The following Motions and Documents were considered by the GFCFacilities Development Committee at its Thursday, November 28, 2013 meeting:

Agenda Title: **St Joseph's College (SJC) Women's Residence Preliminary Design Development**

CARRIED MOTION: THAT the GFC Facilities Development Committee approve, under delegated authority from General Faculties Council and on the recommendation of Planning and Project Delivery, the proposed St Joseph's College Women's Residence Preliminary Design Development, being part of the design build (as set forth in Attachment 2) as the basis for construction.

Final Item: 4

Agenda Title: **Dentistry Pharmacy Building Redevelopment - Shell and Core Development**

CARRIED MOTION: THAT the GFC Facilities Development Committee approve, under delegated authority from General Faculties Council and on the recommendation of Facilities and Operations, the proposed Dentistry Pharmacy Building Redevelopment – Shell and Core Design Development (as set forth in Attachment 3) as the basis for further design and construction.

Final Item: 5

OUTLINE OF ISSUE

Agenda Title: **St Joseph's College (SJC) Women's Residence Preliminary Design Development**

Motion: THAT the GFC Facilities Development Committee approve, under delegated authority from General Faculties Council and on the recommendation of Planning and Project Delivery, the proposed St Joseph's College Women's Residence Preliminary Design Development, being part of the design build (as set forth in Attachment 2) as the basis for construction.

Item

Action Requested	☒Approval ☐Recommendation ☐Discussion/Advice ☐Information
Proposed by	Todd Werre, Director, Project Management Office, Facilities and Operations
Presenters	Kelly Hopkin, Senior Campus Planner/Architect, Office of the University Architect, Facilities and Operations; Ben Louie, University Architect, Office of the University Architect, Facilities and Operations
Subject	St Joseph's College (SJC) Women's Residence Preliminary Design Development

Details

Responsibility	Vice-President (Facilities and Operations)
The Purpose of the Proposal is (please be specific)	This project will increase the amount of purpose built student residences on campus and is in alignment with the University's ultimate goal of accommodating 25% of students in residence housing.
The Impact of the Proposal is	This project will provide 282 beds for female University of Alberta students and will add to the complement of other unit mixes (first year/international/graduate/married/men's/sustainability cohorts) the institution has across its inventory, bringing the University's accommodation to just under 14% of total enrolment.
Replaces/Revises (eg, policies, resolutions)	N/A
Timeline/Implementation Date	The project is ready for final design and construction document completion under a design build construction delivery model. Completion is scheduled for Summer, 2015.
Estimated Cost	N/A
Sources of Funding	N/A
Notes	N/A

Alignment/Compliance

Alignment with Guiding Documents	*Dare to Discover*, *Dare to Deliver*, the Long Range Development Plan (LRDP), and the University of Alberta Comprehensive Institutional Plan (CIP)
Compliance with Legislation, Policy and/or Procedure Relevant to the Proposal (please <u>quote</u> legislation and include identifying section numbers)	1. ***Post-Secondary Learning Act*** **(*PSLA*)**: The *PSLA* gives GFC responsibility, subject to the authority of the Board of Governors, over academic affairs (Section 26(1)) and provides that GFC may make recommendations to the Board of Governors on a building program and related matters (Section 26(1) (o)). Section 18(1) of the *PSLA* give the Board of Governors the authority to make any bylaws "appropriate for the management, government and control of the university buildings and land." Section 19 of the *Act* requires that the Board "consider the recommendations of the general faculties council, if any, on matters of academic import prior to providing for (a) the support and maintenance of the university, (b) the betterment of existing buildings, (c) the

	construction of any new buildings the board considers necessary for the purposes of the university [and] (d) the furnishing and equipping of the existing and newly erected buildings [.] […]" Section 67(1) of the *Act* governs the terms under which university land may be leased. 2. **GFC Facilities Development Committee (FDC) Terms of Reference – Section 3. Mandate of the Committee**: "[…] 2. **Delegation of Authority** Notwithstanding anything to the contrary in the terms of reference above, the Board of Governors and General Faculties Council have delegated to the Facilities Development Committee the following powers and authority: **A. Facilities** 1. To approve proposed General Space Programmes (Programs) for academic units. 2. (i) To approve proposals concerning the design and use of all new facilities and the repurposing of existing facilities and to routinely report these decisions for information to the Board of Governors. (ii) In considering such proposals, GFC FDC may provide advice, upon request, to the Provost and Vice-President (Academic), Vice-President (Facilities and Operations), and/or the University Architect (or their respective delegates) on the siting of such facilities. (GFC SEP 29 2003) **B. Other Matters** The Chair of FDC will bring forward to FDC items where the Office of the Provost and Vice-President (Academic) and/or the Office of the Vice-President (Facilities and Operations), in consultation with other units or officers of the University, is seeking the advice of the Committee." 3. **UAPPOL *Space Management Policy* and *Space Management Procedure***: The respective roles of GFC FDC and the Vice-President (Facilities and Operations) with regard to institutional space management are set out in this Board-approved policy and attendant procedure. To access this policy suite on line, go to: www.uappol.ualberta.ca .

Routing (Include meeting dates)

Consultative Route (parties who have seen the proposal and in what capacity)	• Project Steering Committee; • Construction Community; • Community Presidents Meeting – April 23, 2013; • GFC Facilities Development Committee – Site Plan and Bridging Documents (for information) – April 25, 2013

Approval Route (Governance) (including meeting dates)	Board Finance and Property Committee - Capital Expenditure Authorization Request – May 28, 2013 (for recommendation); Board of Governors - Capital Expenditure Authorization Request – June 21, 2013 (for final approval); GFC Facilities Development Committee – November 28, 2013 (for final approval of the Preliminary Design Development)
Final Approver	GFC Facilities Development Committee (Preliminary Design Development)

Attachments:

1. Attachment 1 (pages 1 – 2) - Briefing Note
2. Attachment 2 (pages 1 – 40) - St Joseph's College (SJC) Women's Residence Preliminary Design Development Report

Prepared by: Todd Werre, Director, Project Manager Office, Facilities and Operations, todd.werre@ualberta.ca

Attachment 1

St. Joseph's College (SJC) – Women's Residence Preliminary Design Development

Background

St. Joseph's College (SJC) is an affiliated Catholic College located at the University of Alberta (University). St. Joseph's College offers three services to students: academics, campus ministry, and a student residence. Currently, the residence is an all-male residence housing 64 University students located in the heart of the campus.

The 2012 Comprehensive Institutional Plan (CIP) identifies the expansion of the student residence portfolio as a strategic priority for the University of Alberta. This project aims to introduce 282 beds to the on-campus housing inventory in an all-female residence as an expansion of SJC.

In support of the CIP, the project will provide individual, self-contained suites in multiple bedroom configurations designed to be attractive to international, rural and graduate students. The buildings will contain the appropriate amount of amenity and programmable space required to deliver support services for students and foster a sense of community.

Students who reside in purpose-built on-campus housing with supportive programming tend to have a more fulfilling and enriching academic experience at university than those who do not. Expanding on-campus housing assists the university in meeting institutional goals and objectives by providing a learning environment conducive to student personal and academic success.

Specifically, female students benefit from living in all-female housing on-campus in numerous ways. The environment is a way in which the pressures of the new university and academic lifestyle can be lessened by the provision of a strong support network. This type of environment is especially important for students who are from strict religious backgrounds, rural communities, and / or international communities where segregated living arrangements are preferred. The absence of such a housing option is a deterrent to some cultures and communities with respect to sending students to the University of Alberta.

Overall, student housing supports many areas of strategic importance to the University. These include:

1. **Academic Success:**
   Programs and procedures are structured such that academic success is a priority.
2. **Leadership Development:**
   Those who live in residence tend to demonstrate a higher sense of civic engagement and giving back to the community.
3. **Engagement:**
   Students living in on-campus housing are more actively involved in campus extracurricular activities. They also report a higher "sense of belonging".
4. **Retention:**
   On-campus housing that offers structured programming is a good way to ensure that students who are at a high risk of leaving complete their studies.
5. **Recruitment:**
   The University plans to increase its' residence capacity to attract international and rural students with the goal of seeing 25% of the student population in purpose-built housing. There

is currently a gap of 4,000 beds as there are currently only 4,690 beds to service a full-time student population of approximately 36,000.

PROJECT SCOPE / OBJECTIVES

The residence will provide 282 beds in a five to seven story development that will operate as an expansion of SJC. It will be an all-female housing option open to all U of A female students and is especially important in attracting female international students.

The recommendation put forward for the SJC female residence is a combination of 24 single bed suites, 45 double bedroom suites, and 39 four bedroom units. Each unit would contain a small kitchen area and bathroom facilities as well as a modest common living area.

The building will contain an appropriate amount of common area and programmable space to build community and deliver support services to students. Parking is limited to 26 surface parking stalls (2 handicapped stalls) to the south of the building and north of Education Car Park.

Issues

This proposed new building will result in the loss of open space and removal of several trees. Site planning and mitigation plans have been developed and the proposal leaves approximately 70% of the open space in place. The project will create no additional traffic interface issues in the area of the Education Car Park and the existing St. Joseph's College, as parking levels and the entrance remain virtually the same.

Also under investigation are the impacts, if any, that the new building foundation systems may have on the LRT tunnels, which run directly under the building site. We continue to work with the City of Edmonton on these impacts. There currently exists a right-of-way agreement protecting our ability to construct a building on the site over the LRT tunnels. This agreement provides for involvement by the City of Edmonton for foundation design approvals and if required, additional funding by the City of Edmonton for any additional foundation requirements beyond standard foundation designs. No issues have been identified by the project consultants or the City of Edmonton with respect to the impacts the new project foundation will have on the LRT tunnels.

The project is being developed as a Best Value Design Build project. The Design Build Proponent has been selected and has advanced through the pre-award stage into contract engagement.

Formal construction is expected to commence November 2013, upon receipt of required Order-in-Council, with a project completion date of July 2015. Occupancy of the new 282 beds is expected to be ready for the 2015 fall term.

Recommendation

That FDC Committee approves, the proposed St. Joseph's College Preliminary Design Development as per motion presented in the Outline of Issues.

Attachment 2

St. Joseph's College Women's Residence - University of Alberta

Preliminary Design Development Report

November 5, 2013

UNIVERSITY OF ALBERTA

stuart olson dominion

Stantec

TABLE OF CONTENT

1.0 INTRODUCTION

This document presents the design work for the Women's Residence planned for St. Joseph's College developed during the pre-award period. The design-build team consisting of Stuart Olson Dominion Company Limited (SODCL) and Stantec has worked with the Client through the proposal and pre-award phases to design a building that answers the need of both the College and the University of Alberta in terms of aesthetic, sustainability, technology, program and cost.

As an affiliate of the University of Alberta, St. Joseph's College currently provides student residence accommodations to students via two facilities; an all-male residence housing 64 university students and an all-female residence housing 14 students. The College recognizes the need for additional female residents and therefor is proposing to construct a new all-female residence housing 282 beds.

As outlined in the Request of Proposal Statement of Requirements, the design is contextual, energy efficient, reliable and low maintenance, while meeting the program requirements and budget.

The project is generally consistent with what was presented to the FDC on April 25, 2013. The most significant change was the reduction of parking provided within the building and on the site. Parking has been reduced to 26 on grade exterior stalls. Finalization of the layout of those stalls will be done when the configuration of the emergency generator is finalized. All interior stalls were removed from the program resulting in a smaller building footprint. The site coverage of the Residence is 14% and with the existing College covering 13% of the site, the total site coverage for both buildings combined is 27%. Access to parking was brought from the existing site vehicular access point to the parking area allowing the existing stand of trees in the southwest corner of the site to remain. The reduced parking provided also allows the existing geometry of the 114 Street roadway to be maintained.

The Women's Residence supports the University's strategic goal of offering on-campus housing to 25% of the fulltime enrollment. Students will benefit from a more fulfilling experience at the University of Alberta. This will help creating an environment fostering academic success, leadership development, engagement, retention and recruitment.

2.0 ARCHITECTURAL DESIGN

2.1 ARCHITECTURAL CONCEPT

The design of the Women's Residence responds to the needs of St. Joseph's College to provide an environment where students connect with the College history and surrounding context, live in a quiet environment that also helps build communities, and is environmentally responsible and reliable. Through careful review of the Statement of Requirements, site visits, and communication with the College and University representatives, the following design guidelines emerged:

- Contextual design through materiality, form and detailing
- Preserve as much of the natural vegetation and landscape feature as possible
- Enhance student, staff and visitors experience
- Provide an energy efficient design that balances capital and life cycle cost

2.2 CONTEXTUAL RELATIONSHIP

The most prevalent characteristic of the proposed Residence is its connection to the existing College and surrounding. The site for this new building sits between the existing historical St. Joseph's College and the existing Education Building, Gymnasium and Parkade. The site is currently populated with many mature deciduous and coniferous trees, grasses, pathways and connects to the existing Education Courtyard which is significant to the University and the community. The construction of the Residence results in the removal of many of the trees and modification of the pathways on the site. Pedestrian circulation from 89 Avenue and 114 Street is provided both north and south of the Residence. North-south circulation along the east side of the site is kept and is available for use during construction.

The Statement of Requirements outlined a strategy for building height requirements, proposing three zones for building heights. The overall building massing can be described as consisting of three sections in response to this requirement on building heights, but also materiality, access and other relevant information.

The west section is 5 storeys high and respects the height of the existing College, also acknowledging the scale of the natural and built environment of 114 Street. The brick cladding of that section also connects the building to the history of the site and original College.

The middle section of the Residence transitions to 7 storeys and relates to the massing of the Education Building. Its metal cladding adds a contemporary touch and acknowledges the different eras during which the proposed residence and the existing College have been designed.

Finally, the 7 storey east section of the residence acts as the front door accessed from 89 Avenue. It provides a distinct identity to this new addition to the College and University campus with a glazed curtain wall in a triangular form. The transparent façade provides a clear visual connection with the student activities taking place in the common spaces on each level. Also, the space between the east section and the Education Building has been deliberately increased in width to maintain the visual and physical connection between 89 Avenue and the Education Courtyard, a well-used exterior space.


St. Joseph's College front entrance


West chapel


Education Building


Existing view from 114 Street


Existing view from 89 Avenue

2.3 PROGRAM

The Women's Residence provides a combination of studio, 2-bedroom and 4-bedroom suites for a total of 282 beds. The following program summaries compare the RFP program, which was presented to FDC in April 2013, and the current program. The removal of interior parking allowed the introduction of suites onto the main level including a common space, which provides increased activity to the St. Joseph's Courtyard.

On the main floor, a generous lobby connects visually and physically the north and south entrances and the exterior view they offer, and leads to the main floor amenities. A multi-faith prayer room is easily accessible at the front of the building and has a light well providing daylight from above while preserving the reflective nature of this space. An office space combines the Residence Services office, the Association office and space for the residence staff. Washrooms, student mailboxes, and a multi-purpose room for residents and others complete the amenity space on that level and are accessible from the lobby.

On all floors above, corridors and units of similar sizes are stacked to facilitate plumbing and mechanical shafts running vertically through the building. Each upper floor has one barrier-free bedroom in a 2-bedroom suite to accommodate women with disabilities. Shared suites have privacy curtains that not only act as visual barrier when closed, but also increase the area of the communal kitchen eating area when opened.

Each floor offers common spaces in lieu of providing large living rooms in each suite to encourage people to gather, either spontaneously or formally, enhancing the sense of community. The main floor common space looks out at the St. Joseph's Courtyard and the upper floors have a common space located at the northeast point facing 89 Avenue. These spaces provide an exceptional view to this busy treed campus artery, as well as showcasing the sense of community that will be experienced in this new residence. This is achieved by views through large expanses of glass of individual students or groups studying, collaborating, and informally gathering. The second to fifth floors also have a common space at the west end looking towards 114 Street that offers a similar experience.

Maintenance, recycling and loading area are located in the northwest corner of the building main floor to take advantage of the loading area of the existing College that has been enlarged to accommodate two trucks. Utilities will come from the existing utilidor located beneath 114 Street and will continue underground through a new utilidor to reach the mechanical and electrical room located on the west face of the building.

	Current Program				RFP Program	Changes
Floor Plan Colour	Room Name	Size ft2	Quantity	Total Area ft2	Total Area ft2	
	SUITES					
	Studio Unit	238 to 255	24	5,780		1-bedroom units became studios, unit sizes were reduced by moving interior living space to common areas.
	2-Bedroom Unit	395 to 424	45	18,638		
	4-Bedroom Unit	804 to 867	39	31,777		
	2-Bedroom Unit (incl. 1 Barrier-Free Bedroom)	493	6	2,958		
	1-Bedroom Barrier-Free Unit	-	-	-		
	TOTAL SUITES		**114**	**59,153**	**65,771**	
	TOTAL BEDS		**282**		**282**	
	RESIDENTIAL FLOORS (LEVEL 2 TO 7)					
	Common Room (Student Lounge) / Study Area	374 to 550	12	6,147	4,500	All residential floor service areas are provided on all floor levels and common areas are designed to accommodate resident assistant to meet with all of her students.
	Telecommunications Closets / Electrical	108 to 133	14	1,725	560	
	Housekeeping Closet	88 to 121	7	814	700	
	Garbage + Recycling Room	74 to 132	7	866	700	
	Laundry Room	128 to 167	7	1,020	700	
	TOTAL			**10,572**	**N/A**	
	MAIN FLOOR AMENITIES					
	Main Lobby	1,125	1	1,125	220	
	Office	766	1	766	850	
	Prayer Room (incl. Storage)	665	1	665	550	Include 49 ft2 of designated storage
	Multipurpose Space	937	1	937	800	
	Public Washrooms	502	-	502	300	
	Mail Room	-	-	-	375	Mail boxes provided in Main Lobby
	Association Space	-	-	-	200	Included in the Office
	Residence Serv. Office/Storage	-	-	-	150	Included in the Office
	Bike Storage	-	-	-	625	Moved to the existing shed
	Common Floor Lounge	-	-	-	800	Removed by St. Joseph's College
	Music Room	-	-	-	120	Removed by St. Joseph's College
	Game Room	-	-	-	440	Removed by St. Joseph's College
	TOTAL			**3,995**	**N/A**	Removing and combining some of the rooms allowed for reduced area for Main Floor Amenities.
	MAIN FLOOR SERVICES					
	Recycle/Garbage, Maintenance, Loading	931	1	931	2,250	Efficient design and Recycle/Garbage included on each floor allowed for reduced area to accommodate Recycle/Garbage, Maintenance, Loading.
	Mechanical & Electrical	1,469	1	1,469	1,500	
	TOTAL			**2,400**	**3,750**	
	PARKING					
	Surface Parking Stalls	-	26	-	20	Parking was reduced to exterior parking only to facilitate overall budget requirements.
	Parking Garage	-	-	-	90	
	TOTAL		**26**		**110**	
	CIRCULATION					
	Circulation	-	-	14,205	10,498	Circulation space designed to accommodate functions.
	TOTAL NET AREA			**90,325**		
	TOTAL GROSS BUILDING AREA (EXCLUDING SHAFTS)			**103,322**		
	TOTAL GROSS BUILDING AREA			**106,012**		Overall building area was not defined in the original RFP program.

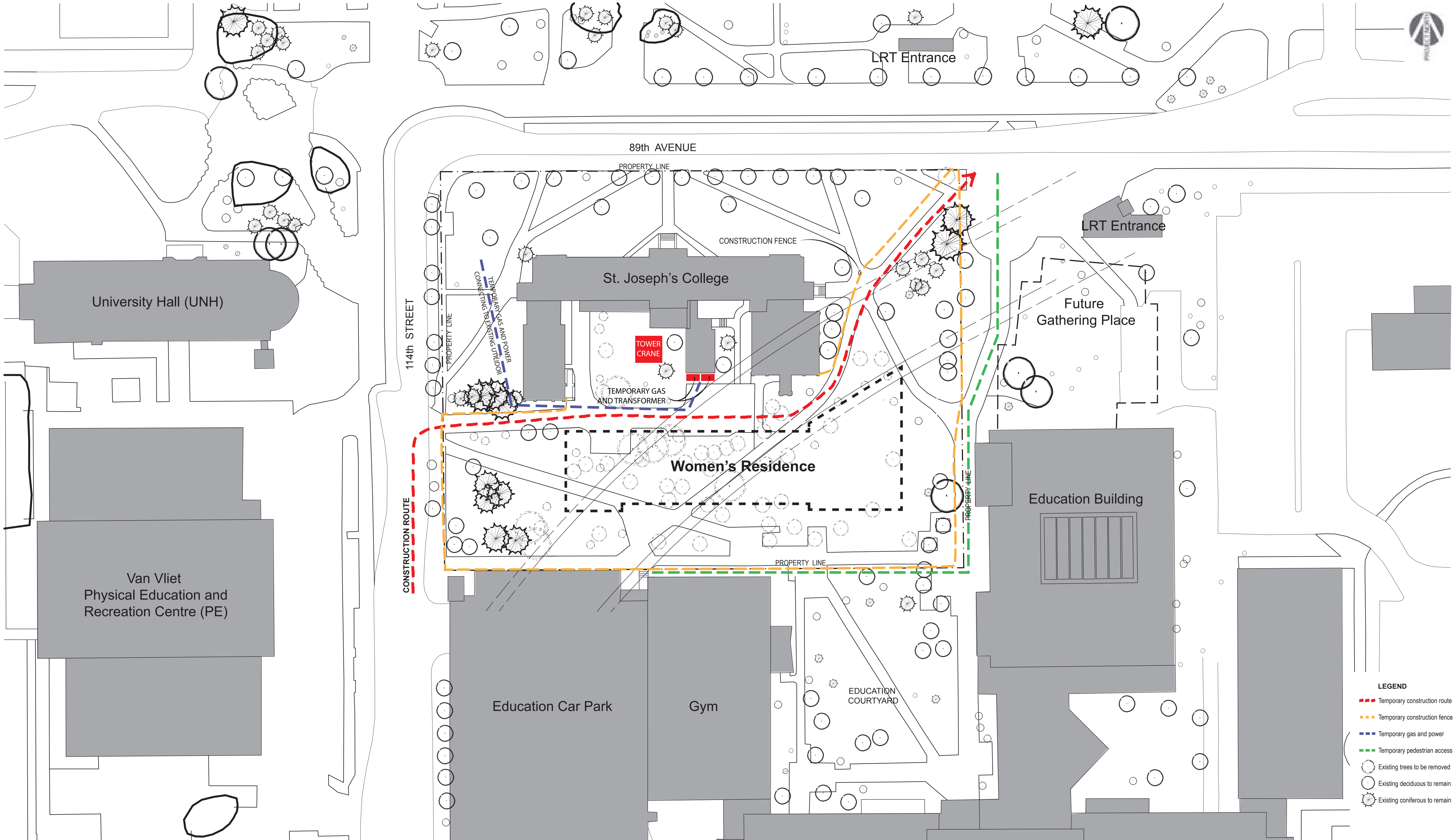
2.4 SUSTAINABILITY AND RELIABILITY

The design for the St. Joseph's College Women's Residence offers an environment that enhances students experience and comfort while reducing its environmental footprint. Energy efficiency deliverables for this project are to target 4 out of 5 for Green Globe Standards. To achieve this goal the design-build team looked at:

- Externally insulated building envelope with a high quality air/vapor membrane and rainscreen system.
- High performance curtain wall system completed with thermally broken frames and double glazed sealed units.
- Cooling is provided for corridors and common spaces only. Individual suites will be provided with ventilation and operable windows.
- A high level of daylighting via large expanses of glass in the common areas and windows in the suites.
- Energy efficient light fixtures.
- Improved indoor environmental quality with low or no VOC (volatile Organic Compounds) content in interior finishes and furnishings.

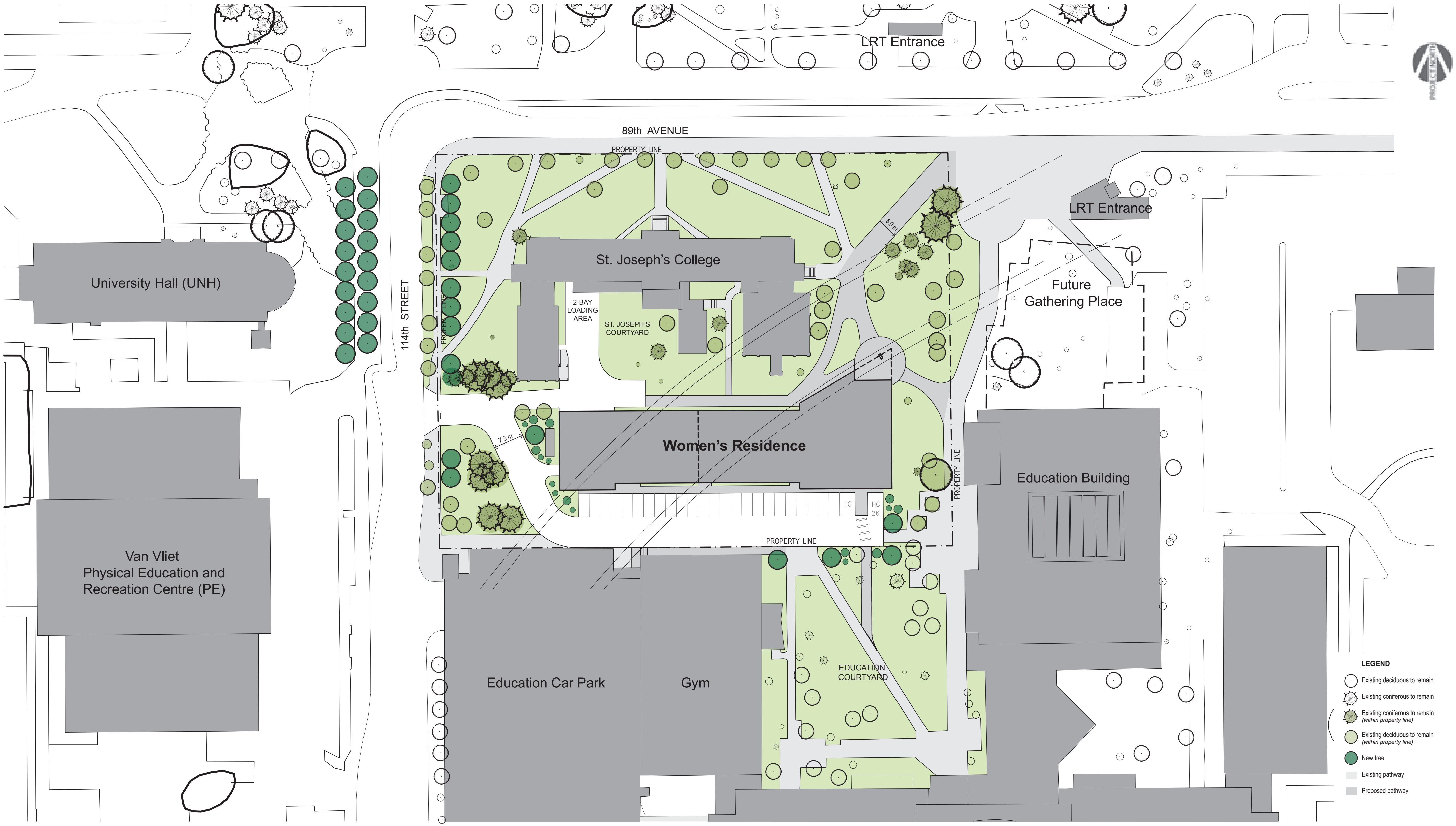
CONSTRUCTION PLAN

N.T.S.



OVERALL SITE PLAN AND LANDSCAPING

N.T.S.



MAIN FLOOR PLAN

1:300

LEGEND

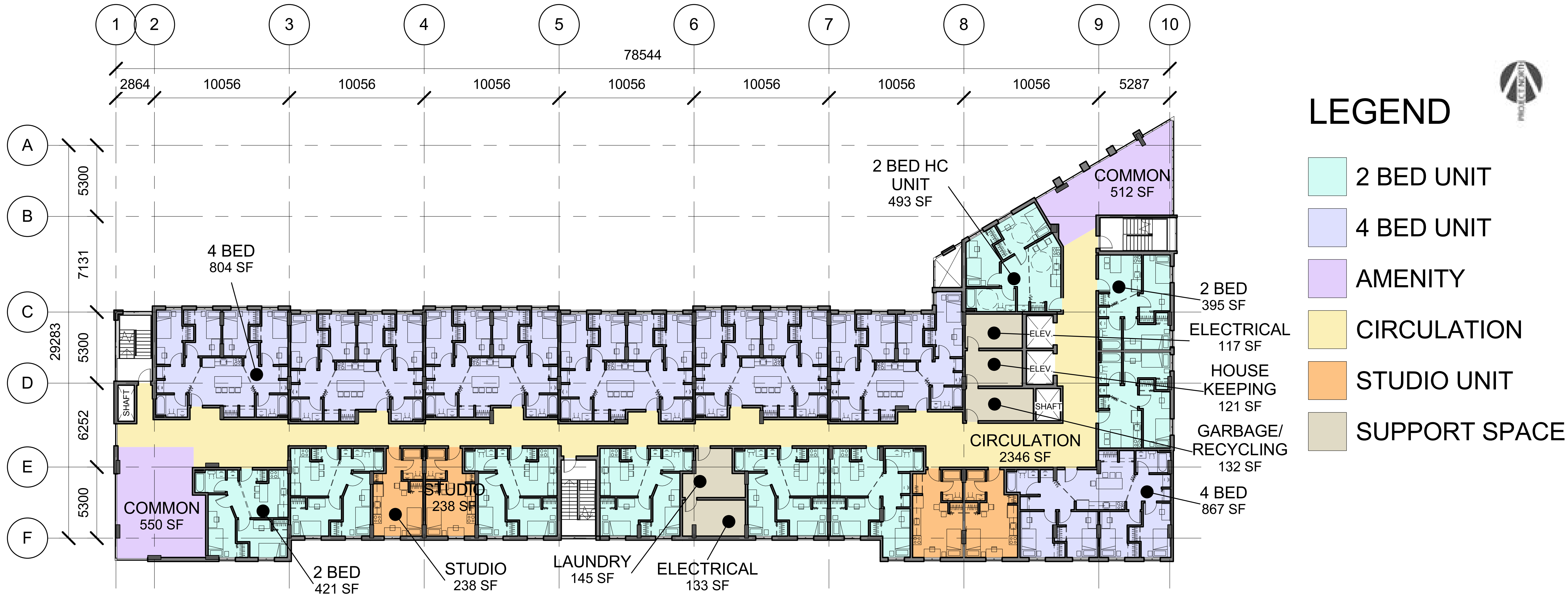
- 2 BED UNIT
- 4 BED UNIT
- AMENITY
- CIRCULATION
- LOBBY
- OFFICE
- STUDIO UNIT
- SUPPORT SPACE

PARKING COUNT
SURFACE: 26 STALLS
TOTAL: 26 STALLS

UNIT COUNT MAIN LEVEL
4 BED UNITS: 3 (12 BEDS)
2 BED UNITS: 4 (8 BEDS)
ACCESSIBLE 2 BED UNITS: 0
STUDIO UNITS: 4 (4 BEDS)
TOTAL BEDS: 24

GROSS FOOTPRINT AREA: 16,680sf

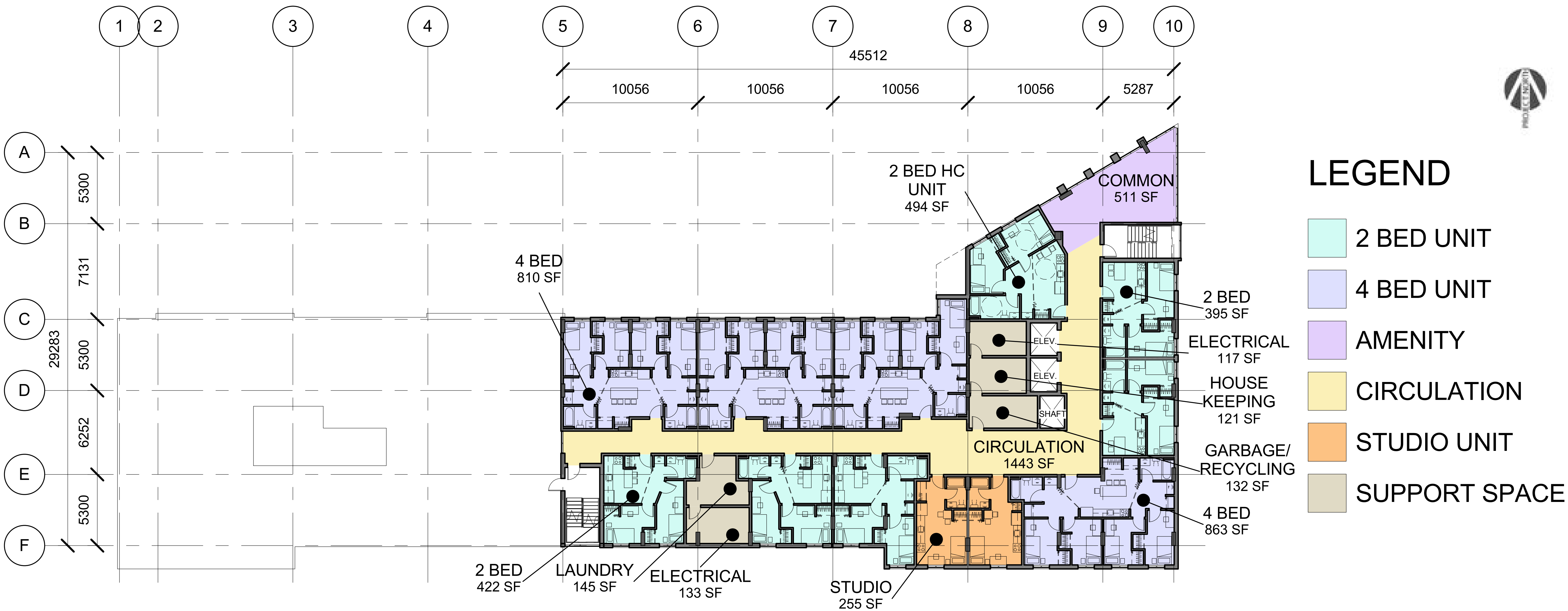
LEVEL 2 TO 5 FLOOR PLAN
1:300



UNIT COUNT LEVELS 2 - 5
4 BED UNITS: 28 (112 BEDS)
2 BED UNITS: 32 (64 BEDS)
ACCESSIBLE 2 BED UNITS: 4 (8 BEDS)
STUDIO UNITS: 16 (16 BEDS)
TOTAL BEDS: 200

GROSS FOOTPRINT AREA: 17,023sf
@4 LEVELS = 68,092sf

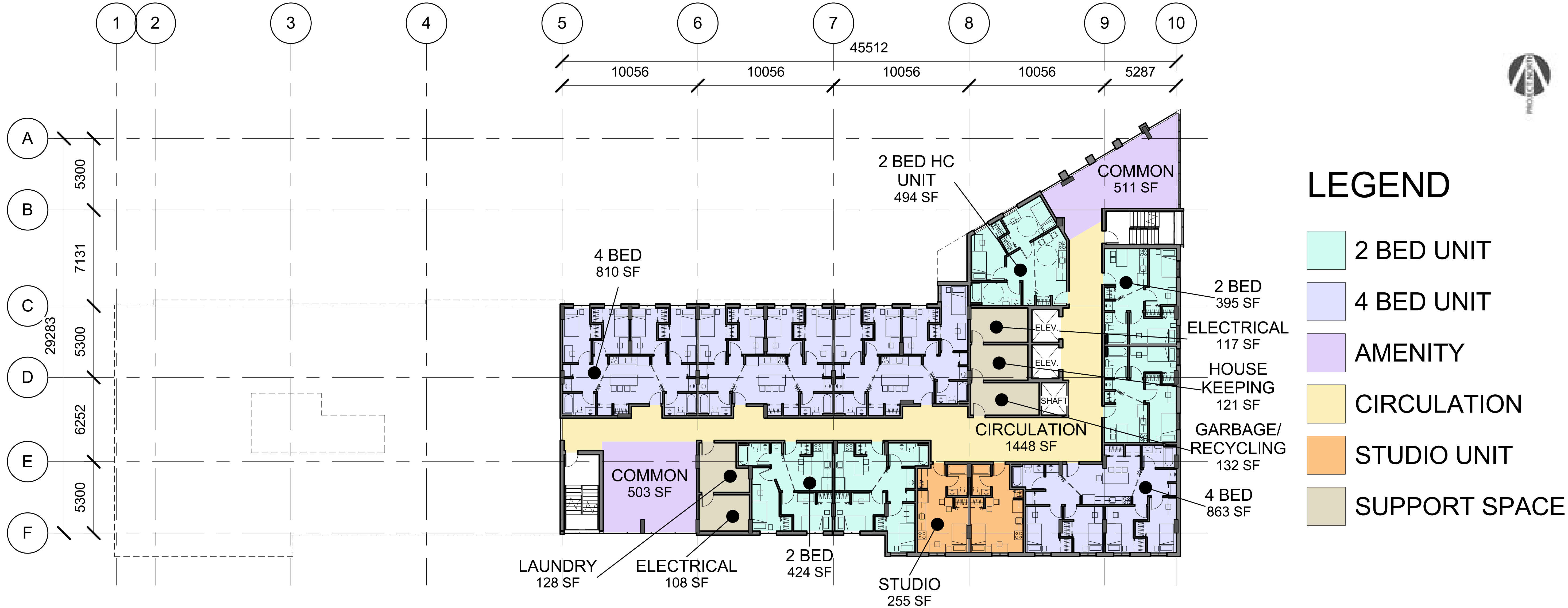
LEVEL 6 FLOOR PLAN
1:300



UNIT COUNT LEVEL 6
4 BED UNITS: 4 (16 BEDS)
2 BED UNITS: 5 (10 BEDS)
ACCESSIBLE 2 BED UNITS: 1 (2 BEDS)
STUDIO UNITS: 2 (2 BEDS)
TOTAL BEDS: 30

GROSS FOOTPRINT AREA:10,620sf

LEVEL 7 FLOOR PLAN
1:300

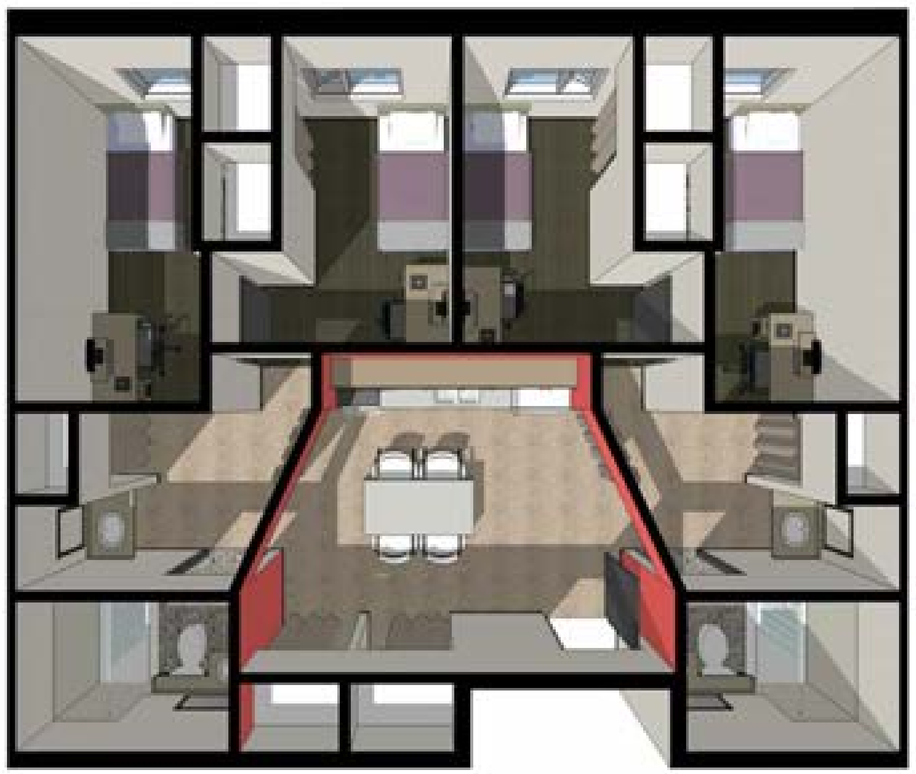


UNIT COUNT LEVEL 7
4 BED UNITS: 4 (16 BEDS)
2 BED UNITS: 4 (8 BEDS)
ACCESSIBLE 2 BED UNITS: 1 (2 BEDS)
STUDIO UNITS: 2 (2 BEDS)
TOTAL BEDS: 28

TOTAL UNIT COUNT
4 BED UNITS: 39 (156 BEDS)
2 BED UNITS: 45 (90 BEDS)
ACCESSIBLE 2 BED UNITS: 6 (12 BEDS)
STUDIO UNITS: 24 (24 BEDS)
TOTAL BEDS: 282
TOTAL GROSS BUILDING AREA: 106,012sf

GROSS FOOTPRINT AREA:10,620sf

3D VIEWS OF SUITES



4-Bedroom Suite - Typical

4-Bedroom Suite - Typical

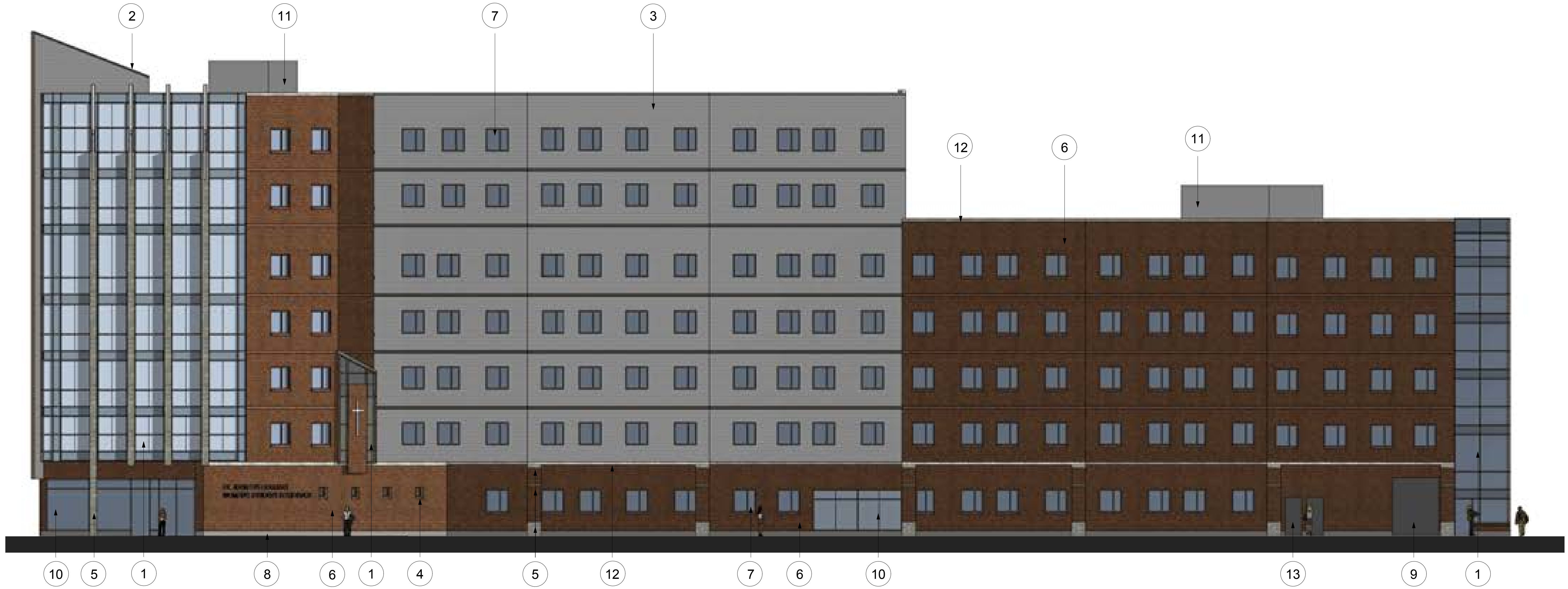
Studio Suite - Typical

2-Bedroom Suite - Typical

2-Bedroom Suite - Typical

Studio Suite - Typical

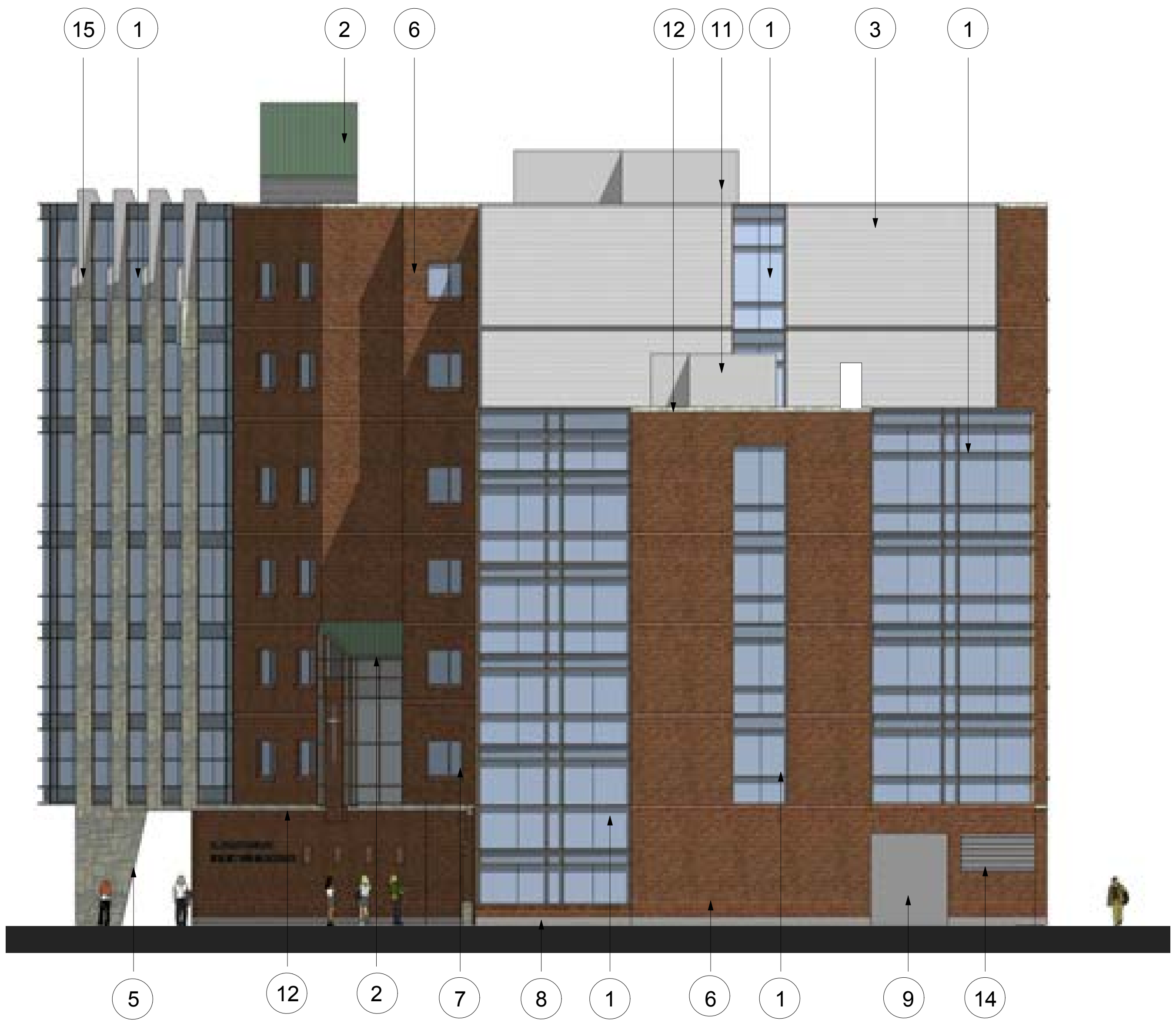
BUILDING ELEVATION
N.T.S.



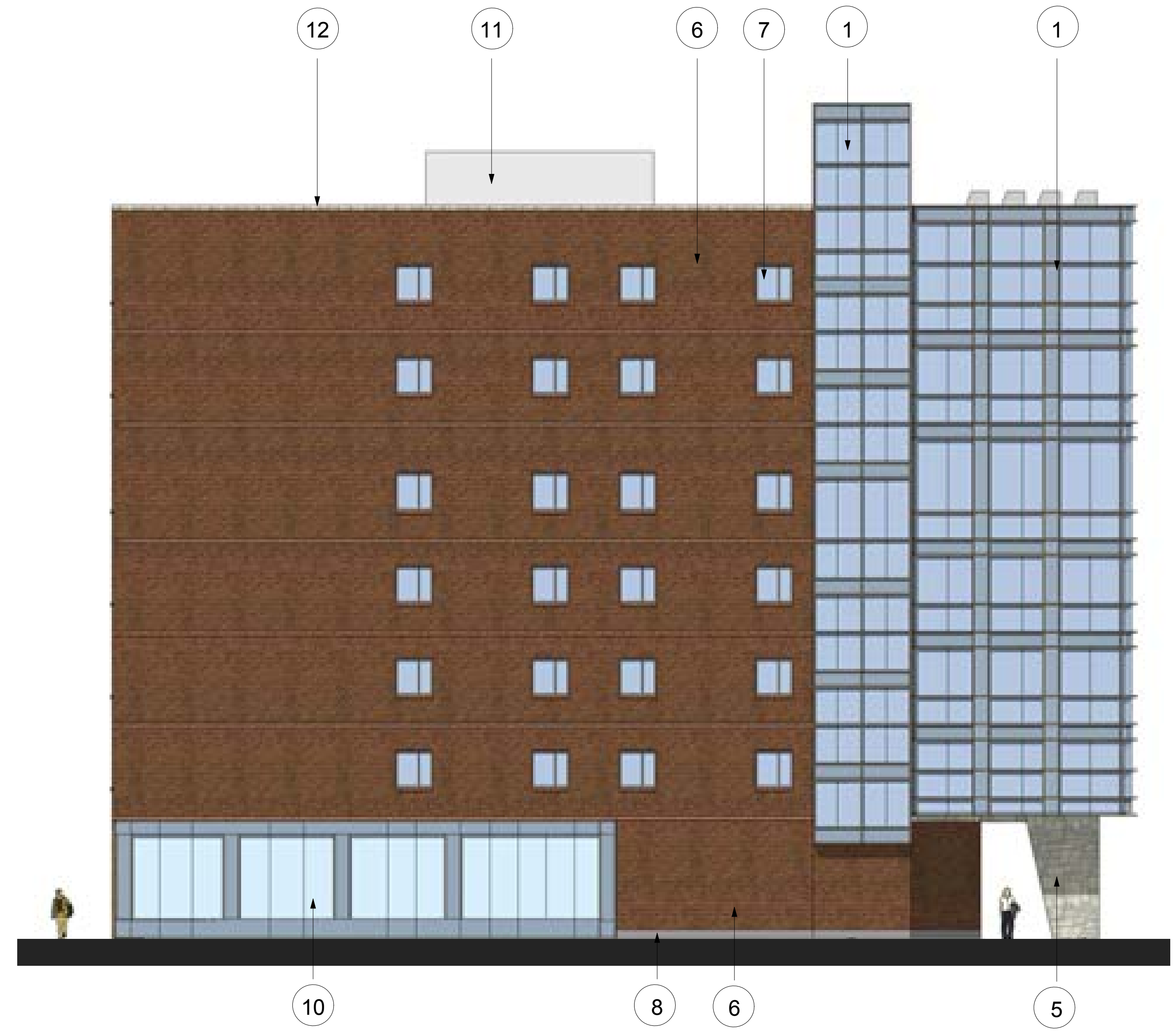
North Elevation

1 Curtain Wall System
2 Standing Seam Metal Roof
3 Prefinished Metal Cladding Panel (Horizontal)
4 Glass Sealed Unit - Fixed
5 Tyndall Stone
6 Brick Veneer
7 Glass Sealed Unit - Operable
8 Concrete Base / Precast Concrete Panel or Pour-in-Place Concrete
9 Overhead Door
10 Storefront Window
11 Roof Top Mechanical Unit
12 Stone Coping
13 Metal Door
14 Metal Louvers
15 Prefinished Aluminum Fins

BUILDING ELEVATIONS
N.T.S.



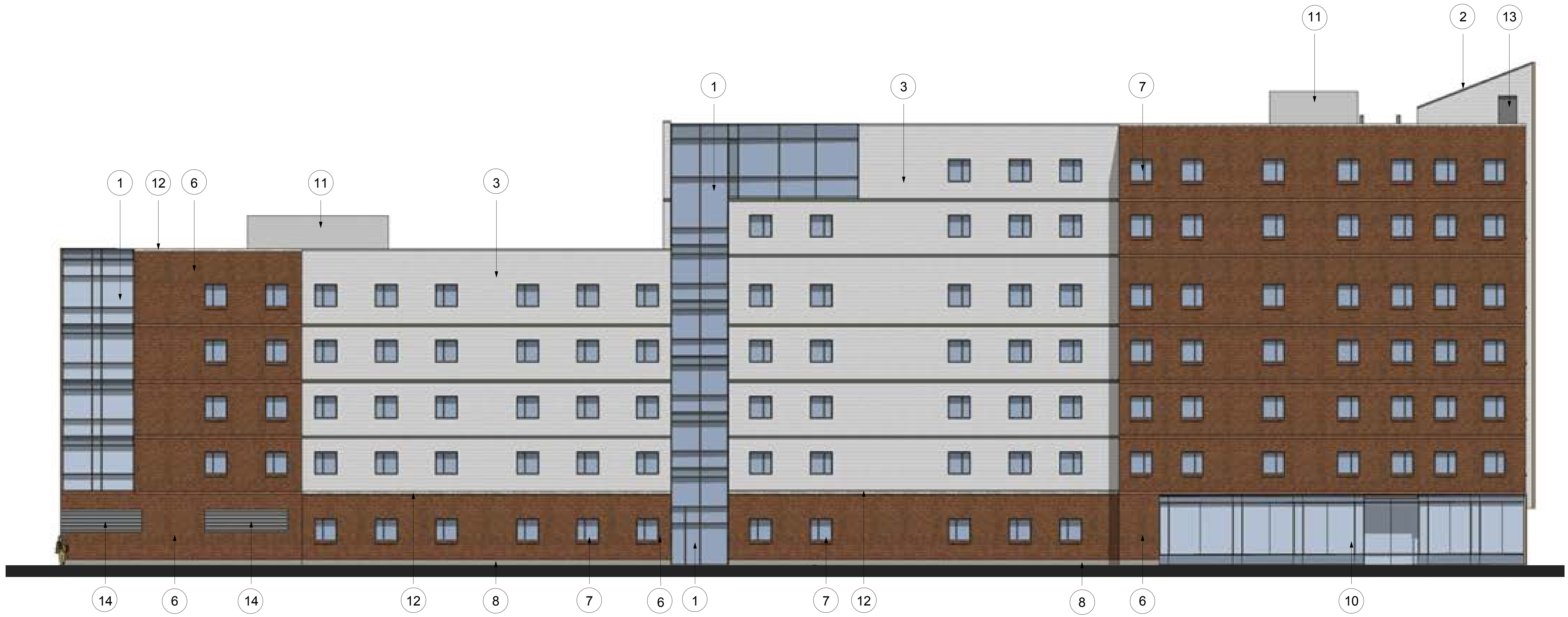
West Elevation



East Elevation

1 Curtain Wall System
2 Standing Seam Metal Roof
3 Prefinished Metal Cladding Panel (Horizontal)
4 Glass Sealed Unit - Fixed
5 Tyndall Stone
6 Brick Veneer
7 Glass Sealed Unit - Operable
8 Concrete Base / Precast Concrete Panel or Pour-in-Place Concrete
9 Overhead Door
10 Storefront Window
11 Roof Top Mechanical Unit
12 Stone Coping
13 Metal Door
14 Metal Louvers
15 Prefinished Aluminum Fins

BUILDING ELEVATION
N.T.S.



South Elevation

1 Curtain Wall System
2 Standing Seam Metal Roof
3 Prefinished Metal Cladding Panel (Horizontal)
4 Glass Sealed Unit - Fixed
5 Tyndall Stone
6 Brick Veneer
7 Glass Sealed Unit - Operable
8 Concrete Base / Precast Concrete Panel or Pour-in-Place Concrete
9 Overhead Door
10 Storefront Window
11 Roof Top Mechanical Unit
12 Stone Coping
13 Metal Door
14 Metal Louvers
15 Prefinished Aluminum Fins

VIEW OF THE NORTHEAST APPROACH

VIEW OF THE NORTH APPROACH

VIEW OF THE MAIN ENTRANCE

VIEW OF THE NORTH FACADE

AERIAL VIEW FROM NORTHWEST

VIEW OF THE WEST APPROACH

VIEW OF THE SOUTHWEST APPROACH

VIEW FROM THE EDUCATION COURTYARD

2.6 ARCHITECTURAL STANDARDS

Minimum Acoustic Ratings

- Floor to Floor – STC 64
- Suite Party wall – STC 57
- Suite to Corridor – STC 52
- Suite to Elevator – STC 56
- Bedroom to Kitchenette – STC 36
- Bedroom to Bedroom – STC 36
- Bathroom to Kitchenette – STC 36

Minimum Fire Resistance Ratings

- Floor to Floor – 2hr FRR
- Suite Party Wall – 1hr FRR
- Suite to Corridor – 1hr FRR
- Suite to Elevator – 1hr FRR
- Service and Storage rooms – 1 hr FRR
- Service Shafts – 1 hr FRR

Building Construction

The building materials specified for the proposed St. Joseph's College Women's Residence are durable, high quality materials suitable to both the function and aesthetic of the program requirements and the surrounding buildings.

The building will be of combustible and non-combustible materials as per the Code Analysis. See Section 6.0

Exterior Materials

Standard Brick Masonry Units Cladding
- Contextual – references the existing St. Joseph's College to the North
- Durable, low maintenance
- Fire resistant
- Used as cladding on the entire first storey to provide a sense of human scale

Tyndall Stone
- Accent coping, lintels and caps within the brick masonry cladding

Metal Cladding System
- Pre-finished metal panels
- Used above the first storey in the middle section of the overall massing

Windows
- 4' x 5' Operable, double pane, sealed glass units for each bedroom
- Curtain wall, non-operable, double glazed system on all common and public areas.

Spandrel and Aluminum Panel Inserts (as per elevations)
- All frames to be thermally broken, clear anodized aluminum with structural steel where required (Campanile)
- All glass to have Low E coating

Roofing
- Flat roof system, concrete slab, sloped insulation, SBS membrane

Interior Materials

Ceilings
- Spray texture on exposed concrete ceilings, painted to suit, in suites and common rooms
- Gypsum board bulkheads in suites
- Suspended acoustic ceiling tiles on the main level to include: Multi-Purpose Room, Public Washrooms, Office Space and Lobby
- Suspended acoustic ceiling tile in all residence corridors
- Exposed ceilings in all service and storage rooms

Floors
- Polished, sealed concrete floors throughout public spaces
- Sheet vinyl to be used through Suites, Common rooms and residence corridors
- Sealed concrete within service and storage rooms
- Rubber base throughout

Partitions
- Painted 5/8" gypsum board on steel stud or concrete block partitions
- Cement board to be used in wet areas with tile backsplash around sinks

Doors and Entrances
- Main and secondary entry vestibules to be storefront or curtain wall systems with clear anodized aluminum framing and double pane fixed vision glass
- Exterior doors to be insulated steel doors in thermally broken steel frames
- Corridor to suite doors to be hollow metal doors in pressed steel frames (3/4hr FRR)
- Interior service room, exit stairs and public doors to be hollow metal doors in pressed steel frames (rated as per code)
- Suite bedroom and washroom doors to be solid core wood doors and frames.

Millwork

Construction
- Drawer bottoms, sides, and backs to be 12mm particle board
- Drawer fronts and doors to be 19mm particle board
- Lower case, upper case backs against walls to be 10mm Poplar Plywood
- Fixed and adjustable shelves to be 19mm Poplar Plywood
- Counter top cores and backsplashes to be 19mm Poplar Plywood with plastic laminate
- Counters to have 38mm edge

Finishes
- Doors and drawer fronts
- Gables and insides
- Counter tops
- Backsplashes

Window Covering – All rooms

1. Vertican BBV-700 Vertical Blinds or equal
2. Options:
    a. Fabric free hang
    b. Mounting clips: ceiling clip or wall bracket
    c. Valance: standard

Elevator

Elevator to be of high quality, environmentally friendly, and energy efficient. The elevator equipment shall have durable and easily maintained finishes, fixtures and components suitable for long term operation.

Elevators will have minimum 5 minutes handling capacity of 7% of the building population with an average wait time of 35 seconds or less.

3.0 STRUCTURAL DESIGN

3.1 GENERAL

This section describes the recommended structural systems proposed for the St. Joseph's College Women's Residence at the University of Alberta Main Campus and the applicable building code requirements that govern the design.

The structural systems are to be developed to be economical, and responsive to the architectural requirements for the building within the framework of environmental sustainability. The proposed structure will be constructed above the existing LRT tunnels and will be designed to not impact the tunnel structure and the LRT operations.

The design of all structural systems will meet or exceed all applicable CSA Standards, thus providing a safe environment for the occupants for years to come.

3.2 DESIGN REQUIREMENTS

The structural systems will be capable of sustaining the following loading requirements:

Typical Floor:	Dead Load = 1.7 kPa (Superimposed not including self-weight of structure)
	Live Load = 1.9 kPa (Suites)
	Live Load = 4.8 kPa (Common Areas and Stairs)
	Live Load = 4.8 kPa (Minimum for Mechanical/Service Areas)
Roof Structure:	Dead Load = 1.2 kPa (Superimposed not including self-weight of structure)
	Live Load = 1.46 kPa + Snow Drift
	Important Factor (Is) = 1.0

Appropriate snow drift in accordance with the Alberta Building Code will also be incorporated into the roof design due to difference in roof heights.

The structural design will incorporate the actual anticipated loads in various designated areas, which are unique to the building occupancy, and all equipment and finishes loads will be individually considered.

3.3 LATERAL LOAD RESISTANT SYSTEMS

The main lateral load resisting elements of the building, which consist of elevator shafts, stair shafts and shear walls, will be designed using the following parameters:

Wind

Reference Hourly Wind Pressure (1/50) = 0.45 kPa
Important Factor (Iw) = 1.0

Earthquake

Peak Ground Acceleration = 0.06

5% Damped Spectral Response Acceleration Values, Sa(T)

- Period = 0.2 s   Sa(0.2) = 0.12
- Period = 0.5 s   Sa(0.5) = 0.06
- Period = 1.0 s   Sa(1.0) = 0.02
- Period = 2.0 s   Sa(2.0) = 0.01

Site Class   As per geotechnical report (to be confirmed)
Acceleration based Site Coefficient (Fa)   Site Class dependent
Velocity based Site Coefficient (Fv)   Site Class dependent

Important Factor (IE) = 1.0

3.4 DESIGN CRITERIA

The structural design will be in accordance with the following Codes and Standards:

- Alberta Building Code 2006
- National Building Code 2010
- Reinforced Concrete Design and Construction CAN/CSA-A23.1/A23.2/A23.3
- Structural Steel Design CAN/CSA-S16

3.5 CONSTRUCTION MATERIALS

The following materials will be utilized:

Concrete

	Minimum 28-day Compressive Strength (MPa)
- Footings and foundations	25
- Structural slabs and columns	35
- Walls and shafts	35
- Interior Slabs-on grade	25
- Exterior apron slabs and sidewalks	32

Air entrainment will be used in concrete for different exposure classes. Cement Type GU will be used for all above grade concrete. Reinforcing steel will conform to CAN/CSA-G30.18 with 400 MPa yield grade.

Structural Steel

Structural steel will conform to CAN/CSA-S16

3.6 BUILDING SYSTEM DESCRIPTION

The proposed Women's Residence will be constructed of reinforced cast-in-place concrete. Suspended floors and roof will be flat slab construction with no drop panels at column locations. Rectangular shape columns narrow in the shorter dimension will be used throughout for better fit in the partition walls. Concrete shafts will be used for elevators and stair and will be utilized as lateral load resisting elements.

Shallow spread and strip footings will be utilized to support the building under columns, shafts and perimeter foundation walls to minimize the amount of excavation and reduce the impact on the existing LRT tunnels underneath the building.

4.0 MECHANICAL DESIGN

4.1 GENERAL

This report is the preliminary design development summary of the mechanical systems planned for the St. Joseph's College Women's Residence. The facility will be approximately 106,000 square feet in area, apartment style high rise building designed to house two hundred eighty-two students. The facility will incorporate multiple apartment configurations containing studios, two and four bedrooms. The facility will feature amenities and programmable space required to deliver support services for students.

The mechanical systems in the St. Joseph's College Women's Residence shall be designed to meet the following goals:

- Meet the Program requirements
- Meet the operational needs of Facilities and Operations
- Provide cost effective and maintainable solutions that integrate with other design disciplines
- Contribute to a healthy, comfortable working environment
- Contribute to sustainable solutions, consistent with Green Globe assessments
- Provide life safety systems consistent with Alberta Building Code requirements and all other applicable codes and standards such as NFPA, ASHRAE and CSA.
- Provide mechanical systems consistent with the University of Alberta, Facilities and Operations design guidelines.

4.2 MECHANICAL DESIGN CRITERIA

4.2.1 CODES AND STANDARDS

Requirements from the following codes and standards will be incorporated into the mechanical design as they apply to this project.

- Alberta Building Code
- U of A Facilities and operations design guidelines
- ASHRAE Standard and Guidelines
- Standard 90.1 – 2007: Energy Efficient Design of new Buildings except Low Rise residential Buildings
- Standard 62-2010: Ventilation for Acceptable indoor Air Quality
- NFPA 13 – Installation of Automatic Wet Sprinkler System
- NFPA 14 – Installation of Standpipe System and Hose System
- NFPA 20 – Installation of Stationary Fire Pumps
- National Energy Code

4.2.2 HEATING SYSTEMS

Trane Trace software will be used to determine the building envelope heat loss at winter design conditions for Edmonton, Alberta.

The space heating conditions for all areas of the building will be designed using the following criteria:

- Winter outside air temperature: -34°C
- Indoor air temperature: 22°C
- Indoor relative humidity: 15% (approximately – no humidification is being provided)

4.2.3 COOLING SYSTEMS

Trane Trace software will be used to determine the building envelope heat gain plus the internal heat gain from the occupants and the various appliances that generate heat.

The building will have several different cooling design criteria for the different areas. The five major areas are: tenant rooms/suites, common spaces/corridors, mechanical rooms, electrical rooms, elevator machine room.

The common space/corridors will have mechanical cooling for ventilation air precooling to provide additional comfort to meet the following criteria:

- Summer outside air temperature: 30 °Cdb, 20 °Cwb
- Discharge Air Temperature: 18.3 °Cdb / 18.2 °Cwb
- Indoor air temperature: 24°C (approximately – temperature will float)
- Indoor relative humidity: 50% RH to 80% RH

The suite will not have any mechanical cooling of the ventilation air or space. The ventilation system will deliver air at the following conditions and each of the rooms will have operable windows (hand cranks) to allow for additional free cooling and air exchange.

- Summer outside air temperature: 30 °Cdb, 20 °Cwb
- Discharge Air Temperature: 30 °Cdb / 20 °Cwb
- Indoor air temperature: 31°C (approximately – temperature will float)
- Indoor relative humidity: 55% RH to 90% RH

The mechanical room, most of the smaller electrical rooms and other general areas will not have any mechanical cooling of the ventilation air or dedicated cooling in the rooms.

The main electrical room and the elevator machine room will have mechanical cooling of the ventilation air and dedicated cooling in the room.

4.3 STEAM SUPPLY

- A new high pressure steam service will be brought from the existing utility tunnel in a newly constructed utilidor into the main floor of the building and over to the new wet mechanical room on the main floor.
- The existing steam utility service is expected to have adequate capacity to service the Women's Residence.
- Steam distribution piping to two steam convertor heat exchanger stations (one for hot water heating and one for heated glycol)
- Condensate return from the steam to hot water heat exchanger.
- Hot water heating system (82°C / 71°C) for space heating with residential style convectors
- Heated glycol system (82°C / 65°C) with heat exchanger for ventilation air preheating

4.4 CHILLED WATER SUPPLY

- New chilled water supply and return piping will be brought from the existing utility tunnel in a newly constructed utilidor into the main floor of the building and over to the new wet mechanical room on the main floor.
- Chilled water piping (7.2°C / 12.8°C) and distribution to fan coil units and to the chilled water / chilled glycol heat exchanger in the main floor mechanical room,
- Chilled glycol piping (7.8°C / 14.5°C) up to two air handling units located outdoor on the roof.

4.5 DOMESTIC WATER SUPPLY

- New domestic water supply piping will be brought from the existing utility tunnel in a newly constructed utilidor into the main floor of the building and over to the new wet mechanical room on the main floor.
- The existing water service is expected to have adequate capacity to service the Women's Residence.
- Backflow preventers will be provided to eliminate possibility of cross contamination of water supply.
- Cold water piping to booster pump located in main floor mechanical room.
- Domestic water heating with indirect storage tanks heated from hot water heating system
- Hot water piping (55°C) from hot water storage tanks into building to plumbing fixtures.
- Hot water recirculation from fixtures back to storage tanks.

4.6 FIRE WATER SUPPLY

- New fire water supply piping will be brought from the existing utility tunnel in a newly constructed utilidor into the main floor of the building and over to the new wet mechanical room on the main floor.
- The existing fire water service is expected to have adequate capacity to service the Women's Residence.
- Backflow preventers will be provided to eliminate possibility of cross contamination of water supply.
- Dedicated fire water piping distribution to electric fire pump (c/w soft start) to meet NFPA 20.
- Standpipes in stairwells and wet sprinklers throughout building to meet NFPA 13.

4.7 SANITARY AND STORM SEWER

- Sanitary drainage piping from plumbing fixtures to internal sanitary drainage piping below grade to connect to existing sanitary system.
- Roof drainage to internal storm drainage piping down below grade to connect to existing storm system.
- The existing sanitary and storm services are expected to have adequate capacity to service the new Women's Residence.
- All new sanitary and storm piping will tie-in to existing services on the site near the building.

4.8 VENTILATION SYSTEMS

- Custom outdoor air handling units (100% outside air) and hydronic coils and heat recovery and air filters (no humidification).
- Roof mounted inline fans with mixing box section to discharge to roof.
- None of the air in the building from the two air handling units will be recirculated.
- Air distribution at the corridor will be low pressure (less than 500 pascals) and medium pressure (less than 1500 pascals) from the air handling units and down into the main ventilation shafts.
- Smoke exhaust system utilizing ventilation equipment.
- Vestibule pressurization / Fire Control Center requirements are under review.
- Fan coils to provide mechanical cooling to the main electrical room and elevator machine room
- All other electrical rooms to use transfer air from adjacent corridor space with inline exhaust fans
- Toilet rooms and janitor rooms and kitchens will be exhausted out through the exhaust fans at the roof.
- Acoustic considerations will require further discussion to determine if silencers will be required.

4.9 CONTROL SYSTEMS

- Building automation system with DDC Controls provided as a standalone system inside of the building, but not necessarily DDC controls in each room.

4.10 SUSTAINABILITY

- Mechanical systems will be designed with consideration of Green Globes criteria.

5.0 ELECTRICAL DESIGN

5.1 GENERAL

This report is the preliminary design development summary of electrical systems planned for St. Josephs College Women's Residence. The facility will be approximately 106,000 square feet in area, apartment style high rise building designed to house two hundred eighty-two students. The facility will incorporate multiple apartment configurations containing studios, two and four bedrooms. The facility will feature amenities and programmable space required to deliver support services for student.

The work shall include but not limited to the following:

- Complete power distribution system. Unit substation power distribution centres and pan elboards, provided and installed by the electrical contractor;
- Existing St. Joseph's College is currently powered from the Education Building Parkade at 347/600 volts. This service shall be removed and existing St. Joseph's College will be provided with permanent power from normal and emergency distribution in the new residence building;
- Power connections to mechanical equipment including motor control centers (MCC), motor starters, contactors and disconnect switches;
- Complete infrastructure and wiring for building natural gas powered emergency generator;
- Complete indoor and outdoor lighting systems, including lighting control systems;
- Complete power supplies, motor starters, contactors and disconnect switches for all equipment supplied by others, as required;
- Complete life safety systems (voice communication fire alarm system, emergency lighting, exit lighting);
- Complete infrastructure for telecommunications, A/V, public announcement, and security systems (raceways, empty conduits and rough-in boxes);
- Complete communications cabling system for voice and data systems;
- Complete security system including cabling and devices;
- Commissioning, start-up and training.

5.2 GENERAL PROVISIONS FOR DESIGN

The electrical systems will be designed in accordance and in keeping with the intent of all applicable codes, ordinances, standards and regulations. The following is a list of the applicable codes and regulations that apply to this facility

5.2.1 APPLICABLE CODES & REGULATIONS

- Alberta Building Code;
- WorkSafe Alberta Regulations;
- Applicable NFPA Regulations;
- Canadian Electrical Code 2006 & Standata Amendments;
- CSA Standards;
- ULC Standards;
- IESNA (Illuminating Engineering Society) Recommended Practices;
- U of A Power Authority standards and requirements;

5.2.2 SCOPE

Complete, fully tested and operational electrical systems will be provided to meet the requirements described herein and in complete accordance with applicable codes and ordinances, and good installation practices.

Connection to equipment specified in other sections and to equipment supplied and installed by other contractors and/or by the Owner.

5.2.3 SUSTAINABLE DESIGN

The design and operation of an energy efficient facility is an important goal.
The following are energy efficient design elements that will be incorporated into the project design. Four Green Globes rating is to be attained including:

Light Pollution Reduction

- Meeting the illumination levels recommended by IESNA while controlling glare and the amount of stray light leaving the site. The luminaries that are specified must have appropriate distribution cutoff for reduction and/or elimination of obtrusive glare.

5.2.5 MATERIALS

Materials and equipment specified and installed will be new and of quality required for the application.

Each major component of equipment will display the manufacturer's name, model number and serial number. All pre-assembled equipment will have complete maintenance and operations instructions provided by the manufacturer.

Materials and equipment of a like type will be of a common manufacturer.

5.3 ELECTRICAL SYSTEMS

5.3.1 POWER DISTRIBUTION

Power Servicing - The power distribution will consist of 347/600V, 3 phase power supplied from a new indoor U of A substation located on the main level of this building. Primary power will be supplied by the U of A utilities. The new substation will also serve the existing St. Joseph's College. New secondary power is required between the substation and St. Joseph's College. The temporary power supplied from Education Car Park to the existing St. Joseph's College will be disconnected and removed by the electrical contractor. Primary cable and terminations will be provided by the U of A. Primary duct will be supplied and installed by the electrical contractor as directed by the U of A. All secondary cable, duct and terminations supplied and installed by the electrical contractor. The substation will be provided by the U of A, installed by the electrical contractor. System grounding etc. and all associated labour and install costs will be supplied and installed by the electrical contractor to the U of A standards.

Power distribution - A main 347/600 volt distribution panel (MOP) will be provided in the electrical room and will house the main circuit breaker, and distribution breakers. Power panels will be supplied throughout the building in appropriate locations (electrical closets, storage rooms, utility rooms etc). Panels will be placed strategically to minimize cost and voltage drop. Service size to be determined after load calculations are completed.

All tenant suites will be powered from 120/240 volt single phase 16 circuit load centre panel boards that will be flush mounted in each suite.

Metering – one common meter will be provided for residential suites, house loads and common spaces.

Generator – A natural gas powered emergency generator will be provided to supply emergency power to the building. The generator will supply emergency systems, elevators and lighting to code requirements, plus back up power to the heating system. The generator will have a "critical" style muffler to reduce noise pollution. Separate transfer switches will be provided for emergency loads, non-emergency loads, and for fire pump.

Emergency generator will be installed external to the building. In custom built level II metal enclosure.

5.3.2 EXTERIOR LIGHTING

Existing exterior pole mounted lighting will be modified to suit new site conditions. Existing U of A luminaire poles to be reused and unused poles to be returned to U of A. Allow for removal, storage and re-installation of existing pole lights to this building. Additional matching poles may be required. Additional exterior lighting to be sharp cut off LED wall fixtures where glare is not a concern. All exterior lighting will be controlled via astronomical time clock with battery backup and automatic daylight savings adjustment.

5.3.3 INTERIOR LIGHTING

All fixtures are to be specified with compact fluorescent lamps and electronic ballasts, LED fixtures may be considered in certain applications. All fluorescent lamps to be 'warm white' (3000k). Light fixtures will be surface ceiling mounted, wall mounted, and/or recessed as required. Fixtures will be controlled using standard 120V switches in the suites. To conserve energy, some corridor fixtures will be shut off by time clock during off peak hours. For safety, some corridor lights will remain energized 24 hours/ day.

5.3.4 INTERFACE WITH BUILDING AUTOMATION CENTRE

Mechanical controls connections to the building automation system shall be provided by the mechanical controls contractor. The electrical contractor will not be responsible for connections to the building automation system.

5.3.5 ENERGY CONSIDERATION

The primary objective for energy conservation will be to ensure a sustainable design and contribute practical to achieving Green Globes (4 globes out of a possible 5). Energy efficiency is to be achieved by compact fluorescent or LED lighting. Additional efficiency can be achieved through lighting control in the corridors, common areas, storage and utility rooms. Occupancy sensors will be provided in some of the above noted areas.

5.3.6 SECURITY, CCTV AND ACCESS CONTROL

Access Control - A smart card or fob system will be used to provide access to the building. Card or fob access shall be required for the elevator: All access control equipment, including door position switches, electric strikes etc., wiring and installation is to be included in contract and to meet U of A specifications.

CCTV - A total of 10 security cameras (2 exterior and 8 interior) are to be provided and installed in this contract and connected to campus security. CCTV cameras are to be located at exterior entrance doors, exterior at fire exits to common areas, in lobbies, elevators, and on floors as required. Allow for a complete installation including cameras, camera equipment, recording equipment and wiring with terminations to U of A specifications.

Campus Security- Fibre optic cable will be terminated within the tunnel system, for connection to Campus Security. Fibre cables and terminations are to be provided by the electrical contractor. The U of A will provide direction to the location in the tunnel. Intrusion detection devices such as door contacts, occupancy sensors, glass break etc. will not be provided. Separate security systems will not be provided for individual suites.

5.3.7 TELECOMMUNICATIONS, CATV & DATA SYSTEMS INFRASTRUCTURE

Data/ WIFI -The U of A wireless access to be provided throughout the building and will be available to all residents. Rough-in will be provided for 20 WIFI devices. End devices not included. Additional hard wired CAT 6 data jacks will be required in other office areas, common spaces. Electrical contractor to provide a fibre optic cable for data services to U of A specifications between this building to the U of A tunnel for data services. Fibre optic cable will be terminated in the tunnel system. Telephone-Service will be provided to the building via 1-4" RPVC duct and will terminate on the main television and cable TV backboard in the main Communications room. Telephone service entry point is to be confirmed. Telephone distribution cabinets will be distributed in electrical rooms as required. 1 CAT 6 cable will be provided to common area spaces as required by user group or the U of A. Telephone and/or data jacks will not be provided to each suite.

CATV - Service will be provided to the building via 1-4" RPVC duct and will terminate on the main television and cable TV backboard in the main Communications room. CATV service entry point is to be confirmed. Television distribution cabinets will be distributed in electrical rooms as required. 1 Coax cable and 1 CAT6 cable will be provided to each suite common living space for TV service, as well as to common area living spaces. Supply and install all necessary components as required to provide television distribution system. Pay all charges which may be levied by the cable TV company for a complete system installation, ready for connection once tenants occupy the premises. Coaxial cable to be equal to RG6U Commscope 5730 complete with black jacket.

Satellite - Provide a 3/4" conduit complete with pullstring to the roof for a future common central satellite service.

5.3.8 FIRE ALARM SYSTEM

The voice communication fire alarm system will be Simplex 41 OOU c/w emergency communications. Fire alarm speaker/ strobe units will be provided in corridors, suites and common areas to ensure emergency paging for fire fighters & campus security is functional. Fire fighter's emergency handsets are to be provided throughout the building as required by code. Campus security will have access to the emergency paging functionality from their offices via fiber optic connection through the tunnel system. The U of A to provide detailed location for terminating the fibre cable in the tunnel. Fibre optic cable to be to the latest U of A specification. Exterior weather proof fire alarm speaker horns will be provided on the exterior of the building (allow for 4 locations) located near the fire alarm response point.

5.3.9 CO DETECTORS

Combination 120V CO/ Smoke detectors c/w battery backup will be provided in all suites located as directed in the Canadian Electrical Code.

5.3.10 ELEVATORS

Supply and install all necessary components to provide for a complete workable elevator system. Coordinate scope of work with elevator manufacturer. For each elevator, provide and wire complete a HP rated fused disconnect switch for power and a 2P-15A disconnect control and lighting switch on the latch side of the elevator machine room door. Supply and install a vapour-proof fixture and weatherproof duplex GFI receptacle in each integral elevator shaft pit. Supply and install a telephone outlet complete with a 20mm conduit to the main telephone board, at a location as directed by the elevator manufacturer. It is the contractor's responsibility to coordinate the exact installation requirements and ratings with the elevator manufacturer and to ensure installation to the latest Alberta Building Code and ADERSA requirements for a high rise building. Provision for cameras & access control within the elevators is to be included.

5.3.11 MISCELLANEOUS ITEMS

Air Conditioning - Air conditioning will be provided in some common spaces only. Air conditioning will not be provided in suites.

Barrier free suite(s)- Barrier free suites will be provided as indicated on the architectural drawings. To accommodate this, electrical device locations will be adjusted in these suites to mounting heights that will improve access for occupants.

Blue Emergency Phones - Emergency phones are not required on this project.

Vending Machines - Vending equipment will be operated by the 'ONE' card and interfaced with the University of Alberta ONE card system database.

Laundry Equipment - Provide and install electrical connections to laundry equipment. Laundry equipment to be supplied by a third party and installed by the electrical contractor. A CAT 6 cable is to be provided at the card reader and run to the main communication room. A 15A duplex receptacle is to be provided at the card reader location. Two CAT 6 cables are to be provided at each washer or dryer and run to the main communication room. Laundry equipment will be enabled with technology that sends signals to student's mobile devices when cycles are complete.

Existing site - It is the responsibility of the electrical contractor and design team to identify and include in contract resolving any conflicts between new construction and existing equipment such as (but not limited to): pedestals, landscape receptacles, phone booths, lighting, vaults etc. identity existing gas lines, steam lines, water lines, hydrants, sanitary lines, storm lines etc. and ensure proper clearances are maintained.

5. 3.12 EXISTING RESIDENCE

Provide new 600 volt 3 phase 4 wire power service from new residence distribution to existing facility. Existing service presently run from the existing parkade distribution center to be removed and temporary service provided during construction.

6.0 ALBERTA BUILDING CODE REVIEW

SECTION DESCRIPTION			REFERENCE
	Code review addresses the Code in general; review is required as a part of detail design.		
A.	**BUILDING CLASSIFICATION**		3.1.2.1
	1.	Residential Group C.	
	2.	Minor occupancies (Common spaces)	
B.	**MULTIPLE OCCUPANCY**		3.1.3.1
	1.	Separate major occupancies.	
C.	**NON COMBUSTIBLE CONSTRUCTION**		
	1.	Buildings required to be built of non-combustible construction shall be constructed with non-combustible materials.	3.1.5.1.1)
	2.	Minor combustible elements allowed: Paint, caulking, foamed plastic air sealants, fire stopping, pneumatic tubing, adhesives, sheathing paper, vapour barriers, wood blocking, electrical outlet, and junction boxes.	3.1.5.2
	3.	Combustible roofing of A, B, or C classification is permitted.	3.1.5.3.1)
	4.	Combustible roof sheathing and supports installed above a concrete deck are permitted.	3.1.5.3.2)
	5.	Nailing elements for interior finishes are permitted if attached to non-combustible backing with space less than 50mm deep.	3.1.5.6
	6.	Combustible interior finishes are permitted. Paint, wallpaper under 1mm thick, wall finishes under 25mm thick and FS under 150, ceiling finishes under 25mm thick with FS under 25 or are fire retardant treated.	3.1.5.10
	7.	Combustible insulation under FS of 25. Restrictions apply. Confirm use if needed.	3.1.5.12
	8.	Combustible ducts and piping is restricted. If used confirm acceptability.	3.1.5.16
	9.	Combustible plumbing fixtures permitted if FS and SD is under wall allowances.	3.1.5.17
	10.	Wires and cables are permitted with conditions.	3.1.5.18
D.	**FIRE RESISTANCE RATINGS**		
	1.	Floor, ceilings, and roof rated to exposure to fire on underside.	3.1.7.3.1)
	2.	Vertical interior fire separations rated for exposure to both faces.	3.1.7.3.2)

SECTION DESCRIPTION			REFERENCE
	3.	Exterior walls rated for exposure from interior.	3.1.7.3.3)
	4.	Supporting structure rating must equal floor supported.	3.1.7.5
	5.	Fire separations shall be continuous, have required FRR, and have closures for any openings.	3.1.8.1
	6.	Closures in ratings as follows: 2hr FRR 1.5 Closure 1hr FRR 45 min Closure	3.1.8.4
	7.	Fire dampers must meet unless waived (3.1.8.8)	3.1.8.7 3.1.8.9
	8.	20 minutes closures allowed in separations of 1hr. FRR between corridor and suites (sleeping rooms)	3.1.8.10
	9.	Self-closing device is required on all doors in a fire separation.	3.1.8.11
	10.	Hold open device allowed on closures except exits but must automatically close.	3.1.8.12
E.	**BUILDING SERVICES IN FIRE SEPARATIONS**		
	1.	Services penetrations in fire separations shall be fire stopped.	3.1.9.1
	2.	Penetration of electrical and mechanical shall meet.	3.1.9.2 3.1.9.3 3.1.9.4
	3.	Fire stopping of concealed spaces required.	3.1.11.1 3.1.11.2 3.1.11.3 3.1.11.4 3.1.11.5
F.	**FLAME SPREAD RATING AND SMOKE DEVELOPED CLASSIFICATION**		
	1.	Interior finishes must meet Section 2.3 of Division B AFC 2006.	3.1.13.1
	2.	FS of 25 required for exits, lobbies, and vertical service spaces.	3.1.13.2
	3.	Bathroom of residential suite may have wall and ceiling finishes up to 200.	3.1.13.3
	4.	Public corridors FS under 150 if sprinklered.	3.1.13.6.3)
	5.	High buildings FS and SD limits FS — Exits, lobbies, vestibules, elevator cars, service rooms (Floor 300 in corridors and elevator cars) — 25 SD — Walls in exits, vestibules, service rooms — 50; Walls in corridors and elevator cars — 100; Ceilings in exits, vestibules, corridors, service spaces — 50	3.1.13.7
G.	**OCCUPANT LOAD**		3.1.17

SECTION DESCRIPTION				REFERENCE
	1.	Two (2) people per sleeping room in a dwelling unit.		
	2.	Assembly uses reading rooms or lounges Standing space Space with non-fixed seats and tables. Storage	1.20 m^2/person 0.40 m^2/person 0.95 m^2/person 46 m^2/person	
H.	**BUILDING FIRE SAFETY**			
	1.	Roof top enclosure for elevators or services not considered a storey.		3.2.1.1.1)
	2.	Building height and area of entire building shall be used.		3.2.2.5
	3.	Every building shall face a street in conformance to 3.2.5.4 and 3.2.5.5 for access routes.		3.2.2.10
	4.	Group C, any height, any area, sprinklered - Non combustible - Sprinklered - Floor assemblies 2hr FRR		3.2.2.42
	5.	Area of unprotected openings in an exposing building face shall meet Table 3.2.3.1C. For residential floors 6m limiting distance provides 100% unprotected opening.		3.2.3.1
	6.	Area of building face can be calculated for each fire compartment with separations of 45min FRR (residential levels area is floor to floor and demising wall to demising wall)		3.2.3.2
	7.	Cladding required if unprotected opening is : Less than 10% 1 hr rating non-combustible cladding : More than 10% and less than 25% FRR of 1hr and non-combustible cladding : If more than 25% and less than 100% FRR of 45min.		3.2.3.7
	8.	Protection of exit facilities must meet		3.2.3.13
	9.	Fire alarm and detection systems - Fire alarm system is required - 2 stage alarm system - Electrical to confirm 3.2.4 is met - Annunciator at building entrance as 3.2.5.5		3.2.4
	10.	Smoke detectors required in public corridors, exit stair shafts.		3.2.4.11
	11.	Air handling system serving more than 1 storey, suite, or fire compartment to have duct type smoke detector to prevent circulation.		3.2.4.12
	12.	Smoke alarms shall be installed in each dwelling unit but not each sleeping room.		3.2.4.20
	13.	Voice communication system if required by 3.2.6		3.2.4.21
I.	**PROVISION FOR FIRE FIGHTING**			
	1.	Roof access required by stair or hatch with fixed ladder.		3.2.5.3

SECTION DESCRIPTION			REFERENCE
	2.	Access routes for fire department vehicles to building face with principal entrance.	3.2.5.4
	3.	Principal entrance not less than 3m or more than 15m from access route. Access route shall be provided for building with fire department connection adjacent fire hydrant (3.2.5.16)	3.2.5.5
	4.	Access route design - Clear width of 6m (possible 5m) - Centre line radius of 12m - Overhead clearance of 5m - Maximum change in grade 1 in 12.5 - Support loads - No longer than 90m dead-end	3.2.5.6
	5.	Mechanical to confirm adequate water supply	3.2.5.7
	6.	Standpipe system is required and meet NFPA 14	3.2.5.8
	7.	Hose connections located in exits	3.2.5.10
	8.	Hose stations with 65 and 38mm hose connections and located in 3 stairs so all portions of floor area are within 9m of hose nozzle with 30m connected hose.	3.2.5.11
	9.	Automatic sprinkler system meets NFPA 13	3.2.5.13
	10.	Combustible sprinkler lines not allowed	3.2.5.14
	11.	Fire department connections no more than 45m to a hydrant and within 3 and 15m of principal entrance.	3.2.5.16
J.	**HIGH BUILDINGS**		
	1.	High building if Group C floor level is over 18m above grade	3.2.6.1
	2.	Limits to smoke movement - Stairs above lowest exit shall have vent to outdoors at or near bottom of shaft - Control fans	3.2.6.2
	3.	Elevators meet CSA B44 with special emergency service manual recall above 1st level	3.2.6.4
	4.	Elevator for use by fire fighters	3.2.6.5
		- All capable of being on emergency power - One shall have useable platform area of 2.2m^2 and capacity of 900kg serving floors	
		- Be provided with a closure at each shaft opening with interlock mechanism that will be maintained over 1hr. - Or a corridor with no occupancy and 1hr FRR - Electrical conductors for elevator shall be in service spaces that do not contain combustible material - Or be protected for exposure to fire to ensure operation for 1hr	

SECTION DESCRIPTION			REFERENCE
		CSA/ULC S101	
	5.	Venting to aid firefighters can be done by windows, smoke shafts, or exhaust systems (Appendix B) Windows to have 1% of wall area, shall be marked, and operable from exterior by firefighters.	3.2.6.6
	6.	Central alarm and control facility - Required on entrance level - Shall have means to control voice communication system, control audible and visual signals, plus more (see Appendix B) - Room separated and ventilated	3.2.6.7
	7.	Voice communication system required by U of A standards.	3.2.6.8
	8.	Electrical conductors for FA and emergency equipment shall be in service spaces with no other combustible materials or be separated from remainder of service space by 1hr FRR or be protected for 1hr from source.	3.2.6.9
	9.	Testing of smoke control and venting is required (See Appendix B)	3.2.6.10
K.	**LIGHTING AND EMERGENCY POWER**		
	1.	Exits, public corridors to have light level of 50 lx illumination levels in residential to 9.34.2.7	3.2.7.1
	2.	Emergency lighting of 10 lx required in exits, principal routes of access to exits in open floor areas and service rooms, corridors, and must be automatic.	3.2.7.3
	3.	Emergency power for lighting required for a period of 2hr.	3.2.7.4
	4.	If emergency power is dependent on fuel supply from outside the building the fuel supply will be provided with an identified separate shut off valve outside the building.	3.2.7.7
	5.	Emergency power required to fire alarm system for 2hr under full load and 24hr supervisory.	3.2.7.8
	6.	Emergency power required for 2hr under full load for every elevator (one at time) water supply, fans and electrical equipment (See Appendix A).	3.2.7.9
M.	**SAFETY IN FLOOR AREA**		
	1.	Separation of suites - 1hr FRR - Except D occupancy	3.3.1.1
	2.	Hazardous substances not present. Fuel fired appliances not in corridor as access to exit. Storage of flammable and combustible liquids conforms to AFC.	3.3.1.2
	3.	Means of egress must be provided from roof or open terrace. Two if population over 60.	3.3.1.3.3)4)
	4.	Roof top enclosure must have access to exit that leads to exit at roof or storey immediately below. If over 200 m² requires 2 means of egress.	3.3.1.3.5)6)

SECTION DESCRIPTION			REFERENCE
	5.	Each suite in a floor area shall have an exterior exit door or door into a public corridor and it shall be possible to go in opposite directions to 2 separate exits.	3.3.1.3.8)9)
	6.	Public corridor shall be separated by a fire separation from remainder of storey. FRR of 45min required for residential. See 3.3.4.2. (1 hr.)	3.3.1.4
	7.	Every suite or room (except dwelling units) shall have 2 egress doors if occupancy load is more than 60, if travel distance to egress door exceeds 25m or area of room is greater than 200m² (A) 150m² (C), and 300m² (D).	3.3.1.5
	8.	Barrier free path at change of elevation shall have 600mm tactile warning strip. 250mm from stair, and ramp.	3.3.1.7.4)
	9.	Minimum width of a public corridor is 1100mm dead-end corridor allowed if less than 3m long.	3.3.1.9
	10.	Door swing in access to exit shall be on vertical access and swing in direction of exit of occupancy is over 60.	3.3.1.11
	11.	Egress doors minimum width 800mm and cannot open onto a step. Door must be operable without use of a key or specialized knowledge. Electromagnetic locks permitted. Total time delay of locks is 30sec.	3.3.1.13
	12.	Capacity of access to exits - 6.1mm/person for doorways, corridors, and ramps under 1 in 8 - 9.2mm/person for ramps over 1 in 8	3.3.1.17
	13.	Guards of 1070mm high required for openings into shafts, around occupied roof at raised floors mezzanines where difference in levels exceeds 600. Openings less than 100mm and not facilitate climbing between 140 and 900.	3.3.1.18
	14.	Glass doors designed so are apparent windows in public areas of residential buildings that are below 1000mm from floor shall have a barrier or guard or be designed as a guard.	3.3.1.19
	15.	Janitor rooms do not need a FRR separation in a sprinklered building.	3.3.1.21
	16.	Common laundry rooms needs to have separation only in a sprinklered building.	3.3.1.22
N.	**Residential Occupancy**		
	1.	Suites separated from each other and remainder of building by 1hr FRR separation. Corridor to be 1hr. FRR.	3.3.4.2
	2.	Common storage rooms require a 1hr FRR separation.	3.3.4.3
	3.	Doors from suite shall be designed not to lock automatically.	3.3.4.5
	4.	Dwelling unit requires sound separation of 50 to other parts of building and 55 to elevator hoistway.	3.3.4.6
P.	**Exits**		
	1.	Exits must be separate from other exits. If more than 2 exits, cumulative exits are less than 50% of required exit width.	3.4.1.2

SECTION DESCRIPTION			REFERENCE
	2.	Exits are one or more of the following : exterior door : exterior ramp : exterior stairway : horizontal exit : interior ramp : interior passageway : interior stair	3.4.1.4
	3.	Every floor area requires at least 2 exits.	3.4.2.1
	4.	Least distance between 2 exits from a floor area shall be half the maximum diagonal of floor area but not more than 9m for a floor area with a public corridor and not less than 9m or half diagonal if no public corridor.	3.4.2.3
	5.	Travel distance is distance from any point in floor area to an exit. Can be measured from a suite egress.	3.4.2.4
	6.	Travel distance cannot exceed 45m in sprinklered building.	3.4.2.5
	7.	Width of exits based upon occupancy load. Exit width is cumulative if 2 or more exits converge.	3.4.3.1
	8.	Exit width is determined by occupant load x 6.1mm for doorways, corridors, passageways, and ramps less than 1 in 8, 9.2mm for ramps over 1 in 8 and stairs except 8mm if rise is less than 180 and run is over 280mm.	3.4.3.2.1)
	9.	Exits need not be cumulative if located above another.	3.4.3.2.4)6)
	10.	Width of an exit shall not be less than 1100 for corridors, ramps, stairs and 800 for doorways.	3.4.3.2.8)
	11.	Exit headroom not less than 2100mm except 2030mm accepted for doors and 1980mm for closer on door.	3.4.3.4
	12.	Exits shall have 2hr FRR separation.	3.4.4.1
	13.	No openings in an exit except for standpipe and sprinkler piping, electrical that only serves the exit, exit doorways, requirements of 3.2.6. Exit serves no other purpose than exit or access to a floor area. Service rooms cannot open directly into an exit.	3.4.4.4
	14.	Exit signs required at all exits.	3.4.5.1
	15.	Stairs, ramps, and landings to have slip resistant finish and colour demarcation.	3.4.6.1
	16.	No less than 3 risers to interior stairs.	3.4.6.2
	17.	Maximum rise of 3.7m between landings. Landings minimum length and width is width of stair. Level area required if door empties onto a ramp.	3.4.6.3
	18.	Handrail required both sides of 1100 wide stair. Handrails continuous and graspable. Between 865 and 965 from nosing. At least one handrail to be continuous, at least one handrail will extend 300 beyond top and bottom of stairway.	3.4.6.4
	19.	Guards in exit stairs 920mm on stairs and 1070 on landings, no openings greater than 100mm required at windows and not climbable.	3.4.6.5

SECTION DESCRIPTION			REFERENCE
	20.	Ramps l in 12 (BF)	3.4.6.6 3.8.3.4
	21.	Stairs minimum run 280mm and rise between 125 and 180, rise and run to be uniform.	3.4.6.7
	22.	Doors 300mm from swing to first riser.	3.4.6.10
	23.	Exit doors must swing in direction of exit travel.	3.4.6.11
	24.	Door release hardware needed on all exit doors to exterior if building occupant load exceeds 100.	3.4.6.15
	25.	Emergency access to floor areas is required from stairs in buildings exceeding 6 storeys such that travel up or down to an unlocked door from a locked door is not more than 2 storeys.	3.4.6.17
	26.	Floor numbers required in stairs at latch side of doors to exit stair shafts.	3.4.6.18
Q.	**Vertical Transportation**		
	1.	Elevators and escalators must conform to AEDARSA and CSA B44	3.5.2.1
	2.	Hoistways shall be 2hr FRR separation.	3.5.3.1
	3.	Elevator machine room requires 2hr FRR separation.	3.5.3.3
	4.	All levels shall be served by an elevator which provides access for stretcher 2010x610	3.5.4.1
R.	**Service Facilities**		
	1.	Fuel fired appliances in service rooms require 1hr FRR separation.	3.6.2.1.1)
	2.	Electrical equipment required to be in a service room to be separated by 1hr FRR.	3.6.2.1.6)
	3.	Storage for combustible garbage requires 1hr FRR separation.	3.6.2.5
	4.	Emergency power used for life safety, etc in its own room with 2hr FRR separation.	3.6.2.8
	5.	Vertical service spaces require 1hr FRR separation. Shafts require top and bottom to have same 1hr FRR.	3.6.3.1
	6.	Horizontal service spaces – plenum requirements flame spread rating (FS) 25 and smoke developed classification (SD) 50.	3.6.4.3
	7.	Access to roof by stairs.	3.6.4.7
	8.	Duct materials non-combustible with some exceptions.	3.6.5.1
	9.	Vibration isolation to be non-combustible with some exceptions.	3.6.5.2
	10.	Mechanical review 3.6.5.3 – 3.6.5.8 for compliance.	-
S.	**Barrier Free Design**		
	1.	At least 50% of entrances to building must be BF.	3.8.1.2
	2.	Barrier free path required of minimum 920mm width; if path over 30m in length, width needs to increase to 1500 at intervals no more than 30m.	3.8.1.3

SECTION DESCRIPTION			REFERENCE
	3.	Controls for elevators, switches, etc adjacent to BF path shall be located between 400 and 1200 AFF.	3.8.1.5
	4.	Barrier Free path required to full building except: service rooms, levels not served by elevator or escalator, or residential suites not required to be barrier free.	3.8.2.1.2)
	5.	Designated parking spaces required 1 for first 25 stalls or 2 if over 25 to 50.	3.8.2.2.2)
	6.	All washrooms in a barrier free path shall be barrier free except if in suite less than 500m² and barrier free washroom within 45m. Barrier free stall required at 1 per 10 stalls.	3.8.2.3
	7.	Accessibility signs area required at entrance, washrooms, and designated parking.	3.8.3.1
	8.	Minimum width of doors is 800 in open position, have lever type hardware, and have power activation at entrances if over 500m², force to open door less than 38N for exterior and 22N for interior, require 600 space for door open towards and 300 for door open away, vestibule depth no less than 1200 past door swing.	3.8.3.3
	9.	Ramps: Minimum width 870 between handrails, slope less than 1 in 12, have level areas 1200 long and width of ramp at 9m intervals, 1500x1500 landings at doors.	3.8.3.4
	10.	Elevators to include features of appendix E of CSA B44.	3.8.3.5
	11.	Water closet stalls conform to this article (see also Appendix A and Barrier Free Guide). Also, water closets, lavatories, showers, counters, drinking fountains.	3.8.3.8 3.8.3.9 3.8.3.10 3.8.3.11 3.8.3.13 3.8.3.14 3.8.3.16
T.	**Structural Design**		**Part 4**
		See Section 3.0	
U.	**Environmental Separation**		
	1.	Control of condensation and transfer of heat, air, moisture, and sound.	5.1.1.1
	2.	Structure shall be able to resist environmental loads (structure to review and add as required).	5.1.4.1
	3.	Environmental loads to be determined (mechanical to review and add as necessary).	5.2.1
	4.	Structural loads to be determined (structural to review and add as necessary)	5.2.2
	5.	Required resistance to heat transfer is required (see also Appendix A).	5.3.1
	6.	Air barrier is required (see also Appendix A).	5.4.1
	7.	Vapour barrier is required to resistance to vapour diffusion (see also Appendix A).	5.5.1
	8.	Protection from precipitation is required (see also Appendix A) including	5.6.1

SECTION DESCRIPTION				REFERENCE
		sealing and drainage.		5.6.2
	9.	Sound transmission and protection for residential.		5.9.1
V.	**Heating, Ventilating and Air Conditioning**			**Part 6**
		(Provided by Mechanical)		
W.	**Plumbing Services and Health**			
	1.	Insect screens required in all operable windows.		7.1.5.1
	2.	Floor drains required in laundry rooms, garbage room, in washrooms with urinal with automatic flushing.		7.2.1.4
	3.	Water closet requirements for residential (other than dwelling units)		7.2.2.9
		Number of persons of Each Sex *51-75*	*Minimum Number of Water Closets for Each Sex* *4*	
		Population of main level is 150 – 75 Male and 75 Female		
	4.	Lavatories required at radio of 1 per 2 water closets		7.2.4.1

FINAL Item No. 5

OUTLINE OF ISSUE

Agenda Title: **Dentistry Pharmacy Building Redevelopment – Shell and Core Design Development**

Motion: THAT the GFC Facilities Development Committee approve, under delegated authority from General Faculties Council and on the recommendation of Facilities and Operations, the proposed Dentistry Pharmacy Building Redevelopment – Shell and Core Design Development (as set forth in Attachment 3) as the basis for further design and construction.

