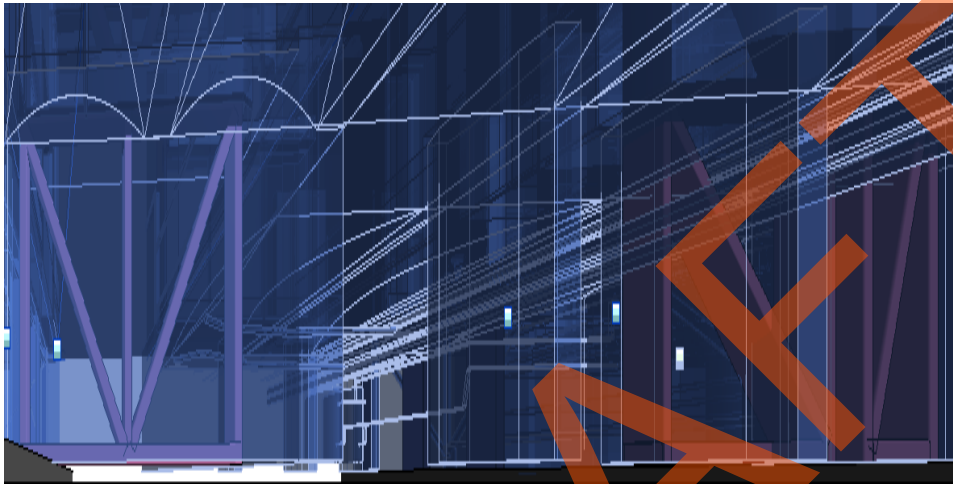




**B 3B** - Basement (including fountain foundation)

The western wall on either side (that is the east walls of rooms G 3K and G3L in the ground floor) has vertical bracing which support the mezanine floor. These are chased down to the basement.

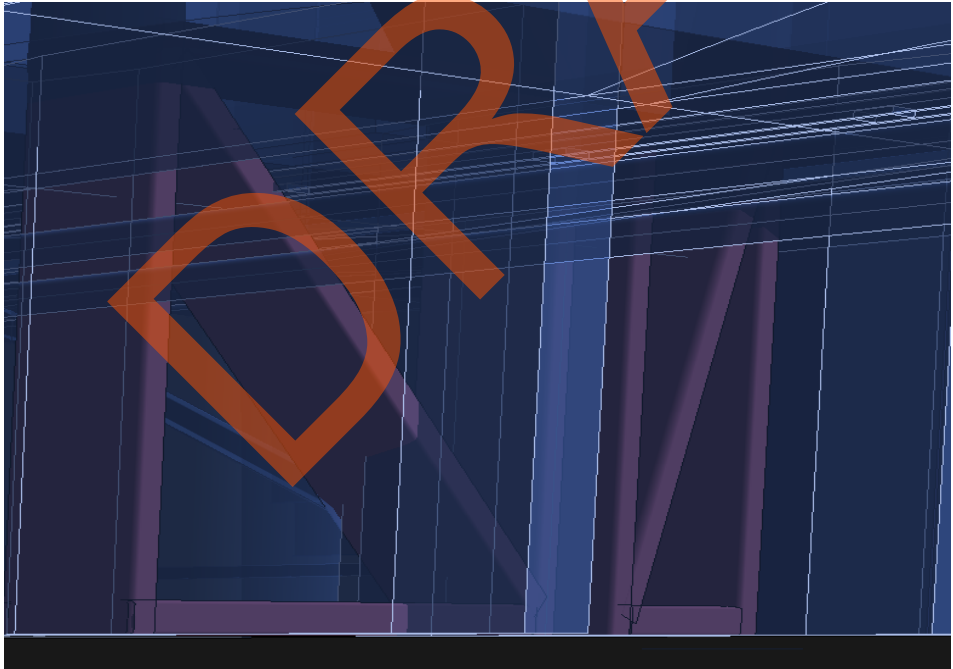
**Western Side:** 125x6SHS vertical bracing which are chased down from the ground floor. The vertical brace cut through the existing basement column. The existing columns need to be locally cut and re-grouted after placment of new elements. Concrete reinstated after.

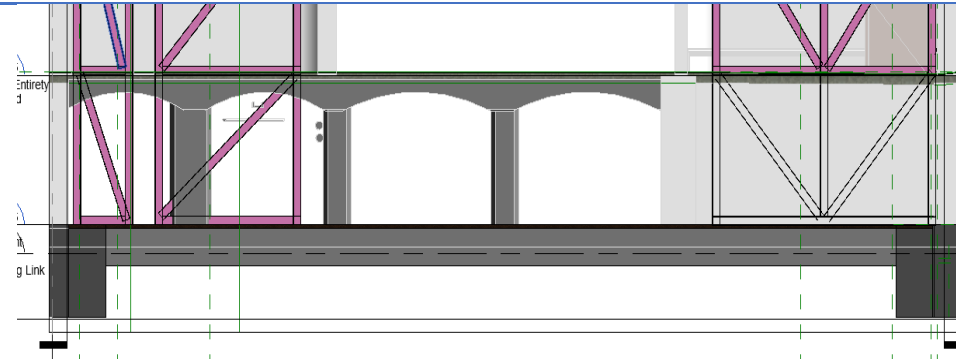


**Ceiling:** FRP to be installed from both above and below the floor after the temporary removal of the existing services

**Foundation:**

- For Vertical elements: A pad footing is to be designed which will pick up the residual axial load.
- Elements with diagonal struts: A ground beam is to be designed between the pad footing to pick up the residual shear.

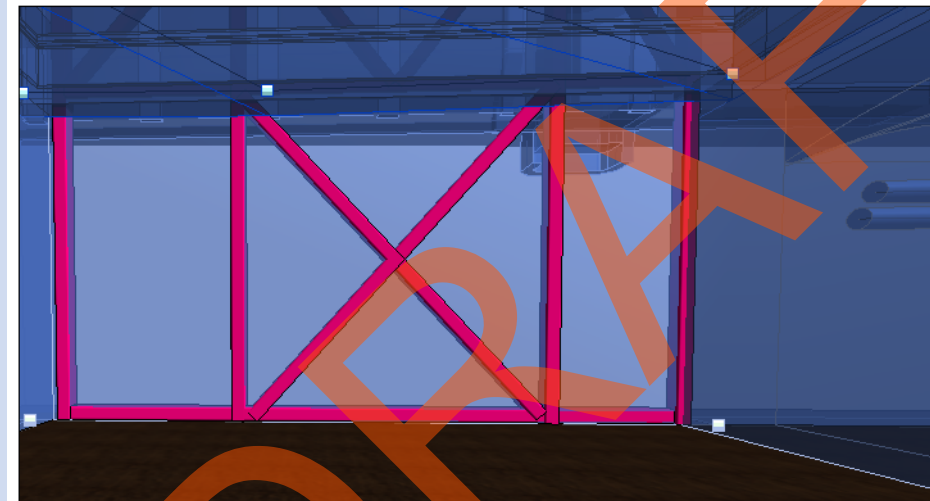




### B 3C - Basement Strongroom

Vertical truss at the end wall which takes the lateral load in the North-South direction.

Vertical truss which support the mezanine floor and dropped down to the basement.



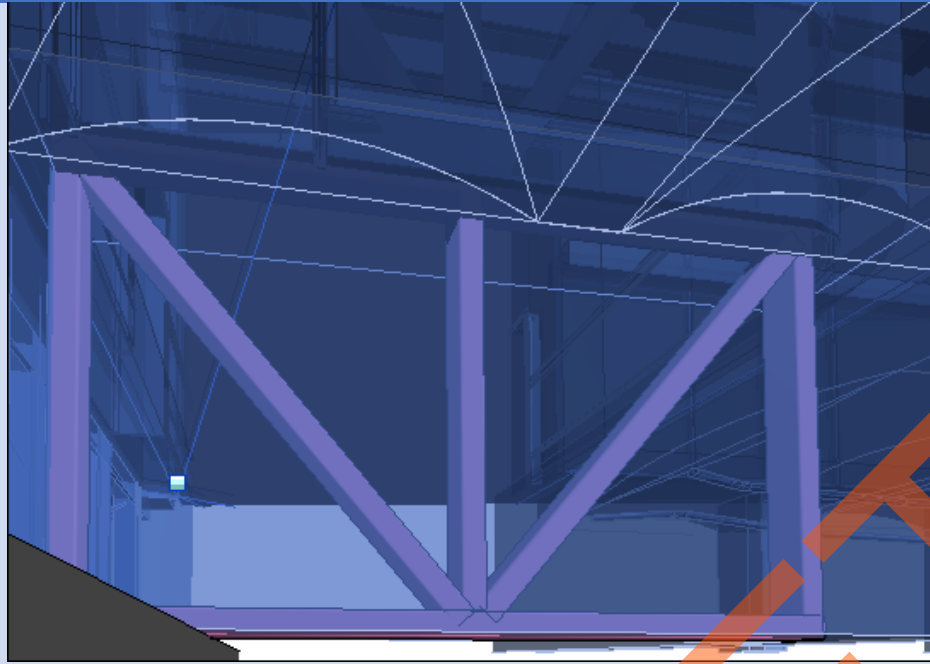
**Western End Wall:** 89x6 SHS vertical truss embedded into the end wall. The steel members are placed within the wall.

**Eastern Side:** 125x6SHS vertical bracing which are chased down from the ground floor. The vertical brace cut through the existing basement column. The existing columns need to be locally cut and re-grouted after placement of new elements. Concrete reinstated after.

**Ceiling:** FRP to be installed from both above and below the floor after the temporary removal of the existing services

#### Foundation:

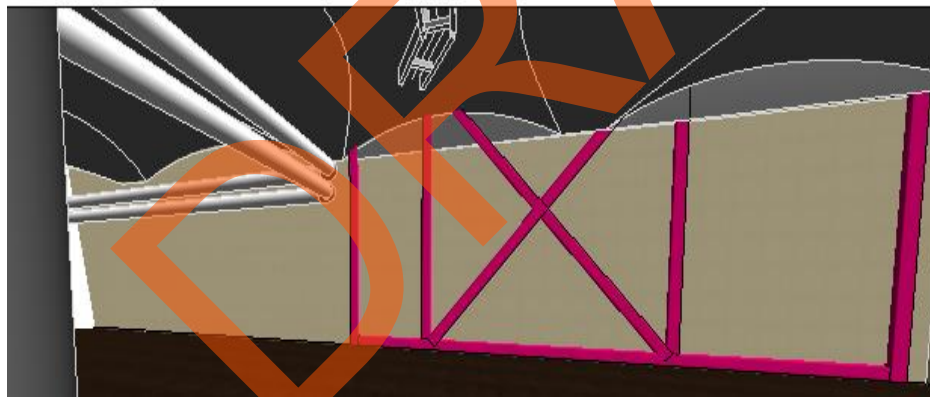
- For Vertical elements: A pad footing is to be designed which will pick up the residual axial load.
- Elements with diagonal struts: A ground beam is to be designed between the pad footing to pick up the residual shear.



#### B 3C-1

Vertical truss at the end wall which takes the lateral load in the North-South direction.

Vertical truss which support the mezanine floor and dropped down to the basement.

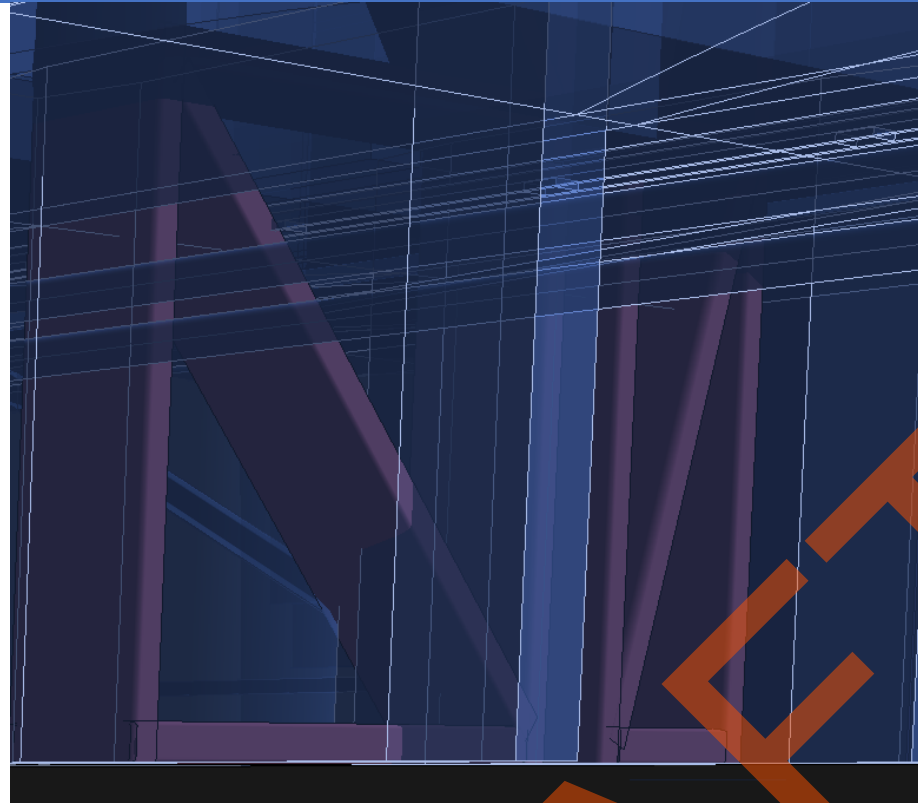


**Western End Wall:** 89x6 SHS vertical truss embedded into the end wall. The steel members are placed within the wall.

**Eastern Side:** 125x6 SHS vertical bracing which are chased down from the ground floor. The vertical brace cut through the existing basement column. The existing columns need to be locally cut and re-grouted after placement of new elements. Concrete reinstated after.

**Ceiling:** FRP to be installed from both above and below the floor after the temporary removal of the existing services **Foundation:**

- For Vertical elements: A pad footing is to be designed which will pick up the residual axial load.
- Elements with diagonal struts: A ground beam is to be designed between the pad footing to pick up the residual shear.



#### B 4A - Basement beneath verandah

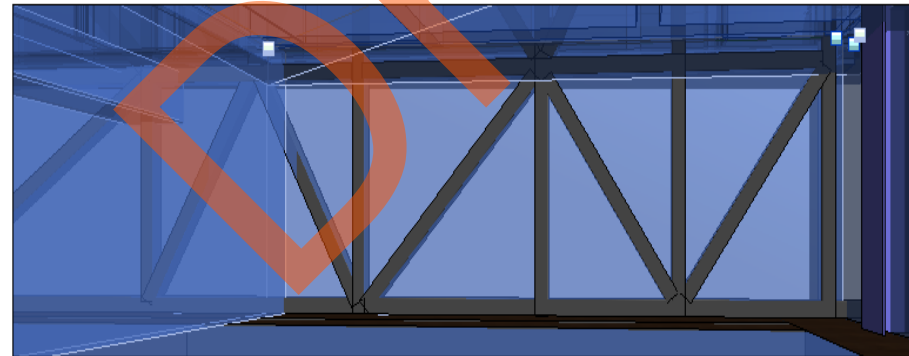
New 125X75mm SHS and 200PFC bracing is to be aligned and housed within the exterior wall cavity and the linings reinstated.

**Western Side:** 125X75mm SHS and 200PFC bracing is to be aligned and housed within the exterior wall cavity and the linings reinstated.

#### B 4B - Basement

All the structural elements are chased down from the ground floor to the basement level.

**Southern & Northern Wall:** 250 UC 89.5 Strongback to be embedded 100mm into the existing concrete pumice wall.



**Eastern Side:** New 125X75mm SHS and 200PFC bracing which are aligned and housed within the exterior wall cavity are chased to the basement.