Item

Action Requested	☒Approval ☐Recommendation ☐Discussion/Advice ☐Information
Proposed by	Hugh Warren, Executive Director, Operations and Maintenance, Facilities and Operations
Presenters	Hugh Warren, Executive Director, Operations and Maintenance, Facilities and Operations; Len Rodrigues, Senior Principal, Stantec Architecture Ltd
Subject	Dentistry Pharmacy Building Redevelopment – Design Development

Details

Responsibility	Vice President (Facilities and Operations)
The Purpose of the Proposal is (please be specific)	To bring forward as an approval item the Dentistry Pharmacy Building Redevelopment – Design Development.
The Impact of the Proposal is	The renewal and repurposing of an aged facility that currently has limited functionality and high deferred maintenance. The attached 'Report' will provide the bases for the business case required by the Provincial Government to seek funding support for this project.
Replaces/Revises (e.g., policies, resolutions)	N/A
Timeline/Implementation Date	With a pull back on capital funding after Design Development (DD), the project will be placed "on hold." A pause document has been created to capture key constraints and decisions made to DD. The project will be implemented as funding becomes available.
Estimated Cost	N/A
Sources of Funding	N/A
Notes	N/A

Alignment/Compliance

Alignment with Guiding Documents	*Dare to Discover*, *Dare to Deliver*, the Long Range Development Plan (LRDP), Deferred Maintenance Master Plan, and the University of Alberta Comprehensive Institutional Plan (CIP)
Compliance with Legislation, Policy and/or Procedure Relevant to the Proposal (please quote legislation and include identifying section numbers)	1. ***Post-Secondary Learning Act*** **(*PSLA*)**: The *PSLA* gives GFC responsibility, subject to the authority of the Board of Governors, over academic affairs (Section 26(1)) and provides that GFC may make recommendations to the Board of Governors on a building program and related matters (Section 26(1) (o)). Section 18(1) of the *PSLA* give the Board of Governors the authority to make any bylaws "appropriate for the management, government and control of the university buildings and land." Section 19 of the *Act* requires that the Board "consider the recommendations of the general faculties council, if any, on matters of academic import prior to providing for (a) the support and maintenance of the university, (b) the betterment of existing buildings, (c) the construction of any new buildings the board considers necessary for the purposes of the university [and] (d) the furnishing and equipping of the

<table>
<tr><td></td><td>existing and newly erected buildings [.] […]" Section 67(1) of the Act governs the terms under which university land may be leased.

2. GFC Facilities Development Committee (FDC) Terms of Reference – Section 3. Mandate of the Committee: "[…]

2. Delegation of Authority

Notwithstanding anything to the contrary in the terms of reference above, the Board of Governors and General Faculties Council have delegated to the Facilities Development Committee the following powers and authority:

A. Facilities

1. To approve proposed General Space Programmes (Programs) for academic units.

2. (i) To approve proposals concerning the design and use of all new facilities and the repurposing of existing facilities and to routinely report these decisions for information to the Board of Governors.

(ii) In considering such proposals, GFC FDC may provide advice, upon request, to the Provost and Vice-President (Academic), Vice-President (Facilities and Operations), and/or the University Architect (or their respective delegates) on the siting of such facilities. (GFC SEP 29 2003)

B. Other Matters

The Chair of FDC will bring forward to FDC items where the Office of the Provost and Vice-President (Academic) and/or the Office of the Vice-President (Facilities and Operations), in consultation with other units or officers of the University, is seeking the advice of the Committee."

3. UAPPOL Space Management Policy and Space Management Procedure: The respective roles of GFC FDC and the Vice-President (Facilities and Operations) with regard to institutional space management are set out in this Board-approved policy and attendant procedure.

To access this policy suite on line, go to: www.uappol.ualberta.ca .</td></tr>
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Routing (Include meeting dates)

Consultative Route (parties who have seen the proposal and in what capacity)	• Visioning Session 1 - President's Executive Committee-Operations (originally Executive Planning Committee) – May 9, 2012; • Visioning Session 2 - President's Executive Committee-Operations – August 30, 2012; • Enterprise and Advanced Education – September 13, 2012; • GFC Facilities Development Committee – October 25, 2012; • Design Development Presentation - President's Executive Committee-

	Operations – May 2, 2013; • Campus Open Forums (TBD); • Shell and Core Schematic Design - GFC Facilities Development Committee (for discussion) – October 25, 2012
Approval Route (Governance) (including meeting dates)	Shell and Core Schematic Design – GFC Facilities Development Committee (for approval) – November 22, 2012; Shell and Core Design Development - GFC Facilities Development Committee (for approval) – November 28, 2013
Final Approver	GFC Facilities Development Committee (Shell and Core Design Development)

Attachments:

1. Attachment 1 (pages 1 – 2) - Briefing Note
2. Attachment 2 (pages 1 – 32) - University Centre, Volume 1 – Summary – Design Development Report/The Dentistry Pharmacy Building Redevelopment Report (Stantec)
3. Attachment 3 (pages 1 – 457) - University of Alberta, Dentistry Pharmacy Building Redevelopment Volume II - Part 1 (252 pages) and Part 2 (205 pages) - Design Development Report

Prepared by: Hugh Warren, Executive Director, Operations and Maintenance, Facilities and Operations, hugh.warren@ualberta.ca

UNIVERSITY OF ALBERTA Facilities and Operations [redacted]

Dentistry Pharmacy Building Redevelopment - Shell and Core Design Development

Background

With the completion of Edmonton Clinic Health Academy and the move of faculty units to new space, large portions of the Dentistry Pharmacy building have become vacant. This has presented an opportunity to renew and repurpose the full facility. Requests for funding assistance were made to the Government and sufficient funding was obtained to allow the initial phases of the project to proceed. This phase was to be based on a concept of redevelopment design on the basis of a shell and core project development to the design development (DD) phase. The shell and core design project has proceeded in advance of interior programming which will be carried out through the Office of the University Architect during the development of a formal program function.

The original building was constructed in 1922 and wings were added in 1946, 1947, 1951 and 1958 with a combined total gross area of 30,584 square meters. This building has a rich history on our campus with strong architecture, placement and structure. Rather than a historic conservation project, this project has been approached as a renewal and redevelopment of a significant building on campus that the University would define the areas and features of the building that would be brought forward for preservation and as special functional / celebration areas, thus celebrating and recognizing the rich history of this building within the campus fabric.

As preparation for the redevelopment project two visioning session have been held with Presidents Executive Committee – Operations (PEC-O); one on May 9, 2012 and one on June 13, 2012. These sessions were to set steering committee goals and guidelines for the project. The visioning sessions set clear goals for:

1. A Town Hall in support of the workings of a participatory University Community, including the Council Chamber and various conference/meeting rooms – an active face of the University, a symbol of architectural style iconography, both exterior and interior, that reference Age of Reason/Humanism & Liberal Education), repository of memories and history of the institution.
2. The Executive offices to be centrally located and under one roof to effectively deliver academic plan.
3. A Venue to celebrate academic mission, people and excellence – recognition events, exhibitions, symposium opening/closing, plaques and other activities to celebrate the University community, its various programs, discoveries, achievements and laureates – brand development.
4. The Welcome Centre to promote the “present” vibrant institution and for recruitment activities students, faculties and staff as well as supporting on-going retention goals – welcoming spirit, recruitment and retention of students.

5. A Hub for networking and development of social capital: to engage alumni, members of the Board and Senate, government officials, business leaders, donors, visitors and guests who engage actively with the University – relations building, lobbying, networking and fundraising.

The Design Development report was presented PEC-O on May 2, 2013. The development of design for shell and core have taken the project to the following levels of completion:

1. Architectural / Structural / Building Envelope – all interior and exterior building elements have been addressed to the point to allow for shelling of interior floor spaces for future fit out. This also includes design resolution for vertical conveyance, conversion of court yards to interior space, dealing with the Slowpoke, LRT entrance relocation, building code reviews and reconciliations, floor loading to use and exiting requirements.
2. Mechanical - design complete for central utilities, all central systems in place, ventilation distribution to but not on individual floors and perimeter heating and cooling.
3. Electrical – design complete for all central utility, all building central systems in place and distribution to the individual floors (floor panels, raceways, data closets etc.).

Issues

With a pull back on capital funding after Shell and Core Design Development (DD), the project will be placed on hold. A pause document has been created to document key constraints and decisions made to DD. The attached “Dentistry Pharmacy Report” is a summary of the larger Shell and Core Design Development Report.

Recommendation

THAT the GFC Facilities Development Committee approve, the Shell and Core Design Development Report for the repurposing of the Dentistry Pharmacy building as presented.

UNIVERSITY OF ALBERTA

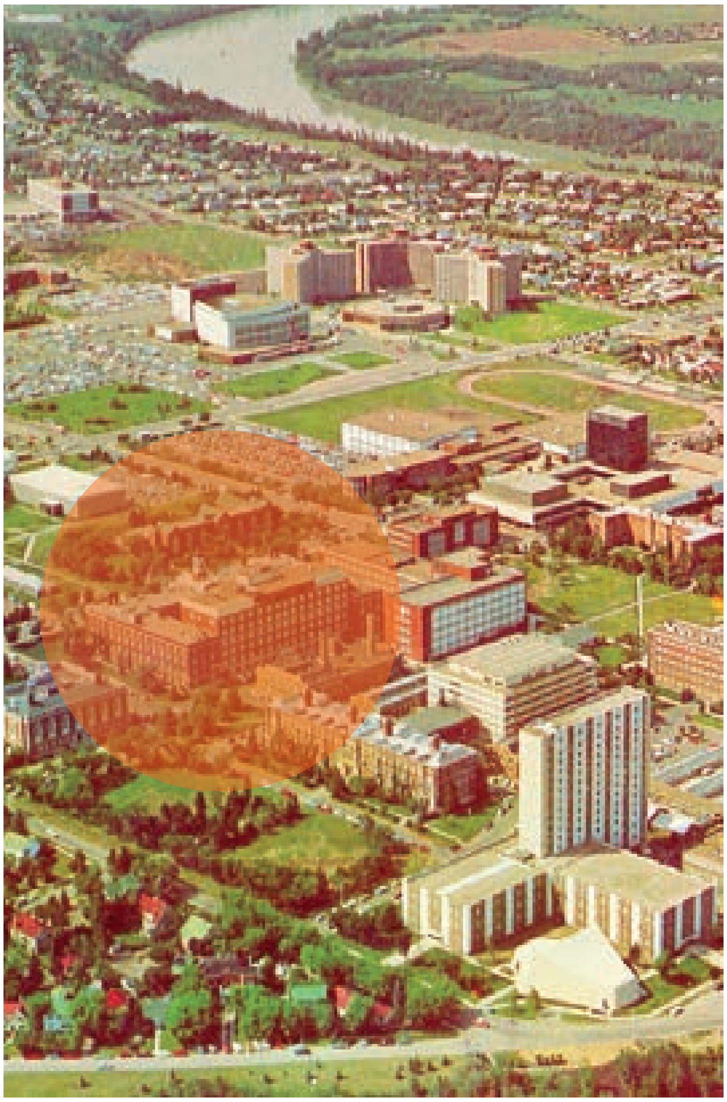
UNIVERSITY CENTRE

VOLUME I - SUMMARY - DESIGN DEVELOPMENT REPORT

THE DENTISTRY PHARMACY BUILDING REDEVELOPMENT

Stantec

INTRODUCTION
TO THE PROBLEM

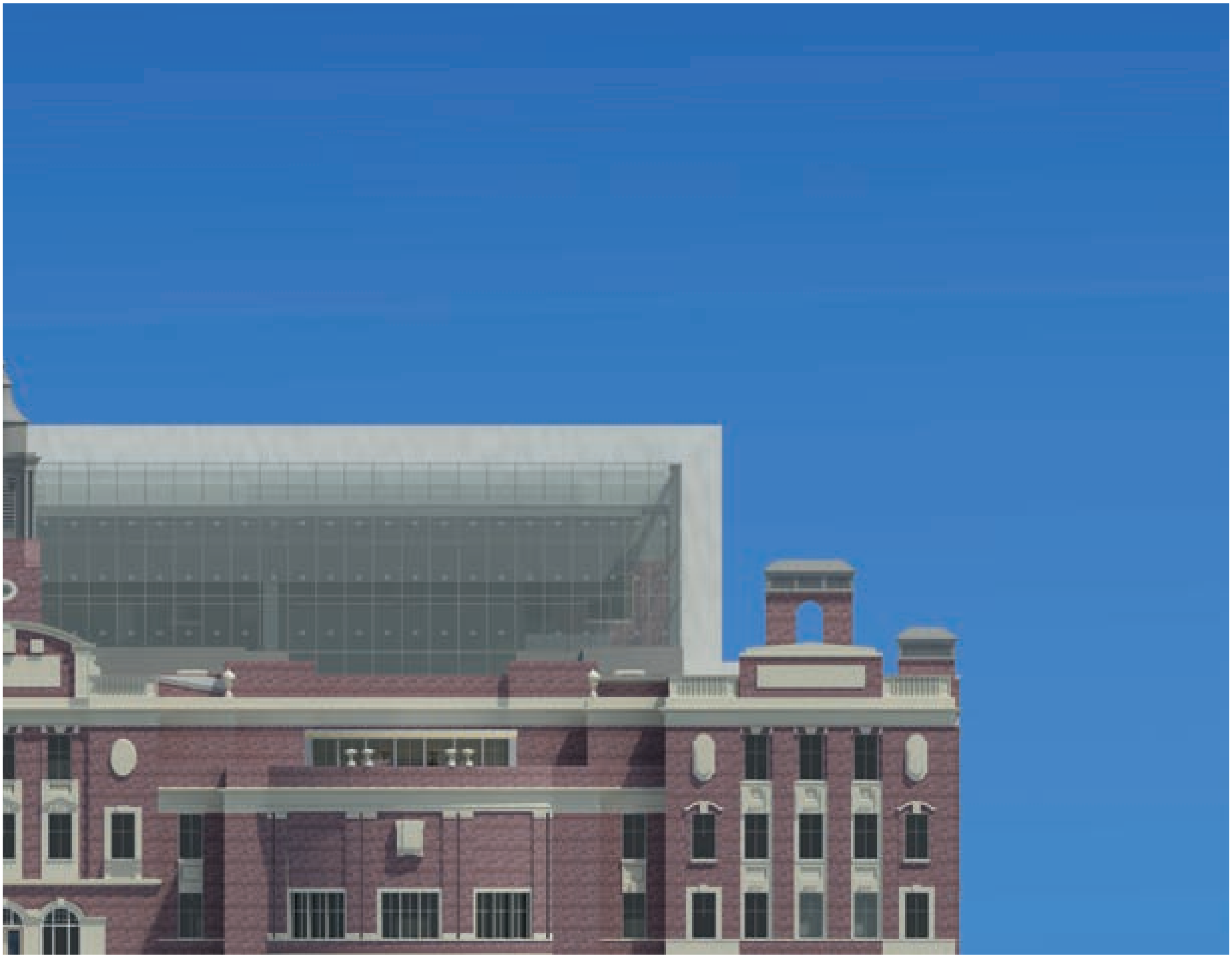


The following narrative is a description of a transformation proposed for a small part of the University of Alberta Campus. It is the result of 15 months of extensive work by a team of planners, architects, engineers, and client representatives. The objectives for this transformation are rooted in the origin of the building itself: a building that was one of the original few of a new and growing university in the Prairies of Western Canada. It is also rooted in the noble sensibilities of the Academy- to learn and to discover. The transformation is based on the idea of telling a number of stories of this history and of the academy and of telling those stories in a way that celebrates the past and looks boldly to the future.

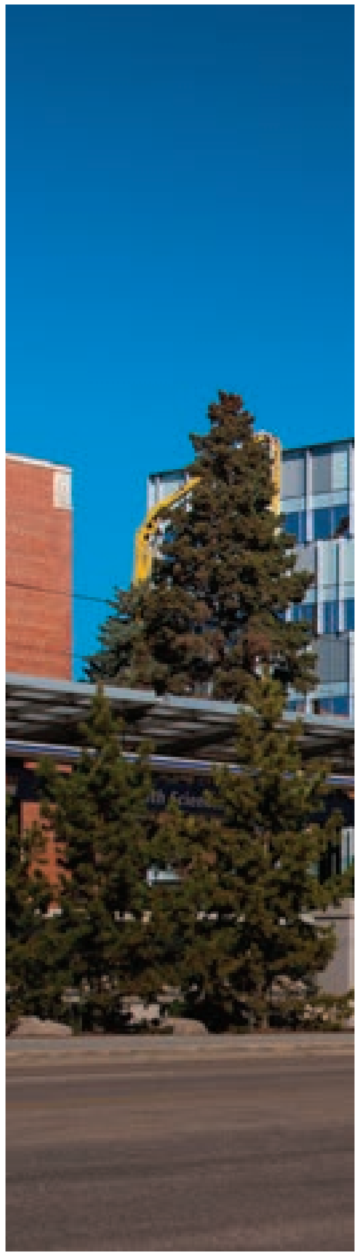
WHAT WE STARTED WITH

What is now known as the Dentistry Pharmacy Building at the University of Alberta is the building that began its life in 1922 as the University's Medical School. The building was designed by Percy Nobbs, then professor of architecture at the School of Architecture at McGill University and the author of the original Campus Master Plan for the University of Alberta commissioned by the University's first president – Dr. Henry Marshal Tory. Nobbs worked with the University's campus architect and Professor of Architecture - Cecil Burgess - who taught architecture in addition to his duties as the campus architect. It is interesting to note that a degree of Bachelor of Science in Architecture was formalized at the University of Alberta in 1931 and continued until Burgess retired in 1940.

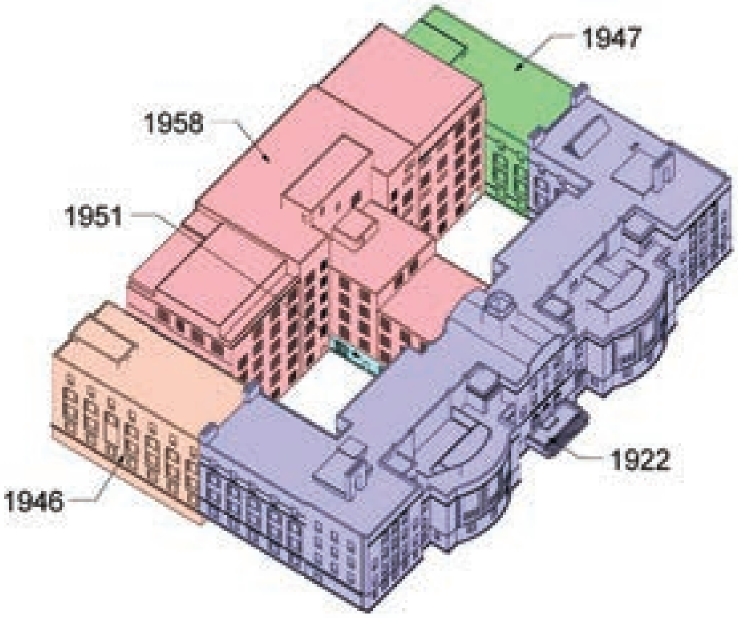
The original 1922 building was added to extensively over the years, having its end wings extended in 1946 and 47 and a partial centre wing added in 1951. A large addition was added to both the centre wing and a new block linking the ends of the 466/47 additions were added in 1958. Finally, in 1976, an underground area was added to house the **SLOWPOKE** (**S**afe **LOW**-**PO**wer **K**ritical **E**xperiment) nuclear research reactor. It was built under the east courtyard. The reactor will be decommissioned in the course of the redevelopment of the DEntistry Pharmacy Building.

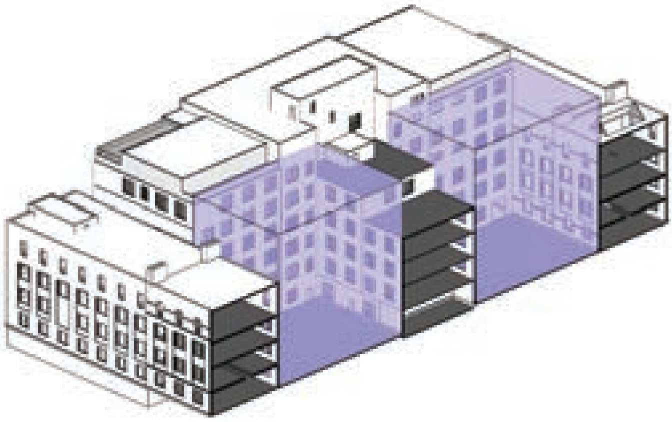


ANTICIPATED CHANGE IN USE

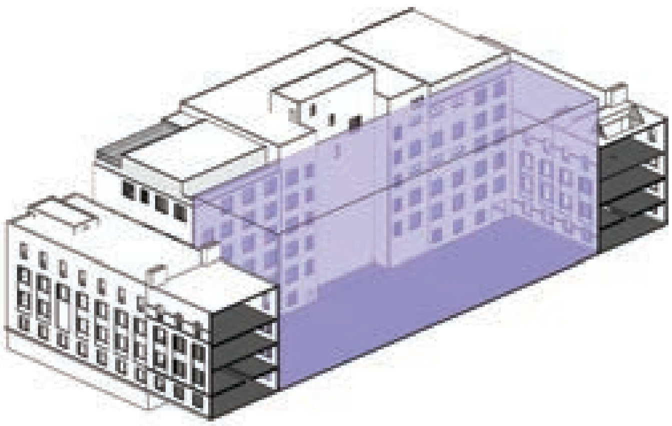


Over the years, the various movements of programs on campus left the building with the dental and pharmaceutical sciences programs and the building became known as the Dentistry Pharmacy Building. The recent opening of the new Edmonton Clinic Health Sciences Academy and the Health Research Innovation Facility meant that much of the occupancy of the Dentistry Pharmacy Building would be relocated to the ECHSA and HRIF leaving the building available for new occupancy.

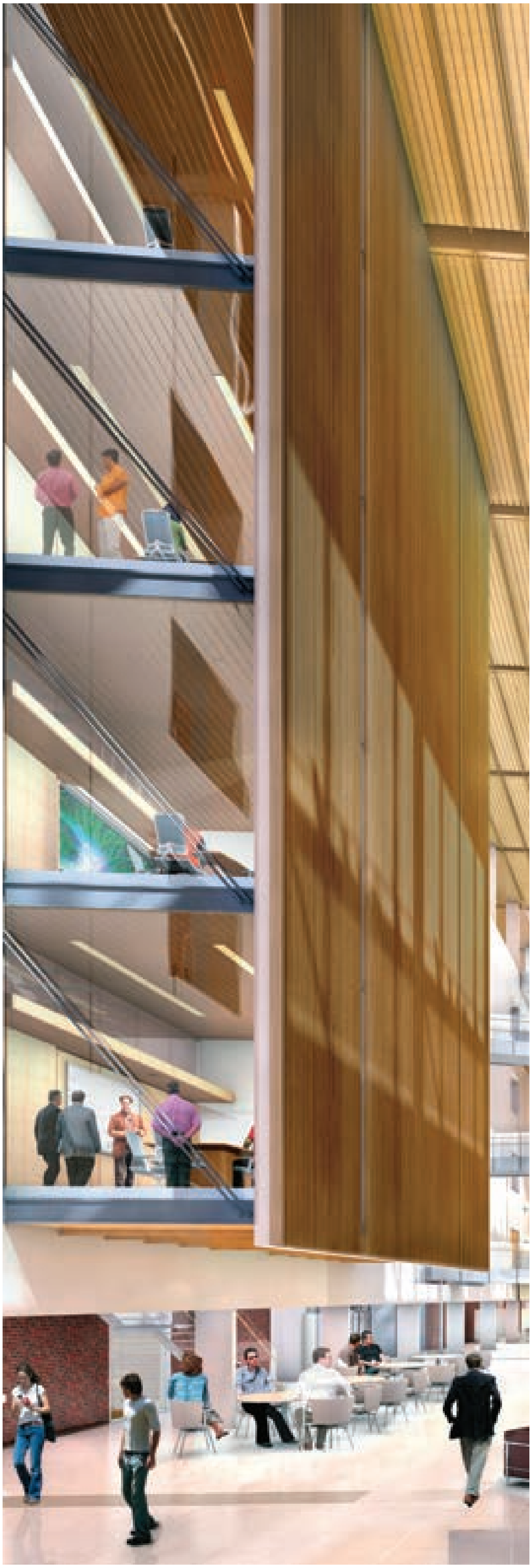




- Had the two courtyards simply been roofed, the west courtyard roof would have been structurally difficult to build and the central link would not be very efficicent.



- With one atrium space, the solution requires building space on teh east side to make up for floor area taken out, but the structure is much easier to build.



Intended Use, Applicability to Sector Plan and Building Configuration

The Dentistry Pharmacy Building Redevelopment is intended to prepare the building for use as the new heart of the University of Alberta – a new University Centre. The general intent is to decant the current users of both the existing University Hall and components of the existing Administration Building into the redeveloped Dentistry Pharmacy Building.

Currently the building has a total of 30,832 Gross Square meters of space. In assessing the development of a building to act as a coherent office building, the immediate issue of enclosing the external courtyards became apparent. There was much debate on how this might be accomplished and what it might ultimately yield as an overall building. Several options were reviewed that began with the idea of roofing the courtyards as two separate atria clerestory lights. This is easily accomplished in the east courtyard, but extremely difficult for the west due to the **SLOWPOKE** reactor location and the additional basement area that makes creating a new foundation for the roof quite difficult.

The design team examined possible solutions to the structural issues the western courtyard presented. Any roof that might be developed for the courtyards must be structurally independent of all existing buildings due to limitations to structural capacity and shear resistance. It became increasingly apparent that the only practical solution was an entirely independent single structure that would result in one roof. Retaining the middle wing did not provide any benefit for the continuity of that structure, so the space removed by its demolition would be "made up for" in the reconfiguration of the building with the new interior space the roof creates.

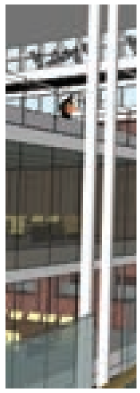
These intentions preserve most of the existing building of all construction periods whereas the current version of the Sector Plan anticipates demolition of everything except for the 1922 Wing. With thate xception, we see no conflict with the Sector plan as currently stated.

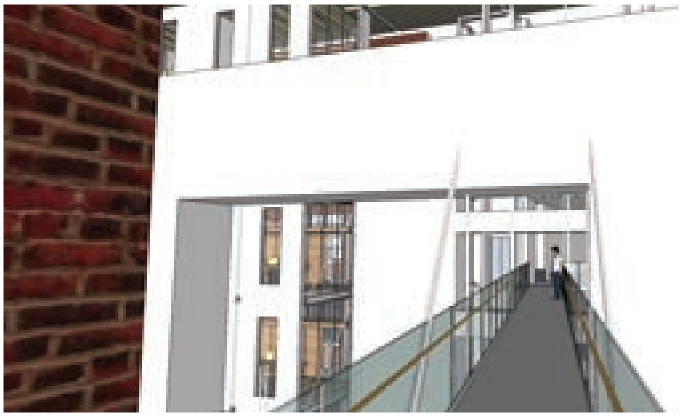
APPROACH TO THE SOLUTION

The necessary independence of the new structure means we would be placing a new “box” within the long rectangular existing “box” of open space created by the removal of the central wing and the consolidation of the existing open courts. That structure is designed to carry the new roof, the clerestory glass, additional floor space and any circulation elements – both horizontal and vertical - we add. It would have to do so without depending upon any existing structure with the exception of the foundation of the central wing. It also allows air from the atrium to return to the fan systems that are placed on the existing 7th floor which will have its building envelope entirely rebuilt.

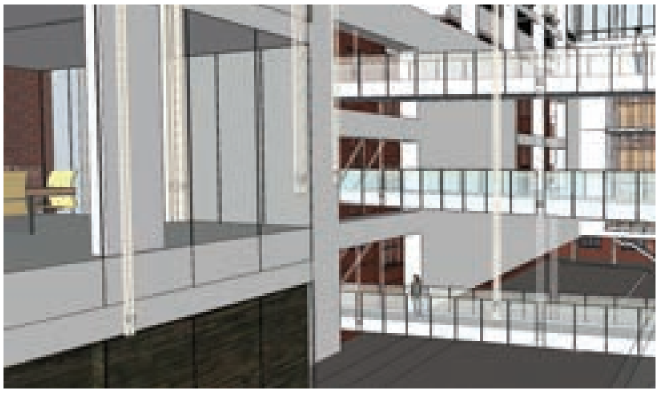
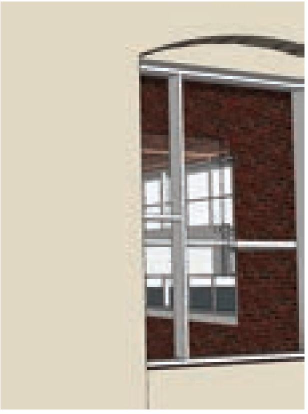
A considerable amount of thought has resulted in a fusion of structures – old and new. More information on the technical features of the solution may be found in **Volume II, Sections 3 through 10.**

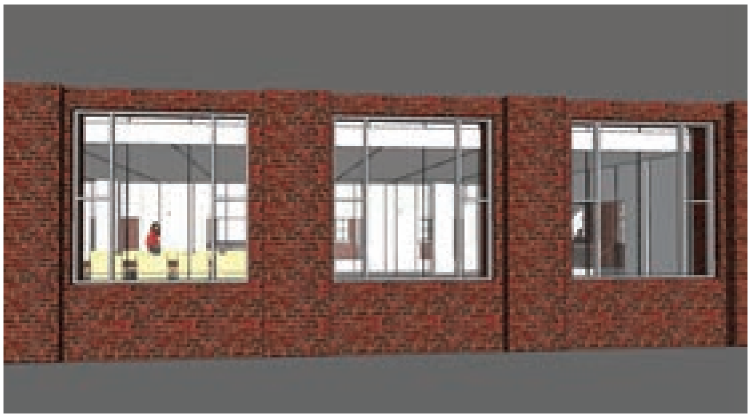
The manner in which we would fuse these two pieces: the old buildings, the new interior and the necessary transition between the two afforded a unique opportunity to make this building represent the **whole experience of the University** to both the public and the University Community. We explored this possibility through programming the building’s internal and external “performance” as a series of “stories” told from different points of view.

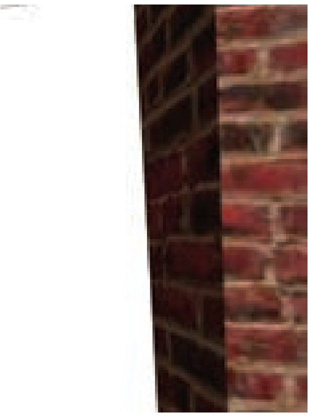




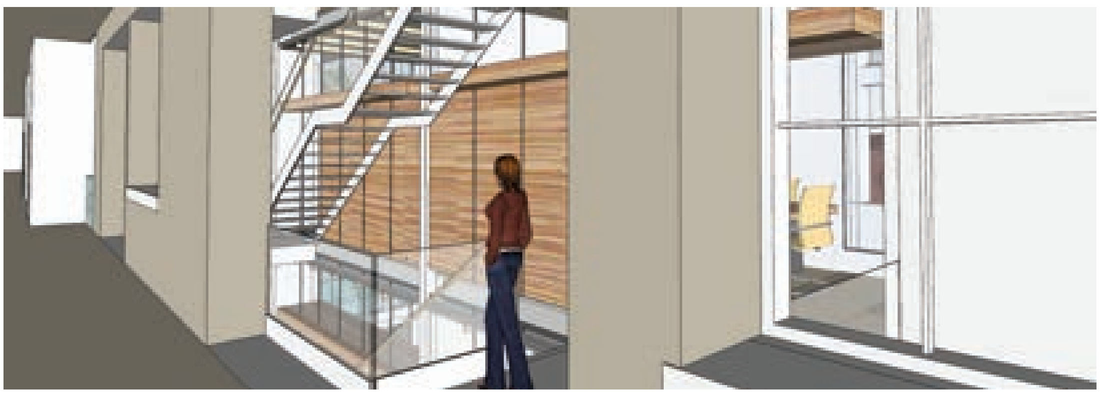


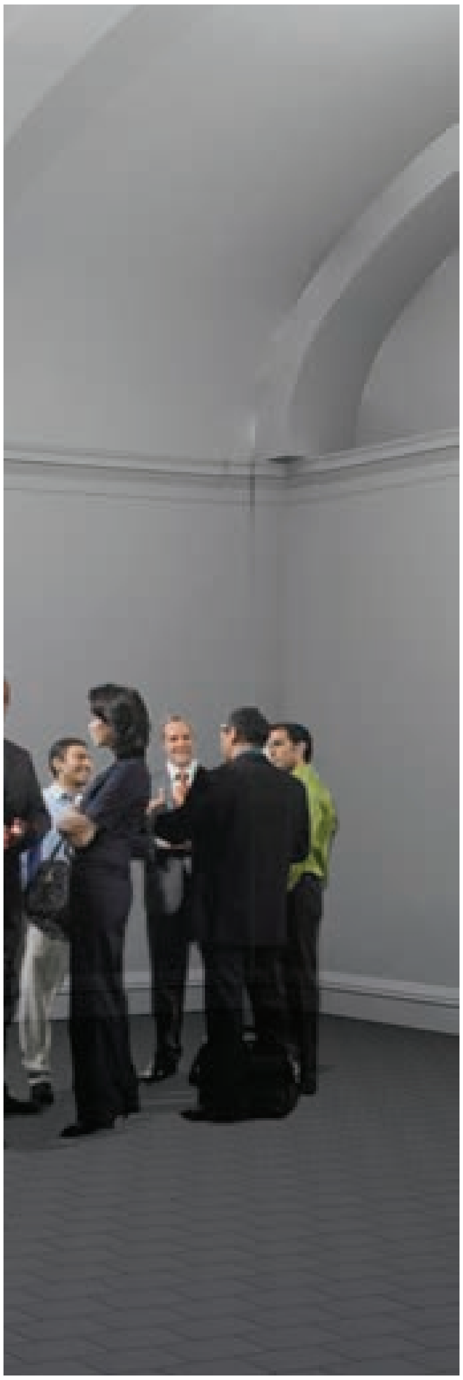







STORIES

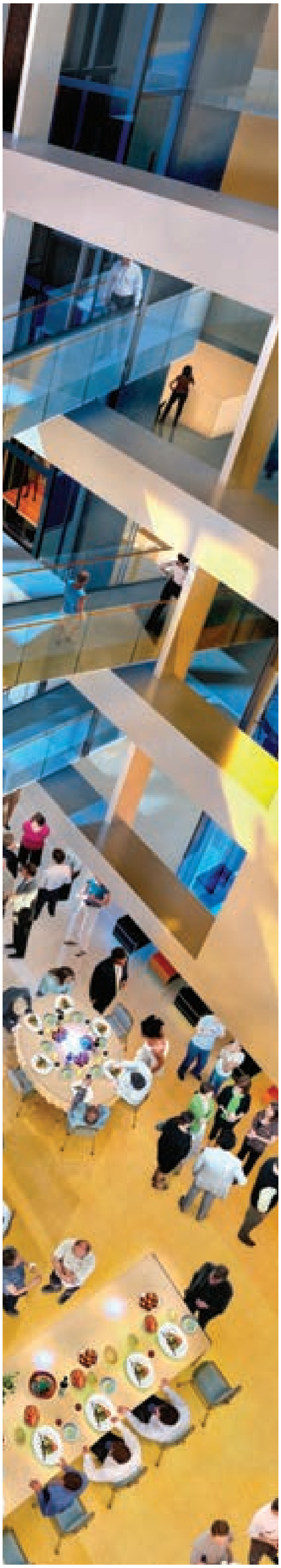


The new University Centre will serve many purposes. To understand how the design should respond to these purposes, we developed several stories based on a theme of recruitment from several points of view: the public, faculty, administration and visiting academics. We further developed and elaborated six stories, but there can be many more. For the purposes of this narrative, we will concentrate on two to illustrate the possible diversity of the building's design response.

The Academy

Let us first look at the celebration of the Academy – its deep traditions of scholarship, learning, exploration and discovery. The building will need to reflect the dignity of this tradition in some events and with many visitors that come to the institution representing their involvement in the academic affairs of this or another University. The path that one might create to – say – visit the President of the University of Alberta as a dignitary from another institution might find you brought to the south court and walking up the stairs to the 1922 building into the lobby with the character of its original design. You could be brought up a floor to the classical reading room to discuss issues of mutual interest with the President and then invited to see the 21st century University of Alberta. You leave the reading room and move to one of several transitionary spaces where the time of the place is transformed from the tradition that the older building is steeped in, to an utterly modern place that speaks to a bold and innovative future – full of daylight, movement and discovery.

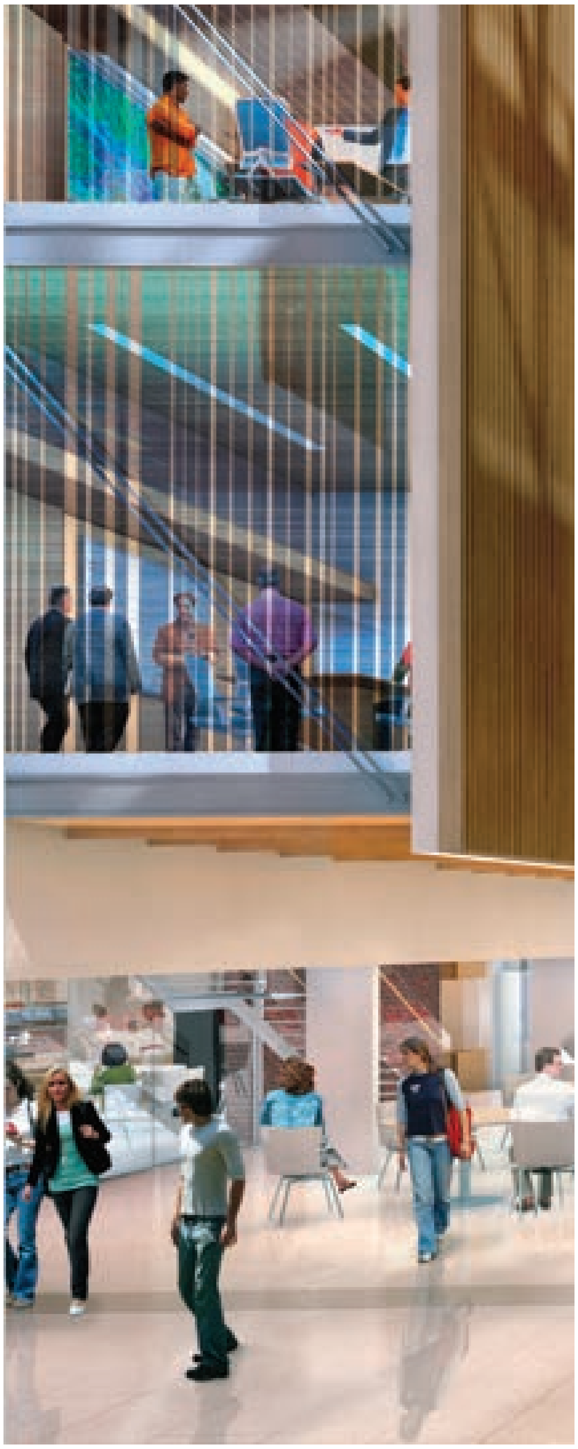
We cross the long ramping bridge and find ourselves in the upper level court plaza where we meet the Deans of most of the faculties and discuss research collaboration and exchanges. This gathering is separate from the activities happening one level below, yet is a part of it. As the assembly dwindles in numbers, you are invited to the President's office and take the glazed elevator up to the 6th level. Soon you are having coffee with the President in the winter garden with the evening light fading and the interior lighting giving the entire atrium and its adjacent spaces an early evening glow before you say your farewells and head to the airport for a flight home.

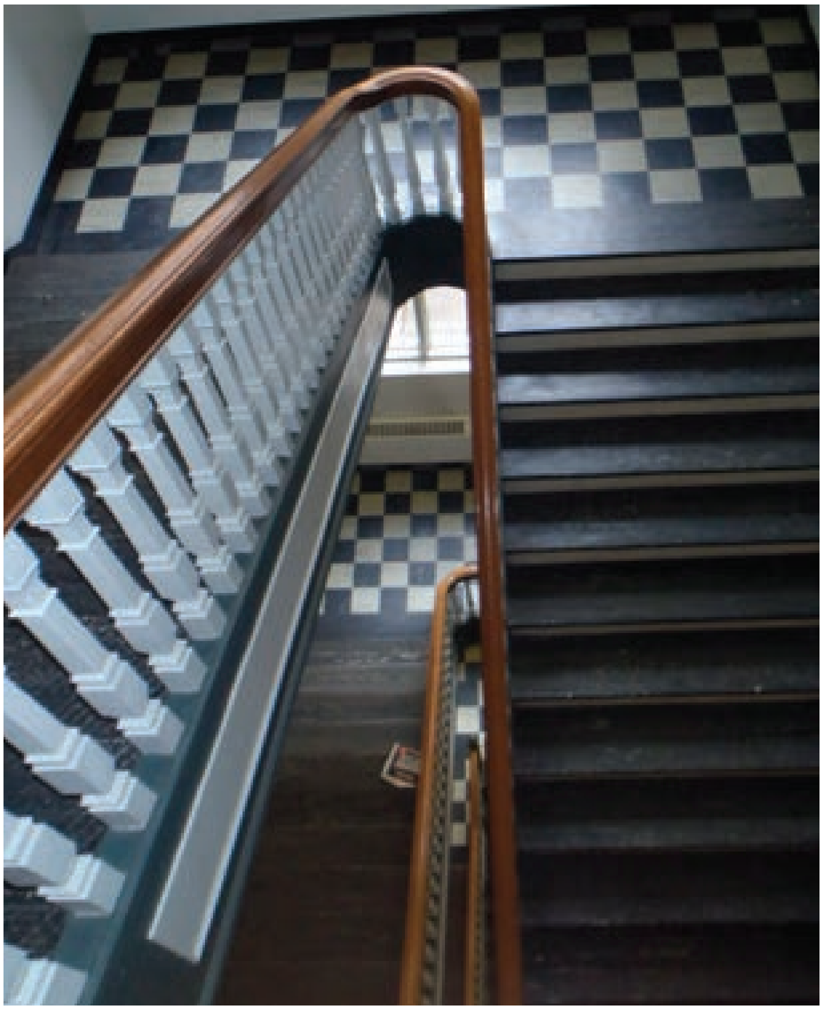


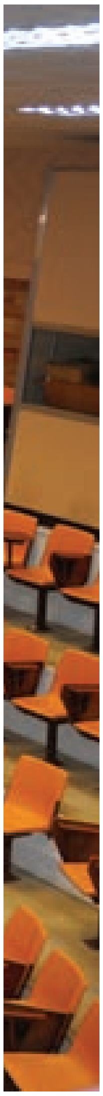

The Informal

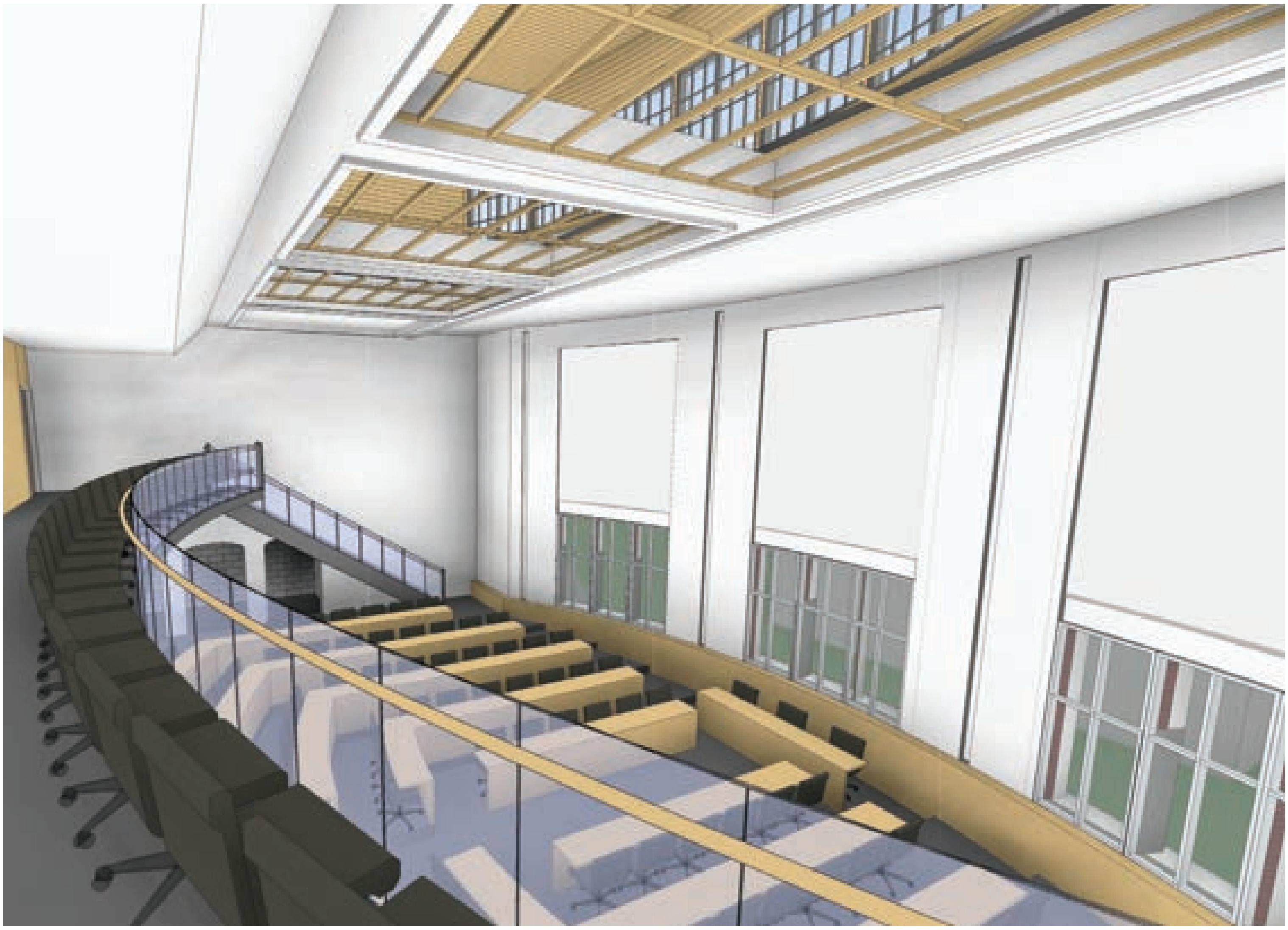
As a parent, you wanted to talk to the Registrar of the University about the procedures to register your eldest child for their freshman year. You decided to take the LRT and arrived at the University station following the signs for University Centre – which is the location of the Registrar's office. You approach the stair and as you ascend, you can see University Centre's historic central doorway. You emerge from the glass pavilion to face the entry doors.   Many people are heading toward the lower sets of doors to the right and left of the stairway to the old building. Following that crowd, you come into the 1922 building and move through a doorway toward an opening beyond. As you do so, you notice the specially lit room to your right that has exhibits of old photography and artifacts of the campus from its beginnings in 1908. From there you move further toward the bright daylight interior and you emerge into the seven storey atrium. The signage is clear and you move off to the welcome center and join the students and personnel from the Registrar's office.

Shortly after being attended to, you and your son have your questions answered and one of the Registrar's volunteer attendants invites you and your son to join her for coffee to help answer a few other questions that your son has about the adventure he is about to embark upon. The café is a short distance away and as the attendant answers your son's questions, you can see the Fall Term startup activities animating the entire building from your vantage point in the lower part of the atrium. You feel your son has made the right decision and this institution will give him a high quality education leading him to do great things in his life and perhaps even change the world.







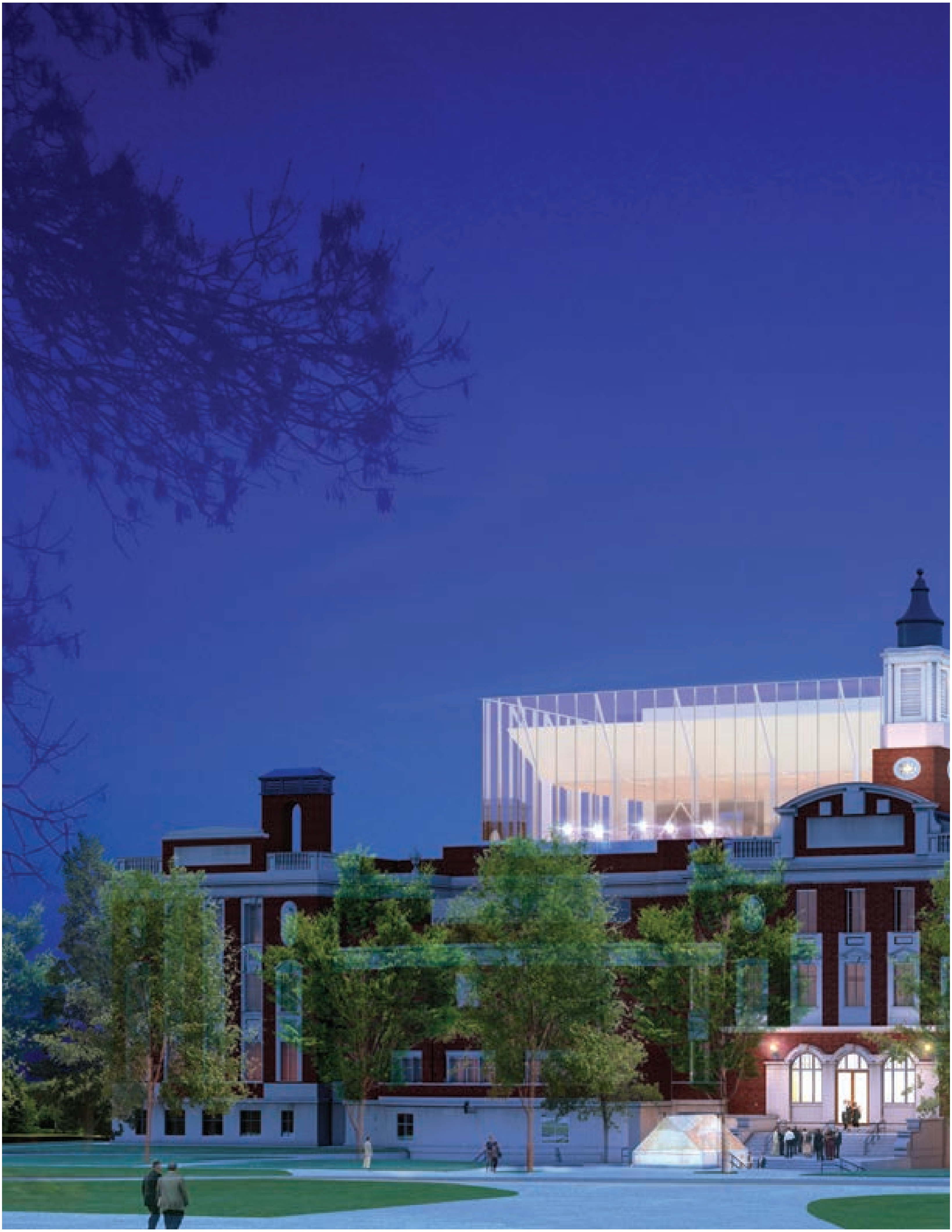


THE ORIGINAL PIECES

The treatment of the original buildings will be as follows:

- 1922 Original Medical School will be largely restored. The restoration involves:
  - The corridors
  - The reading room on level 2
  - The reconfiguration of the lecture theatres
  - Restoring the clerestory lighting and horizontal grid at both lecture theatres
  - Restoration of the stairs to its original slate steps and landings.
  - Replacement of all external windows with aluminum double glazed units in white and to the original window fenestration.
  - New windows double glazed for sound isolation for that portion of the 1`922 original that opens to the "Transition" Spaces and Atrium

Refer to **Section 2 of the Design Development Report Volume II** to explore the approach to the existing load bearing masonry envelope as well as roofing.

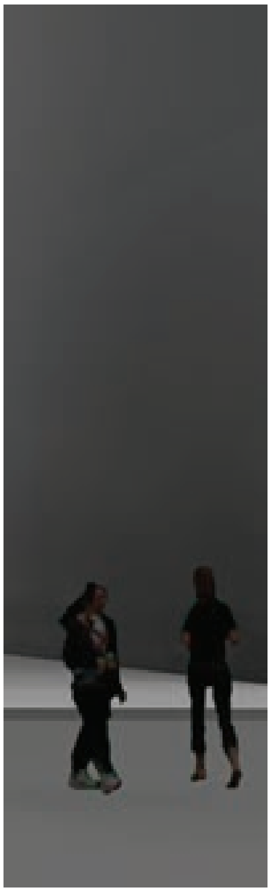


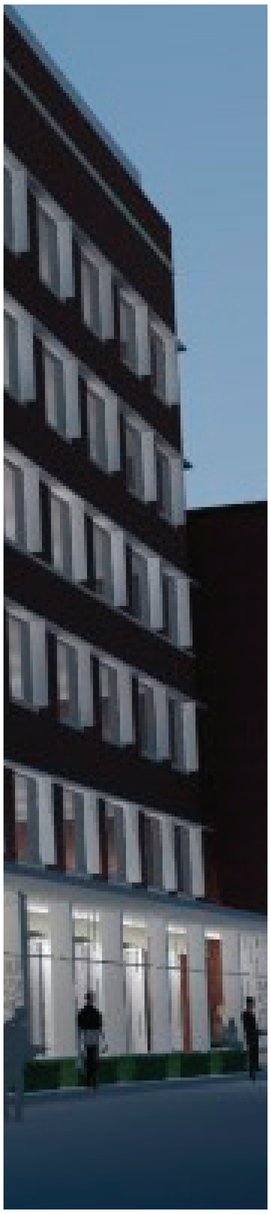
- 1946/1947 Buildings
  - Gutted internally
  - New circulation corridors will be in the inside edge of both the 1946 and 1947 buildings
  - Windows into the transition spaces will be removed and new frames developed
  - Some Windows at the atrium level may be opened to the floor level of the atrium to integrate the circulation

Refer to Section 2 of the Design Development Report Volume II to explore the approach to the existing load bearing masonry envelope as well as other envelope components.


SIGNAGE


SIGNAGE





- 1958 Block
  - Gutted internally
  - New circulation corridor against the south wall
  - Windows into the transition spaces and atrium will be removed and new frames developed
  - All of the windows at the atrium level will either be opened to the ground or the brick wall demolished and floor to ceiling glazing installed. This will definitely be done in the two areas leading from the atrium to the north exits.

FLOOR PLANS

Areas documented here indicate available program space, building circulation and services. The program spaces have not yet been allocated to specific user groups. The "Weather Map" space management tool is being used by the Campus Planners to make the final determination of tenancy.

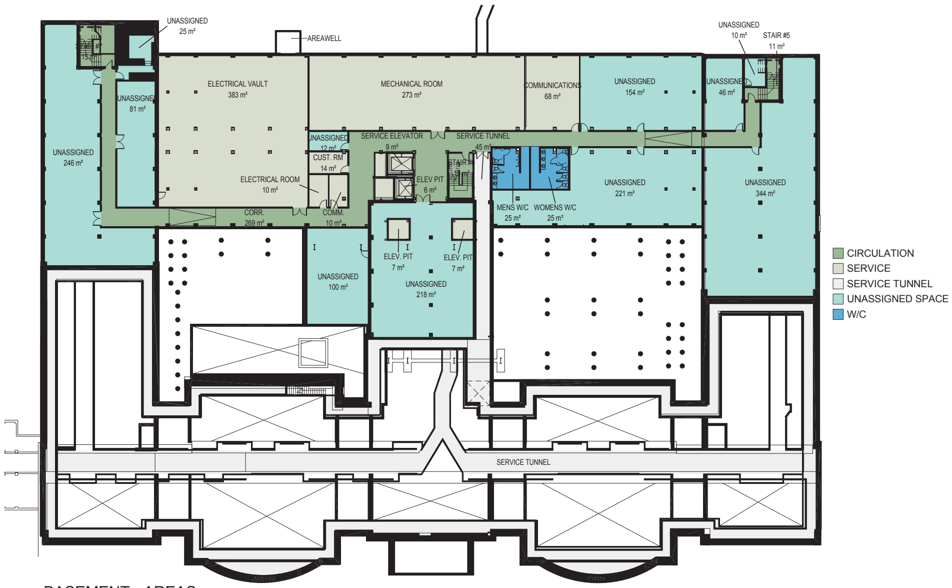
BASEMENT

Program Area
1606.6 m²

Subtotal Service Area
1251.4 m²

Subtotal Floor Area
2858 m²

GFA
3148.14 m²



BASEMENT - AREAS

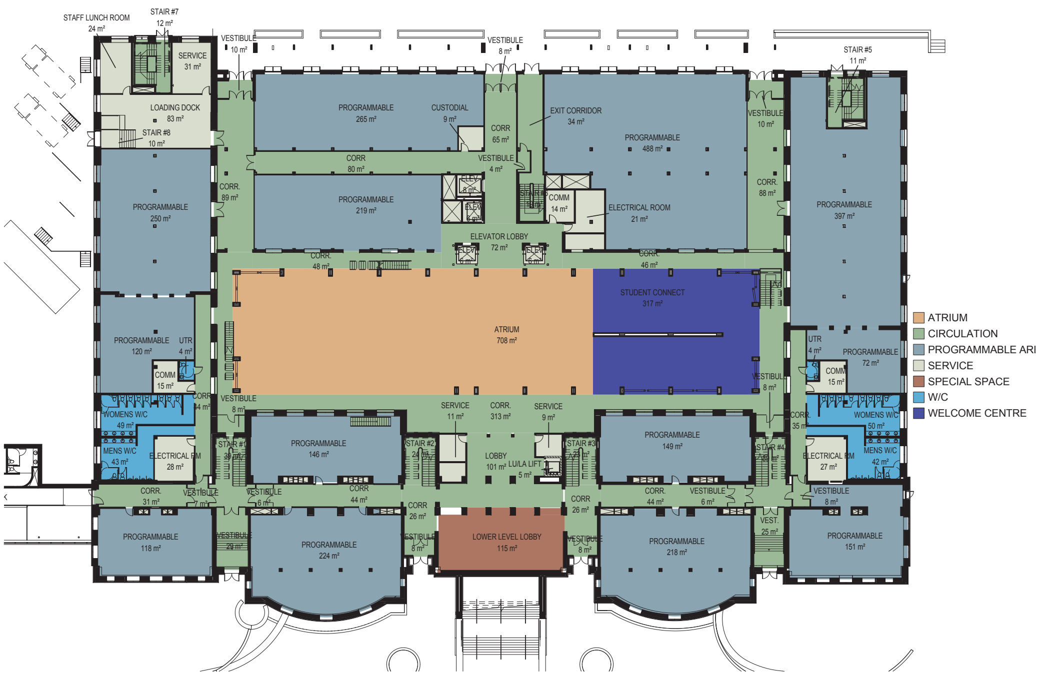
LEVEL 1

Program Area
3132.2 m²

Subtotal Service Area
2952.8 m²

Subtotal Floor Area
6085 m²

GFA
6693.56 m²



LEVEL 2

Program Area
3680.1 m²

Subtotal Service Area
1464.9 m²

Subtotal Floor Area
5145 m²

GFA
5735.14 m²

LEVEL 3

Program Area
3391.1 m²

Subtotal Service Area
1319 m²

Subtotal Floor Area
4710.1 m²

GFA
5200.81 m²

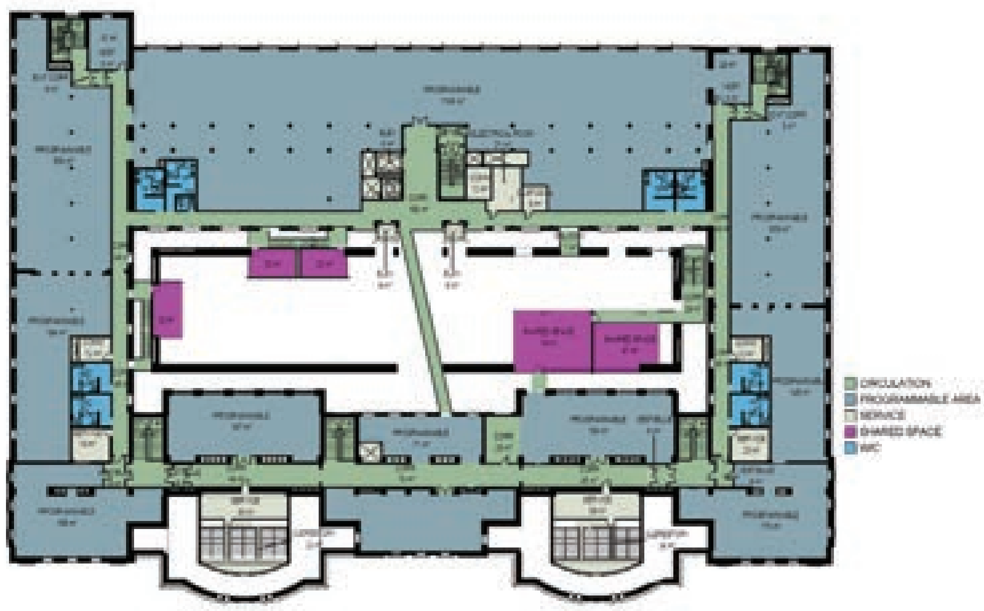
LEVEL 4

Program Area
3205.1 m²

Subtotal Service Area
1371 m²

Subtotal Floor Area
4576.1 m²

GFA
5157.69 m²



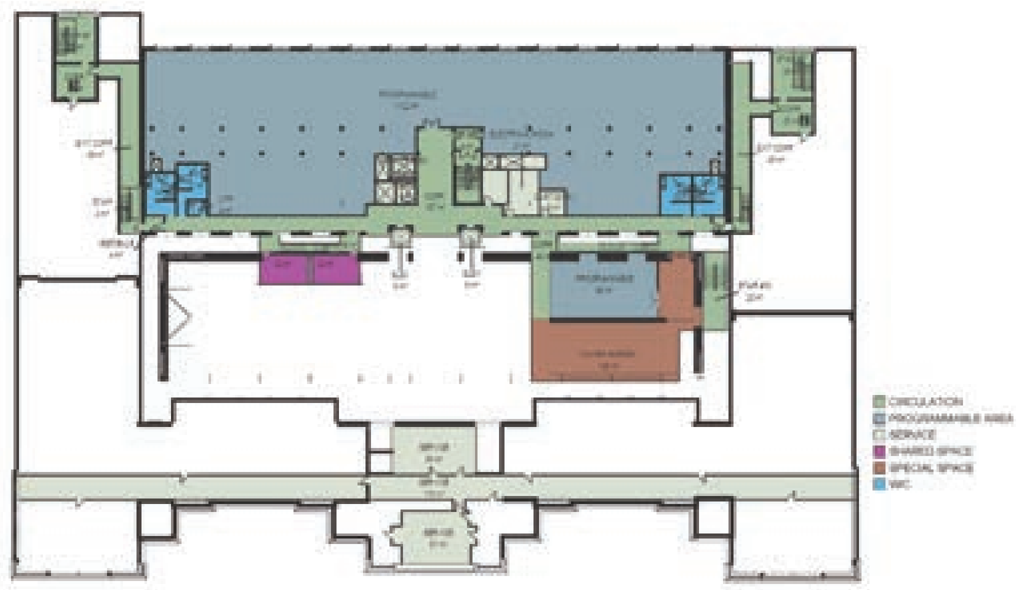
LEVEL 5

Program Area
1418 m²

Subtotal Service Area
1088.3 m²

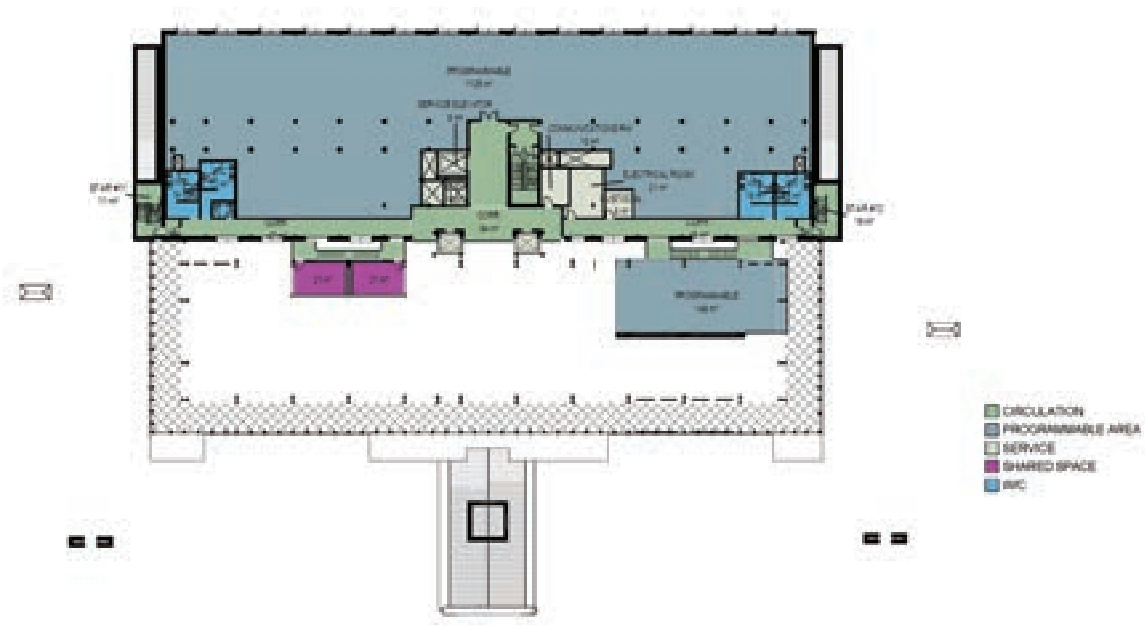
Subtotal Floor Area
2506.3 m²

GFA
2780.9 m²



AREA SUMMARY

Total Program Area	Total Service Area	Total Floor Area	Total GFA	GROSS TO NET
17747.1 m^2	11363.6 m^2	29110.7 m^2	32179.7 m^2	1.81



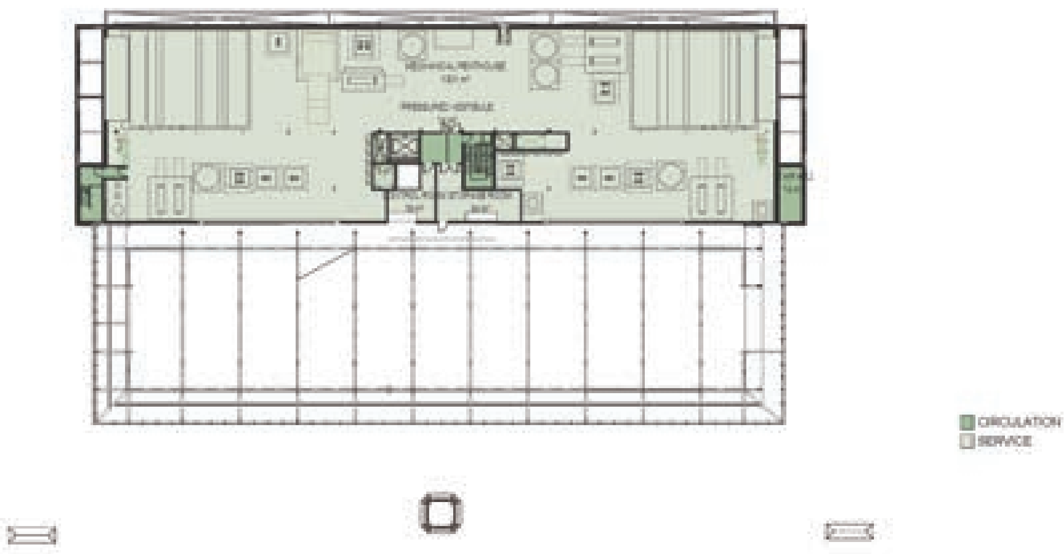
LEVEL 6

Program Area
1314 m^2

Subtotal Service Area
462 m^2

Subtotal Floor Area
1776 m^2

GFA
1934.98 m^2



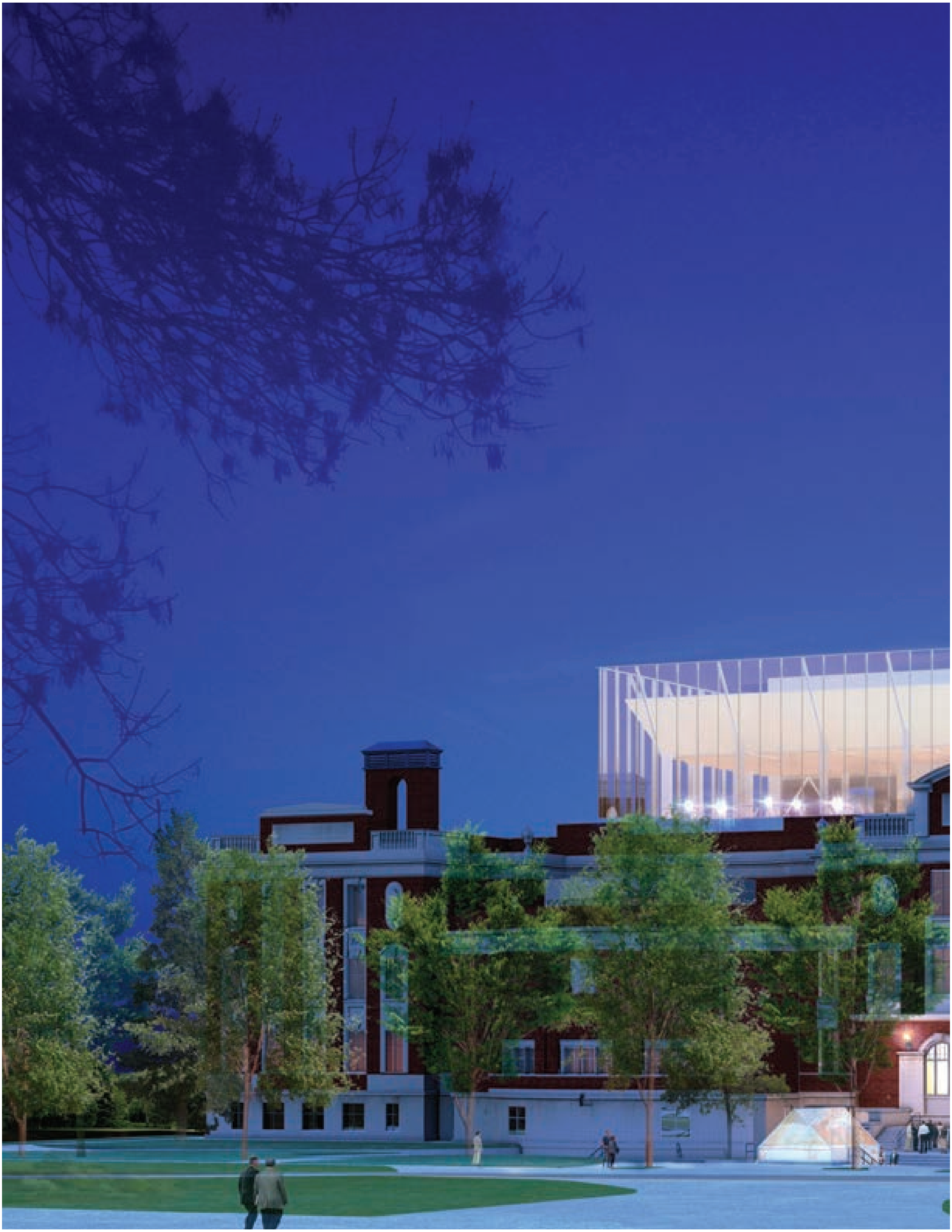
LEVEL 7

Program Area
0 m^2

Subtotal Service Area
1454.2 m^2

Subtotal Floor Area
1454.2 m^2

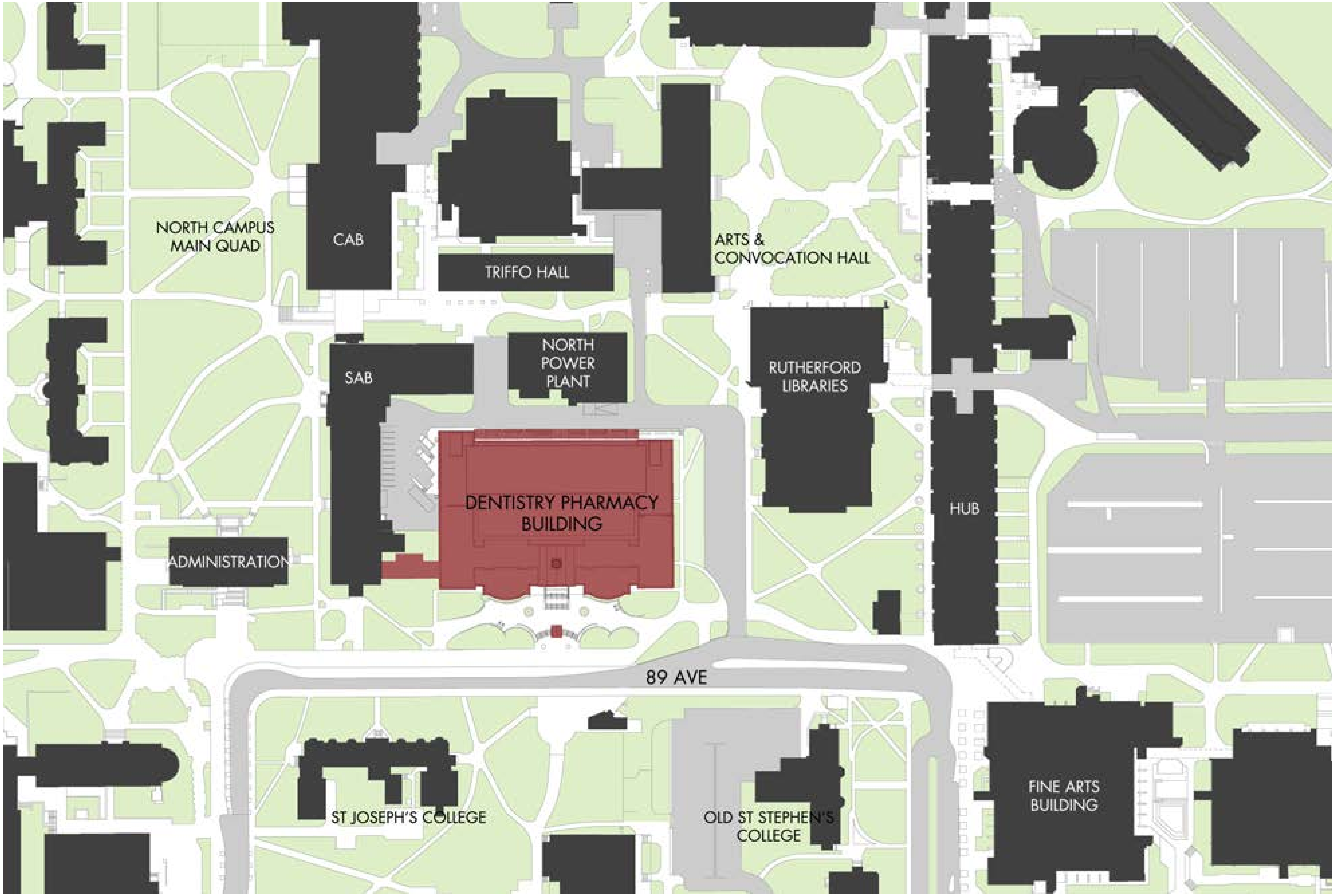
GFA
1528.45 m^2



Attachment 3

UNIVERSITY OF ALBERTA
DENTISTRY PHARMACY BUILDING REDEVELOPMENT
Volume II - Part I
Design Development Report

November 13, 2013


NORTH CAMPUS
MAIN QUAD
CAB
TRIFFO HALL
ARTS &
CONVOCATION HALL
SAB
NORTH
POWER
PLANT
RUTHERFORD
LIBRARIES
DENTISTRY PHARMACY
BUILDING
HUB
ADMINISTRATION
89 AVE
ST JOSEPH'S COLLEGE
OLD ST STEPHEN'S
COLLEGE
FINE ARTS
BUILDING

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Corrie Geertsen
Project Coordinator

University of Alberta Steering Committee

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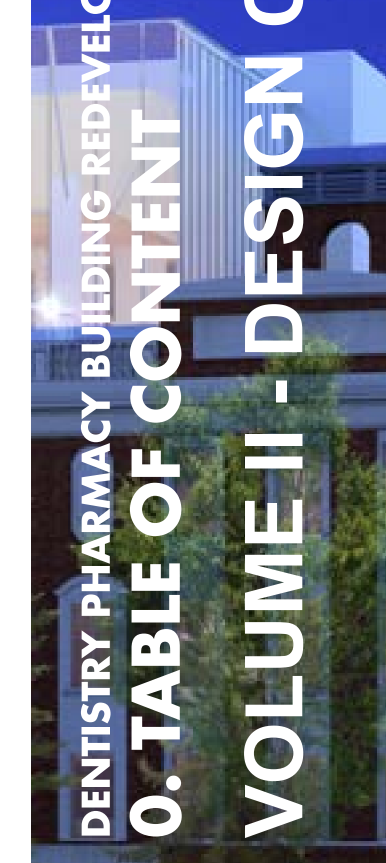
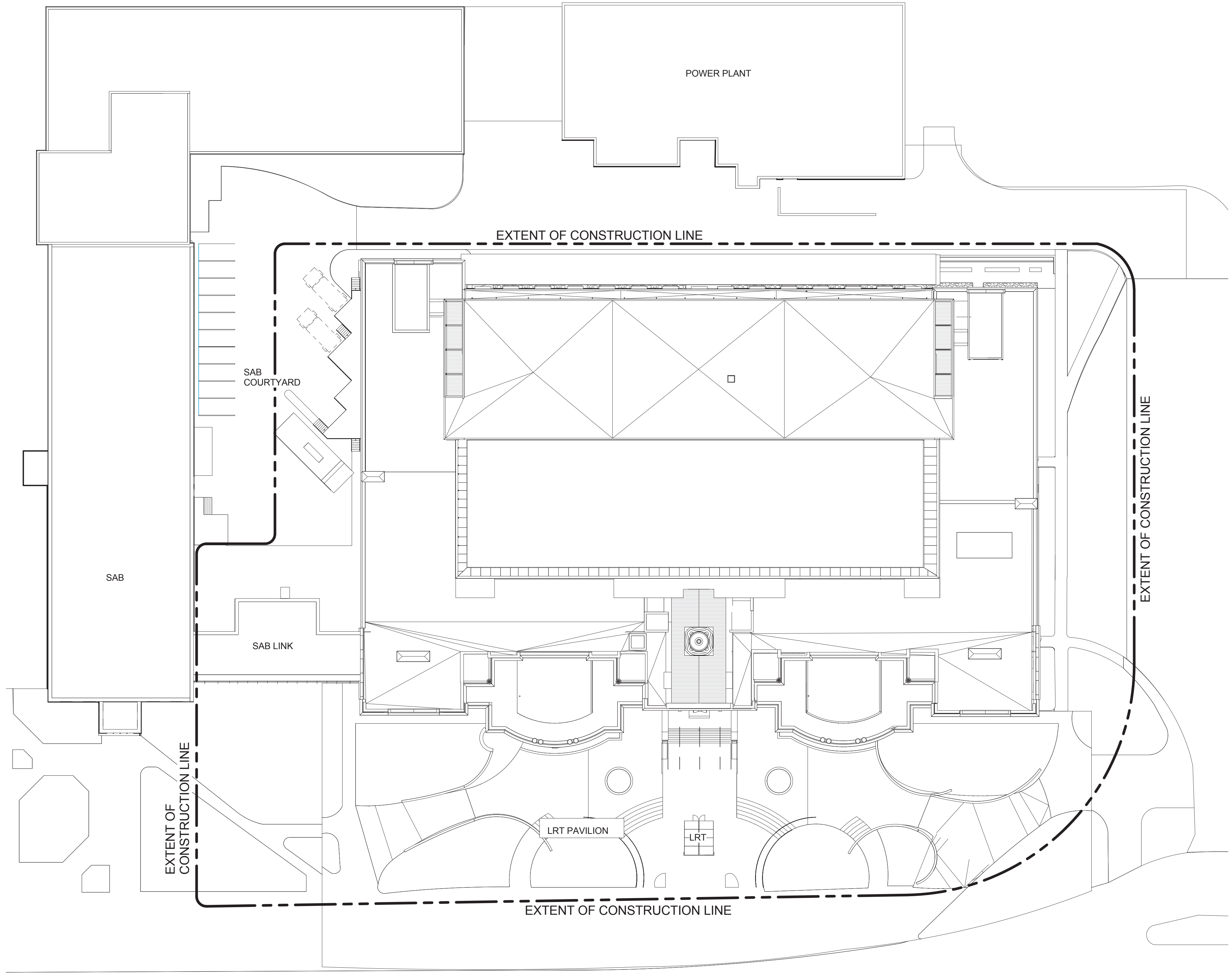
Aflab Jessa

Clover Point Canada
Weathermap and Augmented Reality Consultant
Karl Swannie

SECTION





Stantec
Architecture Ltd.

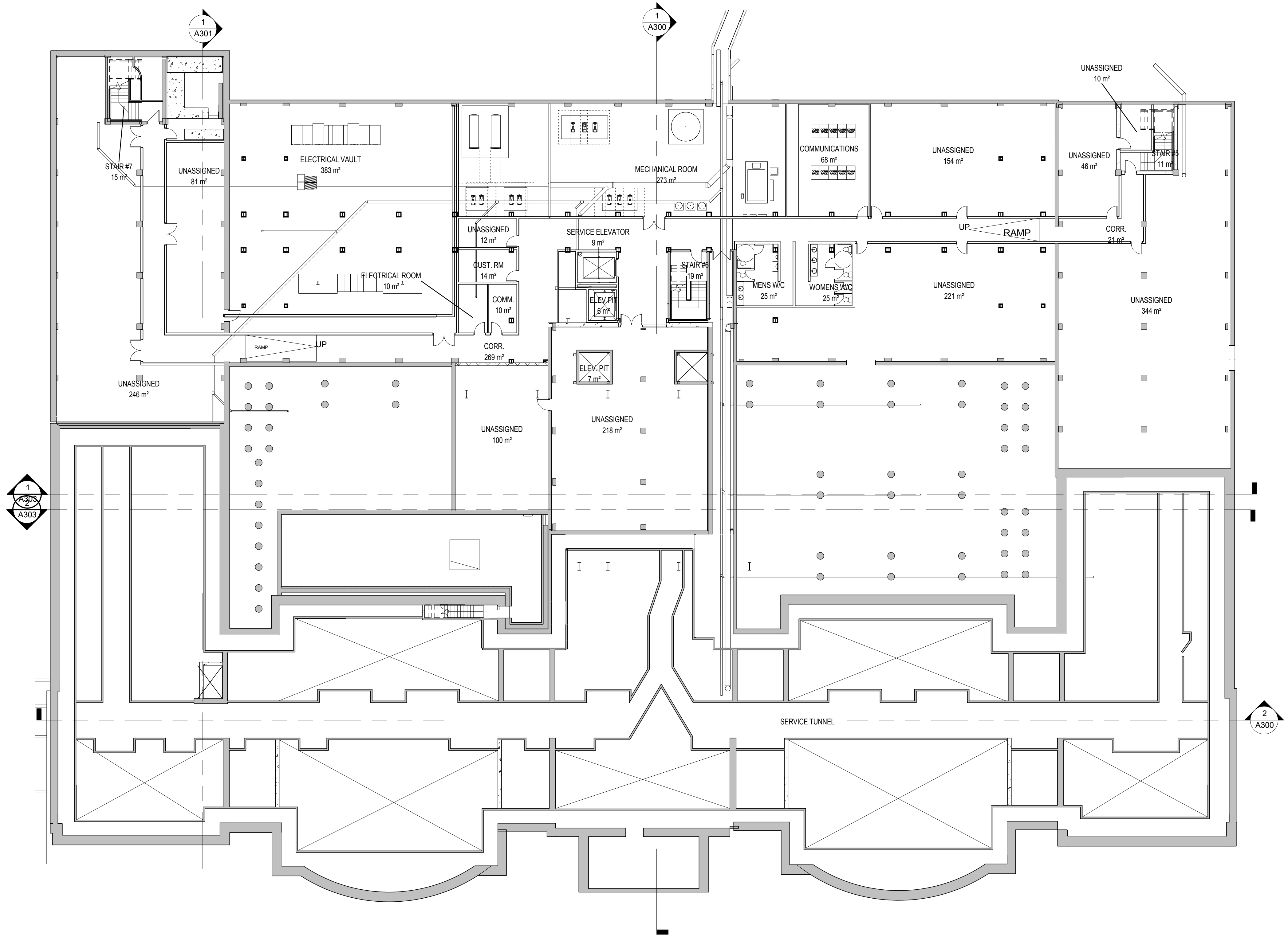
UNIVERSITY OF
ALBERTA

DENTISTRY PHARMACY BUILDING REDEVELOPMENT

0. CORE DRAWINGS

Site Plan

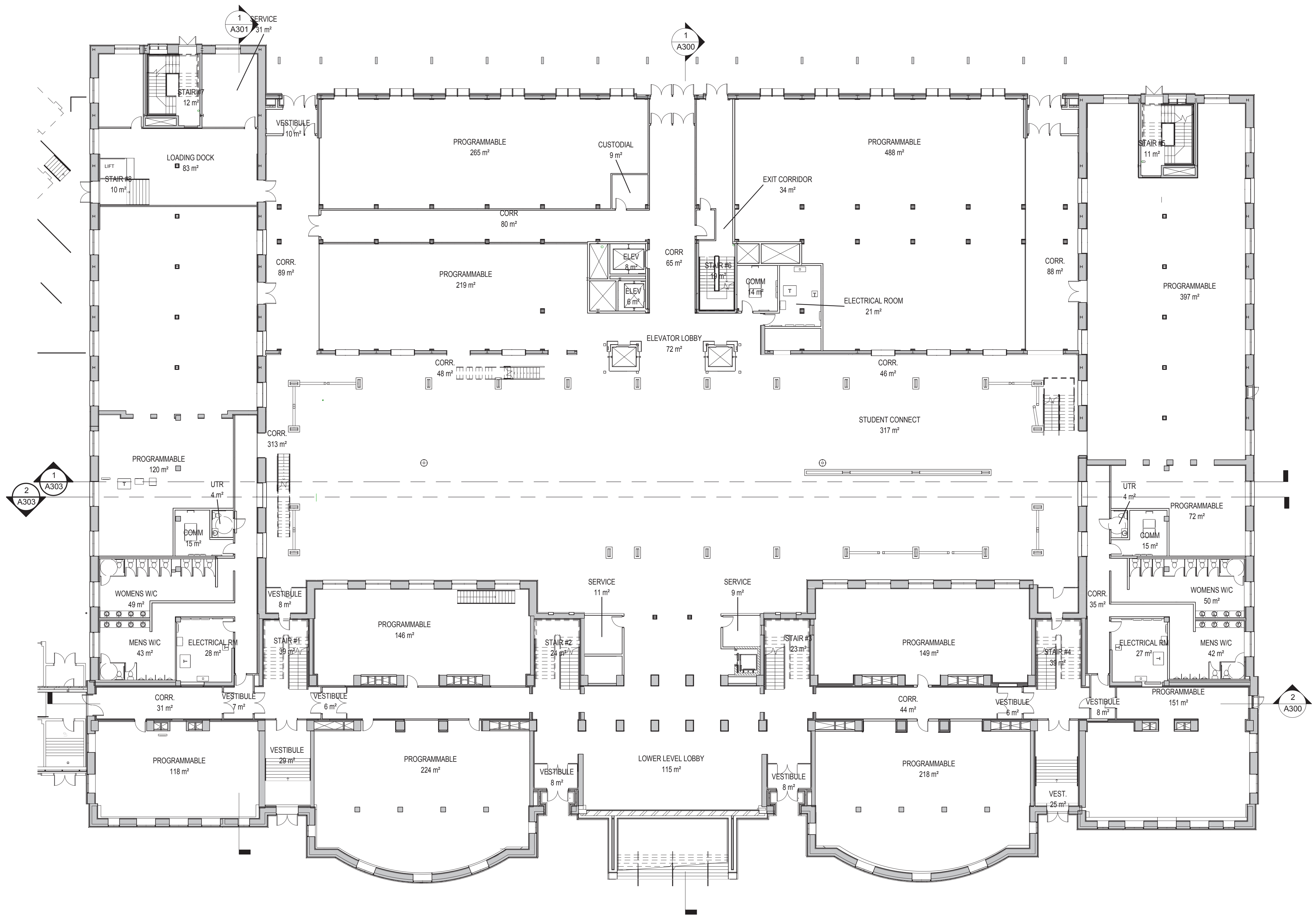
A.000



A.100 Basement

Stantec Architecture Ltd.

UNIVERSITY OF ALBERTA

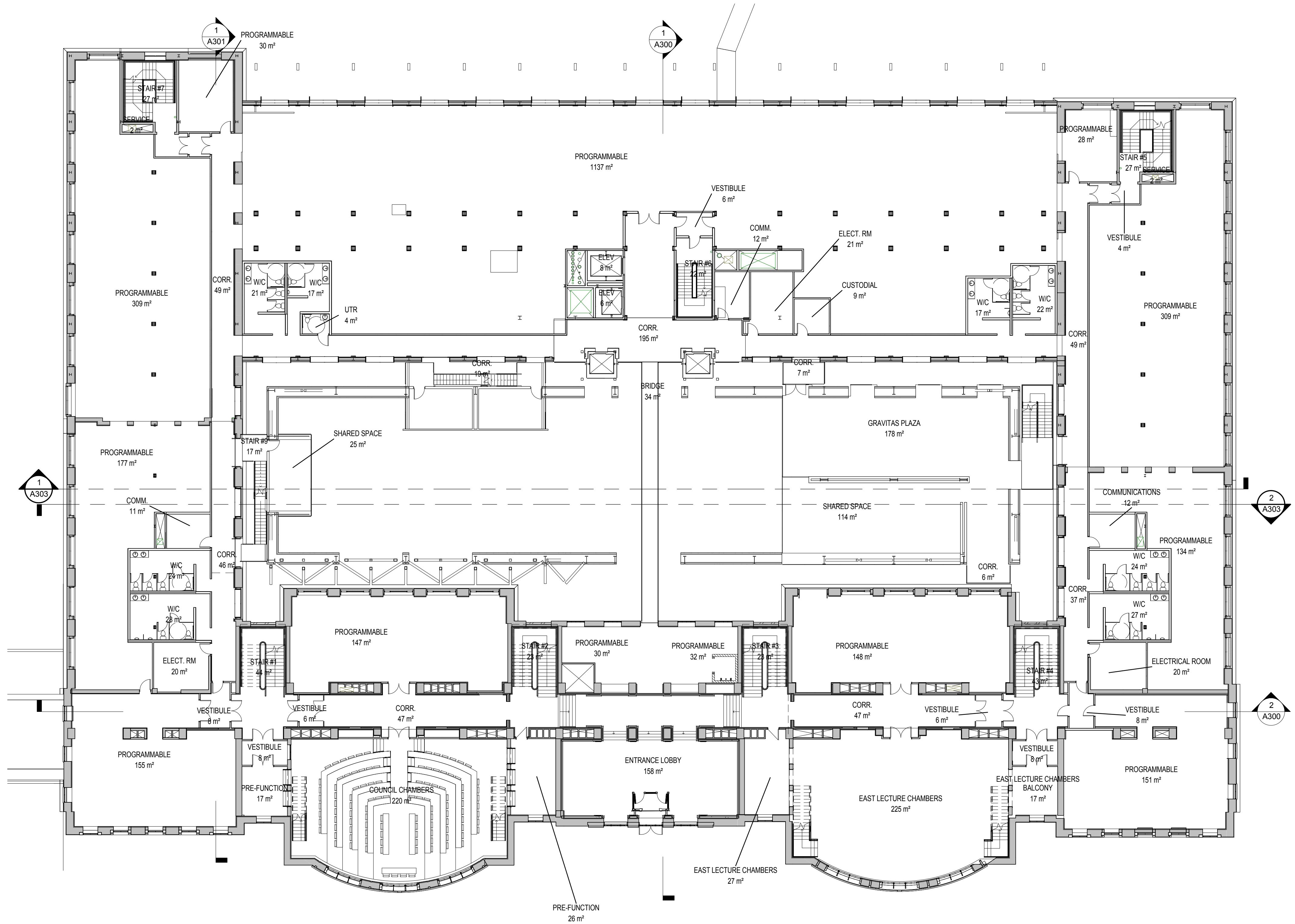


DENTISTRY PHARMACY BUILDING REDEVELOPMENT

0. CORE DRAWINGS

Level 1

A.101


PROGRAMMABLE
30 m²
PROGRAMMABLE
1137 m²
VESTIBULE
6 m²
COMM.
12 m²
ELECT. RM
21 m²
CUSTODIAL
9 m²
PROGRAMMABLE
309 m²
CORR.
49 m²
W/C
21 m²
W/C
17 m²
UTR
4 m²
CORR.
195 m²
BRIDGE
34 m²
PROGRAMMABLE
28 m²
STAIR #5
27 m²
VESTIBULE
4 m²
PROGRAMMABLE
309 m²
CORR.
49 m²
GRAVITAS PLAZA
178 m²
SHARED SPACE
25 m²
PROGRAMMABLE
177 m²
COMM
11 m²
SHARED SPACE
114 m²
COMMUNICATIONS
12 m²
PROGRAMMABLE
134 m²
PROGRAMMABLE
147 m²
PROGRAMMABLE
30 m²
PROGRAMMABLE
32 m²
PROGRAMMABLE
148 m²
ELECT. RM
20 m²
ELECTRICAL ROOM
20 m²
CORR.
47 m²
CORR.
47 m²
VESTIBULE
8 m²
PROGRAMMABLE
155 m²
ENTRANCE LOBBY
158 m²
COUNCIL CHAMBERS
220 m²
PRE-FUNCTION
17 m²
EAST LECTURE CHAMBERS
225 m²
EAST LECTURE CHAMBERS BALCONY
17 m²
PROGRAMMABLE
151 m²
EAST LECTURE CHAMBERS
27 m²
PRE-FUNCTION
26 m²

A.102 Level 2

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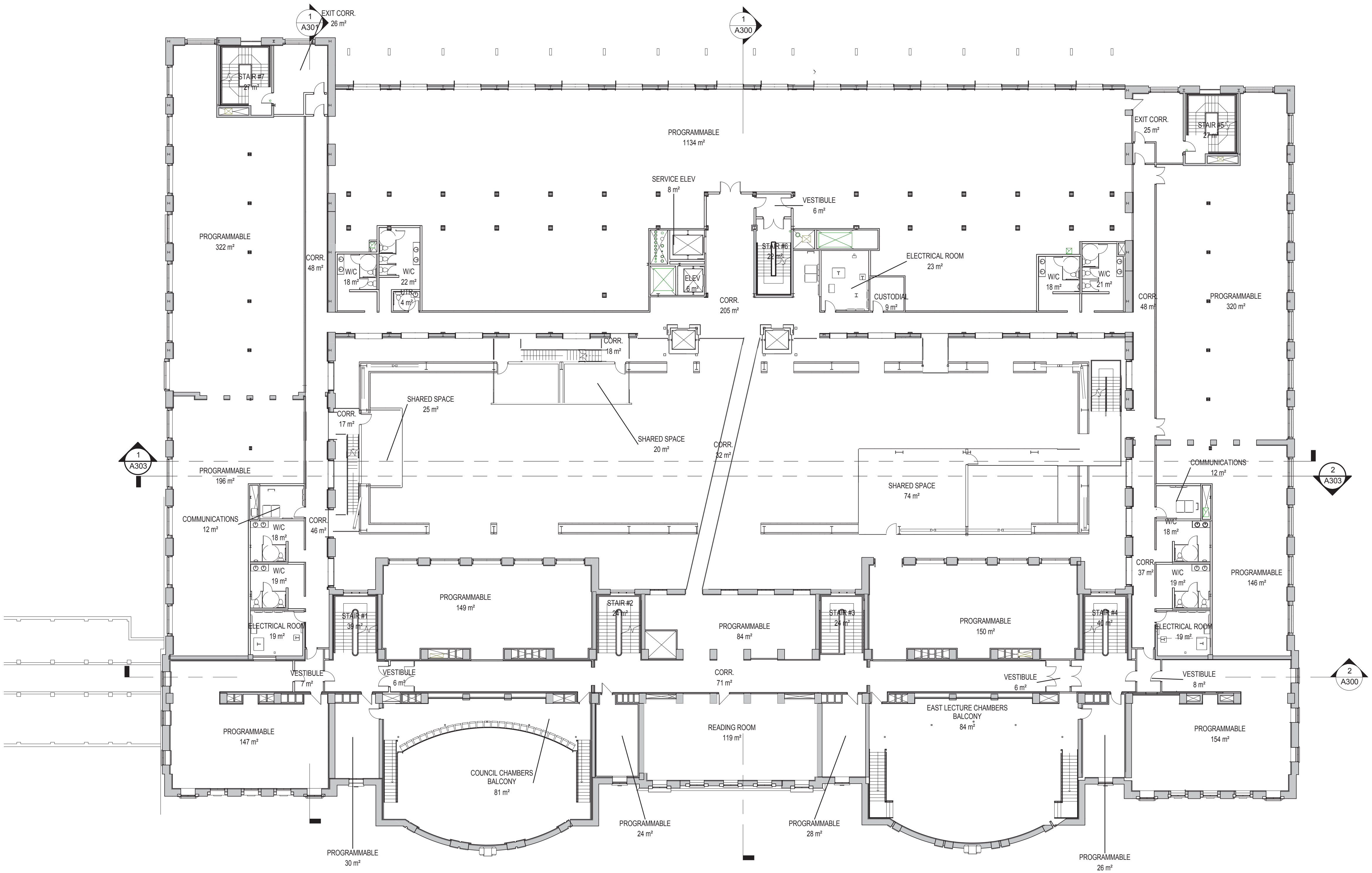
Architecture Ltd.

UNIVERSITY OF ALBERTA

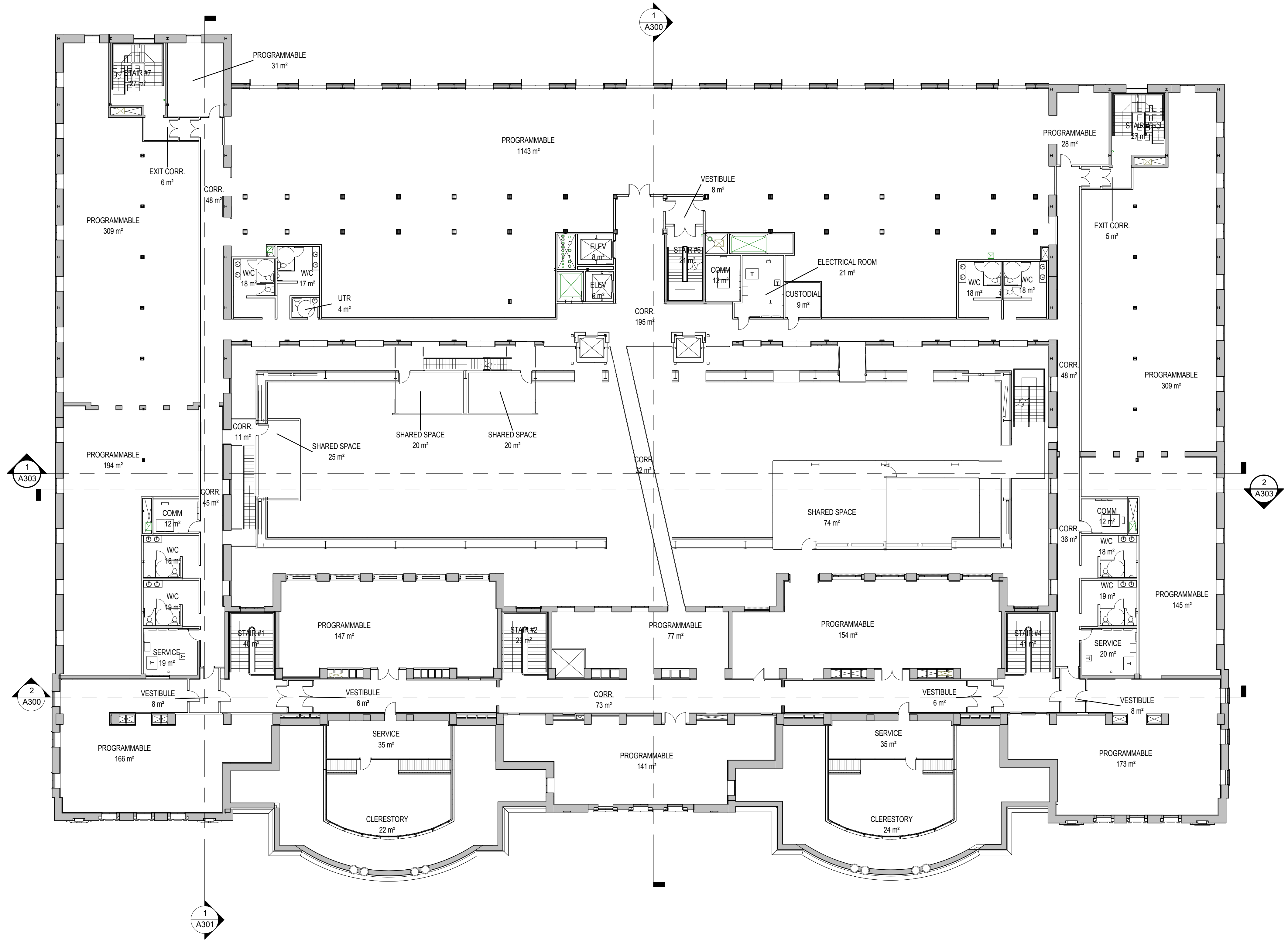


DENTISTRY PHARMACY BUILDING REDEVELOPMENT

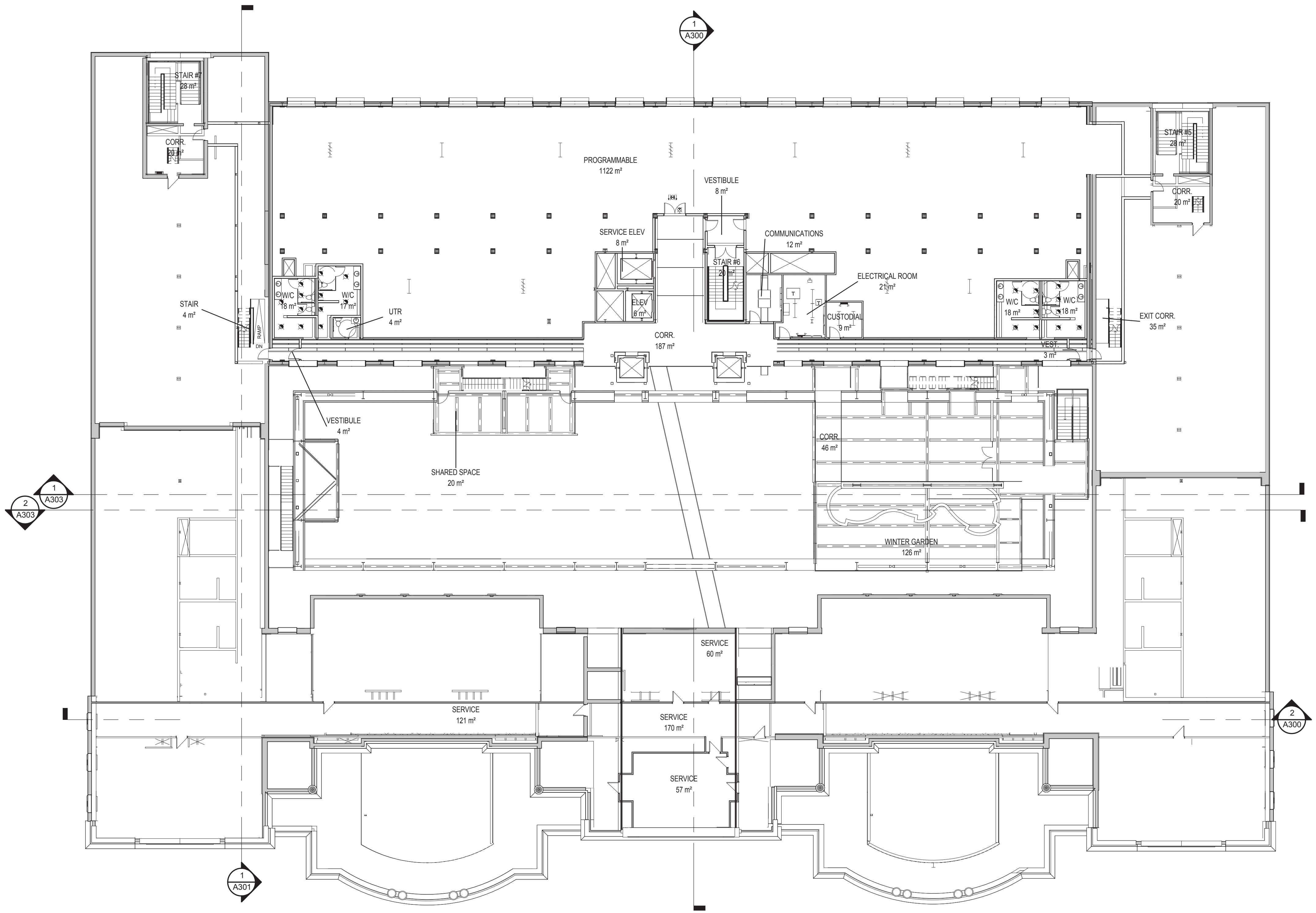
0. CORE DRAWINGS

Level 3

A.103


PROGRAMMABLE
31 m²
STAIR #7
PROGRAMMABLE
1143 m²
PROGRAMMABLE
28 m²
EXIT CORR.
6 m²
CORR.
48 m²
VESTIBULE
8 m²
PROGRAMMABLE
309 m²
EXIT CORR.
5 m²
ELEV
ELEV
STAIR #6
COMM
12 m²
ELECTRICAL ROOM
21 m²
CUSTODIAL
9 m²
W/C
18 m²
W/C
17 m²
UTR
4 m²
CORR.
195 m²
W/C
18 m²
W/C
18 m²
CORR.
48 m²
PROGRAMMABLE
309 m²
CORR.
11 m²
SHARED SPACE
25 m²
SHARED SPACE
20 m²
SHARED SPACE
20 m²
PROGRAMMABLE
194 m²
1
A303
CORR.
32 m²
2
A303
CORR.
45 m²
COMM
12 m²
SHARED SPACE
74 m²
COMM
12 m²
CORR.
36 m²
W/C
18 m²
W/C
19 m²
W/C
18 m²
W/C
19 m²
PROGRAMMABLE
145 m²
STAIR #1
40 m²
PROGRAMMABLE
147 m²
STAIR #2
21 m²
PROGRAMMABLE
77 m²
PROGRAMMABLE
154 m²
STAIR #4
41 m²
SERVICE
19 m²
SERVICE
20 m²
2
A300
VESTIBULE
8 m²
VESTIBULE
6 m²
CORR.
73 m²
VESTIBULE
6 m²
VESTIBULE
8 m²
PROGRAMMABLE
166 m²
SERVICE
35 m²
PROGRAMMABLE
141 m²
SERVICE
35 m²
PROGRAMMABLE
173 m²
CLERESTORY
22 m²
CLERESTORY
24 m²
1
A300
1
A301

A.104 Level 4



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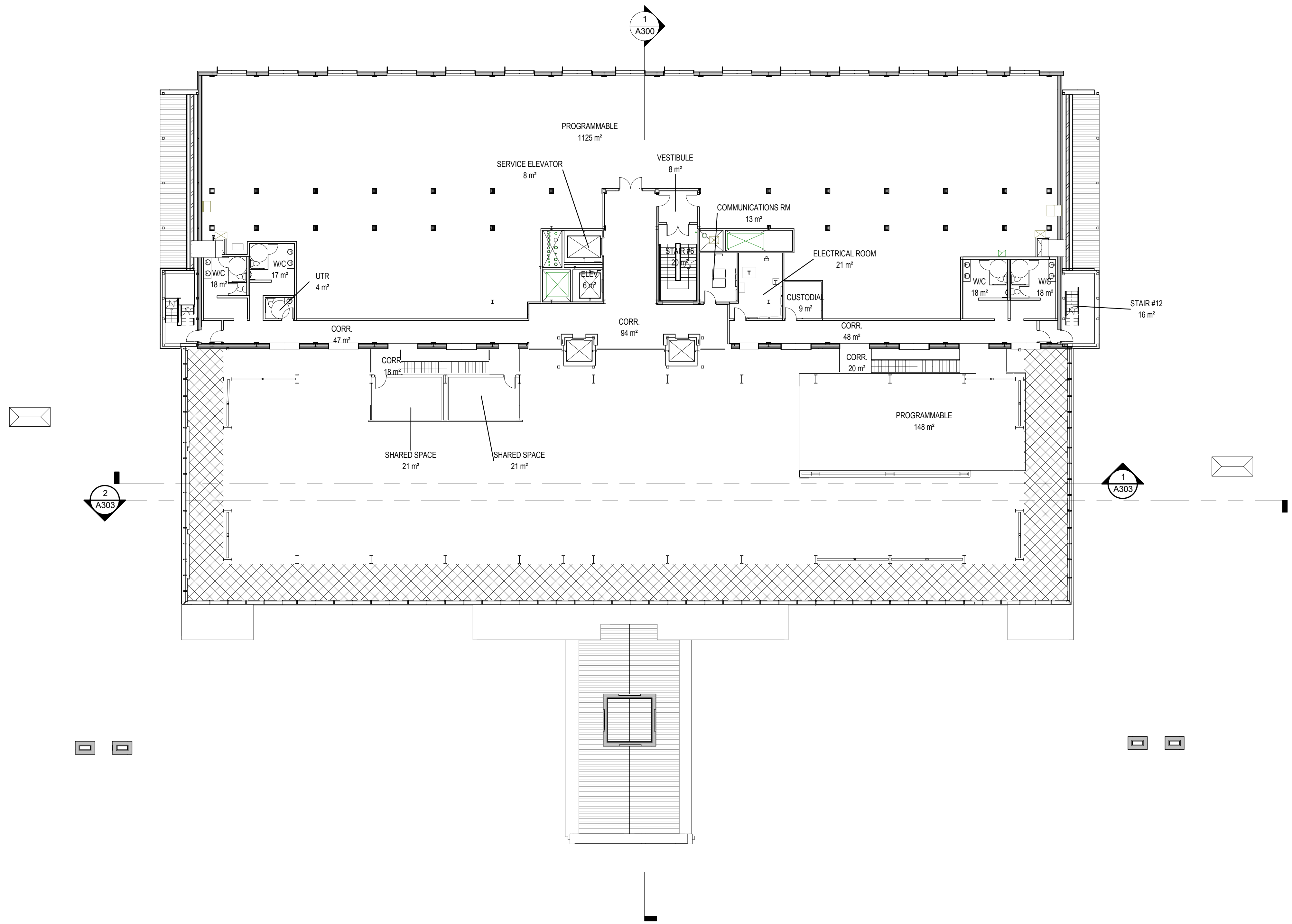
DENTISTRY PHARMACY BUILDING REDEVELOPMENT

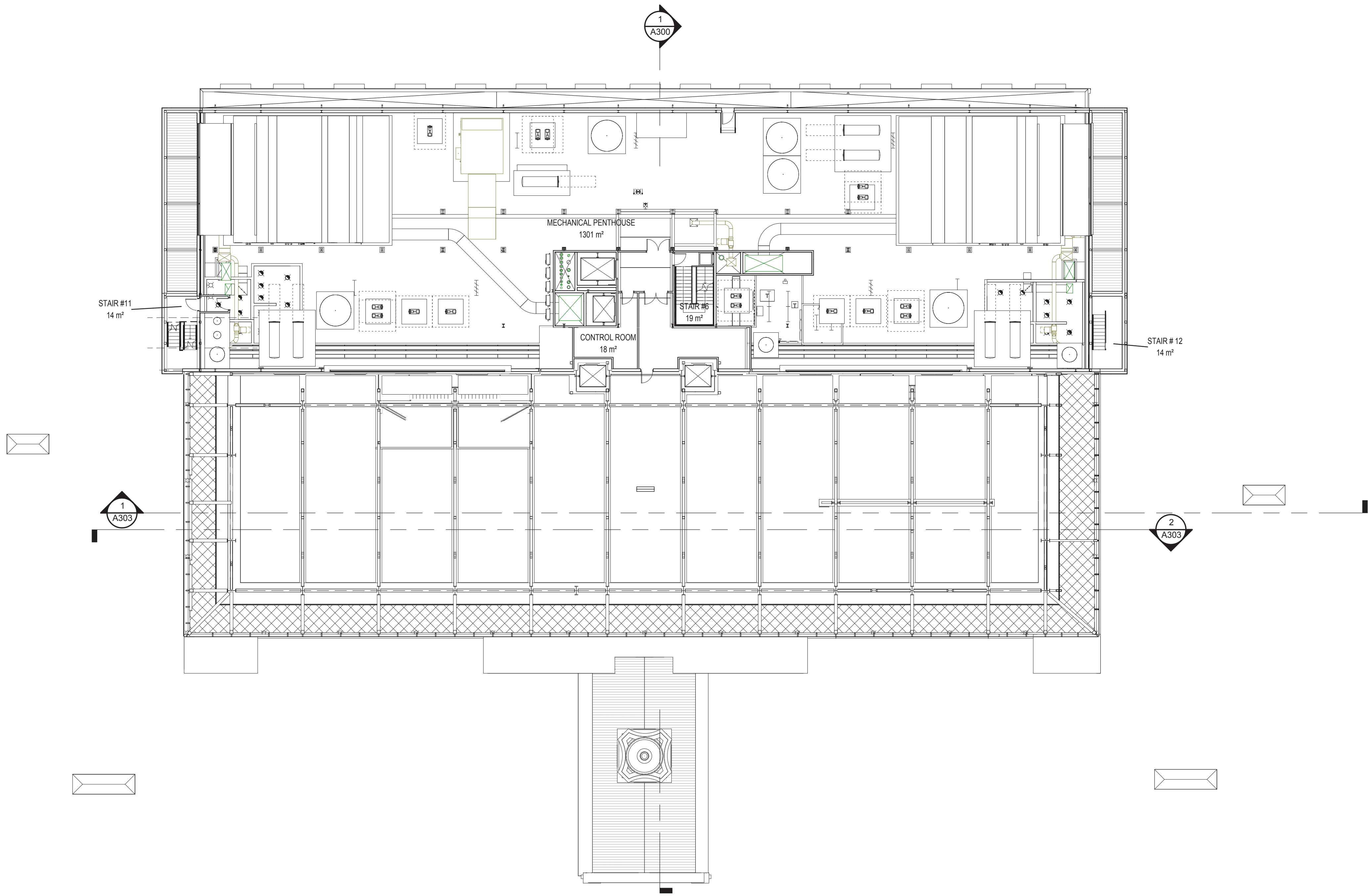
0. CORE DRAWINGS

Level 5

A.105


1
A300
PROGRAMMABLE
1125 m²
SERVICE ELEVATOR
8 m²
VESTIBULE
8 m²
COMMUNICATIONS RM
13 m²
ELECTRICAL ROOM
21 m²
STAIR #6
20 m²
ELEV.
6 m²
CUSTODIAL
9 m²
W/C
18 m²
W/C
17 m²
UTR
4 m²
W/C
18 m²
W/C
18 m²
STAIR #12
16 m²
CORR.
47 m²
CORR.
94 m²
CORR.
48 m²
CORR.
18 m²
CORR.
20 m²
PROGRAMMABLE
148 m²
SHARED SPACE
21 m²
SHARED SPACE
21 m²
2
A303
1
A303

A.106 Level 6



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DENTISTRY PHARMACY BUILDING REDEVELOPMENT

0. CORE DRAWINGS

Mechanical Penthouse

A.107

1
A201
EL - NORTH ELEVATION
1 : 100

A.200 North and South Elevations

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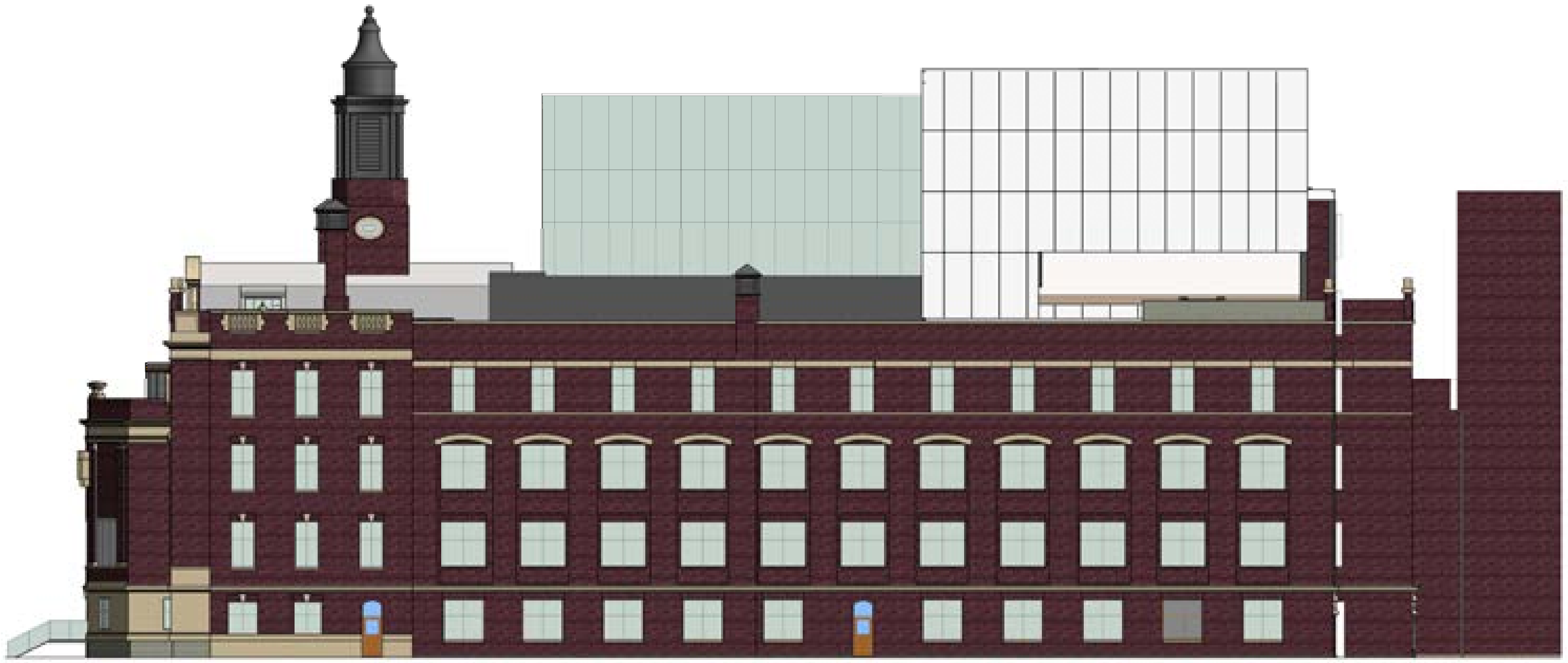


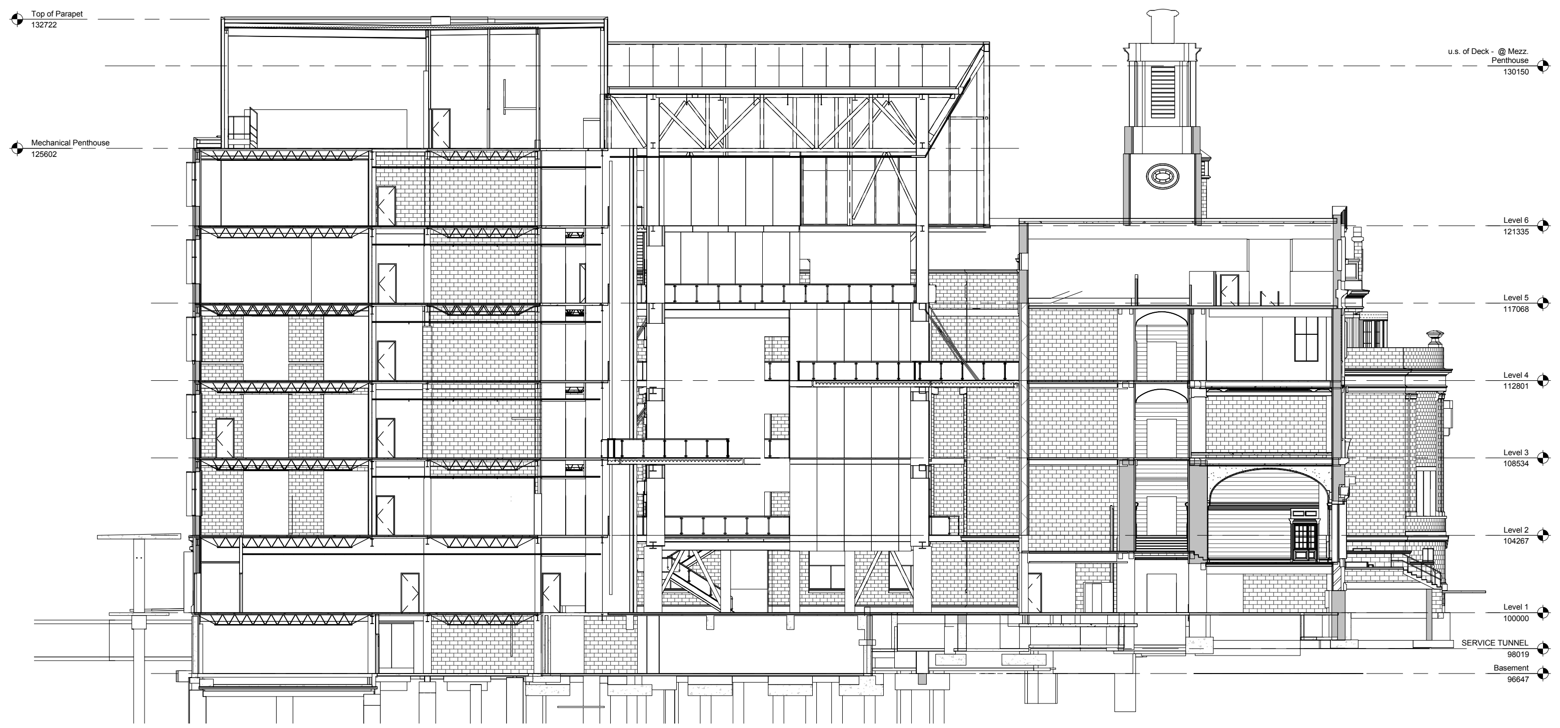
EL - EAST ELEVATION
1 : 100

DENTISTRY PHARMACY BUILDING REDEVELOPMENT

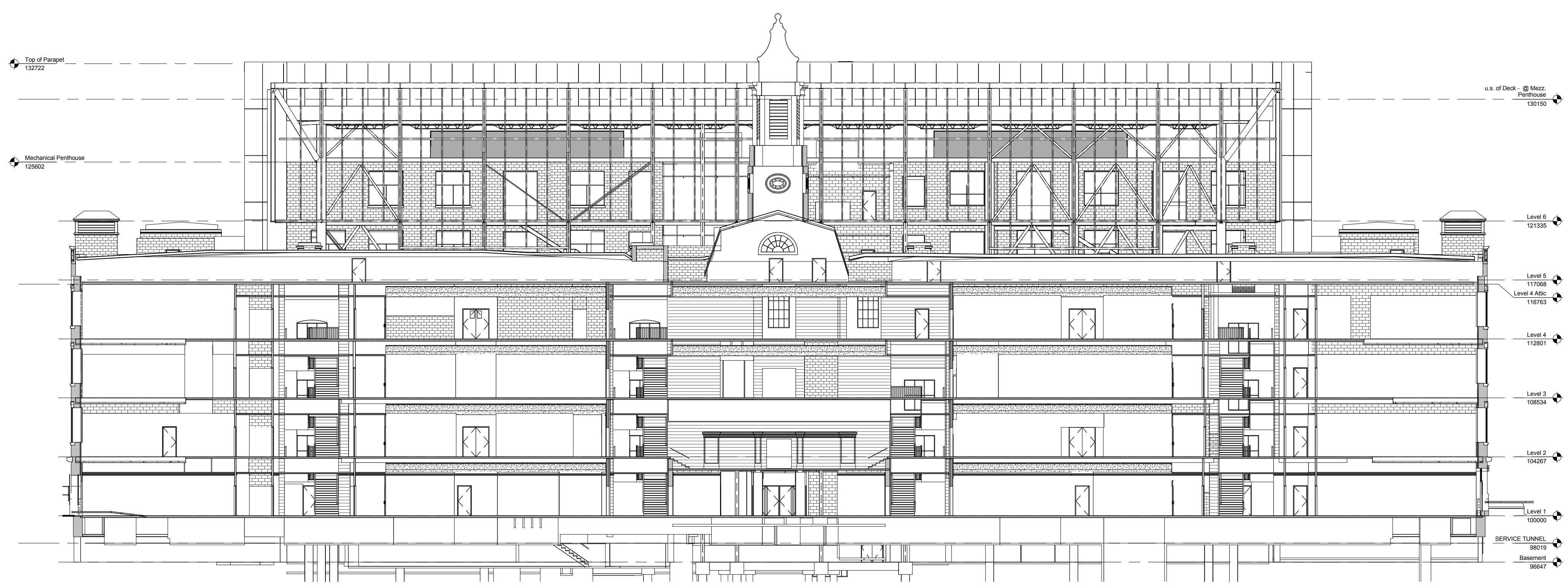
0. CORE DRAWINGS

East and West Elevations

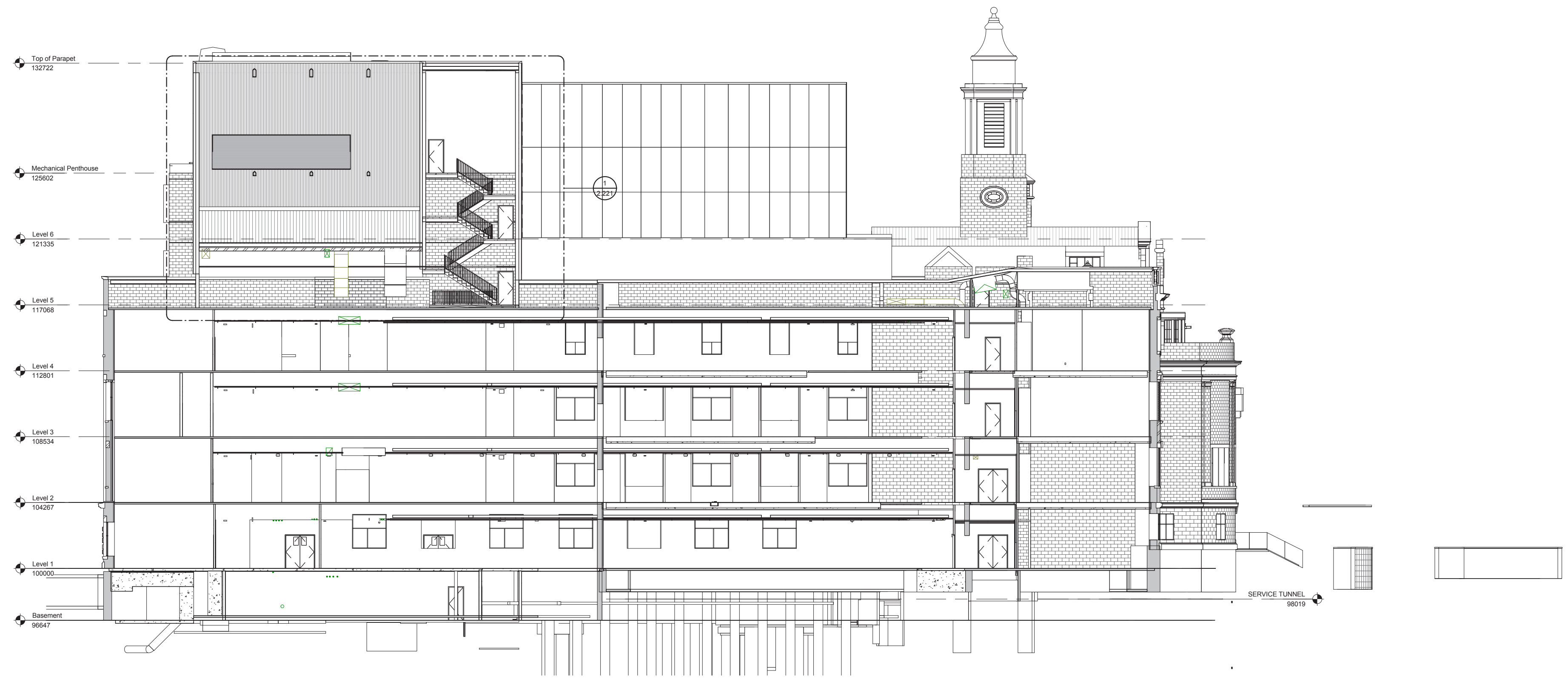
A.201



1
A300
N/S Section on Axis
1 : 125



A.300 Building Section 1



1
A301
N/S Section thru 1946
1 : 125

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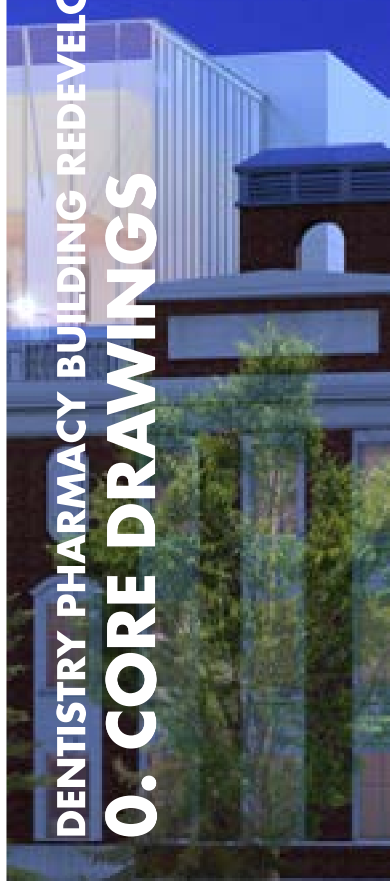
DENTISTRY PHARMACY BUILDING REDEVELOPMENT

0. CORE DRAWINGS



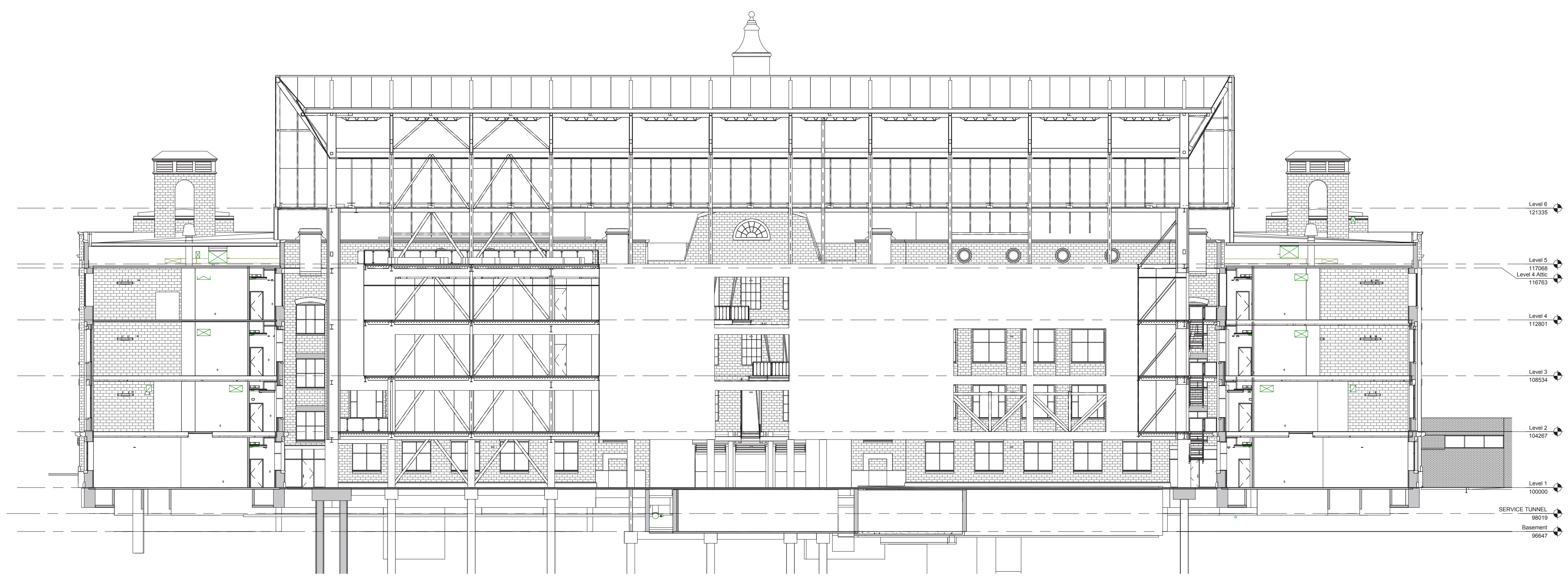
Building Section 2

A.301

1
A302
N/S Section through West Theatre
1 : 100

A.302 Building Section 3

1
A303
E/W Atrium Section Looking North
1 : 125



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DENTISTRY PHARMACY BUILDING REDEVELOPMENT

0. CORE DRAWINGS

Building Section 4

A.303

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DENTISTRY PHARMACY BUILDING REDEVELOPMENT

1. SITE

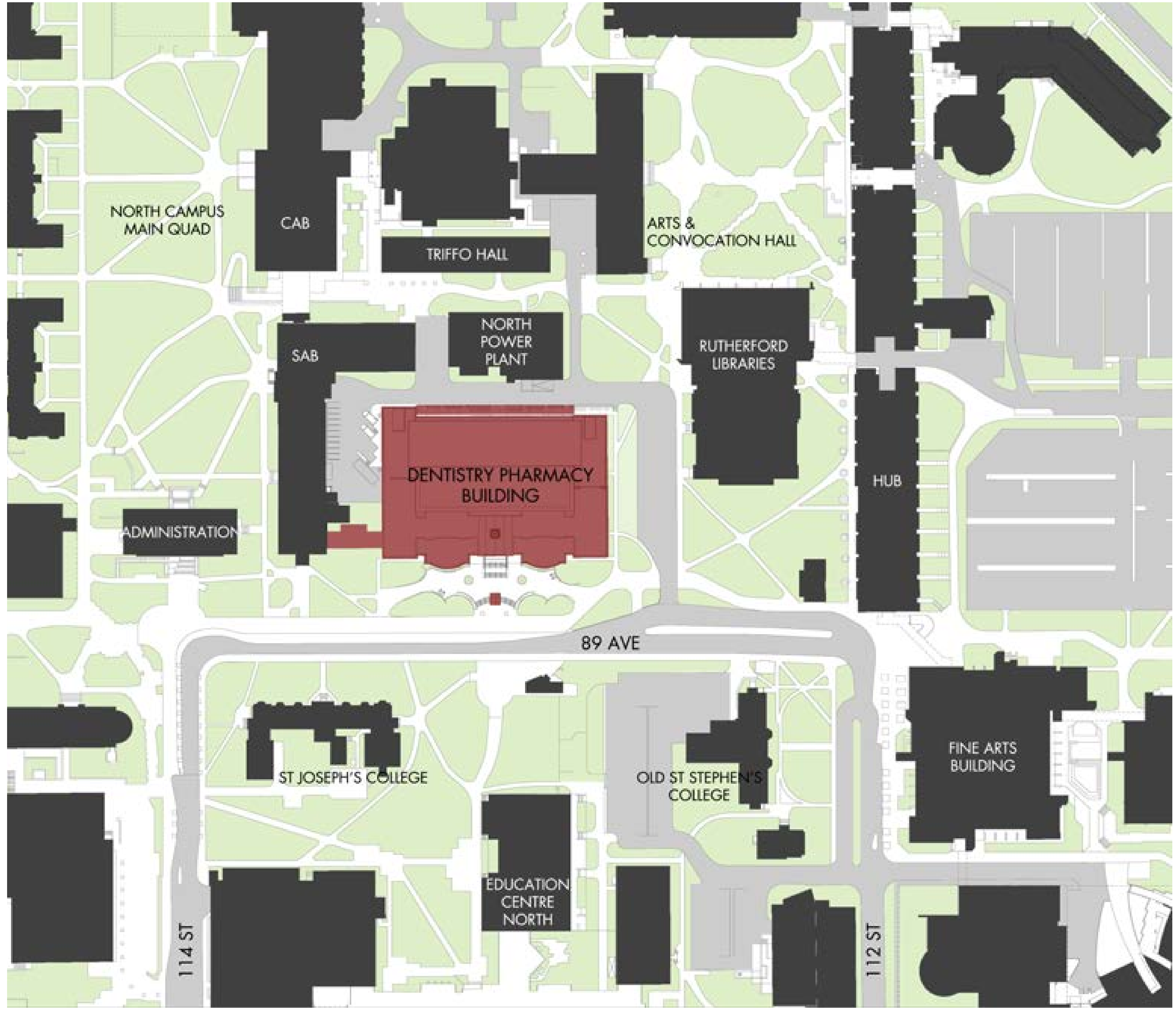
1

Site Context

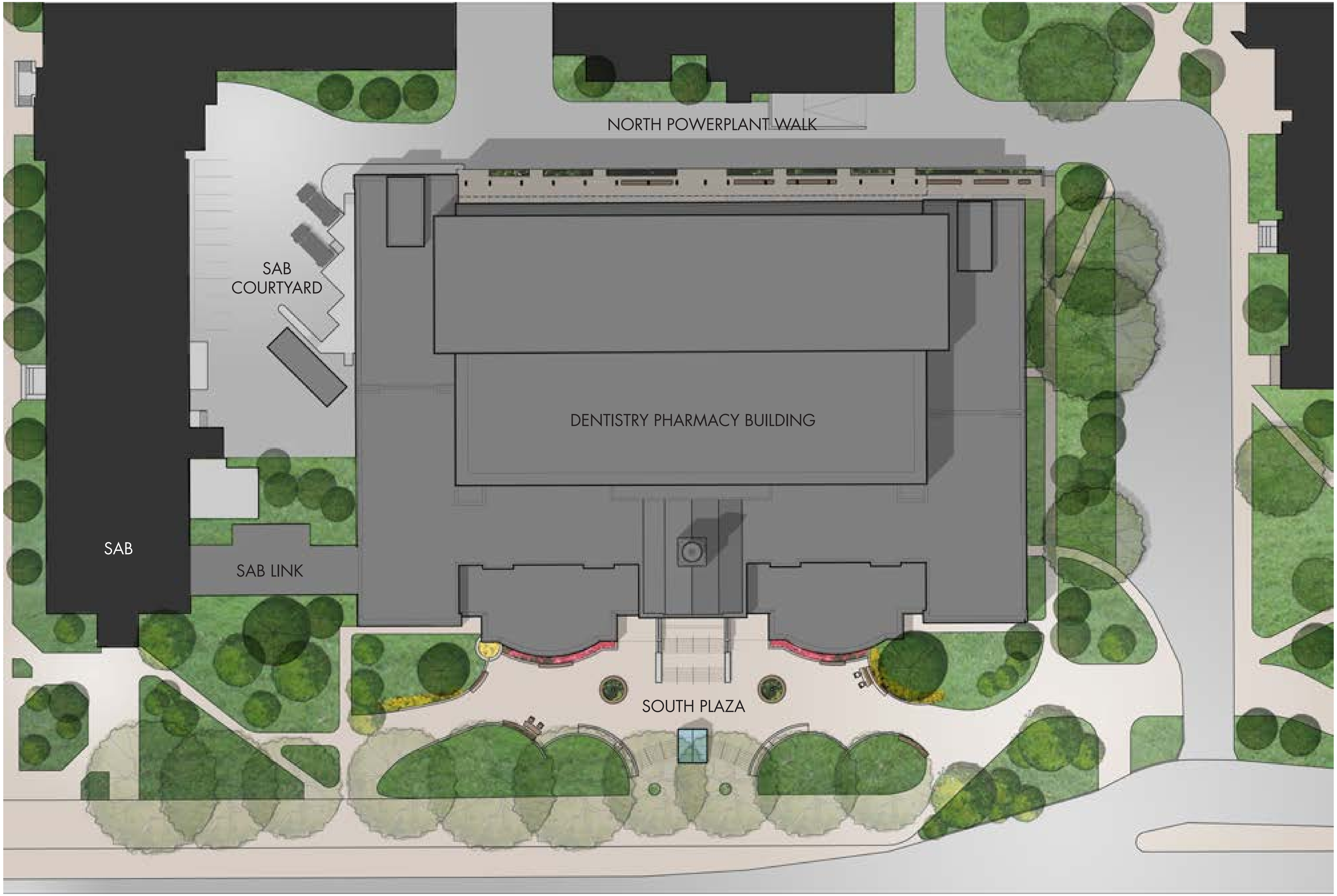
The site around the Dentistry Pharmacy Building has four distinct zones:

- The South Plaza, providing a formal entry to the building's historical front door;
- The North Powerplant Walk, acting as a secondary entrance to the building and providing service access to the west courtyard;
- The west courtyard between the building and the adjacent South Academic Building (SAB);
- The east yard, which currently provides a sidewalk connection around the building, but largely access to surface parking and the Rutherford Library.

This Design Development Report recommends significant site and landscape improvements to three of the spaces listed above: the South Plaza, the North Powerplant Walk, and the SAB courtyard.



1.000 Site Context Keyplan



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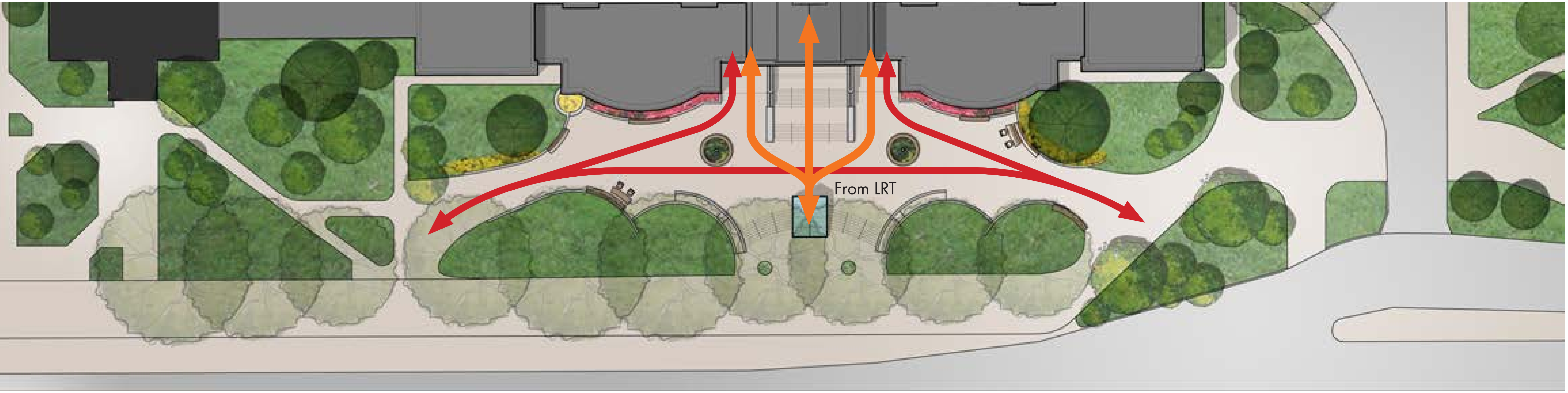
DENTISTRY PHARMACY BUILDING REDEVELOPMENT

1. SITE

OVERALL SITE PLAN

Overall Site Plan



South Plaza / South Entrance

A south plaza has been conceived to provide access to the Dentistry Pharmacy Building. This plaza provides a landing from the new LRT Pavilion, access to the existing ceremonial steps, and access at grade to the atrium level. The existing ceremonial steps will be refurbished and expanded providing access to the historical lobby on Level 2. We are regrading the area south of the building by up to a half-storey, creating accessible entrances into the building on Level 1, and providing access through a lower lobby to the Atrium. This produces a rich landscape design for the south lawn. The ceremonial axial approach is contrasted by the informal curvilinear perimeter seating walls.

This outdoor space is meant to provide an intimate garden experience adjacent to circulation to and from the Dentistry Pharmacy Building.

The intent is to keep as many of the large historic elm trees, coniferous trees, and honorary/ donor trees, the excavation down has been carefully designed to respect the roof structures of those significant trees wherever possible.

The existing LRT entrance will be removed and a glazed shed enclosure in the Dentistry Pharmacy Building axis will be provided.

1.100 South Plaza Enlarged Plan

South Plaza Perspective: Bird's Eye Looking West Across Plaza

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DENTISTRY PHARMACY BUILDING REDEVELOPMENT

1. SITE

SOUTH PLAZA

1.120 **South Plaza Longitudinal Sections**

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DENTISTRY PHARMACY BUILDING REDEVELOPMENT

1. SITE

SOUTH PLAZA

Perspective: South Entries

1.140 **Cross Section: Through LRT Pavilion and Entry Stairs**

Cross Section: Through South Entrance and Steps to 89th Avenue

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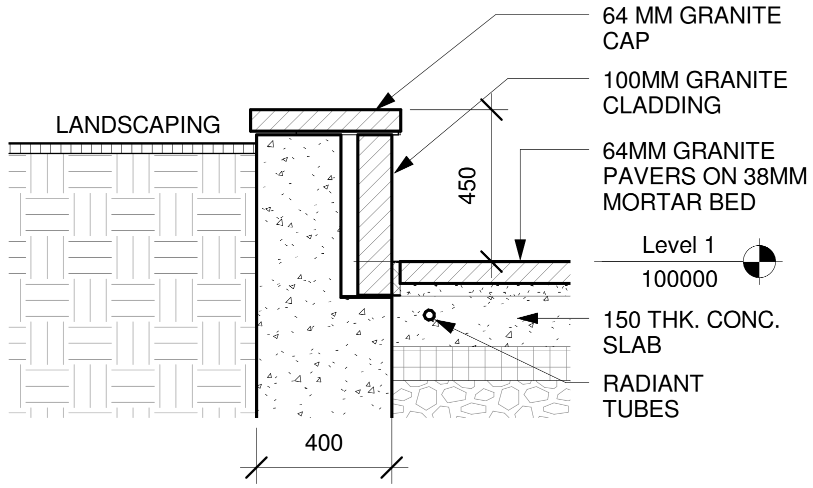
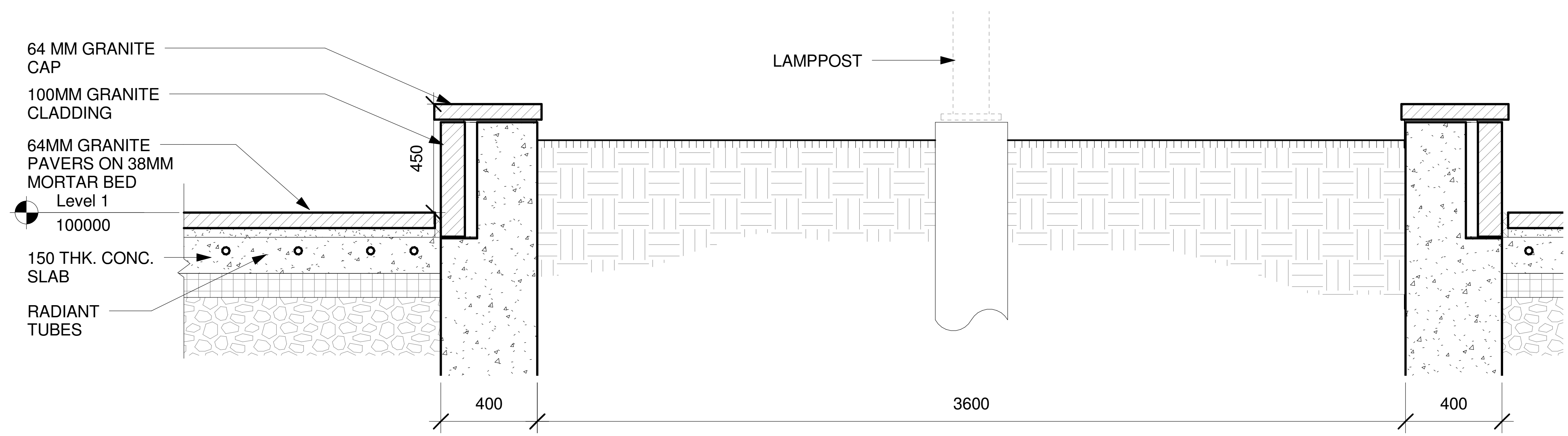
DENTISTRY PHARMACY BUILDING REDEVELOPMENT

1. SITE

SOUTH PLAZA



1
1.160
SECTION - RETAINING WALL



2
1.160
SECTION - CIRCULAR PLANTER WITH LAMPPOST

1.160 Details: Typical Planter Retaining Wall and Circular Planter

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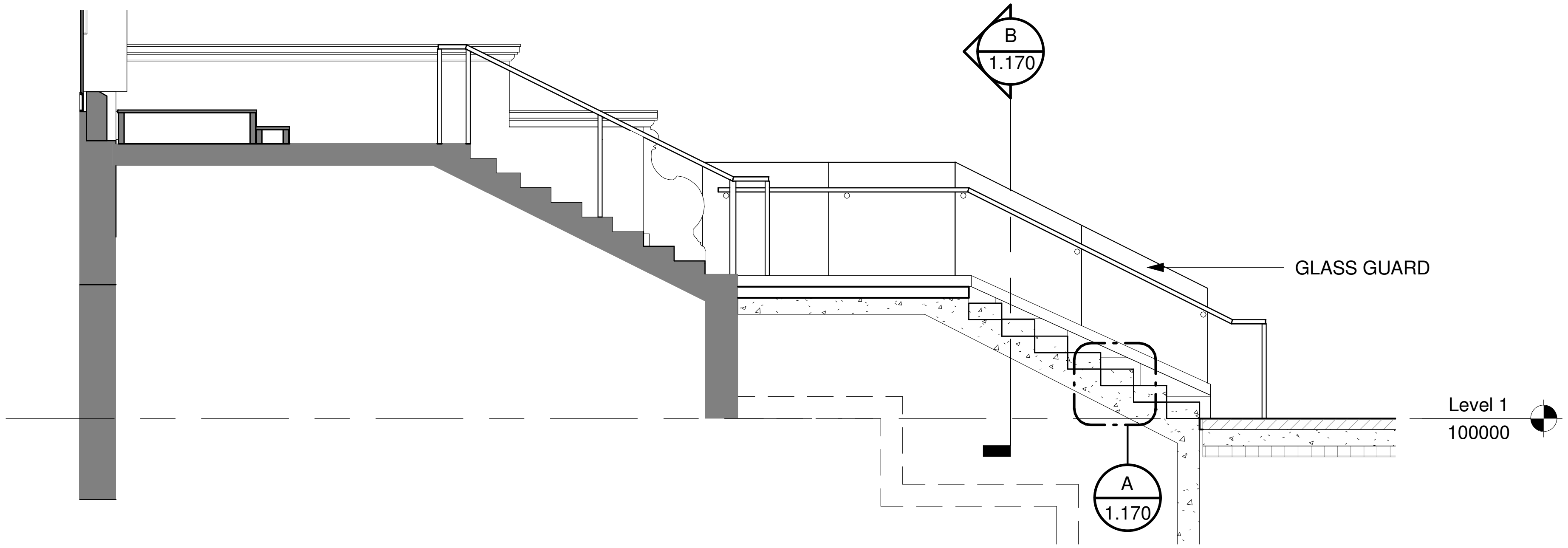
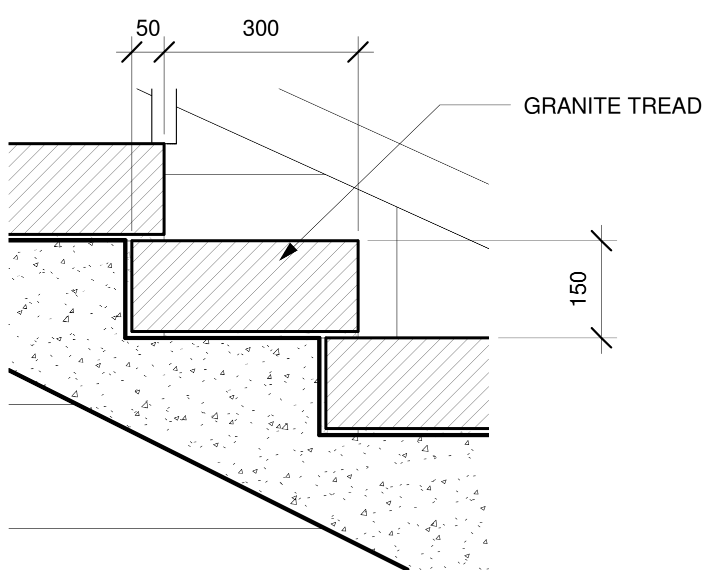
DENTISTRY PHARMACY BUILDING REDEVELOPMENT

1. SITE

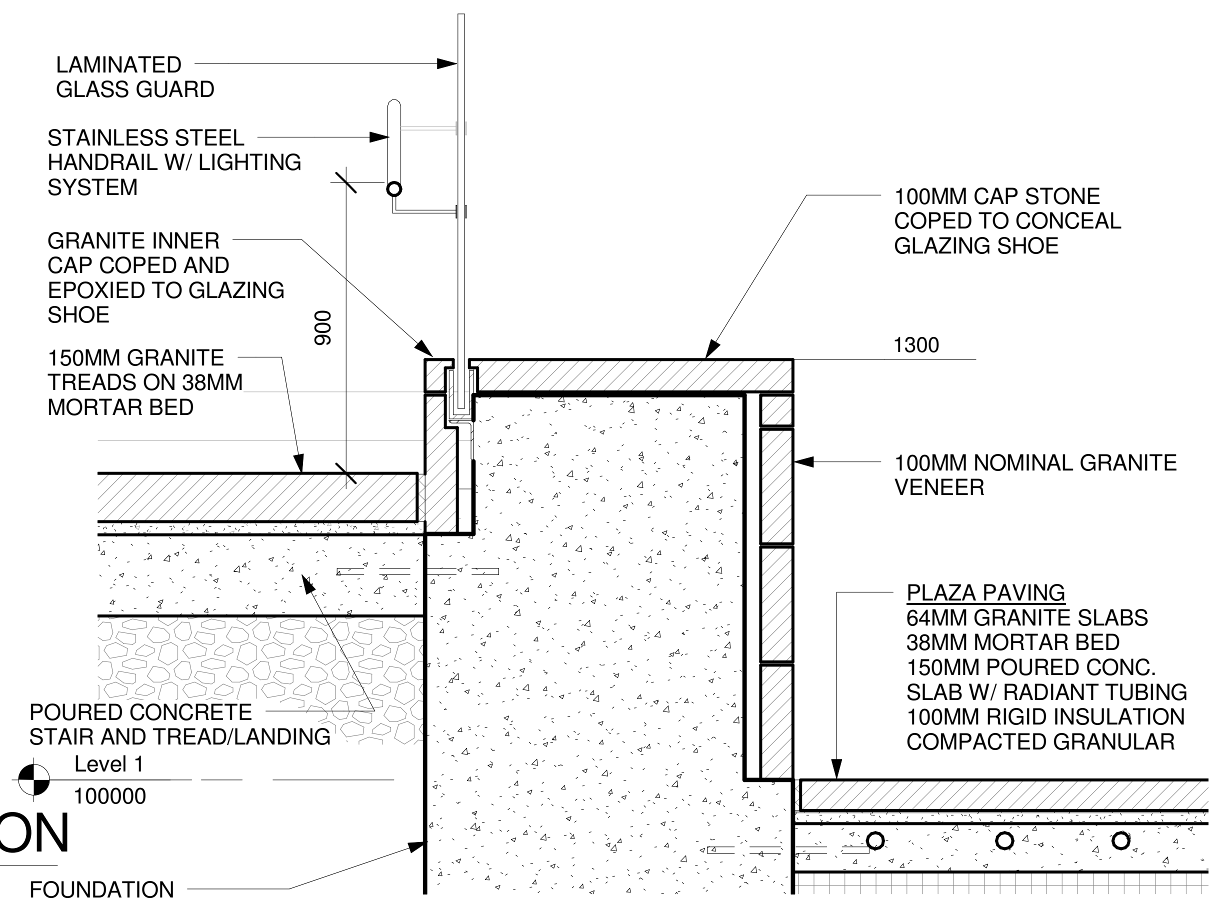
SOUTH PLAZA



1 / 1.170 SECTION - MAIN ENTRY STAIRS WITH NEW EXTENSION



A / 1.170 STAIR DETAIL



B / 1.170 SECTION DETAIL - NEW STAIR EXTENSION

Section: South Entry Stairs

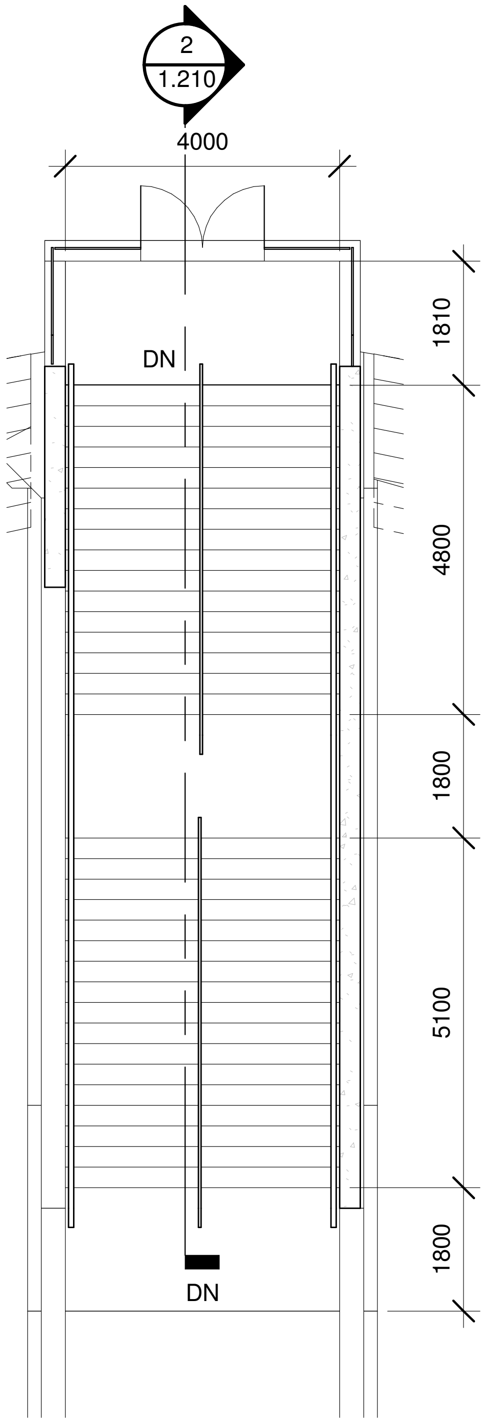
1.170

LRT Pavilion

The current design work on the South Plaza provided the opportunity to rethink the relationship between the Dentistry Pharmacy Building and the closest access to the LRT platform. The proposed LRT pavilion speaks directly to the historic building by sitting in front of its main entrance, in axis with its center. The new stairs going underground reach directly to the existing tunnel leading to the platform. Access to transit from the proposed pavilion to the Dentistry Pharmacy Building becomes easier and its glass triangular form made out of structural glass fins becomes a beacon on site, especially at night when lit up, helping transit users to easily find access to the LRT platform.

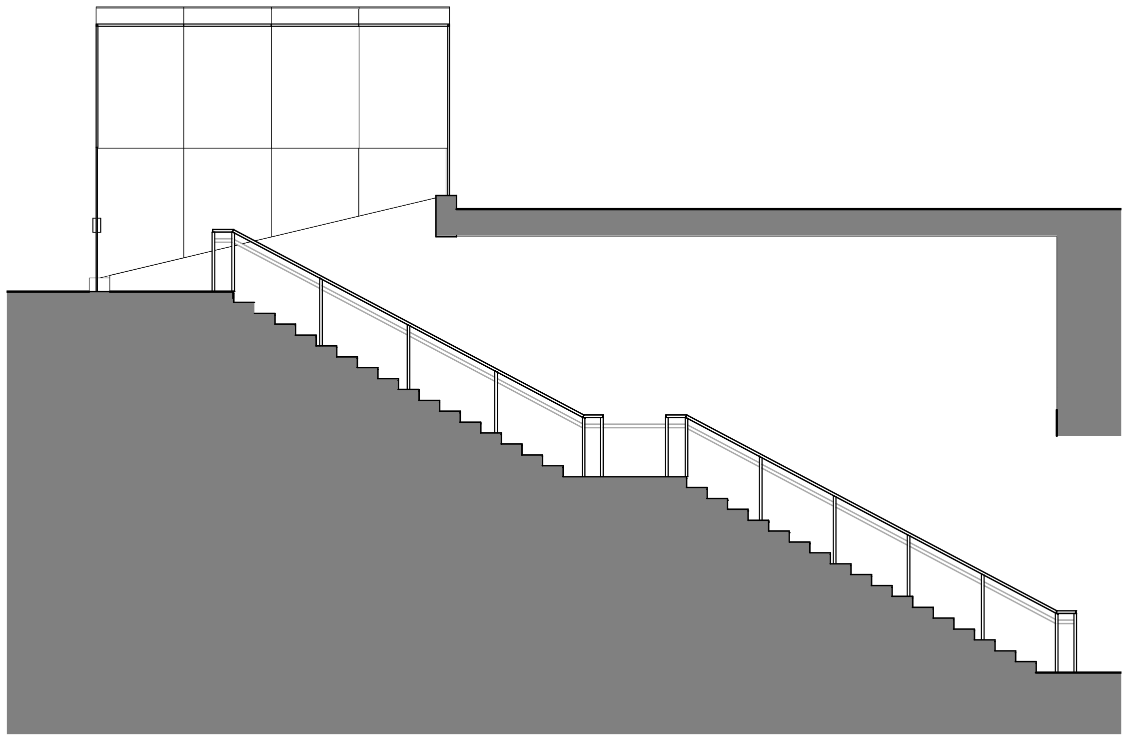
While the proposed LRT pavilion improves access to the LRT platform, its architectural quality becomes alive thought its close relationship with the Dentistry Pharmacy Building. From 89th Avenue, its simple triangular form point at the cupola and its glass construction provide a contemporary solution that does not want to compete with the historic building, but celebrate it by accentuating the symmetry of its classic architecture.

Perspective: On axis with cupola capturing LRT Pavilion



1
1.210

ENLARGED PLAN - LRT PAVILION ENTRY



2
1.210

SECTION - LRT PAVILION ENTRY

Plan: At LRT Pavilion Entry and Cross Section

1 .220 **Perspective: Oblique approach with LRT Pavilion in Foreground**

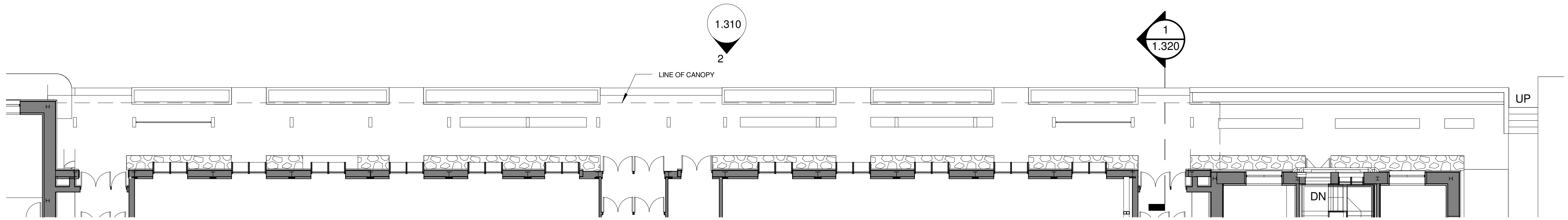
Perspective: North Canopy

Perspective: North Canopy in the Evening

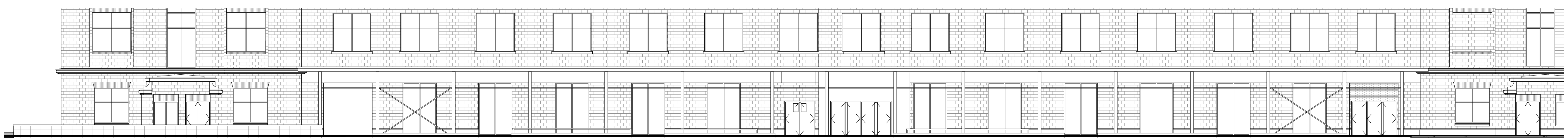
North Powerplant Walk

The University's long-term vision for the roadway zone between the existing Dentistry Pharmacy Building and the North Powerplant involves improving the pedestrian experience and programming of adjacent spaces to create a student and retail focused neighborhood. This space, while still functioning to provide service vehicle access to a series of buildings, needs to be more than an alley.

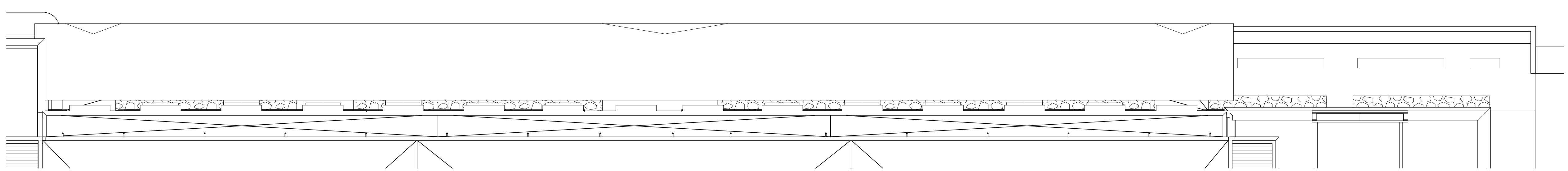
As such, the Dentistry Pharmacy Building Redevelopment offers an opportunity to promote a richer pedestrian-scaled experience along the path adjacent to the building. Therefore a one-storey canopy along the north face is being added. This new canopy will provide protection from the elements, reduce the scale of the six-storey building, promote pedestrian movement to the three new entrances into the building, and provide a space for park benches, bike racks, planters, and other outdoor furnishings. This canopy is intended to pick up on the existing coursing band at the one-storey mark along the north façade.



1 / 1.310 PLAN - NORTH CANOPY

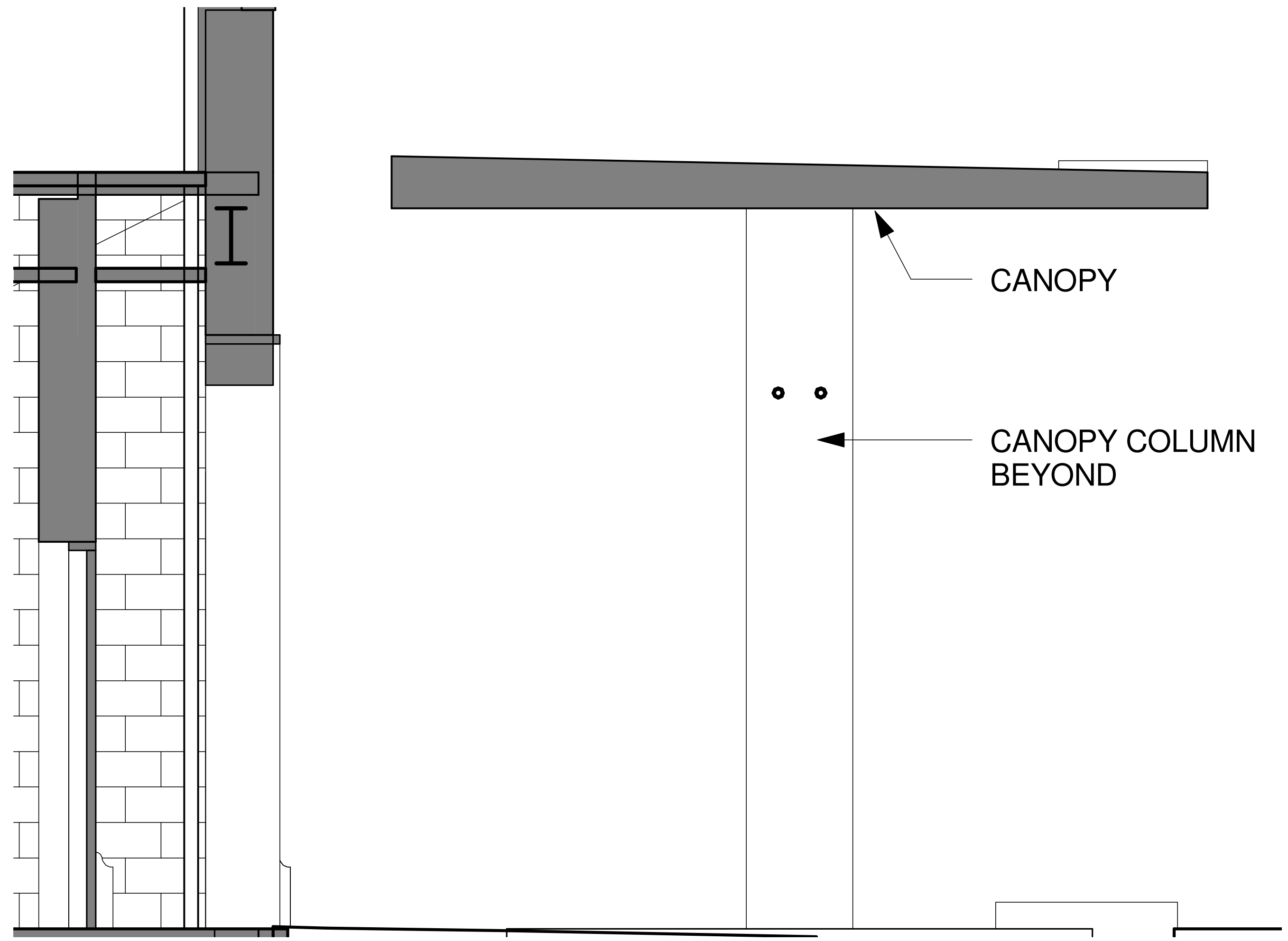


2 / 1.310 ELEVATION - NORTH CANOPY



3 / 1.310 ROOF PLAN - NORTH CANOPY

1.310 North Canopy Plan, Roof Plan and North Elevation



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DENTISTRY PHARMACY BUILDING REDEVELOPMENT

1. SITE

NORTH CANOPY

Section - North East Entry

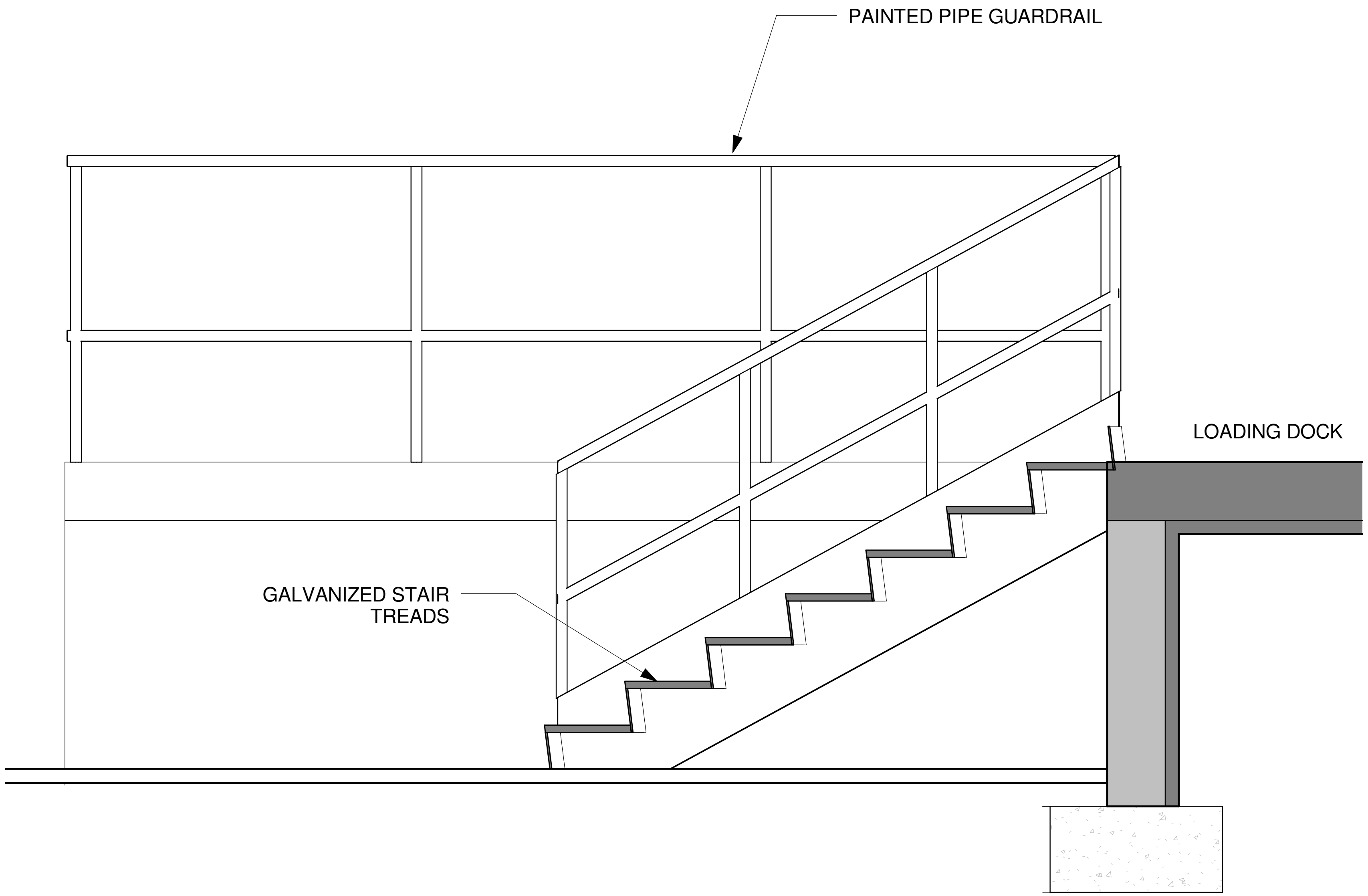
SAB Courtyard

The courtyard between the Dentistry Pharmacy Building and South Academic Building will retain its service functions and access from the North Powerplant service road. A new loading dock completed with solar garbage compactors and elevated platform will service the redeveloped building.

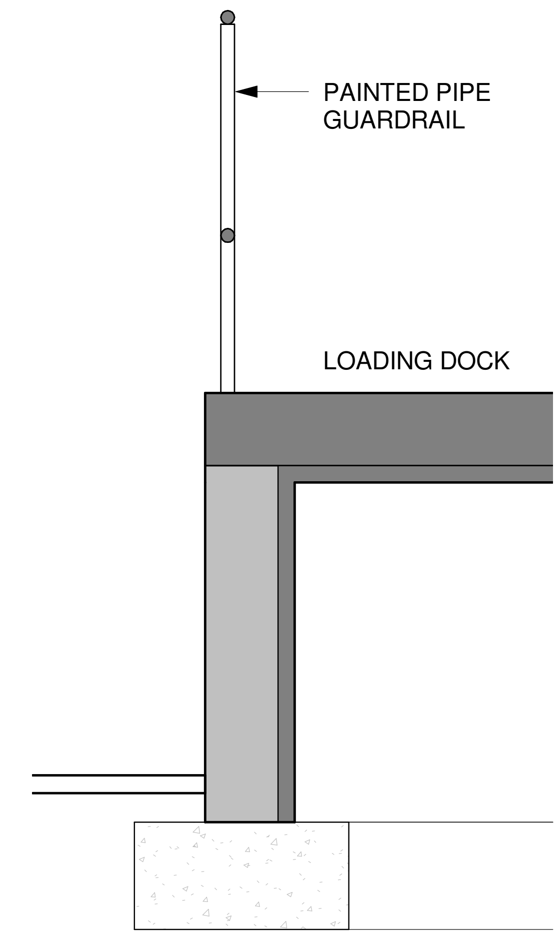
New emergency generator will also be located south of the loading dock in the courtyard to provide service to the building.

Air handler units to serve the SAB Link will also be located in the courtyard.

1.400 SAB Courtyard Service Yard and Loading Dock



1
1.410
SECTION - TYPICAL STAIR



2
1.410
SECTION - TYPICAL GUARD

SAB Courtyard Service Yard and Loading Dock Sections

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University of Alberta

DENTISTRY PHARMACY BUILDING REDEVELOPMENT

1. SITE

SAB COURTYARD and LOADING DOCK

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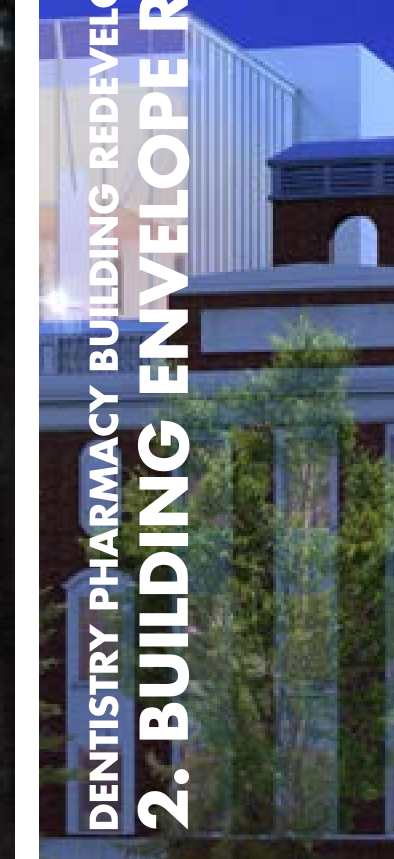


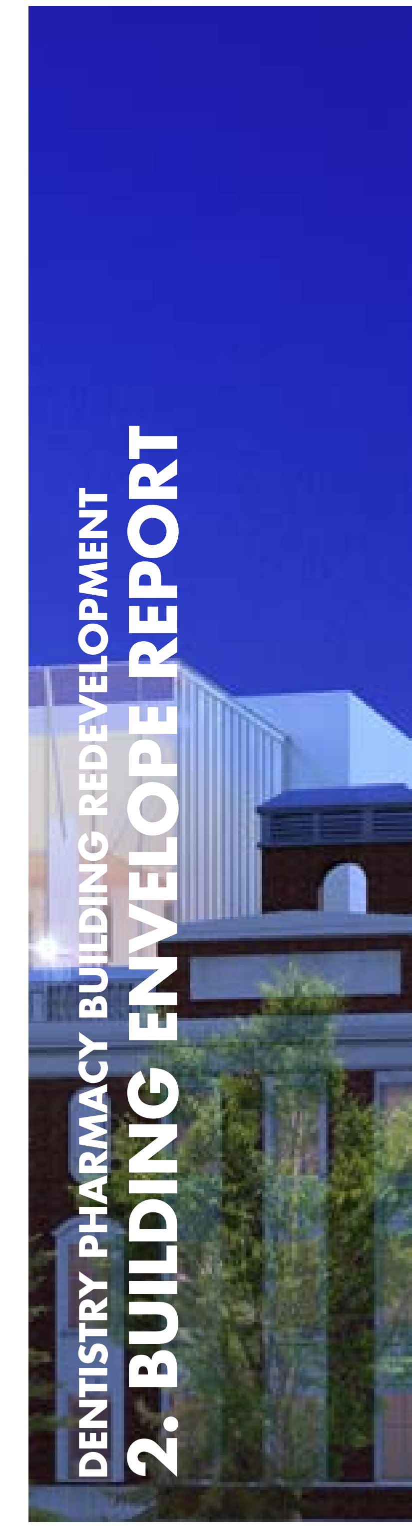
DENTISTRY PHARMACY BUILDING REDEVELOPMENT

2. BUILDING ENVELOPE REPORT

2

2 Building Envelope

Table of Figures



1. Introduction

1.1 Description of the "Buildings"

The original Dentistry Pharmacy Building was constructed in 1922. It is designed in a neoclassical style complete with a central cupola. The building has four levels plus a penthouse and no basement. The exterior walls consist of solid clay brick masonry with Tyndall stone accent elements including belt courses, parapet caps and sills. Punched windows consist of wood framed vertical sliding units. The east and west wings were added in 1946 and 1947 and project a very similar exterior appearance. Both wings have four levels with a partial fifth floor and a partial basement. The taller seven storey centre wing was added in 1958 and varies in that a brick veneer with a block backup wall forms the exterior wall. Over the ninety years since original construction numerous renovations have been carried out and several smaller additions were added to the overall building.

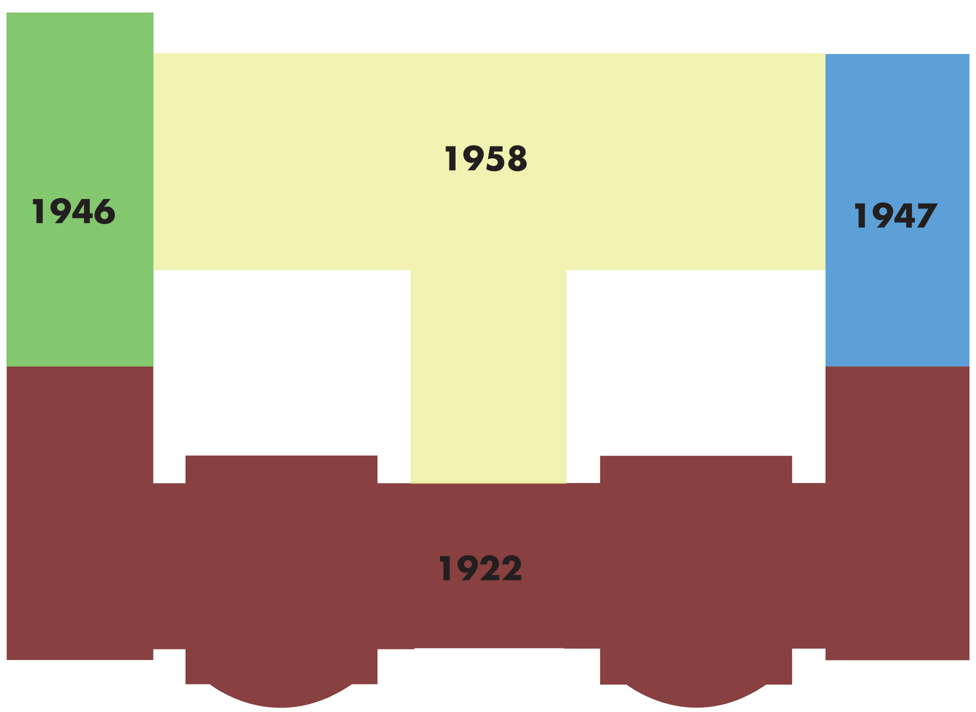


Figure 1 - Dentistry Pharmacy Building Keyplan

1.2 Terms of Reference

An overall assessment and analysis of the building envelope is required and BVDA Façade Engineering, as part of the project team, participated in this task. The scope of services to be provided are summarized below.

1. Conduct a review of available building drawings and any previous reports in order to develop some familiarity with the cladding systems, identify potential weaknesses and properly develop an assessment programme.
2. Conduct a reasonably thorough review of the building on the interior and from grade and roof level on the exterior to confirm the previous assessments and develop an opinion as to the overall condition of the building envelope.
3. Conduct specific investigations to examine windows, walls, doors, and attic areas to gather information necessary to assess current condition, historic performance, evaluate hygrothermal performance and to develop an overall understanding of the functioning of the building from a building physics perspective.
4. Liaise with the mechanical engineers to develop an understanding of the current HVAC system and any proposed systems from the perspective of how they impact the building fabric.
5. Prepare a report for review documenting our procedures, observations, comments and recommendations. Recommendations may include renovation or upgrading of specific elements.

1.2.1 Reference Documents

Reference documents relied on in this study included:

- Dentistry Pharmacy Building Condition Report 110926
- University of Alberta RFP 2011-0147 Redevelopment of Dentistry Pharmacy Building
- Concept Design Report 2011 03 10.
- Original Nobbs and Hyde Drawings of the 1922 building
- Original Rule Wynn Rule Drawings of the 1946/47 Wings
- Original Department of Public Works Drawings of the 1958 "Centre Wing"

2. Examination of Existing Conditions

2.1 Document Review

The two documents relied on for reference information included the Concept Design Report of 2010 and the Building Condition Report of 2011. Review of these reports provided a general overview of the construction and condition of the buildings useful to the current study.

It should be noted that on site review through the selective demolition process has revealed as-built conditions different than those outlined in these previous reports.

2.1.1 Concept Design Report

This report documents the history of the buildings and the design concepts for the redevelopment of the building but also provides useful information on the buildings construction and condition.

- The exterior cladding consists of solid red brick masonry with raked joints and tyndall stone accent. There is a stone banding at the base of the building. All additions include the same red brick. The building was cleaned and repointed in 1998-99. The typical wall assembly, from interior to exterior, of the 1922 and 1947/48 components consists of :

  Paint
  Plaster
  Clay tile (not all locations)
  Brick (2 or 3 wythes) or stone depending on location

  The typical wall assembly of the 1958 addition consists of:

  Paint
  Plaster
  Clay tile (75mm)
  Air space (12mm)
  Brick (200mm) or stone depending on location

  Or

  Paint
  Plaster (20mm)
  Cork (40mm) at heating cabinets
  Brick

- There are glass block panels at the stairwells on the north elevation. There are several stone feature elements in the facades including cornices, keystones, and window sills.

- The majority of the windows are double or single hung units with wood frames incorporating sealed double glazed units. There is a combination of wood frame and aluminum vertical sliding and fixed sealed units that were installed in 1977.

- There is a ridge skylight that appears to be original to the 1922 building. The metal framed skylight is glazed with Georgian wired glass.

- The roofs are primarily flat with a conventional built-up roof membrane system replaced between 1996 and 2000. The roof assembly is on a 4” thick lightweight concrete slab.

- The exterior main entrance doors are solid wood with a stain finish.

2.1.2 Dentistry Pharmacy Centre Building Condition Report 110926

This report documents a high level review of the buildings condition with little or no analysis. Observations of significance include the following:

- The overall building structure and exterior envelope are in generally acceptable condition.

- The exterior walls consist primarily of solid brick and composite masonry assemblies with raked joints. Exterior block walls on the centre wing are painted.

- Tyndall stone accents and banding are used throughout. Glass block accents are also used.

- Windows are single and double hung wood framed vertical sliders with insulating glass units. Doors are solid wood framed.

- Flat roofs consist of conventional BUR systems renewed between 1996 and 2000. The roofing is nominally insulated on a 4” lightweight concrete slab.

- Steel framed skylights incorporating Georgian wired glass are located on the east wing.

2.2 Enclosure Review Methodology

The on site visual reviews were conducted by Mr. Mark Brook, P. Eng. on various dates between December 2011 and July 2012. Further on site review was carried out by various Stantec staff including Mr. Jason Lowe over the same time period. In addition to visual review some limited intrusive examination, involving removal of local areas of brick and selected windows, was carried out by Stantec staff and a contractor provided by the University as documented below. The intent of the site review was to confirm previously reported observations and to identify any missing information critical to the decision making process.

Figure 2 - 1922 Selective Demolition - West Facade

Figure 3 - 1922/1946 Window Investigation Locations (West Elevation)

Figure 4 - 1958 Window Investigation Location (North Elevation)

2.2 Examination of Existing Conditions

2.3 Building Review

As noted elements of the building envelope have been built at different times using slightly varying techniques. Observations were made and grouped according to location and system such as walls, windows and doors and attic and roof.

2.3.1 Above Grade Walls

The details of the above grade walls were viewed from the exterior at grade level and from the roof and on the interior at isolated locations on various floor levels and from accessible attic spaces. With some exceptions the general configuration of the walls is consistent with the observations in the previous reports. Notwithstanding significant areas of poor mortar jointing, the masonry is in generally good condition. Isolated areas of stone distress and mortar erosion were noted. No significant spalling or fracturing consistent with freeze thaw deterioration was noted.


1922

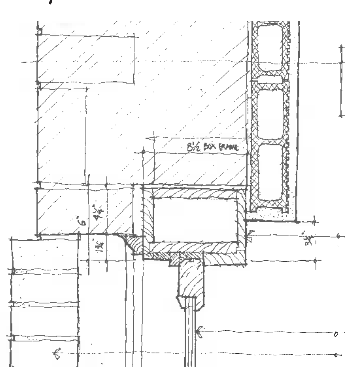

1946/47

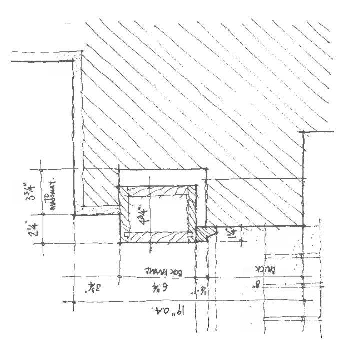

1958

Figure 5 - Existing Brick Masonry Types/Condition

The wall cross section in the 1922/46/47 blocks was confirmed in the window test opening programme (see below) and consists from inside to out of painted plaster and lath on multiple wythes of clay brick with brick or stone facing. No plaster was noted above the ceiling levels. Site review at exposed conditions on the interior revealed no insulation at the exterior walls.

While the 1958 addition generally matches with respect to brick colour the brick texture and joint pattern varies and shelf angles consistent with a cavity wall are visible. Joints are raked and in generally better condition than the other earlier wall areas. The wall cross section was confirmed in the window test opening programme (see below) and consists from inside to out of painted plaster, concrete block, air void and clay face brick.