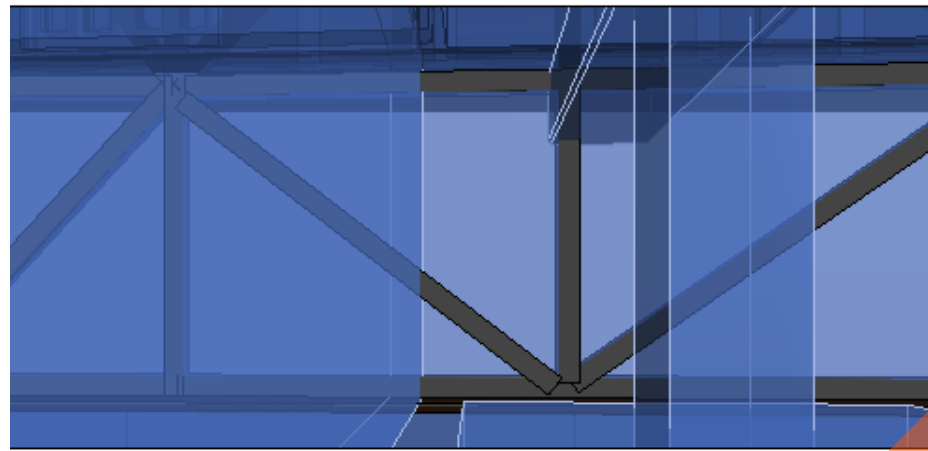
**Western Side:** New 200PFC are chased down from the ground floor. The vertical brace cut through the existing basement column. The existing columns need to be locally cut and re-grouted after placement of new elements. Concrete reinstated after.

**Centre:** New 200PFC are chased down from the ground floor. The vertical brace cut through the existing basement column. The existing columns need to be locally cut and re-grouted after placement of new elements. Concrete reinstated after.

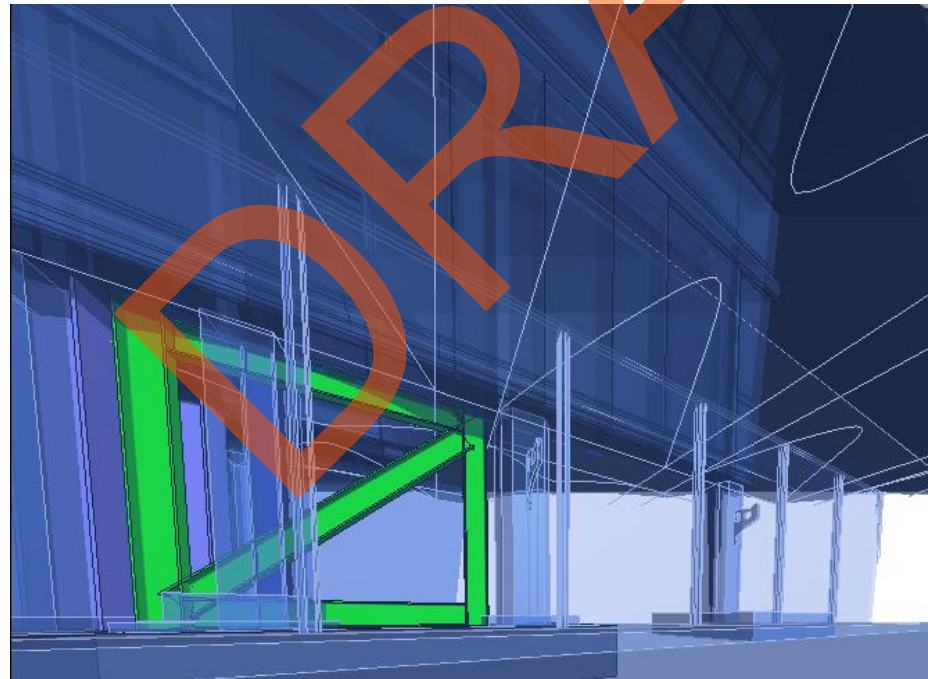
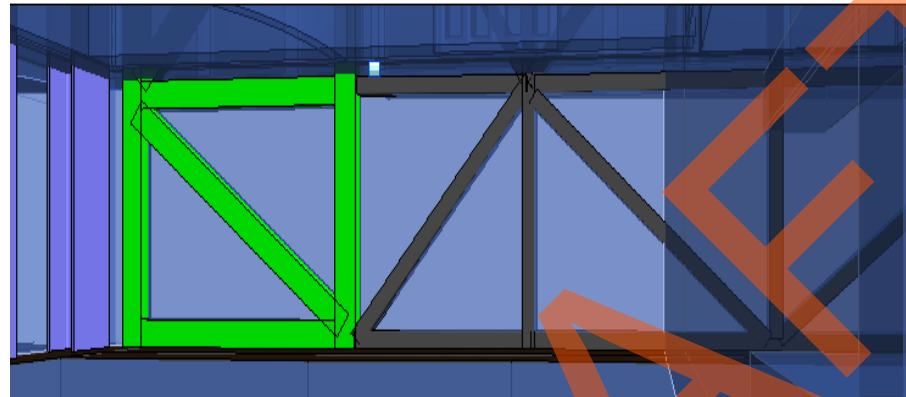
**Ceiling:** Shortcrete to be sprayed from underneath the floor after the temporary removal of the existing services

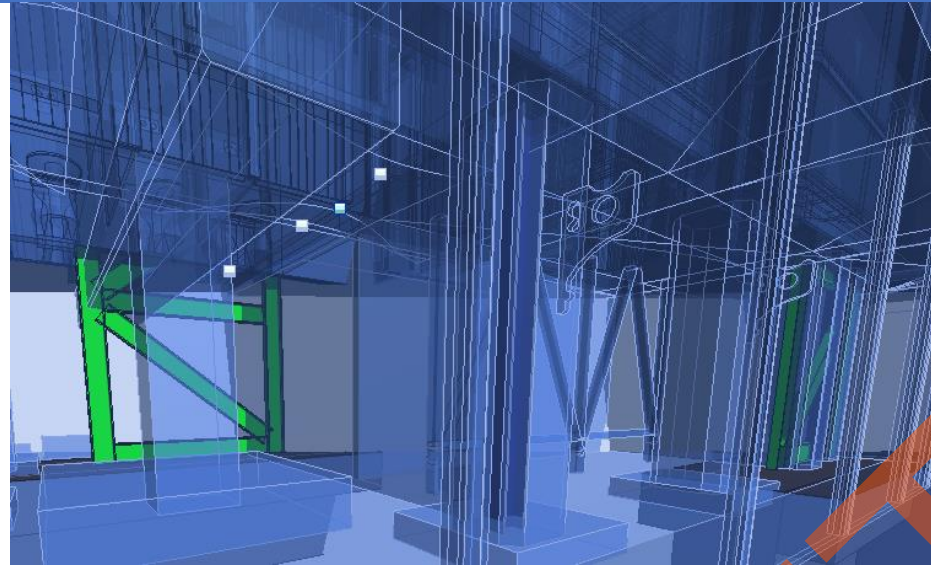
#### Foundation:

- For Vertical elements: A pad footing is to be designed which will pick up the residual axial load.



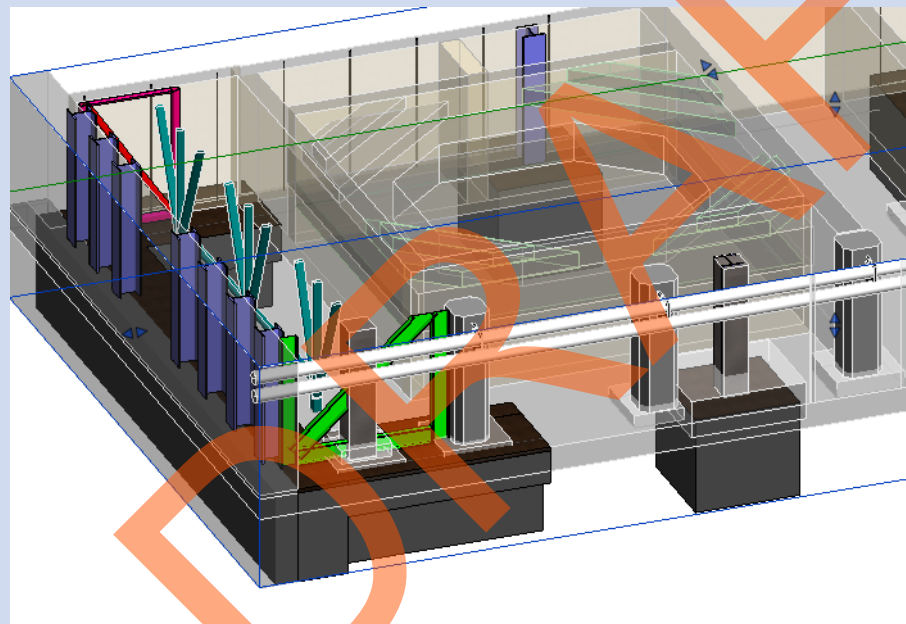
- Elements with diagonal struts: A ground beam is to be designed between the pad footing to pick up the residual shear.
- Vertical Strong Backs to strengthen the out-of-plane of the concrete walls: Base strip footing is to be designed under the strongbacks to resist the overturning moments.





#### B 4C - Rachel Bath Foundation

All the structural elements are chased down from the ground floor to the basement level.



**Northern & Southern Wall:** 250 UC 89.5 Strongback to be embedded 100mm into the existing concrete pumice wall.

**Western Side:** New 89 SHS bracing which are aligned and housed within the exterior wall cavity are chased to the basement.

**Eastern Side:** New 200PFC are chased down from the ground floor. The vertical brace cut through the existing basement column. The existing columns need to be locally cut and re-grouted after placement of new elements. Concrete reinstated after.

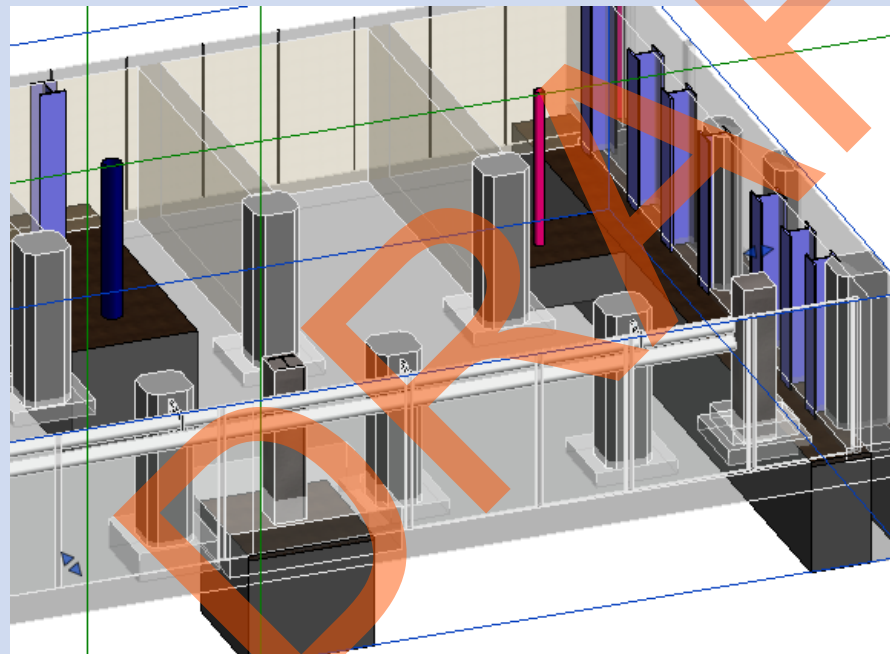
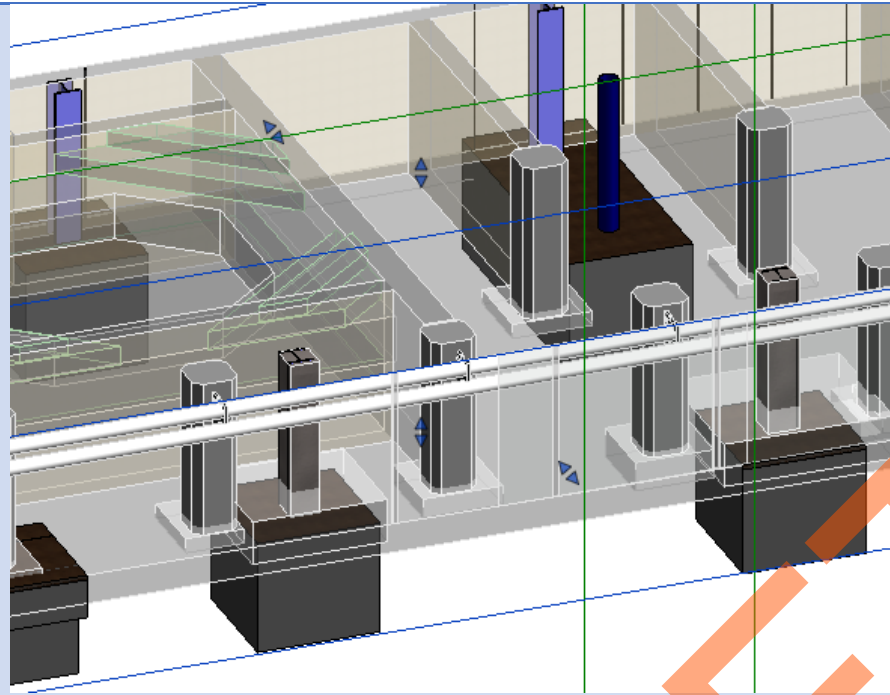
**Portal Frame:** 250UC portals which brace the zone 4 in the east-west direction are brought down to the basement level. These are placed in the position of the existing steel columns.

**Centre:** C350 and 89 SHS post which supports café mezzanine are chased down to the basement

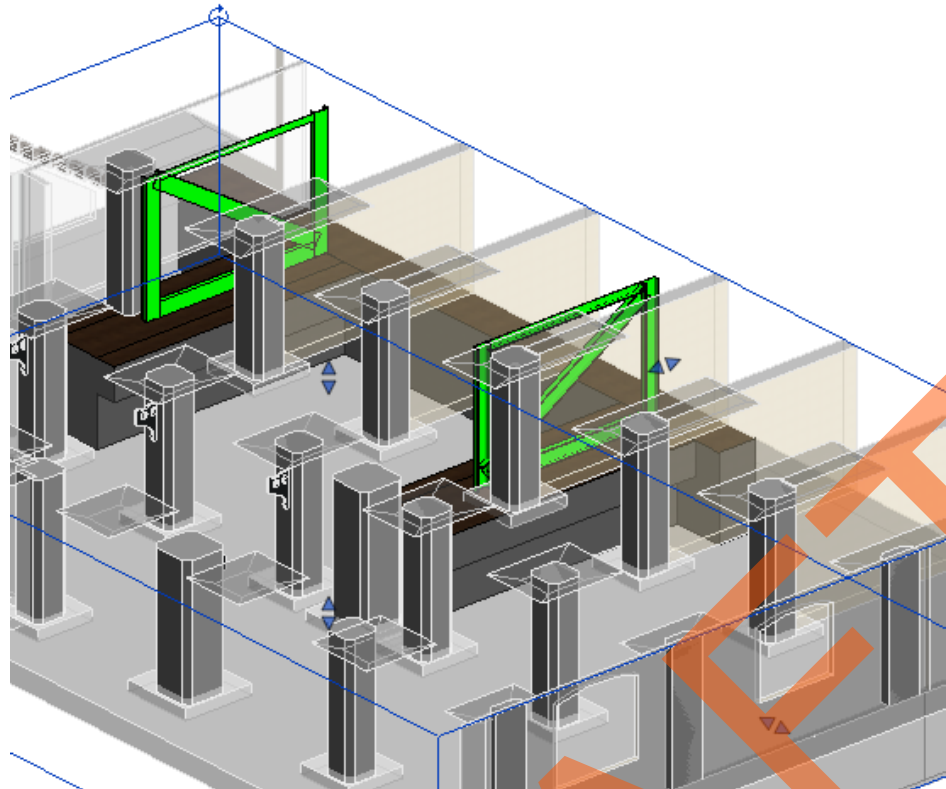
**Ceiling:** Shortcrete to be sprayed from underneath the floor after the temporary removal of the existing services

#### **Foundation:**

- For Vertical elements: A pad footing is to be designed which will pick up the residual axial load.
- Elements with diagonal struts: A ground beam is to be designed between the pad footing to pick up the residual shear.
- Vertical Strong Backs to strengthen the out-of-plane of the concrete walls: Base strip footing is to be designed under the strongbacks to resist the overturning moments.