1922 Wall Assembly


1946/47 Wall Assembly

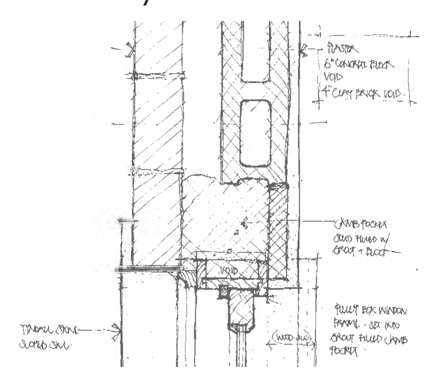

1958 Wall Assembly

Figure 6 - Existing Wall Assemblies

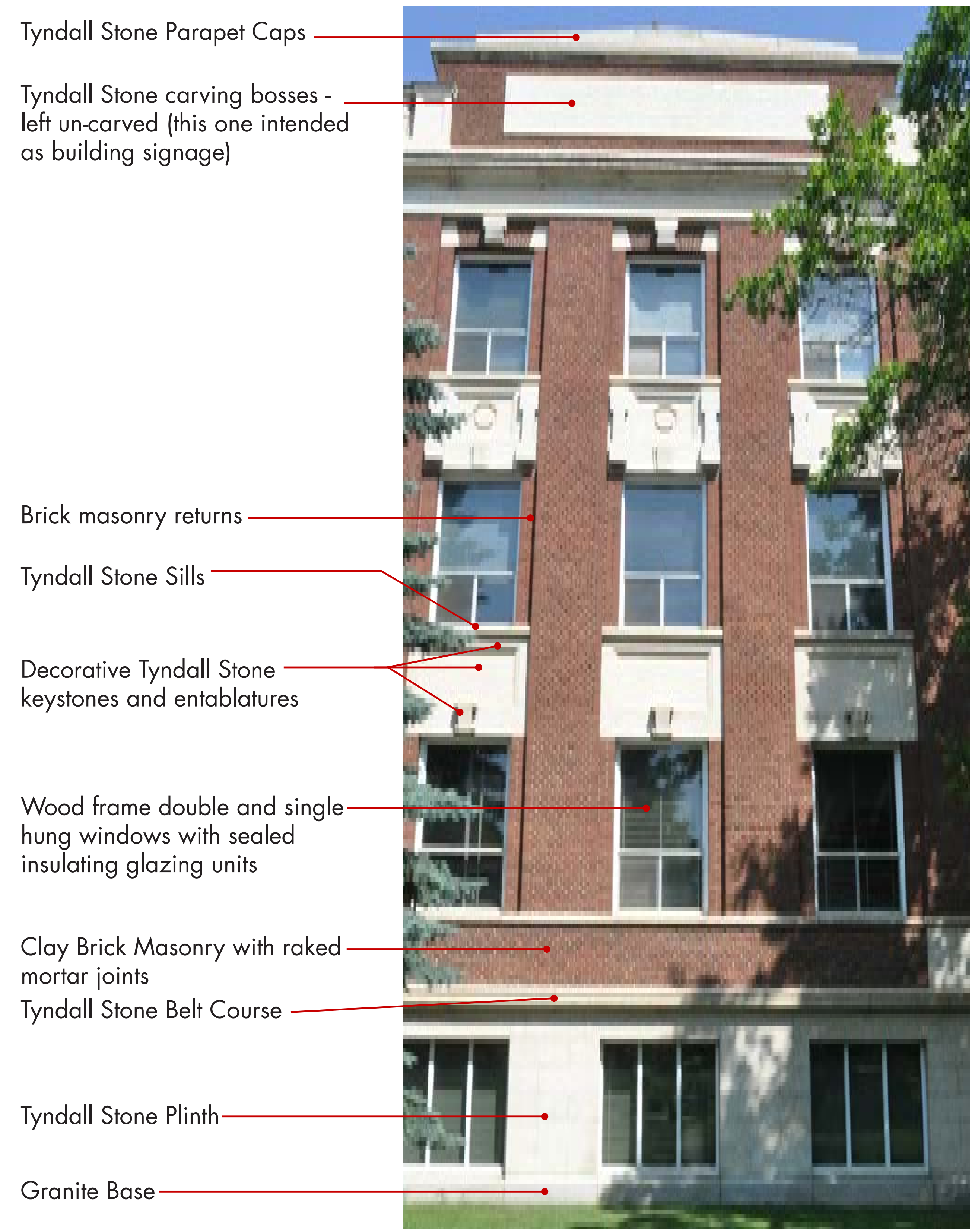


Figure 7 - 1922 Wall "Anatomy"

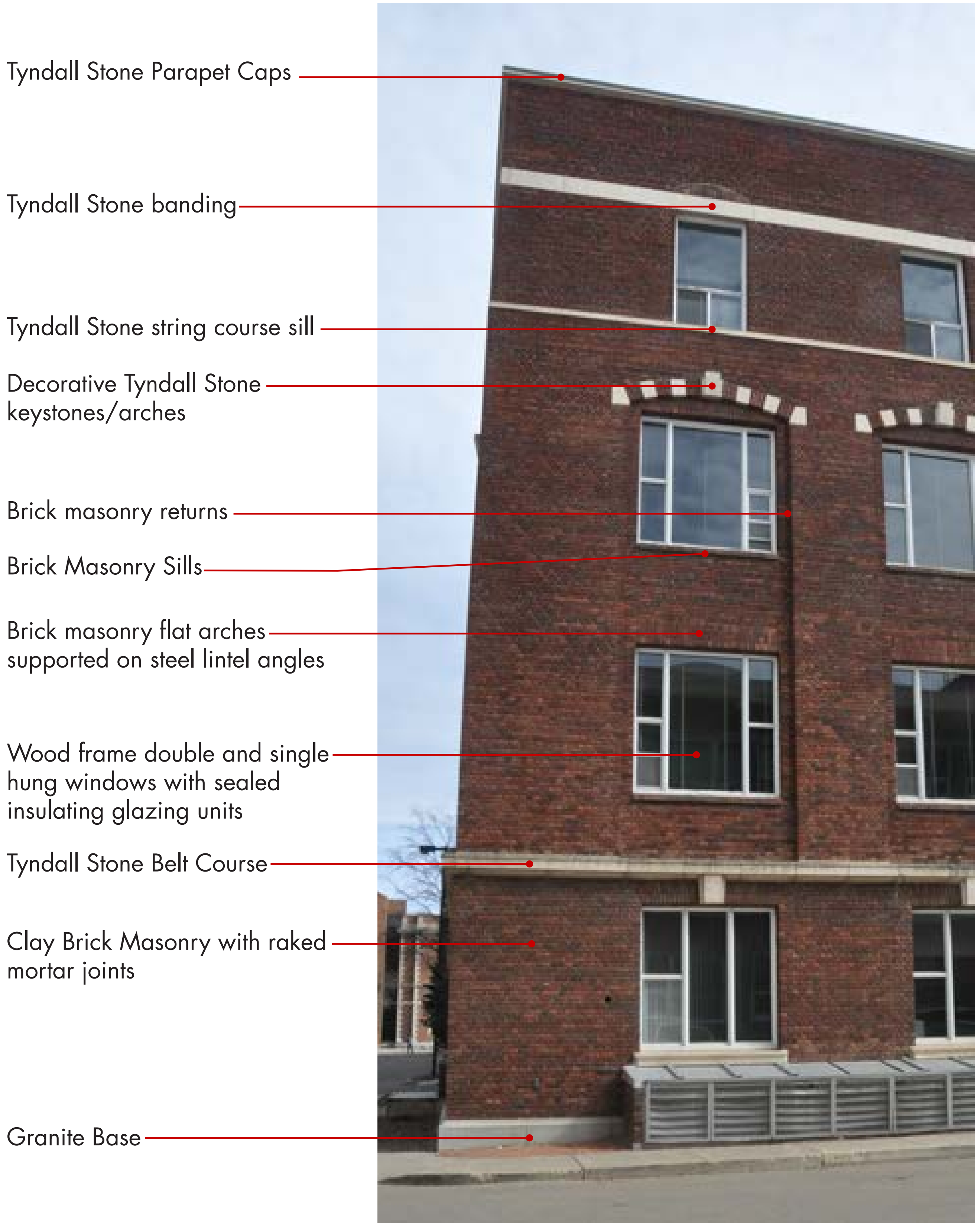


Figure 8 - 1946 Wall "Anatomy" (1947 Similar)

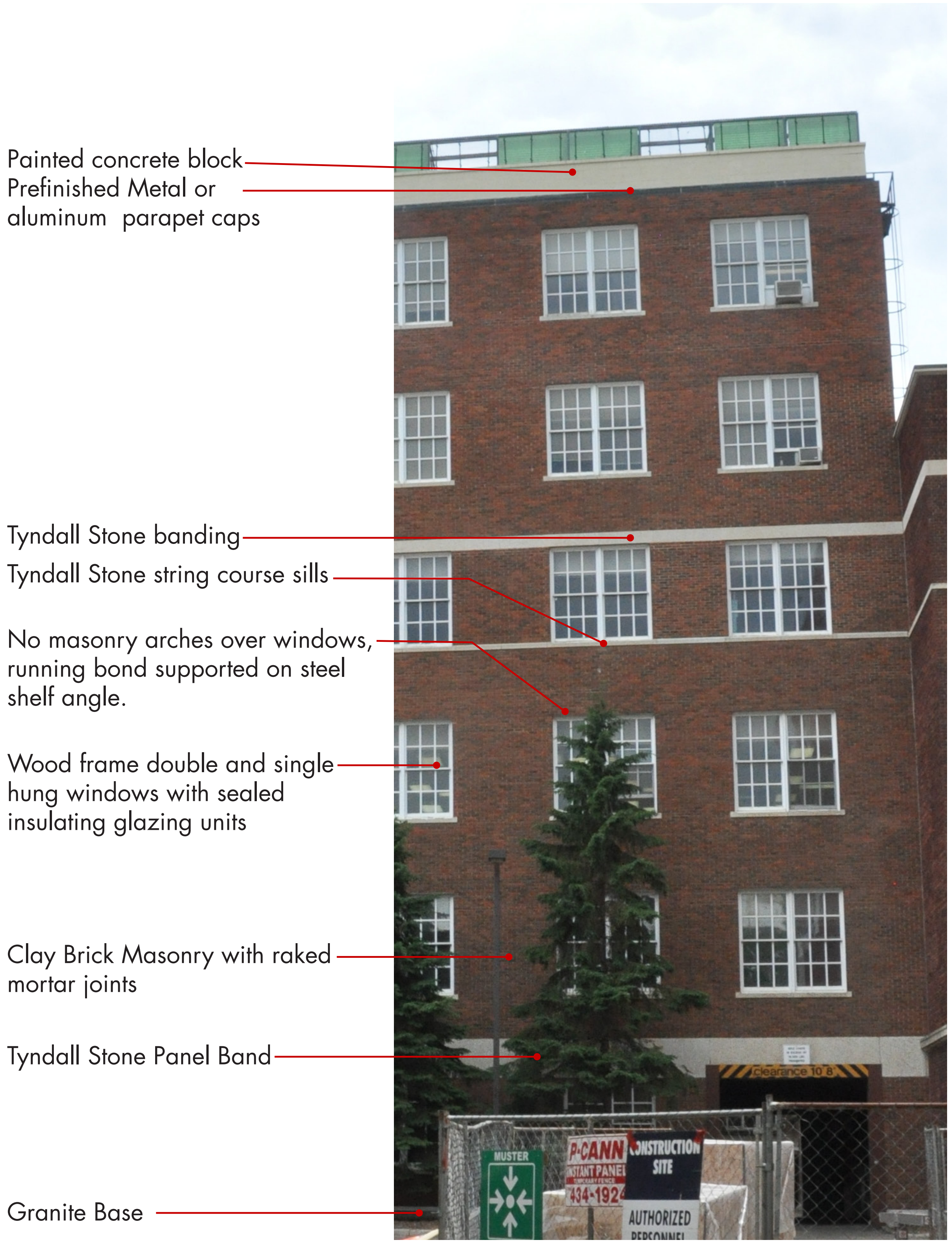


Figure 9 - 1958 Wall "Anatomy"

2.2 Examination of Existing Conditions

2.3.2 Windows and Doors

As the intent is to replace the existing windows a detailed survey was not conducted. However further information regarding the perimeter conditions at the windows is important as it relates to the window replacement design. As such window glazing and portions of window frames were removed at three locations to sample the construction in the 1922, 1946 and 1958 buildings. In all cases the frame assembly was removed to expose the masonry at the rough opening at the sill, jamb and head. Full details of this investigation as documented by Jason Lowe are included in the following pages.

The main entry doors are solid stained wood and in condition suitable for refurbishing.

Figure 10 - 1946 - North-West Stair Entrance

Figure 11 - 1947 - East Entrance

Figure 12 - 1922 - Main South Entrance

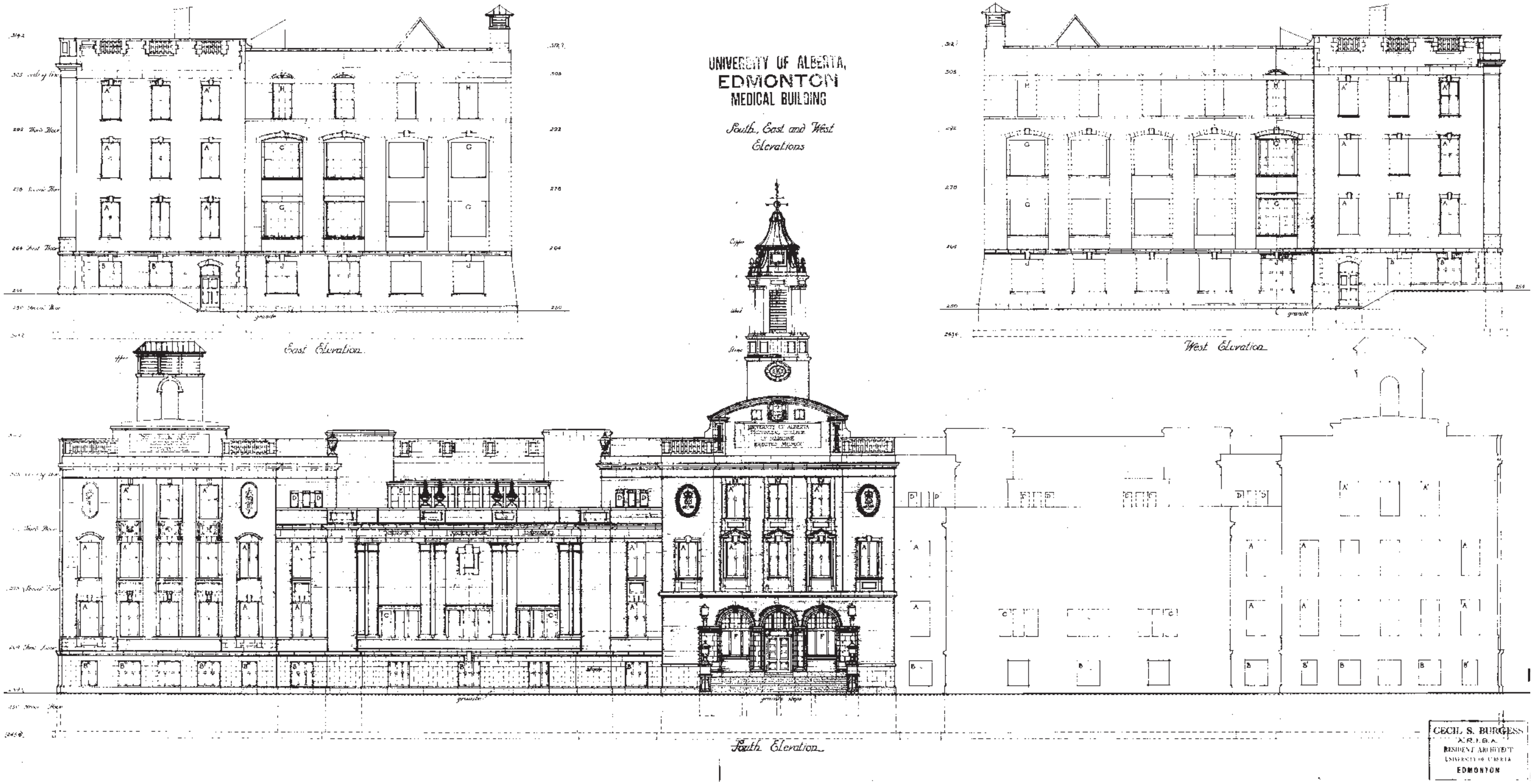


Figure 13 - 1922 Original Building Elevations

2.2 Examination of Existing Conditions

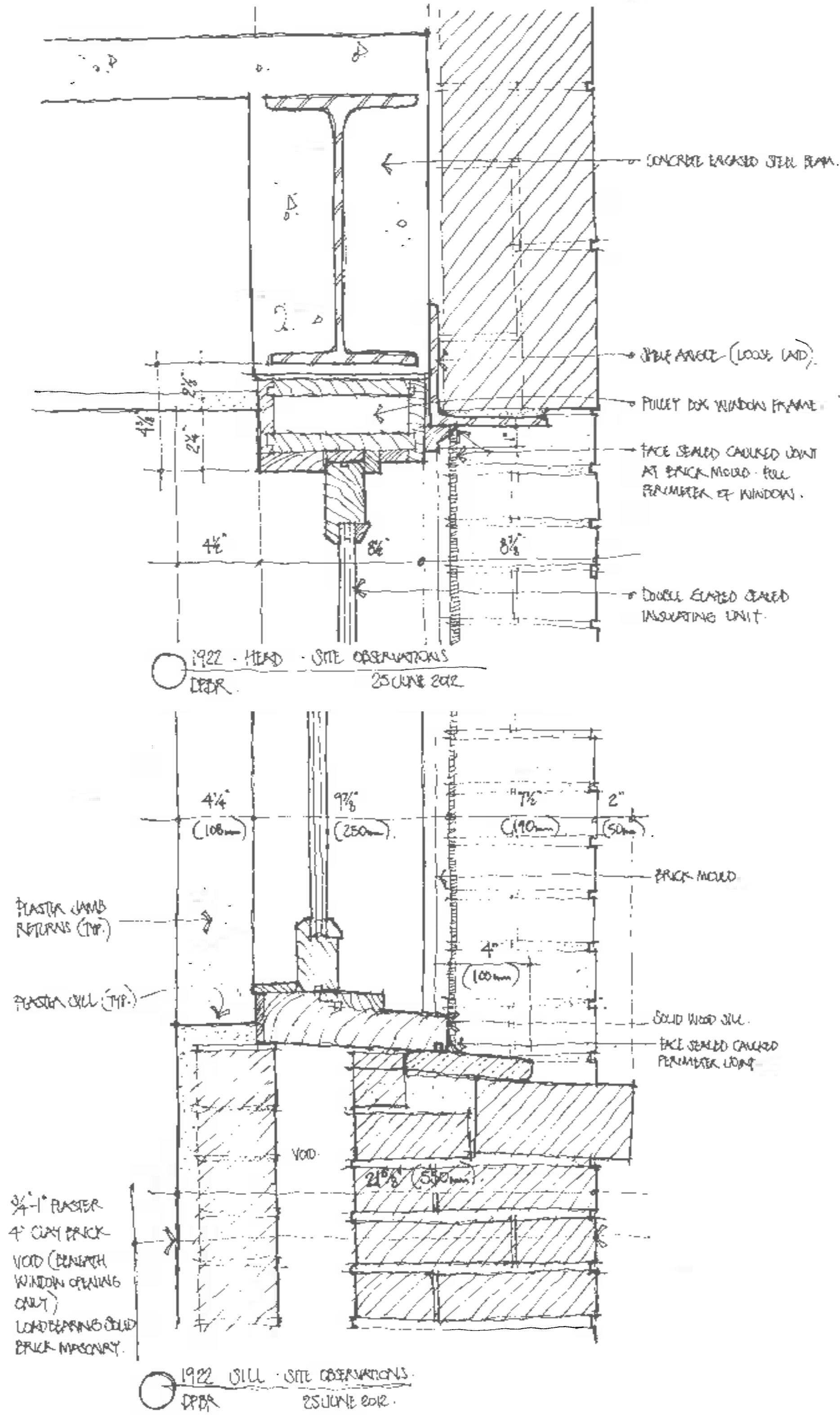


Figure 14 - 1922 Window - Sketch Detail - Head and Sill - Section

Figure 15 - 1922 Window - Head

Figure 16 - 1922 Window - Jamb looking at Sill

Figure 17 - 1922 Level 1 Window Detail - Sill

Figure 18 - 1922 Window - Level 2 Head

Figure 19 - 1922 Window - Level 2 Sill

2.2 Examination of Existing Conditions

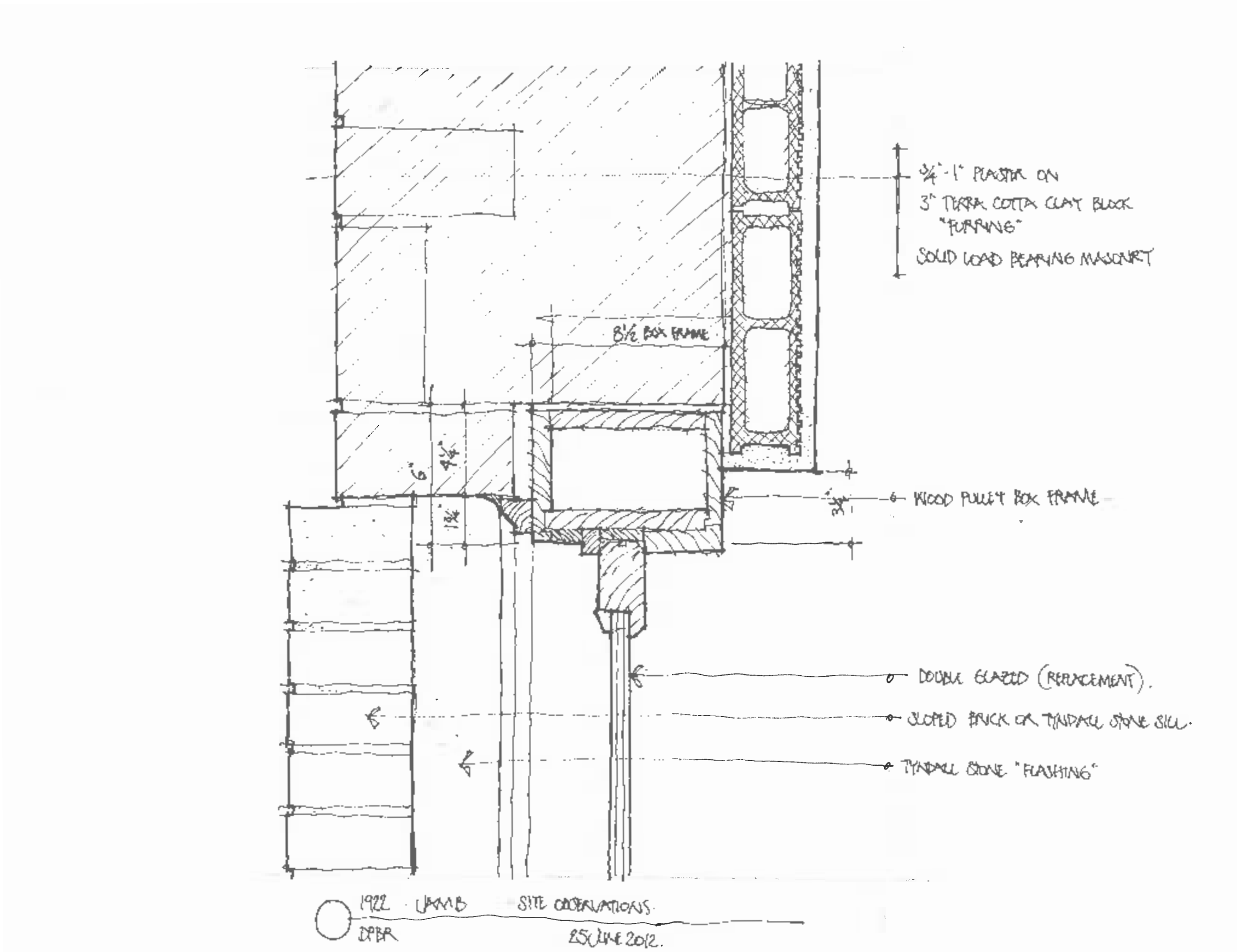


Figure 20 - 1922 Window - Sketch Detail - Jamb

Figure 21 - 1922 Window - Jamb looking at Head

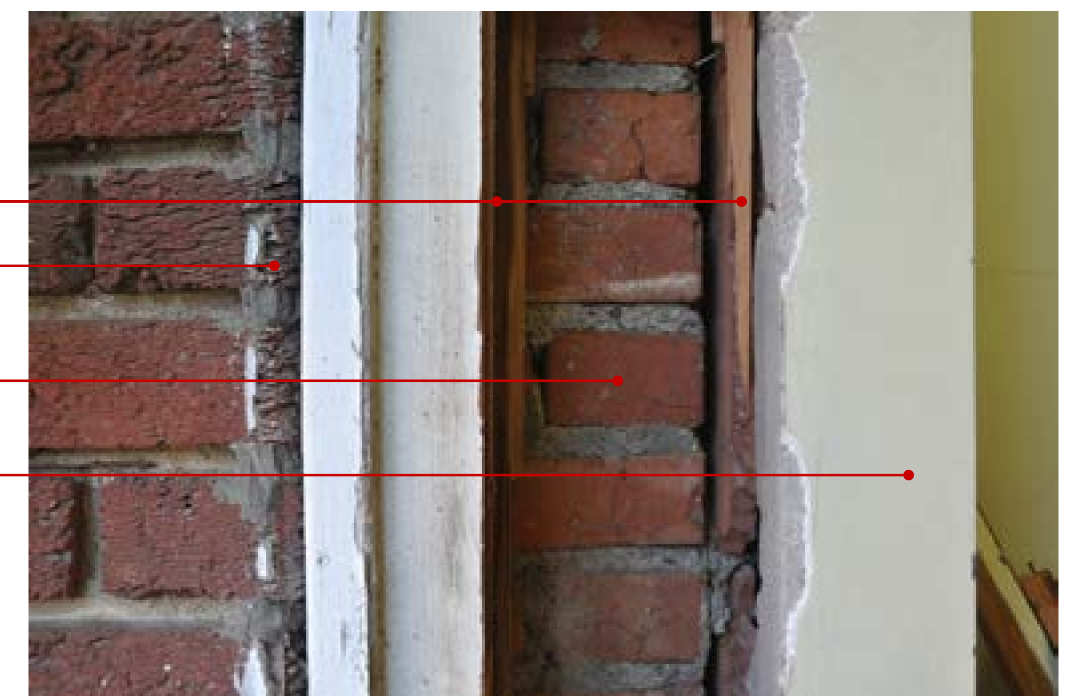


Figure 22 - 1922 Window - Jamb

2.2 Examination of Existing Conditions - Building Review - 1922 Windows

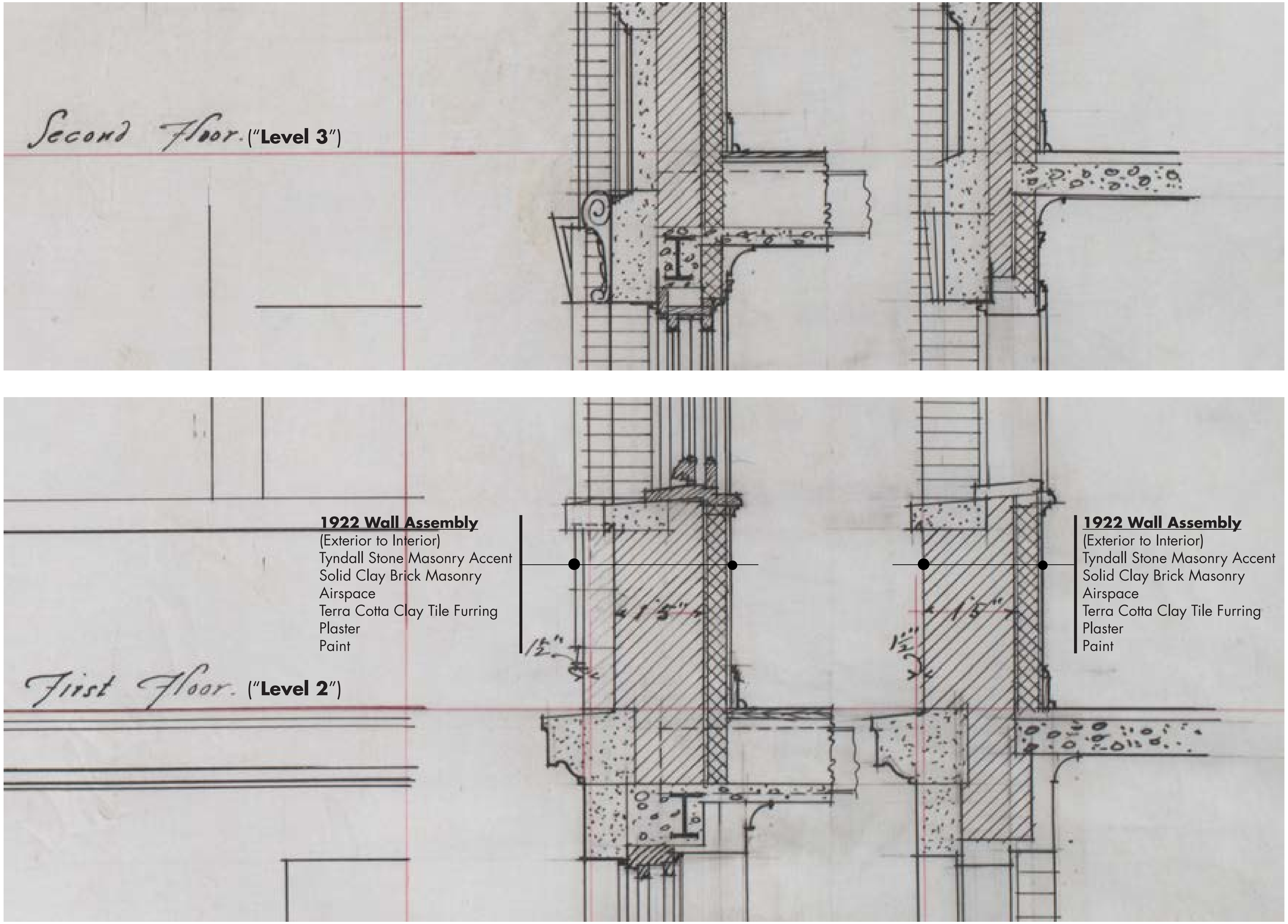


Figure 23 - 1922 Window - Original Window Sections

Figure 24 - 1946 Windows - North Elevation West Wing

Figure 25 - 1946 Windows - West Elevation West Wing

2.2 Examination of Existing Conditions - Building Review - 1946/47 Windows

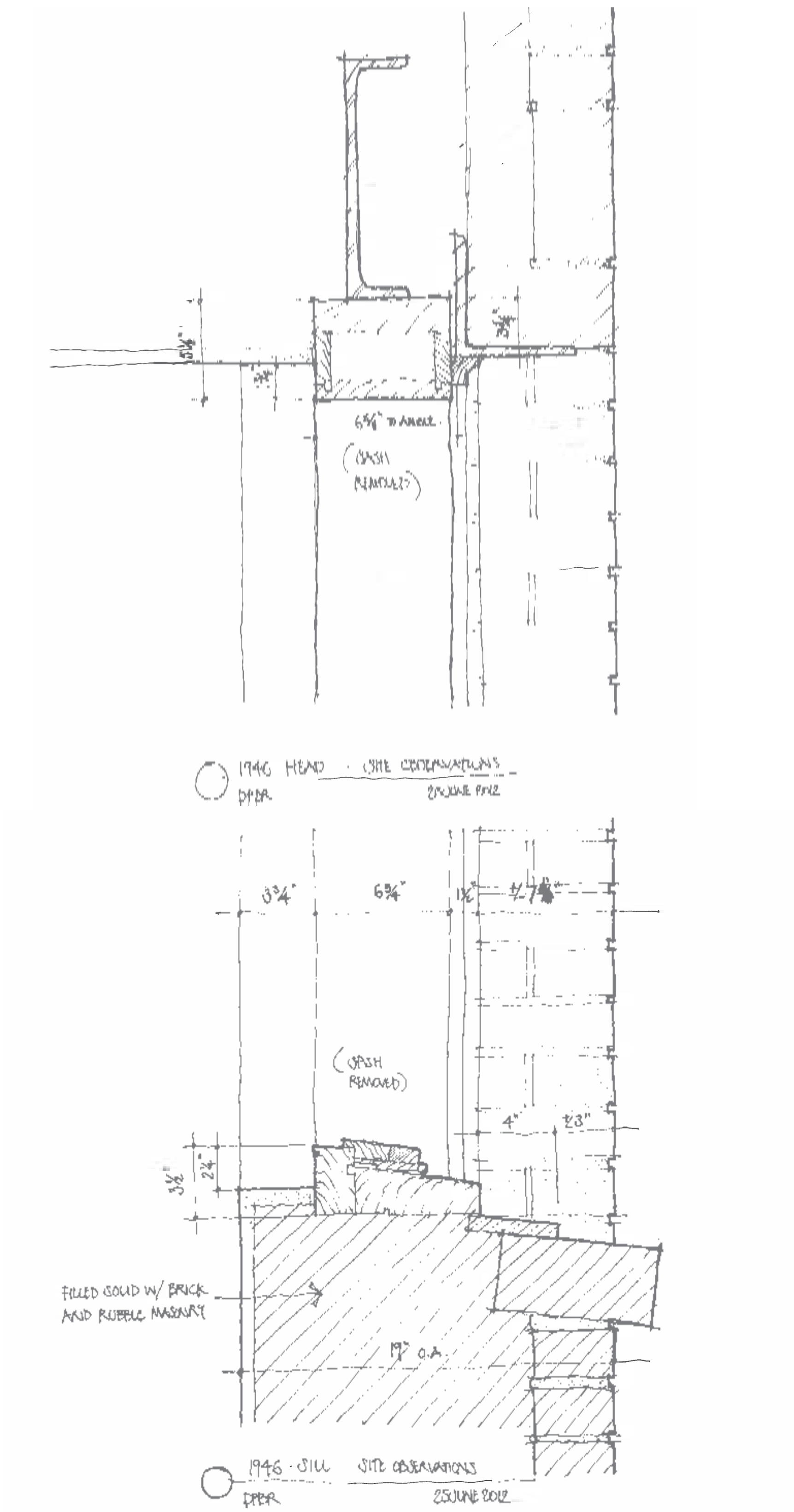


Figure 26 - 1946 Window - Sketch Detail - Head and Sill

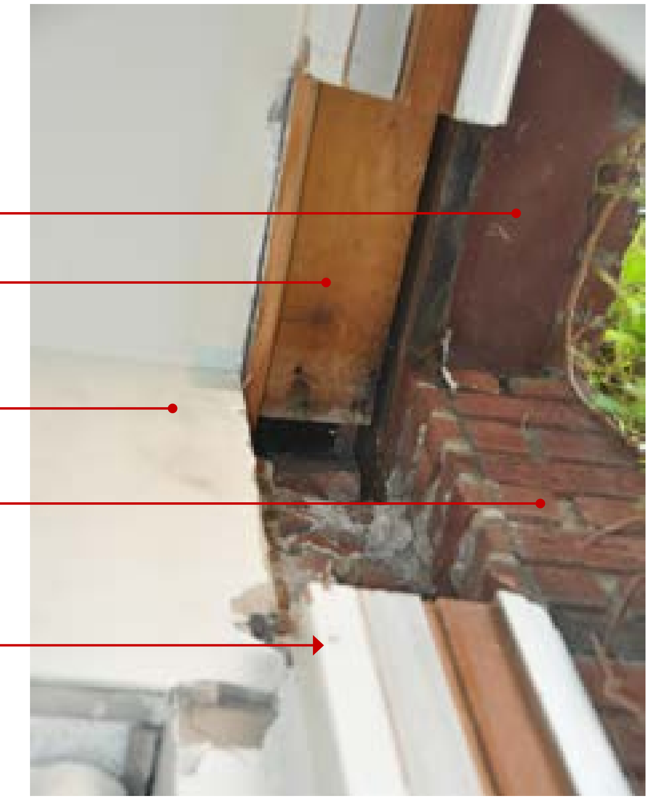


Figure 27 - 1946 Window - Head

Figure 28 - 1946 Window - Sill

2.2 Examination of Existing Conditions

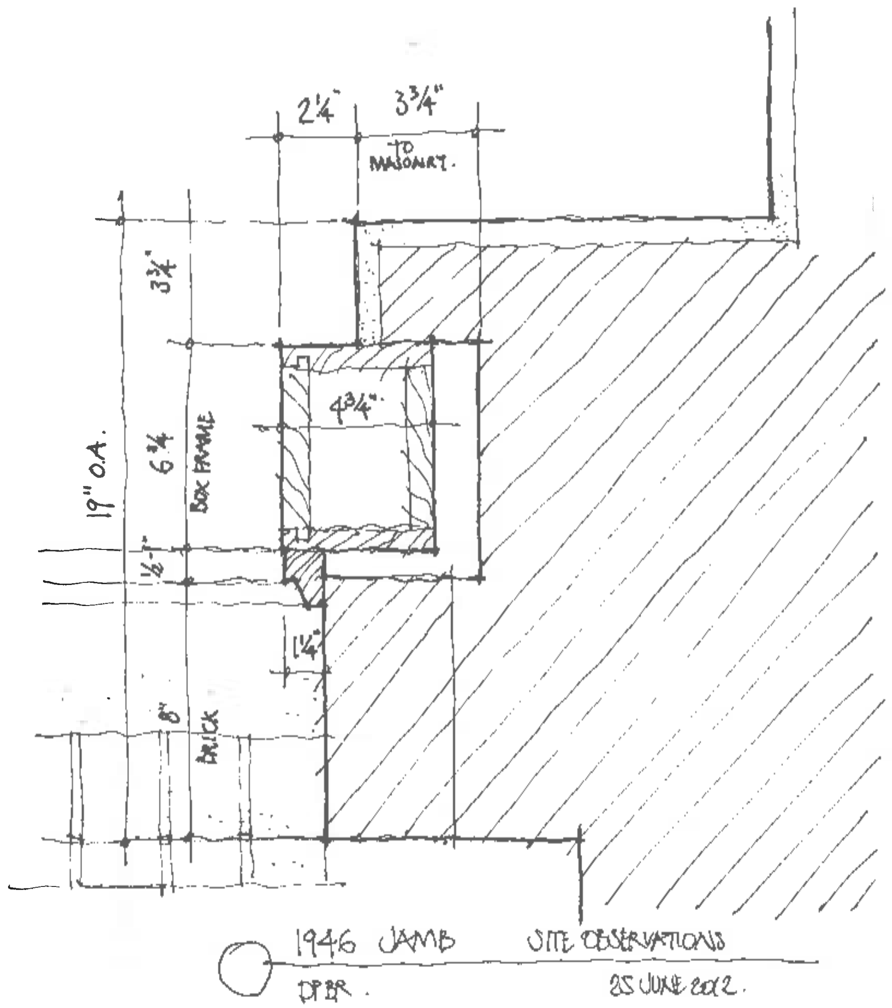


Figure 29 - 1946 Window - Sketch Detail - Jamb

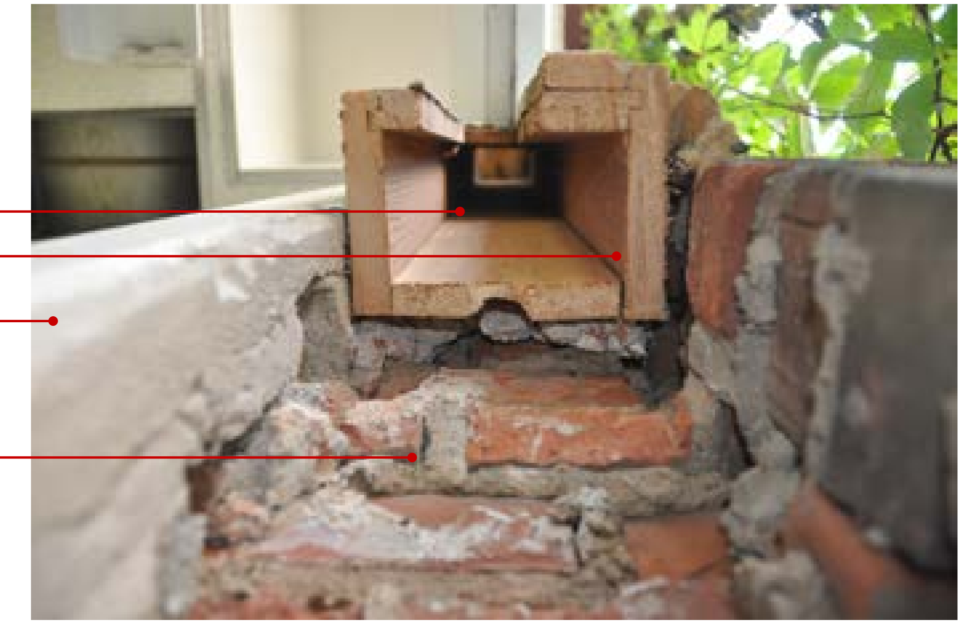


Figure 30 - 1946 Window - Jamb - Pully box frame looking up at Head

Figure 31 - 1946 Window
Jamb exposed at Sill

Figure 32 - 1946 Window - Head

Figure 36 - 1946 Window - Sill

Figure 33 - 1946 Window - Head

Figure 34 - 1946 Window
Exterior Sill Condition

Figure 35 - 1946 Window - Sill at Jamb - exposed

2.2 Examination of Existing Conditions

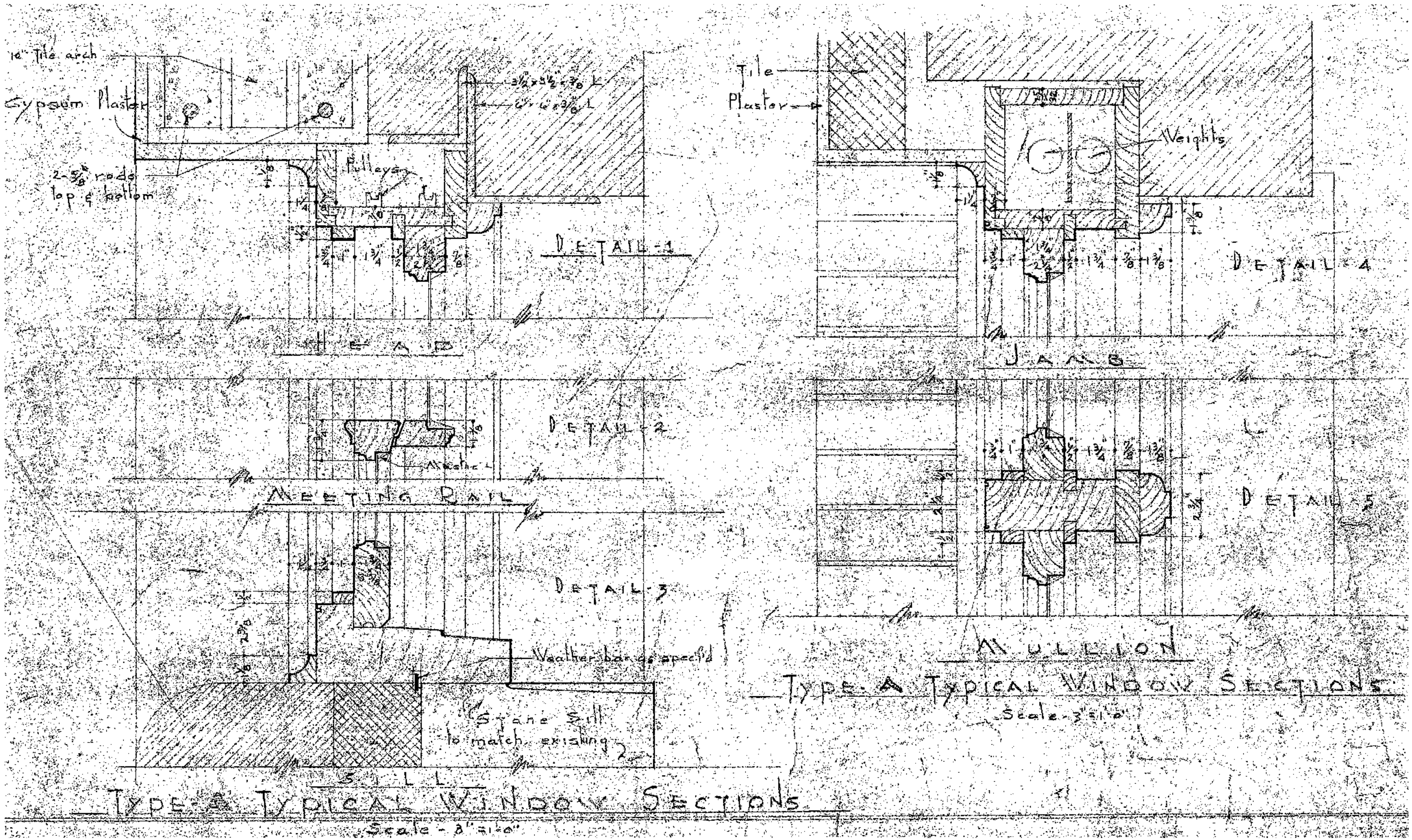


Figure 37 - 1946 Window - Original Drawings - Section Details

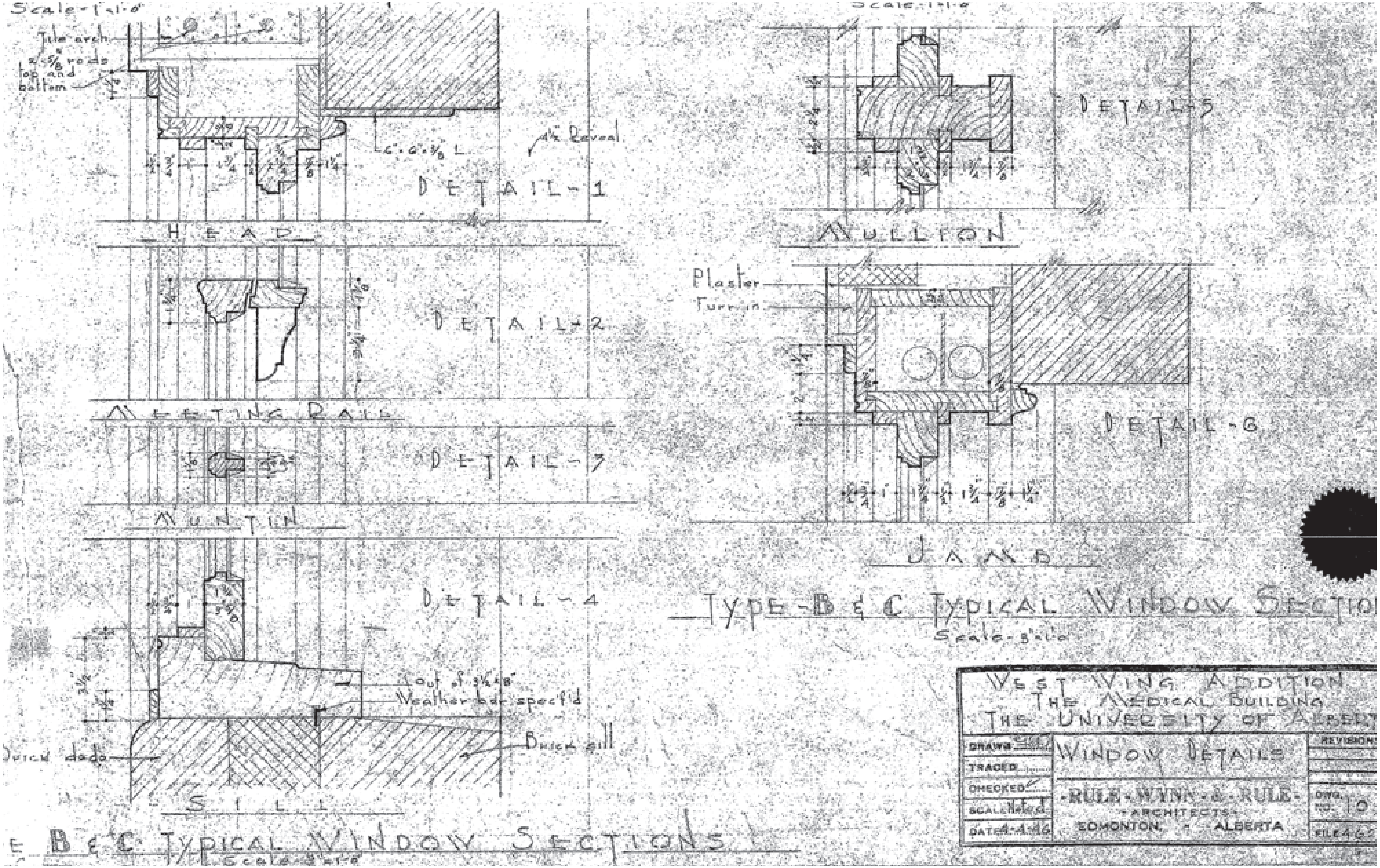


Figure 38 - 1946 Window - Original Drawings - Section Details

2.2 Examination of Existing Conditions

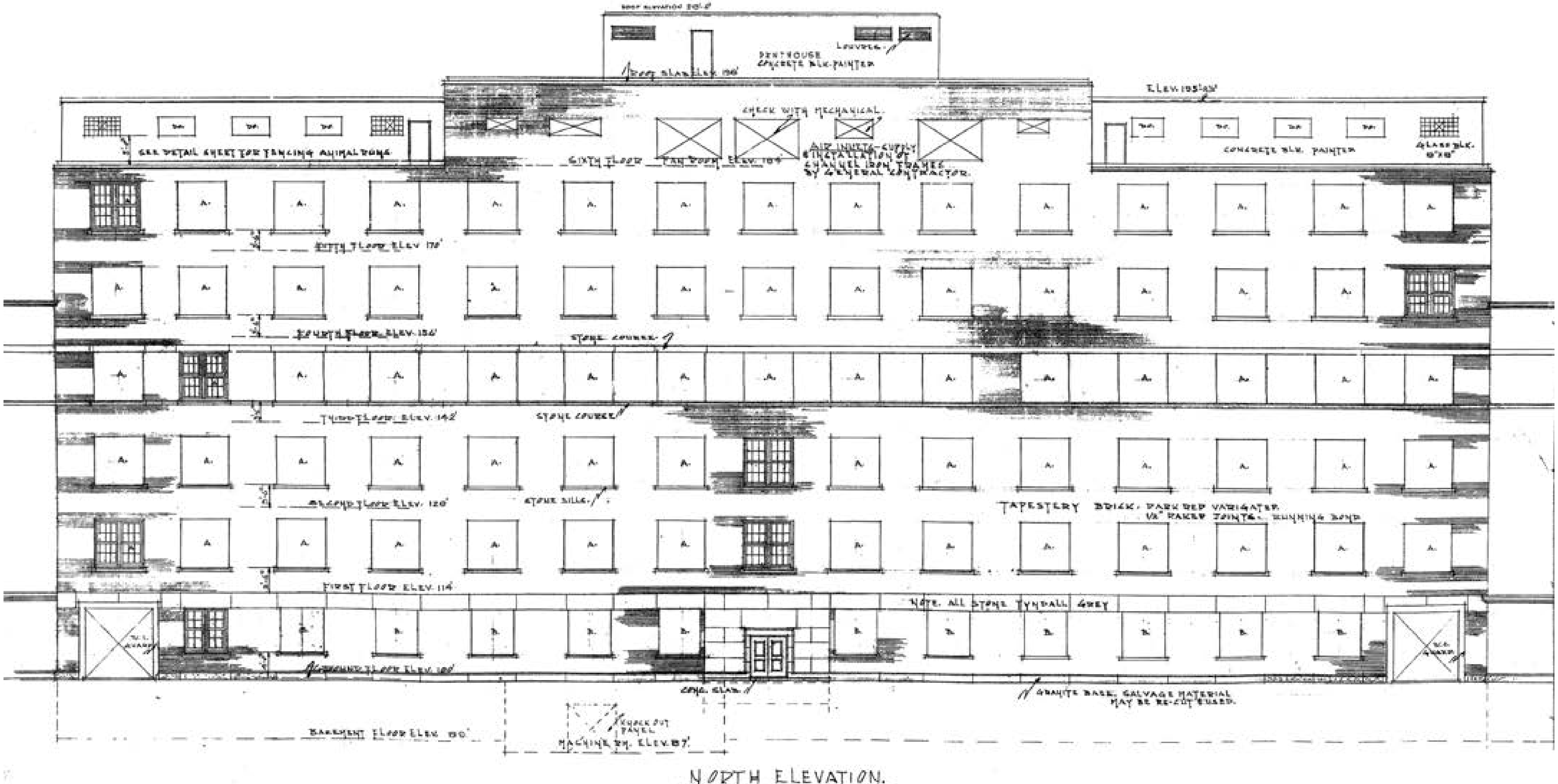


Figure 39 - 1958 North Elevation

2.2 Examination of Existing Conditions - Building Review - 1958 Windows

Figure 40 - 1958 View of North Facade from Triffo Hall

2.2 Examination of Existing Conditions

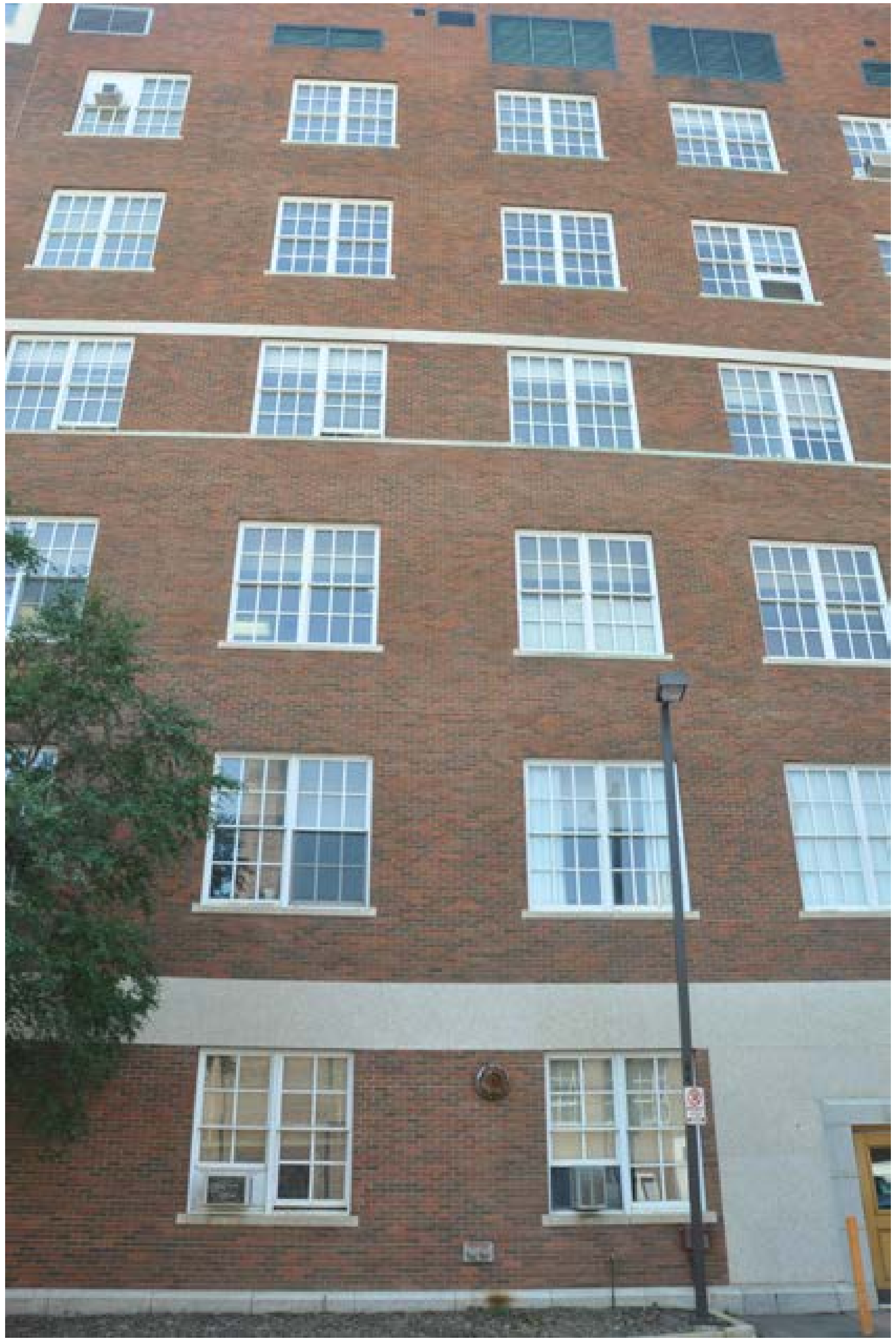


Figure 41 - 1958 Window - Level 1 Elevation

Figure 42 - 1958 Window - Level 1 Elevation

Tyndall Stone Band

Shelf Angle

Figure 43 - 1958 Window - Head

Figure 47 - 1958 Window - Sill Elevation

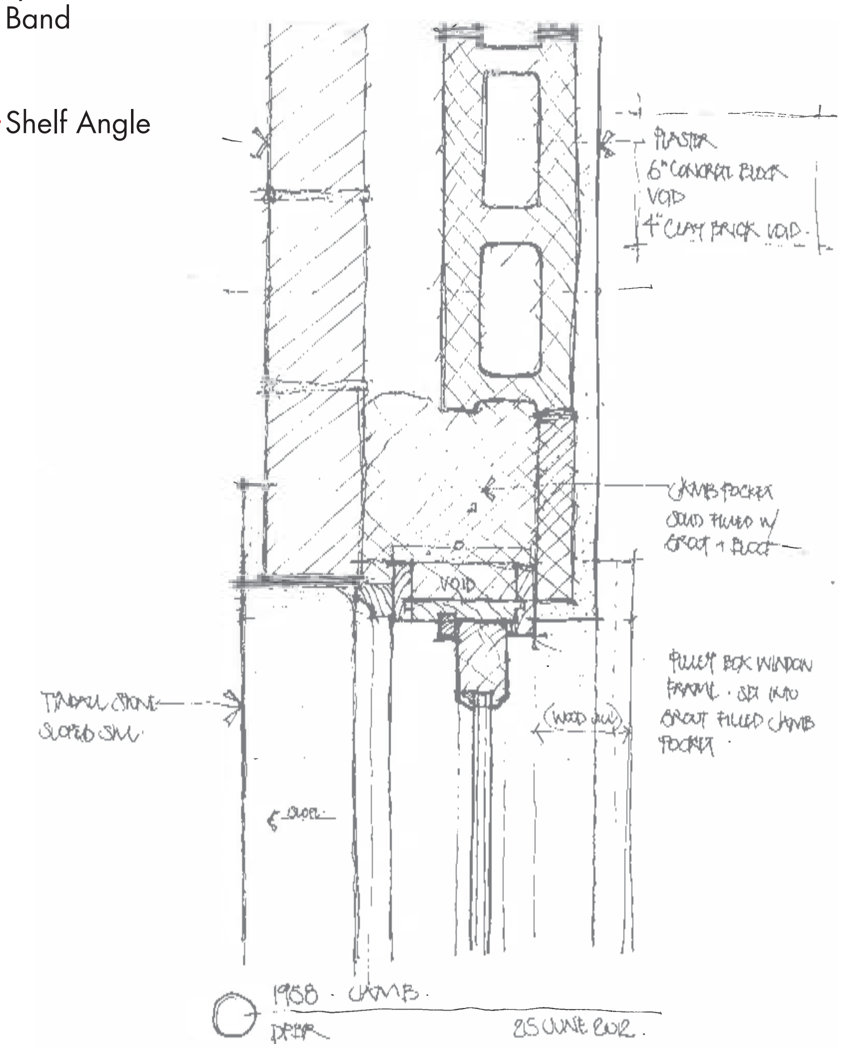


Figure 44 - 1958 Window - Site Observations - Sketch Detail - Level 1 Jamb

Wood blocking infill below structural steel

Shelf Angle

Sealant Joint "Face Sealed"

Void (Airspace) behind brick veneer

Figure 45 - 1958 Window - Head and Jamb

Plaster returns

Concrete block and mortar "rubble fill"

Tyndall Stone Sill

Figure 46 - 1958 Window - Sill and Jamb

2.2 Examination of Existing Conditions

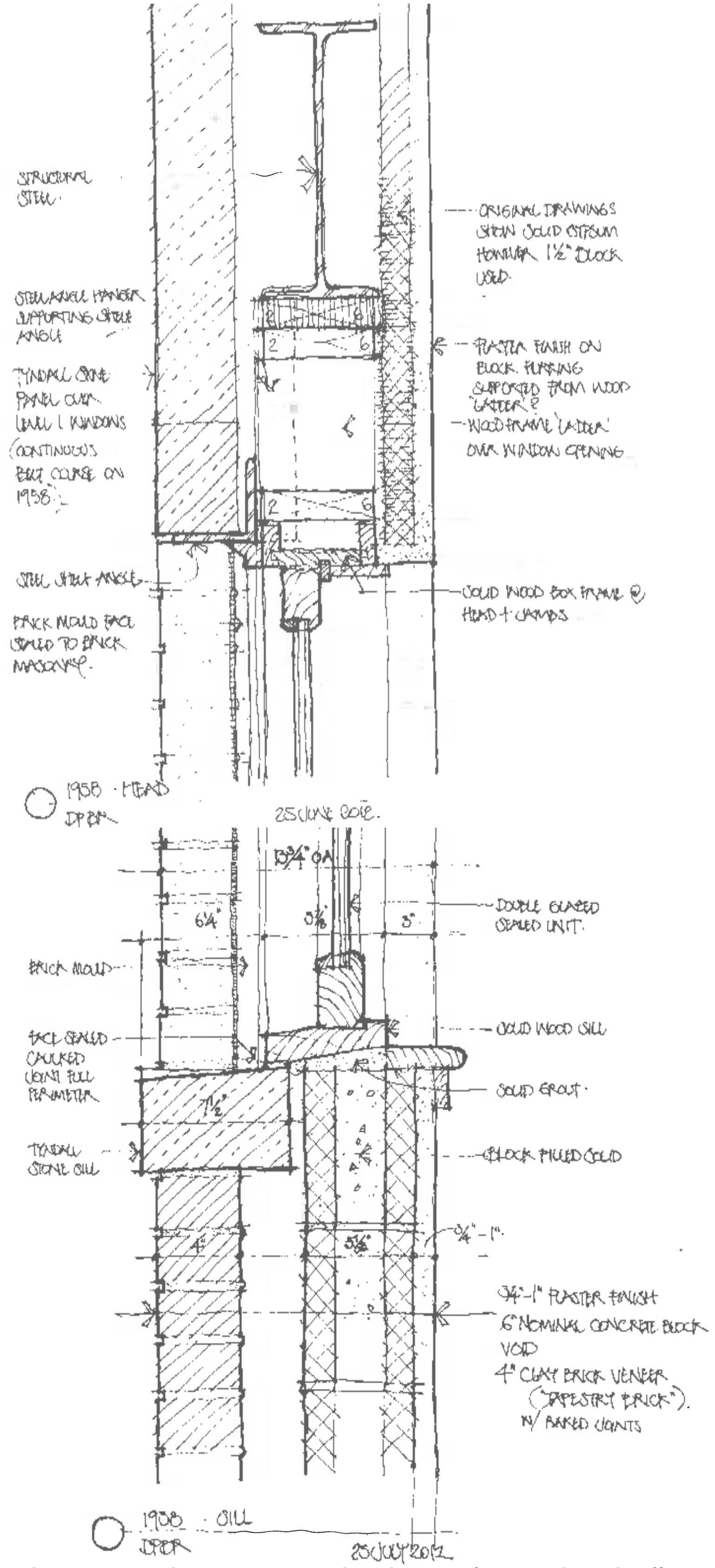


Figure 48 - 1958 Window - Site Observations - Sketch Detail - Head and Sill - Section

Figure 49 - 1958 Window - Head

Figure 50 - 1958 Window - Sill

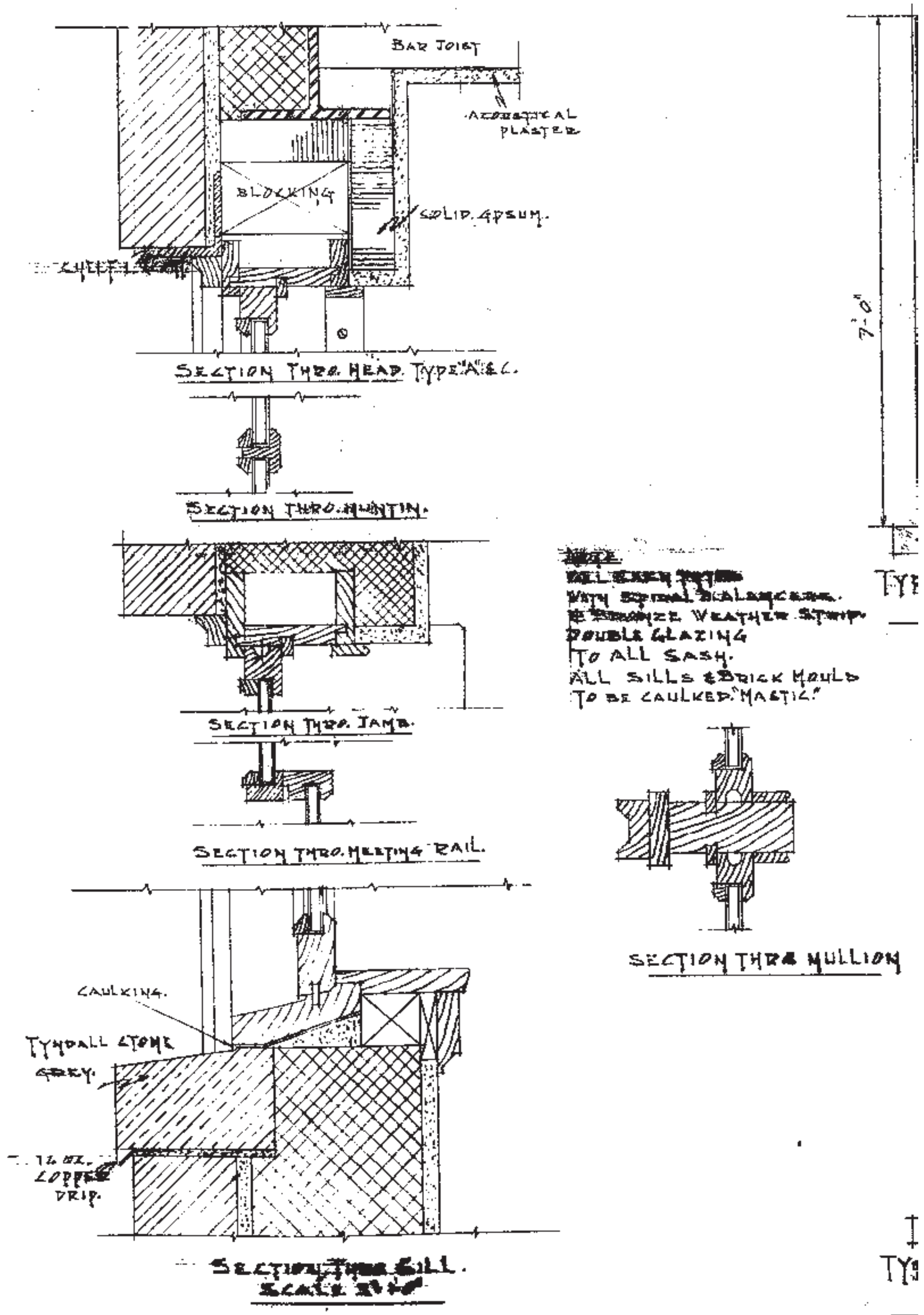


Figure 51 - 1958 Window - Original Drawings - Section Details

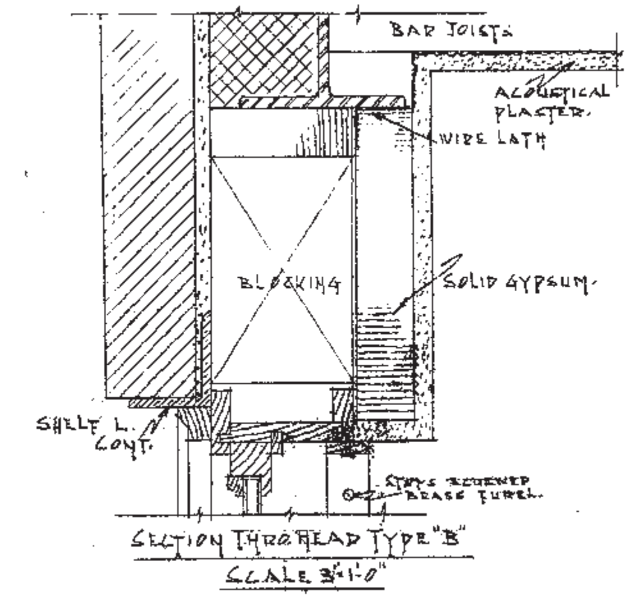


Figure 52 - 1958 Window - Original Drawings - Section Detail at Head

2.2 Examination of Existing Conditions

2.3.3 *Attic and Roof*

Attic spaces accessed in the original building revealed a significant amount of wood framing. While there is evidence of prior water entry there was no evidence noted of chronic water entry. Exposed masonry walls in the attic spaces were free of significant efflorescence. Access to the cupola space revealed black staining in the upper reaches of the structure indicative of local mold growth.

Figure 54: 1922 Typical Attic Space

Figure 53: 1922 Spire Interior - Black stains indicate mold growth on wood members.

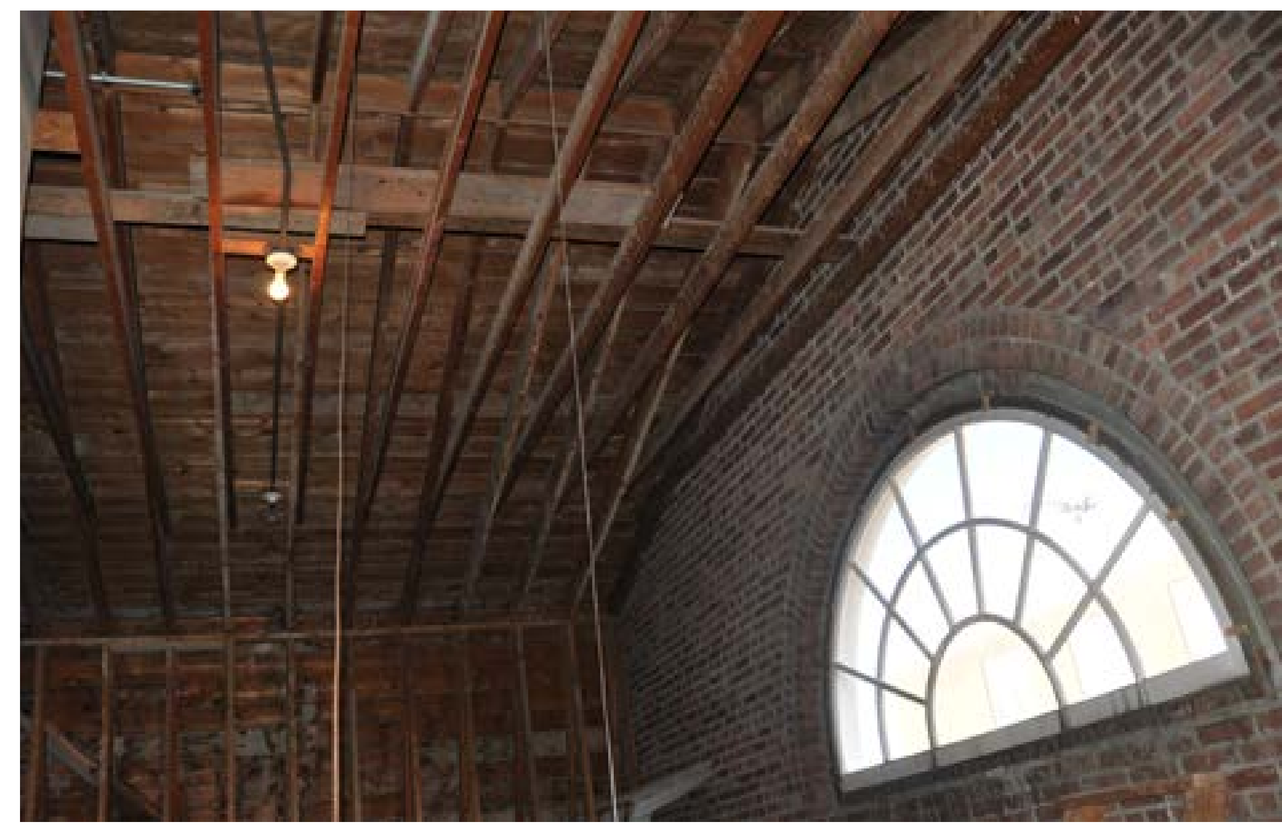


Figure 55: 1922 Mechanical Room - Gambrel Roof

Figure 56: 1922 South West Rooftop

Figure 58: 1922 South West Roof

Figure 57: 1922 South East Roof and Spire

Figure 59: 1958 Roof

2.2 Examination of Existing Conditions

Figure 60: 1922 Roof Cut

Figure 61: 1946 Roof Cut

Figure 62: 1958 Roof Cut

Roof Assemblies

1922 Roof Assembly

Exterior
Gravel
Asphalt Tar
+/- 10 layers tar paper
Wood plank ship-lap sheathing
Interior (Attic)

1946 Roof Assembly

Exterior
Gravel
Asphalt Tar
Roofing Felt/Paper
2 layers 1/2" thick fibreboard
Tar paper
Wood plank ship-lap sheathing
Interior (Attic)

1958 Roof Assembly

Exterior
Gravel
Asphalt Tar
Single ply roofing felt/paper (1/8" to 1/4" thick)
Roof slab (3" Zonolite lightweight concrete)
Interior (Occupied space)

1922 Gambrel Roof

Asphalt Shingles
Building Paper
Wood Plank Ship-lap sheathing

1922 Chimneys/Spire

Copper Shingle or Standing Seam Metal roofing
Building (tar) paper (Assumed)
Wood deck

Figure 62: 1958 Roof Cut

Figure 62: 1958 Roof Cut

2.2 Examination of Existing Conditions

2.3.4 Above the Roof: Parapets, Chimneys, Doghouses, Daylighting and the Cupola

Above the roof level there exists a number of elements that also comprise important aspects of the building envelope. Numerous parapet conditions, projections above the roof and penetrations through the roofing system will all need to be addressed in an eventual re-roofing of the Dentistry Pharmacy building.

Parapets

Several different parapet conditions exist and a variety of methods are employed in their waterproofing and weathering protection.

1922 Building

The 1922 building has predominantly stone parapet caps, some of which have been capped with galvanized steel and others that have been left exposed. The sheet metal cap is of welded construction in some locations and in others has been caulked with sealant - significant areas of which are rusting and there is evidence of failed seaming. In addition the 1922 building has a number of decorative Tyndall stone elements (urns, finials and special profiles) that have been left exposed.

In several locations the back side of the parapets that rise above the roof level have been clad with a galvanized sheet metal some of which is original construction. Rust is apparent in many locations.

1946 and 1947 Wings

The 1946 and 1947 wings also have stone caps and have been capped with a brown pre-finshed sheet metal cap and flashings in most locations. At the wings the parapet does not rise much above 4-6 inches (100-150mmm) above the gravel cover with a sloped back that is most likely concealing a wood cant strip.

1958 Centre/North Wings

The newer portion of the building has only a pre-finshed metal parapet cap with no stone.

Figure 65: Above Roof Keyplan

Figure 63: 1922 Parapet - East Side

Figure 64: 1922 Parapet

Figure 66: 1922 Parapet

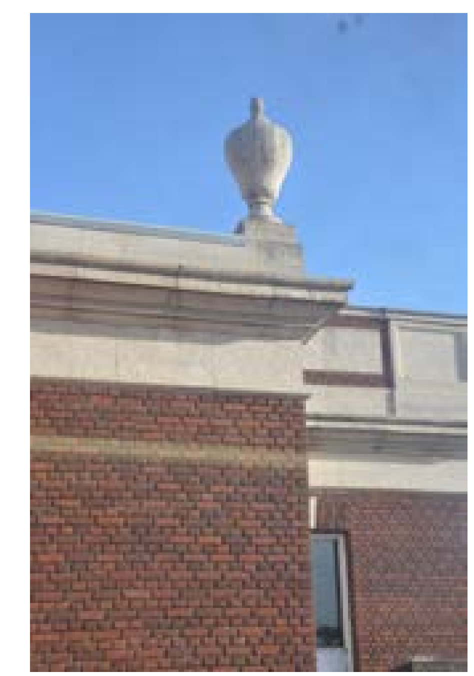


Figure 67: 1922 Parapet

Chimneys

The 1922 building incorporated several intake/exhaust chimneys in its ventilation design. These chimneys are still in use and rise above the roof level forming significant visual components of the roofline. In all cases these extensions are hollow masonry constructions with copper louvres and standing seam copper roofing and flashing in a hip roof shape. At the roof deck galvanized sheet metal flashing extends vertically up the masonry face typically sealed 12-16" above the roof with a termination bar and sealant joint. In some cases there are access doors into these shafts at the roof level.

Doghouses

Several mechanical "doghouses" exist at almost all of the various roof levels. Some of these are used for roof and attic access while others house fan rooms for intake and exhaust. Sheet metal cladding covers a wood frame construction in the 1922 building while the tops of the two north stairs in the East and West wings are solid masonry construction.

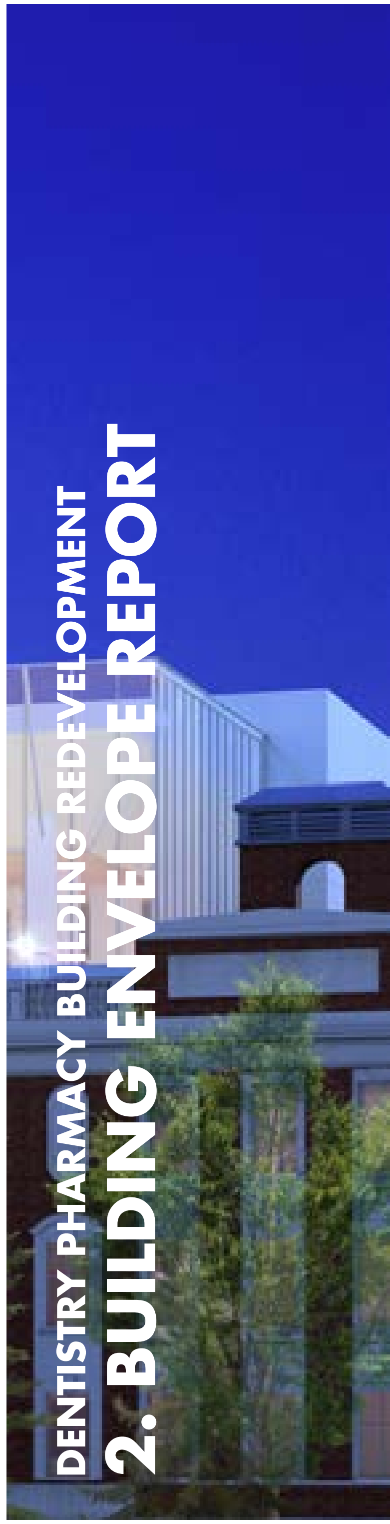
Figure 70: 1922 'Doghouse'

Figure 71: 1947 'Mechanical Doghouse'

Figure 68: 1922 Chimney

Figure 69: 1922 Chimney

Figure 72: 1958 'Mechanical Penthouse'



Daylighting
There are two distinct types of daylighting evident at the roof level - the clerestorey's above the East and West Theatres and the skylight over the East Wing.

Theatre Clerestoreys
Originally the Theatre clerestorey glazing brought light in from the south deep into the theatre space directly in the summer months and indirectly reflected off a plaster covered inclined wall in the winter months illuminating the assembly below. At some point since, the clerestorey lighting was painted black and then completely clad from the exterior with horizontal sheet metal siding.

Figure 73: 1922 Parapet

Skylight(s)
In the original 1922 design the East and West wings incorporated a skylight at the midpoint of the length of the wing. Only the East skylight remains and is clad on the south side with galvanized sheet metal and on the north side has retained its original georgian wire glazing.

Figure 74: 1922 Skylight

Figure 75: 1922 Skylight

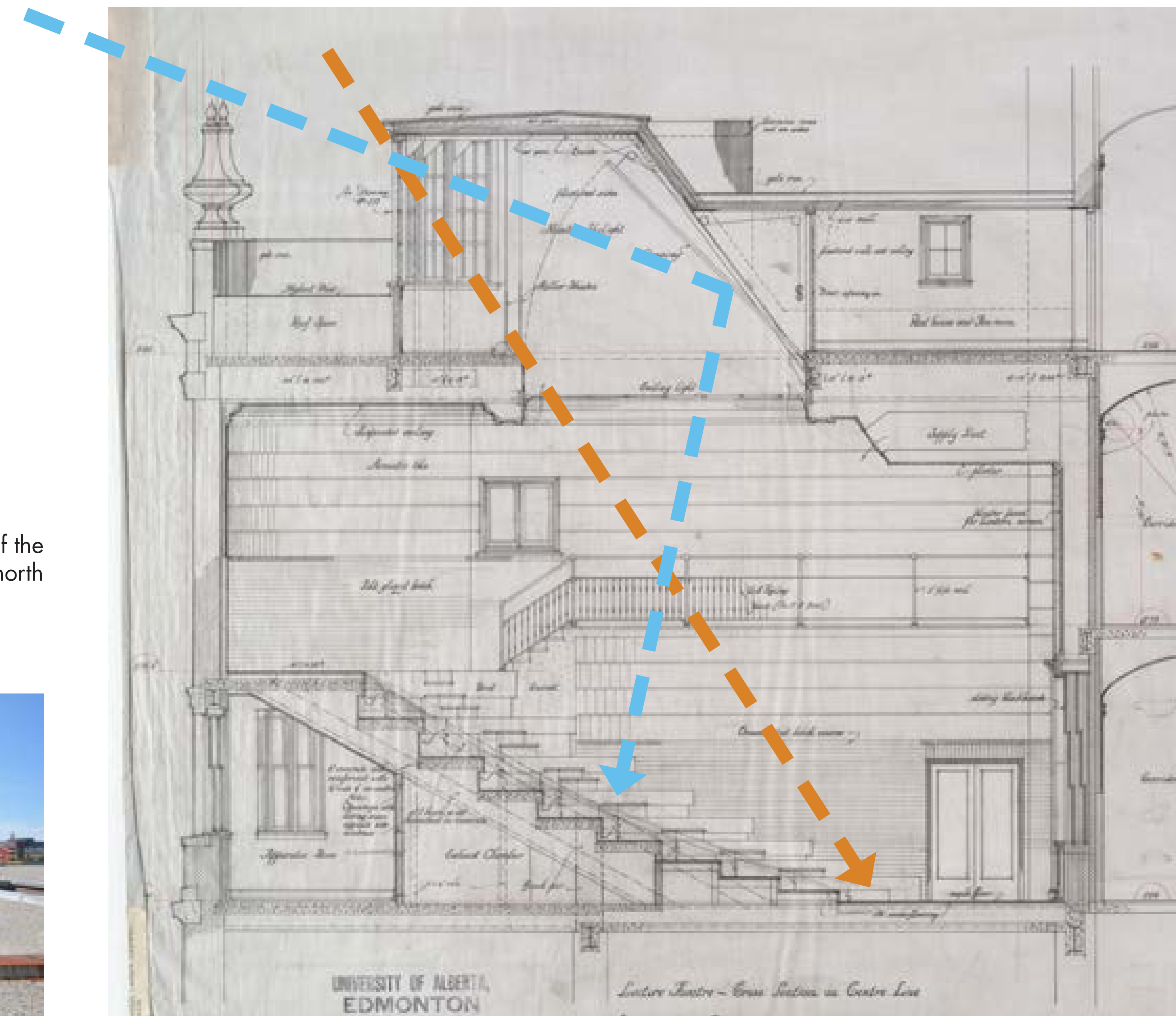


Figure 76: Theatre Clerestorey

The Cupola
The cupola is the defining visual element of the Dentistry Pharmacy Building and in addition to being the landmark point of the building also has a functional purpose acting as a mechanical exhaust chimney.

Visually the cupola is comprised of four separate materials in distinct 'layers' from top to bottom - metal, wood and two levels of masonry - a stone plinth supported by a clay brick base. Structurally the spire cupola is a wood structure set on a corbelled brick masonry foundation that is supported at the top of the central East-West corridor.

Four oval windows set into the brick base bring light into the spire interior.

The spire punches through the peak of the gambrel roof that covers the building from the decorative curved parapet of the main South entrance to the North wall of the 1922 building.

Figure 77: 1922 Cupola and Gambrel Roof

Figure 78: 1922 Gambrel Roof

Figure 79: 1922 Cupola Interior

Figure 80: 1922 Cupola Interior - Oval Windows

Figure 81: 1922 Cupola

2.3.5 Structural Systems - Site Analysis

The external masonry walls were observed from grade level and at locations where windows were investigated during the selective demolition work. The masonry was generally in good condition with no evidence of efflorescence or spalling of the brickwork. We did not observe any cracking of the brickwork or significant cracking within the mortar that would indicate movement or settlement of the walls. From grade level the walls do not appear to be out of plumb. There are extensive areas where the mortar has deteriorated or where joints are missing. It should be noted that our observations were from the outside of the building, bearing conditions of steel beams and timber sections will need to be assessed upon removal of ceilings and plaster during the refurbishment works. The cavity of the 1958 wall construction was not inspected to observe the condition of the brick ties or obstructions within the cavity.

The exterior walls to the 1922 building are load bearing and any structural deficiencies in the walls need to be remediated to ensure the continued performance of the building. We must also ensure that during the refurbishment that we do not induce any failure or degradation of the masonry. Of particular importance is maintaining the current moisture content of the bricks by not altering the location of the current dew point within the depth of the wall assembly. Structural elements bear on the exterior wall directly and again any change in the moisture content of the wall may induce degradation of these members at the bearing points. Building monitoring is taking place at present to monitor pressure differentials between indoor and outdoor, temperature (inside and out) and relative humidity levels.

2.3.6 Mechanical Systems - Site Observations

The ventilation system in the 1922 wing includes a steam grid humidifier, which has been observed to be operational. The mechanical systems in the 1958 wing do not incorporate provisions for humidification.

Entry into and exit out of the building has not demonstrated a positive or negative pressure differential; through spring and summer months, the building appears to be operating at or near neutral pressure.

Considering that the building envelope has performed well over the decades, the strategy going forward is to maintain existing indoor/outdoor pressure differential relationships. Accordingly, it was agreed that four (4) pressure differential meters would be strategically located in the building to measure the delta pressures and record a trend that would be modeled with newly developed mechanical systems.

3. Building Analysis

3.1 Overall Behavior

While mechanically ventilated the vertical air ducts connecting to the east west wind tunnel which in turn connects to the central cupola forms the basis of a natural ventilation system in the original 1922 building. This effect would be supplemented by the action of actual chimneys. Winds passing the cupola would generate a negative pressure in the attic space assisting the air driven up the ducts by thermal buoyancy to be drawn up and out of the structure. For this process to work one would have to open and close the grill shutters and the cupola windows with varying weather conditions and temperature.

While site observations indicate the natural ventilation flow path still exists its operation has been supplanted by the mechanical systems and the cupola is part of the mechanical exhaust duct. The mould in the cupola space is a direct result of the accumulation of moisture deposited from the exhaust of interior moist air. Accidental moisture entry also occurs via air passage through openings in the ceiling plane.

Figure 82: 1922 Cupola Interior

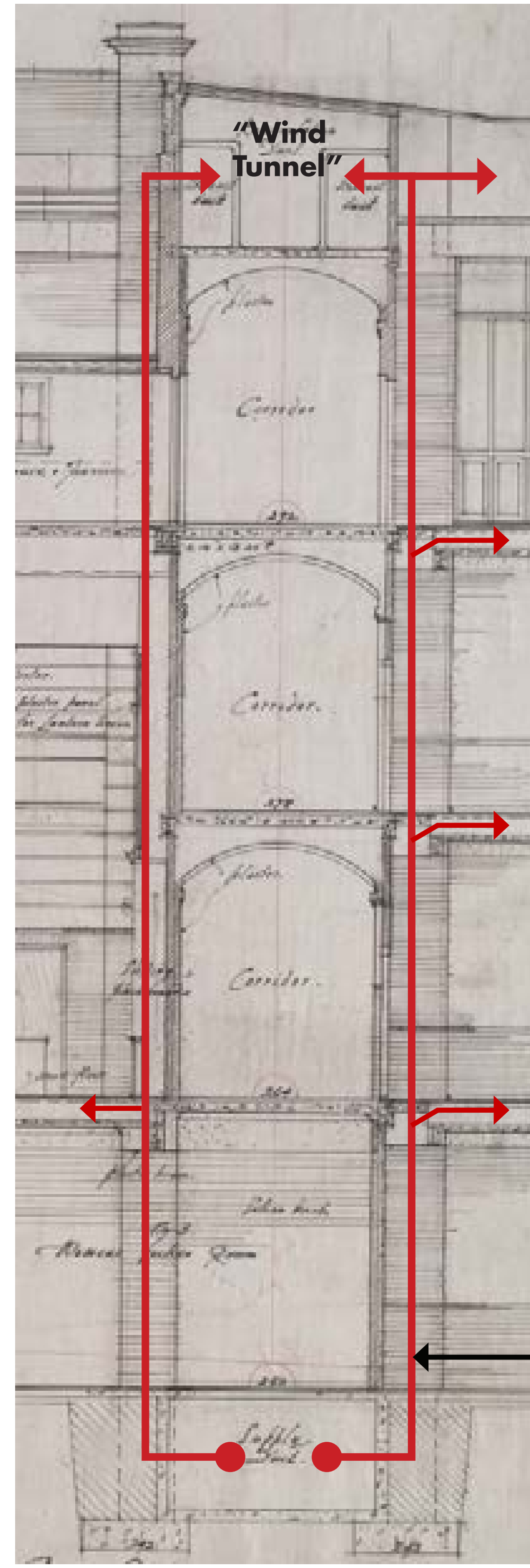


Figure 83: 1922 Path of Ventilation

An implication of the wind tunnel and the high central cupola is the effective height of the building in terms of the position of the neutral plane is increased. Long term pressures below the neutral plane result in net infiltration to the interior and pressures above the neutral plane result in predominately exfiltration. While a longer term air pressure monitoring programme is being set up spot site measurements indicate that under current and likely historic conditions most of the exterior walls are under a negative pressure with the neutral plane at or near the roof eave level. While not particularly attractive from a thermal comfort or energy perspective a net infiltration condition reduces the interior moisture loading of the walls which is beneficial to long term performance.

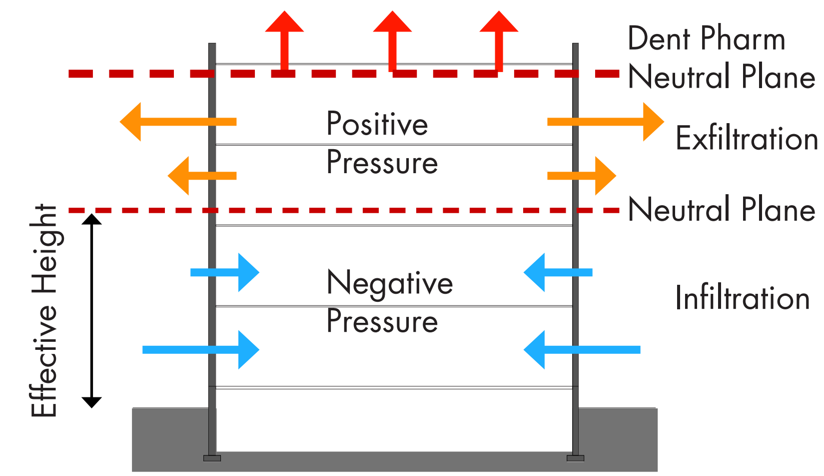


Figure 84: Neutral Plane Concept

As the various additions have been built the influence of natural ventilation has been reduced. The proposed plan to enclose the courtyards will effectively reduce the area of exterior wall reducing both ventilation opening and improving overall energy efficiency through the use of a highly insulated roof. Subject to confirmation from on site monitoring it is expected that the courtyard roof addition will lower the neutral plane placing a greater area of wall under positive pressure (exfiltration conditions). As such the need to improve air tightness of the envelope is emphasized. Mechanical system design must recognize this effect and be adjusted to reduce it.

Within double structure lining central corridor of 1922 building masonry shafts extend from basement level (concrete supply duct beneath central corridor) to fourth floor attic and "wind tunnel".

3.2 Above Grade Walls

Control of water/water vapour flow

The 1922/46/47 exterior stone/masonry walls were built using traditional construction techniques blended with slightly more modern transitional techniques with embedded steel structural members. No overall distress was noted in any wall area and deterioration noted in the walls is primarily focused at the poor condition of the mortar joints. Given that the walls were reported repointed in 1998 one can only assume a very poor repointing job was done. There are also reports of plant growth on the walls that has subsequently been removed. Plant growth can deteriorate mortar joints.

Water penetration resistance is derived initially from the exterior detailing (overhangs, cornices, sills, etc.), the tightness of mortar joints and finally from the mass of the wall itself. As noted above the poor condition of the mortar joints along with the raked style of the joints significantly reduces water penetration resistance. Repointing with a properly tooled concave joint would improve long term performance but would likely be architecturally unacceptable.

To a point the relatively porous stone and brick will absorb moisture and once the rain event is over and drying conditions return retained water will evaporate to the exterior and/or the interior depending on the depth of water penetration. Excessive amounts of water may drain freely in either unfilled collar joints or potential wall cavities. Drying to the interior is limited by the extent of interior finishes however the vent spaces evident between the plaster lath and the inner wythe (clay tile reported in some locations) or voids as noted in the window investigation provides for some drying potential. Observations of interior exposed masonry, particularly in attic spaces, indicate little active drying to the interior over time.

The 1958 cavity wall design relies less on mass to provide water penetration resistance and more on free vertical drainage in the cavity. The test openings indicated that the cavity is not completely clear and flashings may not be complete however little long term deterioration is evident.

As the historic long term interior relative humidity levels and hence interior moisture content has been relatively low the importance of an interior vapour retarder is reduced. The default retarder becomes the paint finish on the plaster walls regardless of the date of construction. As in most historic buildings it is the continuity of the plaster finishes that plays a significant role in controlling interior to exterior vapour flow by limiting air leakage.

Control of air flow.

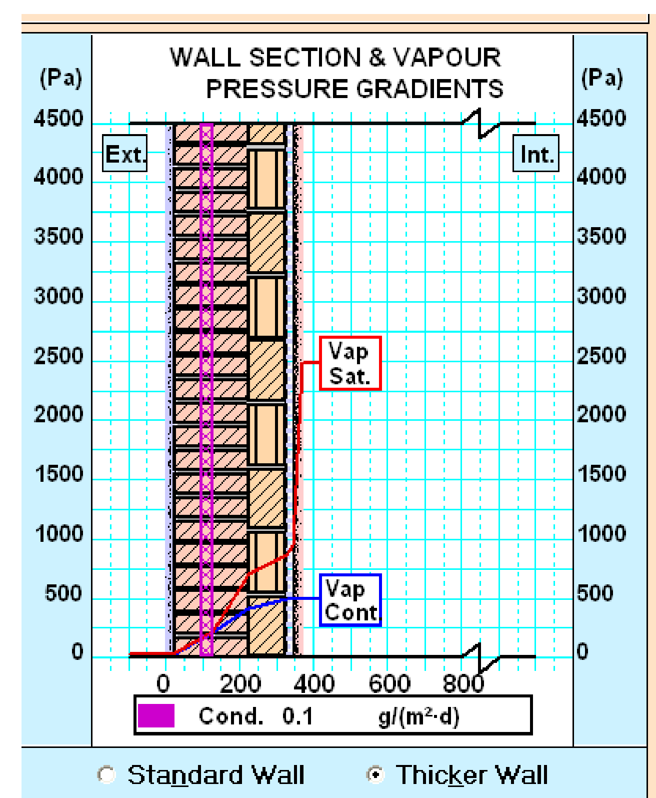
As indicated the default plane of maximum airtightness is the interior plaster finish. This plane is more continuous than any collar joint or parging plane within the solid masonry wall. Aside from the lack of continuity at the level of floor slab pockets (space between ceiling and floor finish), above ceiling finishes, in attic spaces and at door and window casings, the interior plaster is relatively continuous in all occupied spaces above grade and ties to ceiling finishes.

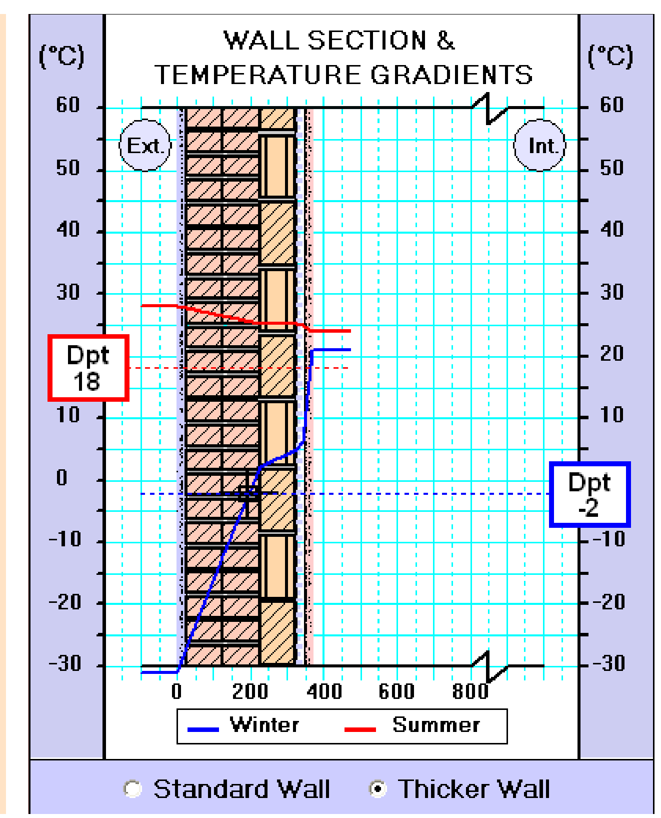
The primary focus with respect to air leakage control in a cold climate is the exfiltration of warm moist air into wall cavities and the potential for moisture accumulation and subsequent wall damage if the wall freezes. Review suggests that the long term operating mode of the building results in a negative pressure (infiltration) being applied over much of the wall area for much of the heating season. This operation mode coupled with a relatively dry interior condition has undoubtedly contributed to the relatively good condition of the exterior walls to date. The importance of the interior air leakage control plane increases if this operating mode or interior conditions change. The concern relates primarily to a change in long term internal air pressure.

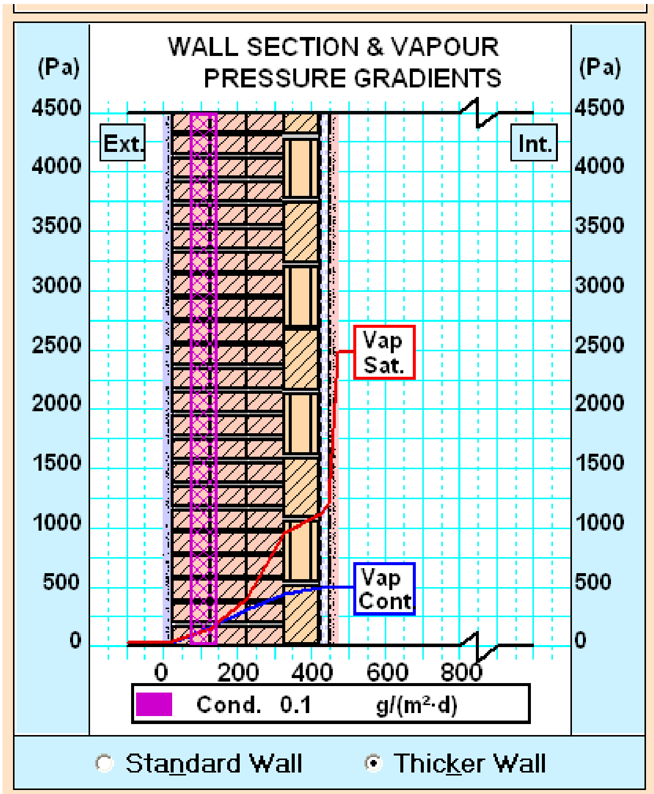
Aside from a change in overall pressure a change in the pressure distribution across the walls or a shift in the neutral plane would also impact the moisture accumulation in the walls. If the plaster plane is retained then concern would focus on the non-plaster coated areas particularly in the upper half of the building. The addition of a parging layer to seal exposed masonry is being done.

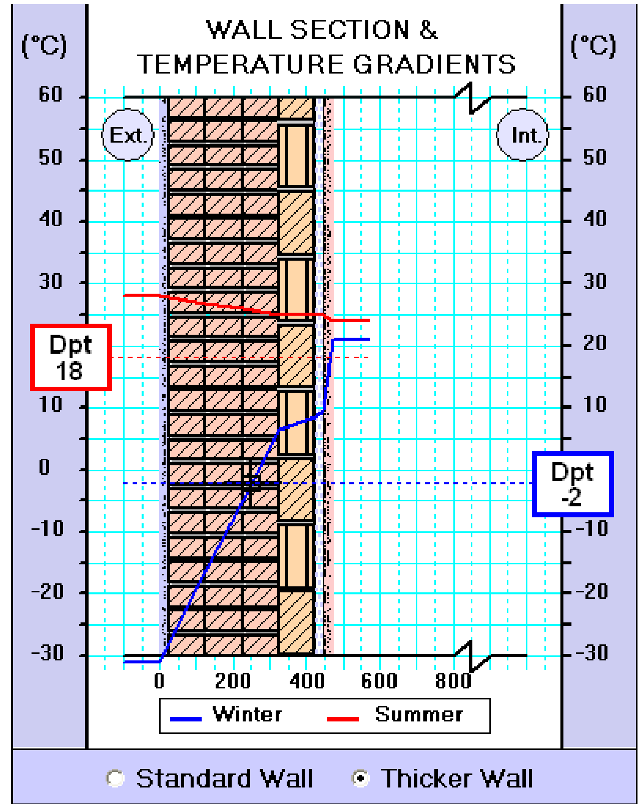
Control of Heat Flow

As with most buildings the age of the Dentistry Pharmacy Building no defined thermal insulation is provided in the wall assembly. Taken as a solid wall of masonry or masonry/stone the 1922/46/47 assembly has an inherent insulating value of RSI 0.5 to RSI 0.75 and the 1958 assembly slightly less . There is also a contribution to the thermal performance by the mass of the wall in terms of thermal lag which tends to delay peak heating and cooling loads. Simple thermal modeling of the solid wall section indicates that at a steady state winter condition approximately one third to one half of the wall thickness would be subject to freezing. The exterior brick would be subject to the greatest number of freeze thaw cycles and the condition of the brick indicates reasonable durability. As the interior wythe of brick in a solid masonry wall are often of lower quality (less thoroughly fired) the performance of the exterior brick may not be an indicator of the performance of the interior brick wythes.









The four plots illustrate above shows the two extremes of wall when analyzed for dew point and planes of condensation. The analysis is a steady state condition at the design Edmonton temperatures for summer and winter. In both cases the dewpoint occurs in the wall section.

The plane of condensation or frost occurs primarily in the outer wythe as indicated. This plane is a much more significant indicator of performance than the dew point. The condition of the outer brick is an indication of its freeze thaw durability. This type of analysis is a measure of extremes and ignores thermal mass, drying potential and varying exterior conditions.

Freezing of the brick and associated damage is an issue if the masonry is sufficiently saturated. An estimation of moisture content at various depths relative to its temperature was made using WUFI, a hygrothermal analysis tool. This tool provides a reasonable model of water movement by diffusion and capillary suction under historical climate conditions. A WUFI analysis of the existing conditions indicates that for most of the year most of the drying of the wall occurs to the exterior. Drying does occur to the interior but this drying is significantly less than the exterior drying. The simulations indicated that for typical brick and stone properties the wall materials do not approach saturation thus reducing the risk of freeze thaw damage. However this assumes the interior wythe bricks to have similar properties as the exterior brick and that the joints in the wall are tight thus limiting liquid water flow.

In order to assess the sensitivity of the wall to the addition of interior insulation the hygrothermal simulations were repeated with insulation added to the interior wythe beneath the painted plaster layer (assumed to be either 1″ or 3″ of urethane foam). It was found that drying to the interior was essentially eliminated. The depth of freezing in a steady state condition extended essentially through the wall. As such thermal movements and the development of cracks would increase with an insulated option. The moisture content of the wall materials increased over the non-insulated case but still remained below critical saturation levels. Again this is for the case of a water tight exterior face.

As noted the above discussion applies to the 1922/46/47 solid wall areas. The 1958 wall is subject to different behaviour due to the at least partially ventilated void behind the face brick. This void promotes drying of the brick from the back side but also, depending on the degree of ventilation, exposes the brick to much colder conditions for longer periods of time. Assuming no header courses and metal brick ties the exterior face brick is thermally de-coupled from the more massive block backup wall. As such the addition of insulation in concept to the block wall has less impact on the face brick for the veneer wall compared to the solid masonry wall area.

Insulating the block wall on the interior face would reduce the mass effect, place structural elements in a colder environment and induce movements between the insulated and non-insulated wall areas. However given that natural movement joints exist at the perimeter of the block backup to the structure this is less of a concern. It is therefore feasible to insulate the interior of the 1958 wall area with due attention to air seals and vapour retarders as per contemporary construction.

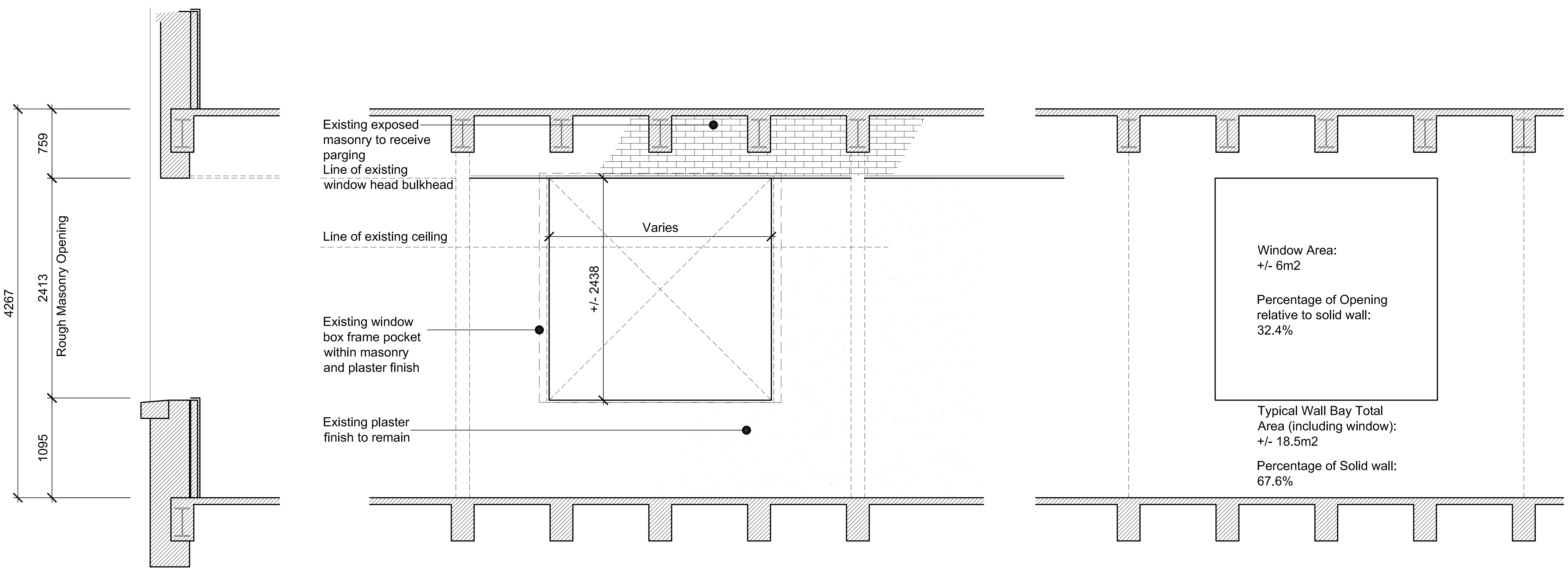


Figure 85 - Typical Window/Wall Relationship

3.3 Windows and Doors

Given the stated intent to replace the windows a detailed discussion of the existing window performance is unnecessary. However the long term behavior of the windows with respect to air flow and heat flow can influence design moving forward.

Control of air flow

The lack of weatherstrip, ill fit, sash cord pockets and ineffective hardware renders the original windows relatively drafty and lacking in air tightness to meet contemporary standards. Local air infiltration would contribute to thermal discomfort adjacent the window; would have a negative impact on overall window thermal performance and will result in localized glass condensation. Drafty windows do however contribute to the overall ventilation of the building and reduce excessive humidity levels. The increased air tightness of the new window system must be considered in the overall ventilation strategy.

Similar comments apply to the original doors where significant openings exist about the door perimeters and the meeting stiles. Simple adjustment to the perimeter details would significantly improve airtightness.

Control of heat flow

Replacement windows will have lower U values than the existing assemblies due primarily to the use of low e coated glass and gas filled units. Historically lower performing windows have been a simple indicator of excessive relative humidity. Better performing windows do not function as well as a humidity indicator.

Window Selection

To meet mechanical design expectations a wide variety of glass types are available incorporating low e coatings and argon gas fills into insulating glass units. Unit selection can be made based on performance as well as appearance. The presumed intent is to provide non-operable historically sympathetic windows to replace all the existing window assemblies. These windows would be a custom or modified custom window and the volume for the project justifies such an approach. Frame type can be fiberglass as mentioned in the concept study or thermally broken aluminum and both can be tendered and evaluated based on cost and performance.

3.3.1 Window Types

Figure 86 - Window Types - 1922 Building

Figure 87 - Window Types - 1946/47 Buildings

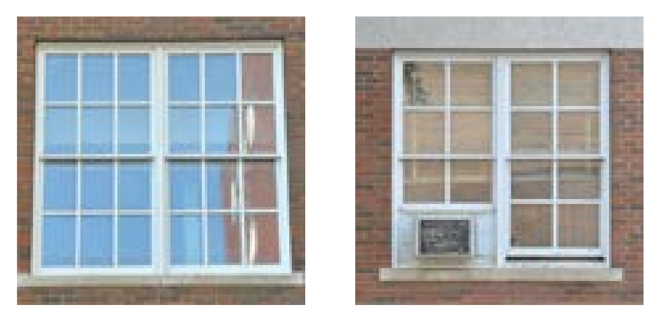


Figure 88 - Window Types - 1958 Buildings

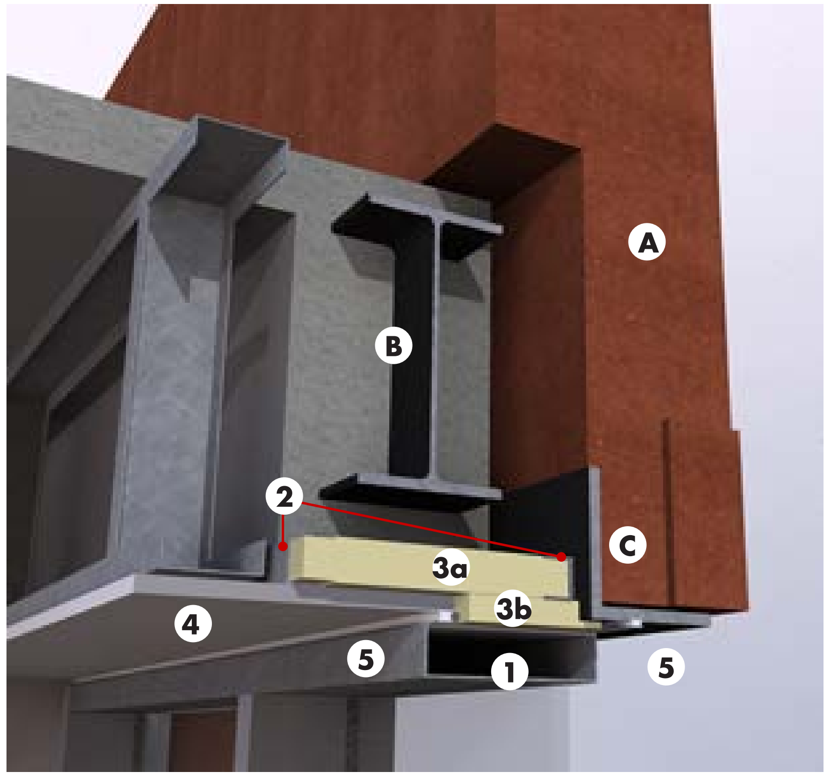


Figure 89 - 1922 Window Installation - Head

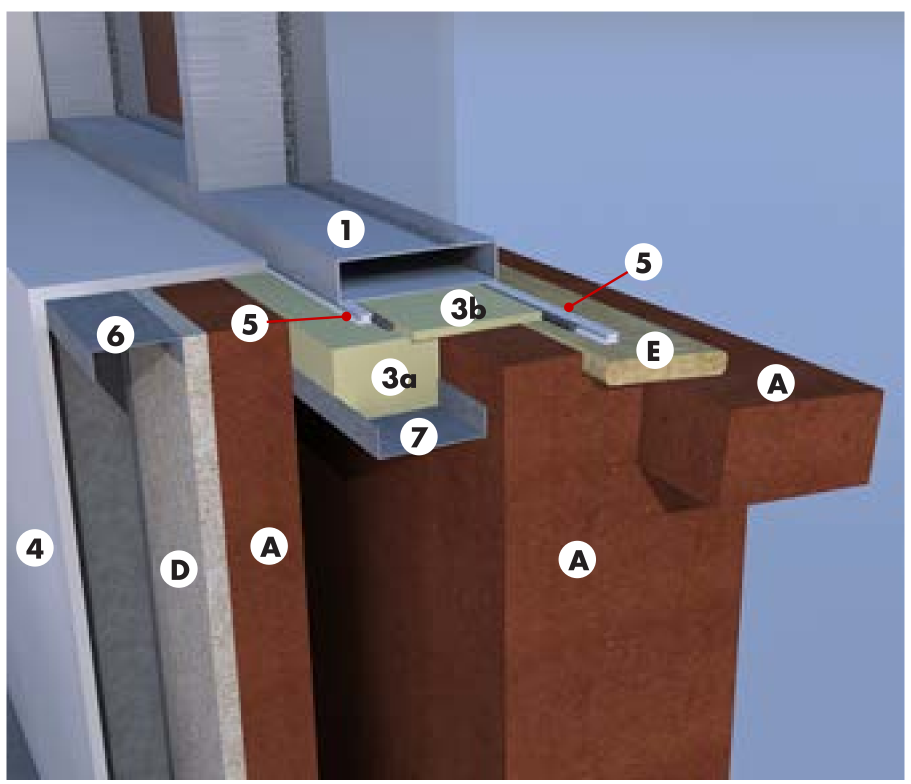


Figure 90 - 1922 Window Installation - Sill

Window Installation

Window installation into any existing building is subject to variances in the rough opening size particularly when the building has been built in different phases using varying techniques. While some standardization of window size will be possible it is likely that window sizes will have to be grouped into families by similar size. The connection of window to rough opening is critical from an air and water penetration control perspective. Two basic approaches have been used which include either creating a solid surround by filling voids left by removal of sash cord boxes with brick or grout or by developing an adjustable sheet metal closure and then filling voids with spray foam. Both approaches are valid and often a site mockup using both is appropriate to confirm the final approach.

The sketches to the left illustrate window installation approaches.

Existing Building Elements to remain post demolition:
A. Existing Masonry
B. Existing Concrete encased steel beam
C. Existing steel shelf angle over window openings typical
D. Existing Interior Plaster Finish
E. Existing Tyndal Stone Sill Flashing

Elements of New Window detail:
1. New thermally broken extruded aluminum "Replica" window frame.
2. Steel stud ladder framing at head and jamb anchored to existing masonry or steel structure.
3a. Spray applied foam insulation (first application)
3b. Compressible Spray applied foam insulation (second application)
4. Gypsum board
5. Foam rope and sealant
6. Interior envelope finish: 16mm gypsum board on 64mm or 92mm steel studs spaced off existing masonry/ existing plaster by 12mm.
7. Sheet metal closure for support of foam insulation at sill.

Sequence of Installation:

1. Remove existing brick moulding and interior trim, window frame and sash pulley system hardware, prepare existing opening by removing remaining sealant, interior plaster returns (to face of interior wall),

2. Install steel stud ladder frame at jambs and head anchor to masonry/steel structure.

3. Apply spray foam insulation to steel stud ladder cavity and all gaps to adjacent masonry/steel.

4. Install drywall/sheet metal over ladder frame/foam assembly for fire protection.

5. Install new window frame.

6. Install glazing.

7. Apply compressible foam insulation to gap between window frame and steel stud/foam insulation assembly for contiguous seal and thermal break. Install foam rope and sealant to full perimeter of window frame.

8. Apply new parging to wall all exposed masonry on interior.

9. Install interior steel stud framing. Rough in building services.

10. Install 16mm gypsum board (optional until fit-up). Paint.

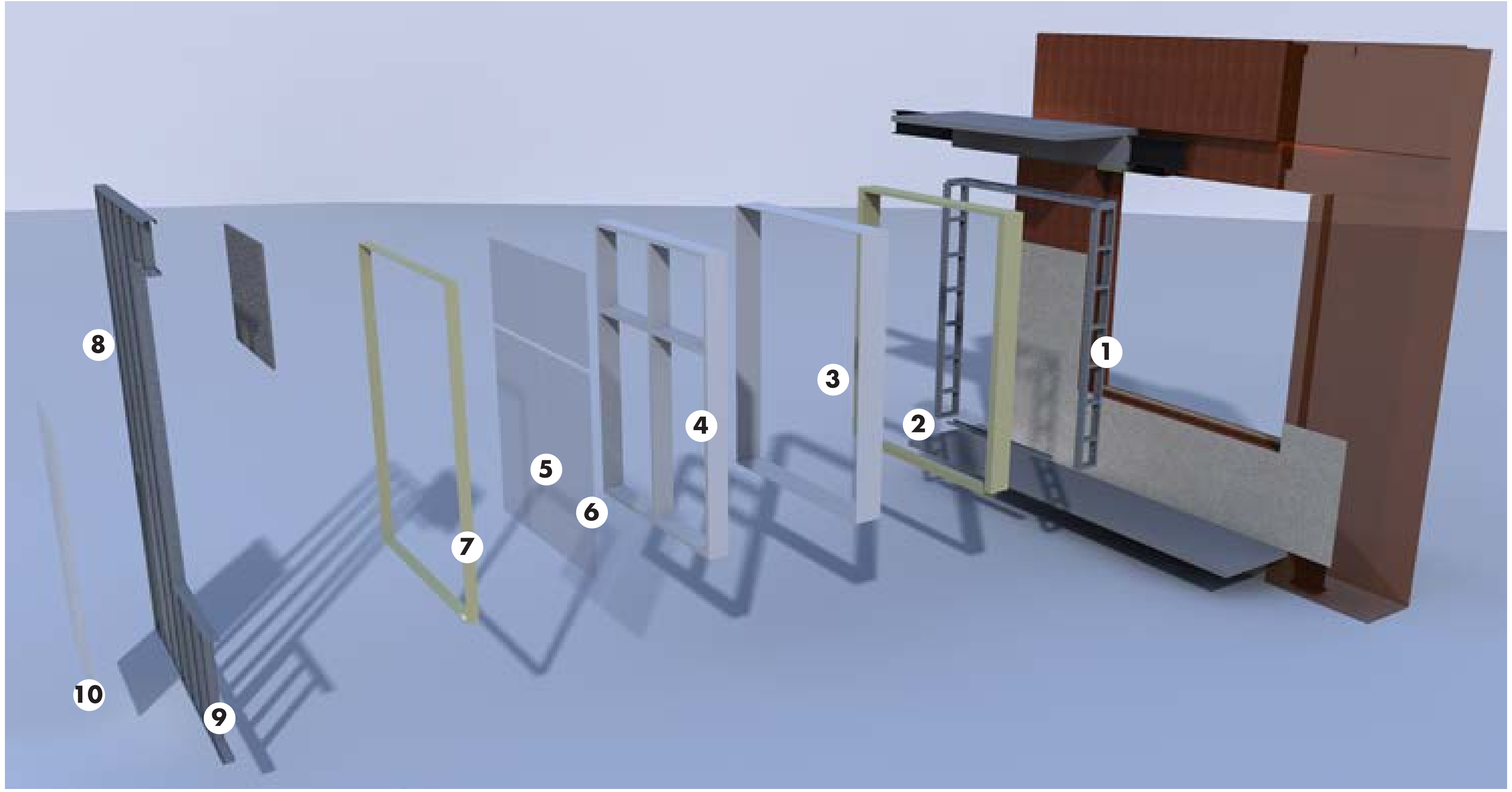


Figure 91 - Proposed Sequence of Window Installation

2.3 Building Analysis - Windows and Doors

3.4 Attic and Roof

The existing flat BUR system and the metal clad roof areas are generally performing well. This is in part due to the relatively recent renewal. The current development plan however includes the replacement of most of the roof areas. This provides the opportunity to significantly upgrade the insulation at the roof level. Unlike the walls, which may deteriorate with increased insulation levels, roof level insulation can increase to maximum limits economically feasible. Any increase in roof insulation should be coupled with increased air tightness at the roof plane.

The concept of roofing over the courtyard with a very high performance roof and upgrading the existing roofs thermally is an effective means of increasing overall building envelope performance by bringing the courtyard wall area indoors eliminating their effect on overall heat loss. The outer walls will have upgraded windows which coupled with the exterior wall area reduction would be the principal increase in thermal performance attained in the redevelopment.

3.5 Parapets

The existing metal parapet caps will be replaced in the re-roofing work and the backs of the parapets clad with a ventilated rainscreen of metal cladding. Because the exterior walls are masonry construction it is important that the parapet caps and the metal cladding on the backside are vented to prevent capturing moisture within the wall cavity where it would be subject to freeze-thaw cycles. Details will be developed to make appropriate waterprrofing connections between the roofing membrane, parapet cladding and caps.

3.6 Structural Systems - Analysis

From a structural perspective mortar provides a uniform transfer of load through elements and acts as a gap filler to keep out the weather. In specifying a repointing mortar that is compatible with the masonry units the objective is to achieve one that matches the historic mortar as closely as possible so that the new mortar can co-exist with old. The new mortar must conform to the following criteria:

- The new mortar must match the historic mortar in colour, texture and tooling. (Laboratory testing will be required to identify the components of the mortar and their proportions)
- The sand must match the sand of the historic mortar. (If we match the sand the colour and texture will usually match the original)
- The new mortar must have greater vapour permeability and be softer (Measured in compressive strength) than the existing masonry units.
- The new mortar must be as vapour permeable and as soft or softer than the historic mortar.

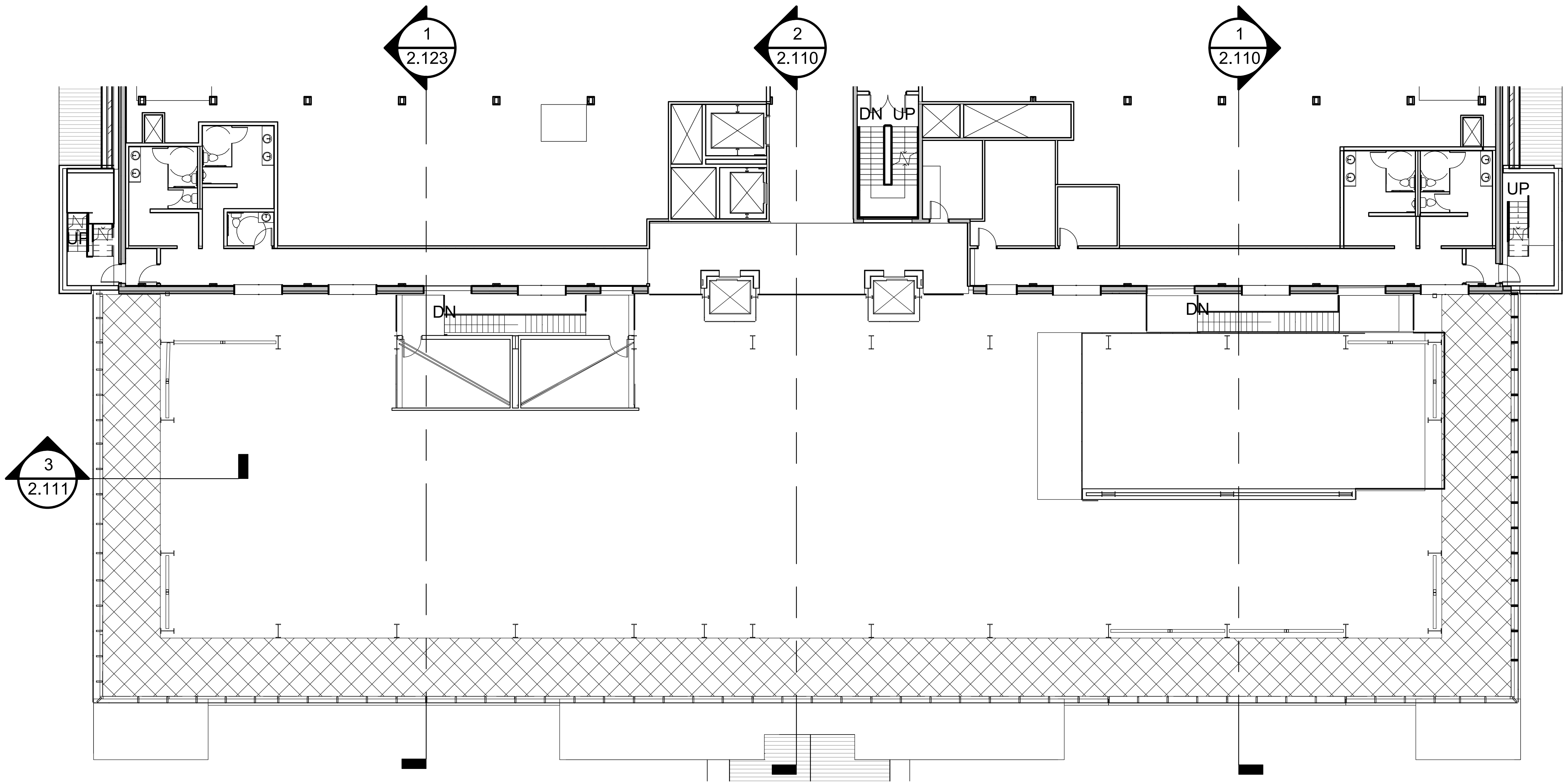
3.7 Mechanical Systems

Mechanical ventilation systems can readily be commissioned to reflect the positive or negative pressure relationship established by the metering provisions. This will be accomplished by managing the air volume relationship between outside air delivered into the building, the volume of air exhausted, and the volume of air exhausted.

4. Conclusions and Recommendations

With respect to the Dentistry Pharmacy Building the future restoration/integration programme should include the following themes: overall building behavior, improvements to the exterior masonry walls, improvements to the windows and doors and improvements to the roof.

• Historically the exterior walls have operated under minimal positive pressures and with low interior moisture loads. This interior environment would be maintained in the redeveloped building.	**Proposed Solution**: Mechanical systems to operate to provide building pressurization and humidification at existing pre-renovation levels.
• Known weaknesses in the air barrier of the masonry wall system should be addressed primarily through the use of vapour permeable planes such as parging. Of particular concern are masonry walls exposed to the interior and window perimeters.	**Proposed Solutions:** Masonry exposed to the interior to be parged from top of existing plaster finish to underside of floor slab above - or where more appropriate, new plaster finish to match existing to underside of slab above where exposed to the finished interior. New improved window perimeter details to be implemented.
• Capping the courtyards with roofs as part of the atrium development has implications with respect to building internal pressure which must be considered mechanically. More significant is the overall improvement in energy performance achieved by effectively reducing the exterior wall and window area.	**Proposed Solution**: Mechanical system to accommodate changes in building pressurization induced by the introduction of the Atrium enclosure.
• The minimum risk intervention with respect to the masonry walls is to concentrate on achieving reliable air seals and improving exterior water shedding through flashings and repointing the deterioriated exterior joints. Insulation is not added in the minimum risk solution. The risk of long term deterioration increases with increased levels of interior insulation however the risk increases significantly in the solid masonry walls for insulation values greater than R4-6 (assuming foam insulation). The cost benefit of this minimum level of insulation must be evaluated mechanically. The risks of deterioration due to insulating the 1958 block walls are lower and again must be examined from a cost benefit basis.	**Proposed Solution**: No new insulation will be applied to the inside of the building envelope to the 1922, 1946 or 1947 wall assemblies in order to minimize the risk that a change in the existing performance of the assembly may cause damage over time to the masonry by altering the balance of infiltration and exfiltration of air and moisture that has maintained the wall in good condition for as long as 90 years. Instead, in concert with the other proposed solutions here, improving the performance of the windows and vapour permeable membranes (plaster/parging) and a mechanical design that seeks to maintain the existing interior climatic conditions with respect to humidity and pressure, the proposed solution seeks to attain a balance to maintain the existing pre-renovation condition. The addition of insulation to the interior of the 1958 building envelope is being done.
• Window upgrades can be considered in isolation and the highest performing conventional products assembled in an historically sympathetic manner is the recommended approach.	**Proposed Solution:** New thermally broken 'replica' aluminum or fibreglass windows with double glazed, low emissivity , argon filled insulating units will replace the existing wood frame windows.
• Existing wood doors can be refurbished to meet contemporary expectations. Replica wood replacement can be considered.	**Proposed Solution**: Existing major entry doors (South, East and West wings) may be considered for refurbishment/re-use in the renovation however most other doors will be replaced with contemporary door technologies as appropriate (aluminum frame entry doors, insulated steel for service doors)
• Roof insulation upgrades can be considered in isolation and the highest thermally performing economically feasible roof assembly should be considered.	**Proposed Solution:** All existing and new roof areas are to receive new SBS roofing membrane systems with minimum R40 roof insulation.
• Upgraded parapet protection can be achieved in tandem with the roofing system installations to address these vulnerable locations of the building envelope.	**Proposed Solution:** Existing parapets to receive new vented metal parapet caps and rainscreen cladding on the roof side of the parapet.



2.100 Atrium Level 6 Plan

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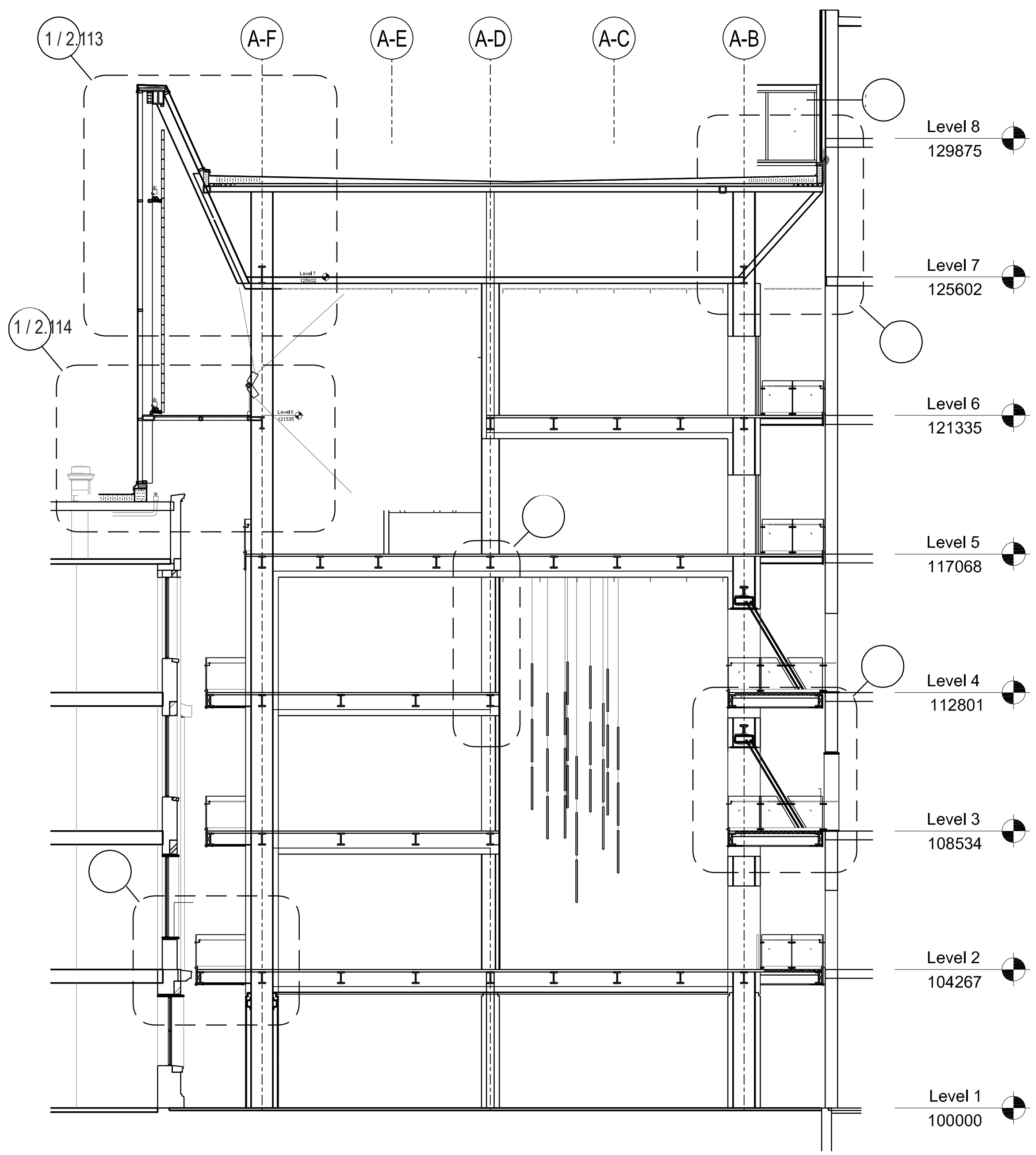
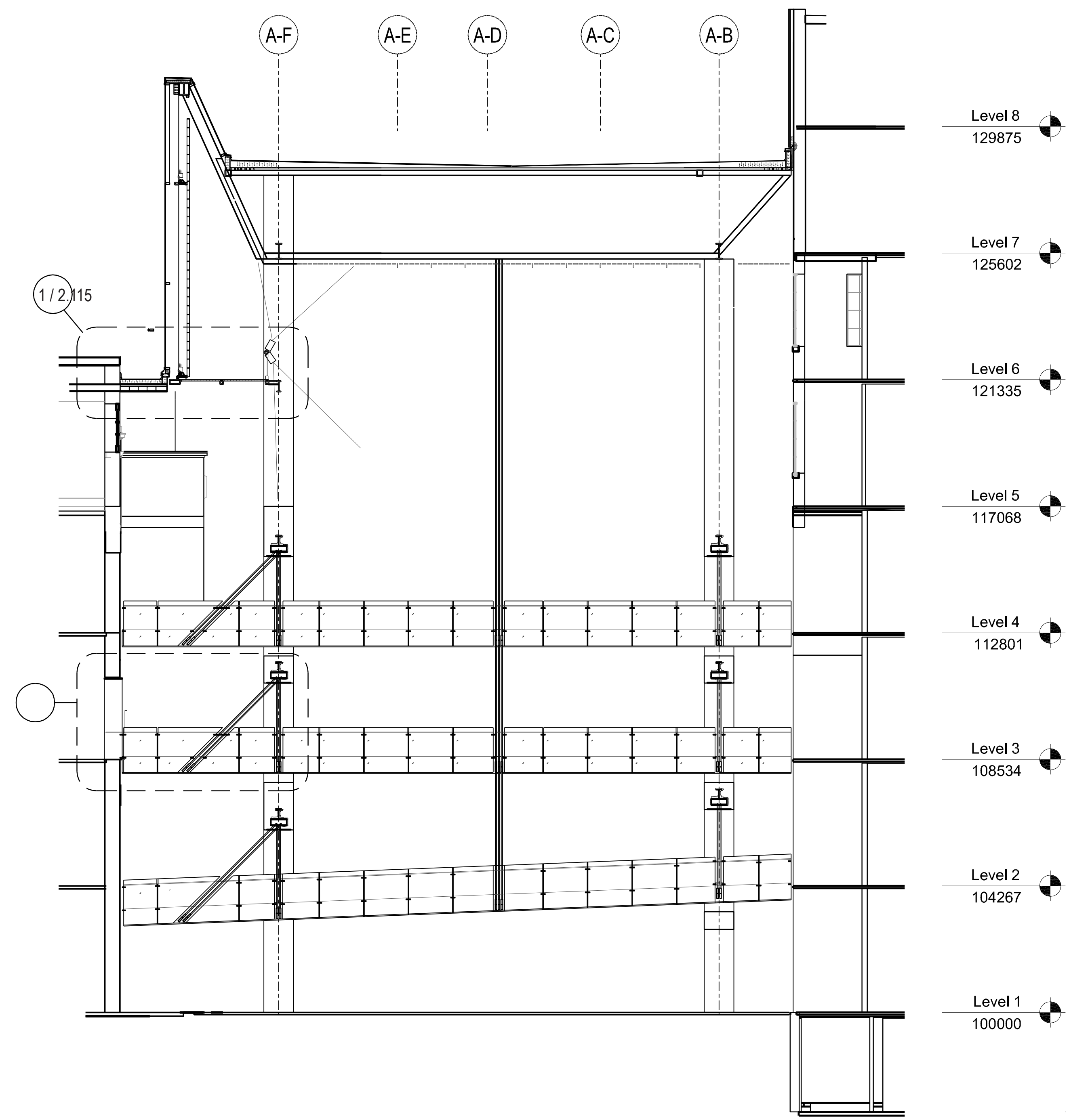
DENTISTRY PHARMACY BUILDING REDEVELOPMENT

2. BUILDING ENVELOPE

ATRIUM CLERESTORY



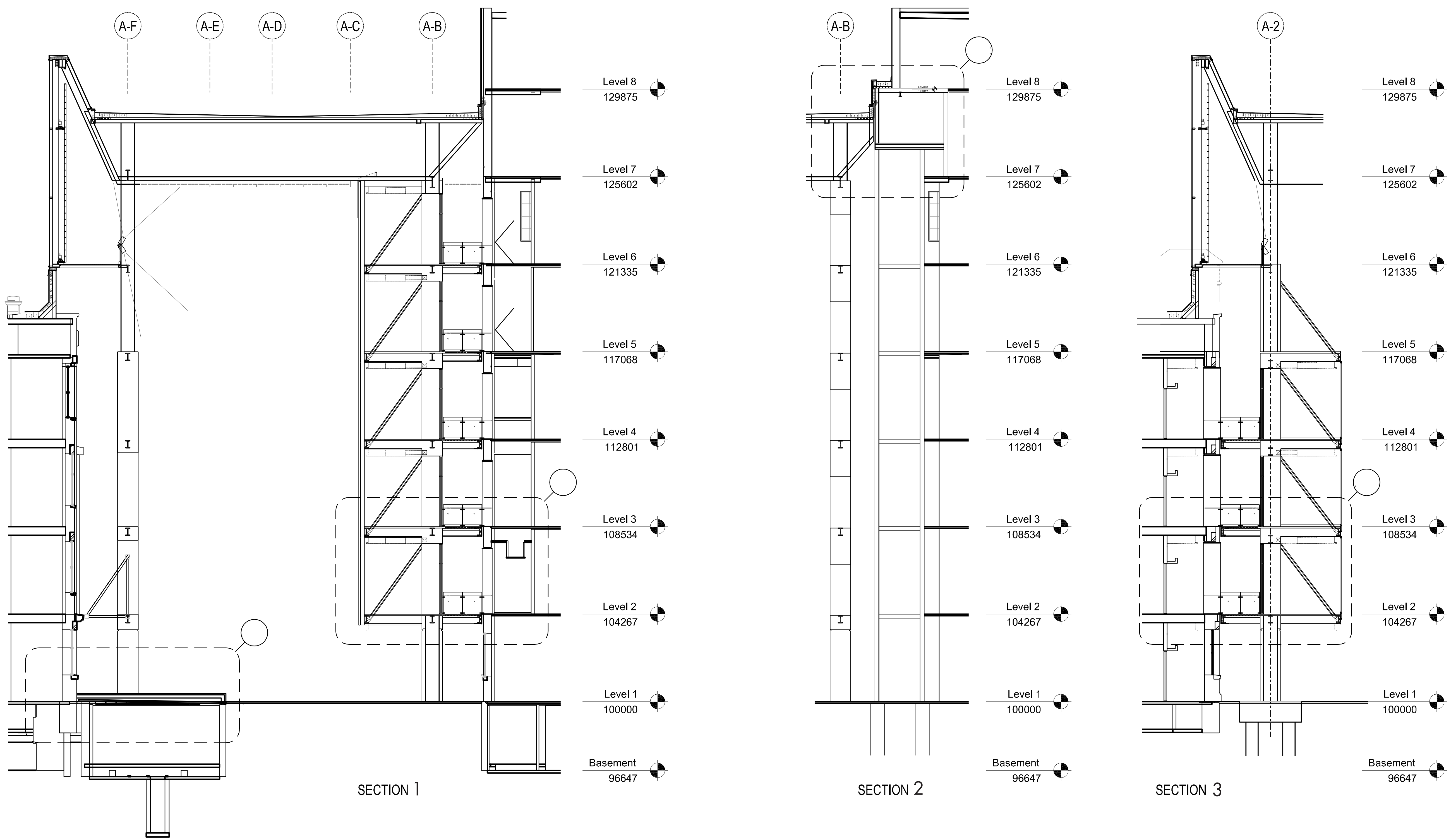
SECTION 1



SECTION 2

Atrium Sections

2.110



2.111 Atrium Sections

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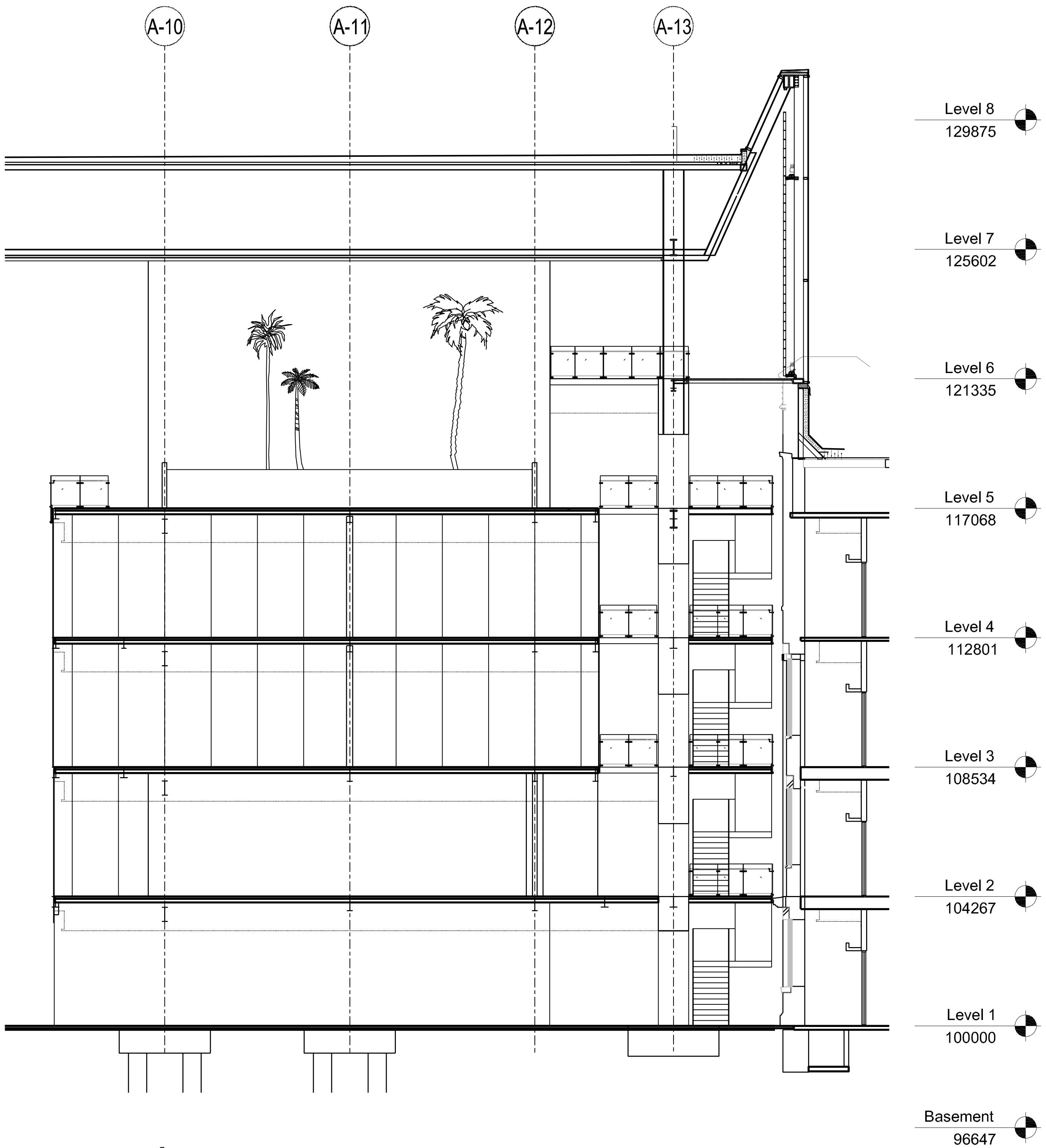
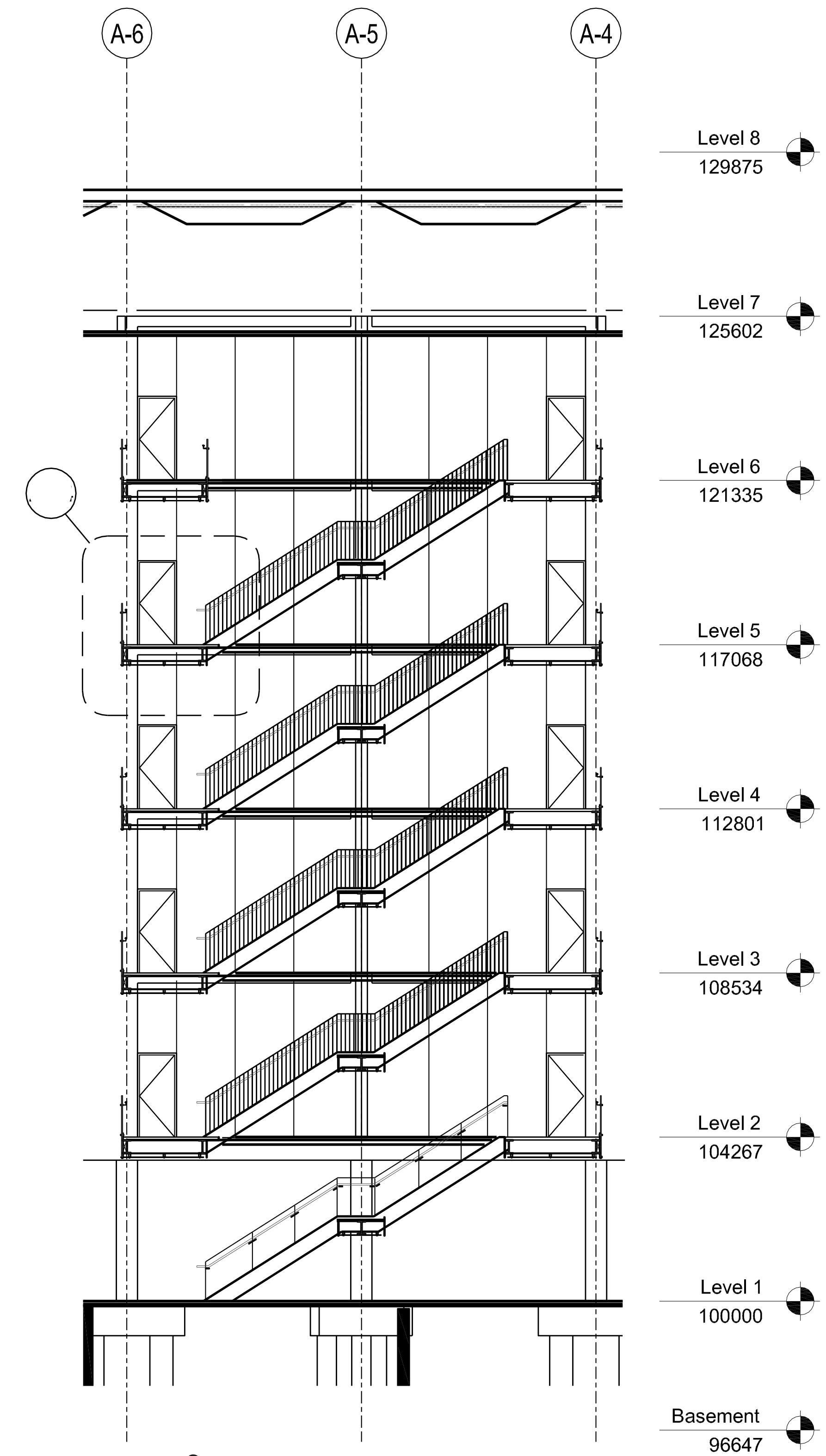


SECTION 1

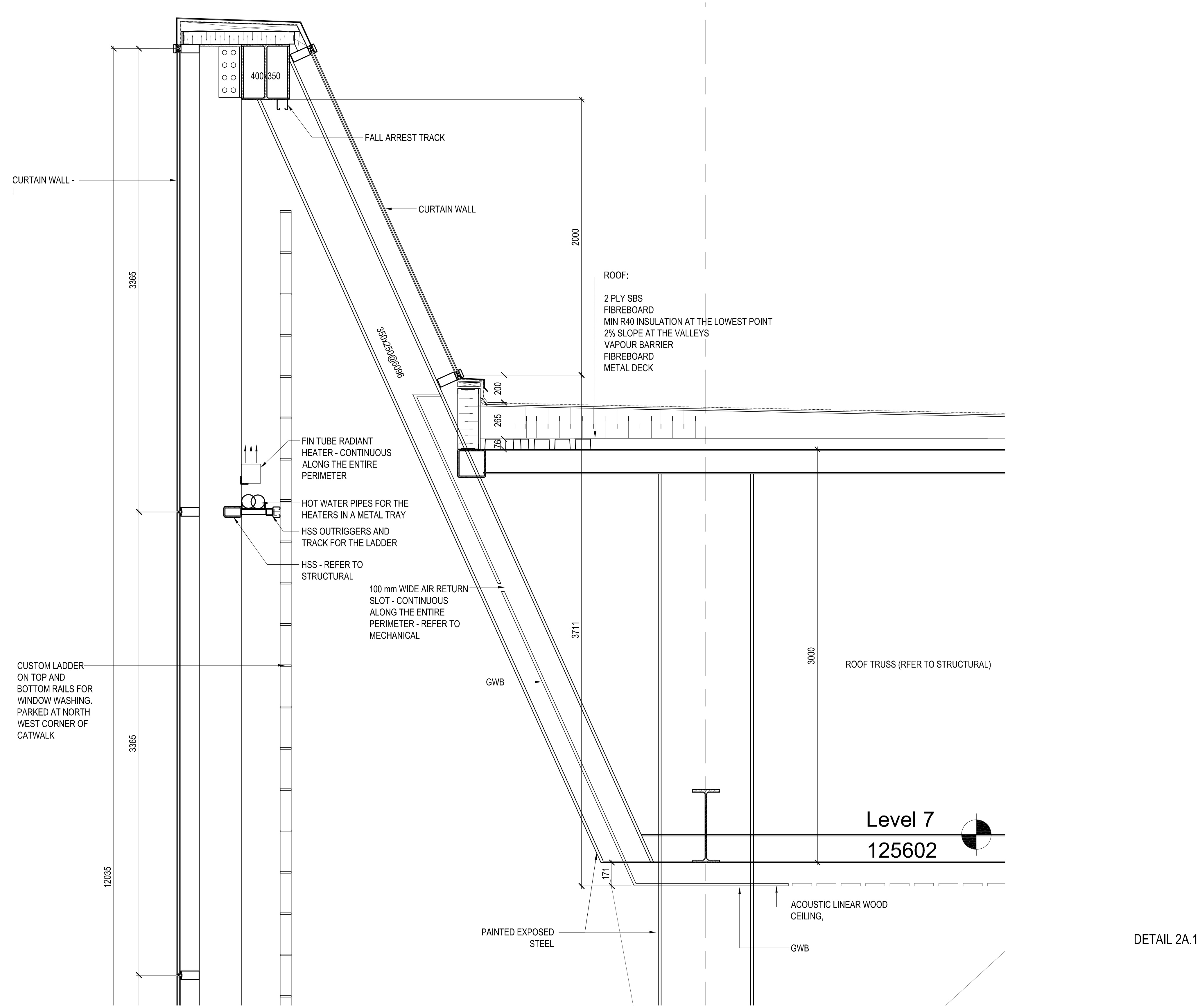


SECTION 2

DENTISTRY PHARMACY BUILDING REDEVELOPMENT

2. BUILDING ENVELOPE

Atrium Sections



2.113 Atrium Glazed Parapet Detail

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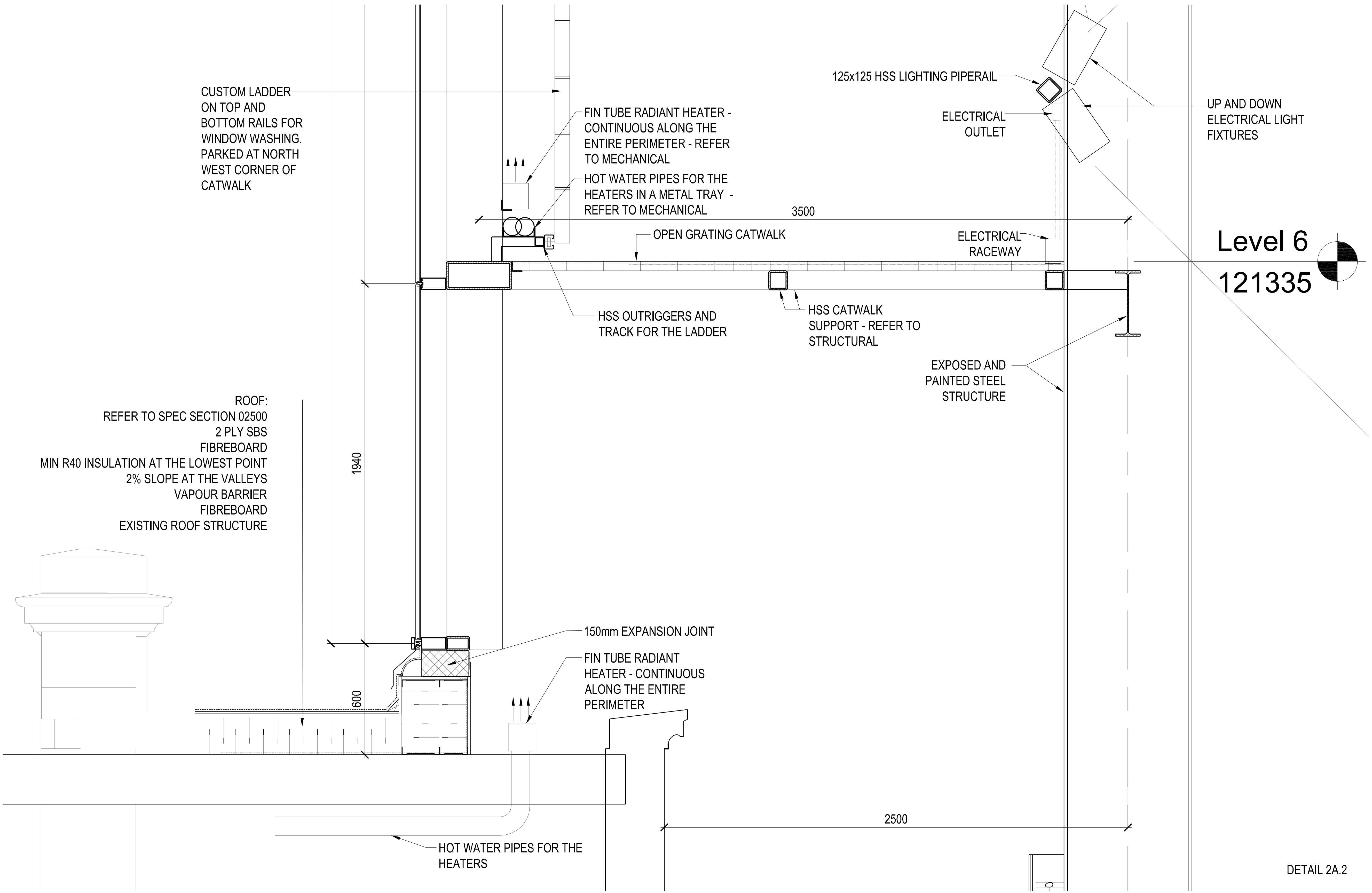
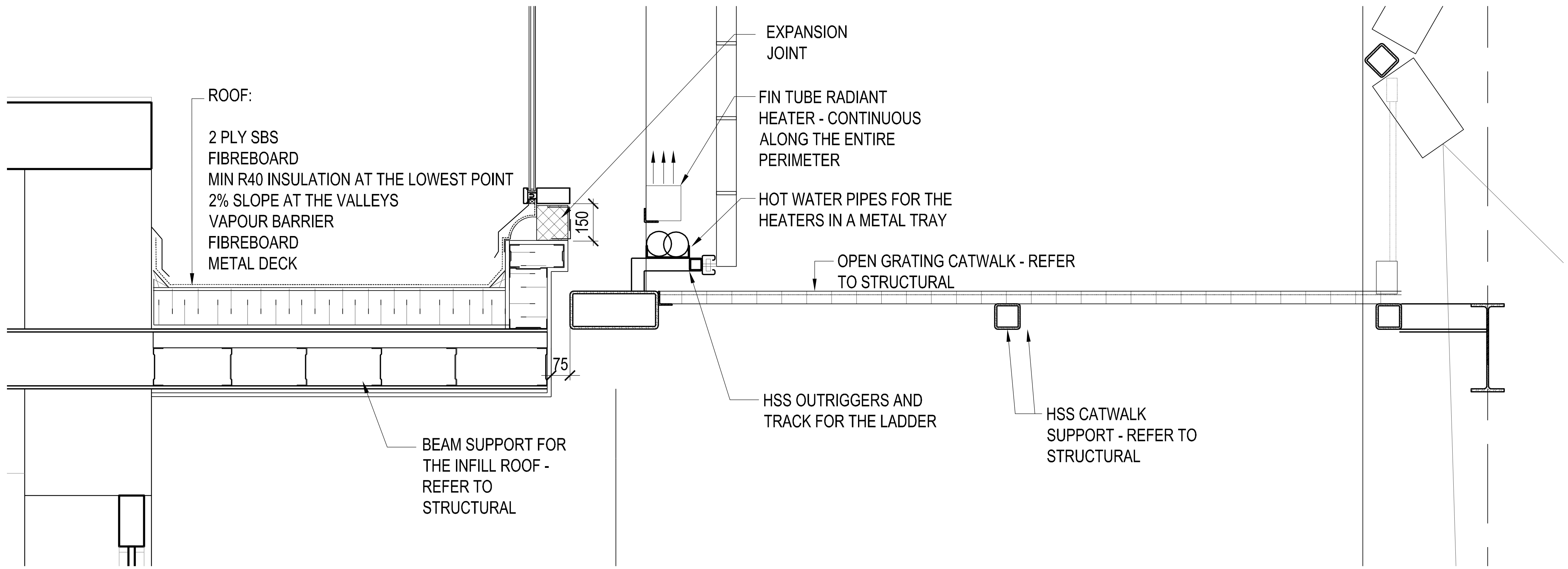
DENTISTRY PHARMACY BUILDING REDEVELOPMENT

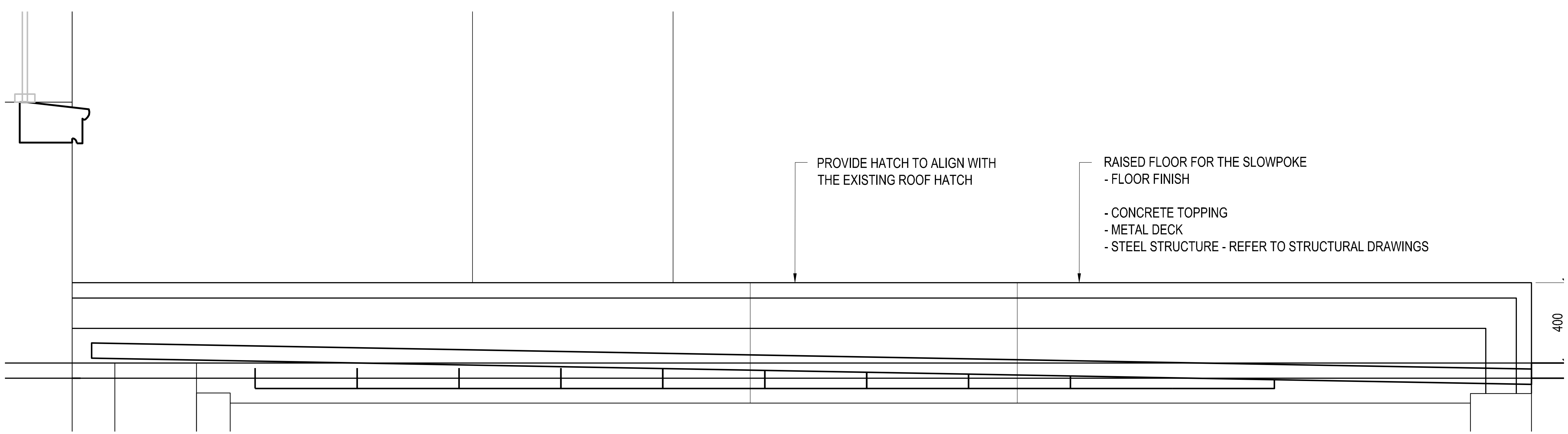
2. BUILDING ENVELOPE

ATRIUM CLERESTORY

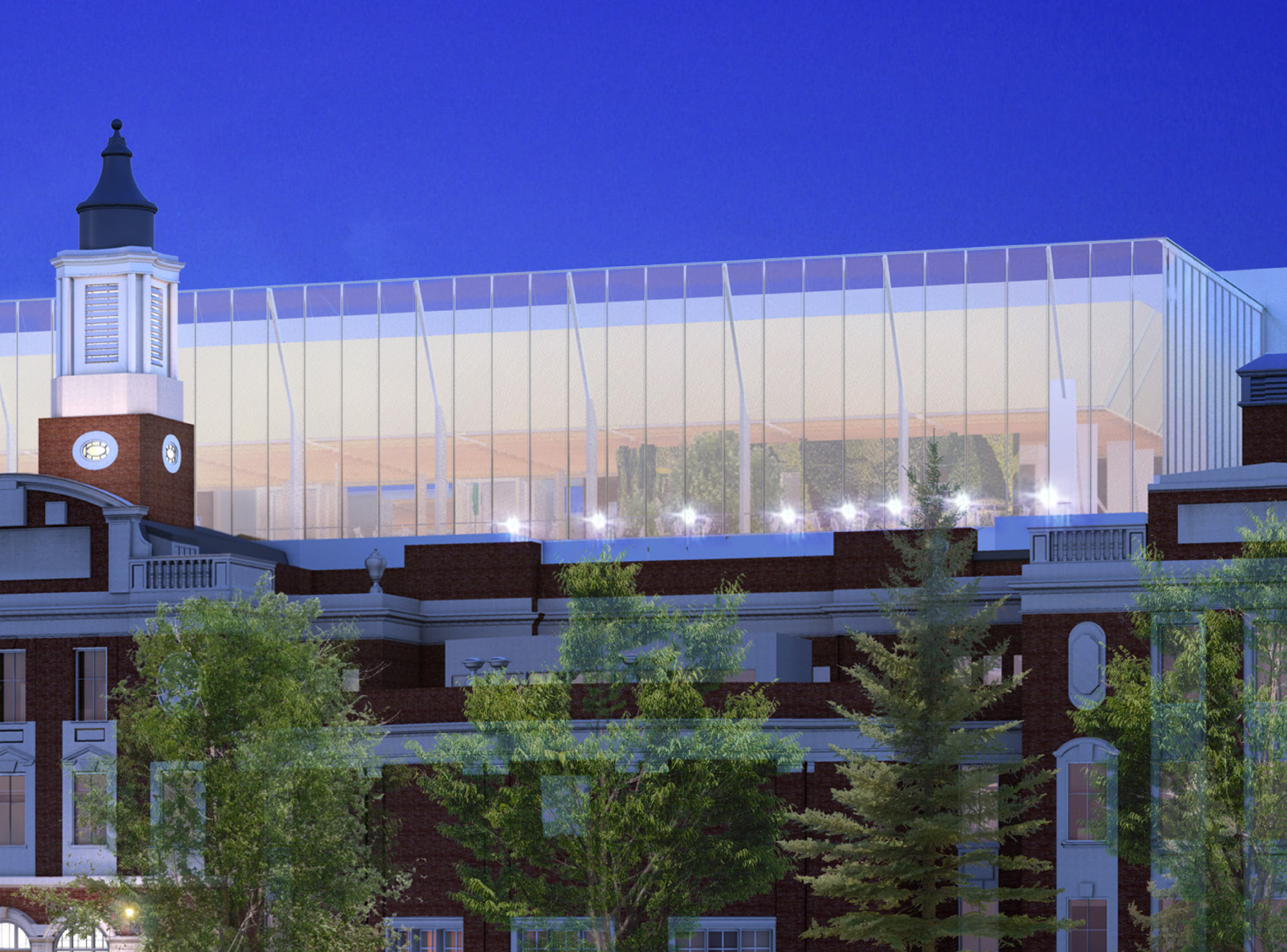


Atrium Base of Glazed Wall at Service Catwalk





2.115 Atrium Base of Glazed Wall at Gambrel Roof Infill



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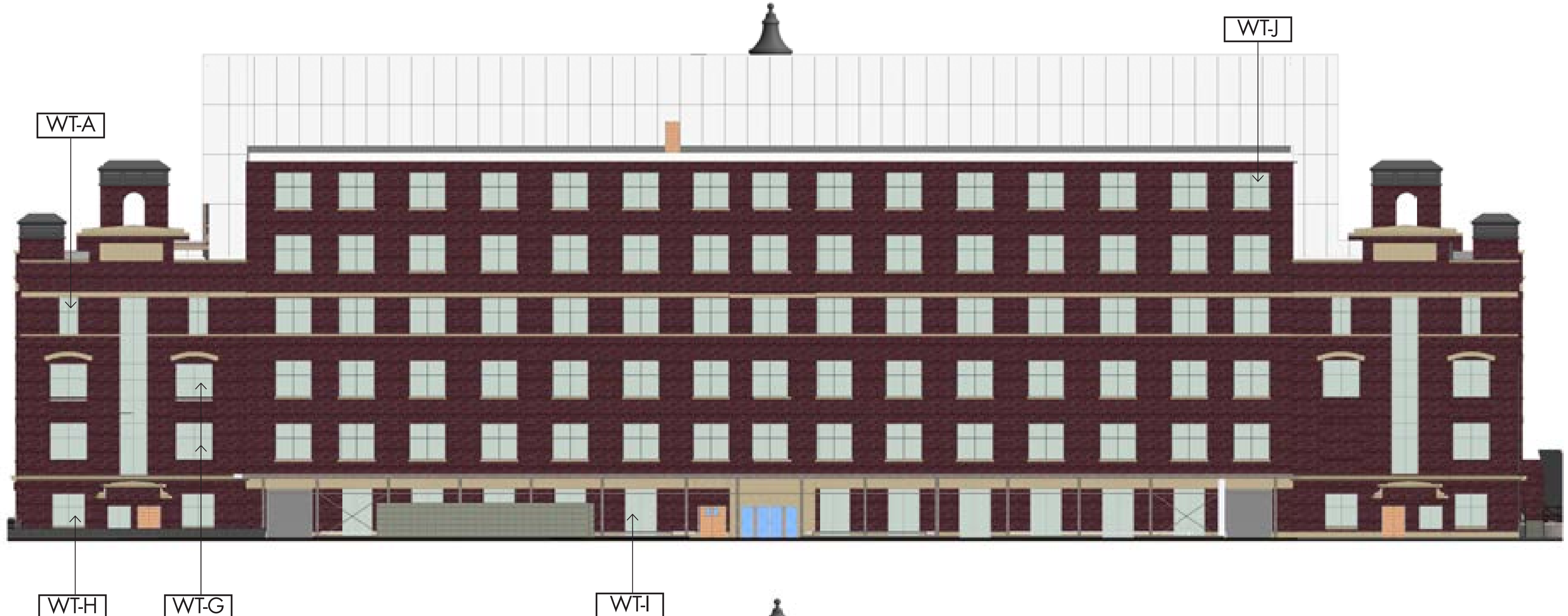
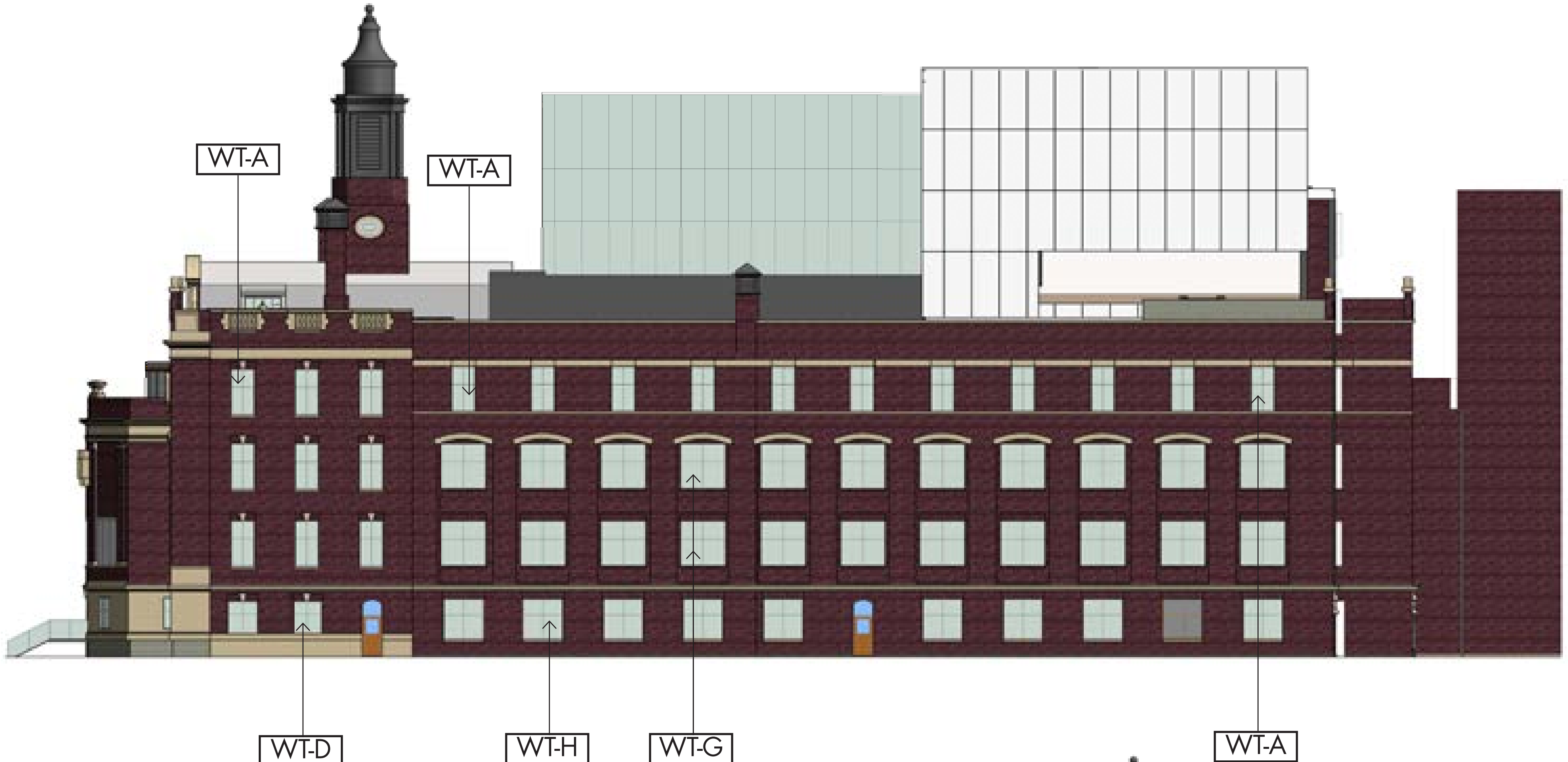
DENTISTRY PHARMACY BUILDING REDEVELOPMENT

2. BUILDING ENVELOPE

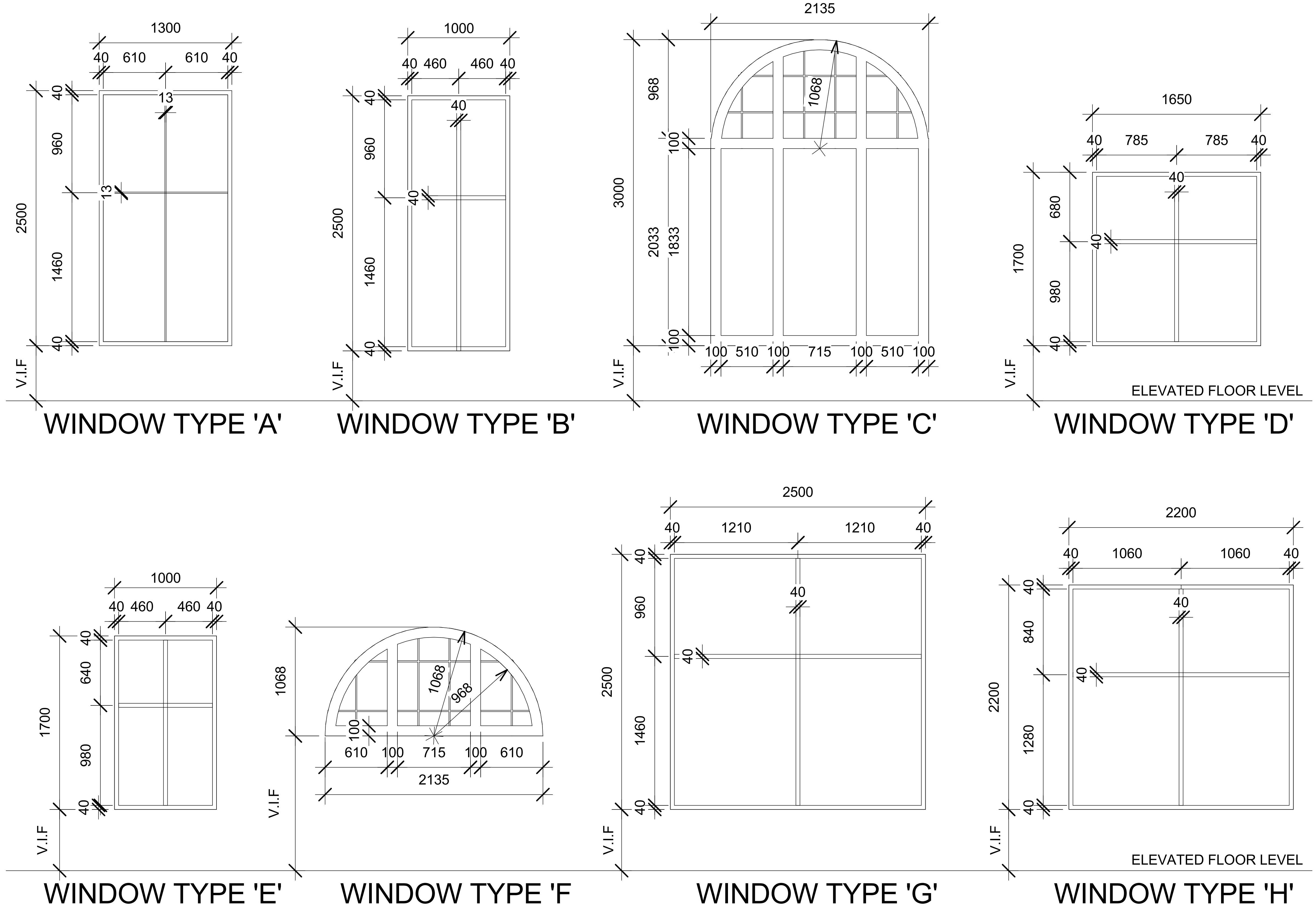
ATRIUM CLERESTORY



2.200 Window Types Keyplan Elevations - North and South



Window Types Keyplan Elevations - East and West


WINDOW TYPE 'A'
WINDOW TYPE 'B'
WINDOW TYPE 'C'
WINDOW TYPE 'D'
ELEVATED FLOOR LEVEL
WINDOW TYPE 'E'
WINDOW TYPE 'F
WINDOW TYPE 'G'
WINDOW TYPE 'H'
ELEVATED FLOOR LEVEL
V.I.F

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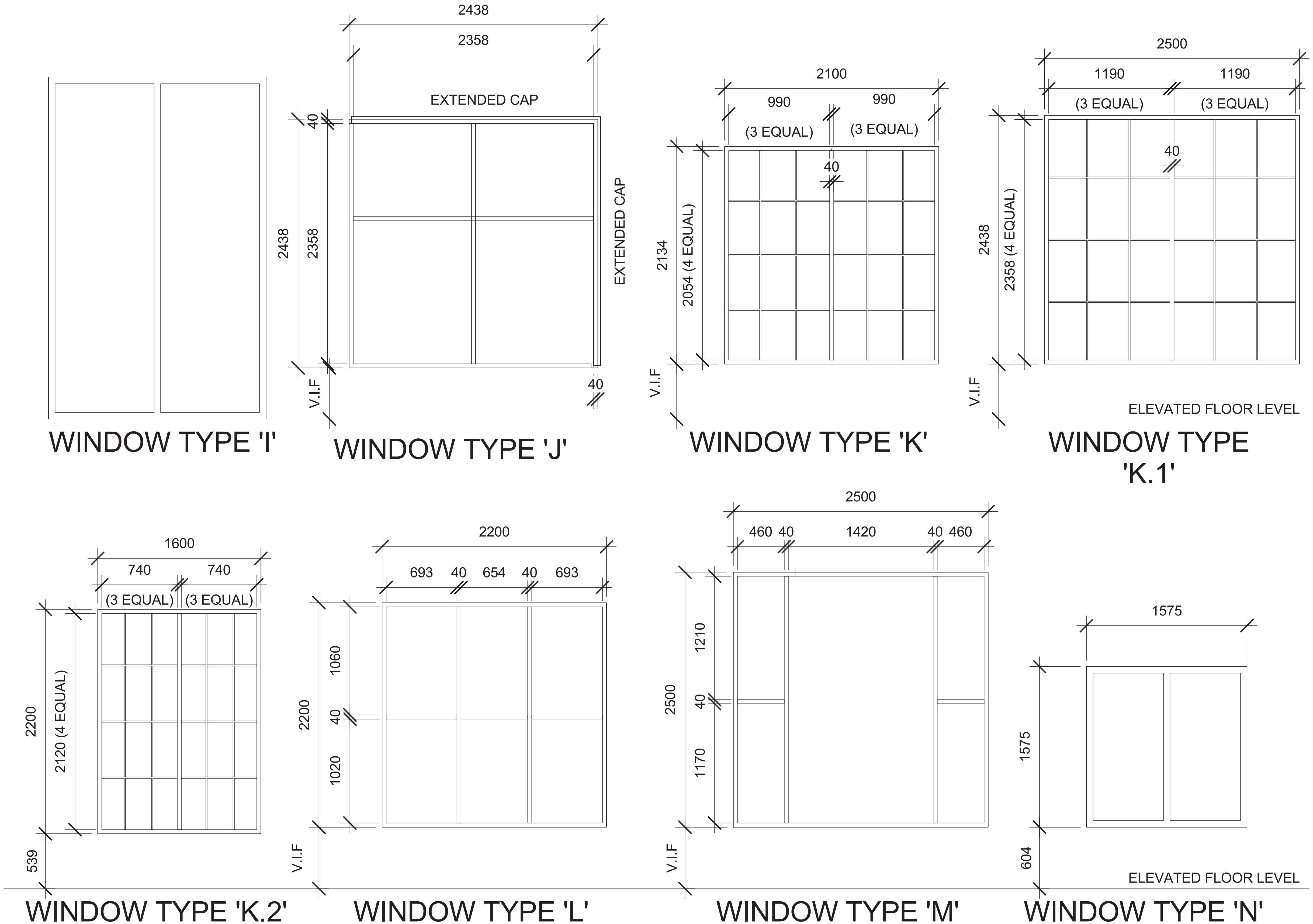
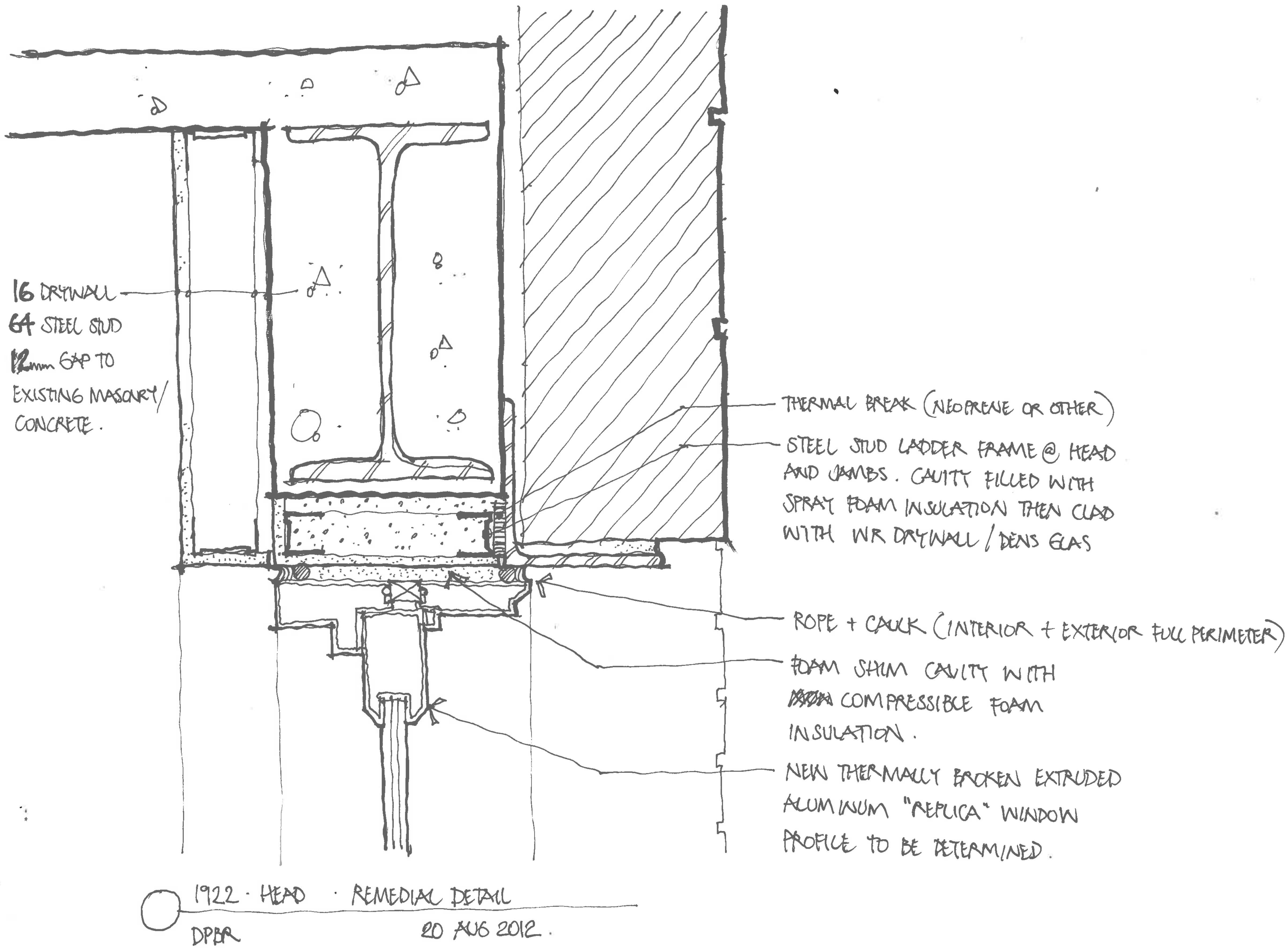
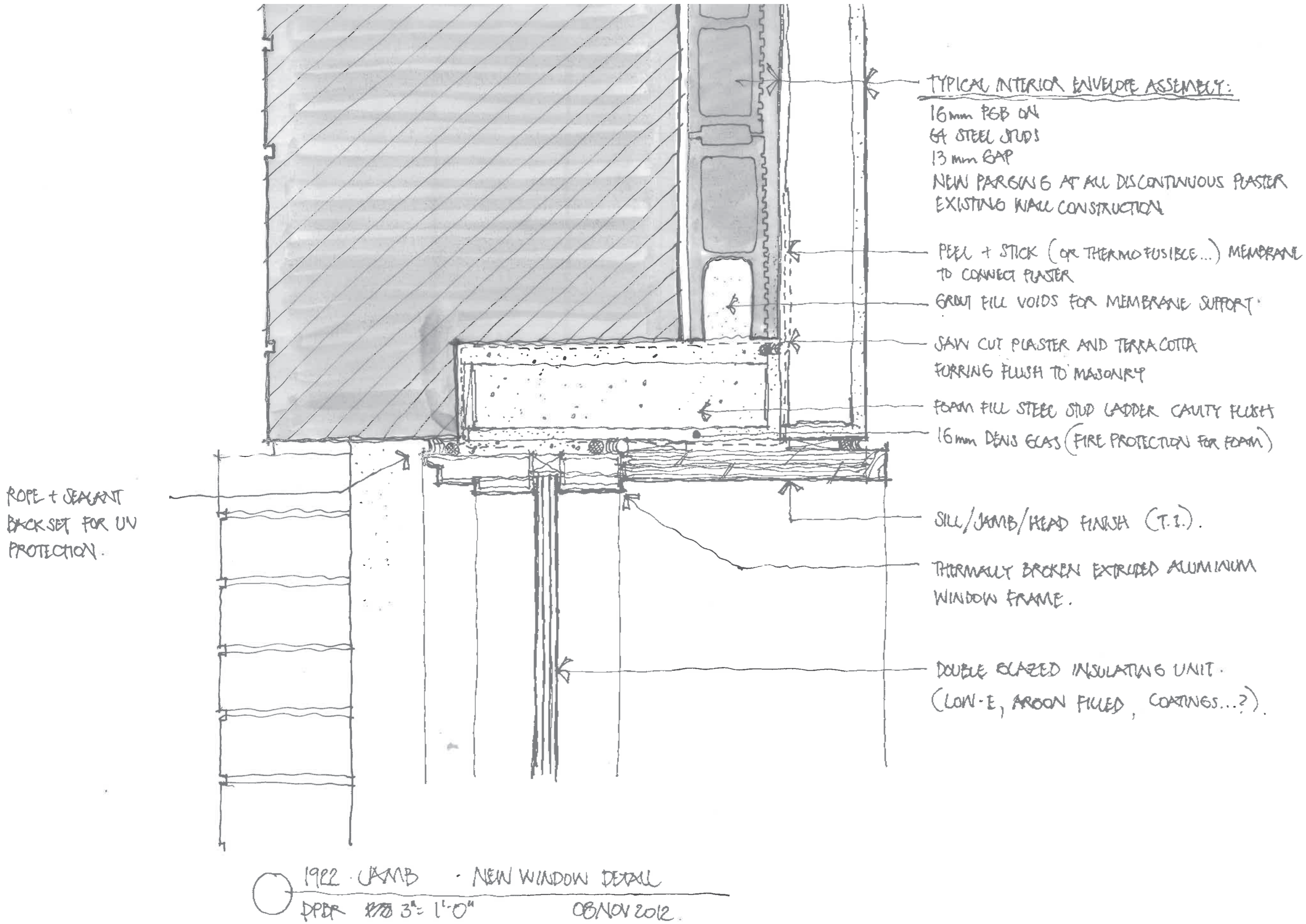
2. BUILDING ENVELOPE

EXISTING BUILDING WINDOWS



Window Type Elevations


16 DRYWALL
64 STEEL STUD
12mm GAP TO
EXISTING MASONRY/
CONCRETE.
THERMAL BREAK (NEOPRENE OR OTHER)
STEEL STUD LADDER FRAME @ HEAD AND JAMBS. CAVITY FILLED WITH SPRAY FOAM INSULATION THEN CLAD WITH WR DRYWALL / DENS GLAS
ROPE + CAULK (INTERIOR + EXTERIOR FULL PERIMETER)
FOAM SHIM CAVITY WITH COMPRESSIBLE FOAM INSULATION.
NEW THERMALLY BROKEN EXTRUDED ALUMINUM "REPLICA" WINDOW PROFILE TO BE DETERMINED.
1922 · HEAD · REMEDIAL DETAIL
DPBR
20 AUG 2012.



1922 Window Details (1946/47 Sim.)

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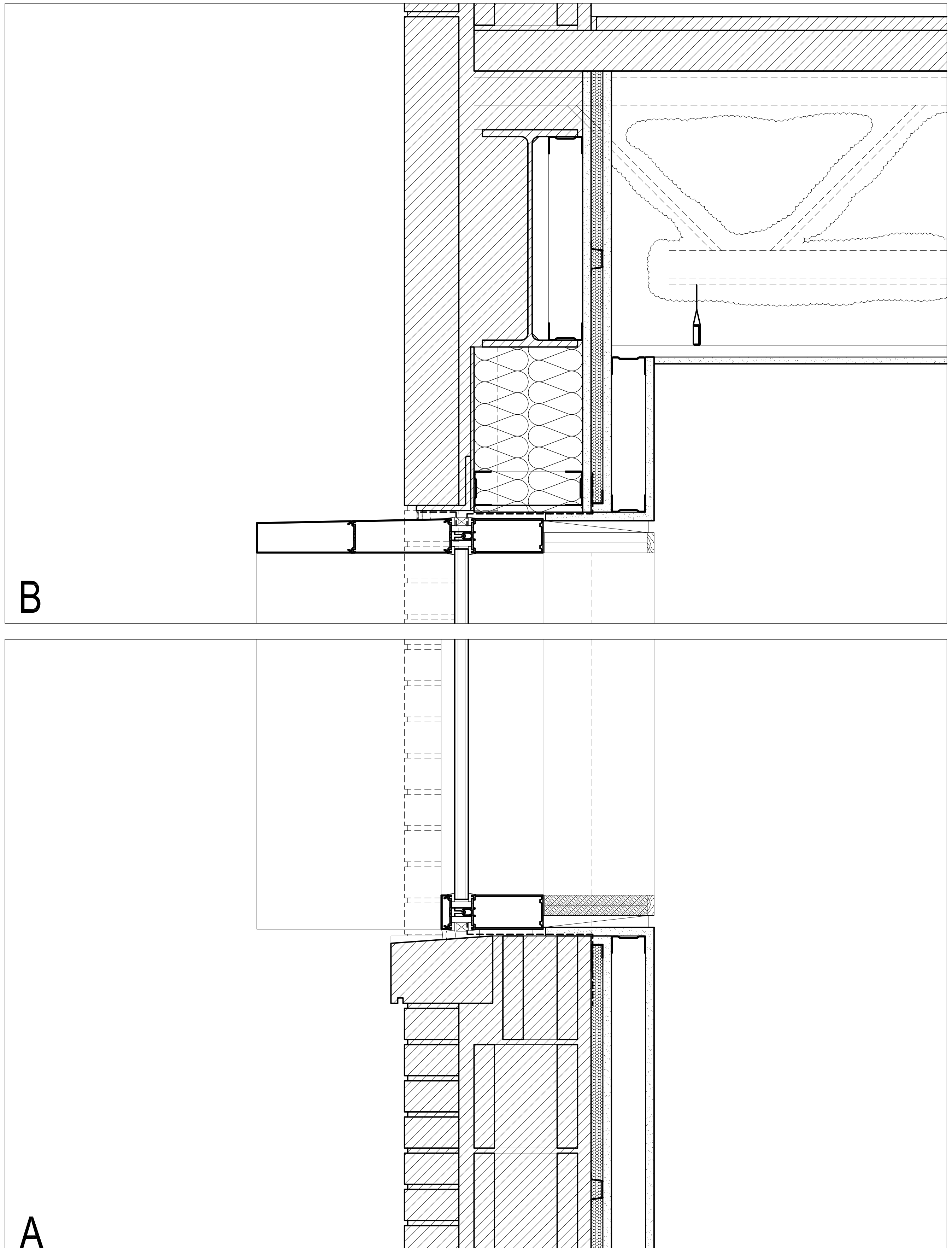
DENTISTRY PHARMACY BUILDING REDEVELOPMENT

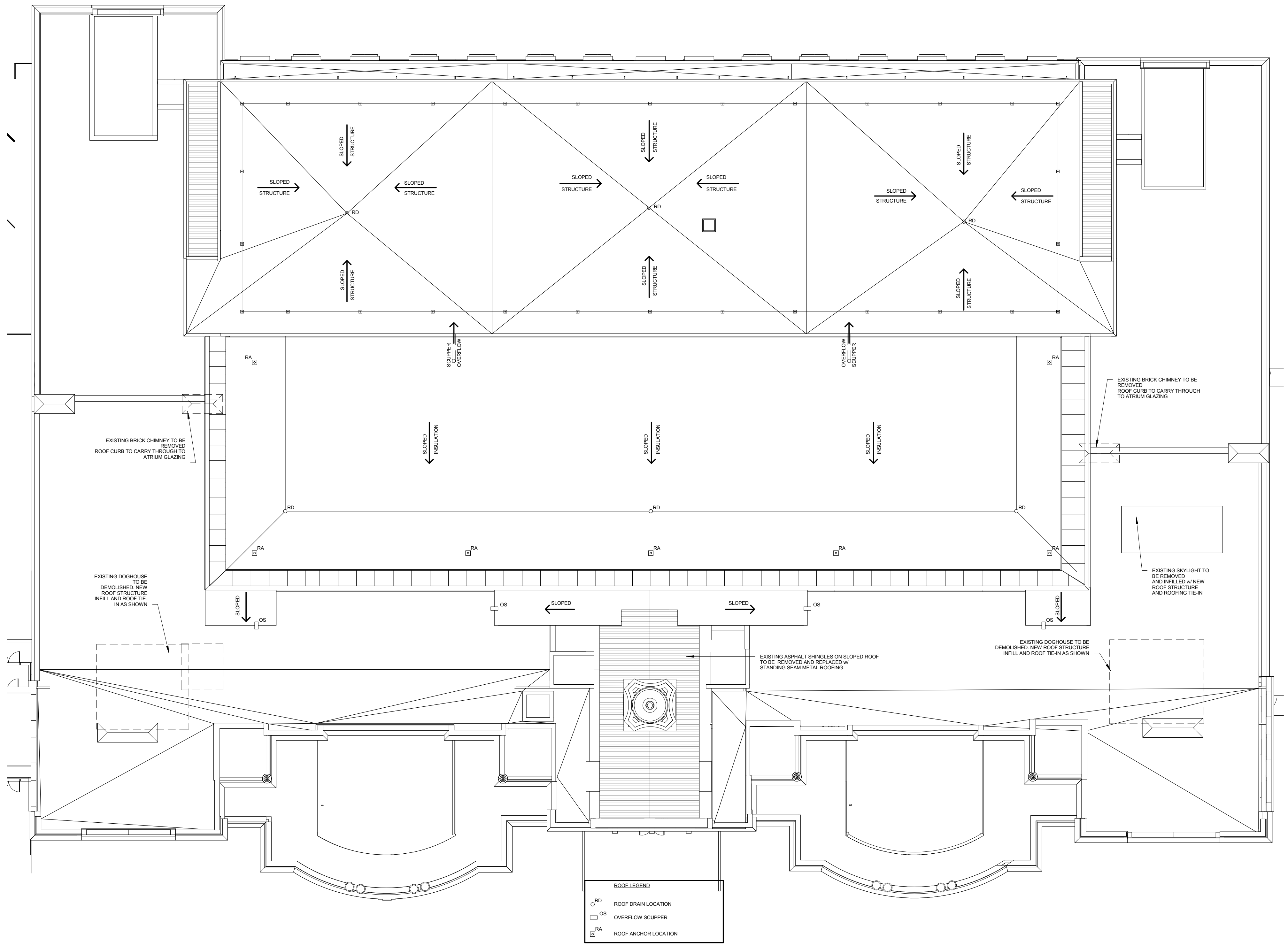
2. BUILDING ENVELOPE

EXISTING BUILDING WINDOWS

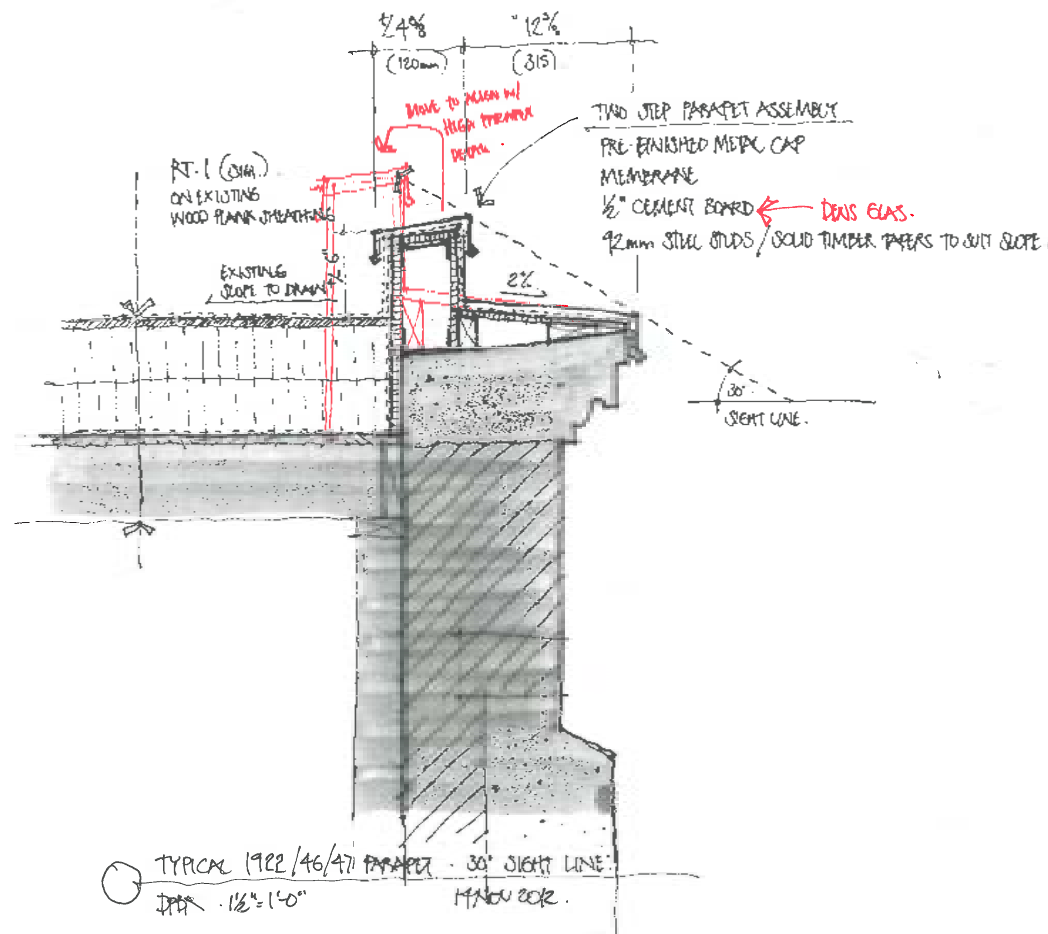


2.315 - Existing 1958 Windows

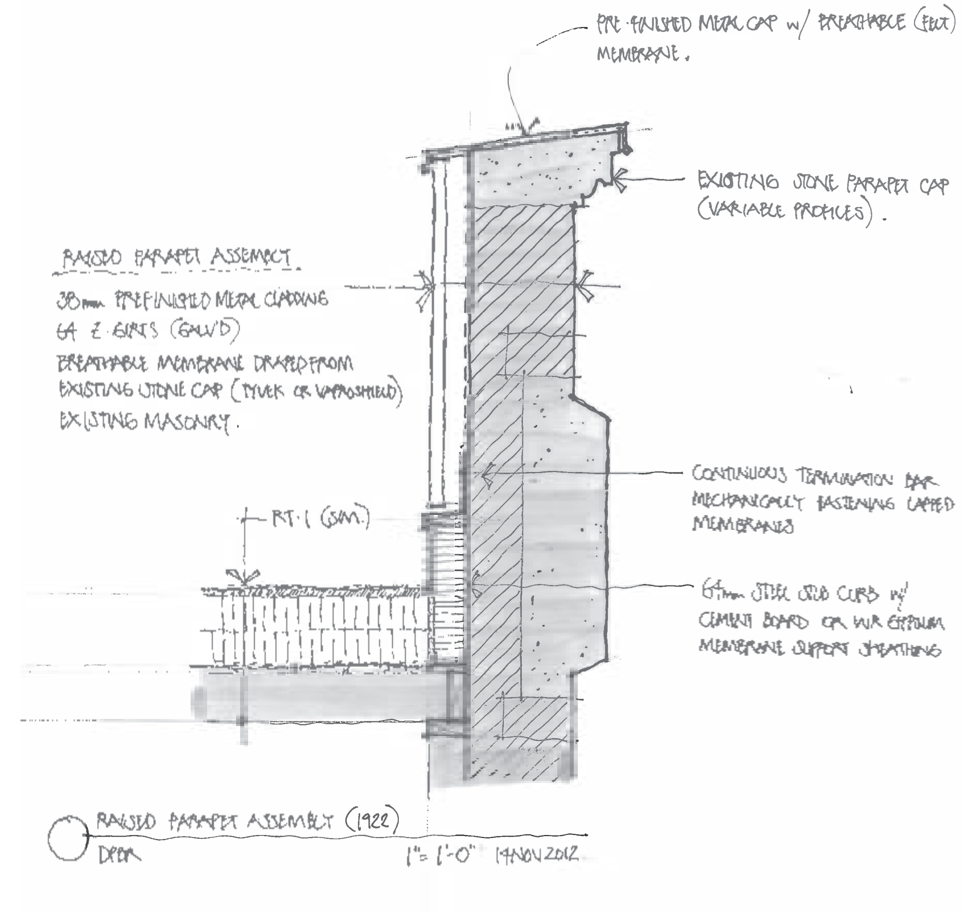
1958 Details



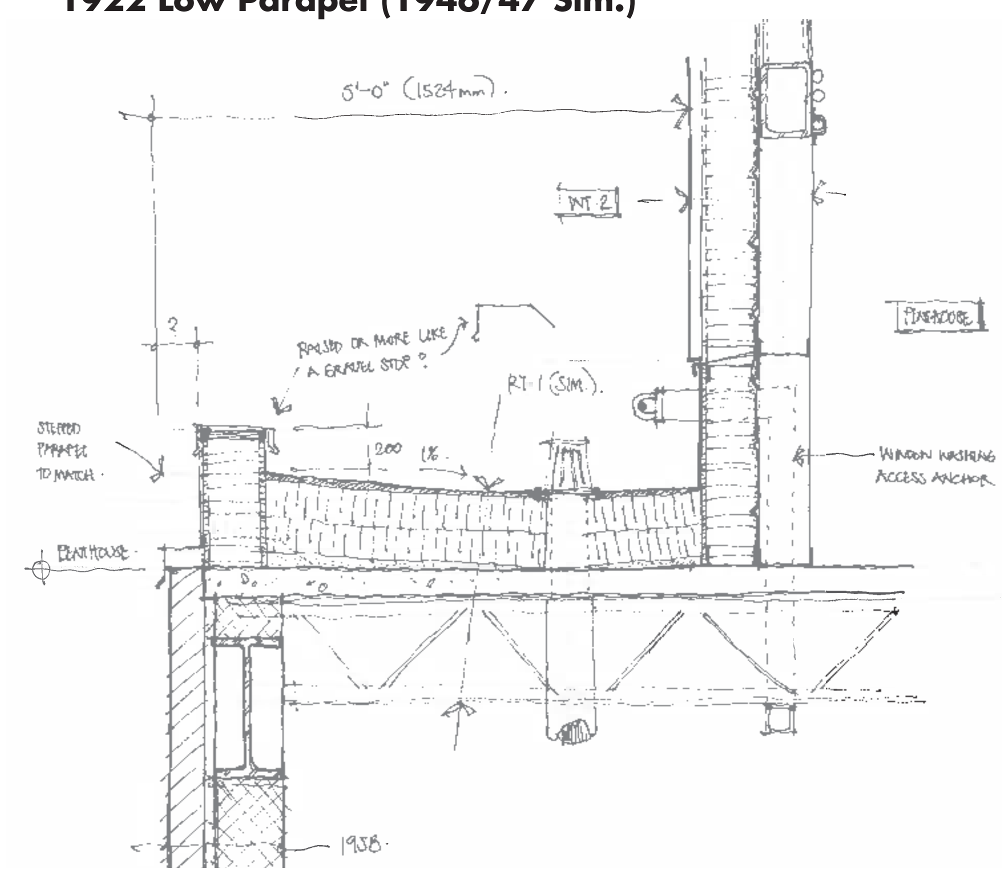
2.300 Roof Plan Parapet Keyplan



1922 Low Parapet (1946/47 Sim.)



1922 High Parapet (1946/47 Sim.)



1958 North Parapet

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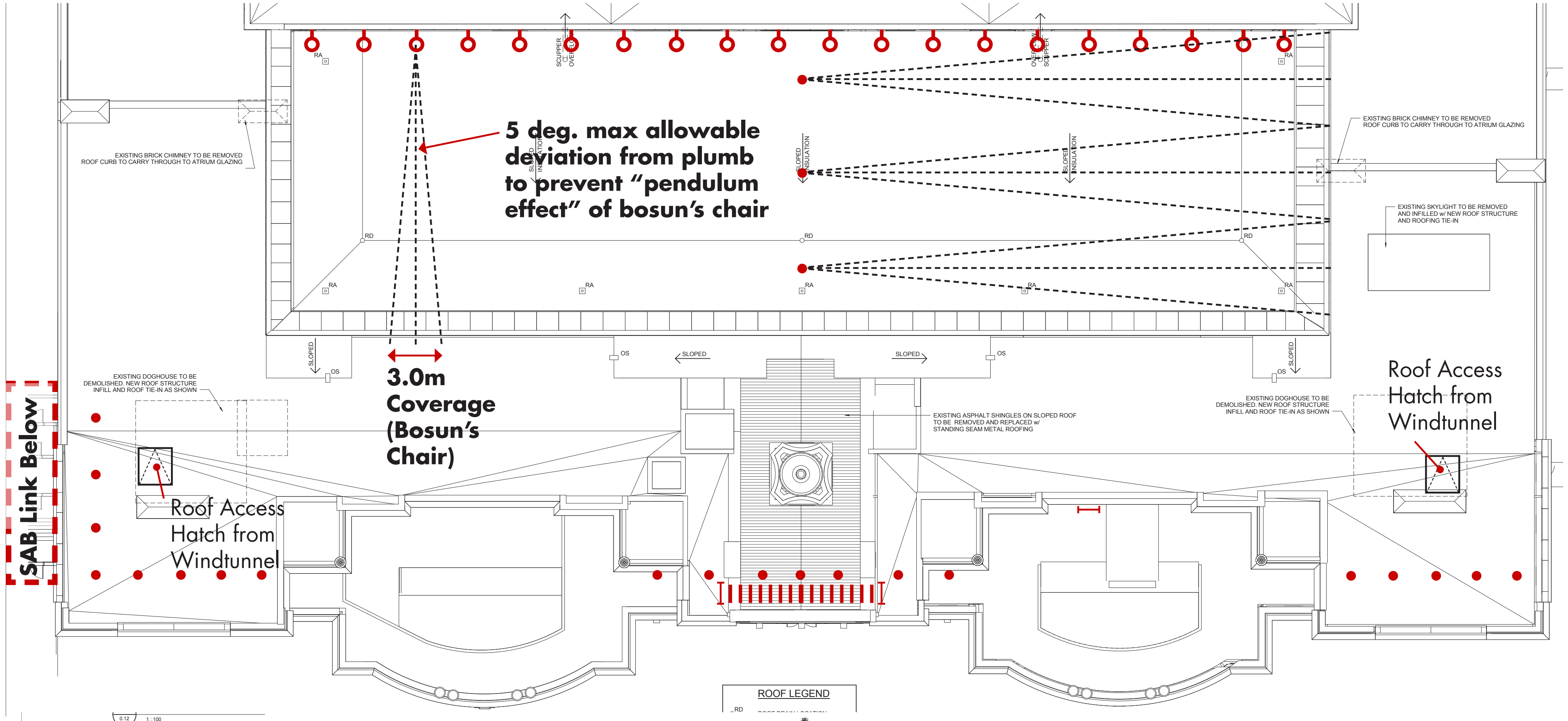
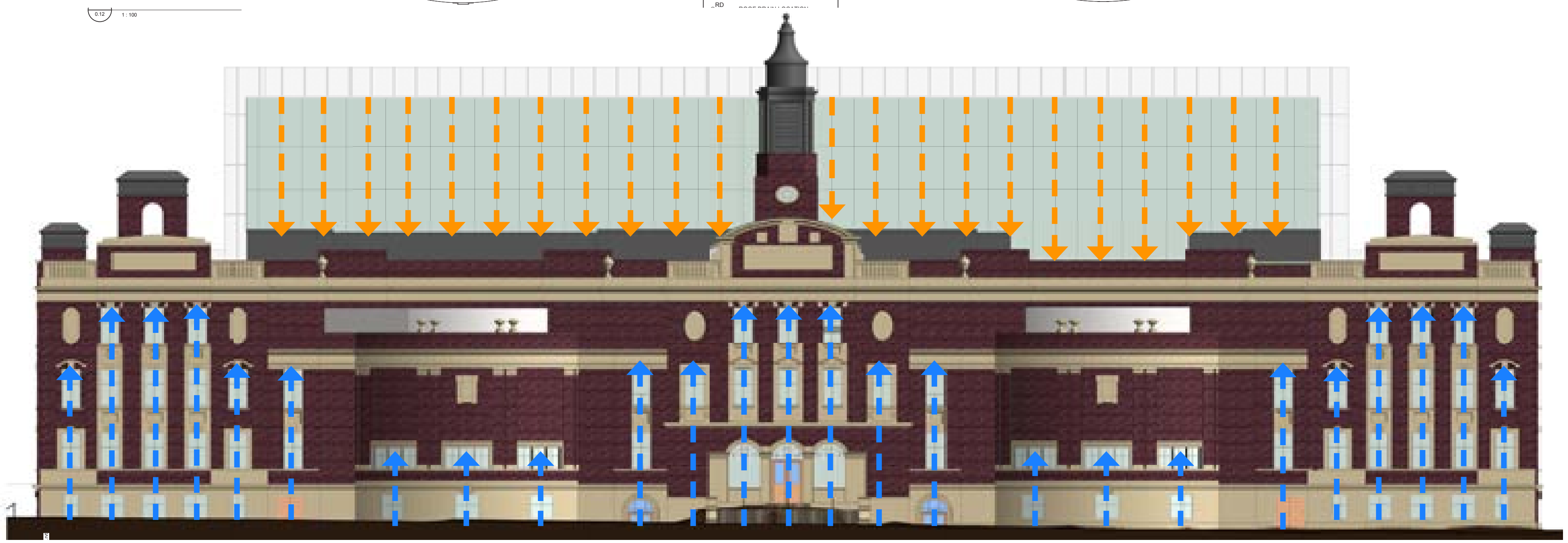
DENTISTRY PHARMACY BUILDING REDEVELOPMENT