**B 5A - Basement**



**Eastern Side:** New 200PFC are chased down from the ground floor.

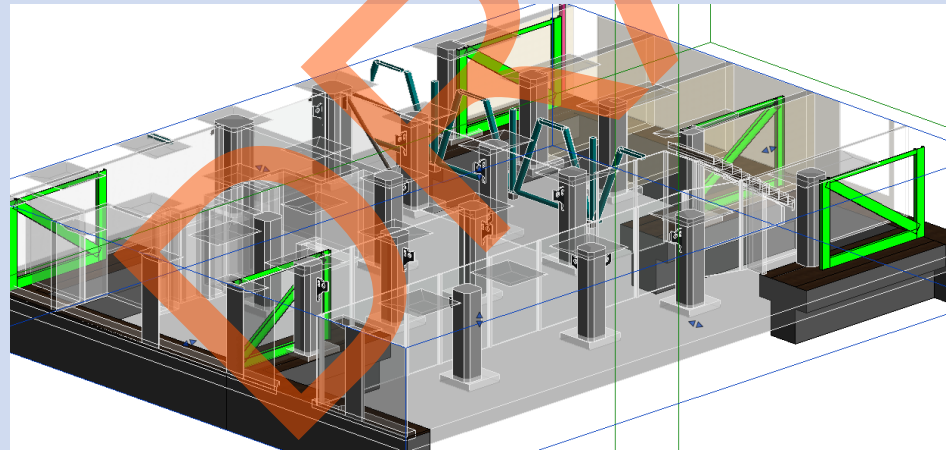
**Western Side:** New 200PFC are chased down from the ground floor.

**Ceiling:** Shortcrete to be sprayed from underneath the floor after the temporary removal of the existing services

**Foundation:**

- For Vertical elements: A pad footing is to be designed which will pick up the residual axial load.
- Elements with diagonal struts: A ground beam is to be designed between the pad footing to pick up the residual shear.

**B 5A-1**



**Eastern Side:** New 200PFC's are chased down from the ground floor. The vertical brace at the south corner cut through the existing basement column. The existing columns need to be locally cut and re-grouted after placement of new elements. Concrete reinstated after.

**Western Side:** New 200PFC's are chased down from the ground floor. The vertical brace at the south corner cut through the existing basement column/wall. The existing column/wall need to be locally cut and re-grouted after placement of new elements. Concrete reinstated after.

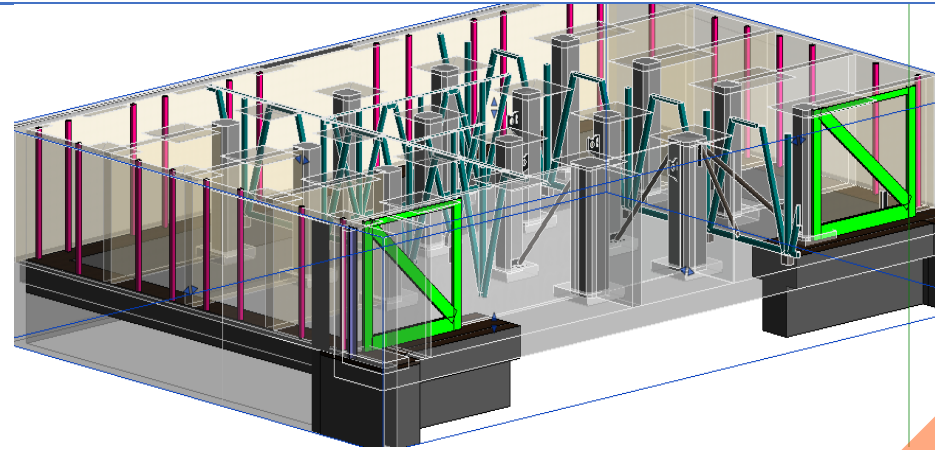
**Ceiling:** Shortcrete to be sprayed from underneath the floor after the temporary removal of the existing services

**Foundation:**

- For Vertical elements: A pad footing is to be designed which will pick up the residual axial load.
- Elements with diagonal struts: A ground beam is to be designed between the pad footing to pick up the residual shear.

**B 5A-2**

**Western Wall:** 89 SHS vertical strongback which supports the unreinforced concrete nib wall are chased down through the basement wall.



**Northern Wall:** 89 SHS vertical strongback which supports the unreinforced concrete nib wall are chased down through the basement wall.

**Southern Wall:** 89 SHS vertical strongback which supports the unreinforced concrete nib wall are chased down through the basement wall.

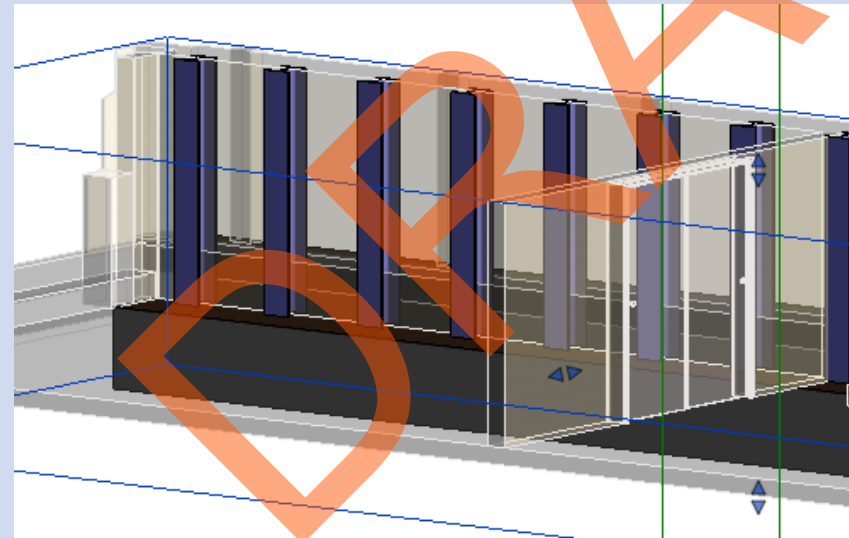
**Eastern Side:** New 200PFC's are chased down from the ground floor. The vertical brace at the south corner cut through the existing basement column/wall. The existing column/wall need to be locally cut and re-grouted after placement of new elements. Concrete reinstated after.

**Ceiling:** Shortcrete to be sprayed from underneath the floor after the temporary removal of the existing services

**Foundation:**

- For Vertical elements: A pad footing is to be designed which will pick up the residual axial load.
- Elements with diagonal struts: A ground beam is to be designed between the pad footing to pick up the residual shear.

**B 6A - Plant / Store Room**

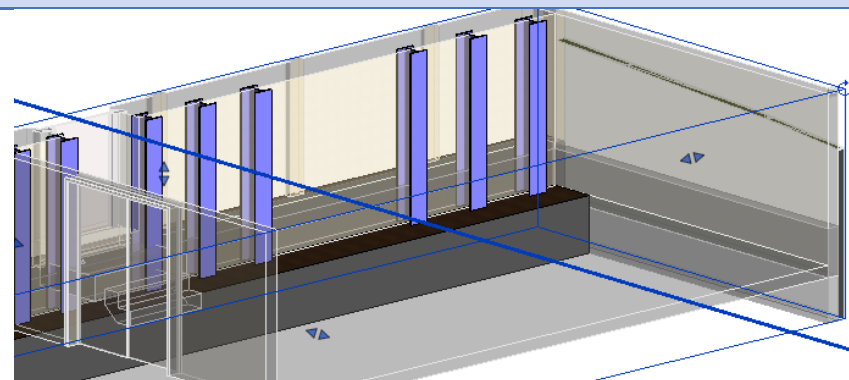


**Southern Wall:** 250 UC 89.5 Strongback to be embedded 100mm into the existing concrete pumice wall.

**Foundation:**

- Vertical Strong Backs to strengthen the out-of-plane of the concrete walls: Base strip footing is to be designed under the strongbacks to resist the overturning moments.

**B 6B - Plant / Store Room**

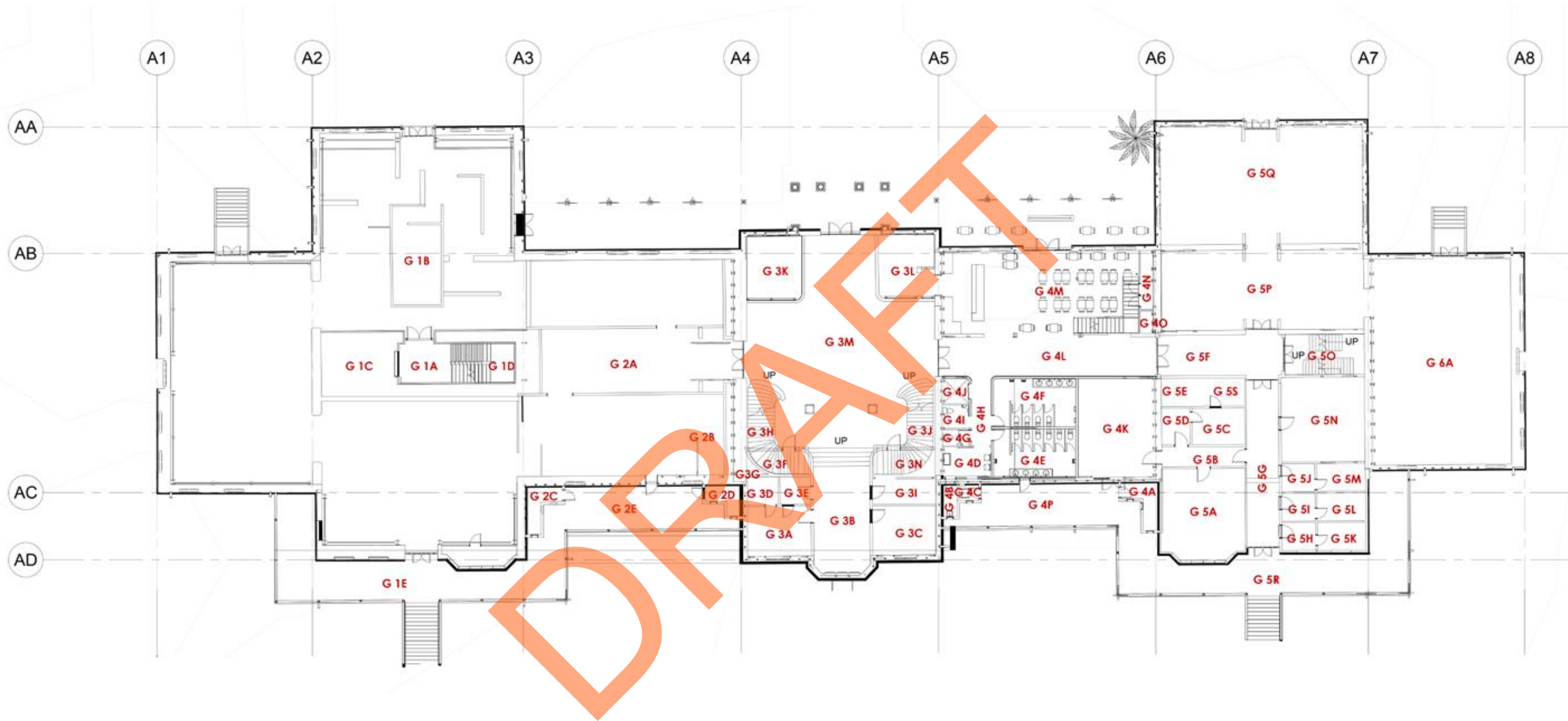


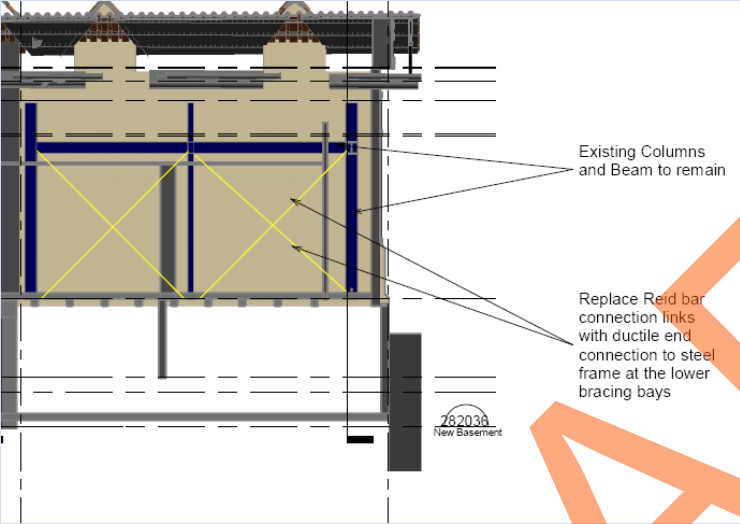
**Southern Wall:** 250 UC 89.5 Strongback to be embedded 100mm into the existing concrete pumice wall.

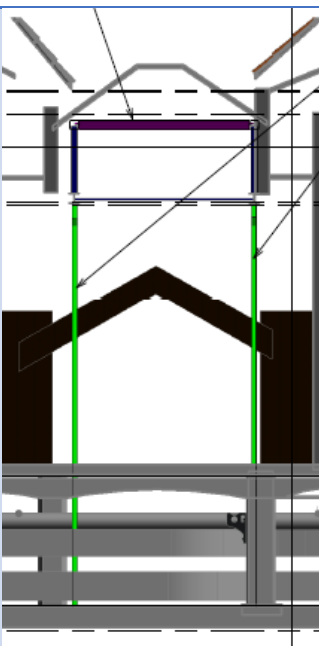
**Foundation:**

- Vertical Strong Backs to strengthen the out-of-plane of the concrete walls: Base strip footing is to be designed under the strongbacks to resist the overturning moments.

## PROPOSED GROUND FLOOR PLAN



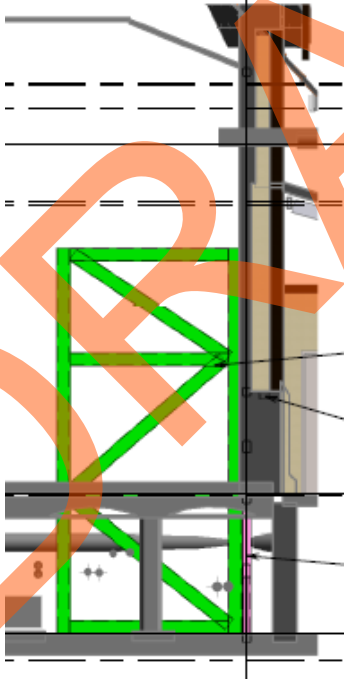
|                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|--|
| <b>G 1A</b> - Stairwell and lift landing to be retained                                                                                                      | There is no structural strengthening required in this space                                                                                                                                                                                                                                                                                                                                              |  |  |
| <b>G 1B</b> - Existing exhibition gallery spaces to be refurbished                                                                                           | Replace reid bar connection links with ductile end connection to steel frame at the lower bracing bays.                                                                                                                                                                                                                                                                                                  |  |  |
|                                                                                                                                                              |                                                                                                                                                                                                                                                                                                                       |  |  |
| <b>G 1C</b> - Lift<br>The existing lift will be retained                                                                                                     | There is no structural strengthening required in this space                                                                                                                                                                                                                                                                                                                                              |  |  |
| <b>G 1D</b> - Stairwell<br>The existing stairwell will be retained as public access to the proposed new exhibition gallery in the south wing basement (B 1E) | There is no structural strengthening required in this space                                                                                                                                                                                                                                                                                                                                              |  |  |
| <b>G 1E</b> - Verandah                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                          |  |  |
| <b>G 2A</b> - Corridor                                                                                                                                       | <div>New horizontal truss on top of existing truss. And vertical bracing to support the horizontal trusses.</div> <div><b>Ceiling:</b> 150x150x9 SHS with RB25 Reid Braces.</div> <div><b>North-Eastern/Western walls:</b> 200PFC vertical framing under the horizontal truss.</div> <div><b>Northern End:</b> 250 UC 89.5 Strongback to be embedded 100mm into the existing concrete pumice wall.</div> |  |  |



**G 2B - Gallery and Cupboard**  
There is a new mezzanine floor in the northern end of this room space.

Vertical bracing to support the mezzanine floor in the northern side. Because of the heritage importance for the walls in central atrium/zone 3 the vertical braces are provided in the eastern end wall of zone 2.