2. BUILDING ENVELOPE

EXISTING BUILDING ROOF

Parapet Conditions





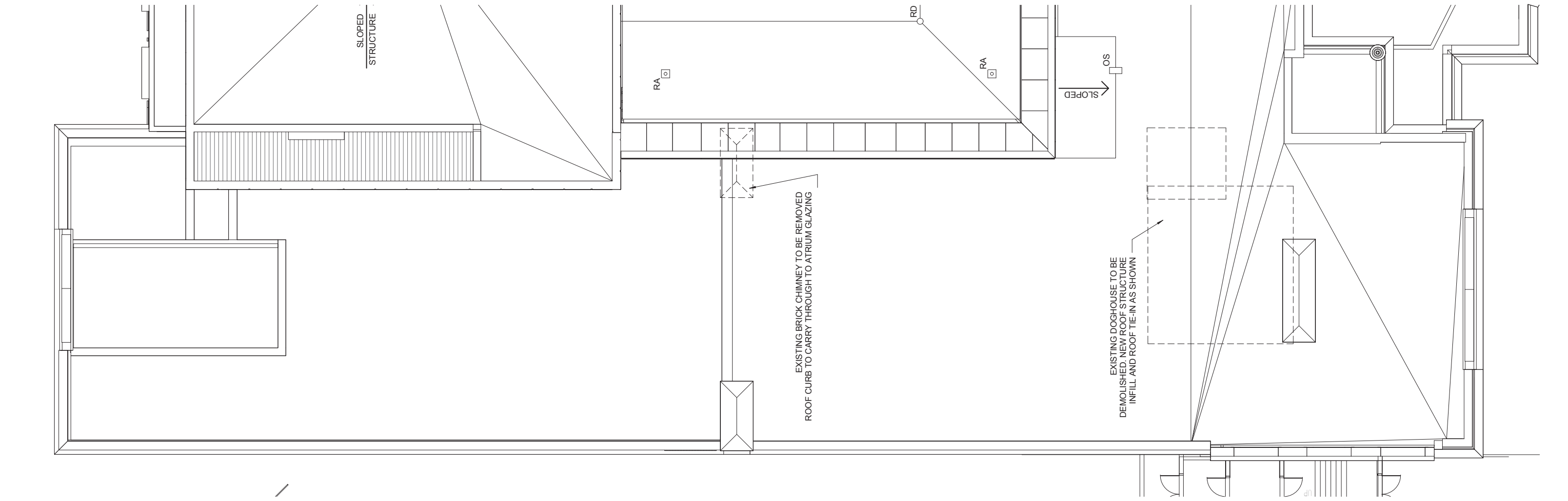
- Roof Anchor Location
- Wall Mount Anchor
- Travel Restraint Cable
- Portable Davit Arm Access
- Life/Suspension Lines
- Roof Access (Bosun's Chair)
- Grade Access
- Ladder

Wall Mount Anchor

Roof Anchor Welded

Davit Arm with Swing Stage

2.400 South Facade and Atrium Glazing Access

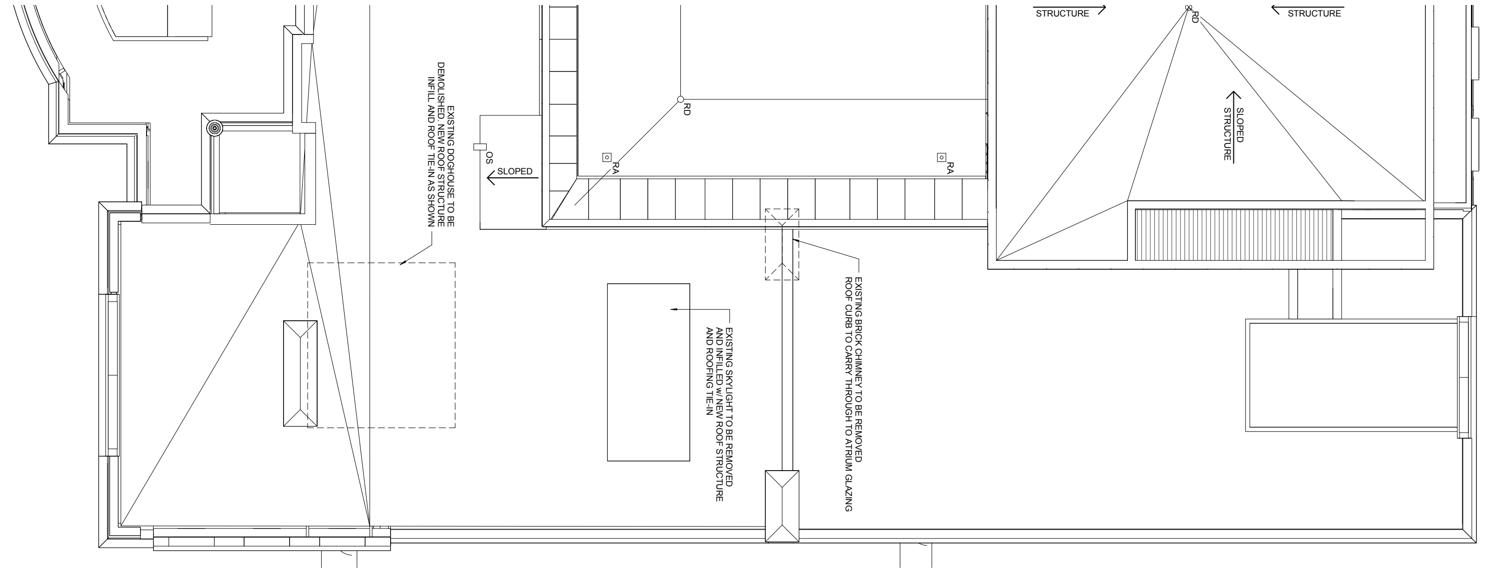


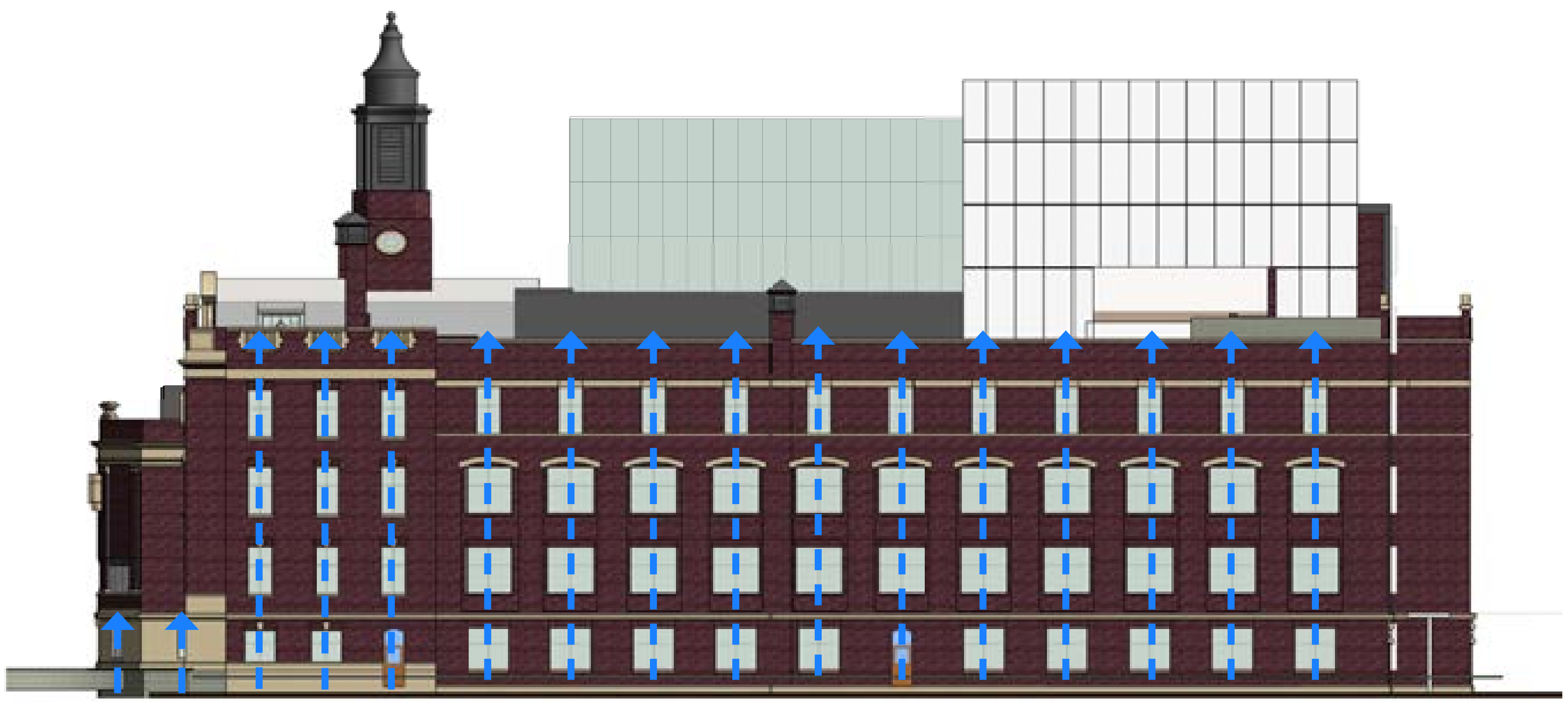
EL - WEST ELEVATION

Roof Anchc
Wall Moun
Travel Restr
Life/Susper
Roof Acces
Grade Acc
Ladder

DENTISTRY PHARMACY BUILDING REDEVELOPMENT
2. BUILDING ENVELOPE
EXISTING BUILDING
ACCESS SOLUTIONS

West Facade Access





Roof Anchor Location

Wall Mount Anchor

Travel Restraint Cable

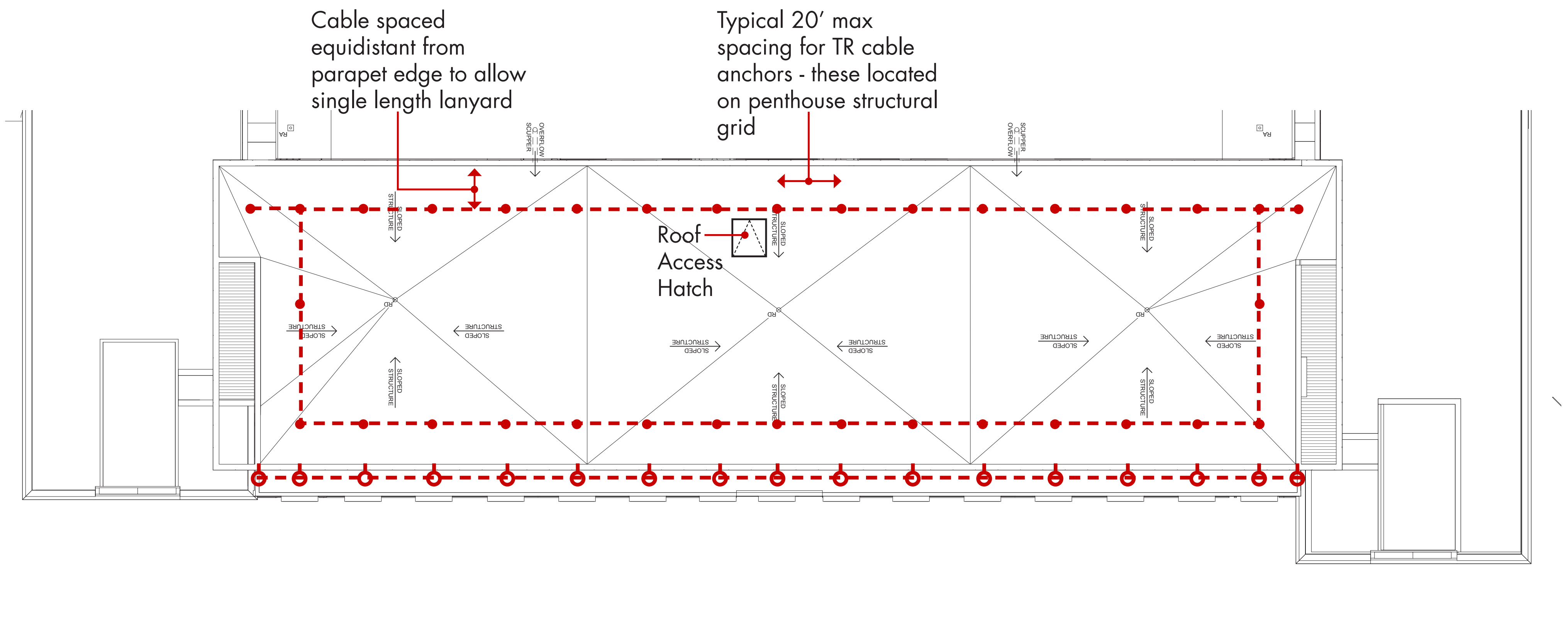
Life/Suspension Lines

Roof Access (Bosun's Chair)

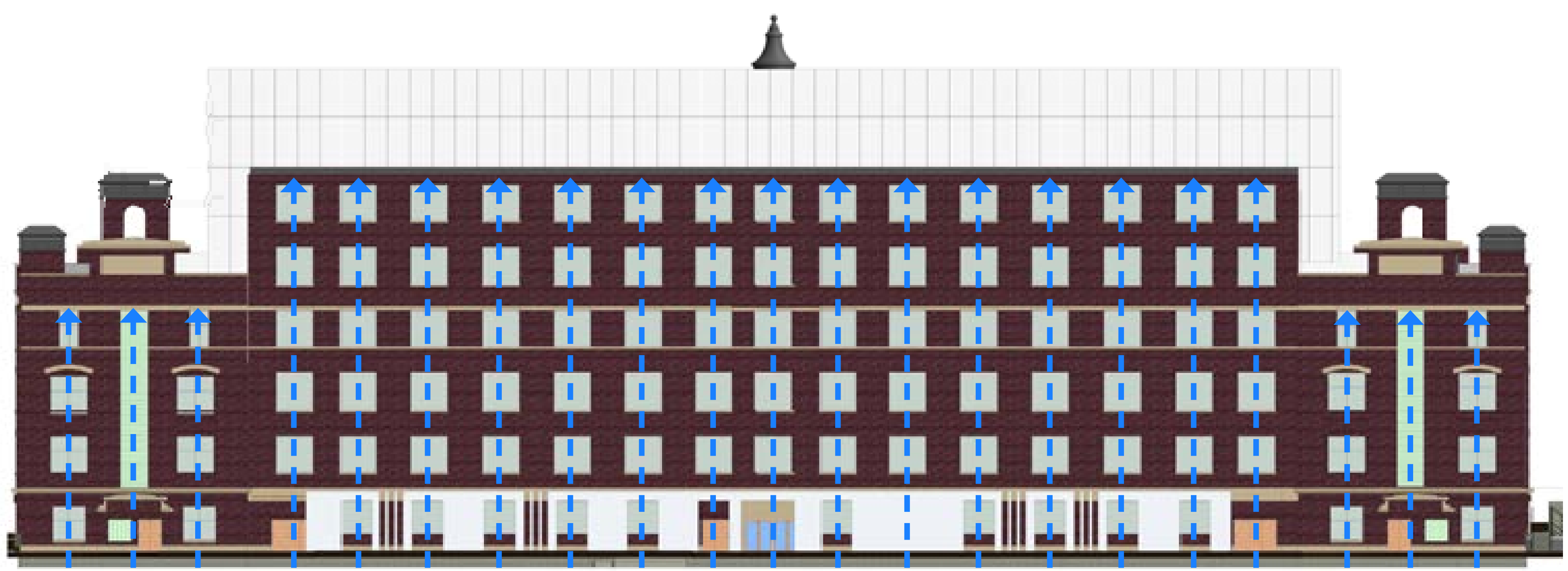
Grade Access

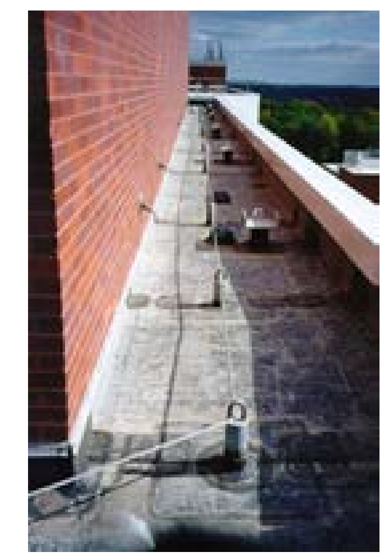
Ladder

2.402 East Facade Access

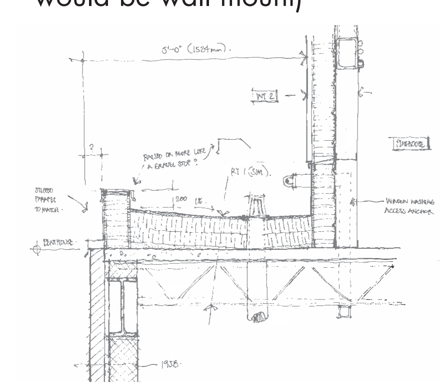


- Roof Anchor Location
- Wall Mount Anchor
- Travel Restraint Cable
- Life/Suspension Lines
- Roof Access (Bosun's Chair)
- Grade Access
- Ladder





Travel Restraint Cable
(Anchors for penthouse would be wall mount)



Existing Building North Elevation and Penthouse Roof - ***Exterior Access Solu***

North Facade Access

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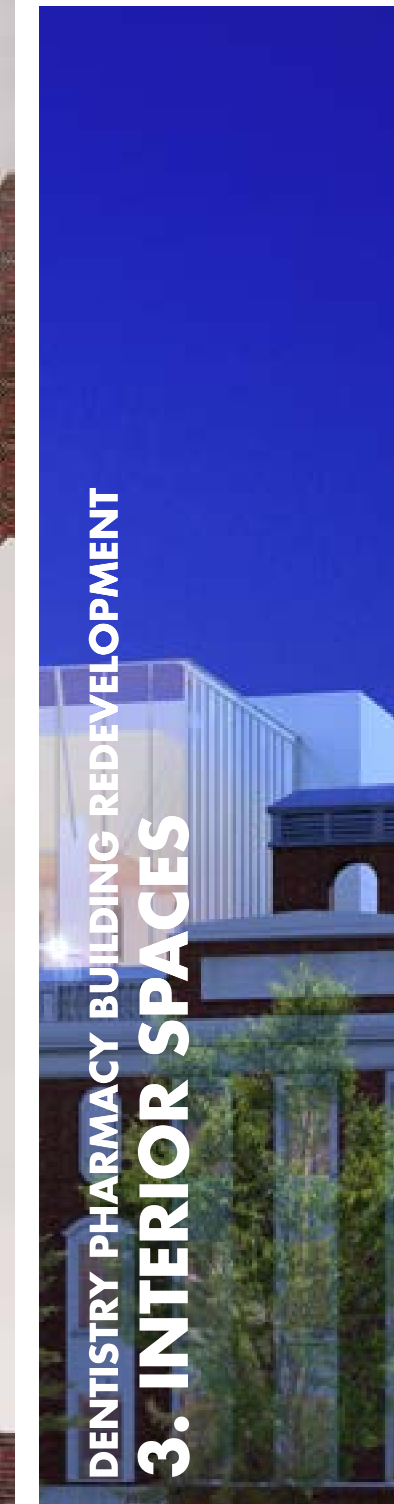
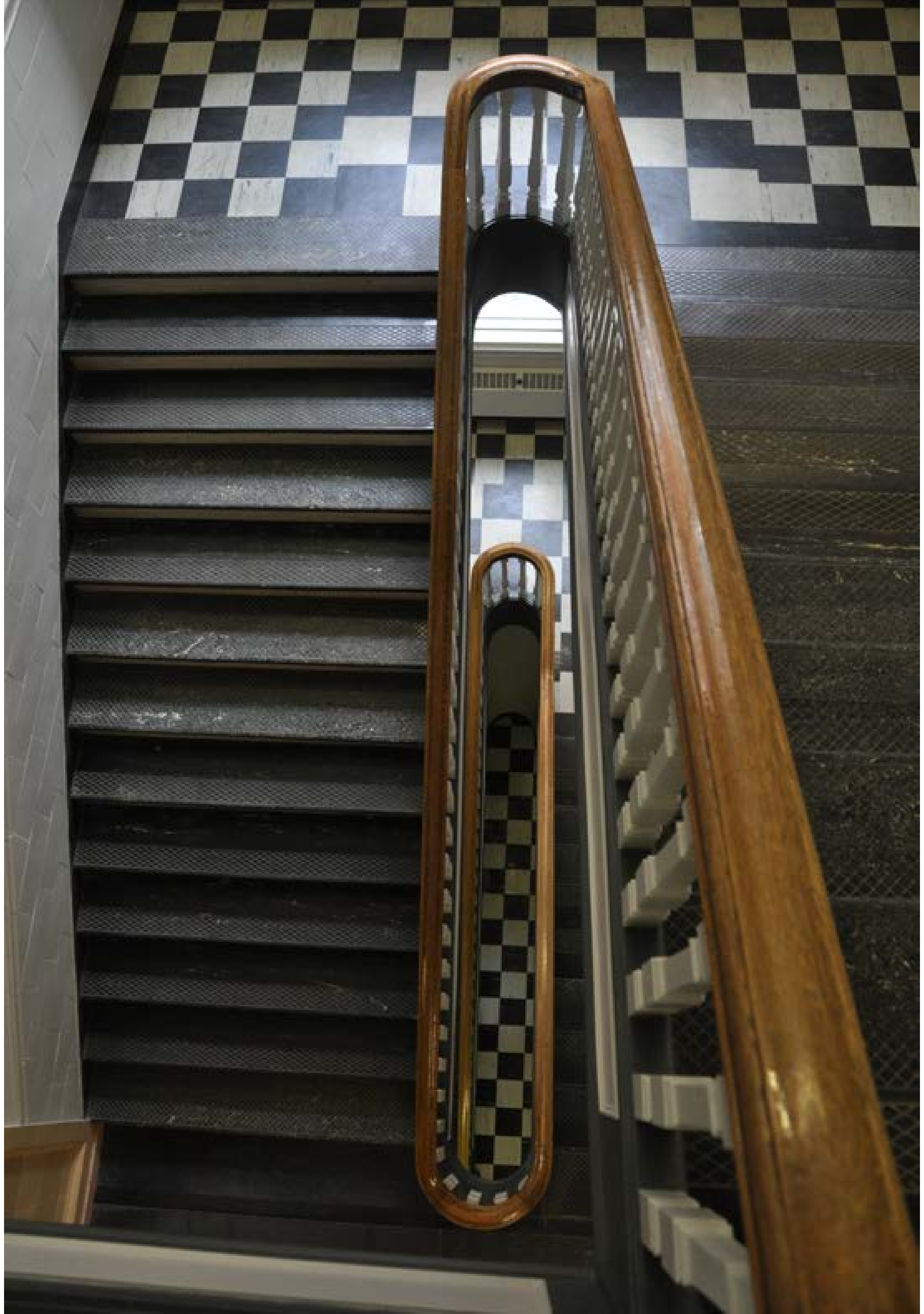


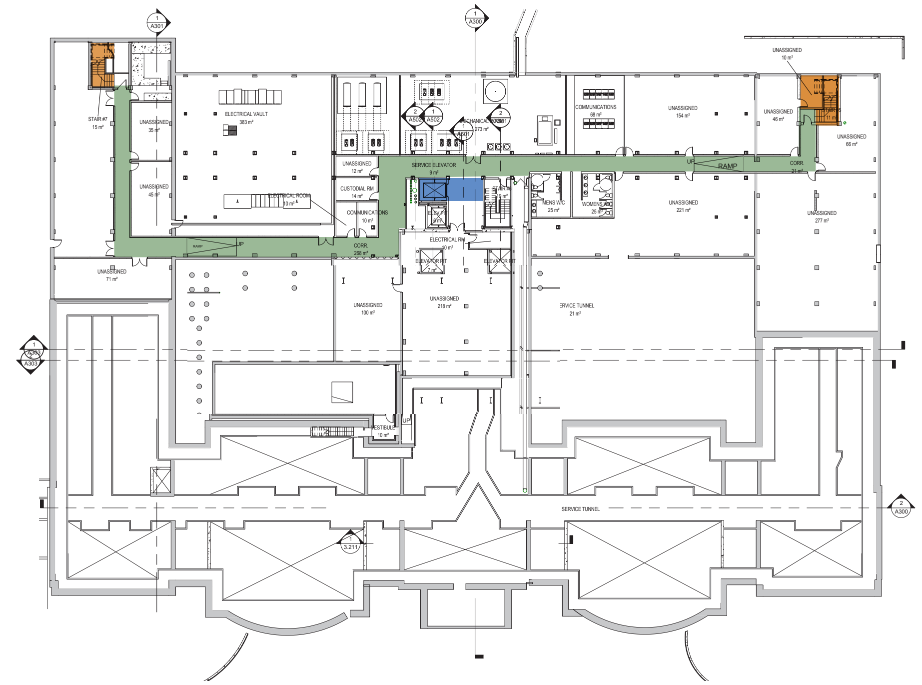
DENTISTRY PHARMACY BUILDING REDEVELOPMENT

3. INTERIOR SPACES

3

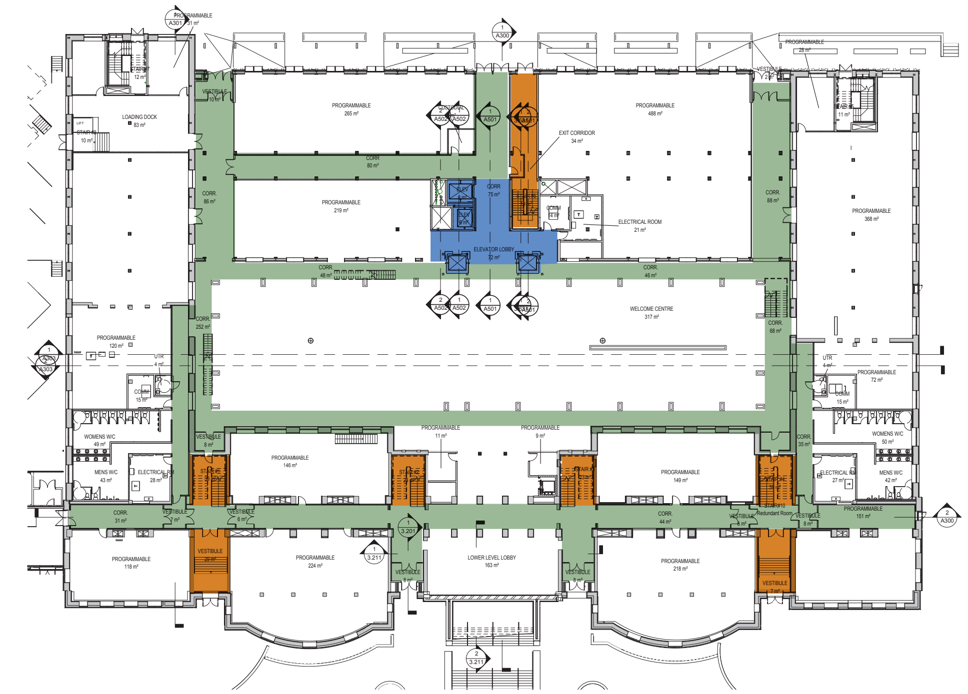
3



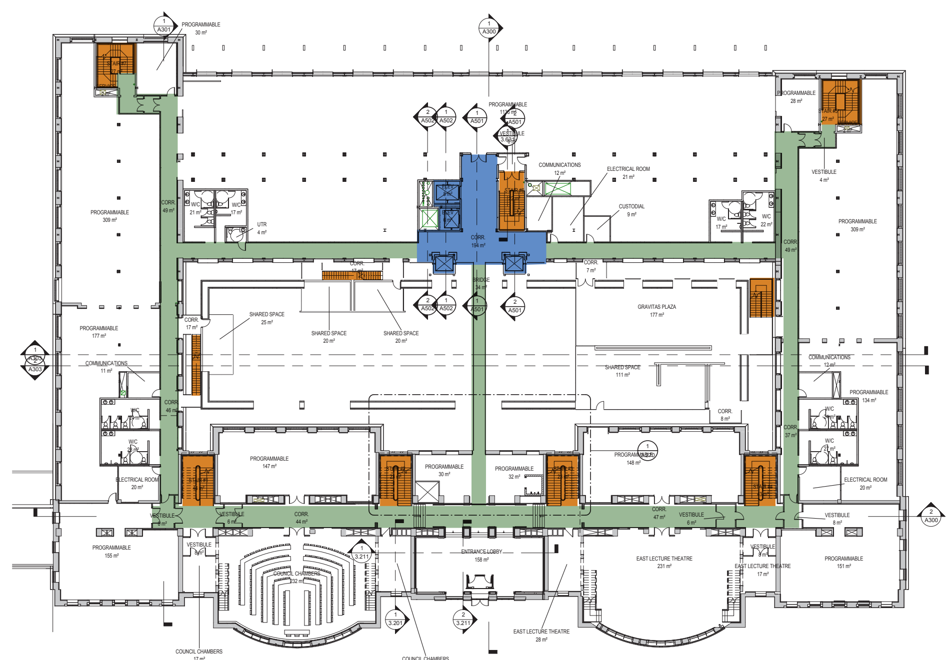


CORRIDOR
STAIRS/ EXITS
ELEVATOR/ LOBBY

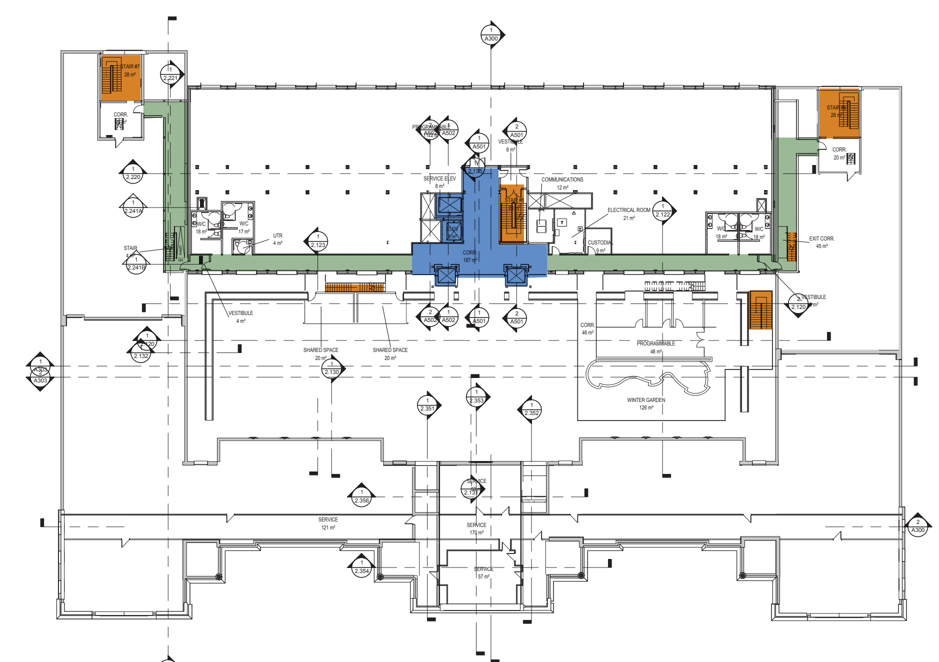
Basement Circulation



Level 1 Circulation

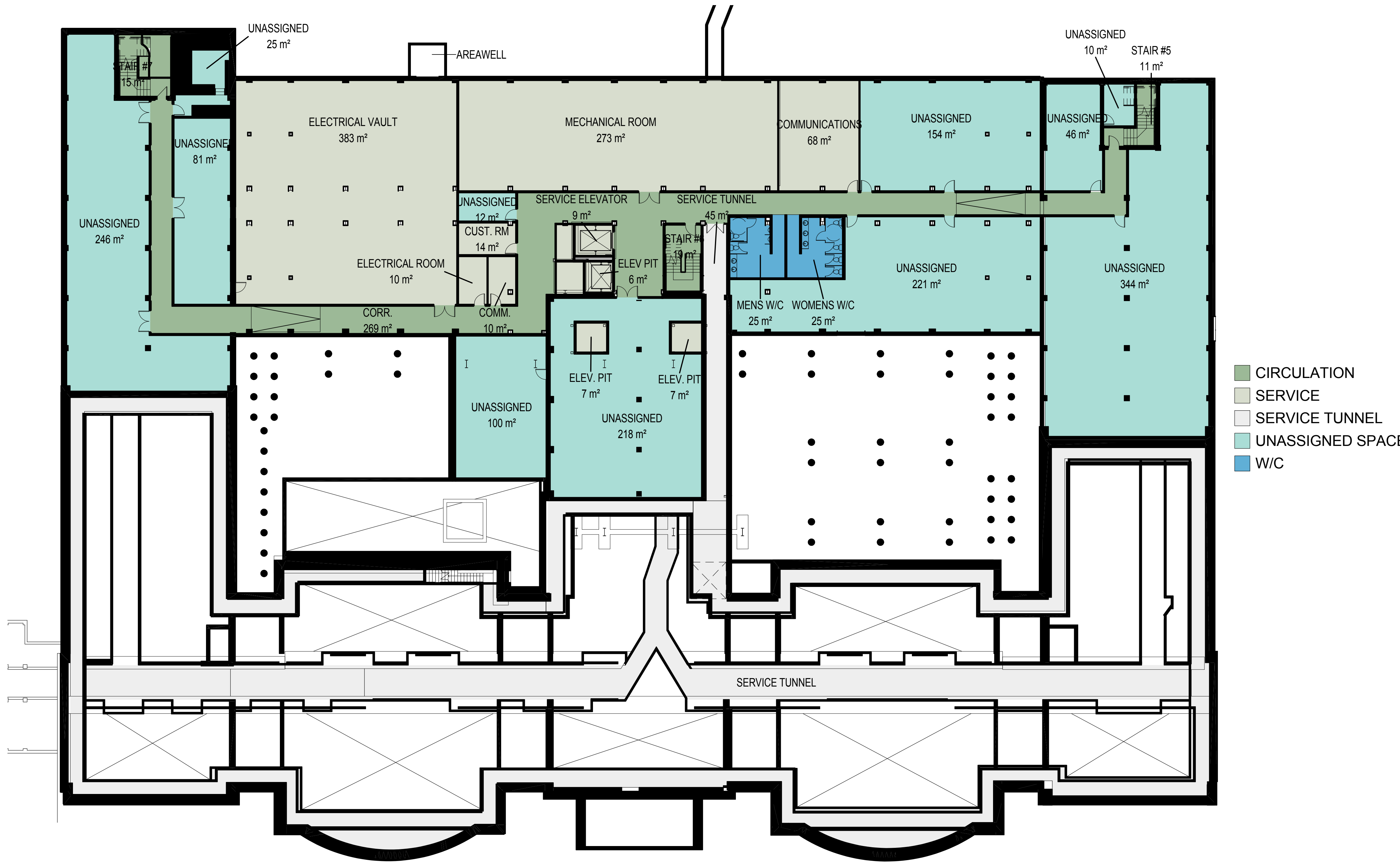


Level 2-4 Circulation



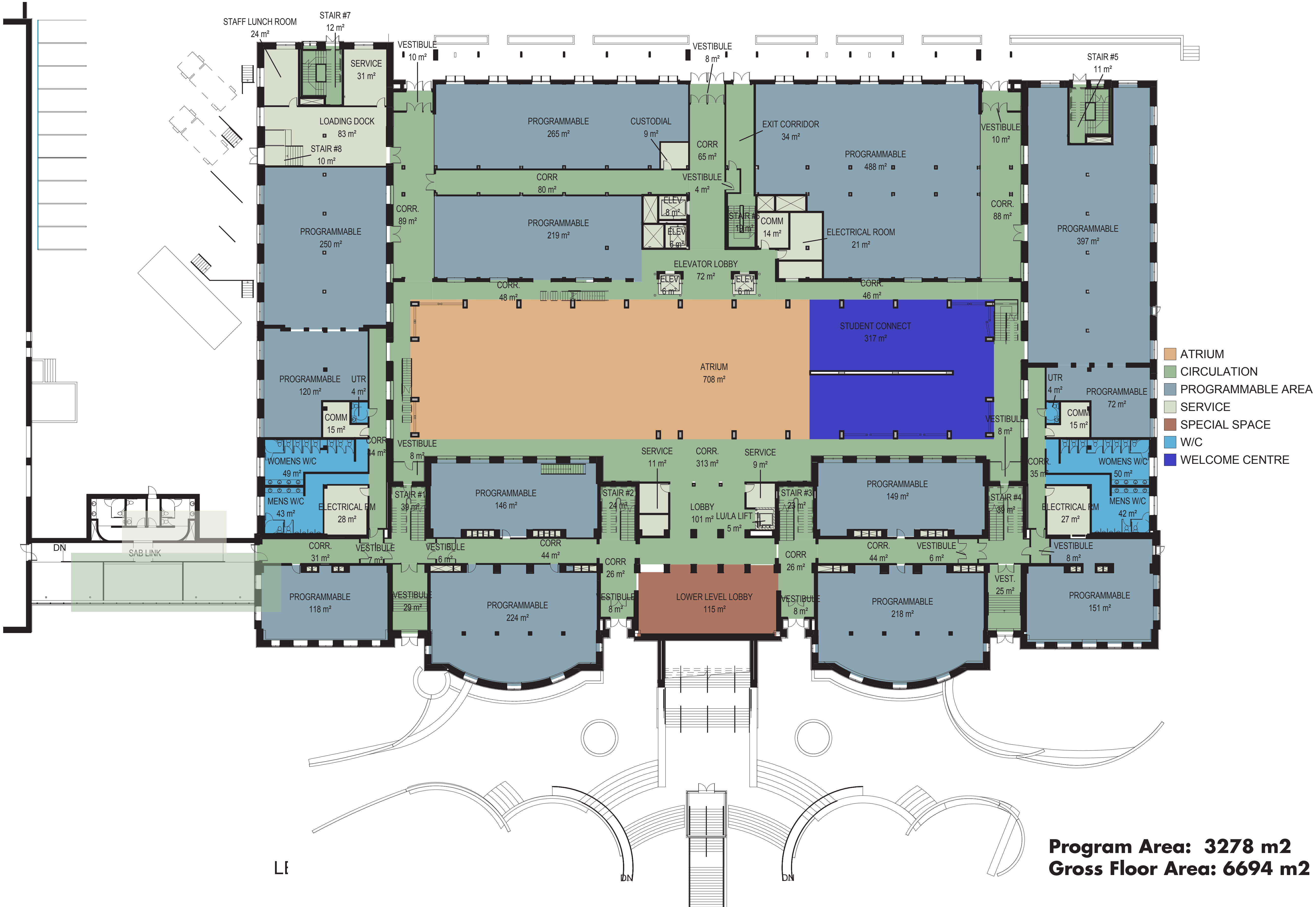
Level 5-6 Circulation

Circulation



Program Area: 1141 m2
Gross Floor Area: 3148 m2

3.100 Basement Program Area Plan



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DENTISTRY PHARMACY BUILDING REDEVELOPMENT

3. INTERIOR SPACES

PROGRAMMABLE AREAS

Program Area: 3278 m2
Gross Floor Area: 6694 m2

Level 1 Program Area Plan

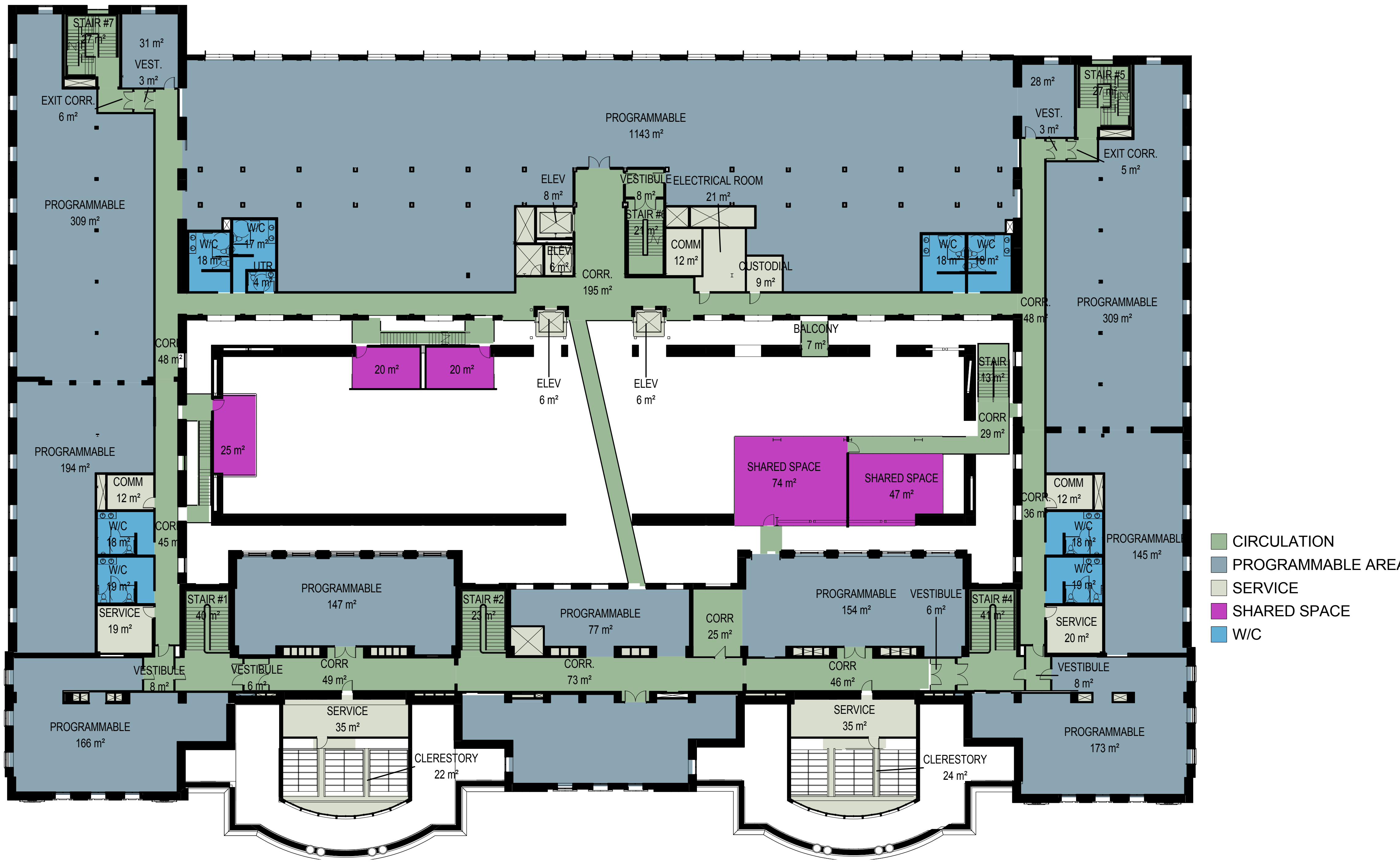
Program Area: 3676 m2
Gross Floor Area: 5735 m2

3.102 Level 2 Program Area Plan

- CIRCULATION
- COUNCIL CHAMBER
- EAST LECTURE CHAMBERS
- PROGRAMMABLE AREA
- SERVICE
- SHARED SPACE
- SPECIAL SPACE
- W/C

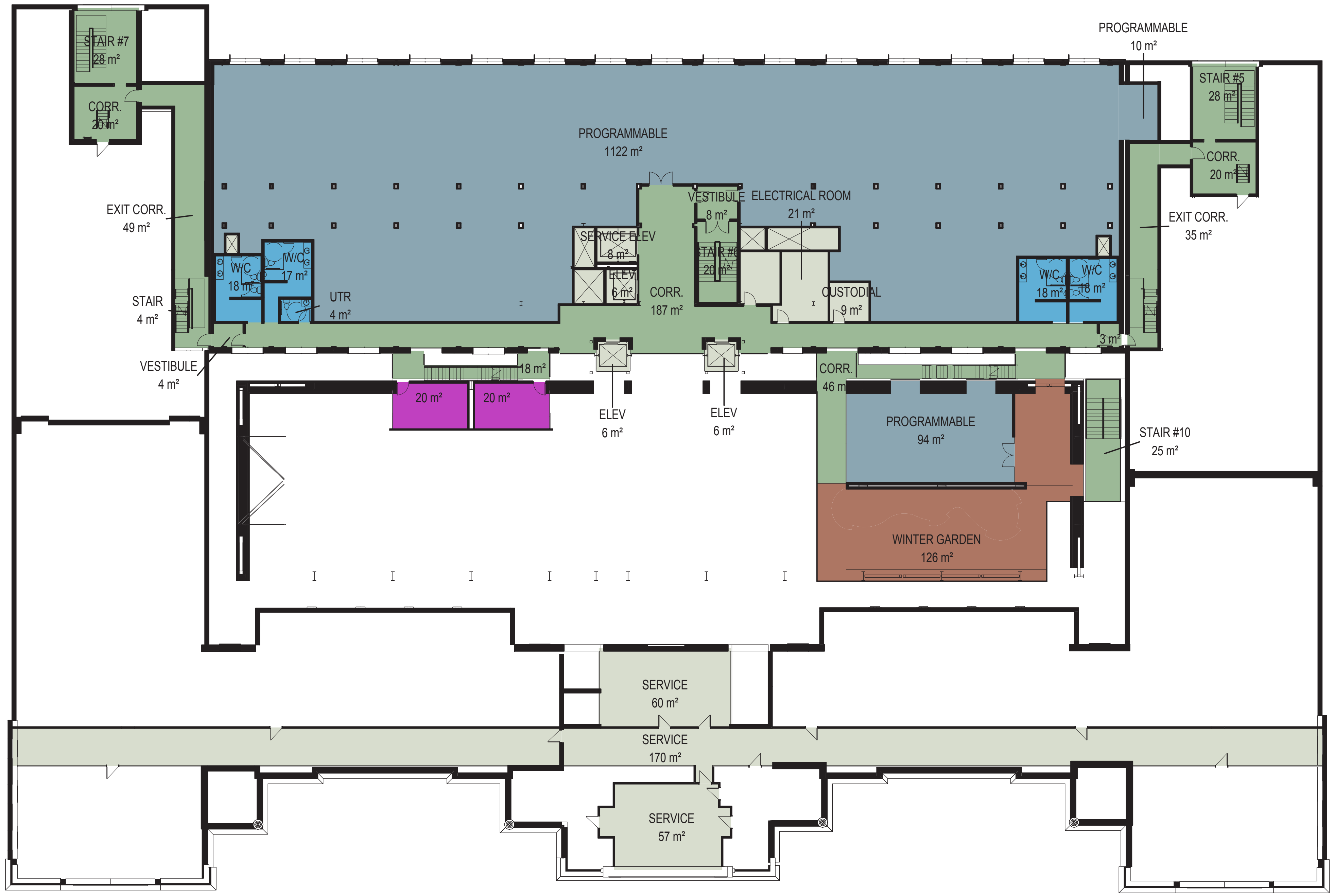
Program Area: 3391 m2
Gross Floor Area: 5201 m2

Level 3 Program Area Plan



Program Area: 3205 m2
Gross Floor Area: 5150 m2

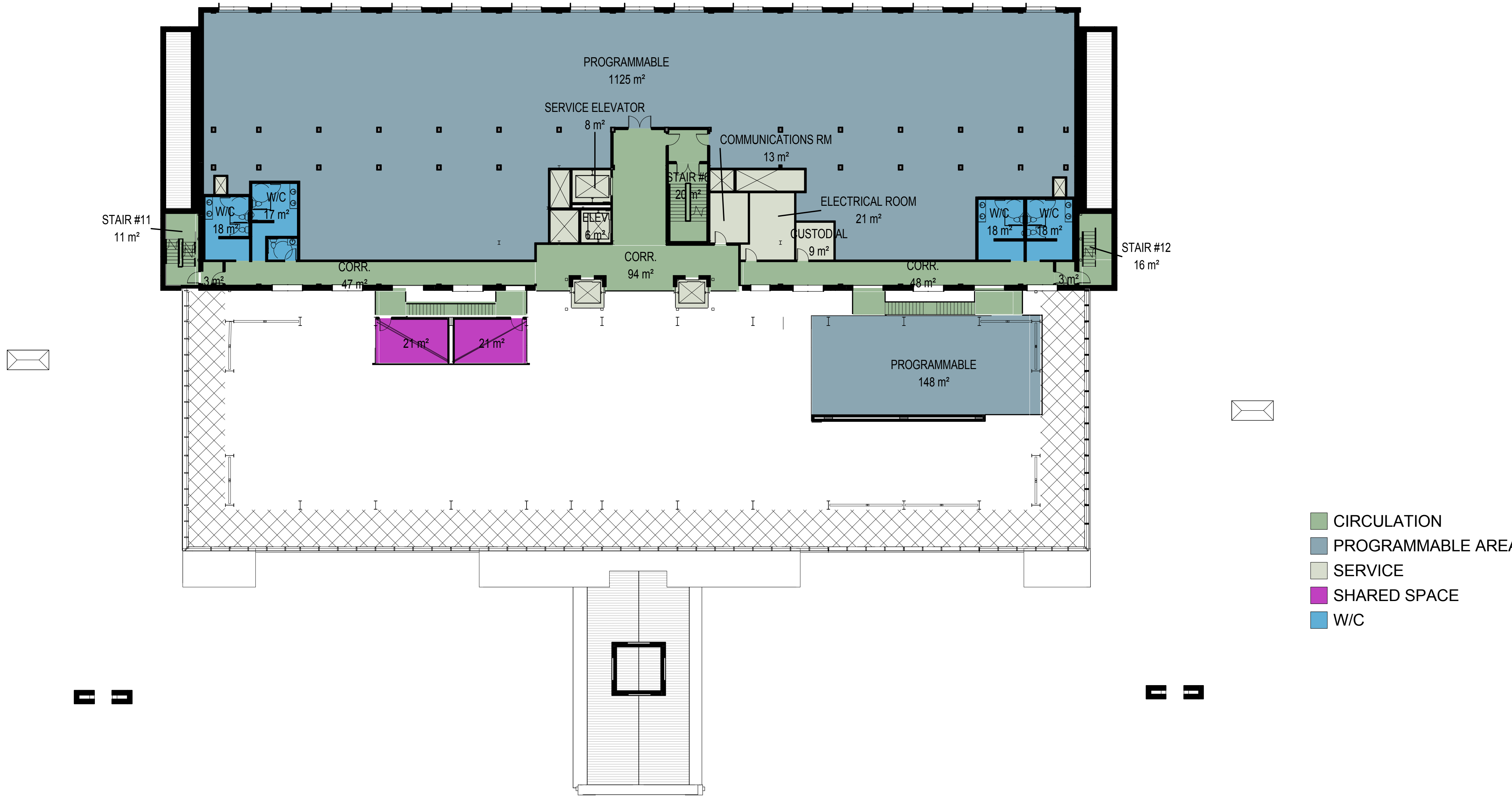
3.104 Level 4 Program Area Plan



- CIRCULATION
- PROGRAMMABLE AREA
- SERVICE
- SHARED SPACE
- SPECIAL SPACE
- W/C

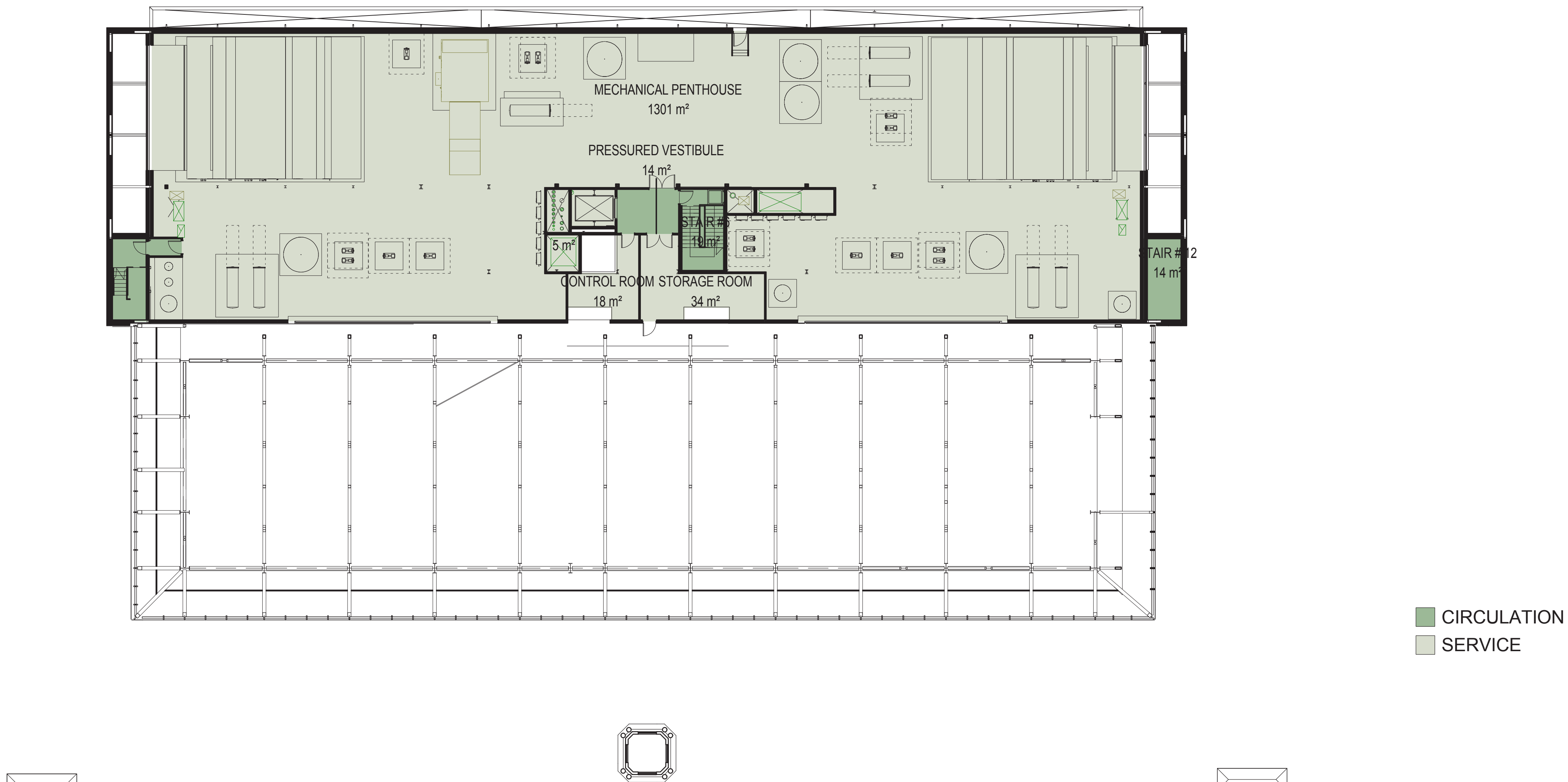
Program Area: 1428 m2
Gross Floor Area: 2781 m2

Level 5 Program Area Plan



Program Area: 1314 m2
Gross Floor Area: 1935 m2

3.106 Level 6 Program Area Plan



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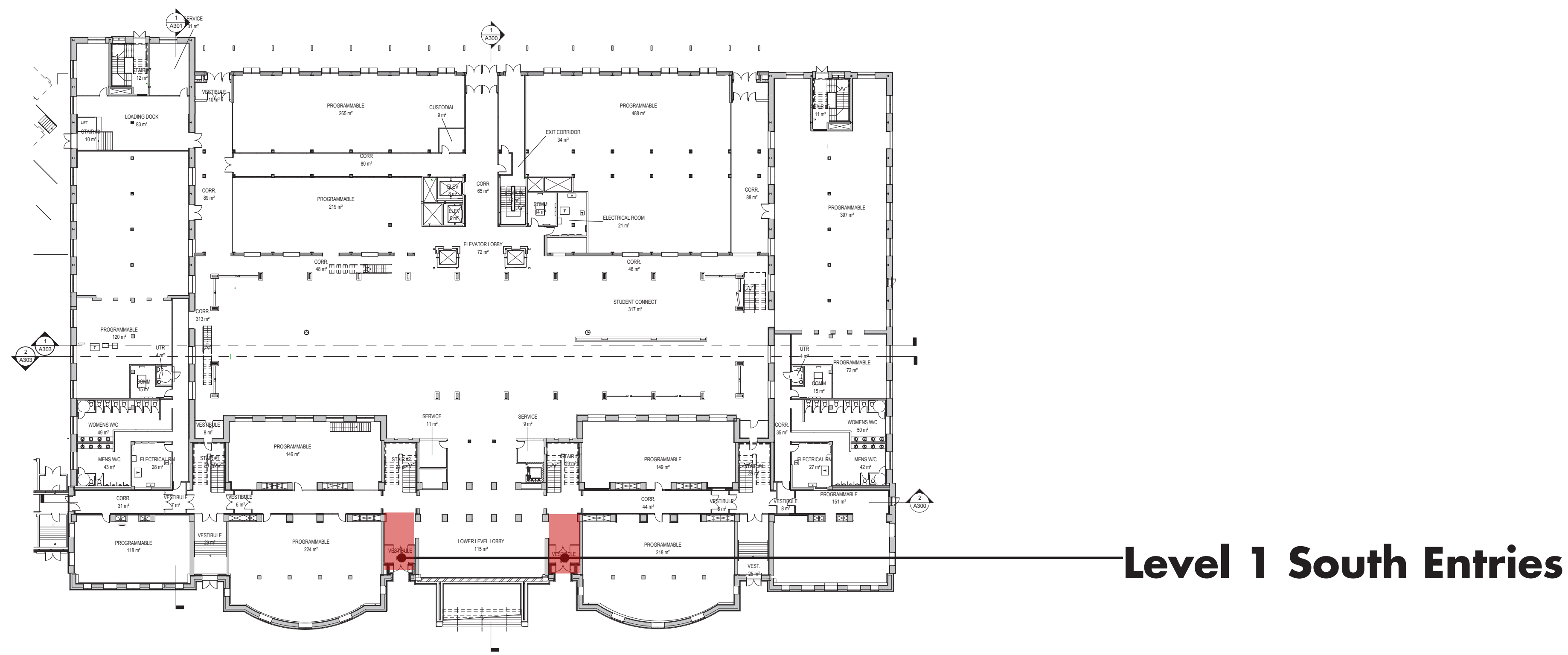
DENTISTRY PHARMACY BUILDING REDEVELOPMENT

3. INTERIOR SPACES

PROGRAMMABLE AREAS

Program Area: 0 m2
Gross Floor Area: 1528 m2

Penthouse Program Area Plan



Level 1

3.200 Entry Sequences - South Entry

South Entry - Section

Level 1 South Entries

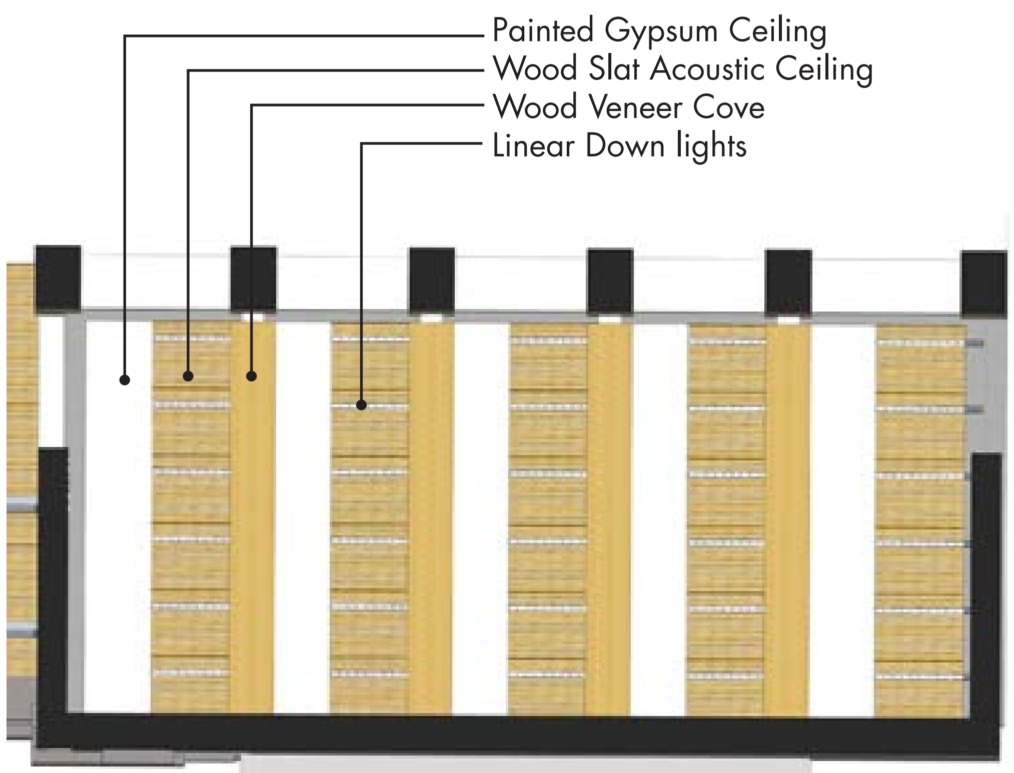
DENTISTRY PHARMACY BUILDING REDEVELOPMENT

3. INTERIOR SPACES

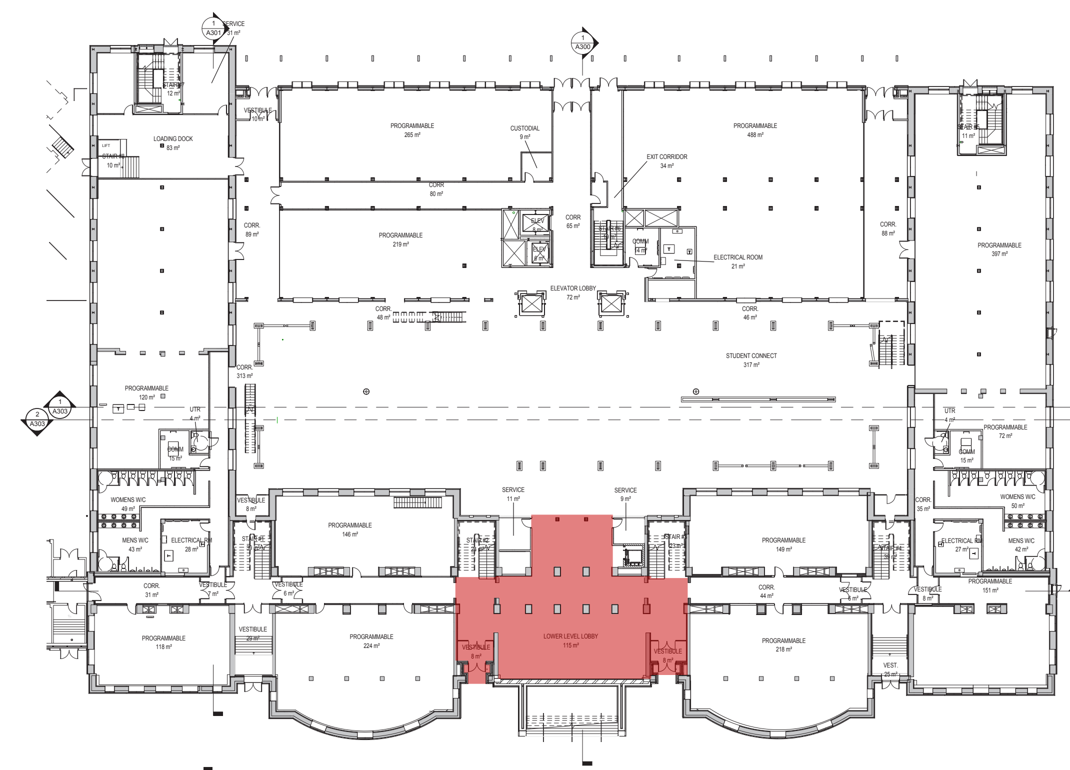
ENTRY SEQUENCES

Lower Level Lobby - Plan

Lower Level Lobby - Perspective

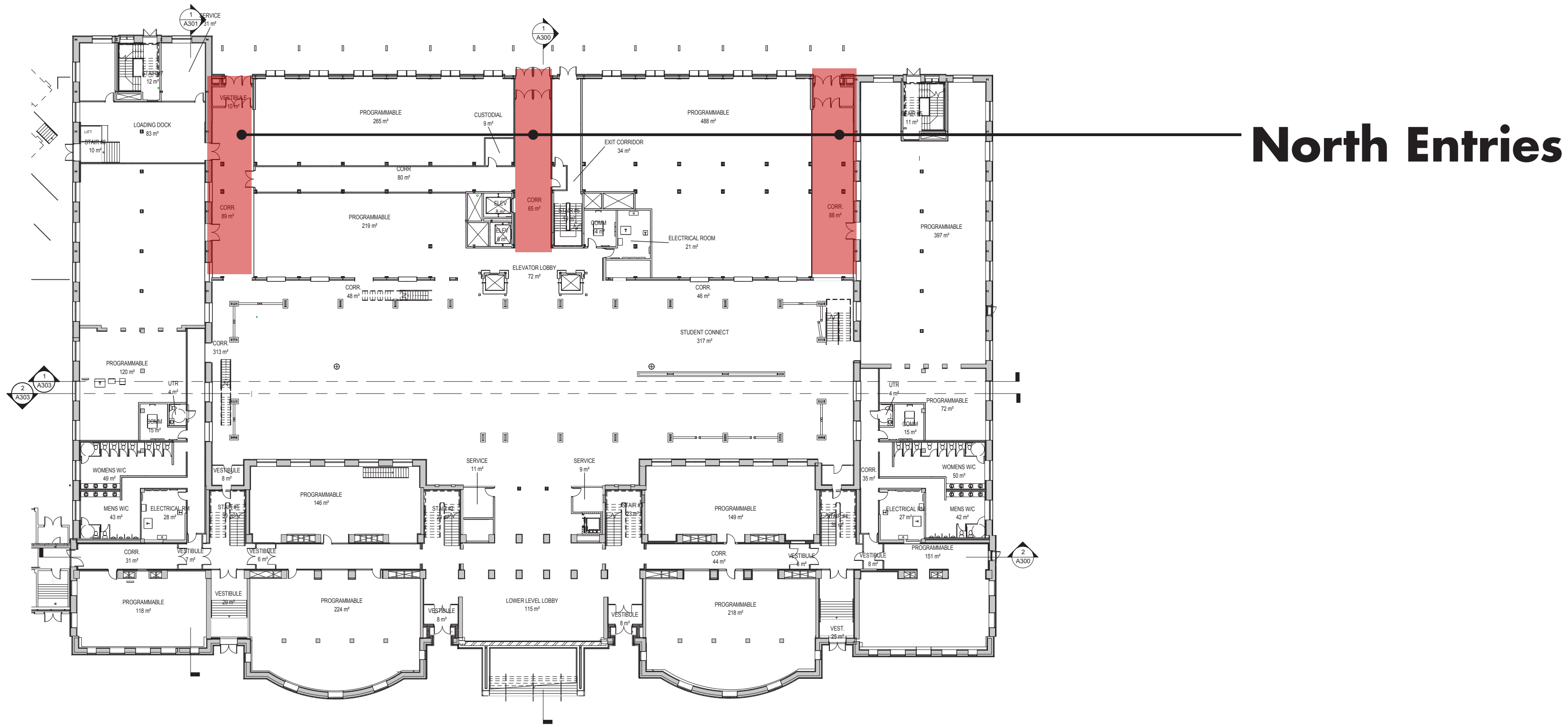


Lower Level Lobby - RCP



Level 1

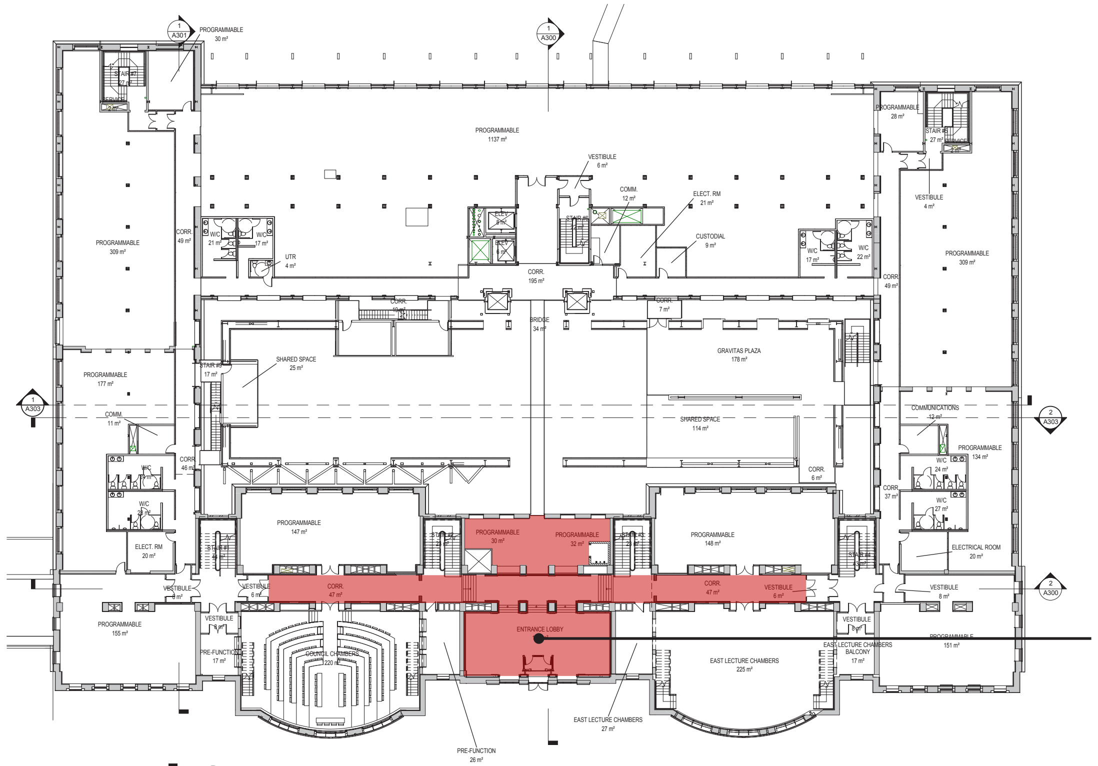
3.210 South Entry Sequence Lower Level Lobby



Level 1

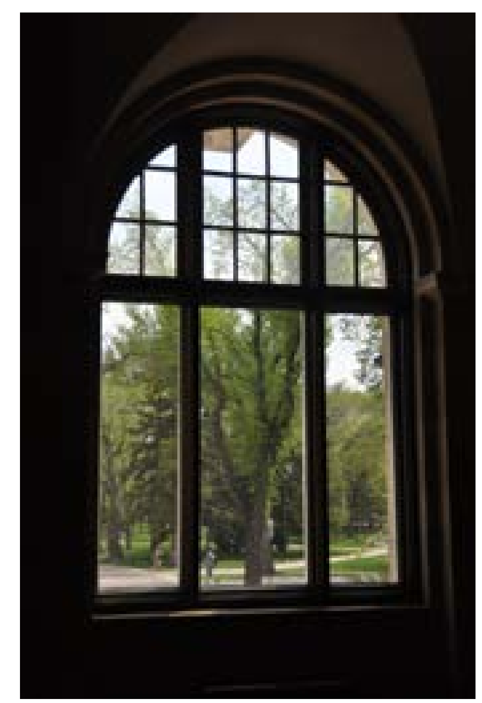
North Entry Sequence North East Breezeway

3 .220 **Level 2 Lobby**



Level 2 Historic Lobby and Corridor

Level 2



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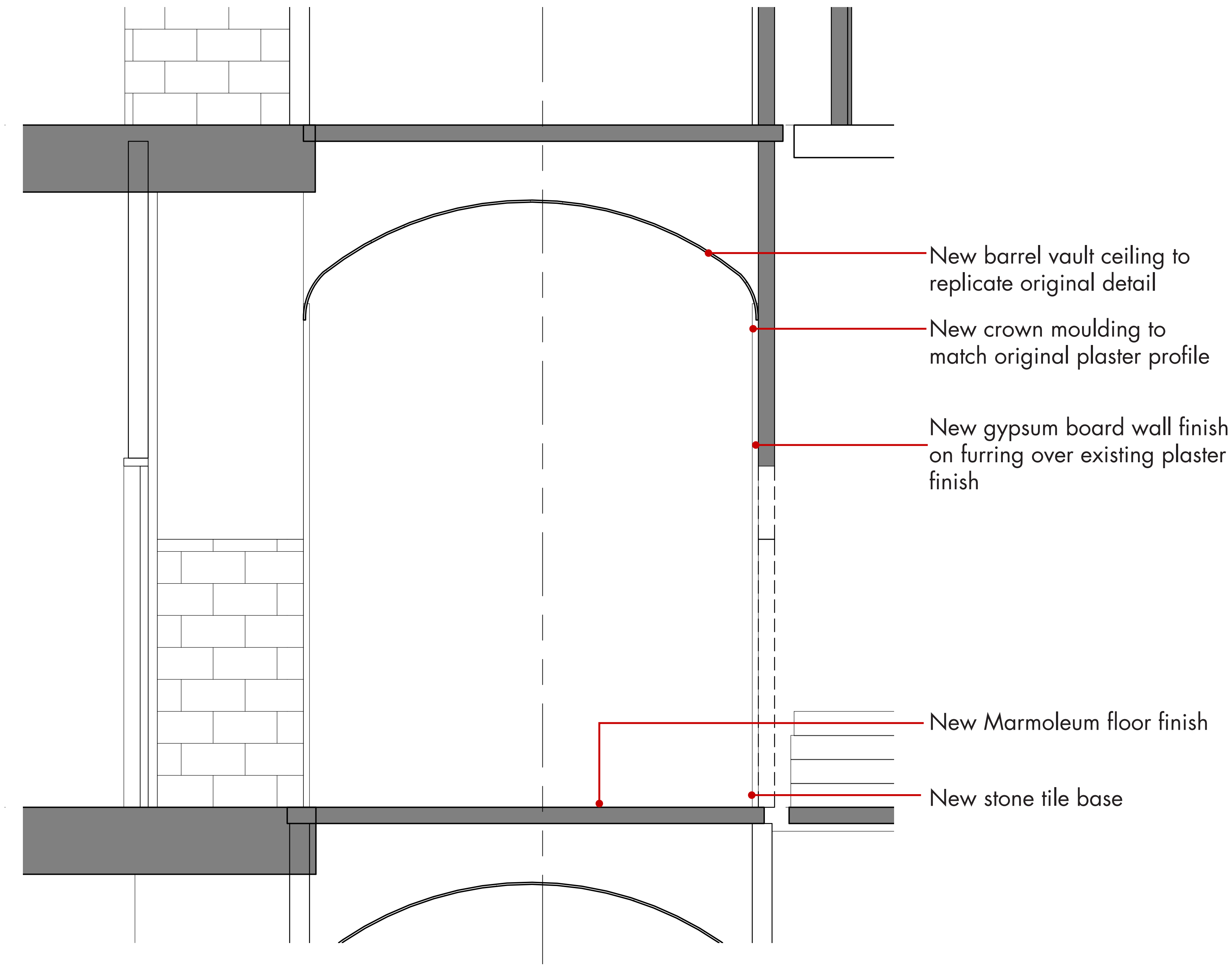
DENTISTRY PHARMACY BUILDING REDEVELOPMENT

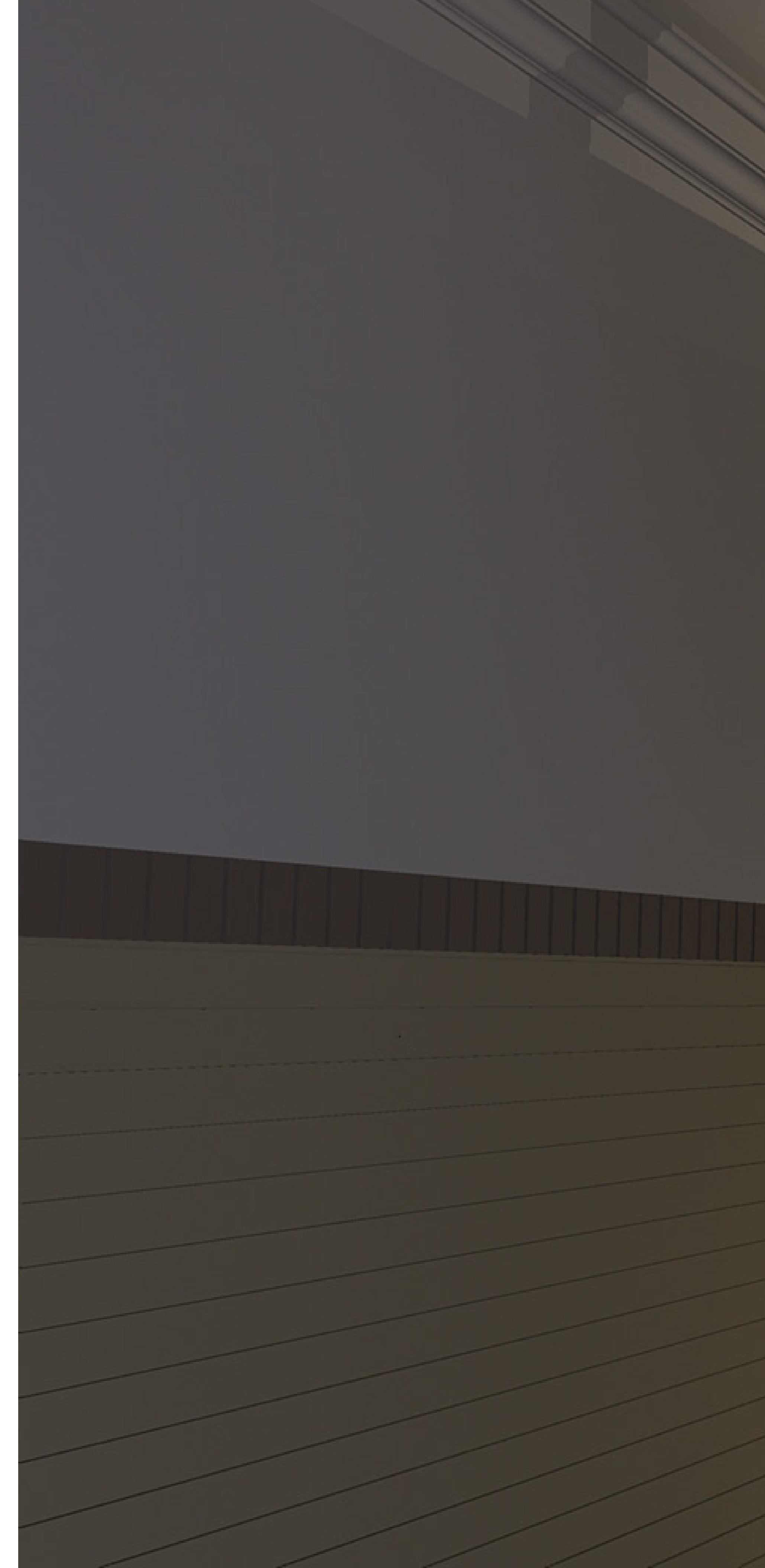
3. INTERIOR SPACES

ENTRY SEQUENCES

1922 HISTORIC CORRIDOR

Historic Corridor - Interior Elevation





3.231 Level 2 Typical 1922 Corridor Section

1922 Historic Corridor Perspective

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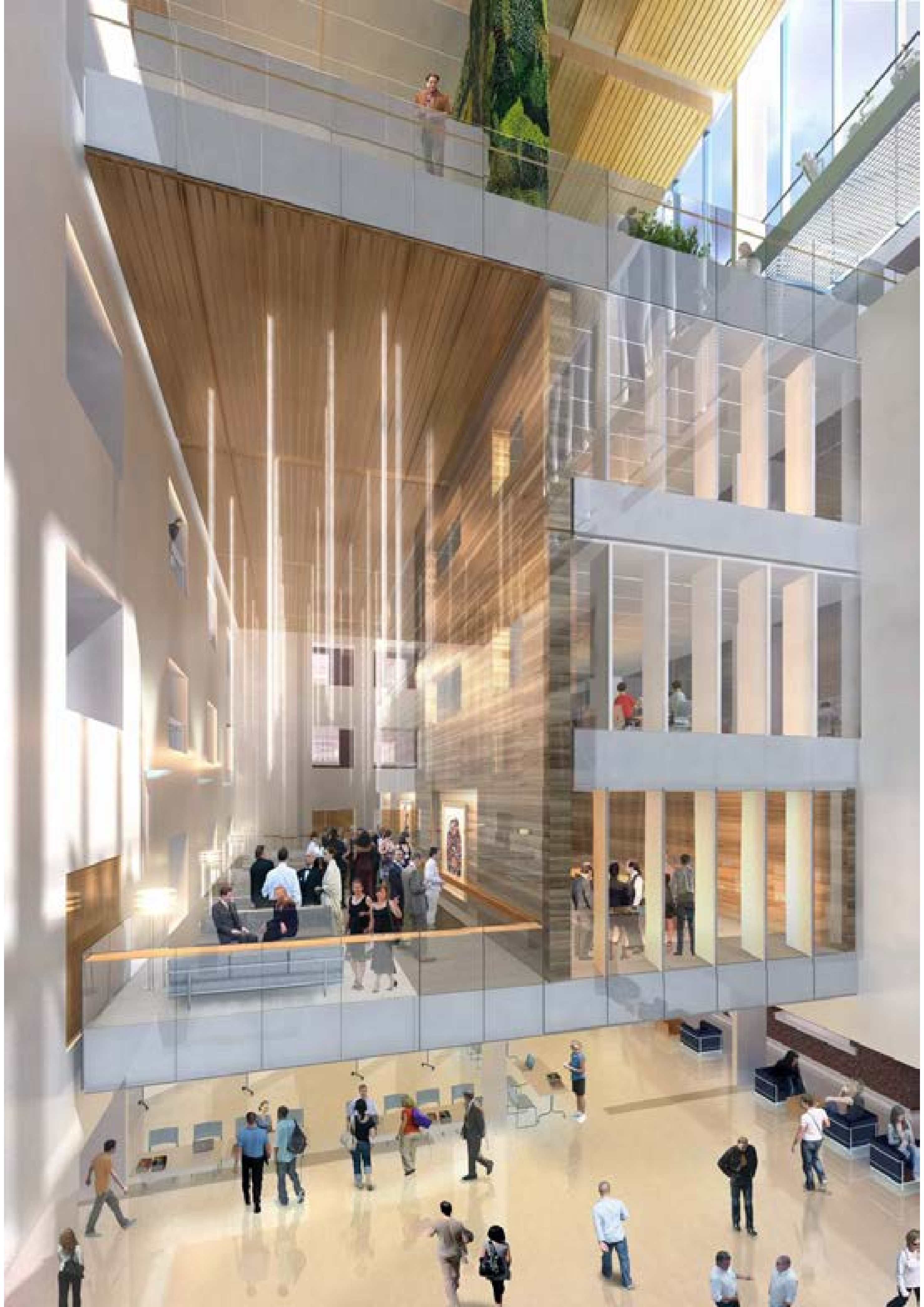

Atrium Perspective
Looking East

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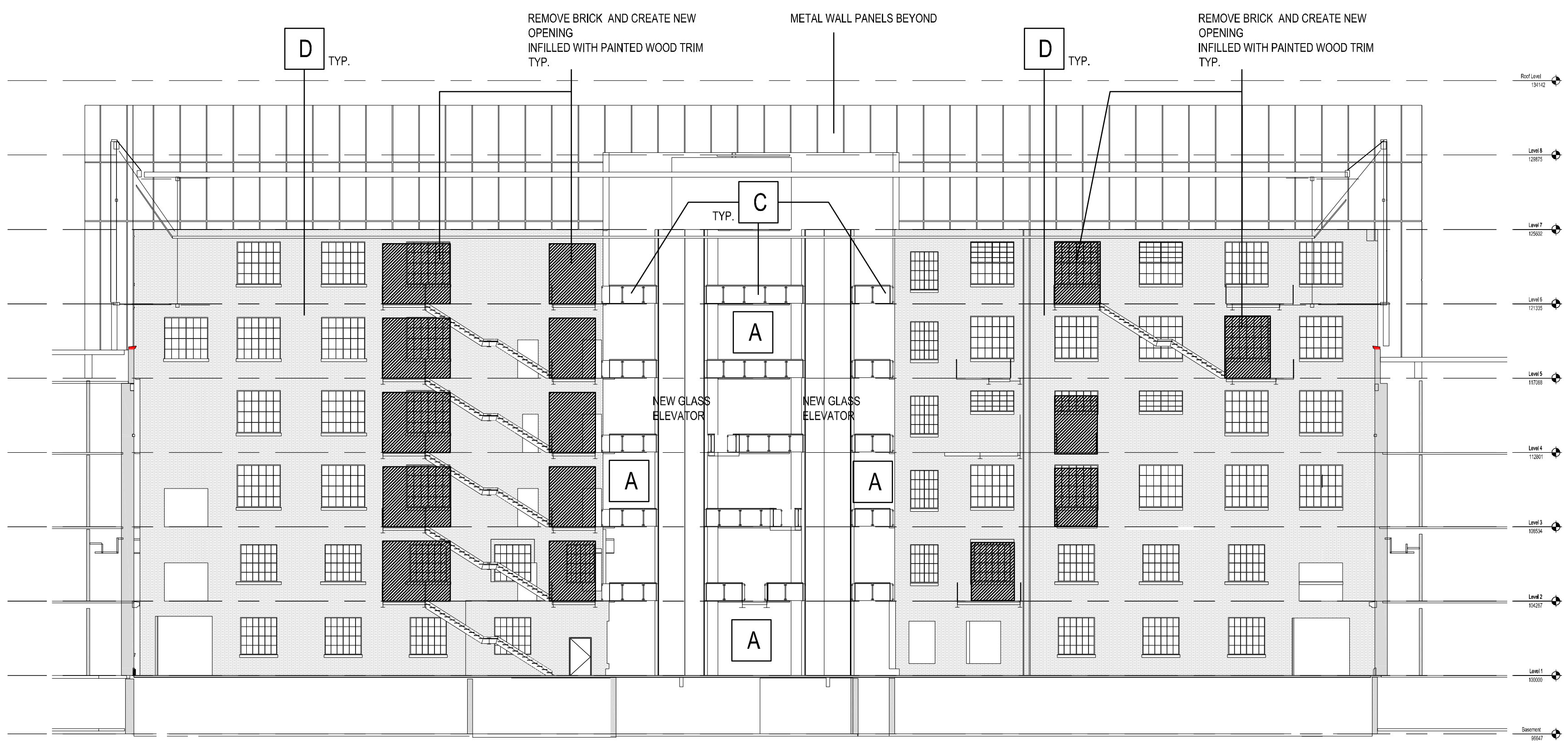


INTERIOR ELEVATION OF EXISTING FACING NORTH

WALL ASSEMBLIES

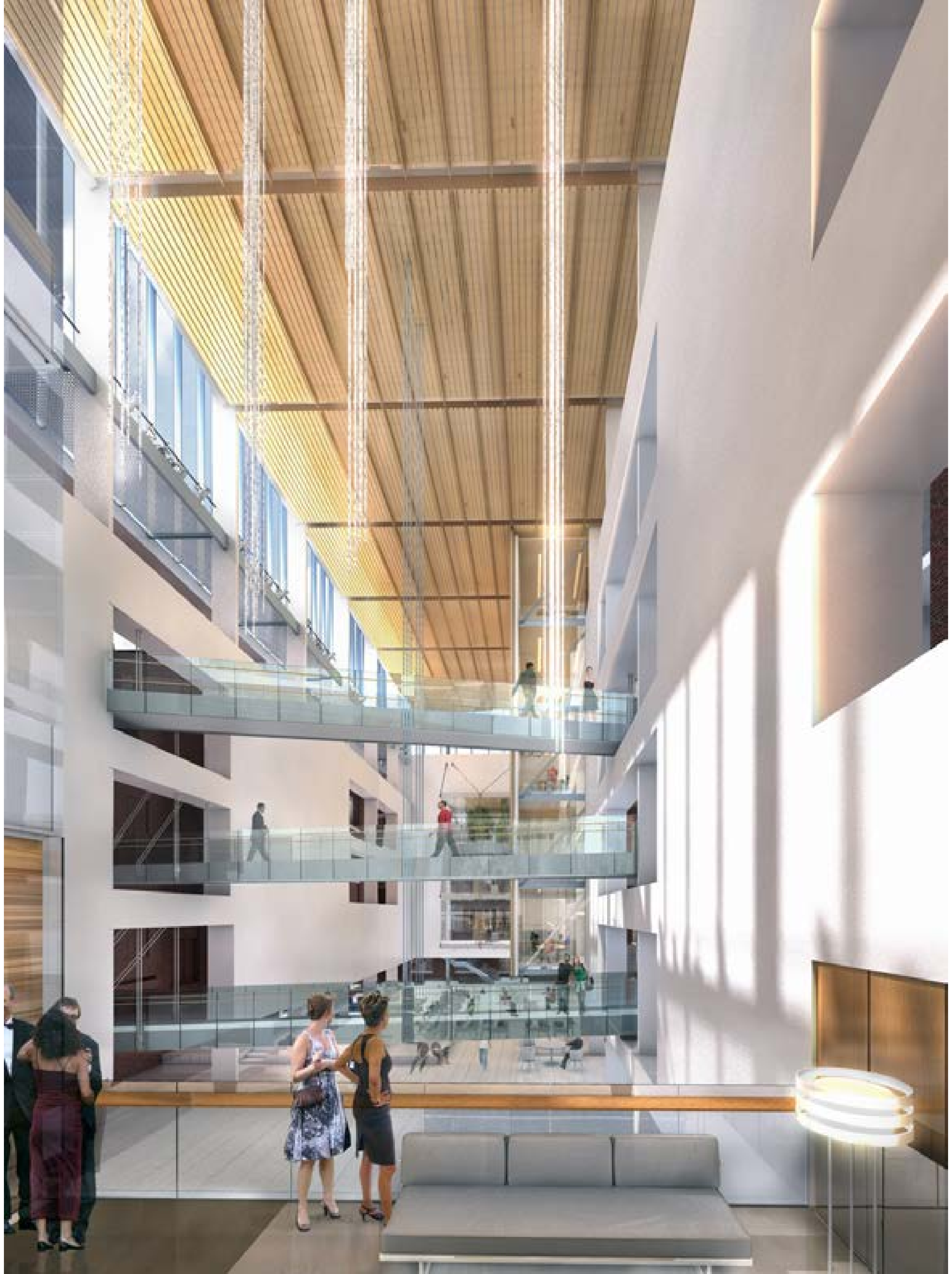
SYMBOL	ASSEMBLY	NOTES
A	16 mm GWB 92 mm STEEL STUDS 75 mm ACOUSTIC INSULATION 16 mm GWB	TYPICAL FULL HEIGHT OFFICE WALLS TO PROVIDE ACOUSTIC SEPARATION
B	FRITTED GLASS PARTITIONS IN WOOD FRAME TO 2200 AFF FLOOR WITH TYPICAL WALL TYPE 1 ABOVE	TYPICAL CORRIDOR PARTITION TO ALLOW LIGHT INTO ADJACENT OPEN WORK STATION AREAS, REFER OUTLINE SPECIFICATIONS FOR TYPICAL DETAILS
C	GLAZED HANDRAIL	SEE TYPICAL DETAILS IN OUTLINE SPECIFICATION
D	REPOINT EXISTING BRICK WALLS AND INFILL EXISTING OPENING WITH PAINTED WOOD TRIM TO MATCH EXITING WINDOW CONFIGURATION (NO GLASS)	TYPICAL INTERIOR EXISTING BRICK WALLS
E	16 mm GWB STEELSTUD FRAMING SPRAY FINE PROOFED STEEL STRUCTURE 16 mm GWB	THE ATRIUM WALL IS TO PROVIDE A SCREEN BETWEEN THE NEW ATRIUM AND THE EXISTING BRICK WALL, AND PROVIDE ACOUSTIC ATTENUATION
F	DEMOLITION OF PREVIOUS RENOVATIONS TO REVEAL EXISTING HISTORICAL ELEMENTS	REFER OUTLINE SPECIFICATION, ANNOTATED DRAWINGS AND PHOTOGRAPHS
G	LINEAR WOOD AND ACOUSTIC INSULATION	REFER OUTLINE SPECIFICATION
H	EXTERIOR CURTAIN WALL	REFER OUTLINE SPECIFICATION
I	CERAMIC TILE TILE BACKER BOARD 150 mm STEEL STUDS	FOR RETROFIT AND REPLUMBING OF EXISTING WASHROOMS
J	GREEN WALL	REFER OUTLINE SPECIFICATION
K	12 mm CLEAR TEMP/LAM GLASS WITH TOP AND BOTTOM ALUMINIUM CHANELS	REFER OUTLINE SPECIFICATION
L	MOTORIZED BLACKOUT FINS WITH ACOUSTIC WOOD PANELS	REFER OUTLINE SPECIFICATION

DENTISTRY PHARMACY BUILDING REDEVELOPMENT

3. INTERIOR SPACES

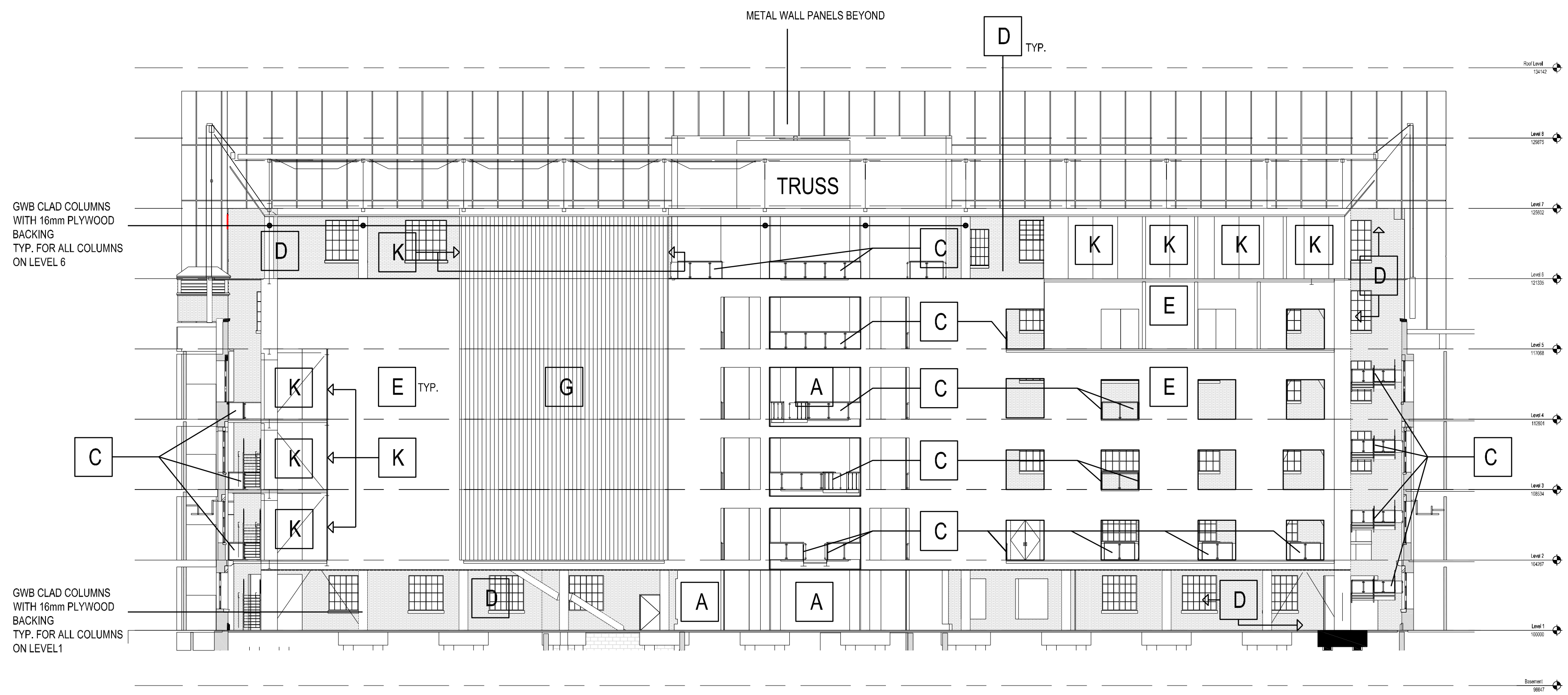
THE ATRIUM INTERIOR ELEVATIONS

Atrium Interior Elevations



3.302

Atrium Perspective Looking West from Gravitas Plaza



INTERIOR ELEVATION OF ATRIUM FACING NORTH

WALL ASSEMBLIES

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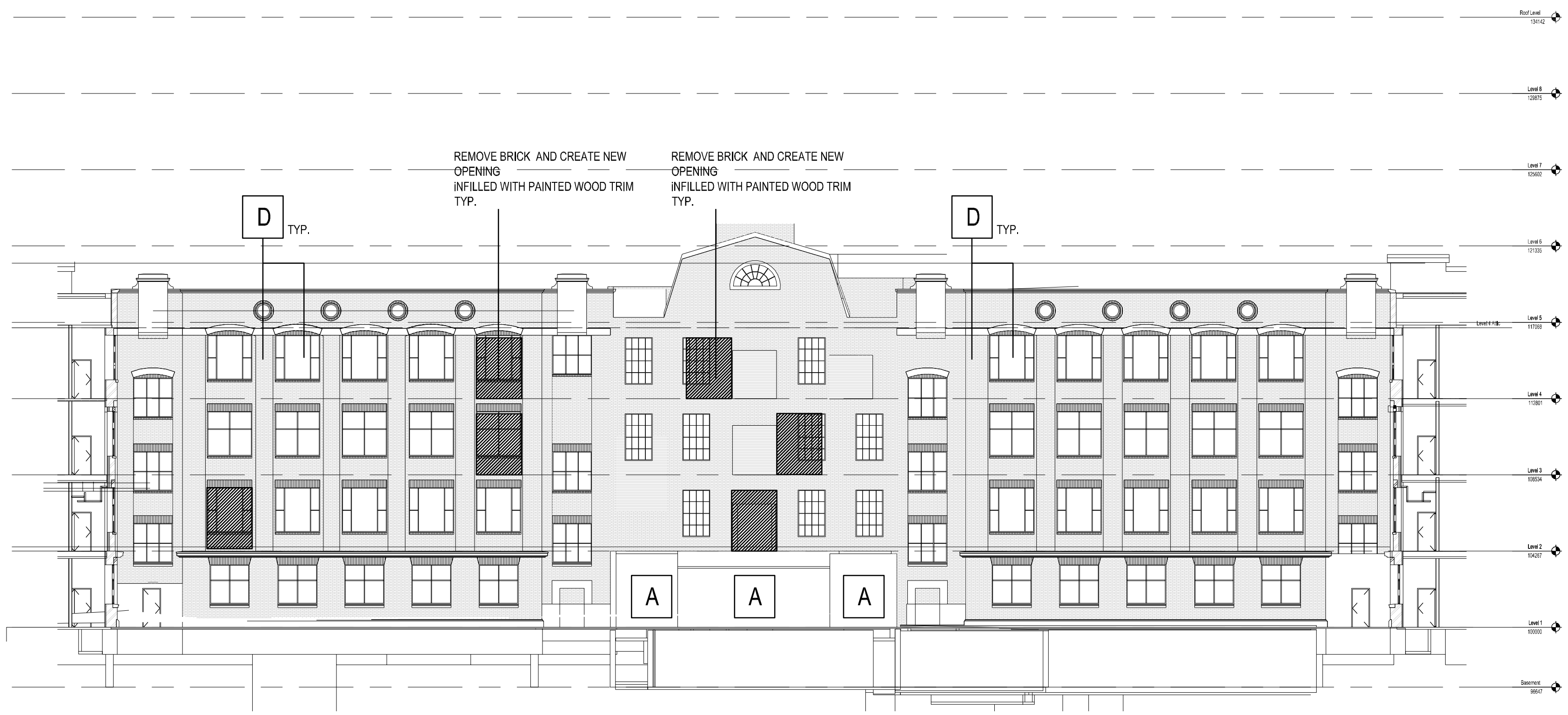
Atrium Interior Elevations



INTERIOR ELEVATION OF EXISTING FACING SOUTH

WALL ASSEMBLIES

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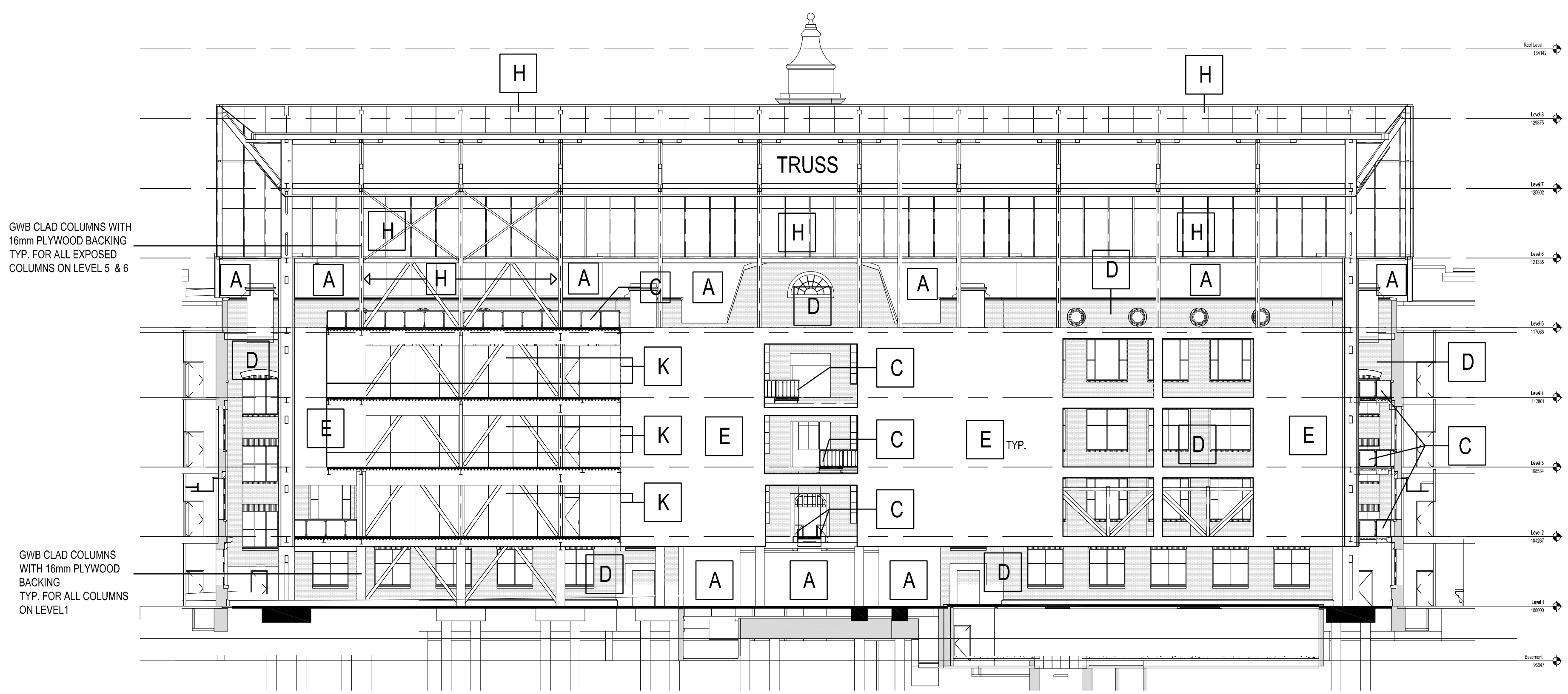
L	MOTORIZED BLACKOUT FINS WITH ACOUSTIC WOOD PANELS	REFER OUTLINE SPECIFICATION

3.304 Atrium Interior Elevations



INTERIOR ELEVATION OF ATRIUM FACING SOUTH

WALL ASSEMBLIES

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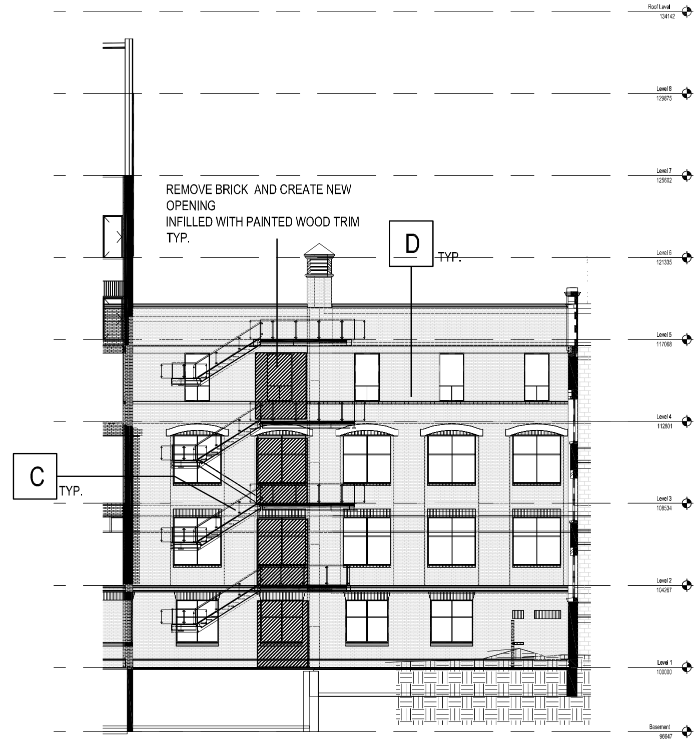
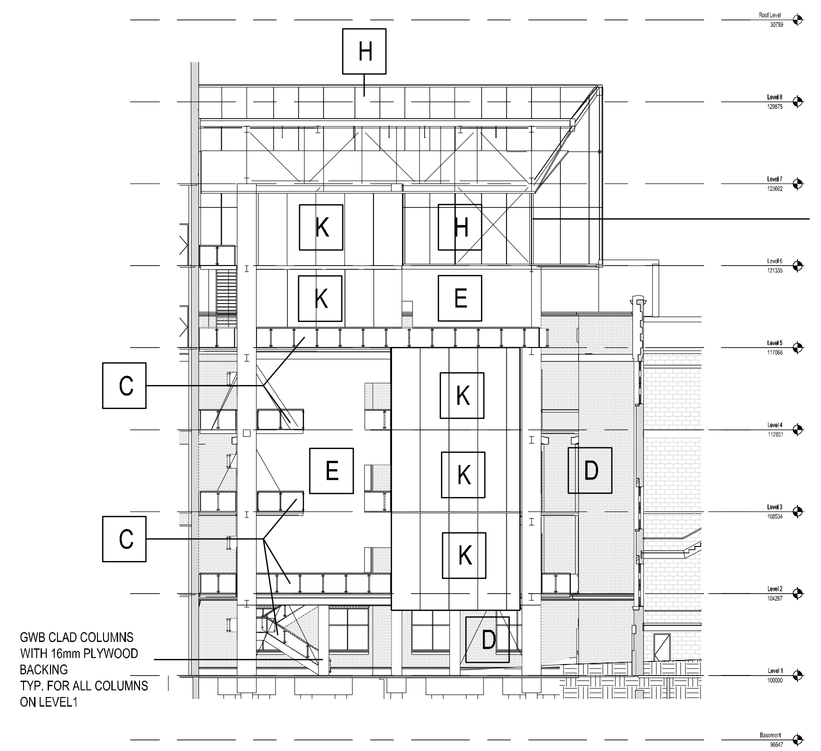


INTERIOR ELEVATION OF EXISTING FACING EAST



INTERIOR ELEVATION OF ATRIUM FACING EAST

WALL ASSEMBLIES

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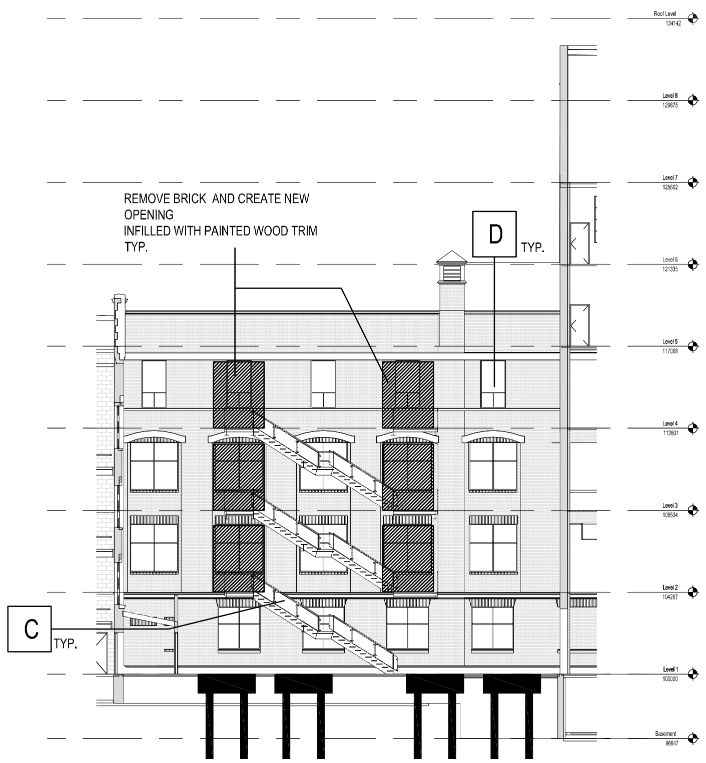
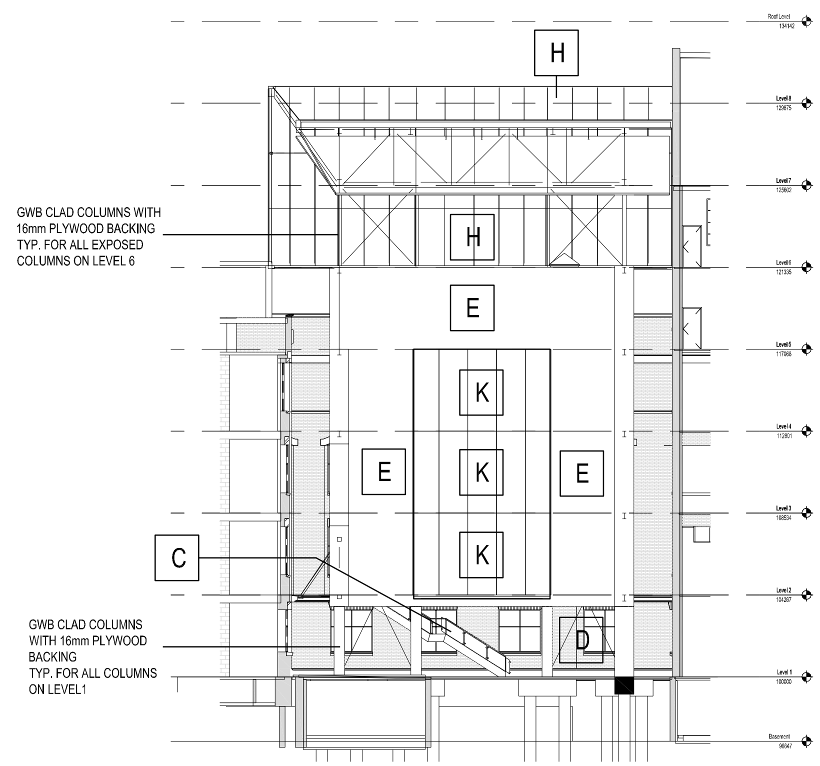
Atrium Interior Elevations



INTERIOR ELEVATION OF
EXISTING FACING WEST



INTERIOR ELEVATION OF
ATRIUM FACING WEST

WALL ASSEMBLIES

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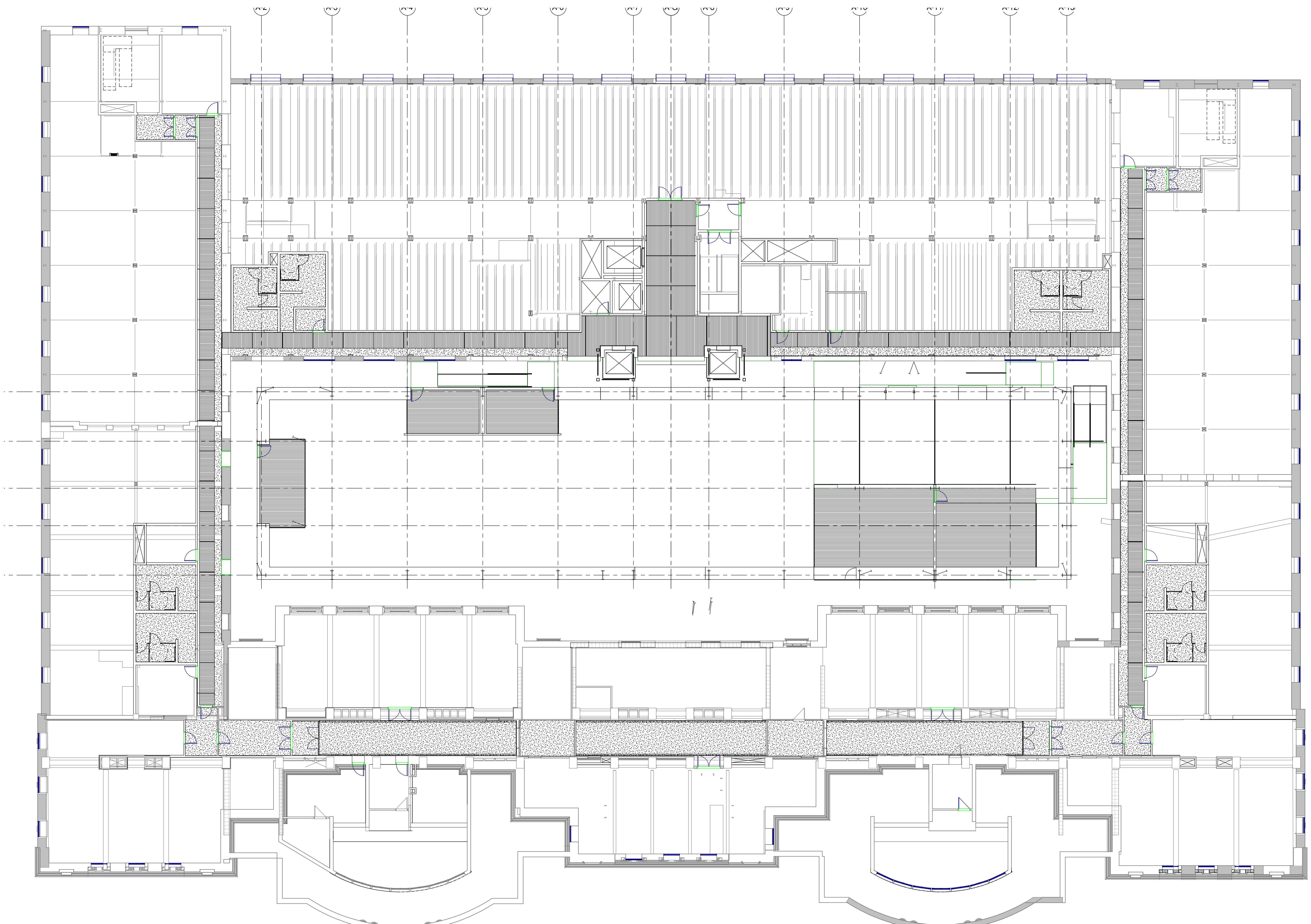
Atrium Interior Elevations



3.310 Atrium Reflected Ceiling Plan - Level 4

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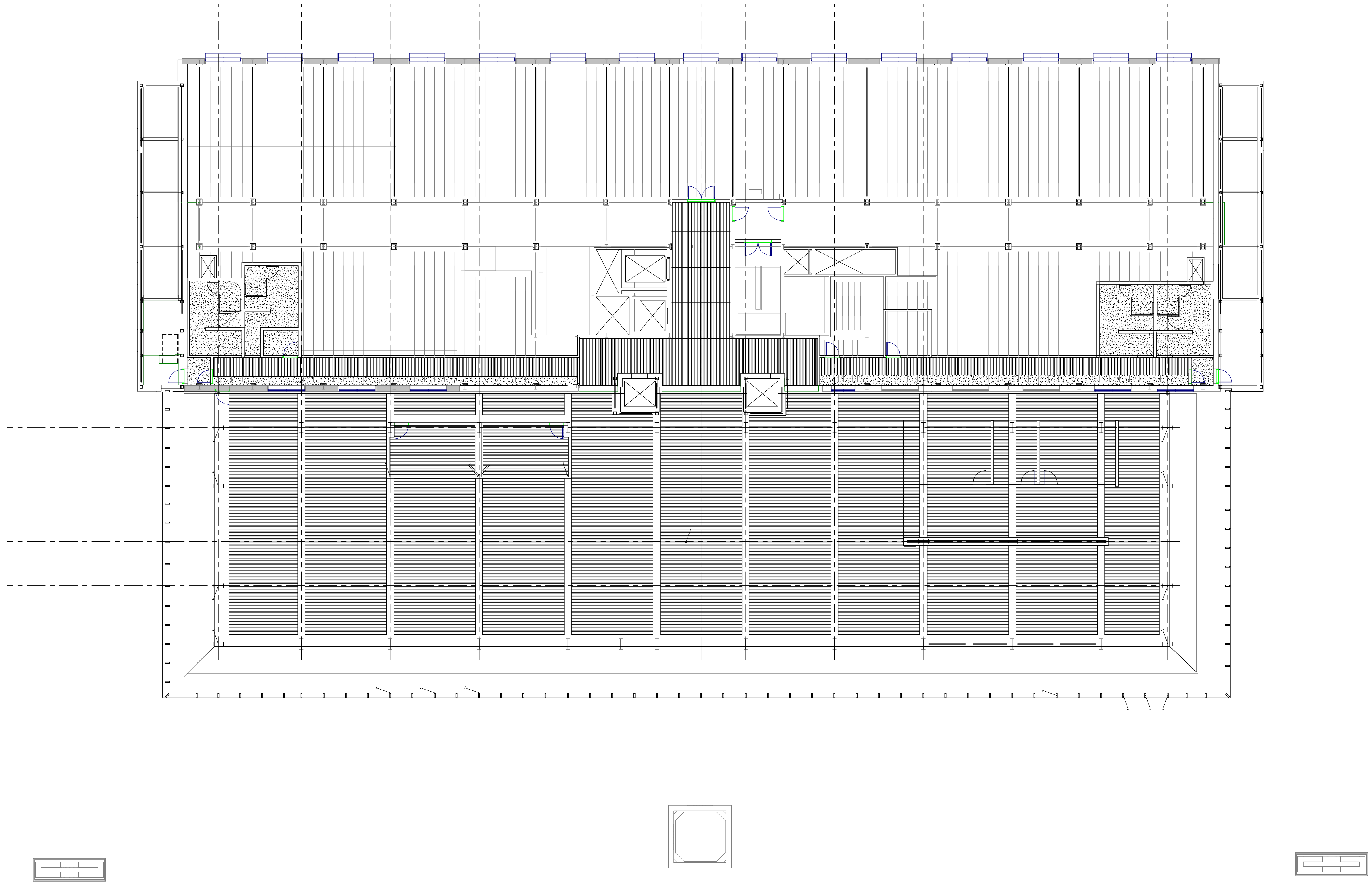
DENTISTRY PHARMACY BUILDING REDEVELOPMENT

3. INTERIOR SPACES

THE ATRIUM REFLECTED CEILING PLANS



Atrium Reflected Ceiling Plan - Level 6

3 .320 **Atrium Meeting Rooms Perspectives Looking up at Ceiling**

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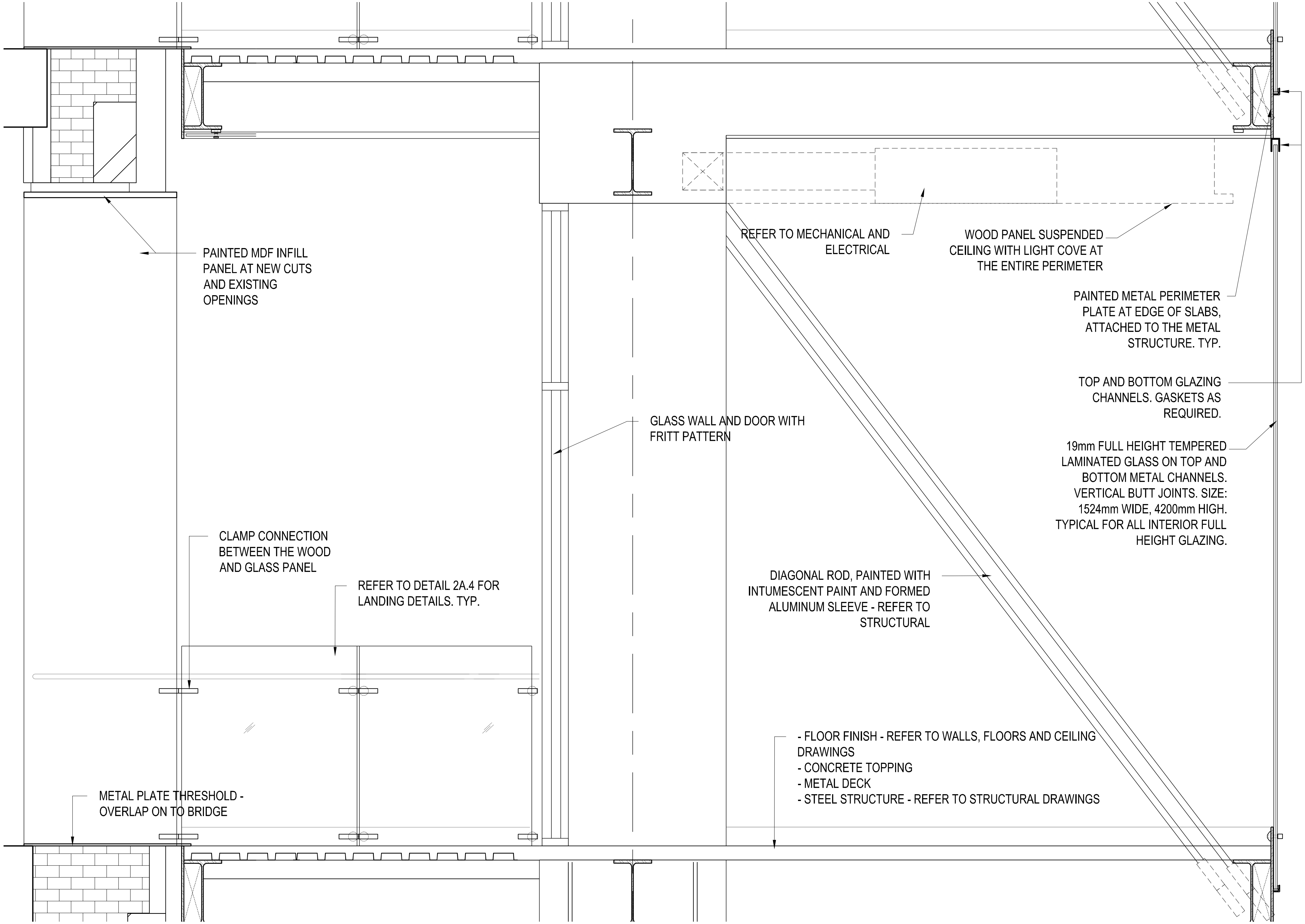
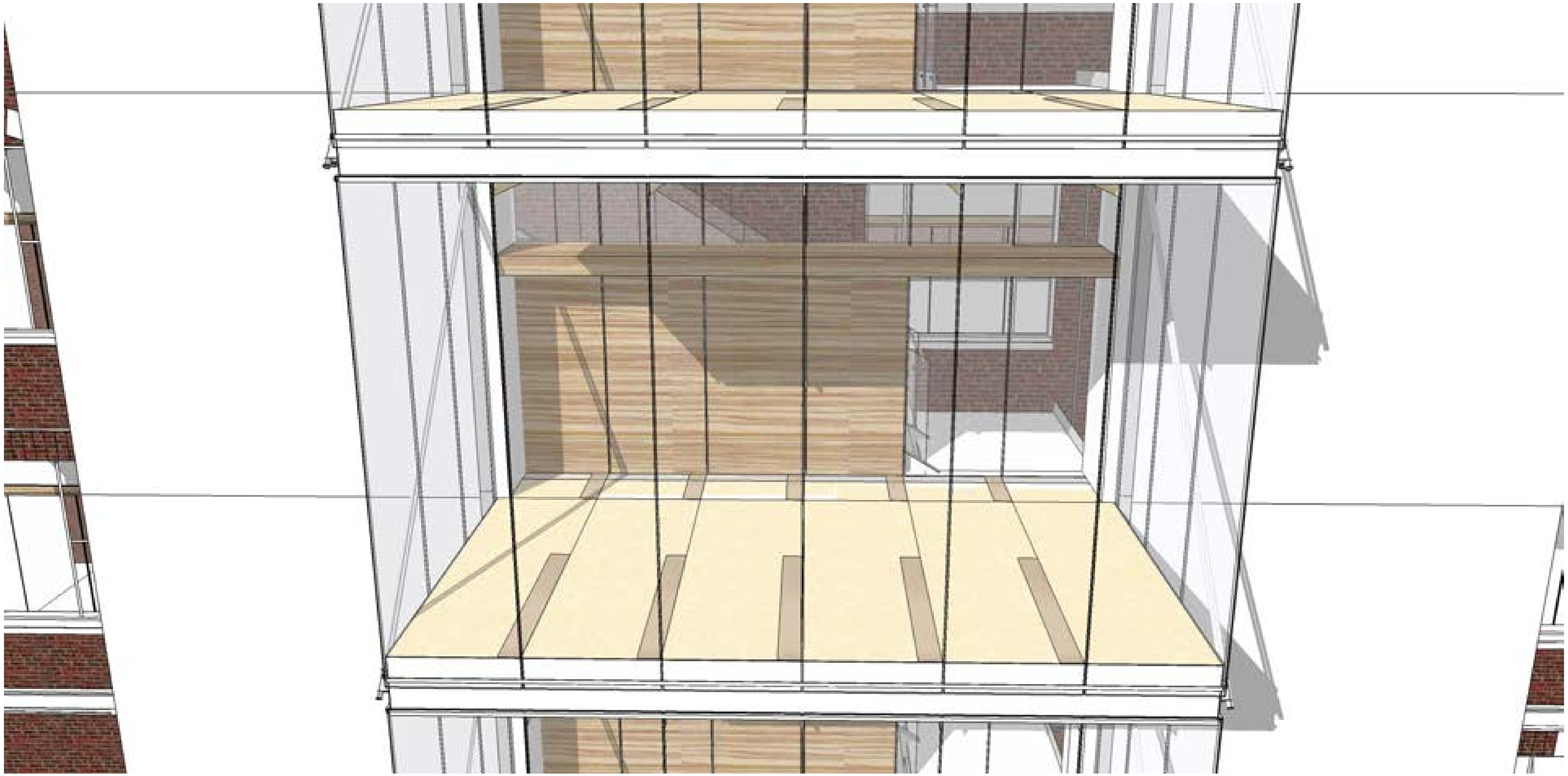
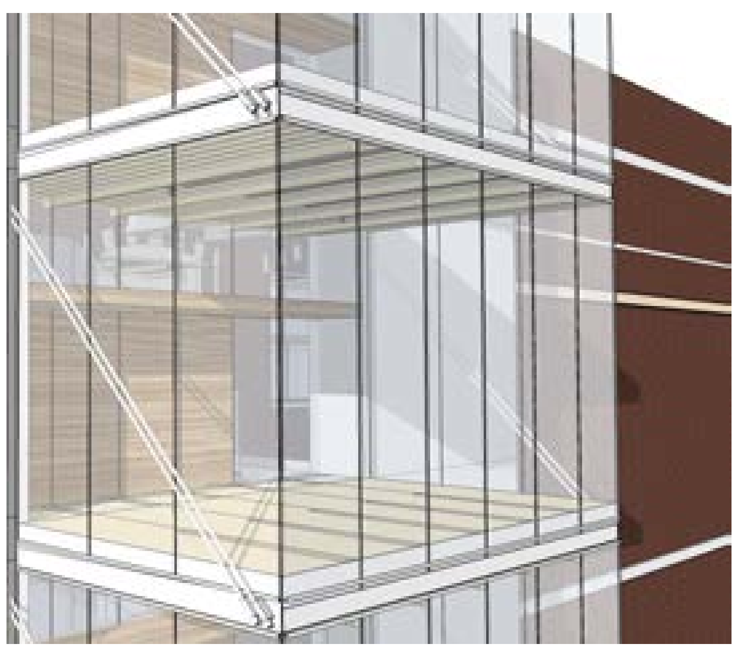


Atrium Meeting Room Section



3 .322 **Atrium Meeting Room Floor View**

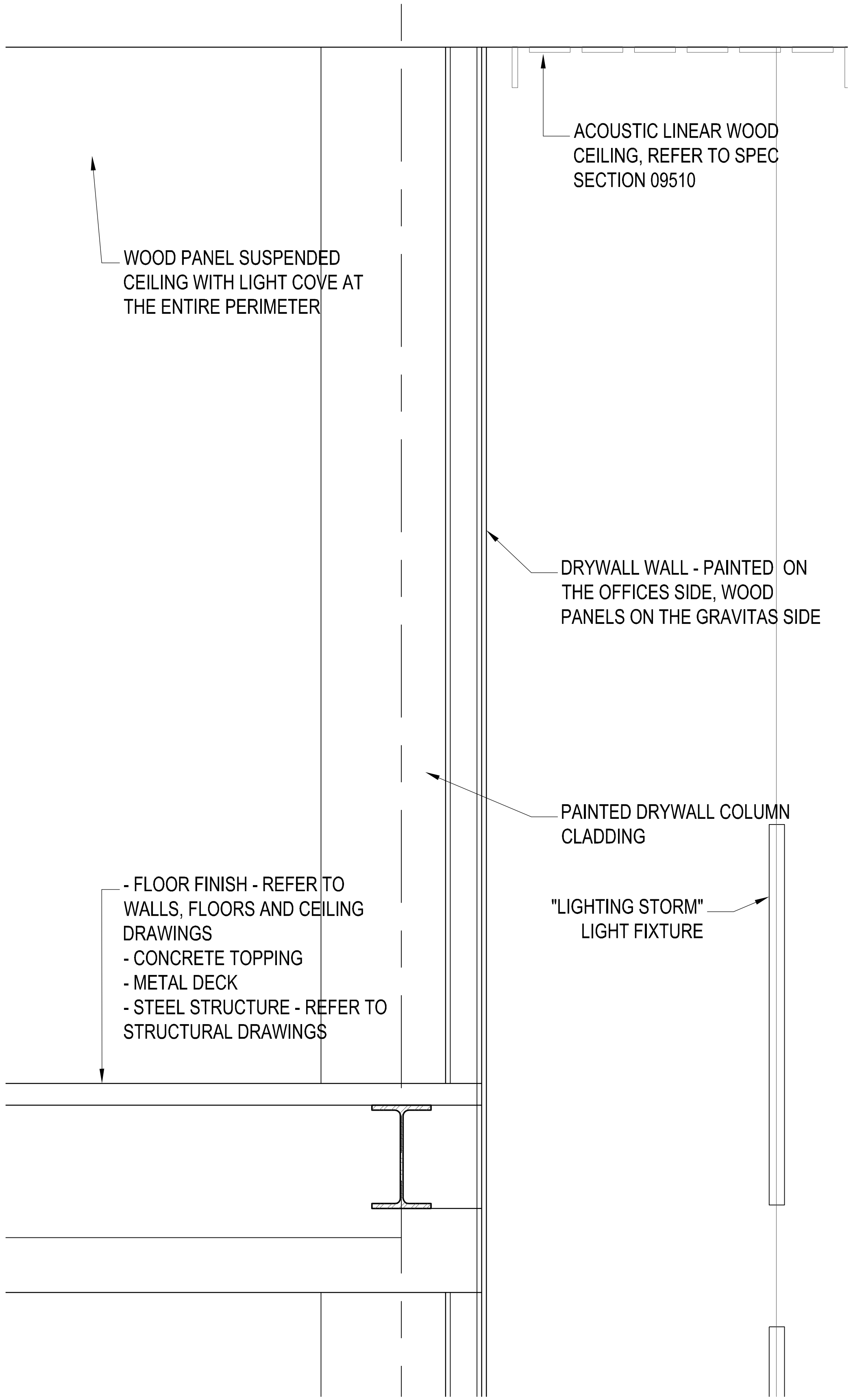


DENTISTRY PHARMACY BUILDING REDEVELOPMENT

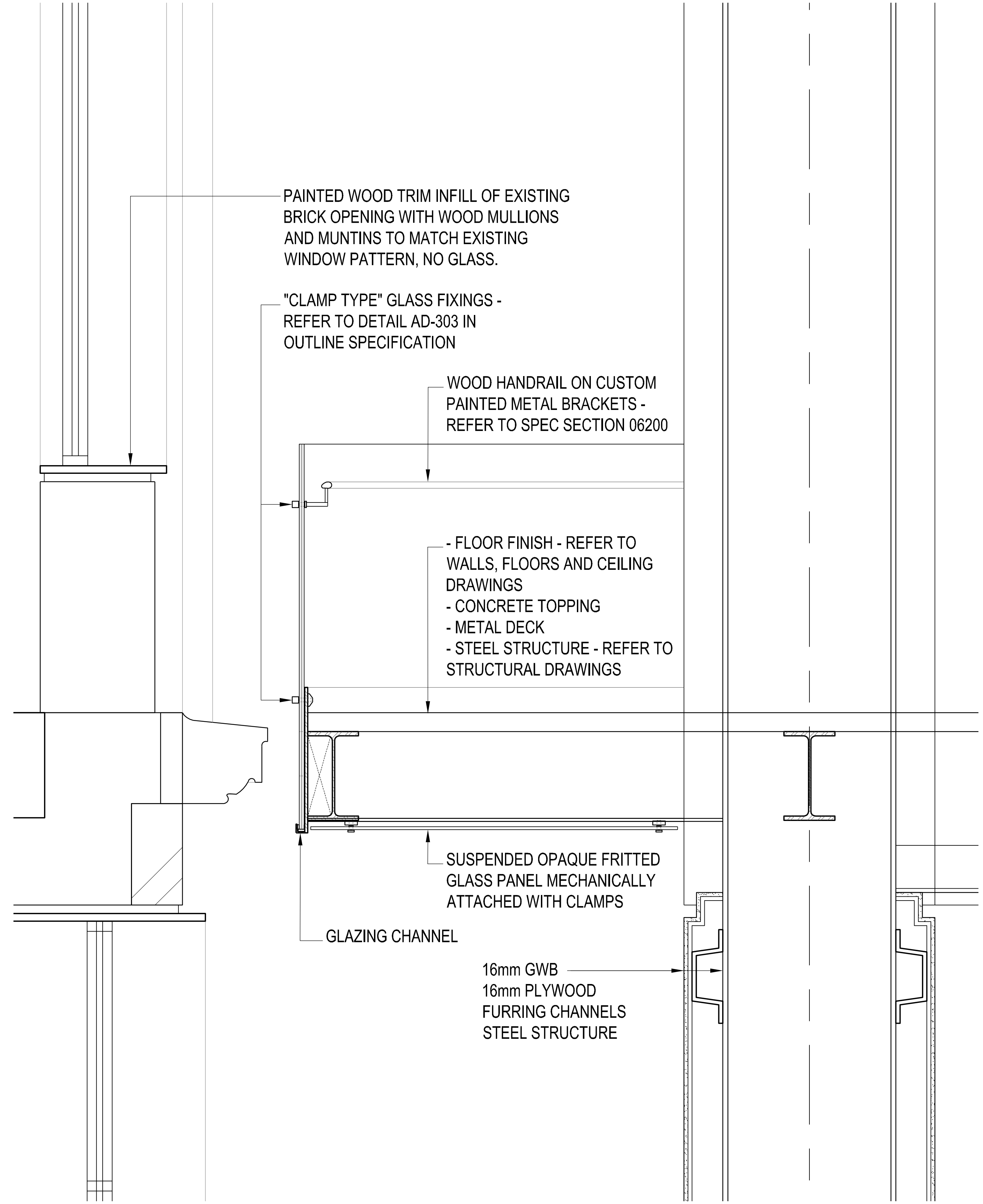
3. INTERIOR SPACES

THE ATRIUM MEETING ROOOM DETAILS

Atrium Meeting Room Perspectives



DETAIL 2A.3



DETAIL 2A.4

3.330 Atrium Section and Details

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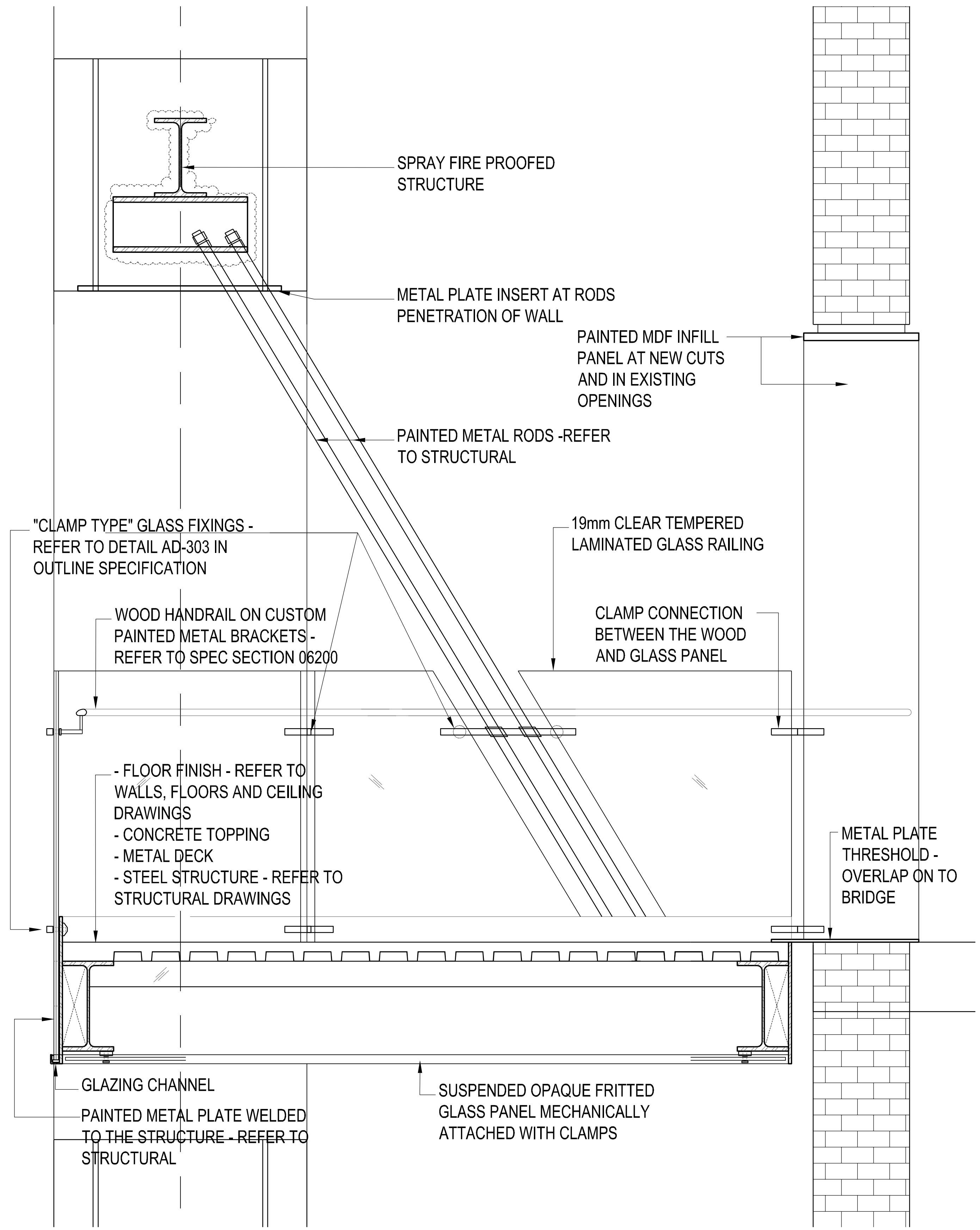
DENTISTRY PHARMACY BUILDING REDEVELOPMENT

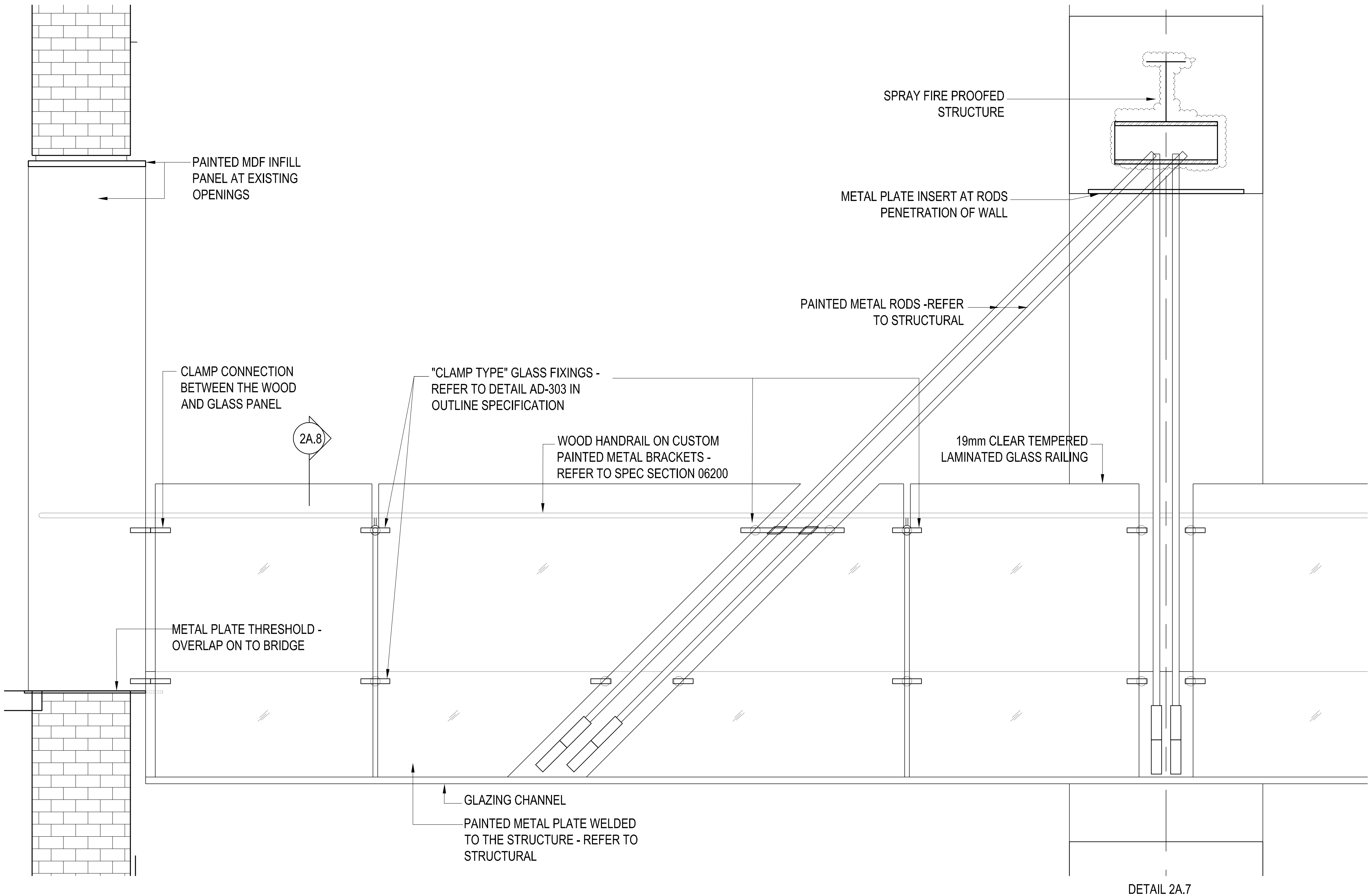
3. INTERIOR SPACES

THE ATRIUM DETAILS

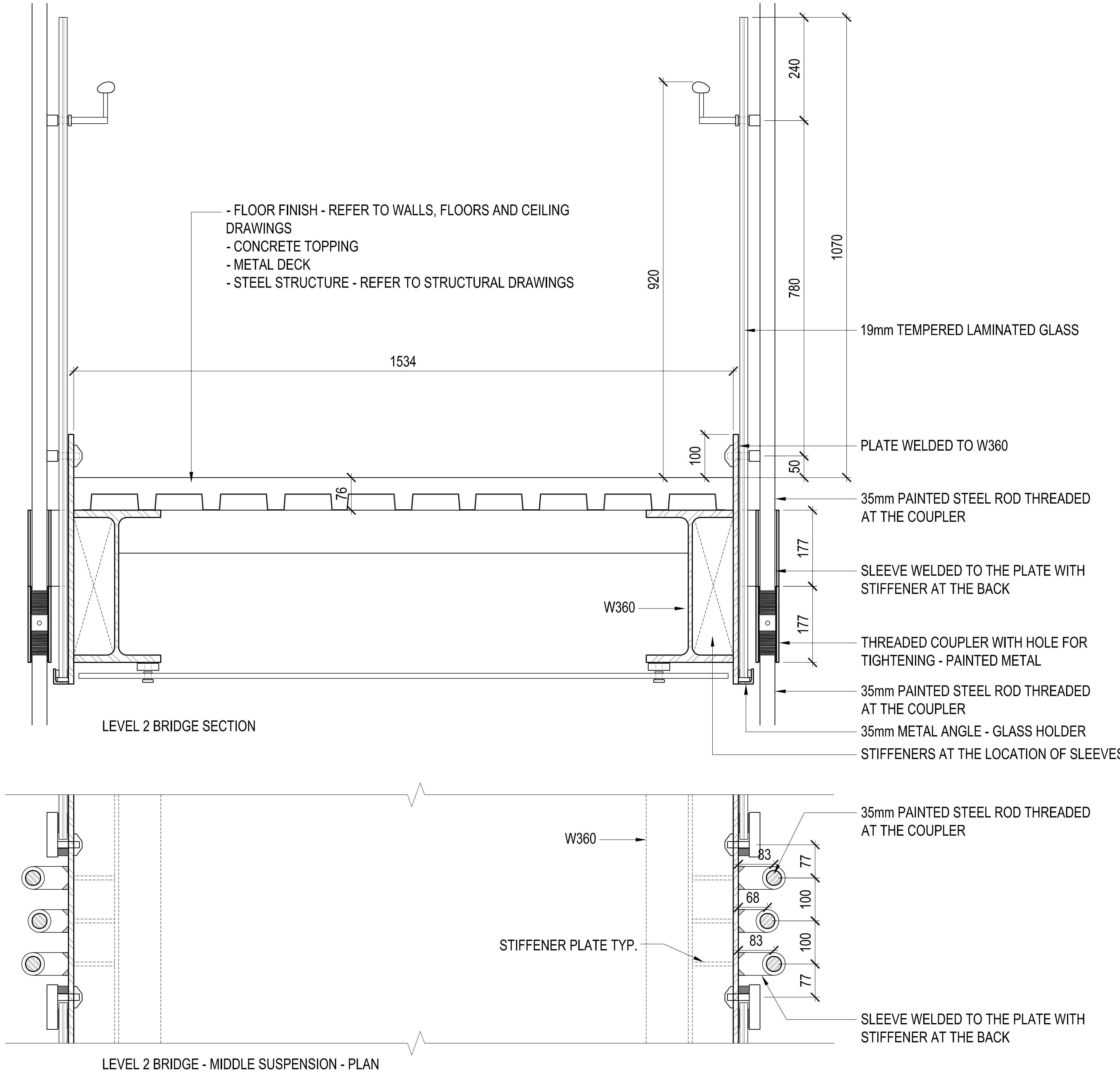


DETAIL 2A.6

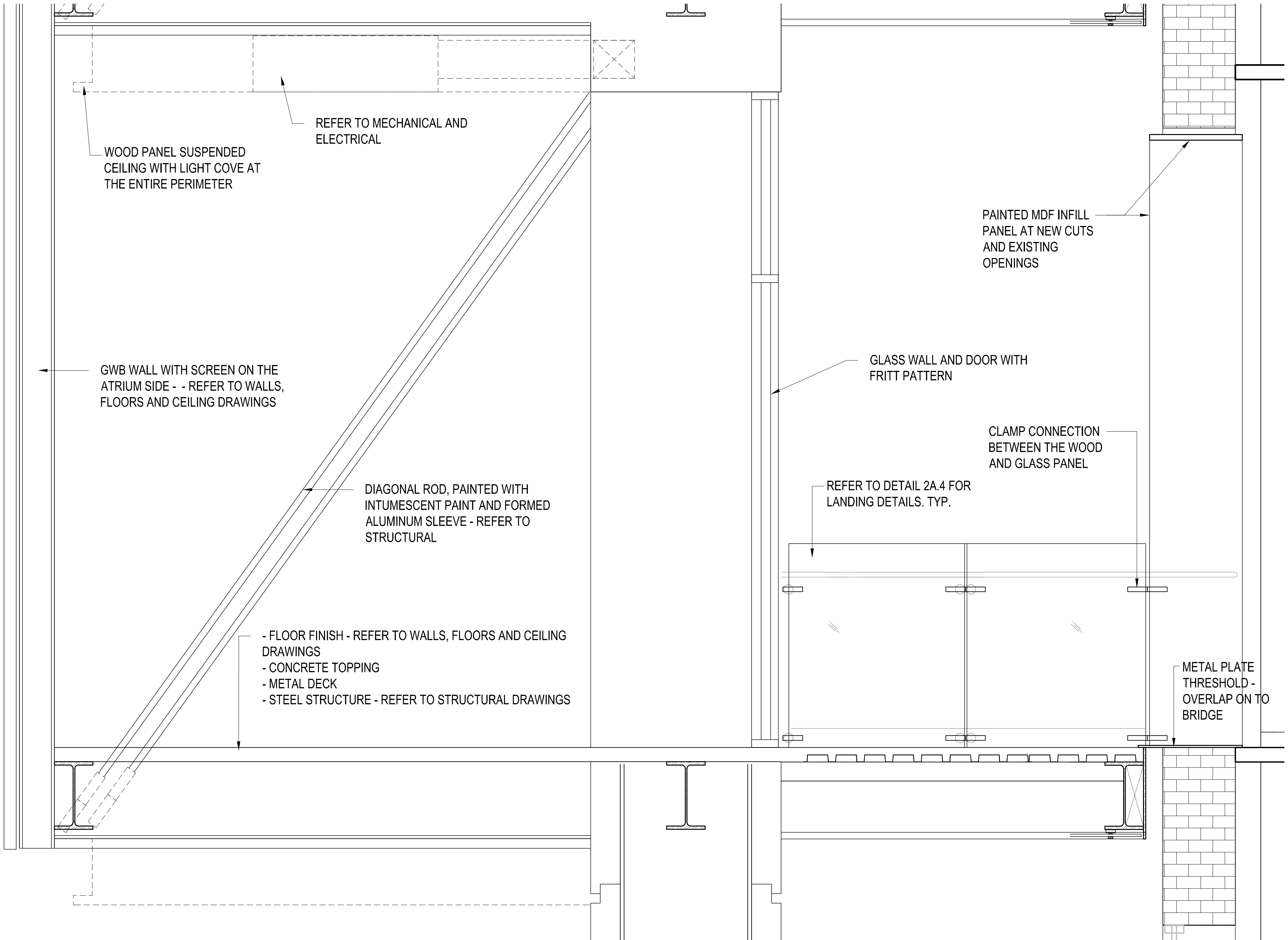
Atrium Section and Details



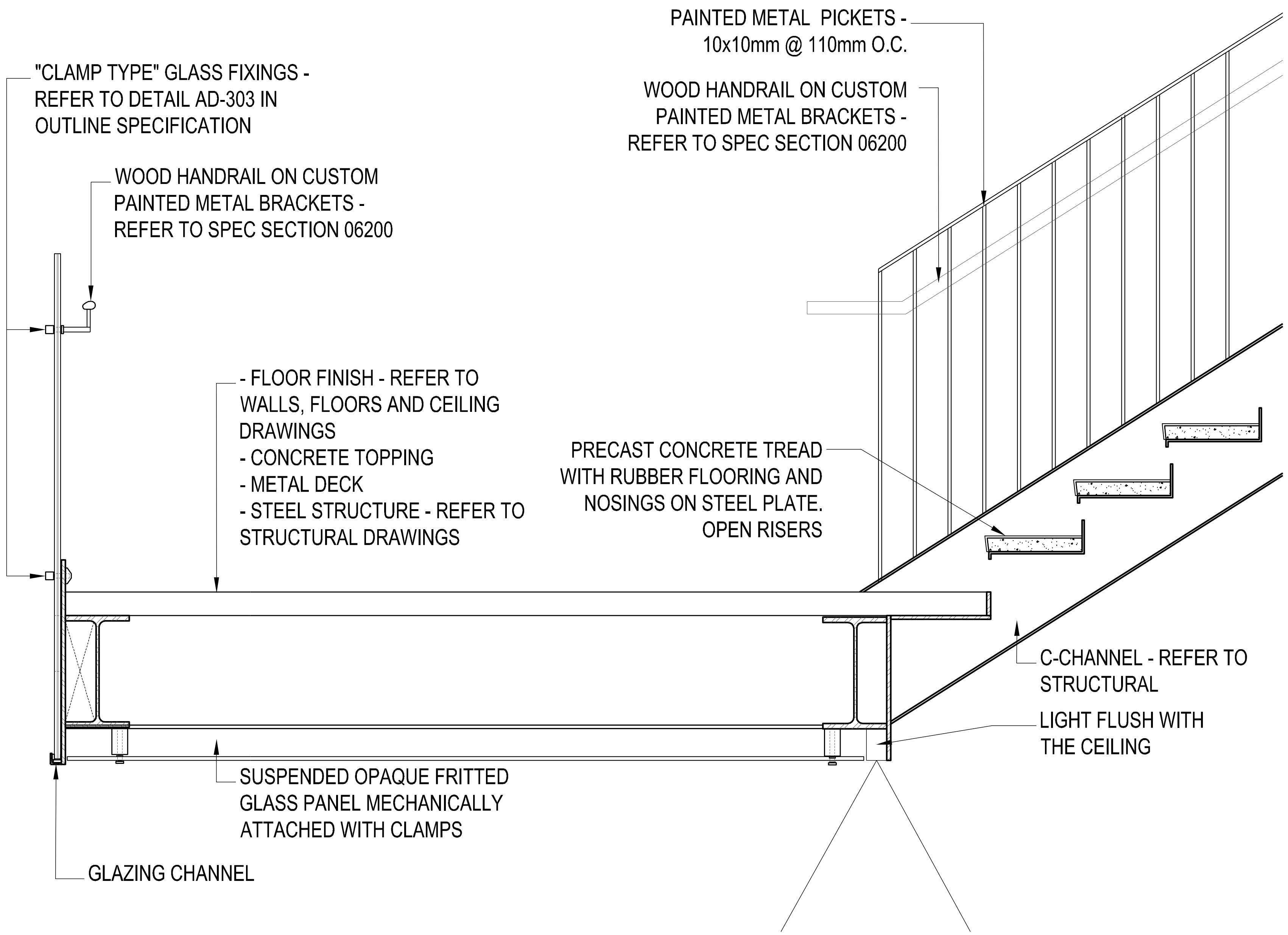
3.332 Atrium Section and Details

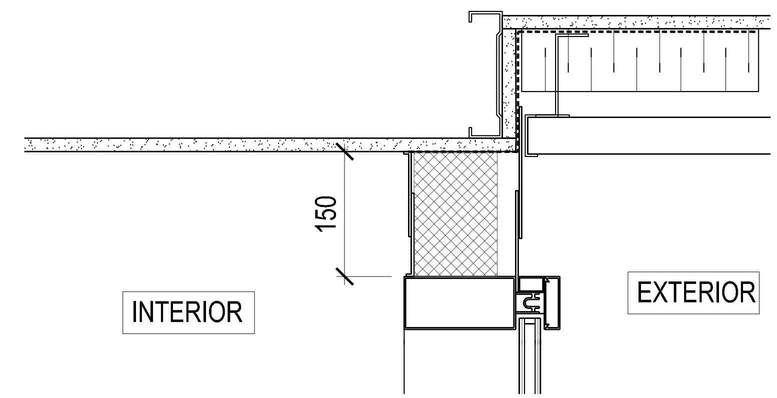


Atrium Section and Details

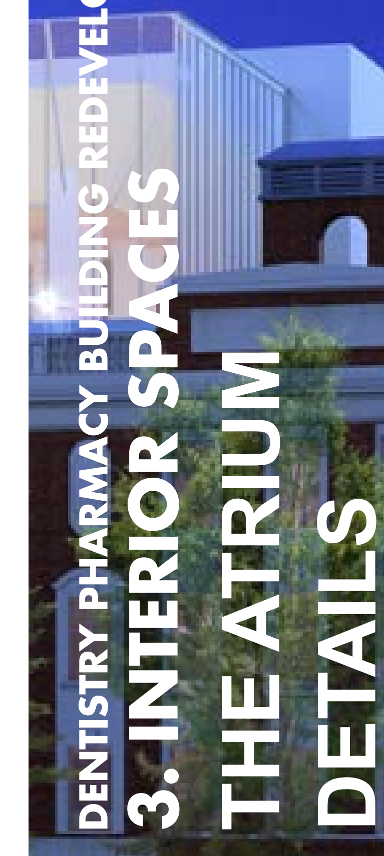


3 .334 Atrium Section and Details





DETAIL 2A.15 - EXPANSION JOINT @ CURTAIN WALL TO METAL PANEL WALL - PLAN

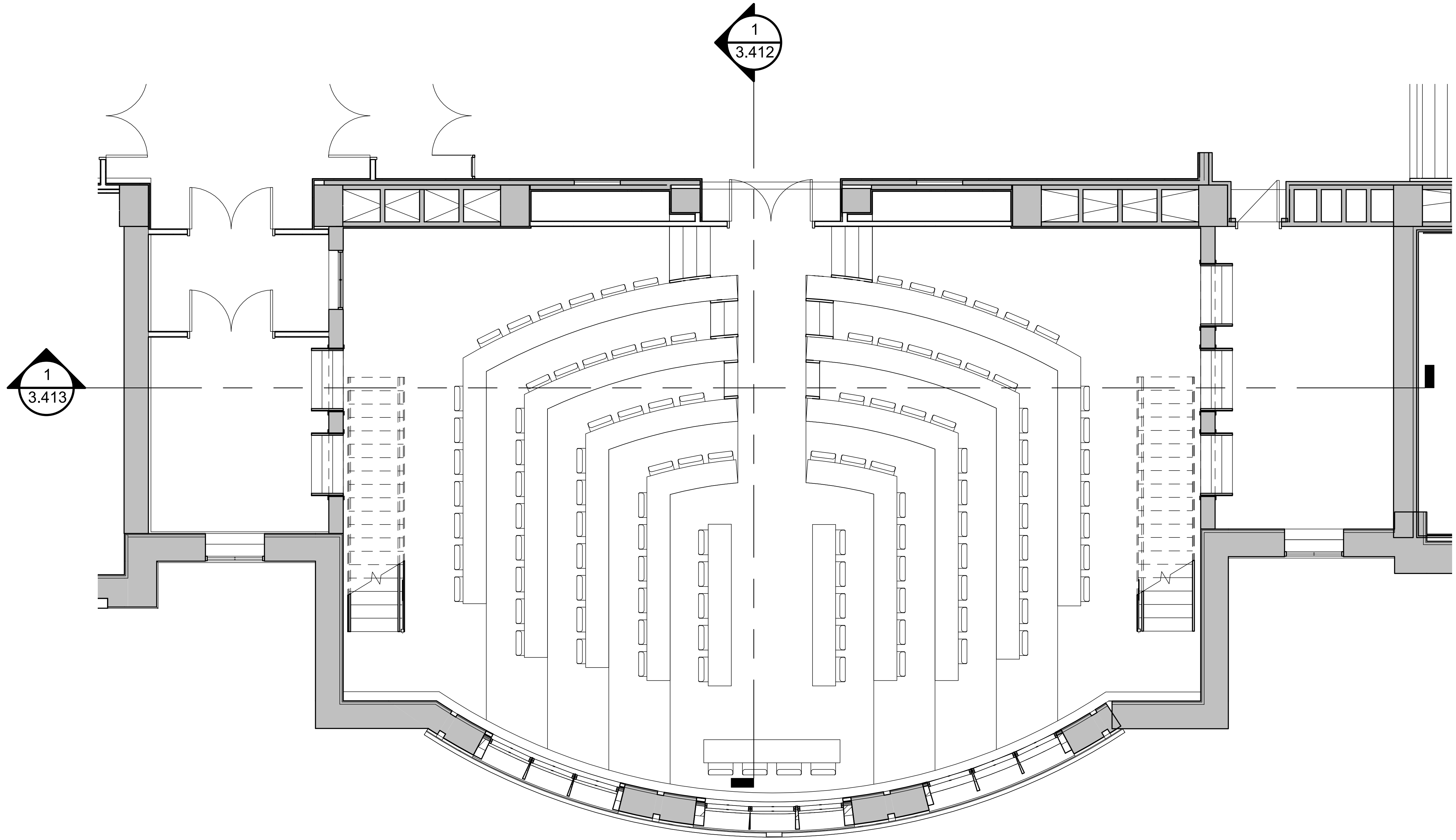


DENTISTRY PHARMACY BUILDING REDEVELOPMENT

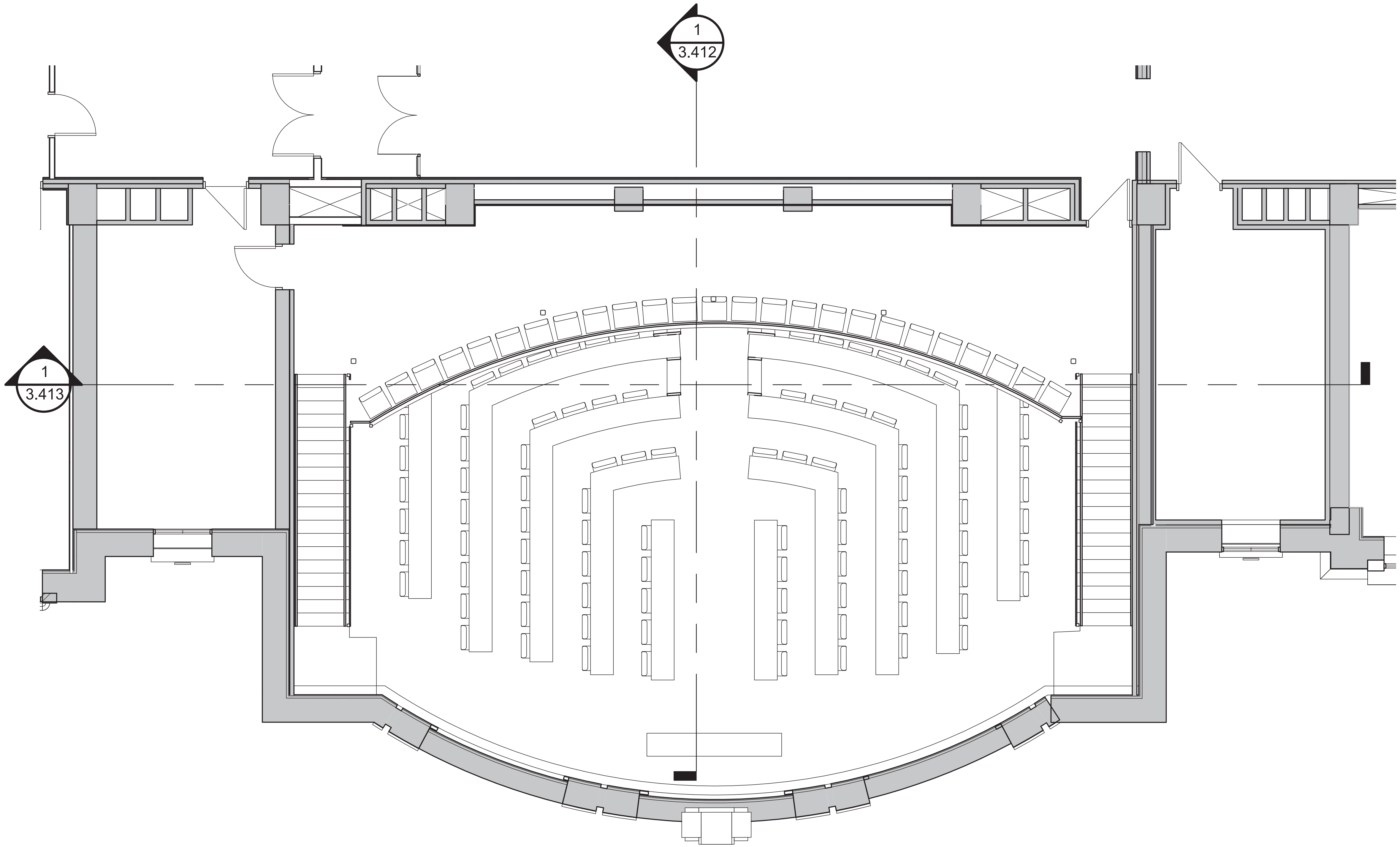
3. INTERIOR SPACES

THE ATRIUM DETAILS

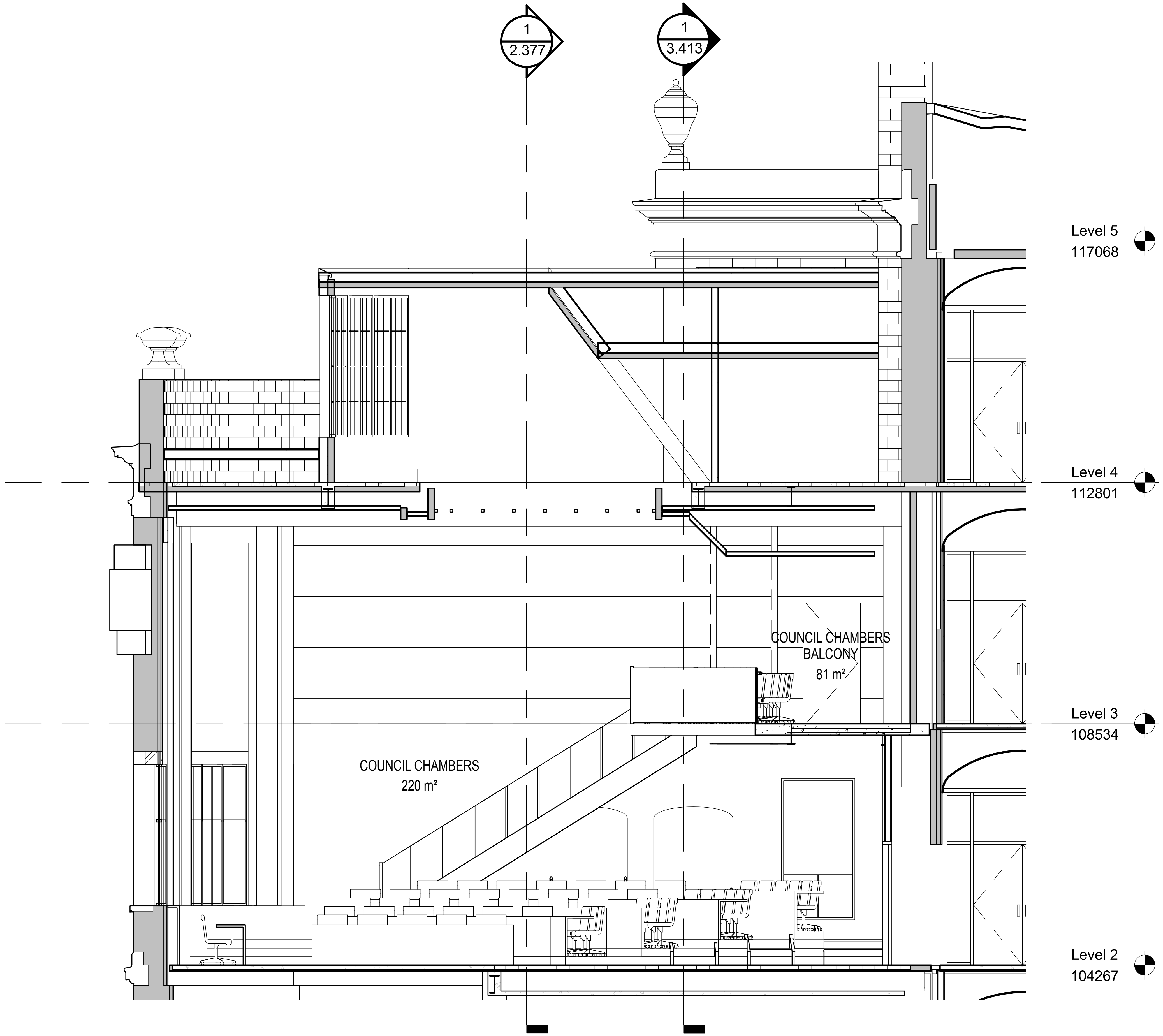
Atrium Section and Details



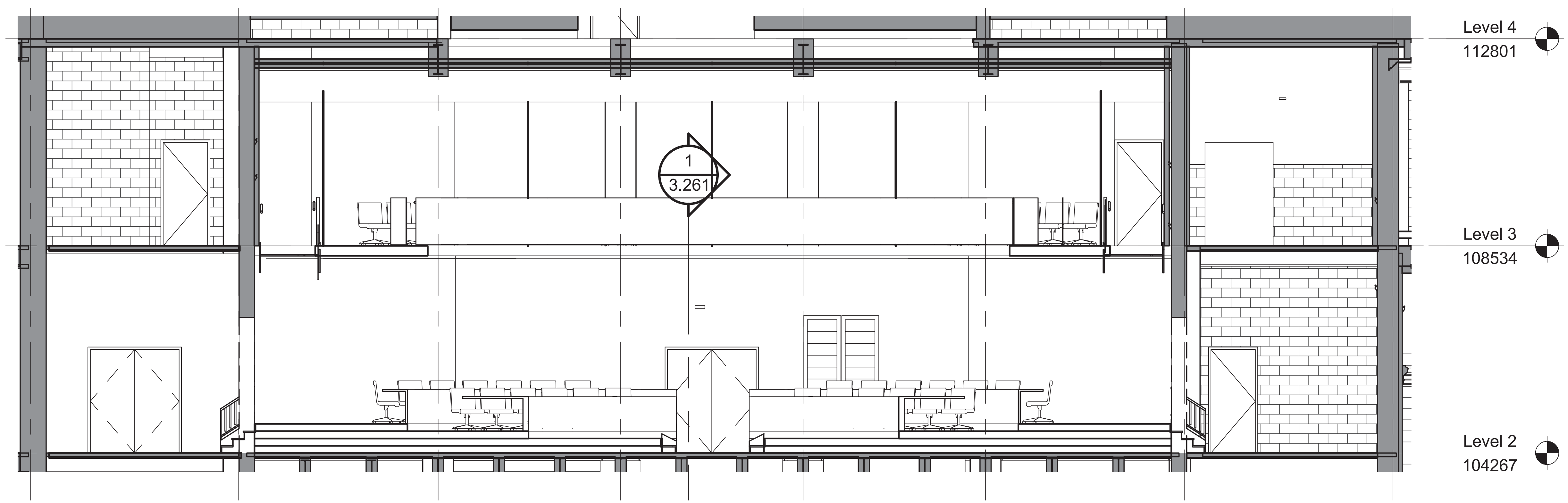
3.400 Council Chambers - Level 2 Enlarged Plan



Council Chambers - Level 3 Enlarged Plan



3.402 Council Chambers - Cross Section Looking West



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DENTISTRY PHARMACY BUILDING REDEVELOPMENT

3. INTERIOR SPACES

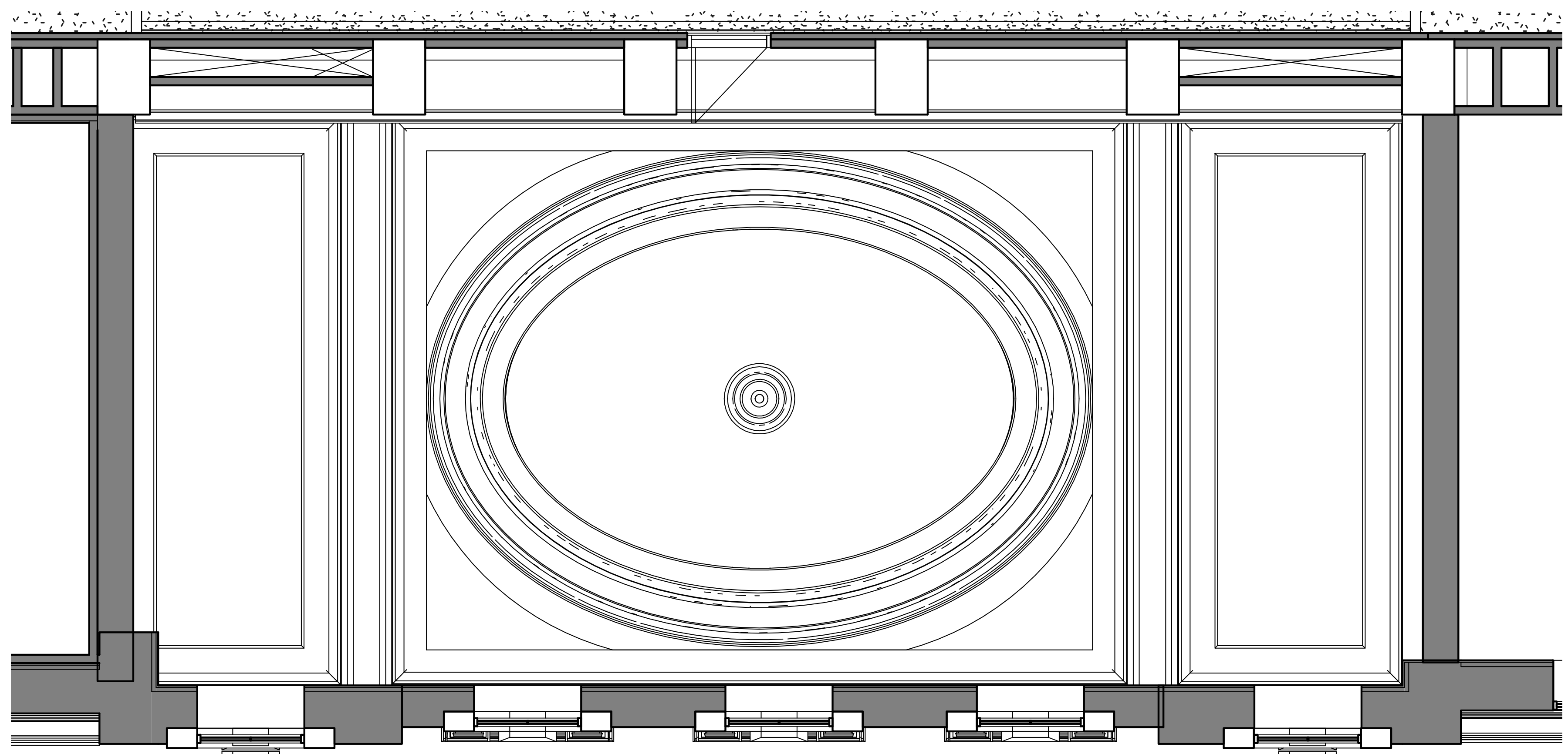
ORIGINAL BUILDING

COUNCIL CHAMBERS

Council Chambers - Long Section Looking North

3 .404 Council Chambers - Interior Perspectives

Council Chambers - Interior Perspectives



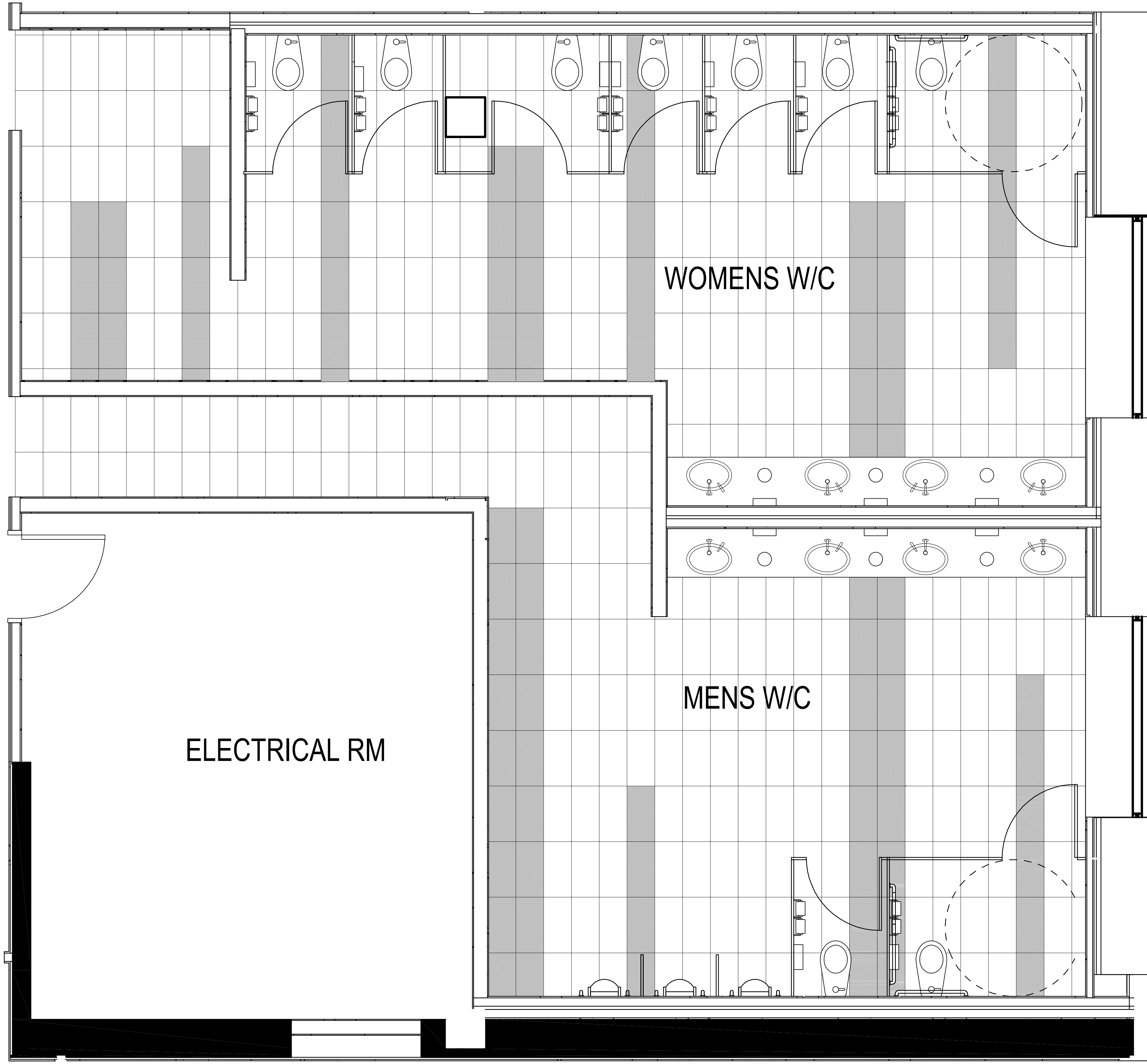
Reinstate decorative historic plaster ceiling

New Wood Veneer Wainscot and Panel Wall Treatment similar to original Nobbs and Hyde design intent

Reclaimed hardwood flooring

3.410 Student Reading Room - Enlarged Plan and RCP

Student Reading Room - Enlarged Plan and RCP



3.500 **Level 1 West Washroom Core - Enlarged Plan**

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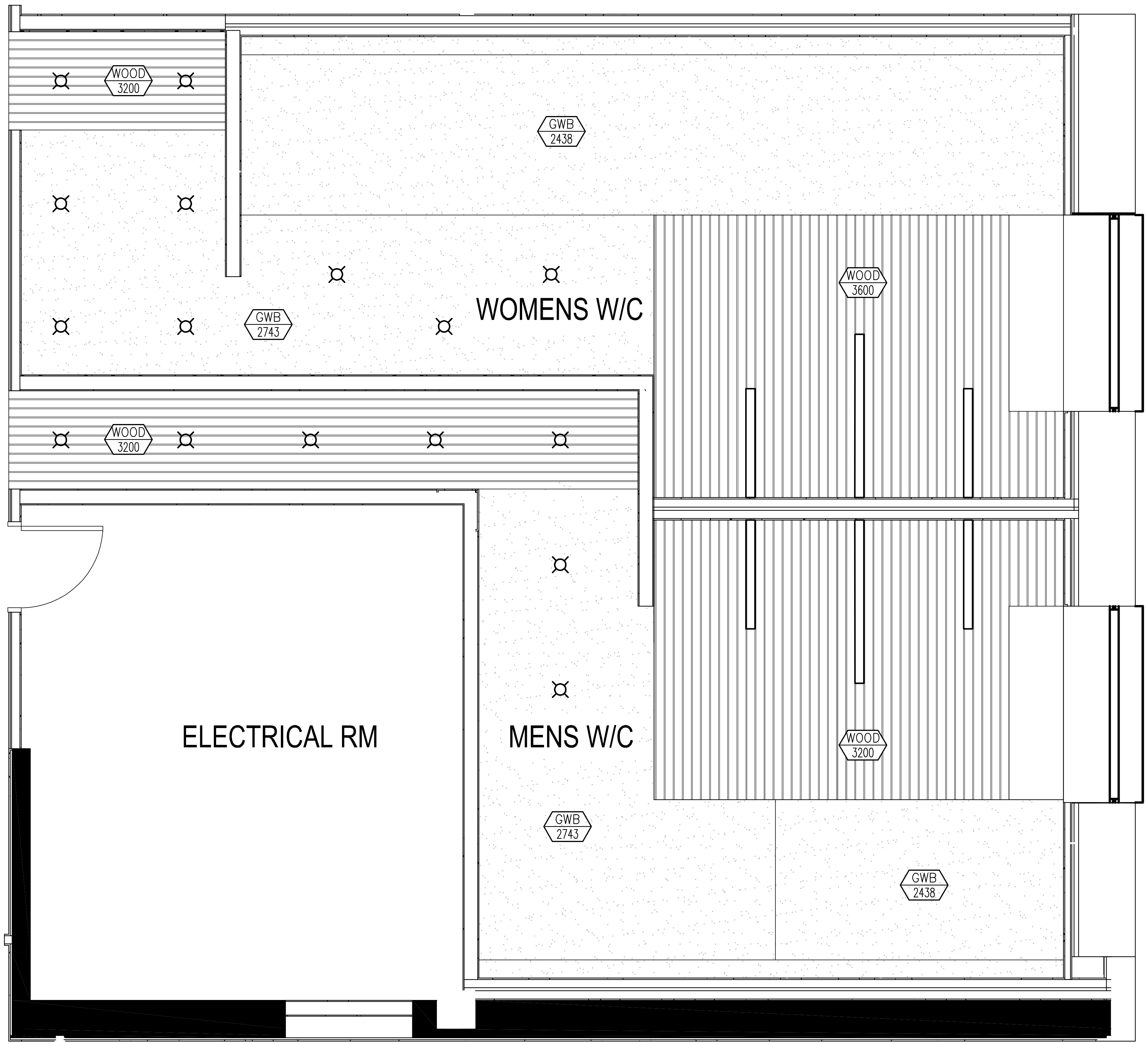
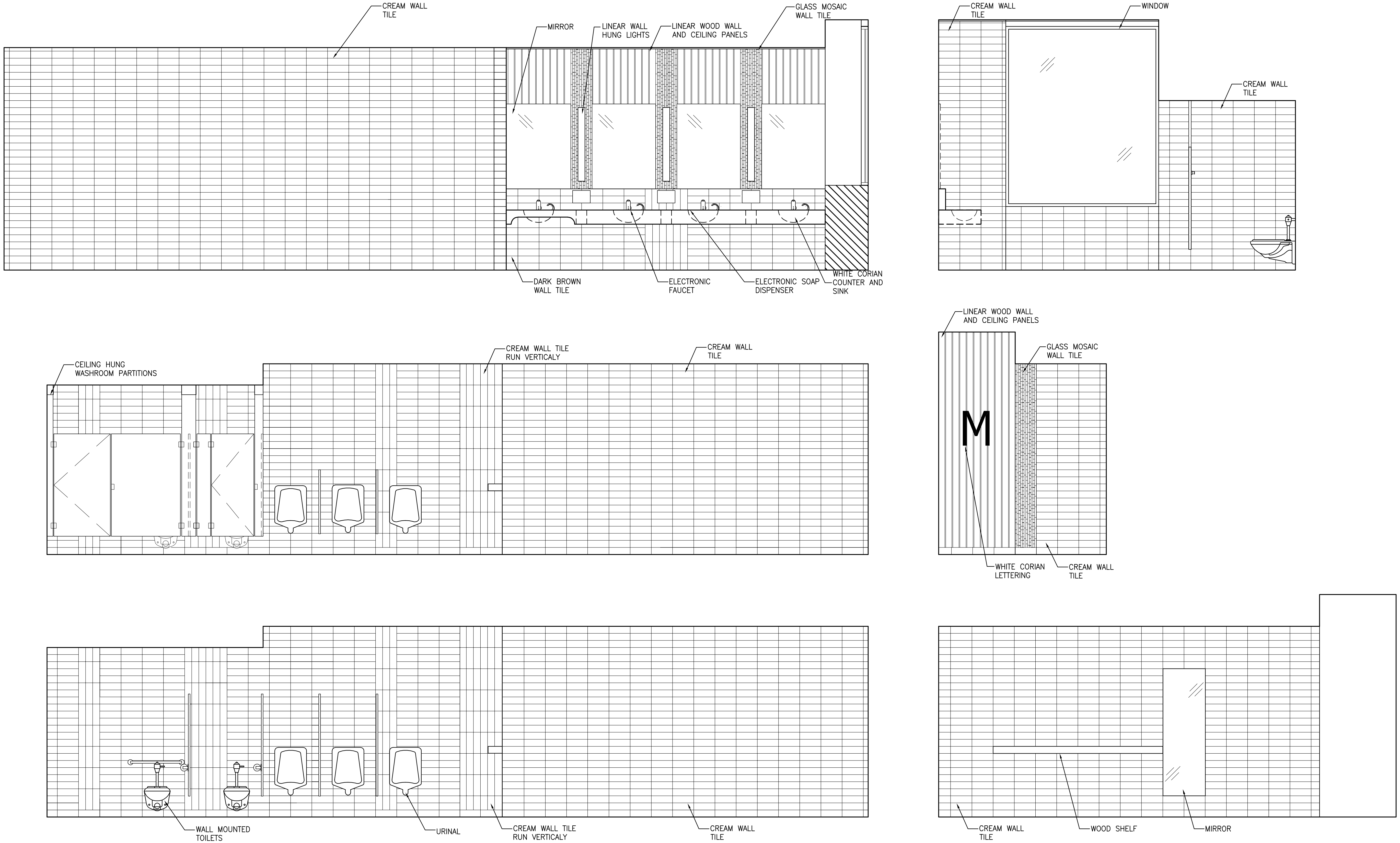
DENTISTRY PHARMACY BUILDING REDEVELOPMENT

3. INTERIOR SPACES

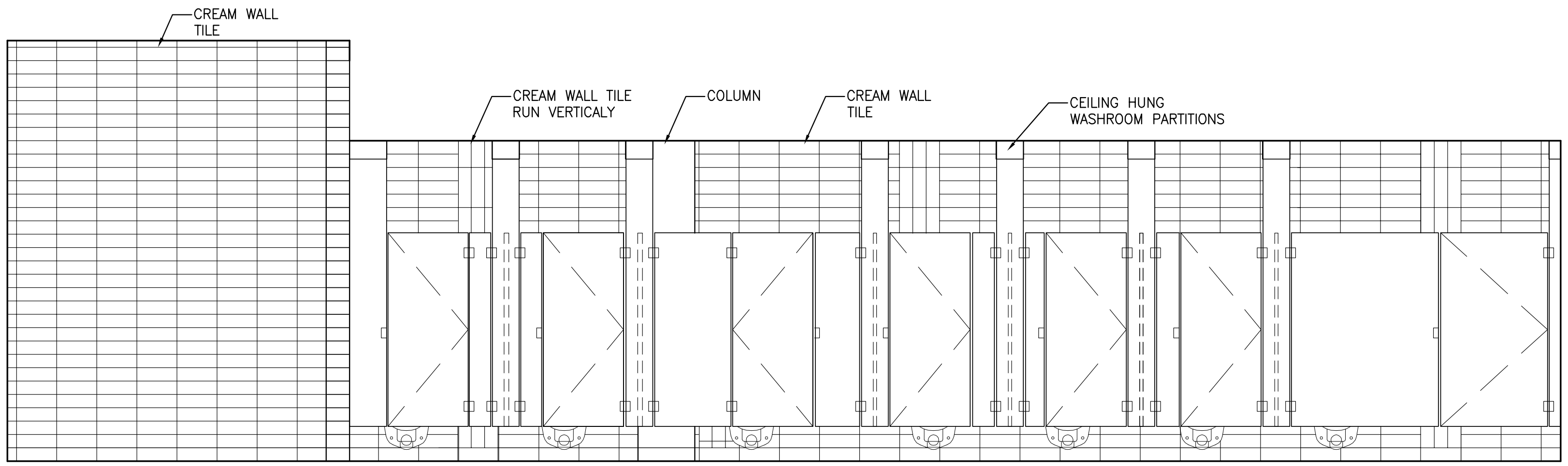
INTEIROR SPACES
WASHROOMS

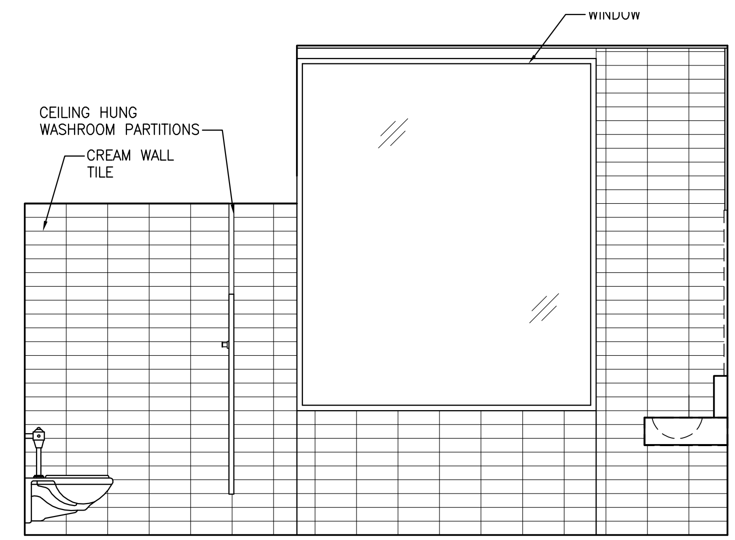


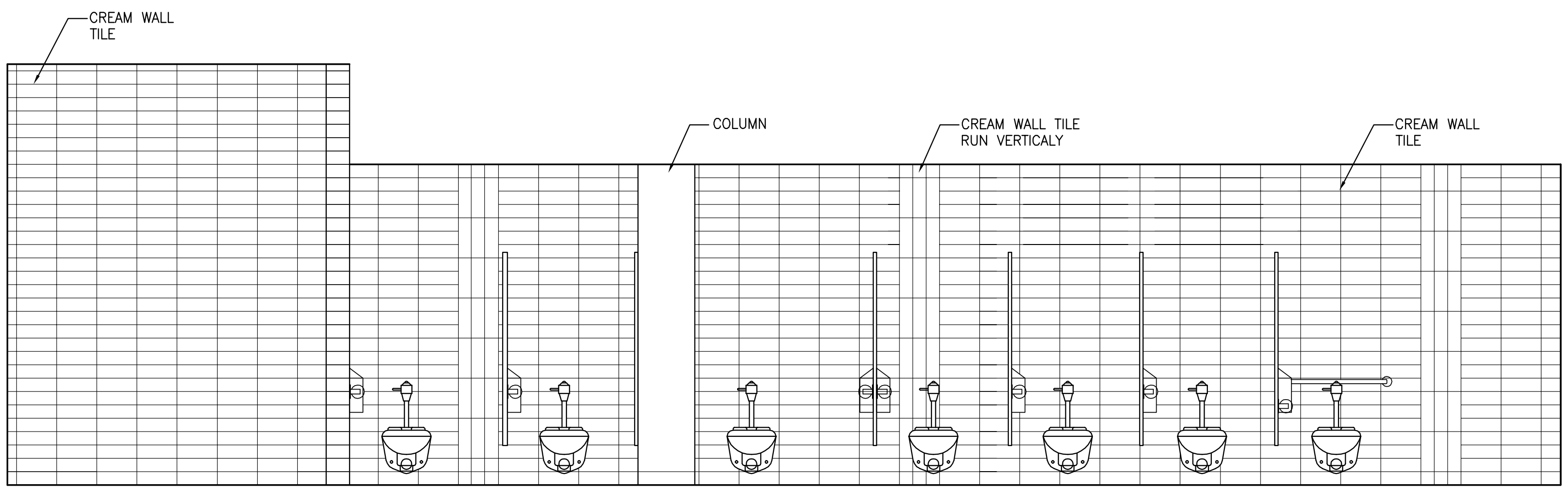
Level 1 West Washroom Core - Reflected Ceiling Plan