**Northern End Mezzanine:** 200PFC vertical framing under the mezzanine floor.  
**Northern End:** 250 UC 89.5 Strongback to be embedded 100mm into the existing concrete pumice wall.  
**Eastern End Wall:** 125X6 SHS vertical shear walls are placed inside the end wall.  
**Nib Walls:** 150PFC horizontal strongback with the strong side hard against the pumice concrete nib wall.



**G 2C - Store Room**

There is no structural strengthening required in this space

**G 2D - Storage**

There is no structural strengthening required in this space

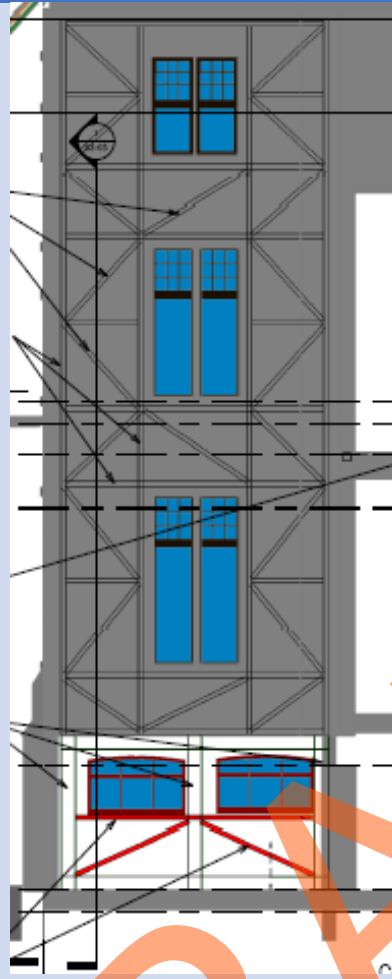
**G 2E - Verandah**

There is no structural strengthening required in this space

**G 2F - South Wing Gallery Space**

**G 3A – Office or Exhibition Space**

Vertical truss at the end wall which takes the laterall load in the North-South direction.  
**Eastern Wall:** 89x6 SHS vertical truss embeded into the end wall. The steel members are placed within the timebr wall.



**Western Wall:** Unreinforced pumice concrete wall to the mezanine floor. These are to be layered with FRP on both sides and connected to the mezanine and the Unreinforced concrete wall in gridline A4.

**G 3B - Upper Foyer, Central Hall**

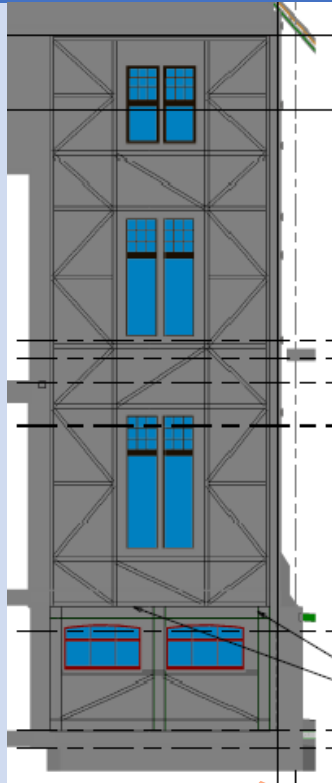
There is no structural strengthening required in this space

**G 3C – Office or Exhibition Space**

Vertical truss at the end wall which takes the lateral load in the North-South direction.

**Eastern Wall:** 89x6 SHS vertical truss embeded into the end wall. The steel members are placed within the timebr wall.

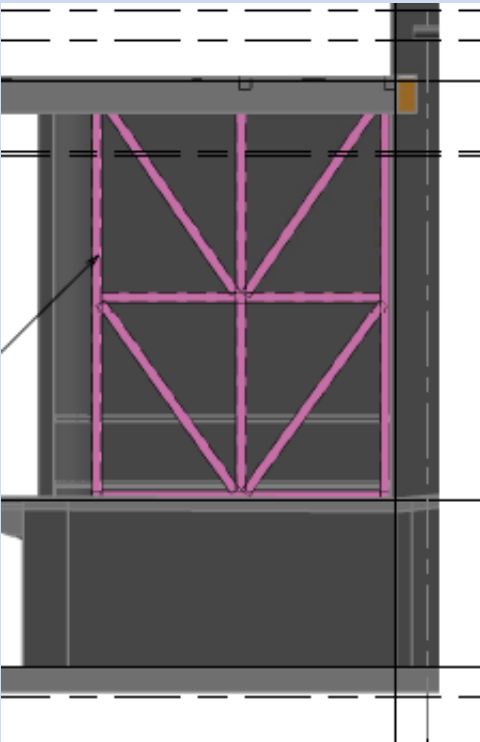
**Western Wall:** Unreinforced pumice concrete wall to the mezanine floor. These are to be layered with FRP on both sides and connected to the mezanine and the Unreinforced concrete wall in gridline A5.



|                                                                                                                                                                                                                                                                   |                                                                                   |                                                                                                                                                                                                               |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>G 3D</b> - Store Room                                                                                                                                                                                                                                          | There is no structural strengthening in this space because of heritage importance | <b>Eastern Wall:</b> Unreinforced pumice concrete wall to the mezanine floor. These are to be layered with FRP on both sides and connected to the mezanine and the Unreinforced concrete wall in gridline A4. |
| <b>G 3E</b> - Store                                                                                                                                                                                                                                               | There is no structural strengthening in this space because of heritage importance | <b>Eastern Wall:</b> Unreinforced pumice concrete wall to the mezanine floor. These are to be layered with FRP on both sides and connected to the mezanine and the Unreinforced concrete wall in gridline A4. |
| <b>G 3F</b> - Switchboard Room                                                                                                                                                                                                                                    | There is no structural strengthening required in this space                       |                                                                                                                                                                                                               |
| <b>G 3G</b> – Original Dressing Room Corridor<br>This corridor originally provided access between the dressing rooms and WC, however, was blocked off some time during or after the 1960s. The corridor still retains an early colour scheme, handrail and steps. | There is no structural strengthening required in this space                       |                                                                                                                                                                                                               |
| <b>G 3H</b> – Storage / Cupboard beneath Staircase<br>This cupboard is currently used for school bag storage. It is proposed to reopen beneath the stairs as per the original design.                                                                             | There is no structural strengthening required in this space                       |                                                                                                                                                                                                               |
| <b>G 3I</b> – Small Office or Store Room                                                                                                                                                                                                                          | There is no structural strengthening in this space because of heritage importance | <b>Eastern Wall:</b> Unreinforced pumice concrete wall to the mezanine floor. These are to be layered with FRP on both sides and connected to the mezanine and the Unreinforced concrete wall in gridline A5. |
| <b>G 3J</b> – Storage / Cupboard beneath Staircase<br>This cupboard is currently used for school bag storage. It is proposed to reopen beneath the stairs as per the original design.                                                                             | There is no structural strengthening required in this space                       |                                                                                                                                                                                                               |

G 3K - Retail Stock Storage Space.

Vertical truss at the end wall which takes the laterall load in the North-South direction and at the eastern wall to transfer the mezanine floor loads.

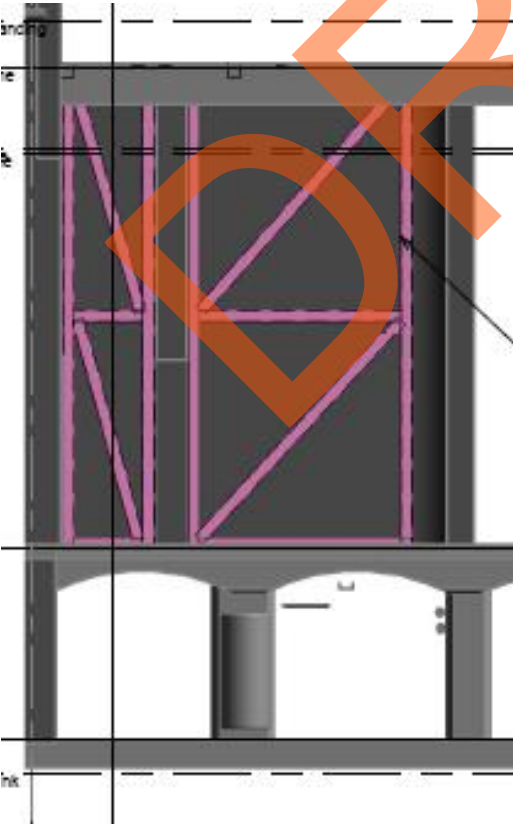


**Western Wall:** The 89x6 SHS bracing is to be embedded within timber wall.

**Eastern Wall:** 125x6SHS vertical bracing will be exposed and offset from the wall to preserve the dado, cornice and skirting

G 3L - Kitchen.

Vertical truss at the end wall which takes the laterall load in the North-South direction and at the eastern wall to transfer the mezanine floor loads.



**Western Wall:** The 89x6 SHS bracing is to be embedded within timber wall.

**Eastern Wall:** 125x6SHS vertical bracing will be exposed and offset from the wall to preserve the dado, cornice and skirting.

**Western Wall:** 125x6SHS vertical bracing will be exposed and offset from the wall to preserve the dado, cornice and skirting.

**Western Wall:** 125x6SHS vertical bracing will be exposed and offset from the wall to preserve the dado, cornice and skirting.



**Western Wall:** New 125X75mm SHS bracing is to be aligned and housed within the east exterior wall cavity and the linings reinstated.

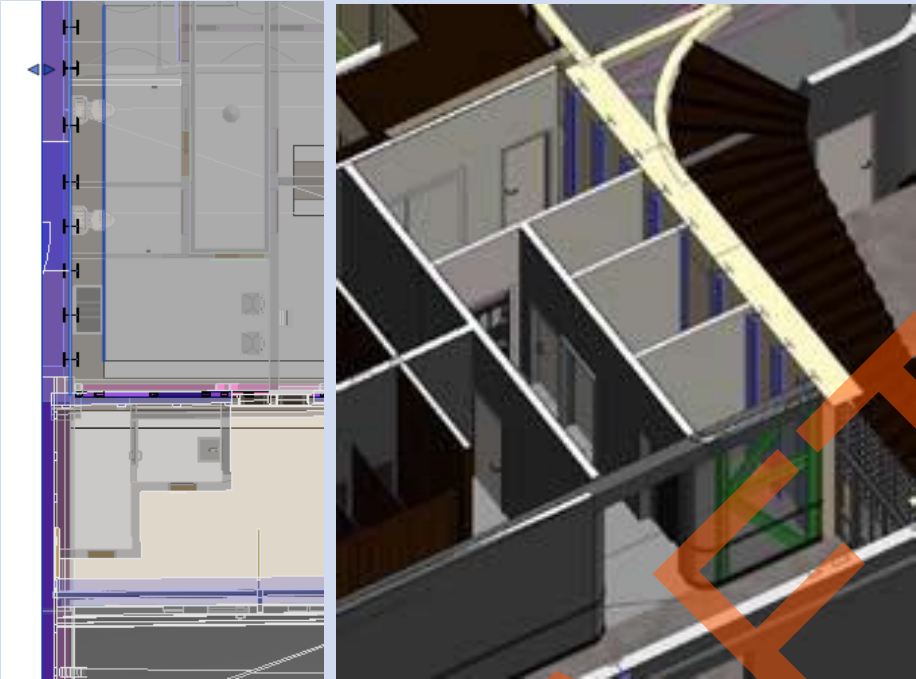
**Western Wall:** New 125X75mm SHS bracing is to be aligned and housed within the east exterior wall cavity and the linings reinstated.

**Western Wall:** New 125X75mm SHS bracing is to be aligned and housed within the east exterior wall cavity and the linings reinstated.

**Southern Wall:** 250 UC 89.5 Strongback to be embedded 100mm into the existing concrete pumice wall.

New 125X75mm SHS bracing is to be aligned and housed within the east exterior wall cavity and the linings reinstated.

**Eastern Wall:** New 125X75mm SHS bracing is to be aligned and housed within the east exterior wall cavity and the linings reinstated.



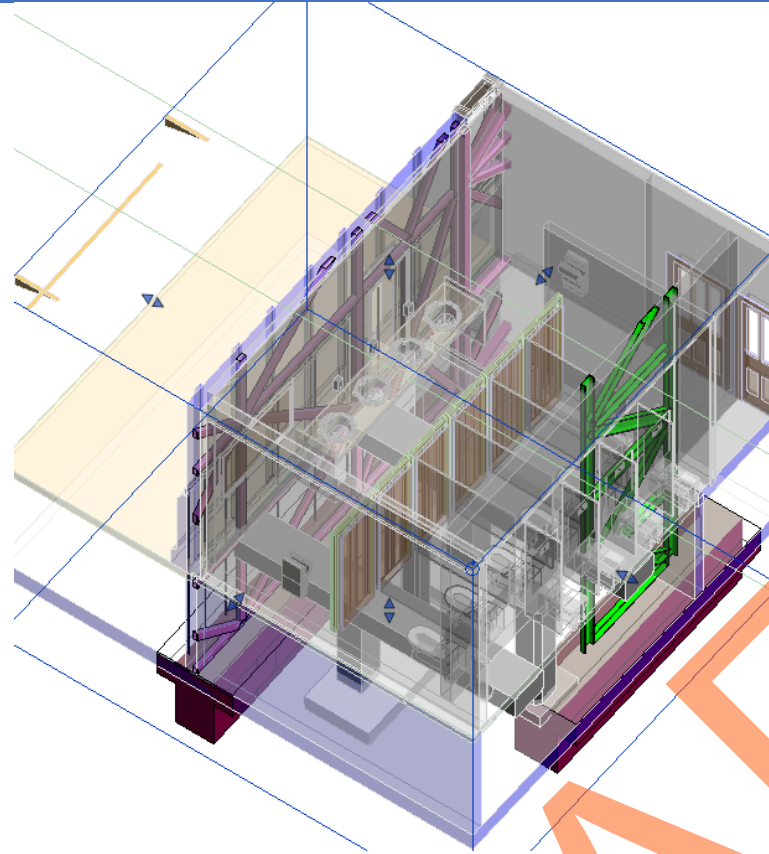
**G 4E** - Female Toilets

New 200 PFC bracing is to be aligned and housed within the new corridor wall.

New 125X75mm SHS bracing is to be aligned and housed within the east exterior wall cavity and the linings reinstated.

**Western Wall:** New 200 PFC bracing is to be aligned and housed within the new corridor wall

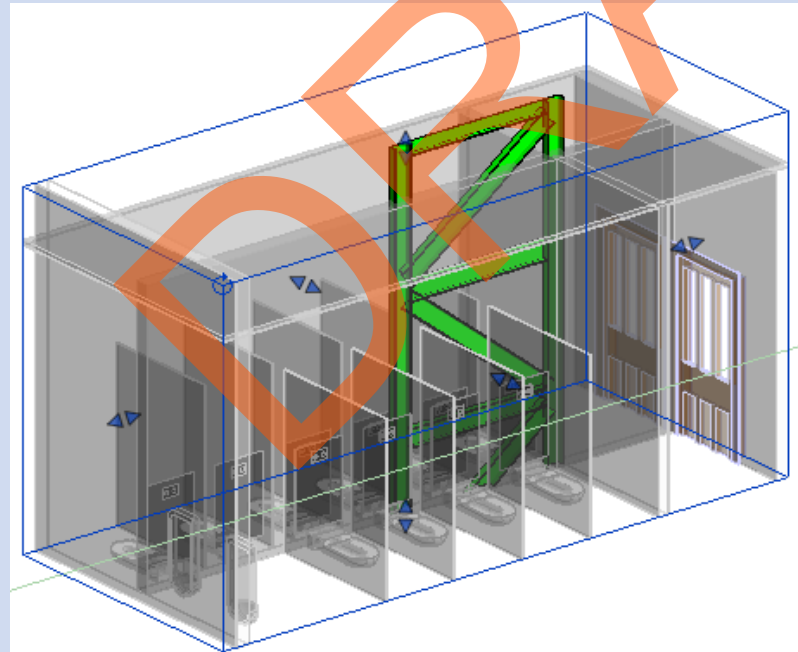
**Eastern Wall:** New 125X75mm SHS bracing is to be aligned and housed within the east exterior wall cavity and the linings reinstated.



#### G 4F - Male Toilets

New 200 PFC bracing is to be aligned and housed within the new corridor wall.

**Eastern Wall:** New 200 PFC bracing is to be aligned and housed within the new corridor wall



#### G 4H - Toilet Corridor

There is no structural strengthening required in this space

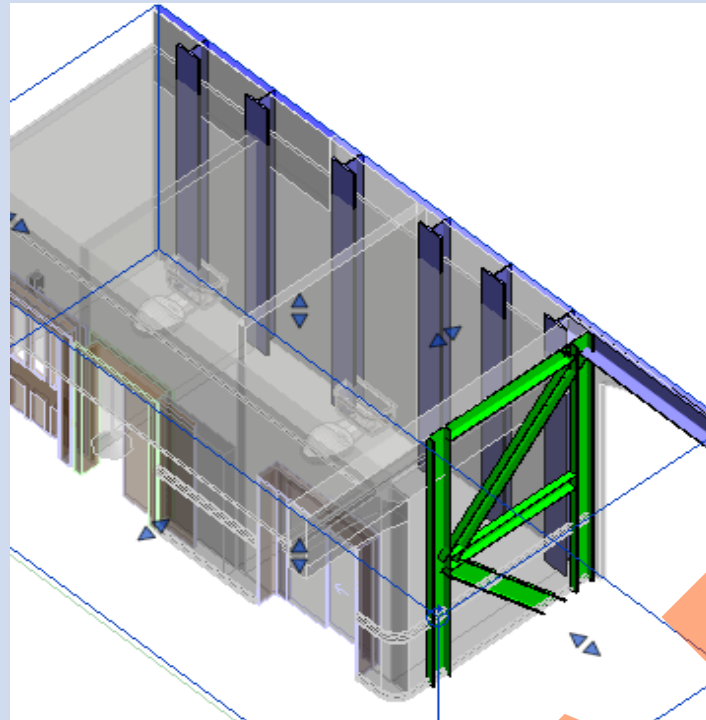
**G 4J** - New accessible lift to provide access to the central hall mezzanine from the ground floor  
(Planning to change the lift by Architect?-DPA to confirm)

250 UC 89 strongbacks embedded 100mm into the south full height concrete wall, grouted in place and a new partition wall built in front.

**Southern Wall:** 250 UC 89.5 Strongback to be embedded 100mm into the existing concrete pumice wall.

New 200 PFC bracing is to be aligned and housed within the new corridor wall.

**Western Wall:** New 200 PFC bracing is to be aligned and housed within the new corridor wall



**G 4K - New Children's Exhibition Area**

250 UC 89 strongbacks embedded 100mm into the north full height concrete wall, grouted in place and a new partition wall built in front.

New 125X75mm SHS and 200PFC bracing is to be aligned and housed within the east exterior wall cavity and the linings reinstated.

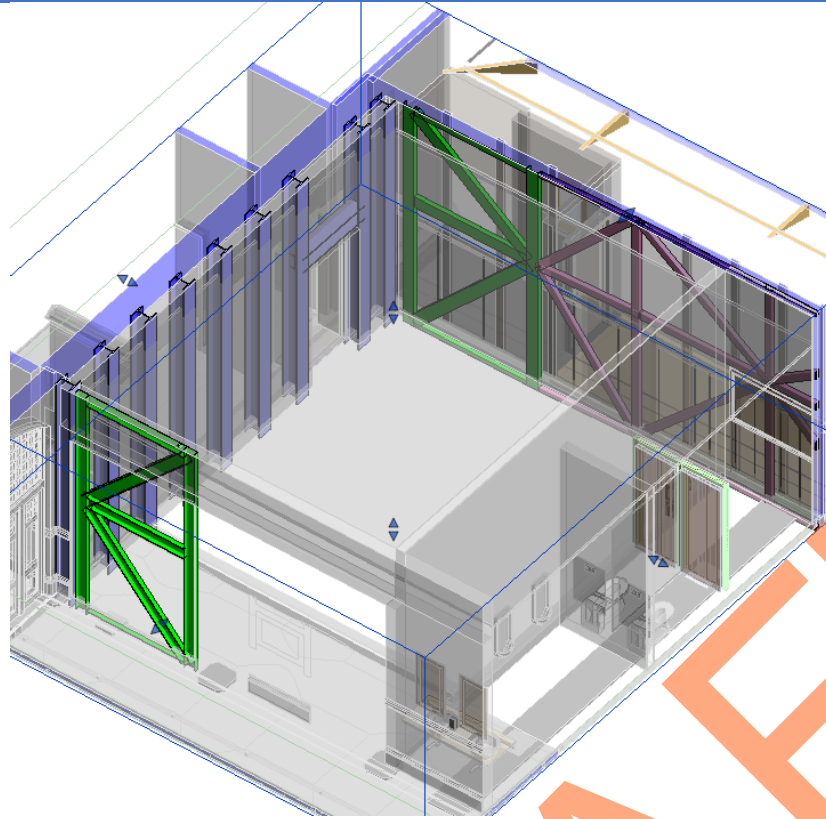
New 200 PFC bracing is to be aligned and housed within the new corridor wall.

**Northern Wall:** 250 UC 89.5 Strongback to be embedded 100mm into the existing concrete pumice wall.

**Eastern Wall:** New 125X75mm SHS and 200PFC bracing is to be aligned and housed within the east exterior wall cavity and the linings reinstated.

**Western Wall:** New 200 PFC bracing is to be aligned and housed within the new corridor wall

**Westernn Wall:** New glass door opening by Architect. GDC to design the Lintel beam and columns assosiated to take the load from above and any point load from the existing floor beams.



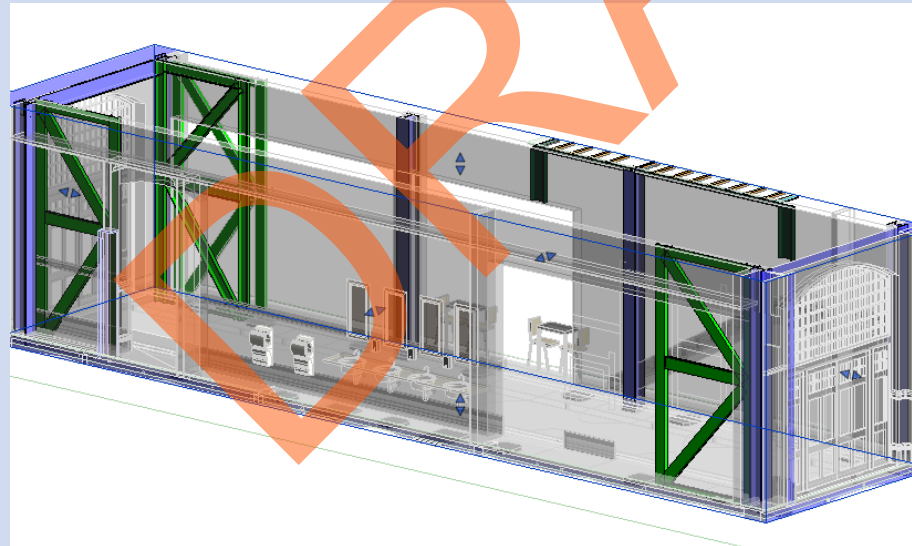
#### G 4L - Main corridor

West and east corridor walls are to be reconstructed with new 200 PFC bracing frames aligned and housed within these new walls.

**Western Wall:** New 200 PFC bracing is to be aligned and housed within the new corridor wall

**Eastern Wall:** New 200 PFC bracing is to be aligned and housed within the new corridor wall

**Ceiling:** New Beams which join the office mezzanine to the café area.



#### G 4M - Cafe

New 250 UC strongbacks are to be embedded 100mm into the south end full height concrete walls, grouted in place and lined over.

**Southern Wall:** 250 UC 89.5 Strongback to be embedded 100mm into the existing concrete pumice wall.

New 89mm and 75mm SHS bracing is to be aligned and housed within the west exterior wall cavity and the wall linings reinstated.

**Western Wall:** New 89mm and 75mm SHS bracing is to be aligned and housed within the west exterior wall cavity and the wall linings reinstated.

HD 12 Reid Braces drilled through the concrete nib walls extending to the basement.

East corridor walls are to be reconstructed with new 200 PFC bracing frames aligned and housed within these new walls.

250 UC portal frames are to be installed within the cafe (east to west) to transfer the lateral load and the columns embedded 100mm into the east and west wall cavities. The portals are to continue above the existing ceiling structure into the attic.

Café has a timber mezzanine in the northern half. The primary structure of the mezzanine will comprise 310 UB and 300 PFC beams supported by a C350 column. The mezzanine is supported onto the steel portal at the eastern end.

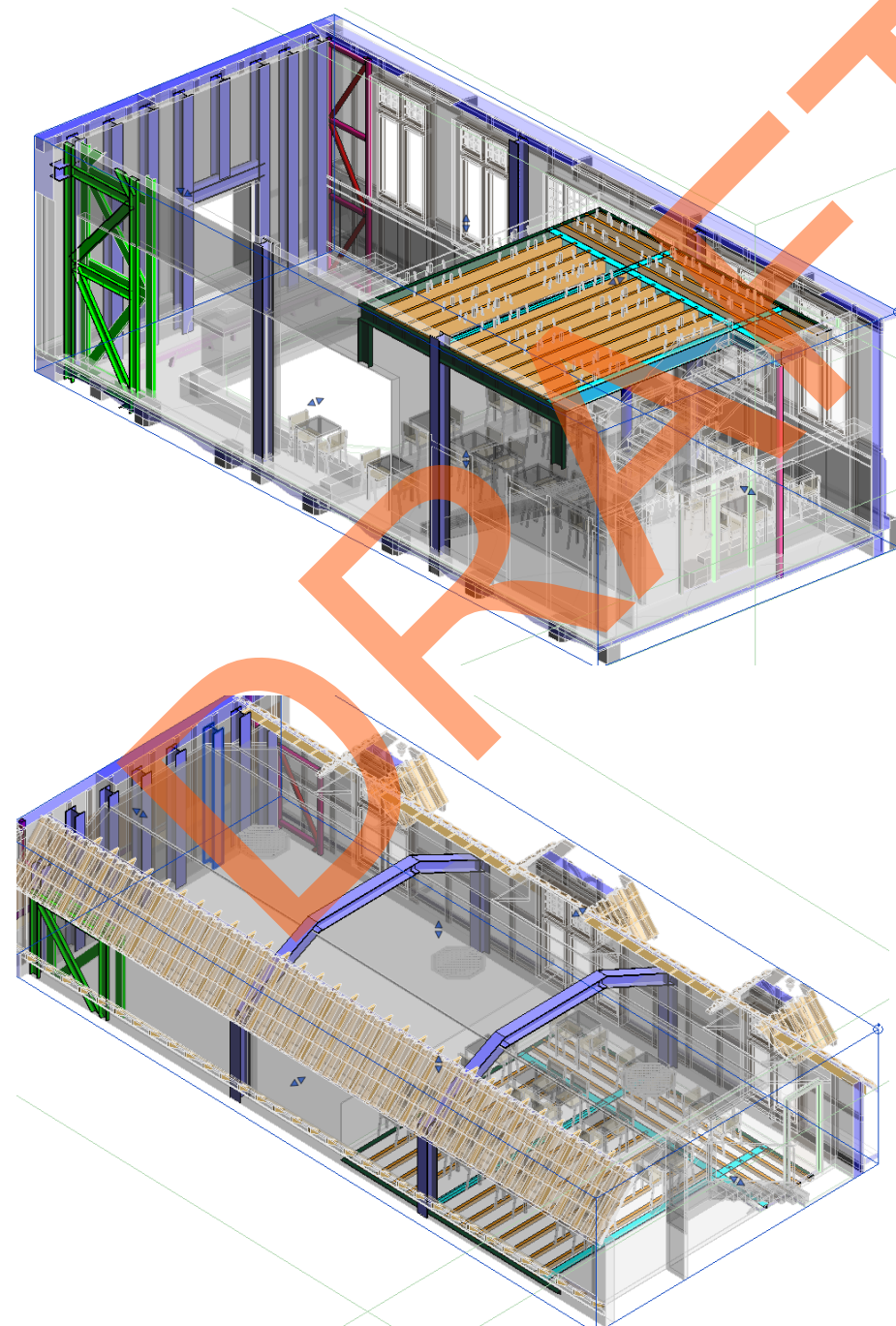
**Eastern Wall:** New 200 PFC bracing is to be aligned and housed within the new corridor wall.

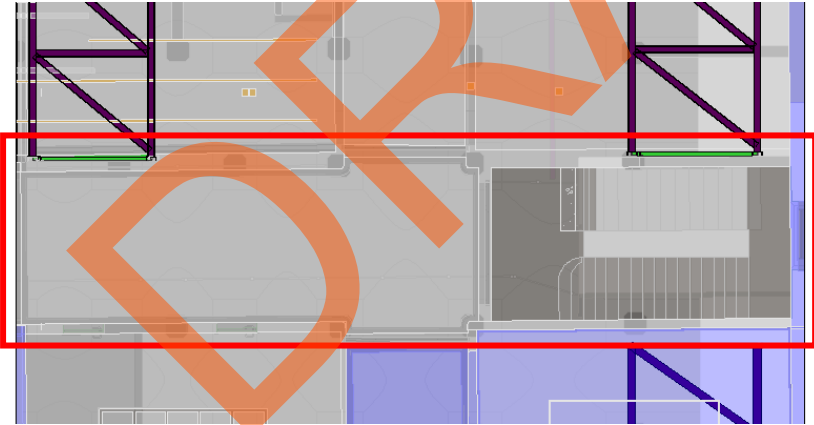
**Portals:** 250 UC portal frames are to be installed within the cafe (east to west) to transfer the lateral load and the columns embedded 100mm into the east and west wall cavities.

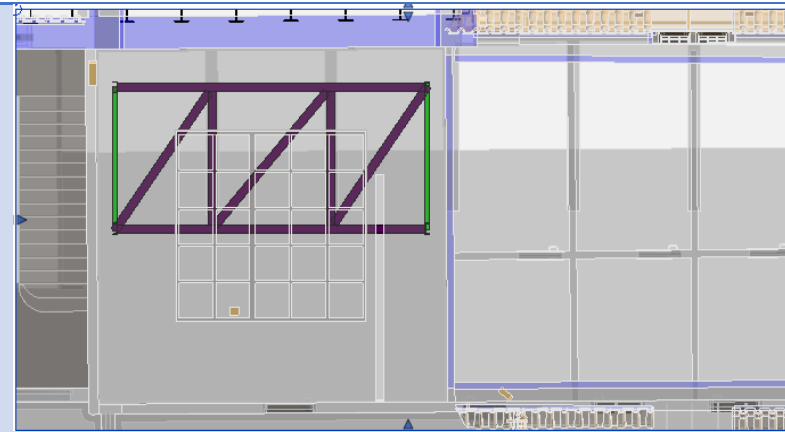
**Mezzanine:** Café has a timber mezzanine in the northern half. The primary structure of the mezzanine will comprise 310 UB and 300 PFC beams supported by a C350 column. The mezzanine is supported onto the steel portal at the eastern end and a Square hollow Section (SHS) post at the northern end.

**Ceiling:** The portals are to continue above the existing ceiling structure into the attic.

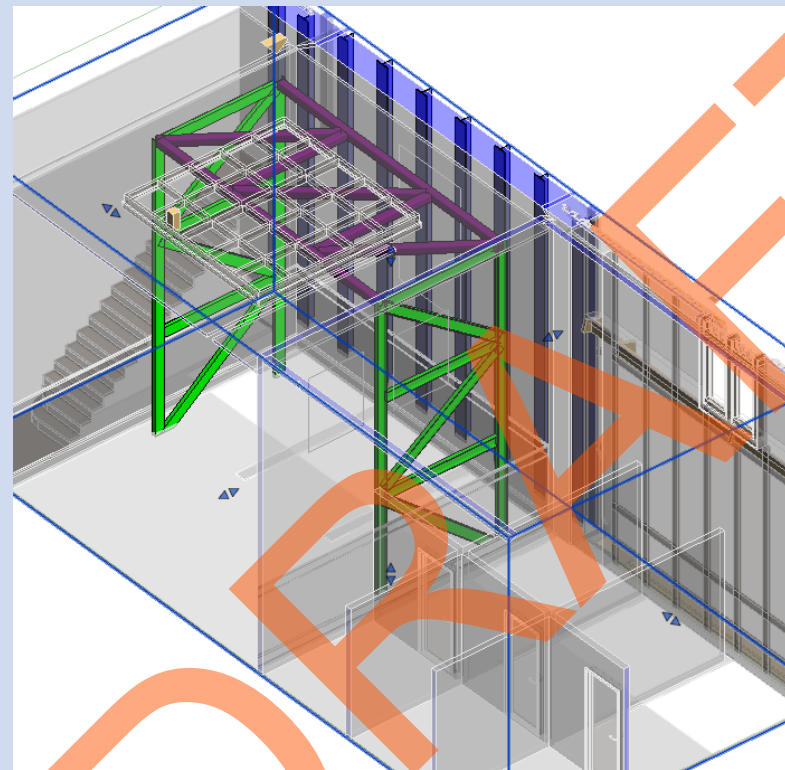
**Methodologies on how the existing steel columns and beams interact with the new members (mainly the portals)**



|                                                                                      |                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                        |
|--------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>G 4N</b> - New Cafe Store Room                                                    | New 250 UC strongbacks are to be embedded 100mm into the north end full height concrete walls, grouted in place and lined over. In the area of fire egress a minimum of 1100mm length is to be attained of the steps. <b>Hence specially designed 150UC is to be with 100mm embedment into the north end wall.</b> | <b>Northern Wall:</b> 250 UC 89.5 at bottom and <b>150UC (specific design) Strongback</b> to be embedded 100mm into the existing concrete pumice wall.<br><br><b>Western Wall:</b> HD 12 Reid Braces drilled through the concrete nib walls extending to the basement. |
| <b>G 4O</b> - New Service Shaft                                                      | New 250 UC strongbacks are to be embedded 100mm into the north end full height concrete walls, grouted in place and lined over.                                                                                                                                                                                    | <b>Northern Wall:</b> 250 UC 89.5 Strongback to be embedded 100mm into the existing concrete pumice wall.                                                                                                                                                              |
| <b>G 5A</b> - Former Cooling Room                                                    | There is no structural strengthening in this space because of heritage importance                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                        |
| <b>G 5B</b> - North Wing Corridor                                                    | There is no structural strengthening in this space because of heritage importance                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                        |
| <b>G 5C</b> - Former Deep Bath (Honeymoon Suite)                                     | There is no structural strengthening in this space because of heritage importance                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                        |
| <b>G 5D</b> - Former Store Room                                                      | There is no structural strengthening in this space because of heritage importance                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                        |
| <b>G 5E</b> - Potential New Switchboard Room                                         | There is no structural strengthening in this space because of heritage importance                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                        |
| <b>G 5F</b> - Corridor                                                               | West corridor walls are to be reconstructed with new 200 PFC bracing frames aligned and housed within these new walls.                                                                                                                                                                                             | <b>Western Wall:</b> New 200 PFC bracing is to be aligned and housed within the new corridor wall.                                                                                                                                                                     |
|  |                                                                                                                                                                                                                                                                                                                    |                                                                                                                                                                                                                                                                        |
| <b>G 5G</b> - Corridor                                                               | There is no structural strengthening in this space because of heritage importance                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                        |
| <b>G 5H, I, J, K, L, M</b> - Former Private Baths (Museum spaces)                    | There is no structural strengthening in this space because of heritage importance                                                                                                                                                                                                                                  |                                                                                                                                                                                                                                                                        |
| <b>G 5N</b> - Exhibition Room (Former Private Baths)                                 | New 200 PFC structural bracing is to be offset from the walls to preserve the tiled dado and offset below the ceiling to preserve the original cornices and mouldings.                                                                                                                                             | <b>Western and Eastern Side:</b> 200PFC vertical bracing will be exposed and offset from the wall to preserve the dado, cornice and moulding.                                                                                                                          |



**Ceiling:** 150SHS horizontal bracing will be exposed and offset from the ceiling to preserve cornice and mouldings.



**G 50 - Staircase/Stairwell**

New 200 PFC bracing is to be aligned and housed within the new west corridor wall.

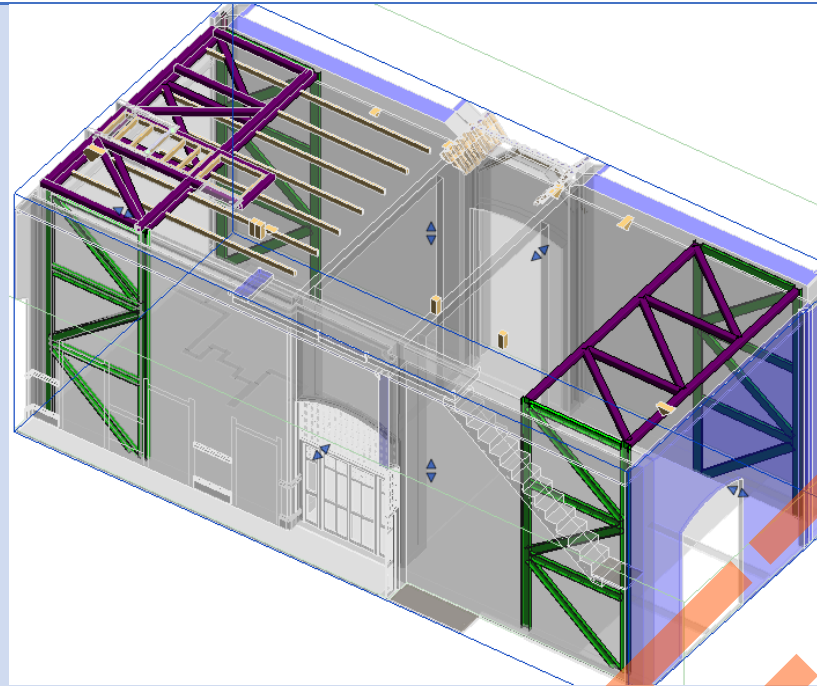
**Western Wall:** New 200 PFC bracing is to be aligned and housed within the new corridor wall.

**G 5P - Exhibition Gallery (Former Private Baths)**

New 200 PFC structural bracing is to be aligned and housed within the existing wall cavities and the wall linings and 150SHS horizontal bracing above the ceiling level.

**Western and Eastern Wall:** New 200 PFC bracing is to be aligned and housed within the new corridor wall.

**Ceiling:** 150SHS horizontal bracing above the ceiling level.

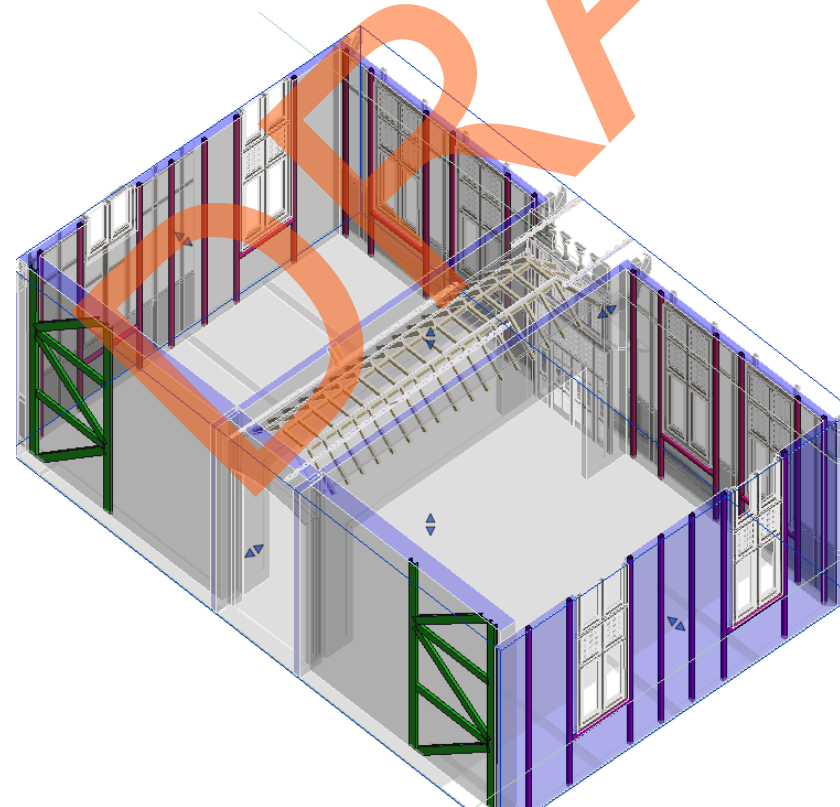


**G 5Q - Exhibition Gallery**

New 200 PFC structural bracing is to be aligned and housed within the existing wall cavities and the wall linings.

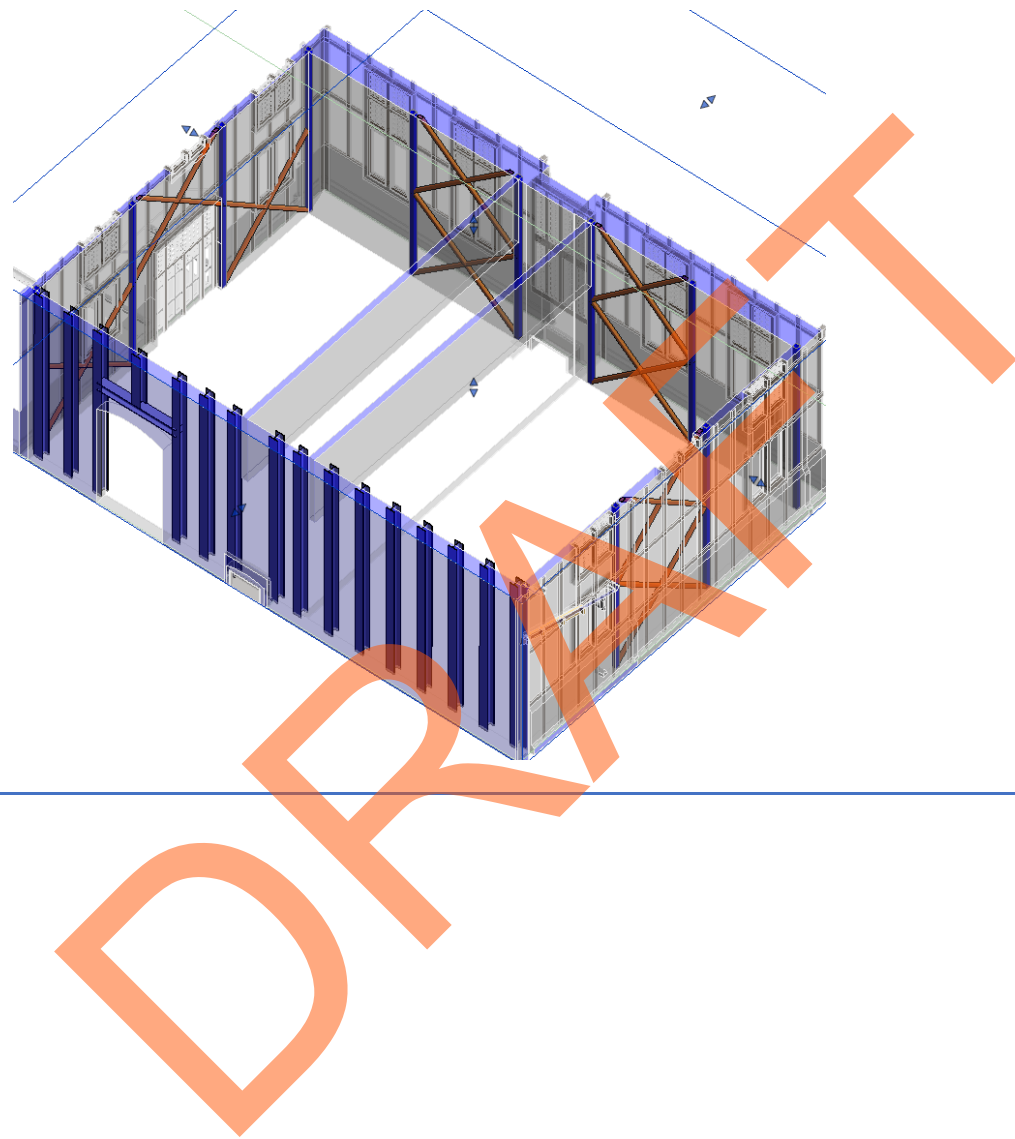
New 89mm and 75mm SHS bracing is to be offset from window openings and housed within the external wall cavities.

**Eastern Wall:** New 200 PFC bracing is to be aligned and housed within the new corridor wall.

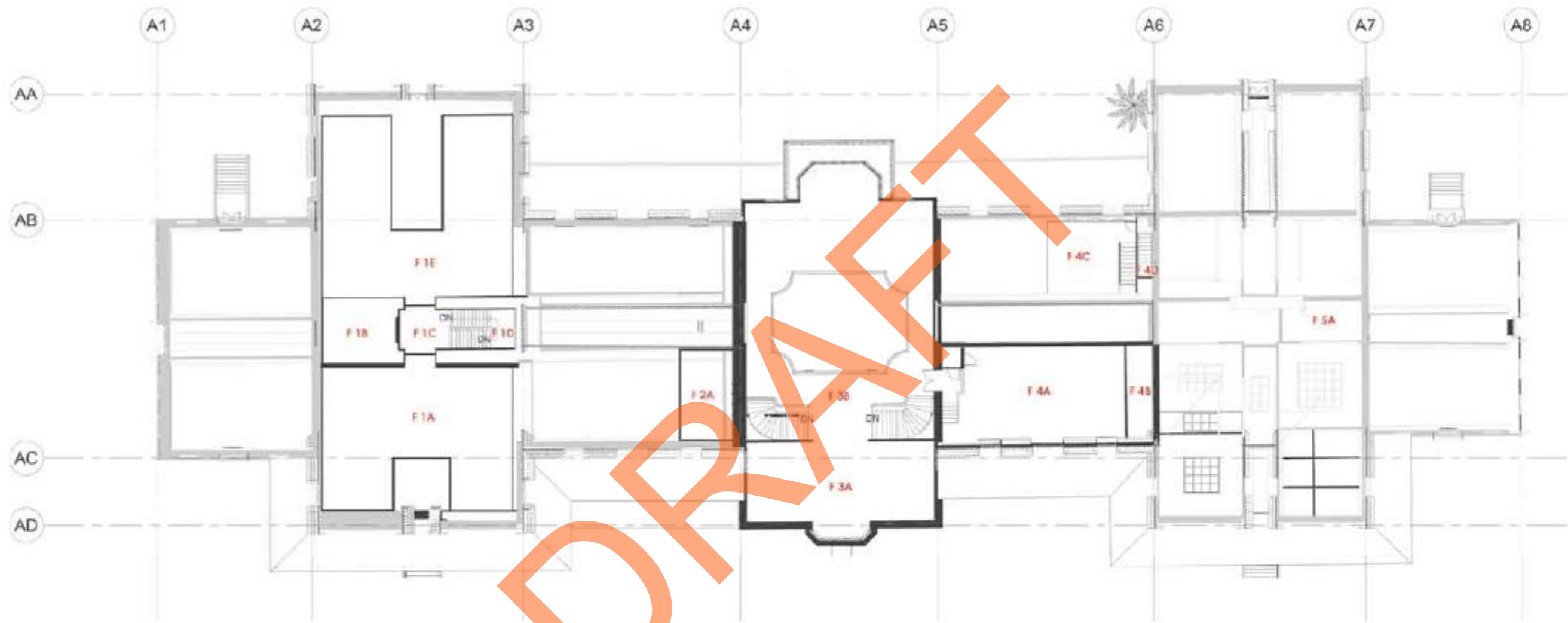


|                         |                                                                                   |
|-------------------------|-----------------------------------------------------------------------------------|
| G 5S - Exhibition Space | There is no structural strengthening in this space because of heritage importance |
|-------------------------|-----------------------------------------------------------------------------------|

|                           |                                                                                                                                                                                                                        |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| G 6A - Exhibition Gallery | <p>New 250 UC strongbacks are to be embedded 100mm into the north end full height concrete walls, grouted in place and lined over.</p> <p>New 100 SHS cross braces are provided at the west, east and south walls.</p> |
|---------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|



# PROPOSED FIRST FLOOR PLAN



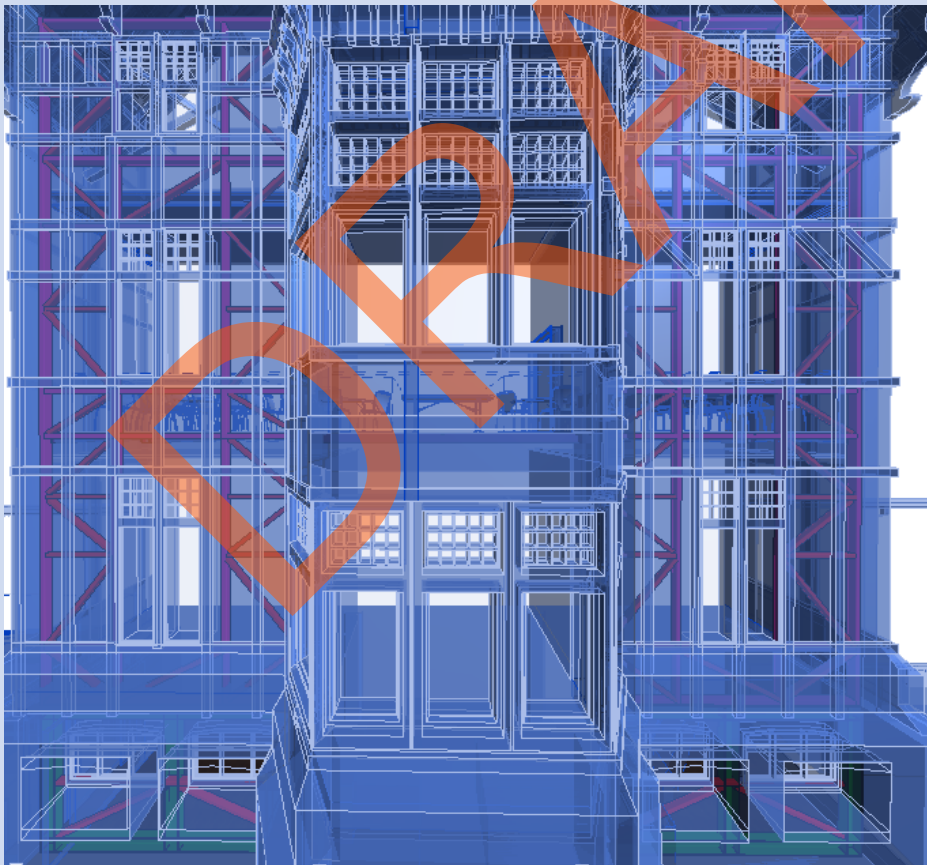
|                                   |                                                             |
|-----------------------------------|-------------------------------------------------------------|
| F 1A - Gallery                    | There is no structural strengthening required in this space |
| F 1B - Lift / Elevator            | There is no structural strengthening required in this space |
| F 1C - Lift and Staircase Landing | There is no structural strengthening required in this space |
| F 1D - Staircase                  | There is no structural strengthening required in this space |
| F 1E - Gallery                    | There is no structural strengthening required in this space |

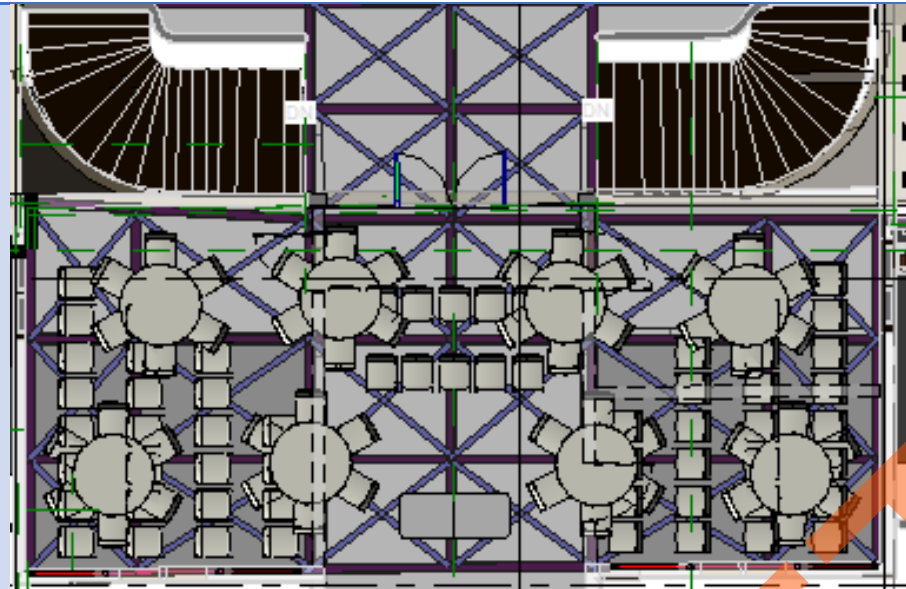
|                       |                                                                                                                                 |                                                                                                                                                       |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
| F 2A - New Store Room | New 250 UC strongbacks are to be embedded 100mm into the north end full height concrete walls, grouted in place and lined over. | <b>Northern Wall:</b> New 250 UC strongbacks are to be embedded 100mm into the north end full height concrete walls, grouted in place and lined over. |
|-----------------------|---------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------|

New mezanine structue:

**Mezzanine Floor:** New

|                                         |                                                                                                                                                                                                                           |                                                                                                                                                                                                                                                                                                                                                       |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| F 3A - New Education / Conference Space | <p>Vertical truss at the end wall which takes the laterall load in the North-South direction.</p> <p>Within the mezanine floor cavity new horizontal truss is to be rebated into the top of the existing floor joist.</p> | <p><b>Eastern Wall:</b> 89x6 and 75 x6 SHS vertical truss embeded into the end wall. The steel members are placed within the timebr wall.</p> <p><b>Mezzanine Floor:</b> A horizontal truss is designed using 150 SHS and the main members and 100x10 flats as the diagonal members. Thesee are rebated into the top of the existing floor joist.</p> |
|-----------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|





**F 3B** - Central Hall Mezzanine

Vertical truss at the end wall which takes the lateral load in the North-South direction.

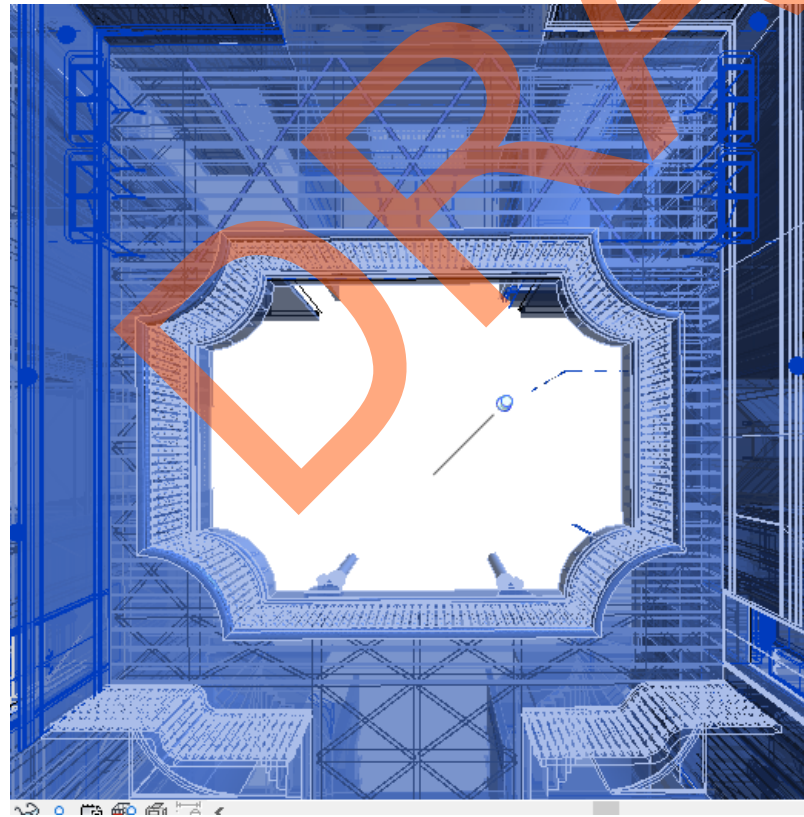
The unreinforced concrete walls are braced out of plane using vertical strongbacks. Due to the heritage significance these are placed in the adjacent wings (Zone 2 and 4 respectively) of the atrium. But, due to the height difference of the atrium with respect to the other wings, some part of the concrete walls are exposed outside the roof area (i.e. these are exposed to weather) and thus placement of steel is not appropriate. Hence Vertical SHS strongback for the unreinforced concrete wall which are exposed to the weather are placed within the wall cavities of the atrium.

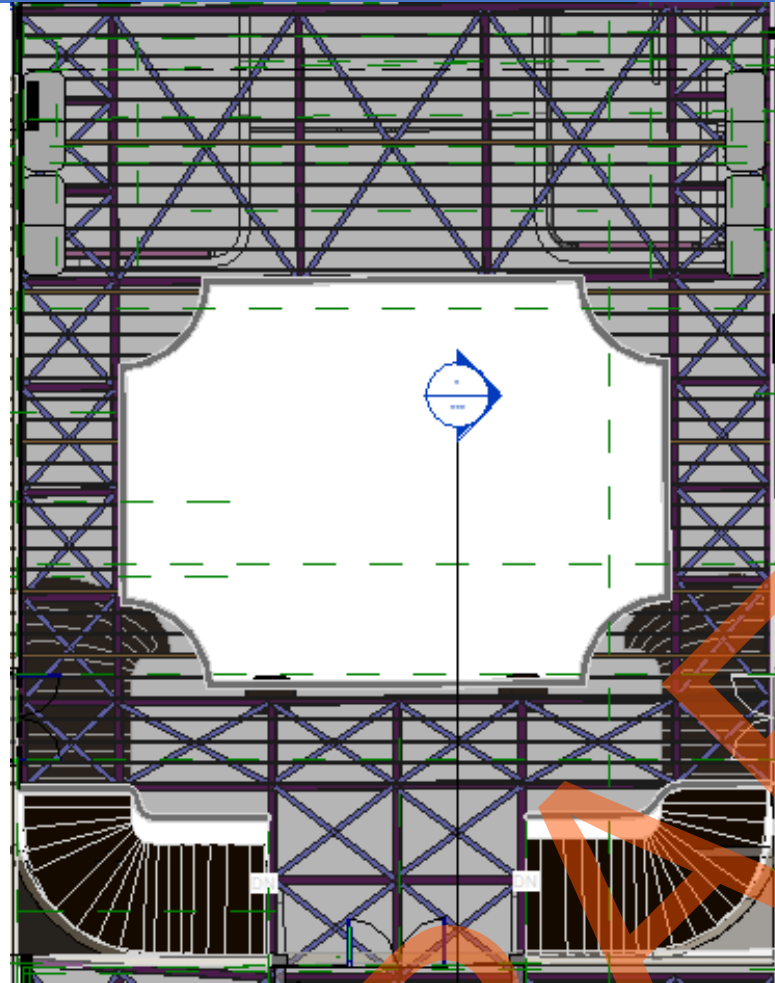
Within the mezzanine floor cavity new horizontal truss is to be rebated into the top of the existing floor joist.

**Western Wall:** 89x6 and 75 x6 SHS vertical truss embedded into the end wall. The steel members are placed within the timebr wall.

**Northern/Southern Wall:** 89 SHS vertical strongbacks (to brace the concrete pumice walls out of plane) are placed within the wall cavity.

**Mezzanine Floor:** A horizontal truss is designed using 150 SHS and the main members and 100x10 flats as the diagonal members. These are rebated into the top of the existing floor joist.





#### F 4A - Offices

250 UC 89 strongbacks embedded 100mm into the north full height concrete wall, grouted in place and a new partition wall built in front.

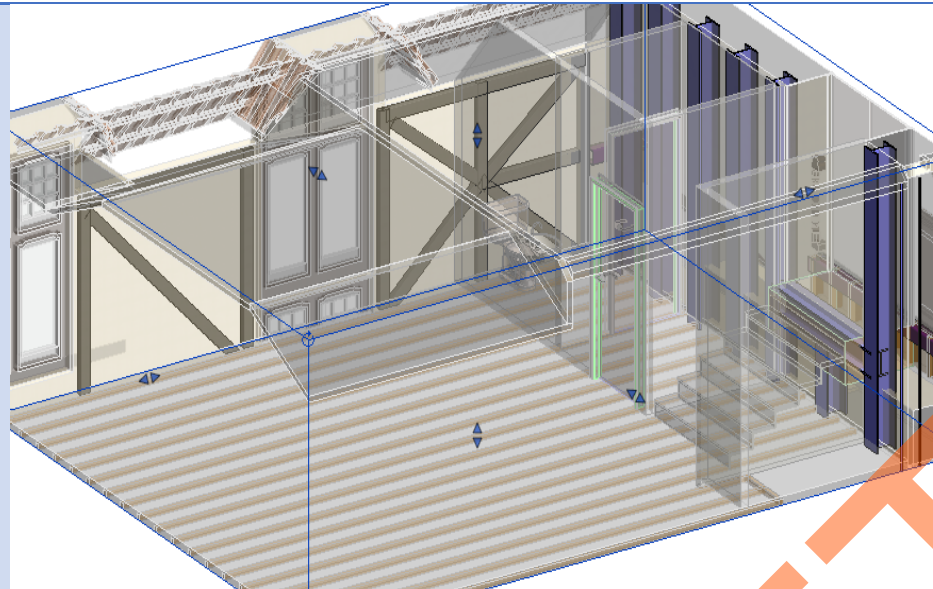
New 125X75mm SHS and 200PFC bracing is to be aligned and housed within the east exterior wall cavity and the linings reinstated.

**Mezzanine Floor:** New cross-braces to be designed to create a horizontal diaphragm action.

**Southern Wall:** 250 UC 89.5 Strongback to be embedded 100mm into the existing concrete pumice wall.

**Eastern Wall:** New 125X75 SHS and 200 PFC bracing is to be aligned and housed within the external wall.

**Mezzanine Floor:** New cross-braces to be designed to create a horizontal diaphragm action.



**F 4B** - New Store, WC, Kitchenette

250 UC 89 strongbacks embedded 100mm into the north full height concrete wall, grouted in place and a new partition wall built in front.

New 200PFC bracing is to be aligned and housed within the east exterior wall cavity and the linings reinstated.

New horizontal truss to be provided beneath the ceiling to avoid disrupting the existing scissor truss. For maximum use of the room height the new horizontal truss is designed in the shape of the ceiling.

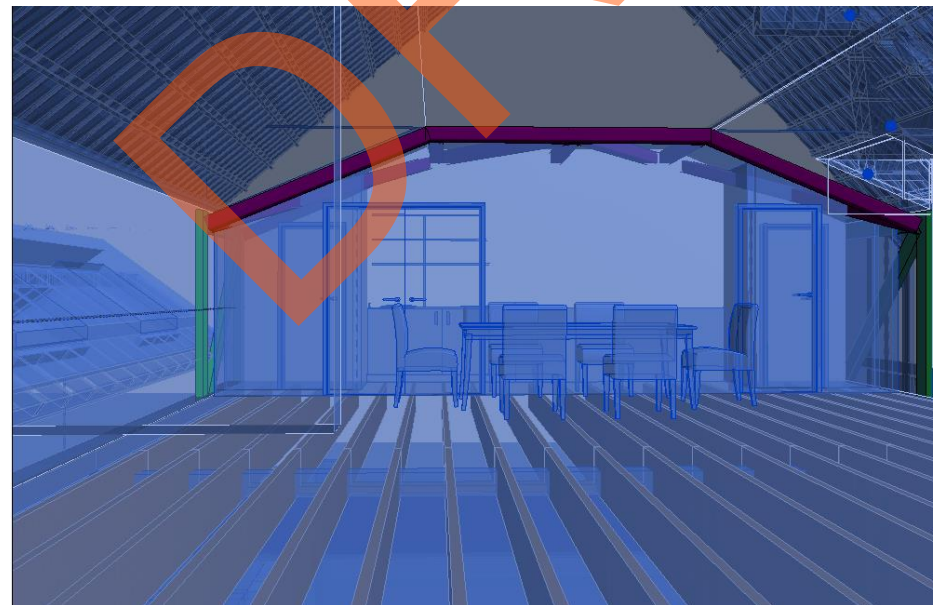
**Mezzanine Floor:** New cross-braces to be designed to create a horizontal diaphragm action.

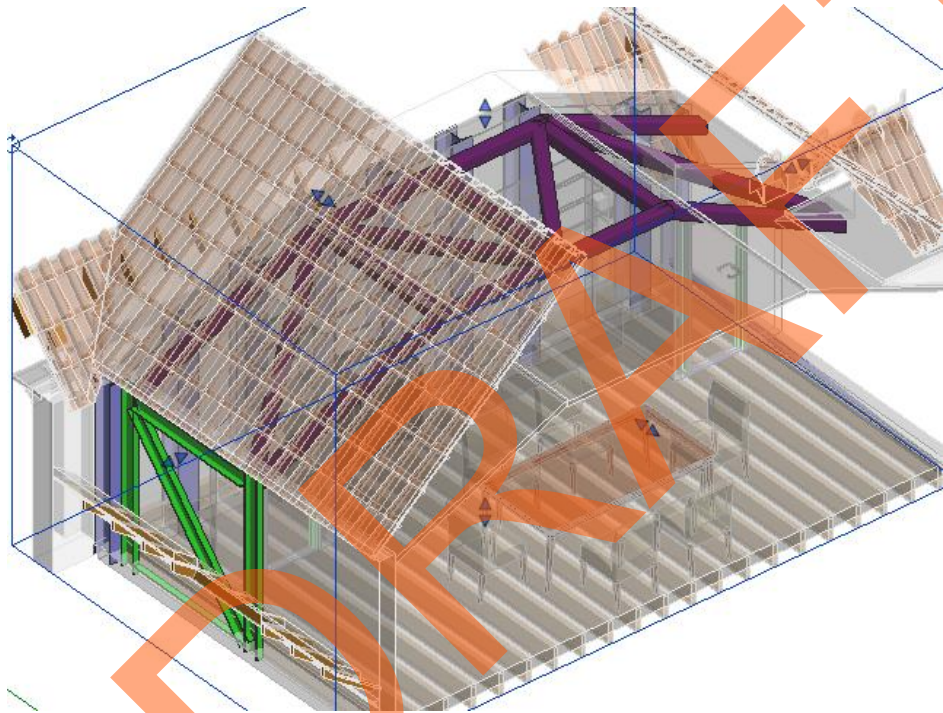
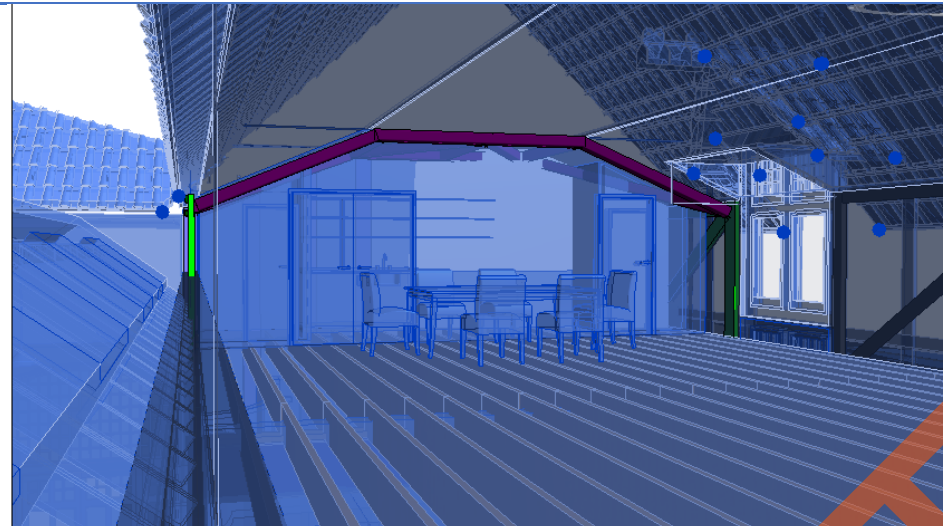
**Northern Wall:** 250 UC 89.5 Strongback to be embedded 100mm into the existing concrete pumice wall.

**Eastern Wall:** New 200 PFC bracing is to be aligned and housed within the external wall.

**Mezzanine Floor:** New cross-braces to be designed to create a horizontal diaphragm action.

**Ceiling:** 150SHS horizontal bracing below the ceiling level.





#### F 4C - New Cafe Mezzanine

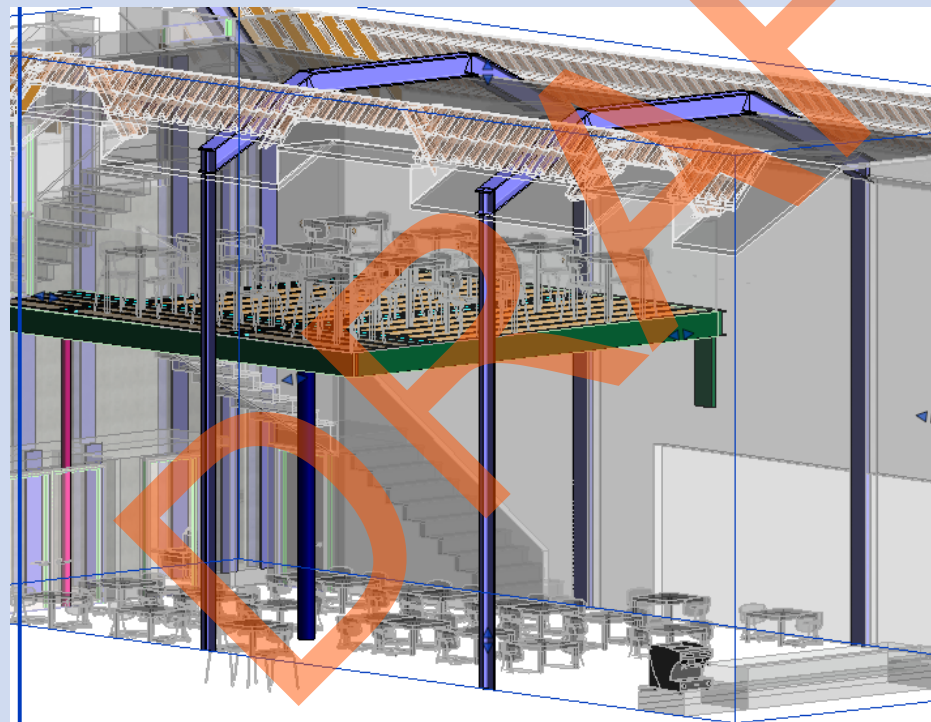
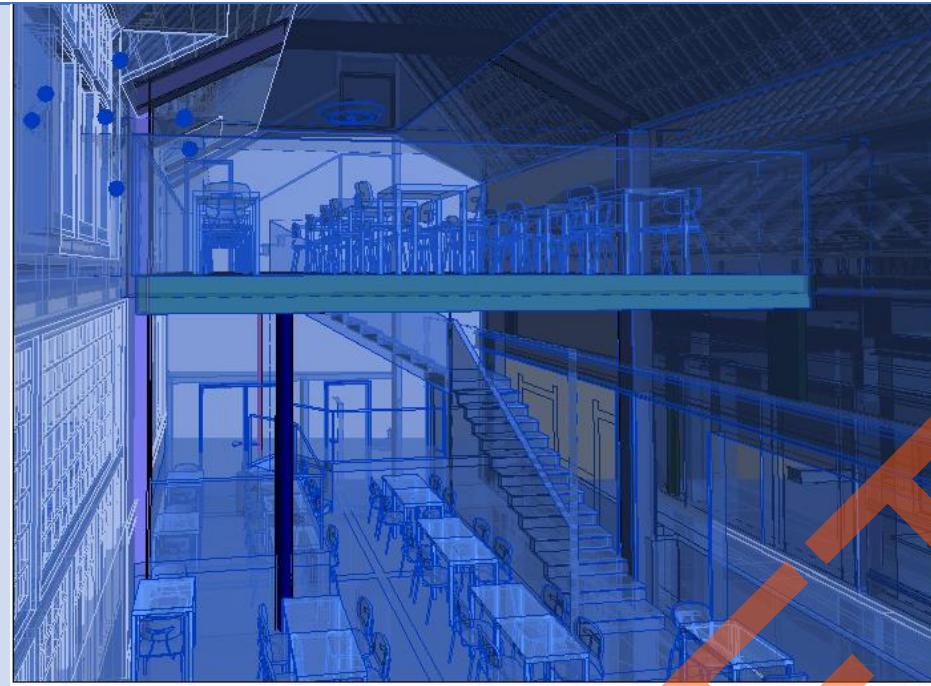
250 UC portal frames are to be installed within the cafe (east to west) to transfer the lateral load and the columns embedded 100mm into the east and west wall cavities. The portals are to continue above the existing ceiling structure into the attic.

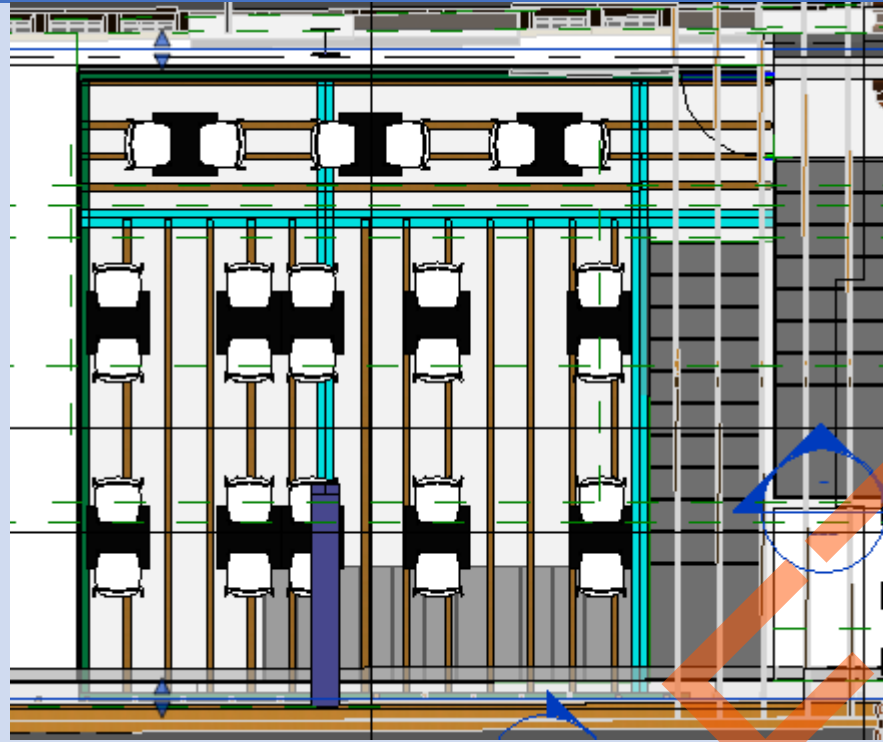
Café has a timber mezzanine in the northern half. The primary structure of the mezzanine will comprise 310 UB and 300 PFC beams supported by a C350 column. The mezzanine is supported onto the steel portal at the eastern end.

**Portals:** 250 UC portal frames are to be installed within the cafe (east to west) to transfer the lateral load and the columns embedded 100mm into the east and west wall cavities.

**Mezzanine:** Café has a timber mezzanine in the northern half. The primary structure of the mezzanine will comprise 310 UB and 300 PFC beams supported by a C350 column. The mezzanine is supported onto the steel portal at the eastern end and a Square hollow Section (SHS) post at the northern end.

**Ceiling:** The portals are to continue above the existing ceiling structure into the attic.



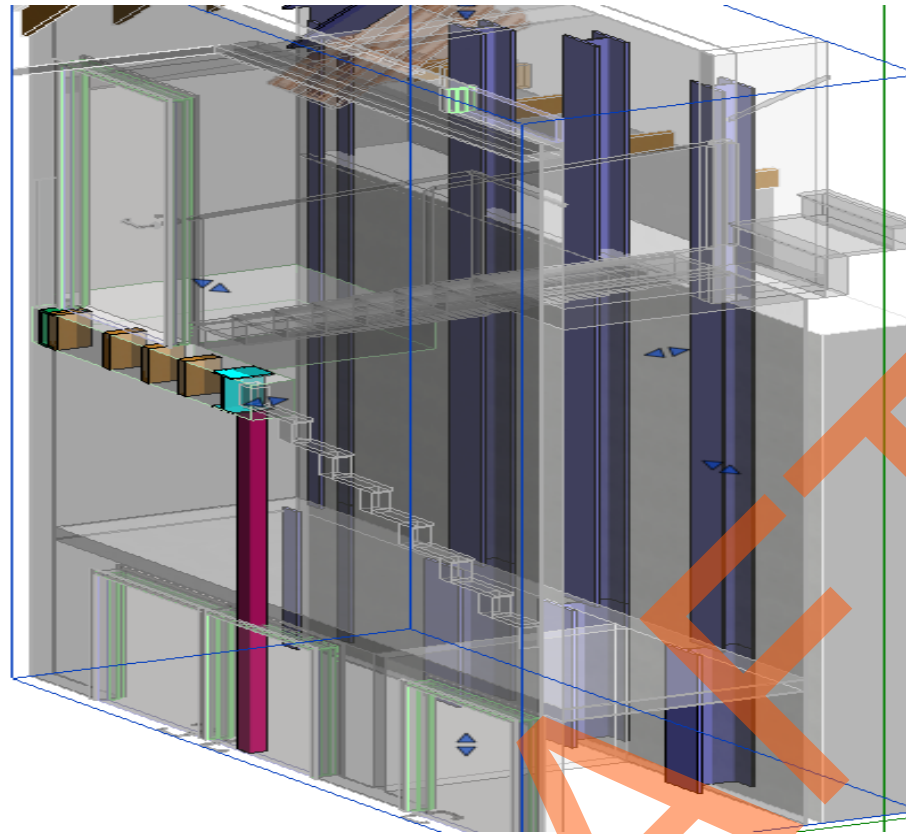


**F 4D** - New Fire Egress Stairs

New 250 UC strongbacks are to be embedded 100mm into the north end full height concrete walls, grouted in place and lined over. In the area of fire egress a minimum of 1100mm length is to be attained of the steps. Hence specially designed 150UC is to be with 100mm embedment into the north end wall.

**Northern Wall:** 250 UC 89.5 at bottom and 150UC (specific design) Strongback to be embedded 100mm into the existing concrete pumice wall.





**F 5A - Stairwell and North Wing Attic**

**Atrium Attic**