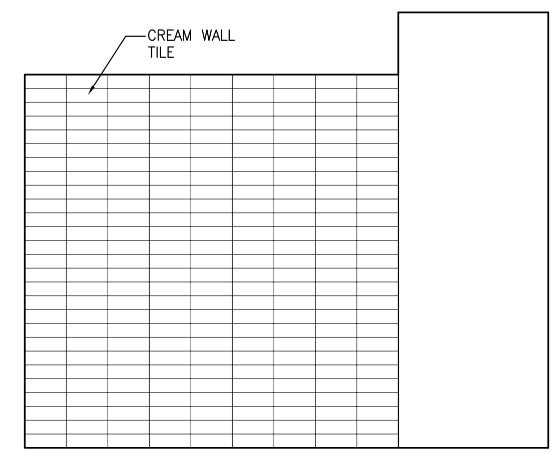


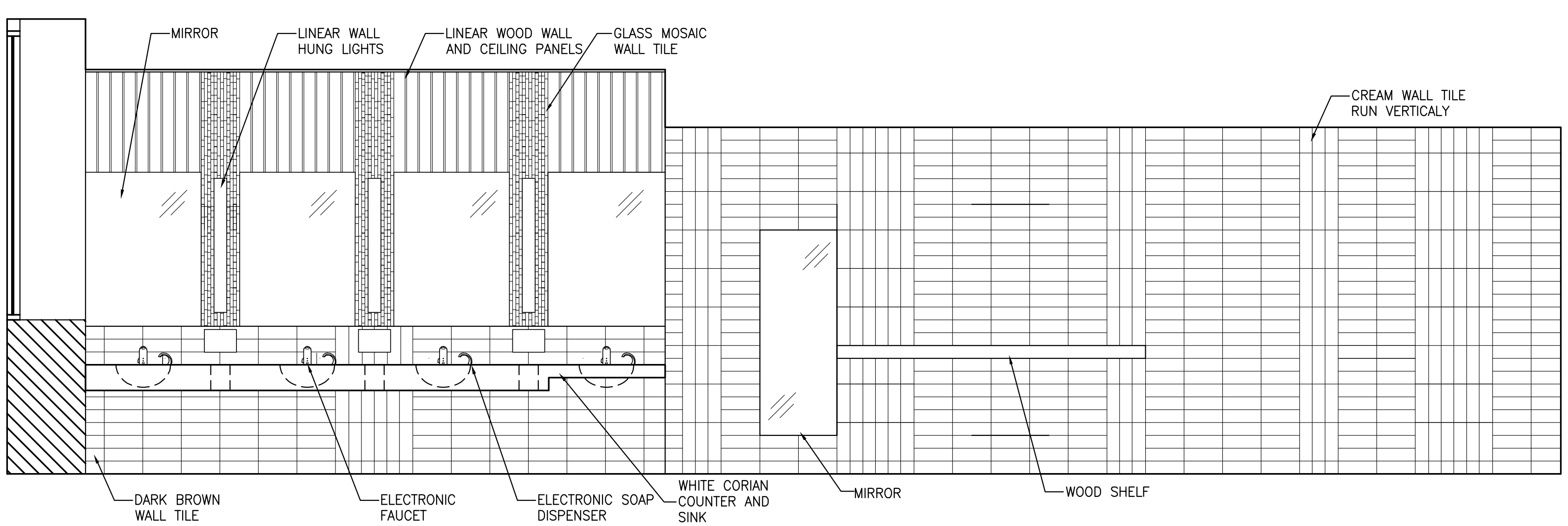
3.502 Level 1 West Men’s Washroom Core - Interior Elevations

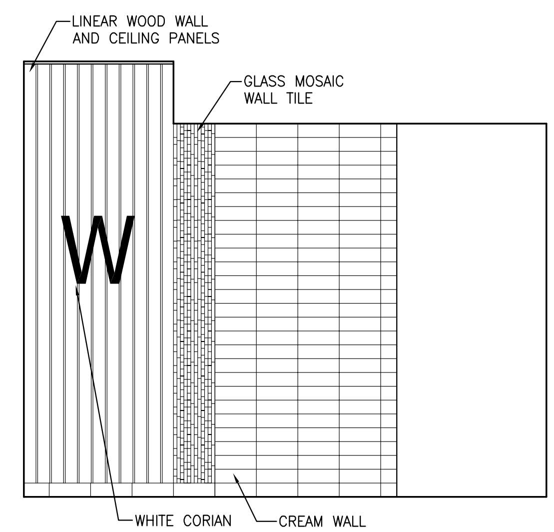




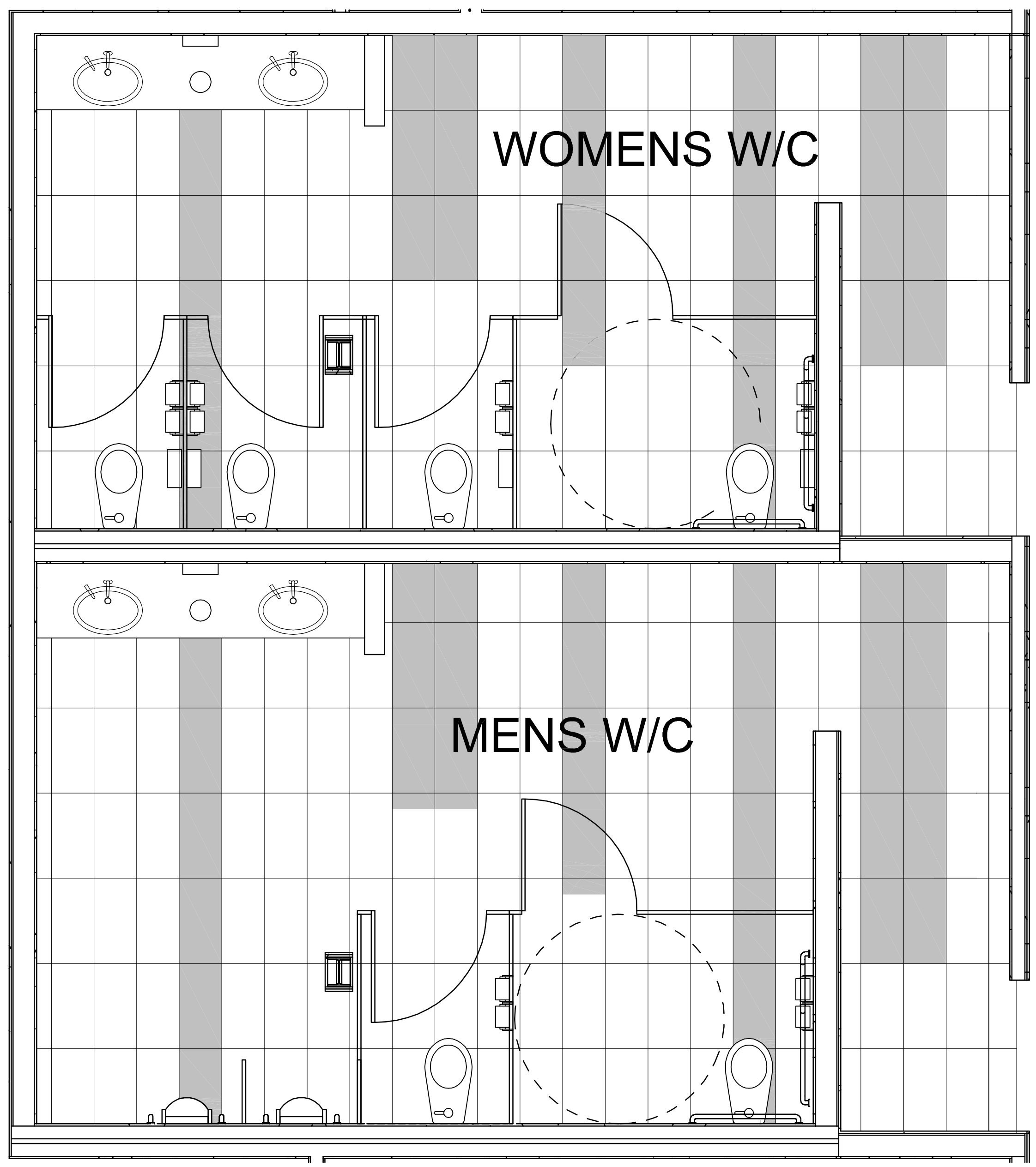


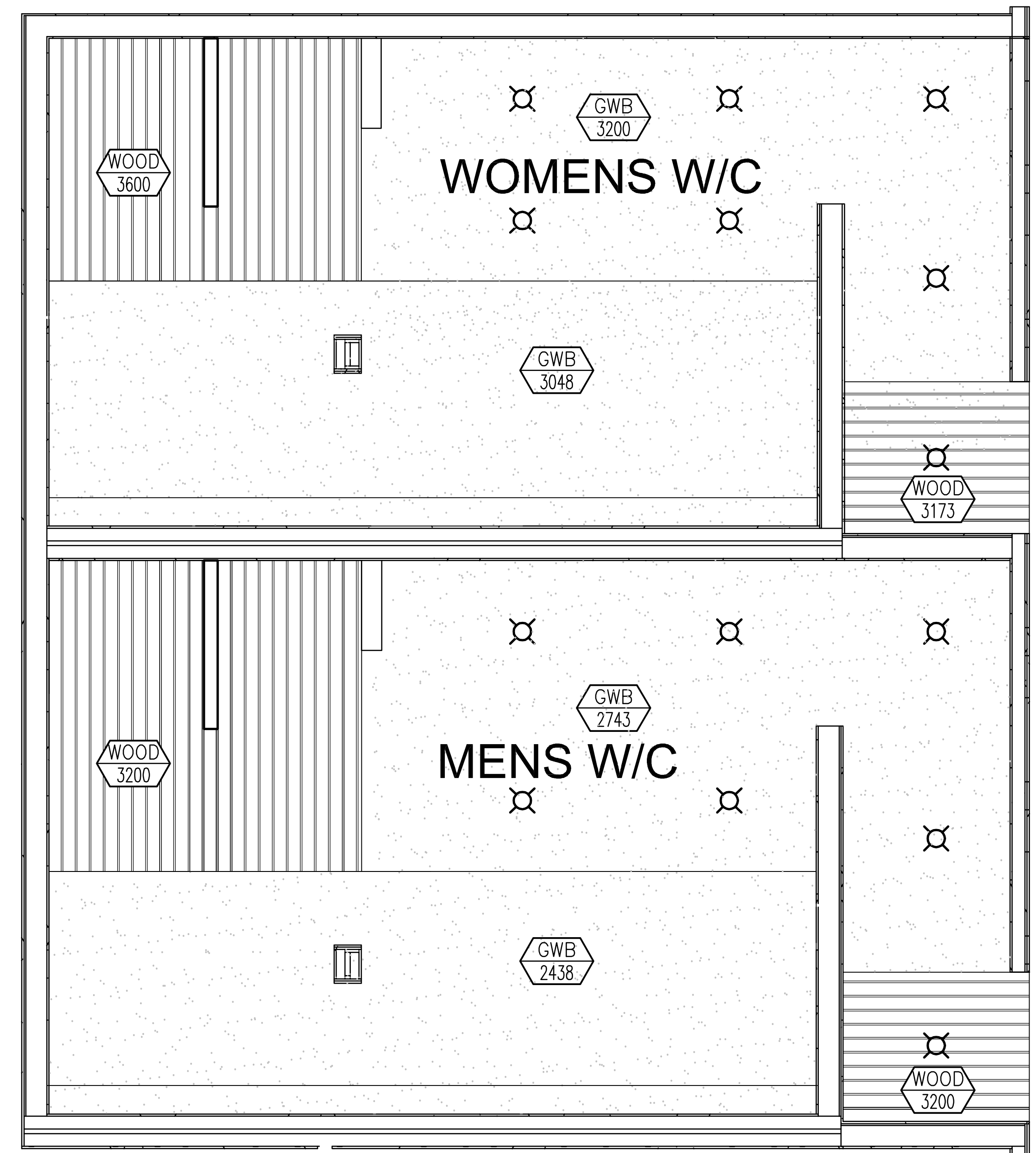




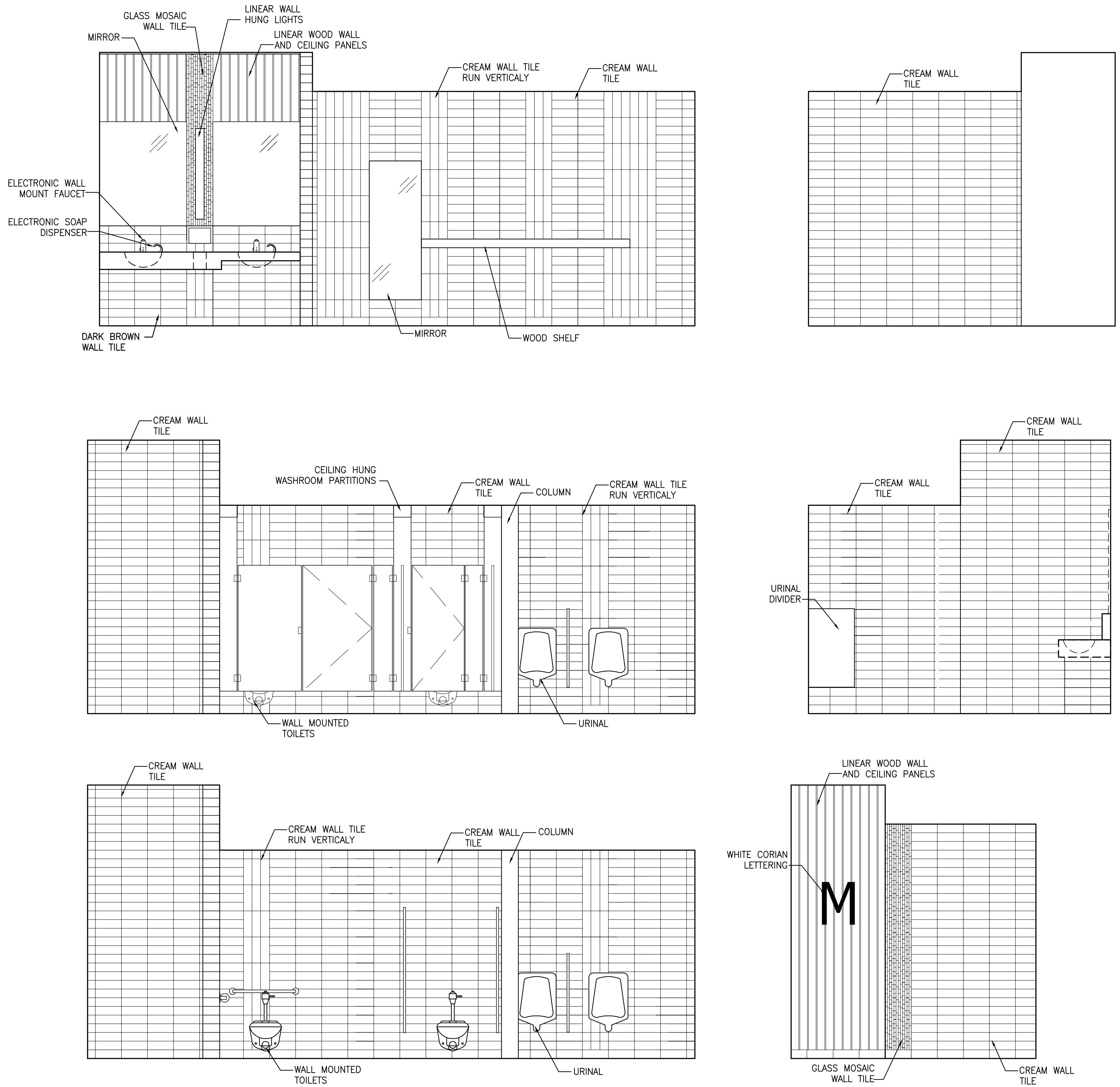


Level 1 West Women's Washroom Core - Interior Elevations





3 504 Level 2-4 South-West Washroom Core - Enlarged Plan and RCP



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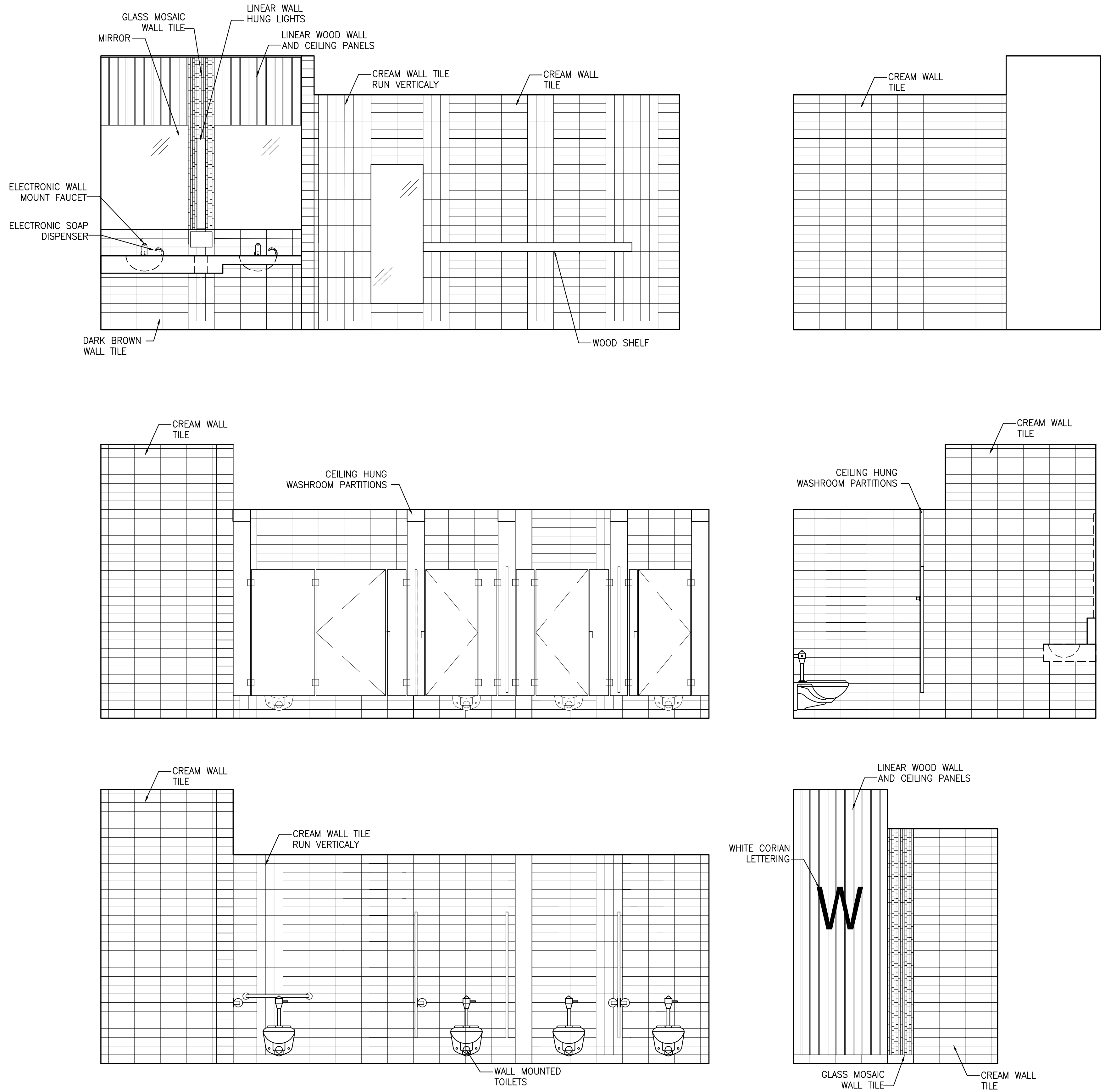
DENTISTRY PHARMACY BUILDING REDEVELOPMENT

3. INTERIOR SPACES

INTEIROR SPACES WASHROOMS

Level 2-4 South West Men's Washroom Core - Interior Elevations



3 506 Level 2-4 South West Women's Washroom Core - Interior Elevations

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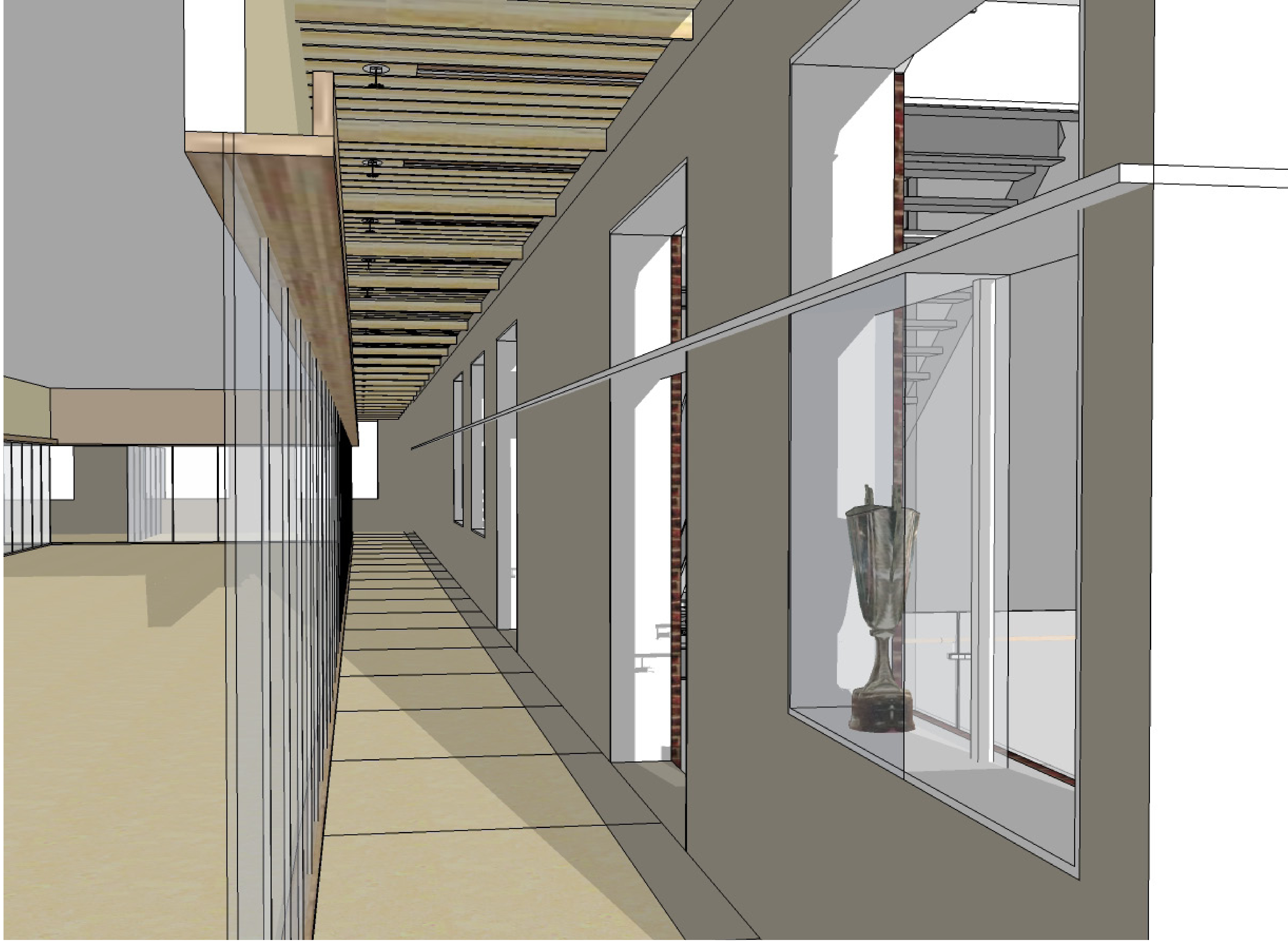
DENTISTRY PHARMACY BUILDING REDEVELOPMENT

3. INTERIOR SPACES

INTEIROR SPACES
WASHROOMS

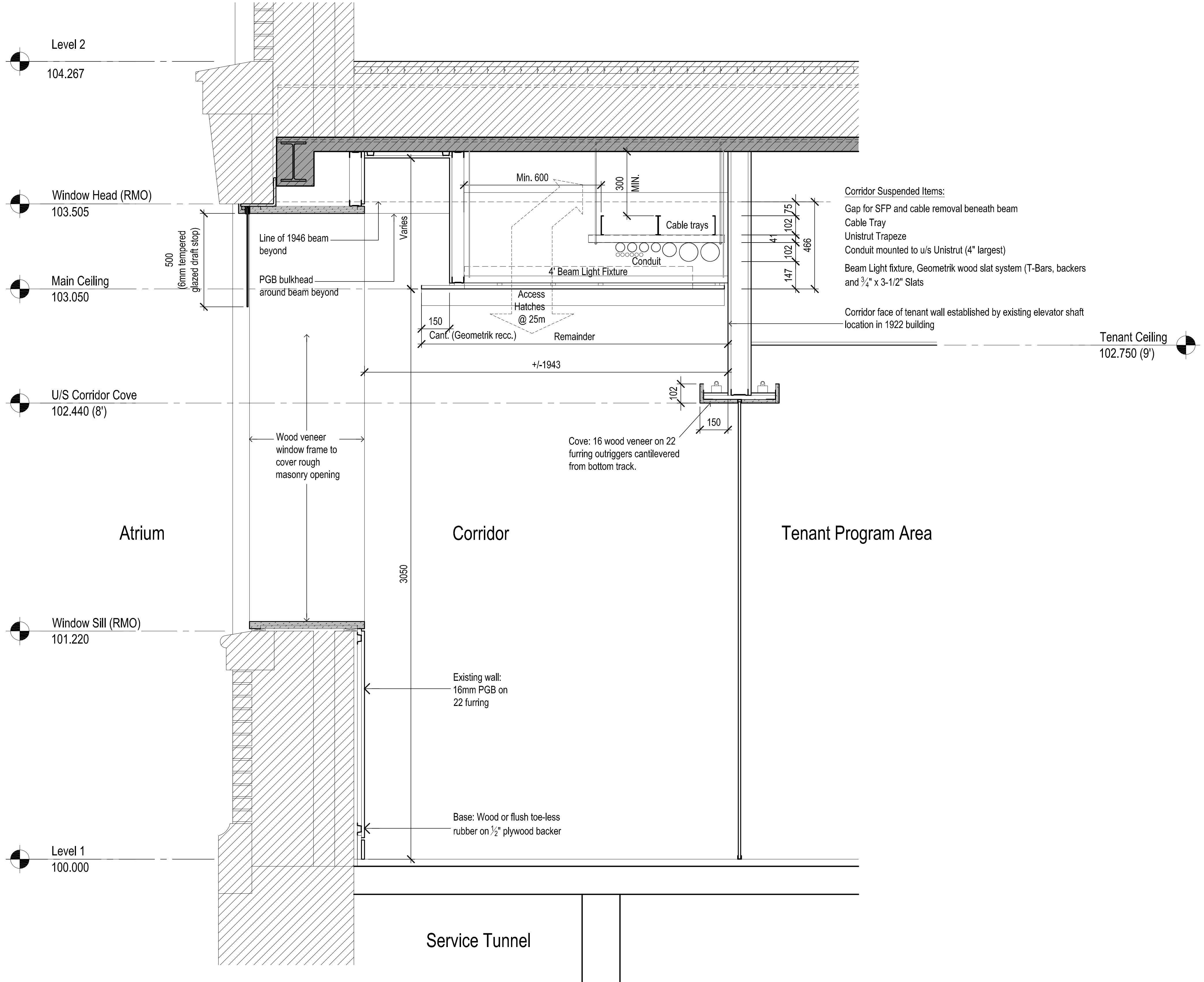
3 .704 Level 2 Bridge Approach to Glass Elevators from Atrium

Looking West through Transition Space at Glass Elevator



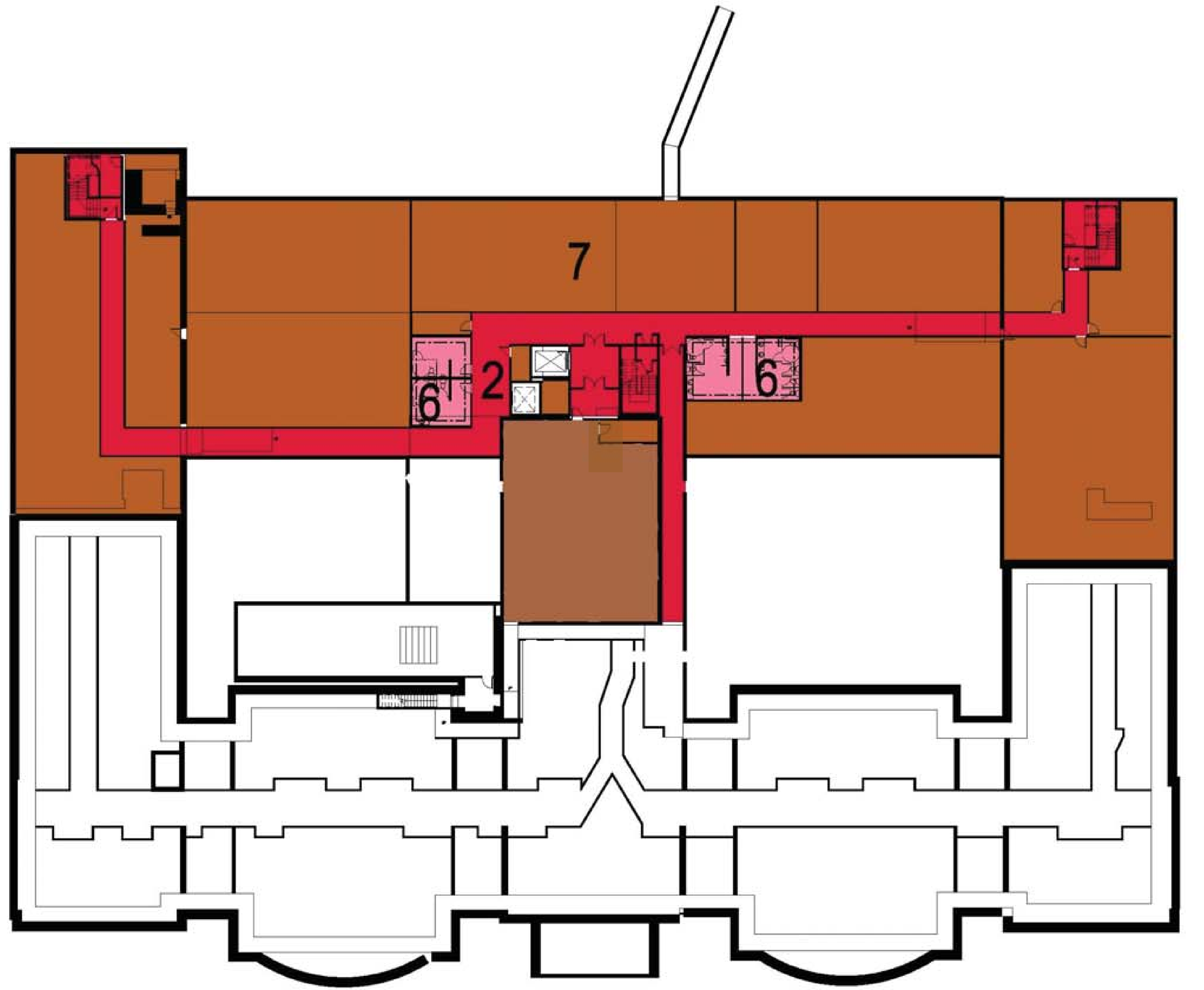
3

Typical Corridor - Floor, Wall, Ceiling and Atrium Window Treatment



1922 Corridor - Level 1

Typical Corridor Section



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AREA TYPES

SYMBOL		MATERIAL TYPES	NOTES
1	OFFICE AREAS	FLOORS: CARPET TILE CEILING: 610x1220 ACOUSTIC CEILING TILES	REFER OUTLINE SPECIFICATIONS
2	CORRIDORS	FLOORS: "MARMOLEUM" SHEET GOODS WITH WELDED SEAMS CEILING: A COMBINATION OF 30% GWB AND 70% WOOD CEILING (REFER DETAIL AD-400)	REFER OUTLINE SPECIFICATIONS
3	HISTORICAL RETROFIT	FLOORS: RENOVATE / REPLACE TO MATCH ORIGINAL FLOOR TREATMENT CEILING: RENOVATE/ REPLACE TO MATCH ORIGINAL CEILING TREATMENT	REFER OUTLINE SPECIFICATIONS REFER PHOTOGRAPHS OF EXISTING CONDITIONS AND RENDERING OF PROPOSED RENOVATIONS TO LECTURE HALLS
4	ATRIUM	FLOORS: TERRAZZO CEILING: LINEAR WOOD CEILING AND 100mm ACOUSTIC INSULATION	REFER OUTLINE SPECIFICATIONS
5	N/A	N/A	N/A
6	WASHROOMS	FLOORS: CERAMIC TILES CEILING: PAINTED GWB	REFER OUTLINE SPECIFICATIONS
7	SERVICES AREAS	EXPOSED CONCRETE	
8	CATWALK	51 mm DEEP GALVANIZED MAINTENANCE CATWALK	REFER OUTLINE SPECIFICATIONS
9	ATRIUM MEETING ROOMS	FLOORS: "MARMOLEUM" CEILING: WOOD SLATS WITH ACOUSTIC INSULATION	REFER OUTLINE SPECIFICATIONS

WALL ASSEMBLIES

SYMBOL	ASSEMBLY	NOTES
A	16 mm GWB 92 mm STEEL STUDS 75 mm ACOUSTIC INSULATION 16 mm GWB	TYPICAL FULL HEIGHT OFFICE WALLS TO PROVIDE ACOUSTIC SEPARATION
B	FRITTED GLASS PARTITIONS IN WOOD FRAME TO 2200 AFF FLOOR WITH TYPICAL WALL TYPE 1 ABOVE	TYPICAL CORRIDOR PARTITION TO ALLOW LIGHT INTO ADJACENT OPEN WORK STATION AREAS, REFER OUTLINE SPECIFICATIONS FOR TYPICAL DETAILS
C	GLAZED HANDRAIL	SEE TYPICAL DETAILS IN OUTLINE SPECIFICATION
D	REPOINT EXISTING BRICK WALLS AND INFILL EXISTING OPENING WITH PAINTED WOOD TRIM TO MATCH EXITING WINDOW CONFIGURATION (NO GLASS)	TYPICAL INTERIOR EXISTING BRICK WALLS
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F	DEMOLITION OF PREVIOUS RENOVATIONS TO REVEAL EXISTING HISTORICAL ELEMENTS	REFER OUTLINE SPECIFICATION, ANNOTATED DRAWINGS AND PHOTOGRAPHS
G	LINEAR WOOD AND ACOUSTIC INSULATION	REFER OUTLINE SPECIFICATION
H	EXTERIOR CURTAIN WALL	REFER OUTLINE SPECIFICATION
I	CERAMIC TILE TILE BACKER BOARD 150 mm STEEL STUDS	FOR RETROFIT AND REPLUMBING OF EXISTING WASHROOMS
J	GREEN WALL	REFER OUTLINE SPECIFICATION
K	12 mm CLEAR TEMPLAM GLASS WITH TOP AND BOTTOM ALUMINIUM CHANELS	REFER OUTLINE SPECIFICATION
L	MOTORIZED BLACKOUT FINS WITH ACOUSTIC WOOD PANELS	REFER OUTLINE SPECIFICATION

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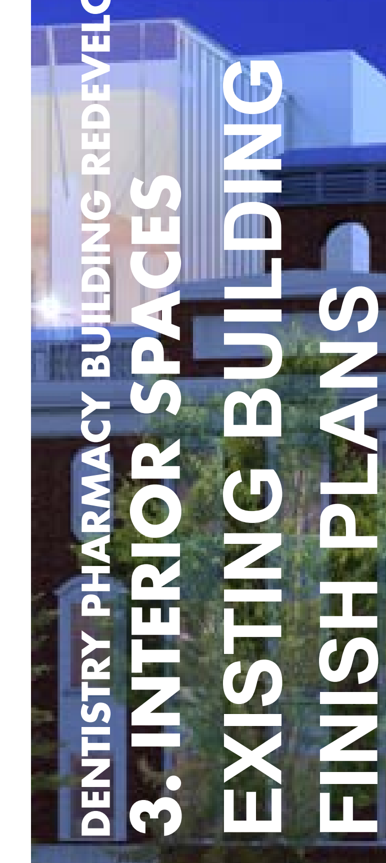
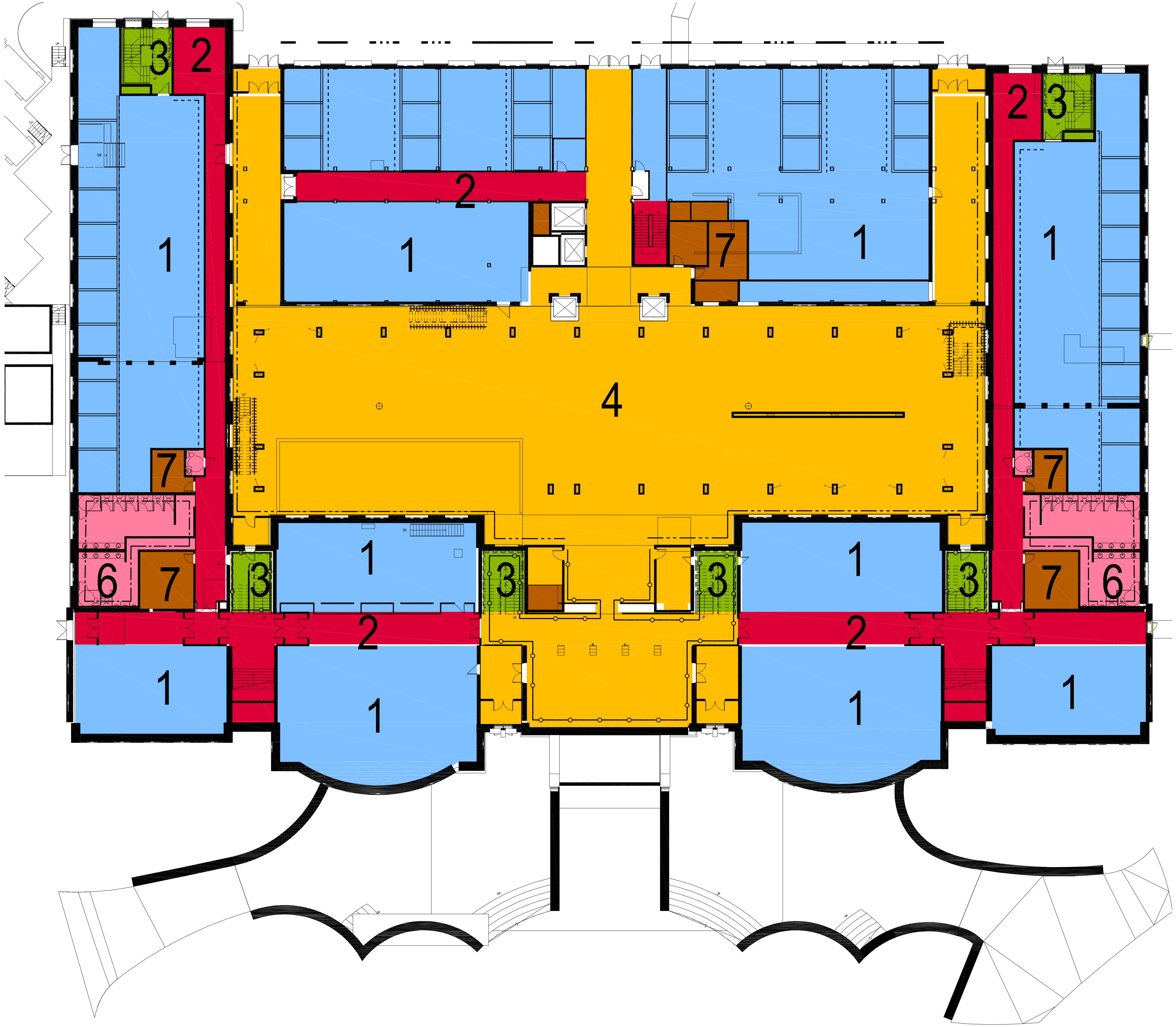


DENTISTRY PHARMACY BUILDING REDEVELOPMENT
3. INTERIOR SPACES
EXISTING BUILDING FINISH PLANS



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AREA TYPES

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4	ATRIUM	FLOORS: TERRAZZO CEILING: LINEAR WOOD CEILING AND 100mm ACOUSTIC INSULATION	REFER OUTLINE SPECIFICATIONS
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6	WASHROOMS	FLOORS: CERAMIC TILES CEILING: PAINTED GWB	REFER OUTLINE SPECIFICATIONS
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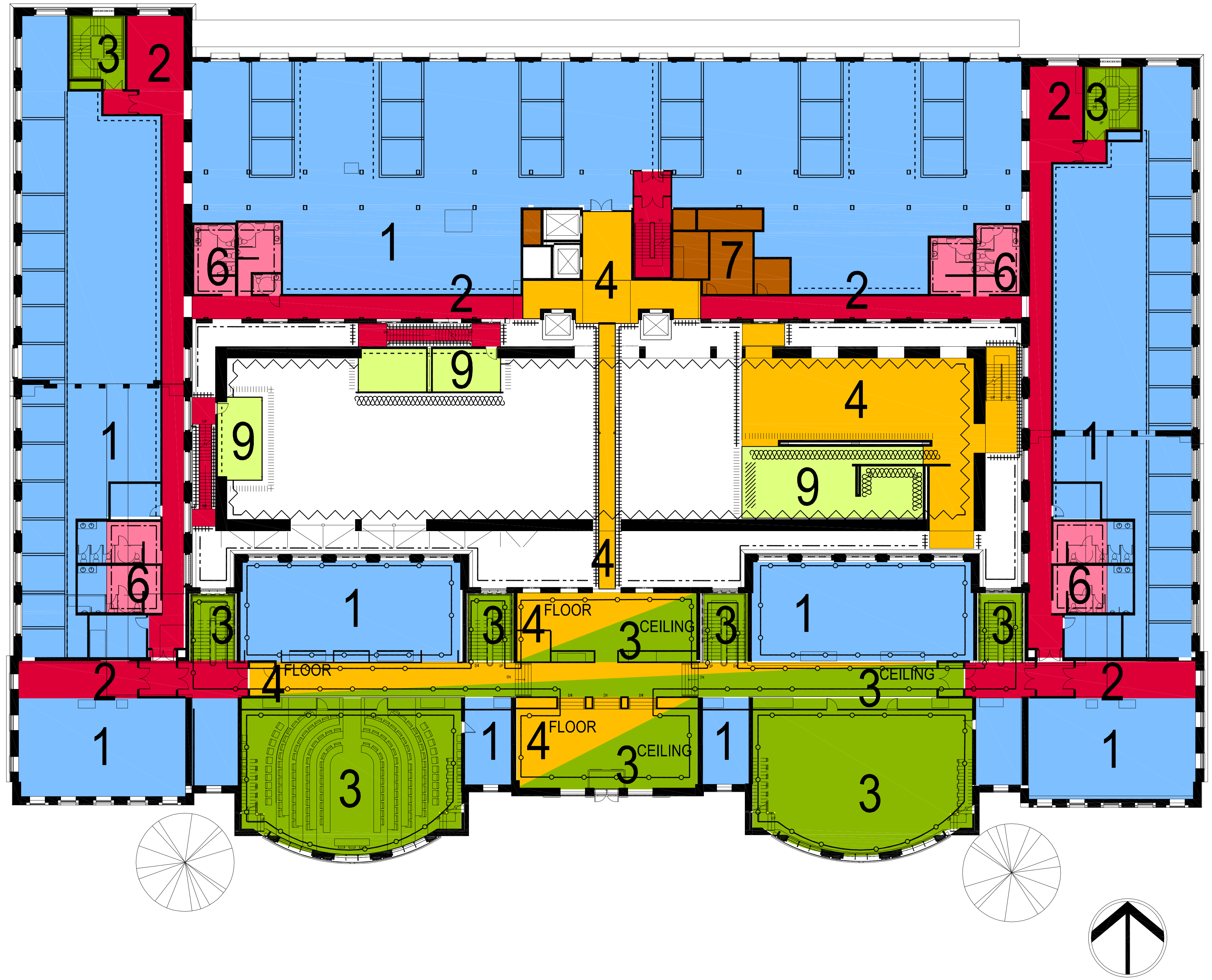
DENTISTRY PHARMACY BUILDING REDEVELOPMENT

3. INTERIOR SPACES

EXISTING BUILDING FINISH PLANS

Level 1 Finishes



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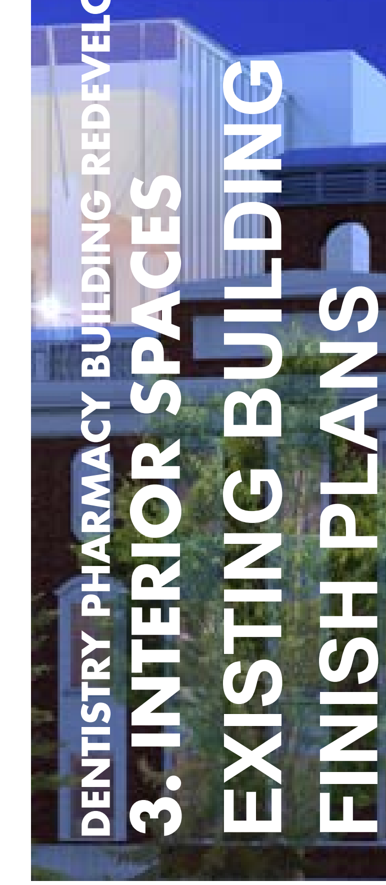
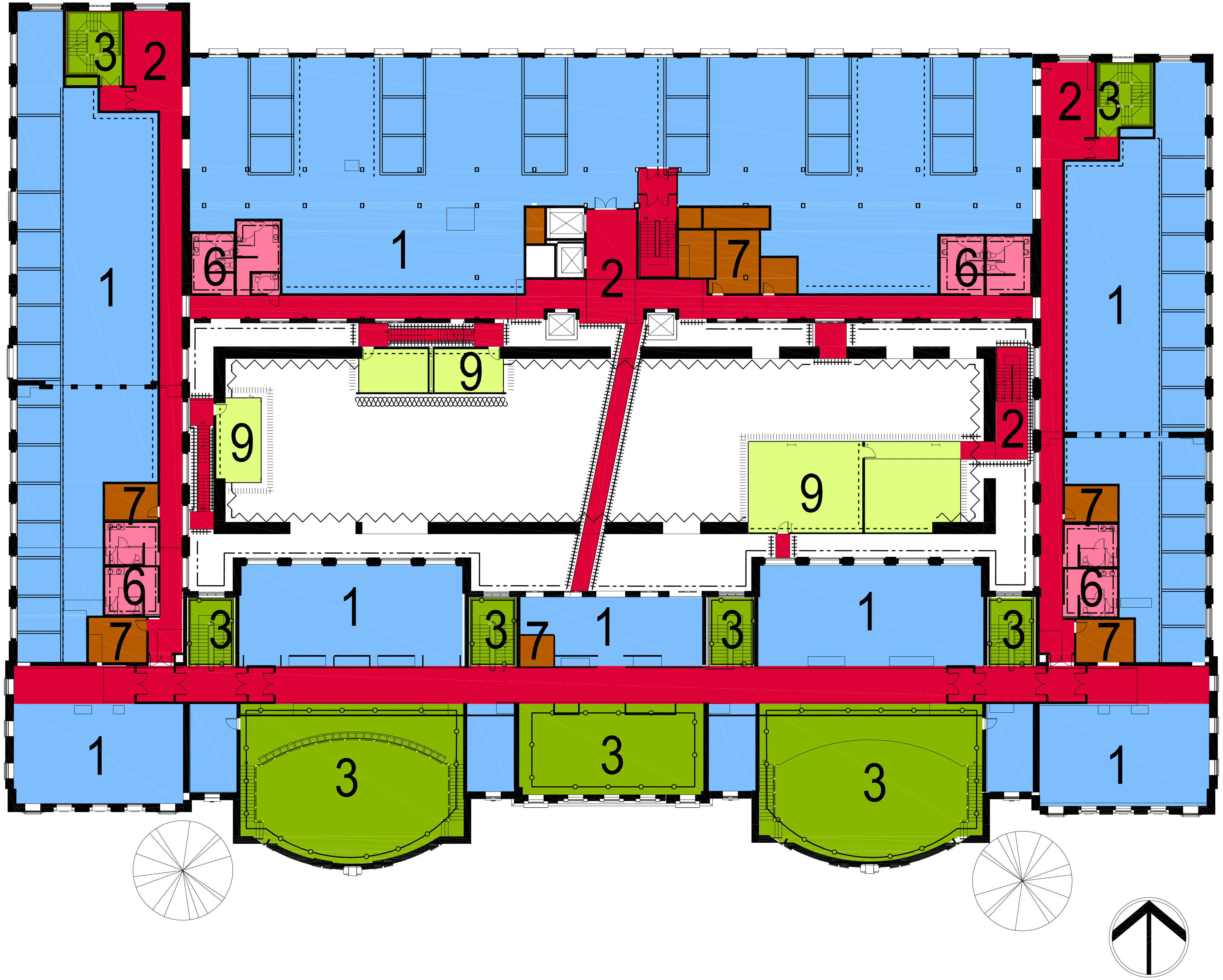


Level 2 Finishes



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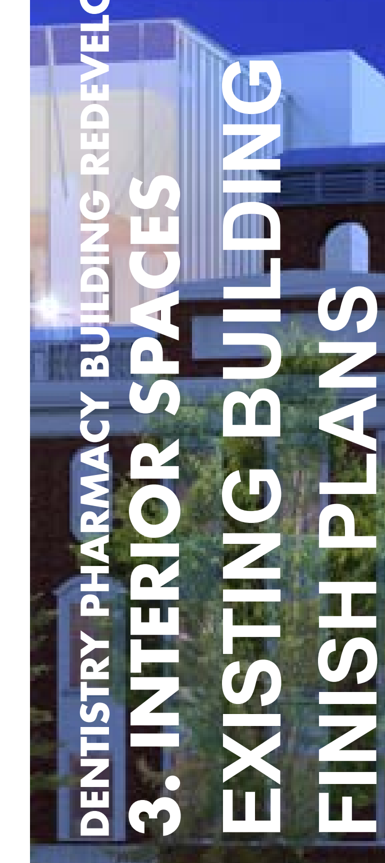

DENTISTRY PHARMACY BUILDING REDEVELOPMENT

3. INTERIOR SPACES

EXISTING BUILDING FINISH PLANS

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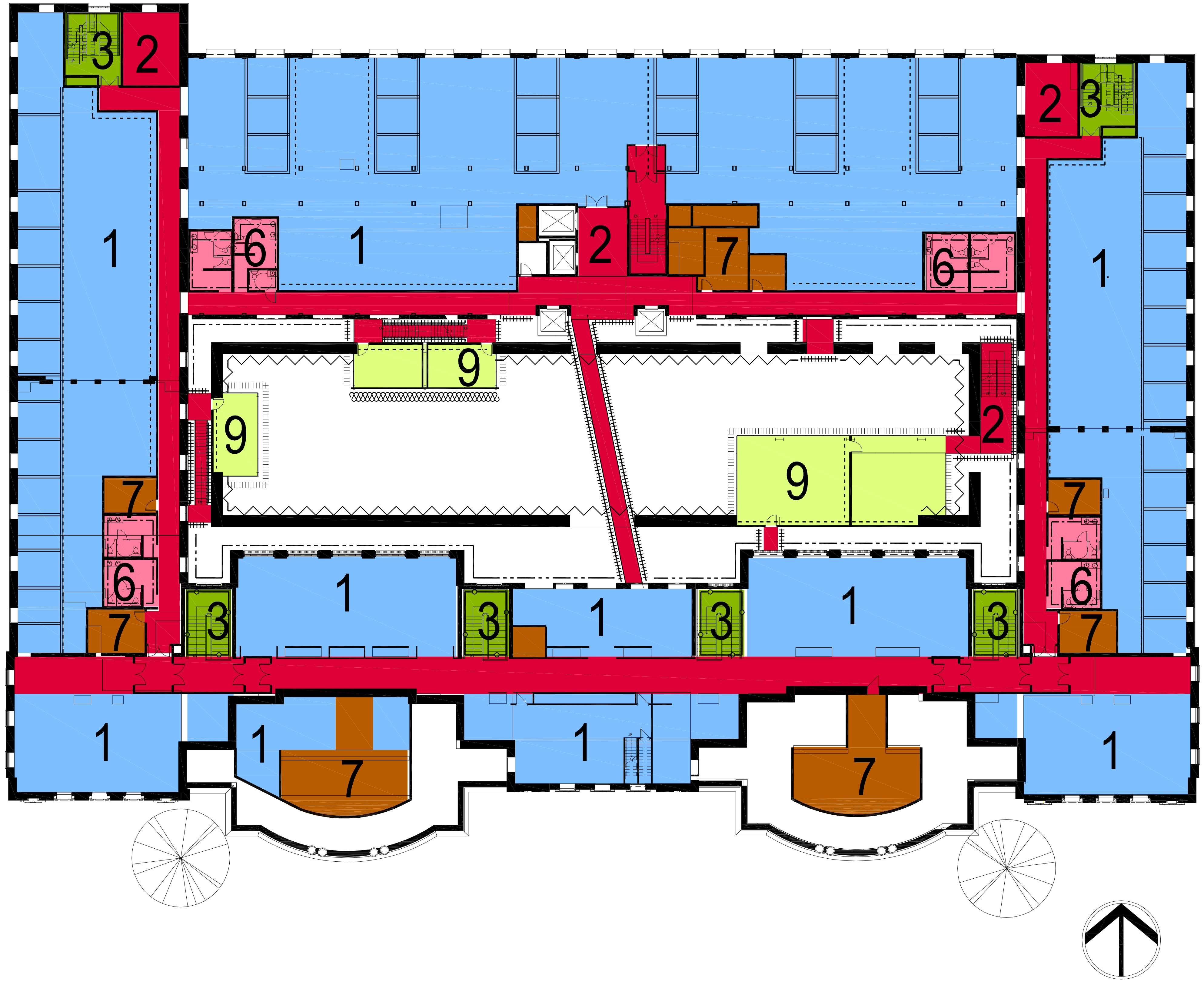
9	ATRIUM MEETING ROOMS	FLOORS: "MARMOLEUM" CEILING: WOOD SLATS WITH ACOUSTIC INSULATION	REFER OUTLINE SPECIFICATIONS

WALL ASSEMBLIES

SYMBOL	ASSEMBLY	NOTES
A	16 mm GWB 92 mm STEEL STUDS 75 mm ACOUSTIC INSULATION 16 mm GWB	TYPICAL FULL HEIGHT OFFICE WALLS TO PROVIDE ACOUSTIC SEPARATION
B	FRITTED GLASS PARTITIONS IN WOOD FRAME TO 2200 AFF FLOOR WITH TYPICAL WALL TYPE 1 ABOVE	TYPICAL CORRIDOR PARTITION TO ALLOW LIGHT INTO ADJACENT OPEN WORK STATION AREAS, REFER OUTLINE SPECIFICATIONS FOR TYPICAL DETAILS
C	GLAZED HANDRAIL	SEE TYPICAL DETAILS IN OUTLINE SPECIFICATION
D	REPOINT EXISTING BRICK WALLS AND INFILL EXISTING OPENING WITH PAINTED WOOD TRIM TO MATCH EXITING WINDOW CONFIGURATION (NO GLASS)	TYPICAL INTERIOR EXISTING BRICK WALLS
E	16 mm GWB STEELSTUD FRAMING SPRAY FINE PROOFED STEEL STRUCTURE 16 mm GWB	THE ATRIUM WALL IS TO PROVIDE A SCREEN BETWEEN THE NEW ATRIUM AND THE EXISTING BRICK WALL, AND PROVIDE ACOUSTIC ATTENUATION
F	DEMOLITION OF PREVIOUS RENOVATIONS TO REVEAL EXISTING HISTORICAL ELEMENTS	REFER OUTLINE SPECIFICATION, ANNOTATED DRAWINGS AND PHOTOGRAPHS
G	LINEAR WOOD AND ACOUSTIC INSULATION	REFER OUTLINE SPECIFICATION
H	EXTERIOR CURTAIN WALL	REFER OUTLINE SPECIFICATION
I	CERAMIC TILE TILE BACKER BOARD 150 mm STEEL STUDS	FOR RETROFIT AND REPLUMBING OF EXISTING WASHROOMS
J	GREEN WALL	REFER OUTLINE SPECIFICATION
K	12 mm CLEAR TEMP/LAM GLASS WITH TOP AND BOTTOM ALUMINIUM CHANELS	REFER OUTLINE SPECIFICATION
L	MOTORIZED BLACKOUT FINS WITH ACOUSTIC WOOD PANELS	REFER OUTLINE SPECIFICATION

Level 3 Finishes



3

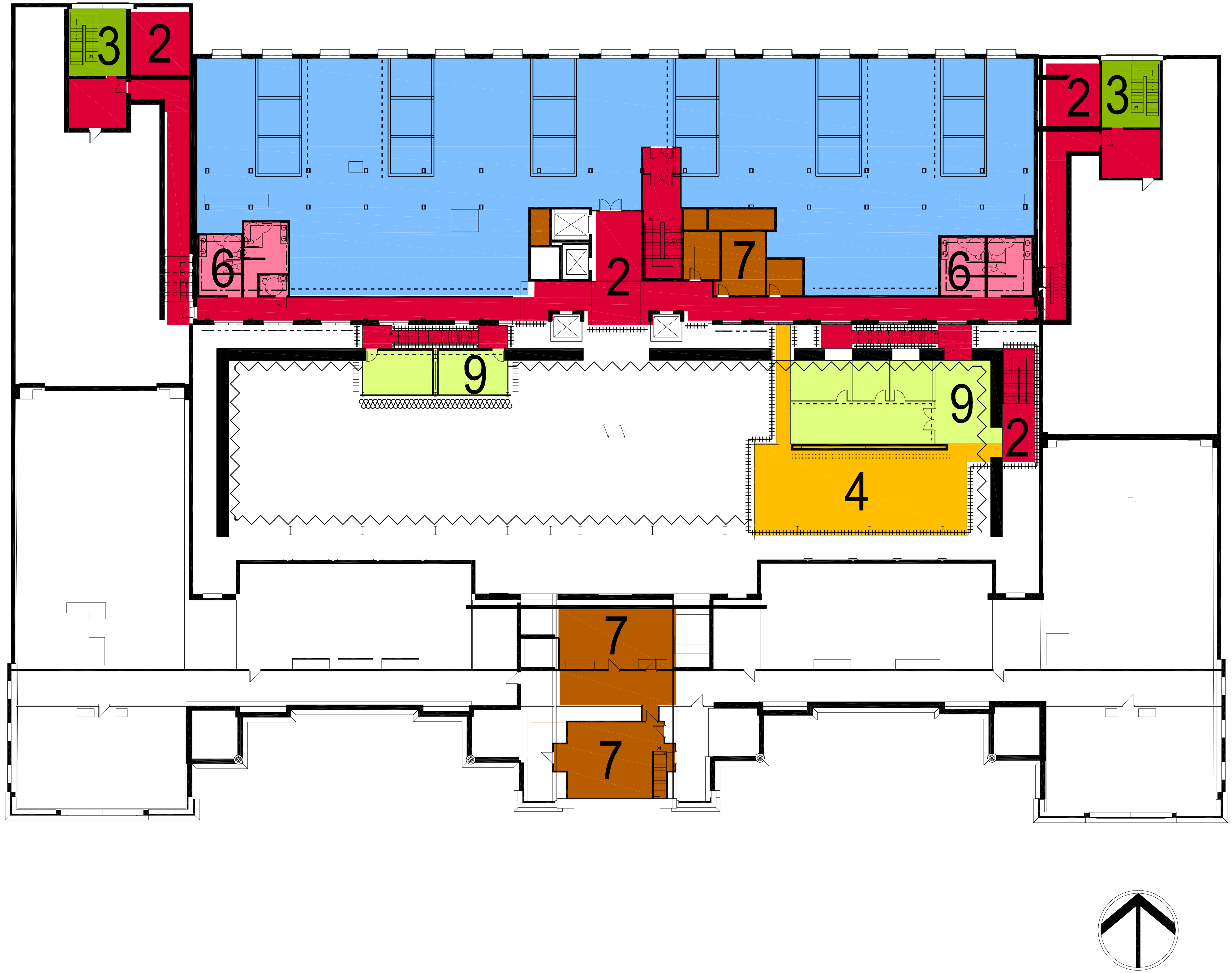
AREA TYPES

SYMBOL		MATERIAL TYPES	NOTES
1	OFFICE AREAS	FLOORS: CARPET TILE CEILING: 610x1220 ACOUSTIC CEILING TILES	REFER OUTLINE SPECIFICATIONS
2	CORRIDORS	FLOORS: "MARMOLEUM" SHEET GOODS WITH WELDED SEAMS CEILING: A COMBINATION OF 30% GWB AND 70% WOOD CEILING (REFER DETAIL AD-450)	REFER OUTLINE SPECIFICATIONS
3	HISTORICAL RETROFIT	FLOORS: RENOVATE / REPLACE TO MATCH ORIGINAL FLOOR TREATMENT CEILING: RENOVATE/ REPLACE TO MATCH ORIGINAL CEILING TREATMENT	REFER OUTLINE SPECIFICATIONS REFER PHOTOGRAPHS OF EXISTING CONDITIONS AND RENDERING OF PROPOSED RENOVATIONS TO LECTURE HALLS
4	ATRIUM	FLOORS: TERRAZZO CEILING: LINEAR WOOD CEILING AND 100mm ACOUSTIC INSULATION	REFER OUTLINE SPECIFICATIONS
5	**N/A**	**N/A**	**N/A**
6	WASHROOMS	FLOORS: CERAMIC TILES CEILING: PAINTED GWB	REFER OUTLINE SPECIFICATIONS
7	SERVICES AREAS	**EXPOSED CONCRETE**	
8	CATWALK	51 mm DEEP GALVANIZED MAINTENANCE CATWALK	REFER OUTLINE SPECIFICATIONS
9	ATRIUM MEETING ROOMS	FLOORS: "MARMOLEUM" CEILING: WOOD SLATS WITH ACOUSTIC INSULATION	REFER OUTLINE SPECIFICATIONS

WALL ASSEMBLIES

SYMBOL	ASSEMBLY	NOTES
A	16 mm GWB 92 mm STEEL STUDS 75 mm ACOUSTIC INSULATION 16 mm GWB	TYPICAL FULL HEIGHT OFFICE WALLS TO PROVIDE ACOUSTIC SEPARATION
B	FRITTED GLASS PARTITIONS IN WOOD FRAME TO 2200 AFF FLOOR WITH TYPICAL WALL TYPE 1 ABOVE	TYPICAL CORRIDOR PARTITION TO ALLOW LIGHT INTO ADJACENT OPEN WORK STATION AREAS, REFER OUTLINE SPECIFICATIONS FOR TYPICAL DETAILS
C	GLAZED HANDRAIL	SEE TYPICAL DETAILS IN OUTLINE SPECIFICATION
D	REPOINT EXISTING BRICK WALLS AND INFILL EXISTING OPENING WITH PAINTED WOOD TRIM TO MATCH EXITING WINDOW CONFIGURATION (NO GLASS)	TYPICAL INTERIOR EXISTING BRICK WALLS
E	16 mm GWB STEELSTUD FRAMING SPRAY FINE PROOFED STEEL STRUCTURE 16 mm GWB	THE ATRIUM WALL IS TO PROVIDE A SCREEN BETWEEN THE NEW ATRIUM AND THE EXISTING BRICK WALL, AND PROVIDE ACOUSTIC ATTENUATION
F	DEMOLITION OF PREVIOUS RENOVATIONS TO REVEAL EXISTING HISTORICAL ELEMENTS	REFER OUTLINE SPECIFICATION, ANNOTATED DRAWINGS AND PHOTOGRAPHS
G	LINEAR WOOD AND ACOUSTIC INSULATION	REFER OUTLINE SPECIFICATION
H	EXTERIOR CURTAIN WALL	REFER OUTLINE SPECIFICATION
I	CERAMIC TILE TILE BACKER BOARD 150 mm STEEL STUDS	FOR RETROFIT AND REPLUMBING OF EXISTING WASHROOMS
J	GREEN WALL	REFER OUTLINE SPECIFICATION
K	12 mm CLEAR TEMP/LAM GLASS WITH TOP AND BOTTOM ALUMINIUM CHANELS	REFER OUTLINE SPECIFICATION
L	MOTORIZED BLACKOUT FINS WITH ACOUSTIC WOOD PANELS	REFER OUTLINE SPECIFICATION

Level 4 Finishes



3

AREA TYPES

SYMBOL		MATERIAL TYPES	NOTES
1	OFFICE AREAS	FLOORS: CARPET TILE CEILING: 610x1220 ACOUSTIC CEILING TILES	REFER OUTLINE SPECIFICATIONS
2	CORRIDORS	FLOORS: "MARMOLEUM" SHEET GOODS WITH WELDED SEAMS CEILING: A COMBINATION OF 30% GWB AND 70% WOOD CEILING (REFER DETAIL AD-450)	REFER OUTLINE SPECIFICATIONS
3	HISTORICAL RETROFIT	FLOORS: RENOVATE / REPLACE TO MATCH ORIGINAL FLOOR TREATMENT CEILING: RENOVATE/ REPLACE TO MATCH ORIGINAL CEILING TREATMENT	REFER OUTLINE SPECIFICATIONS REFER PHOTOGRAPHS OF EXISTING CONDITIONS AND RENDERING OF PROPOSED RENOVATIONS TO LECTURE HALLS
4	ATRIUM	FLOORS: TERRAZZO CEILING: LINEAR WOOD CEILING AND 100mm ACOUSTIC INSULATION	REFER OUTLINE SPECIFICATIONS
5	N/A	N/A	N/A
6	WASHROOMS	FLOORS: CERAMIC TILES CEILING: PAINTED GWB	REFER OUTLINE SPECIFICATIONS
7	SERVICES AREAS	EXPOSED CONCRETE	
8	CATWALK	51 mm DEEP GALVANIZED MAINTENANCE CATWALK	REFER OUTLINE SPECIFICATIONS
9	ATRIUM MEETING ROOMS	FLOORS: "MARMOLEUM" CEILING: WOOD SLATS WITH ACOUSTIC INSULATION	REFER OUTLINE SPECIFICATIONS

WALL ASSEMBLIES

SYMBOL	ASSEMBLY	NOTES
A	16 mm GWB 92 mm STEEL STUDS 75 mm ACOUSTIC INSULATION 16 mm GWB	TYPICAL FULL HEIGHT OFFICE WALLS TO PROVIDE ACOUSTIC SEPARATION
B	FRITTED GLASS PARTITIONS IN WOOD FRAME TO 2200 AFF FLOOR WITH TYPICAL WALL TYPE 1 ABOVE	TYPICAL CORRIDOR PARTITION TO ALLOW LIGHT INTO ADJACENT OPEN WORK STATION AREAS, REFER OUTLINE SPECIFICATIONS FOR TYPICAL DETAILS
C	GLAZED HANDRAIL	SEE TYPICAL DETAILS IN OUTLINE SPECIFICATION
D	REPOINT EXISTING BRICK WALLS AND INFILL EXISTING OPENING WITH PAINTED WOOD TRIM TO MATCH EXITING WINDOW CONFIGURATION (NO GLASS)	TYPICAL INTERIOR EXISTING BRICK WALLS
E	16 mm GWB STEELSTUD FRAMING SPRAY FINE PROOFED STEEL STRUCTURE 16 mm GWB	THE ATRIUM WALL IS TO PROVIDE A SCREEN BETWEEN THE NEW ATRIUM AND THE EXISTING BRICK WALL, AND PROVIDE ACOUSTIC ATTENUATION
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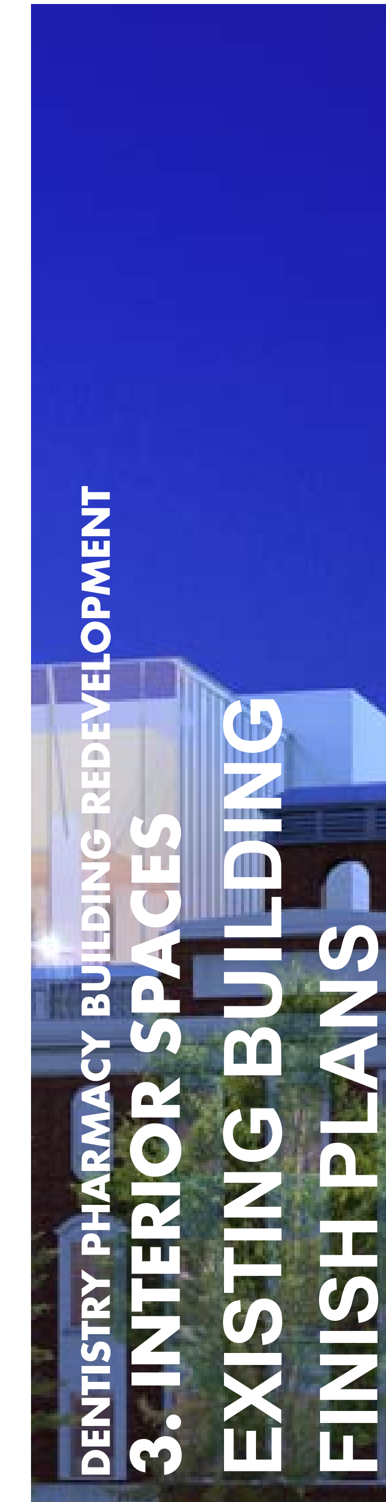
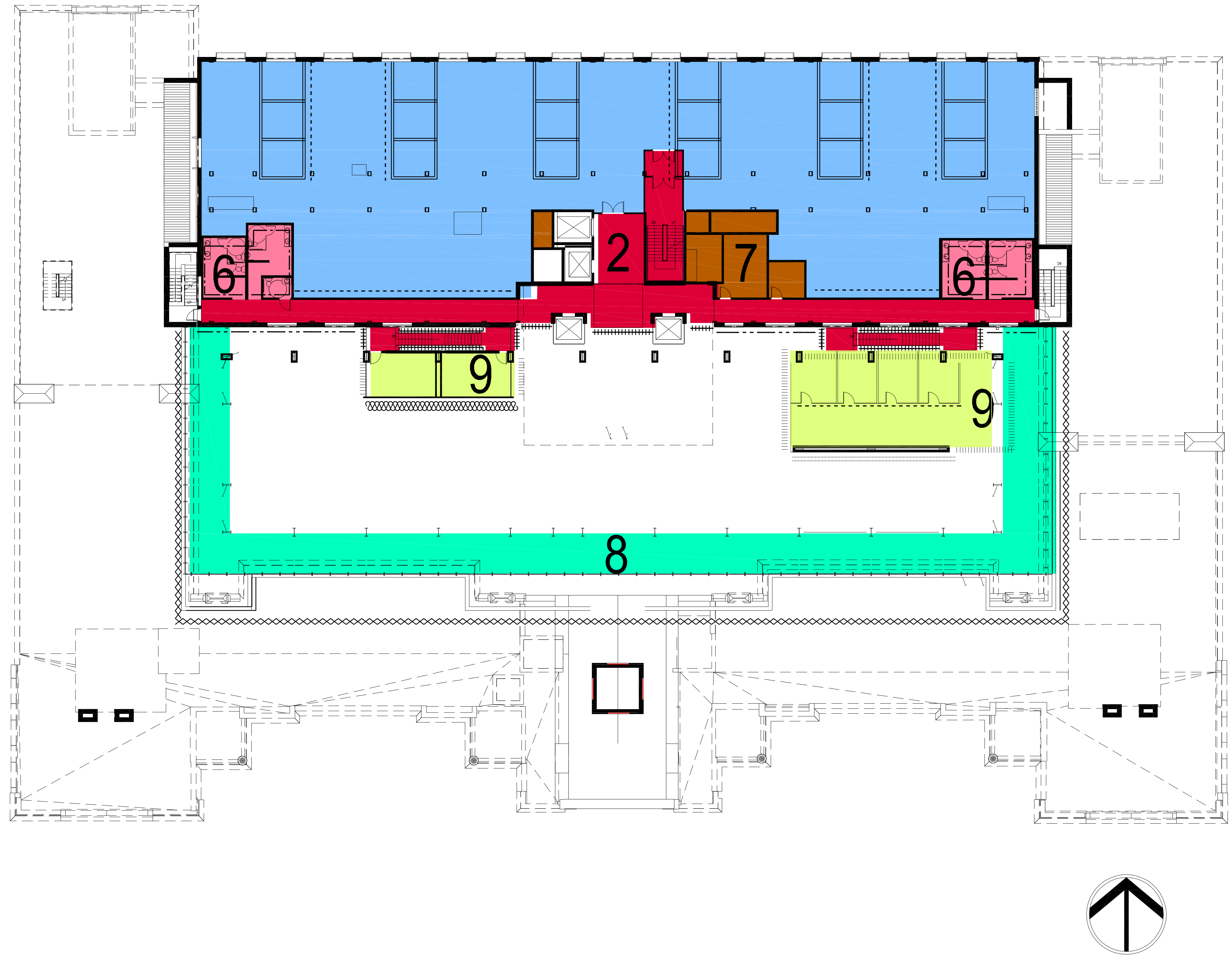
G	LINEAR WOOD AND ACOUSTIC INSULATION	REFER OUTLINE SPECIFICATION
H	EXTERIOR CURTAIN WALL	REFER OUTLINE SPECIFICATION
I	CERAMIC TILE TILE BACKER BOARD 150 mm STEEL STUDS	FOR RETROFIT AND REPLUMBING OF EXISTING WASHROOMS
J	GREEN WALL	REFER OUTLINE SPECIFICATION
K	12 mm CLEAR TEMP/LAM GLASS WITH TOP AND BOTTOM ALUMINIUM CHANELS	REFER OUTLINE SPECIFICATION
L	MOTORIZED BLACKOUT FINS WITH ACOUSTIC WOOD PANELS	REFER OUTLINE SPECIFICATION

Stantec Architecture Ltd.

UNIVERSITY OF ALBERTA



Level 5 Finishes



3

AREA TYPES

SYMBOL		MATERIAL TYPES	NOTES
1	OFFICE AREAS	FLOORS: CARPET TILE CEILING: 610x1220 ACOUSTIC CEILING TILES	REFER OUTLINE SPECIFICATIONS
2	CORRIDORS	FLOORS: "MARMOLEUM" SHEET GOODS WITH WELDED SEAMS CEILING: A COMBINATION OF 30% GWB AND 70% WOOD CEILING (REFER DETAIL AD-450)	REFER OUTLINE SPECIFICATIONS
3	HISTORICAL RETROFIT	FLOORS: RENOVATE / REPLACE TO MATCH ORIGINAL FLOOR TREATMENT CEILING: RENOVATE/ REPLACE TO MATCH ORIGINAL CEILING TREATMENT	REFER OUTLINE SPECIFICATIONS REFER PHOTOGRAPHS OF EXISTING CONDITIONS AND RENDERING OF PROPOSED RENOVATIONS TO LECTURE HALLS
4	ATRIUM	FLOORS: TERRAZZO CEILING: LINEAR WOOD CEILING AND 100mm ACOUSTIC INSULATION	REFER OUTLINE SPECIFICATIONS
5	N/A	N/A	N/A
6	WASHROOMS	FLOORS: CERAMIC TILES CEILING: PAINTED GWB	REFER OUTLINE SPECIFICATIONS
7	SERVICES AREAS	**EXPOSED CONCRETE**	
8	CATWALK	51 mm DEEP GALVANIZED MAINTENANCE CATWALK	REFER OUTLINE SPECIFICATIONS
9	ATRIUM MEETING ROOMS	FLOORS: "MARMOLEUM" CEILING: WOOD SLATS WITH ACOUSTIC INSULATION	REFER OUTLINE SPECIFICATIONS

WALL ASSEMBLIES

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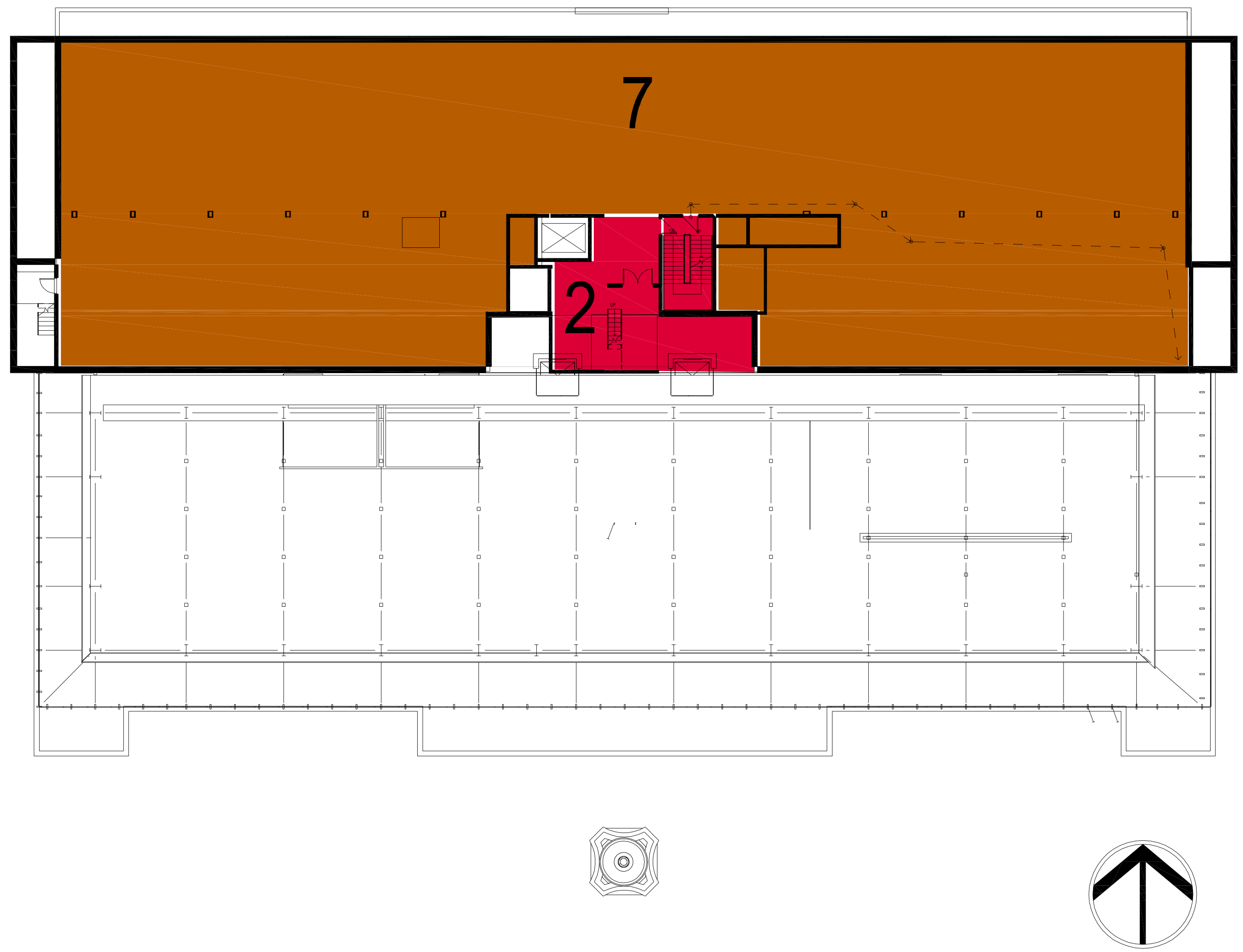
L	MOTORIZED BLACKOUT FINS WITH ACOUSTIC WOOD PANELS	REFER OUTLINE SPECIFICATION

Level 6 Finishes



3

AREA TYPES

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4	ATRIUM	FLOORS: TERRAZZO CEILING: LINEAR WOOD CEILING AND 100mm ACOUSTIC INSULATION	REFER OUTLINE SPECIFICATIONS
5	N/A	N/A	N/A
6	WASHROOMS	FLOORS: CERAMIC TILES CEILING: PAINTED GWB	REFER OUTLINE SPECIFICATIONS
7	SERVICES AREAS	**WATERPROOF COATING ON CONCRETE**	
8	CATWALK	51 mm DEEP GALVANIZED MAINTENANCE CATWALK	REFER OUTLINE SPECIFICATIONS
9	ATRIUM MEETING ROOMS	FLOORS: "MARMOLEUM" CEILING: WOOD SLATS WITH ACOUSTIC INSULATION	REFER OUTLINE SPECIFICATIONS

WALL ASSEMBLIES

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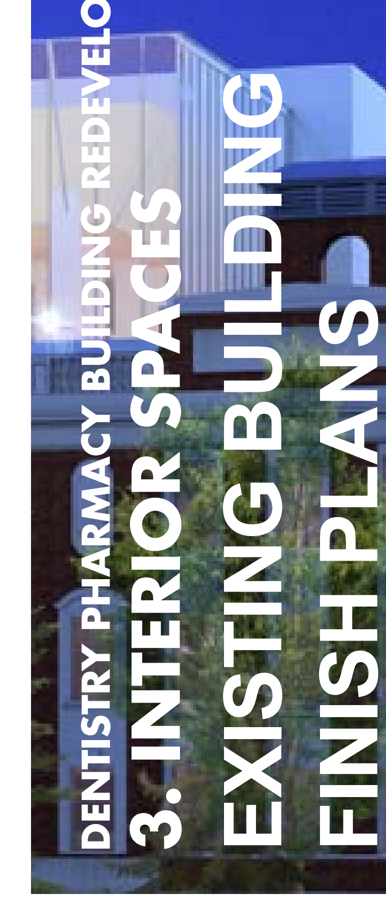
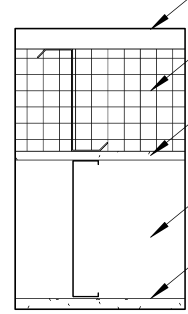
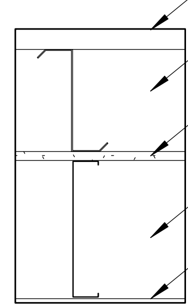
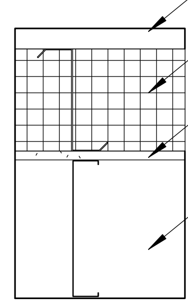
K	12 mm CLEAR TEMP/LAM GLASS WITH TOP AND BOTTOM ALUMINIUM CHANELS	REFER OUTLINE SPECIFICATION
L	MOTORIZED BLACKOUT FINS WITH ACOUSTIC WOOD PANELS	REFER OUTLINE SPECIFICATION

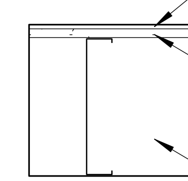
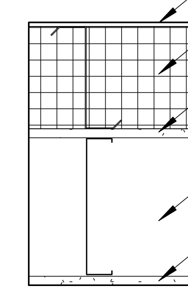


Penthouse Finishes

EXTERIOR WALL ASSEMBLIES

WALL TYPE	CONSTRUCTION DETAIL & DESCRIPTION
W1	ALUCOBOND @ STAIR EXTERIOR SIDE  INTERIOR SIDE PREFINISHED ALUMINUM ALUCOBOND PANEL 150mm Z-GIRTS C/W SEMI RIGID ROXUL INSULATION (R22) 13mm EXTERIOR GRADE GYPSUM BOARD 203mm STEEL STUDS @ 600mm o.c. 16mm GYPSUM BOARD FINISH
W2	ALUCOBOND "COLD WALL"  PREFINISHED ALUMINUM ALUCOBOND PANEL 150mm Z-GIRTS 13mm EXTERIOR GRADE GYPSUM BOARD 203mm STEEL STUDS @ 600mm o.c. PREFINISHED METAL CLADDING
W3	ALUCOBOND @ MECH. PENTHOUSE  PREFINISHED ALUMINUM ALUCOBOND PANEL 150mm Z-GIRTS C/W SEMI RIGID ROXUL INSULATION (R22) 13mm EXTERIOR GRADE GYPSUM BOARD 203mm STEEL STUDS @ 600mm o.c.

EXTERIOR WALL ASSEMBLIES

WALL TYPE	CONSTRUCTION DETAIL & DESCRIPTION
W4	METAL CLADDING @ MECH. PENTHOUSE  PREFINISHED METAL CLADDING 13mm EXTERIOR GRADE GYPSUM BOARD 203mm STEEL STUDS @ 600mm o.c.
W5	METAL CLADDING @ STAIR  PREFINISHED METAL CLADDING 150mm Z-GIRTS C/W SEMI RIGID ROXUL INSULATION (R22) 13mm EXTERIOR GRADE GYPSUM BOARD 203mm STEEL STUDS @ 600mm o.c. 16mm GYPSUM BOARD FINISH

4.110 Construction Assemblies - Exterior Walls

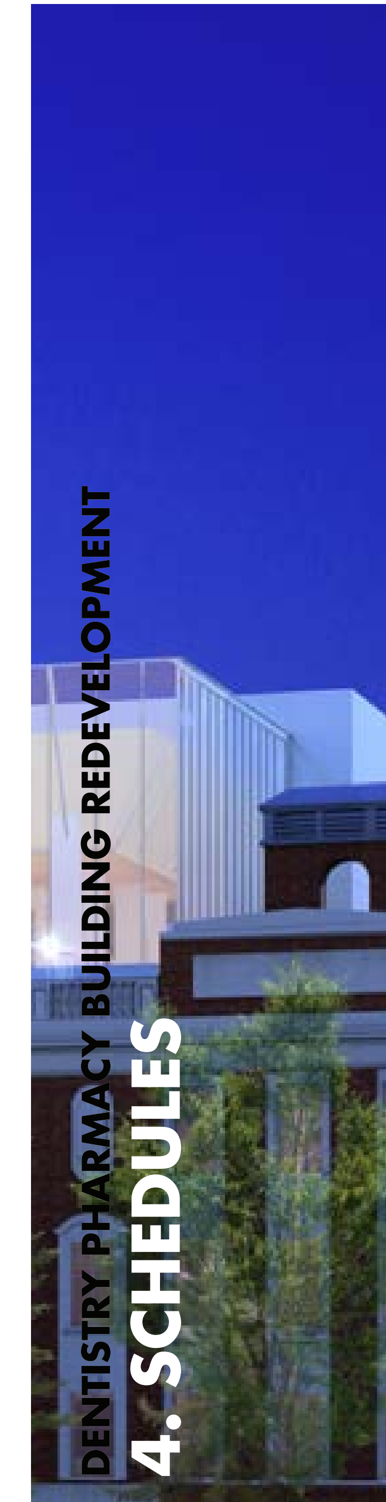
ROOF ASSEMBLY

RT1 — R40 SBS ROOF:
CAP SHEET
BASE SHEET
13mm RECOVERY BOARD
200mm POLY ISO INSULATION
VAPOR DIFFUSION RETARDER
(LAPPED UP @ WALLS, PARAPETS,
TO ENCAPSULATE INSULATION)
13mm GYPSUM SHEATHING
38mm STEEL DECK
SLOPED STEEL BEAM FRAMING TO DRAIN (1%TYP.)

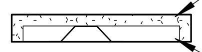
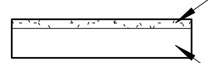
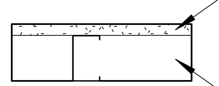
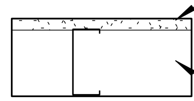
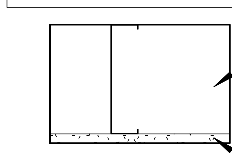
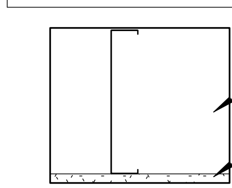
RT2 — STANDING SEAM METAL ROOF:
PREFINISHED STANDING SEAM METAL ROOFING SYSTEM
W/ VAPRO SHIELD
ON EXISTING SUBSTRATE (AND NEW STRUCTURE)

RT3 — R40 SBS ROOF ON EXISTING SUBSTRATE:
CAP SHEET
BASE SHEET
13mm RECOVERY BOARD
200mm POLY ISO INSULATION
VAPOR DIFFUSION RETARDER
(LAPPED UP @ WALLS, PARAPETS,
TO ENCAPSULATE INSULATION)

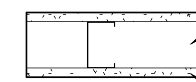
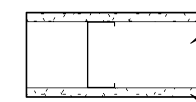
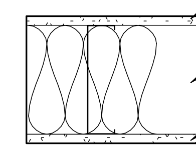
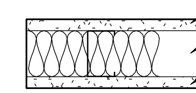
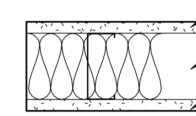
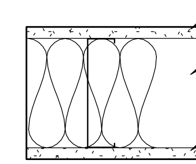
RT4 — R40 SBS ROOF:
CAP SHEET
BASE SHEET
13mm RECOVERY BOARD
200mm POLY ISO INSULATION
VAPOR DIFFUSION RETARDER
(LAPPED UP @ WALLS, PARAPETS,
TO ENCAPSULATE INSULATION)
13mm GYPSUM SHEATHING
38mm STEEL DECK
STEEL STUD FRAMING
ON EXISTING CONCRETE SLAB



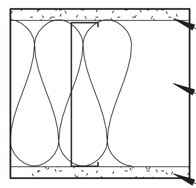
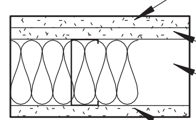
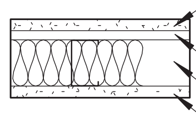
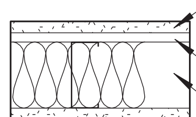
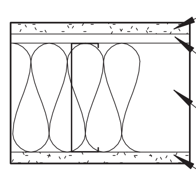
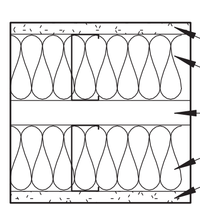
INTERIOR WALL ASSEMBLIES

TAG	CONSTRUCTION DETAIL & DESCRIPTION	STC	RATING	TEST No.
P1a	 16 PGB 22 FURRING EXISTING SUBSTRATE SIDE			
P1b	 16 PGB 41 FURRING EXISTING SUBSTRATE SIDE			
P1c	 16 PGB 64 STEEL STUDS EXISTING SUBSTRATE SIDE			
P1d	 16 PGB 92 STEEL STUDS EXISTING SUBSTRATE SIDE			
P1e	EXISTING SUBSTRATE SIDE  152 STEEL STUDS 12.7 PGB			
P1f	EXISTING SUBSTRATE SIDE  203 STEEL STUDS 12.7 PGB			

INTERIOR WALL ASSEMBLIES

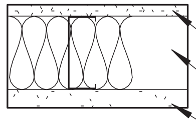
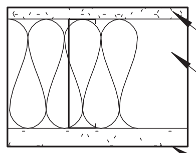
TAG	CONSTRUCTION DETAIL & DESCRIPTION	STC	RATING	TEST No.
P2a	EXISTING SUBSTRATE SIDE  64 STEEL STUDS 12.7 PGB			
P2b	 92 STEEL STUDS 12.7 PGB			
P2c	 12.7 PGB 152 STEEL STUDS 12.7 PGB			
P3a	 16 PGB 64 STEEL STUDS 16 PGB			
P3b	 16 PGB 92 STEEL STUDS 16 PGB			
P3c	 16 PGB 152 STEEL STUDS 16 PGB			

INTERIOR WALL ASSEMBLIES

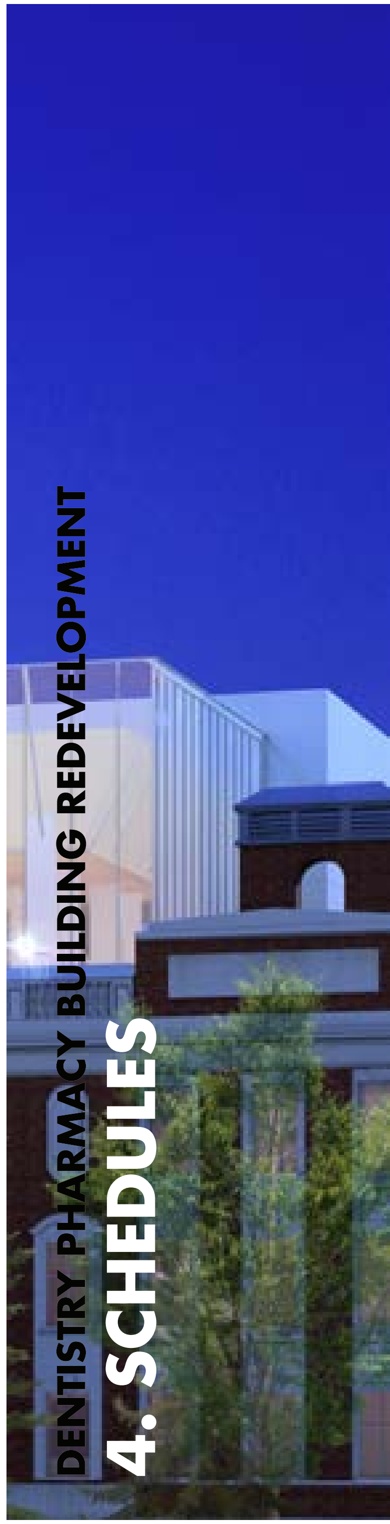
TAG	CONSTRUCTION DETAIL & DESCRIPTION	STC	RATING	TEST No.
P3d	 16 PGB 203 STEEL STUDS 16 PGB			
P4a	CORRIDOR SIDE  PROGRAMMABLE SIDE 16 PGB 16 PGB 92 STEEL STUDS 16 PGB			
P5a	 16 PGB 12.7 RESILIENT CHANNELS 64 STEEL STUDS 16 PGB			
P5b	 16 PGB 12.7 RESILIENT CHANNELS 92 STEEL STUDS 16 PGB			
P5c	 12.7 PGB 12.7 RESILIENT CHANNELS 152 STEEL STUDS 12.7 PGB			
P6a	 16 PGB 92 STEEL STUDS 34 AIR SPACE 92 STEEL STUDS 16 PGB			

** NOTE: SUFFIX "X" ON FLOOR PLAN PARTITION TYPES DENOTES 1HR. FIRE RATING **

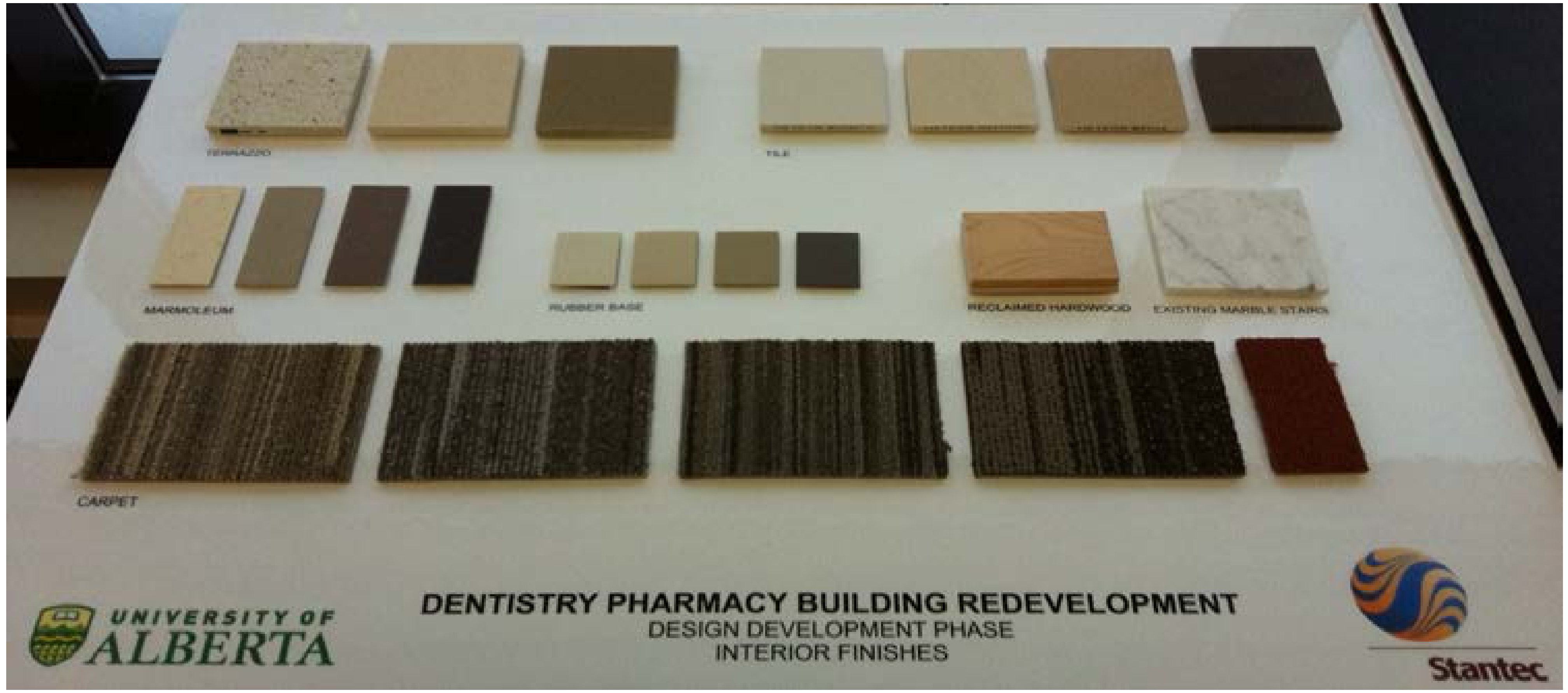
INTERIOR WALL ASSEMBLIES

TAG	CONSTRUCTION DETAIL & DESCRIPTION	STC	RATING	TEST No.
P7a	ROOM SIDE  SHAFT SIDE 15.9 PGB TYPE 'X' 102 STEEL C-H STUDS 25.4 GYPSUM LINER PANEL			
P7b	ROOM SIDE  SHAFT SIDE 15.9 PGB TYPE 'X' 152 STEEL C-H STUDS 25.4 GYPSUM LINER PANEL			

** NOTE: SUFFIX "X" ON FLOOR PLAN PARTITION TYPES DENOTES 1HR. FIRE RATING **

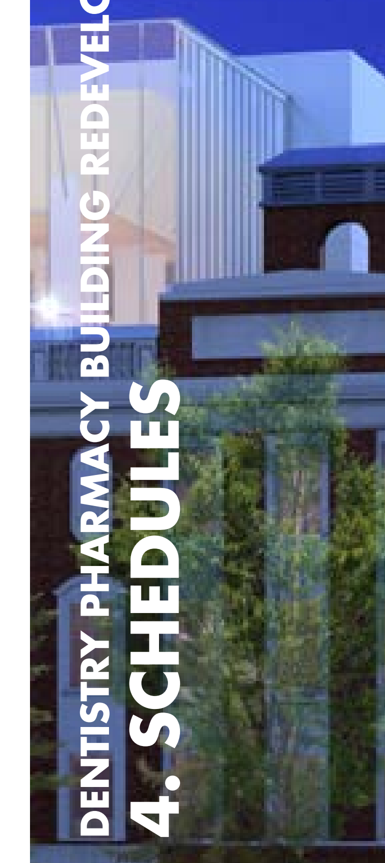


Construction Assemblies - Partitions

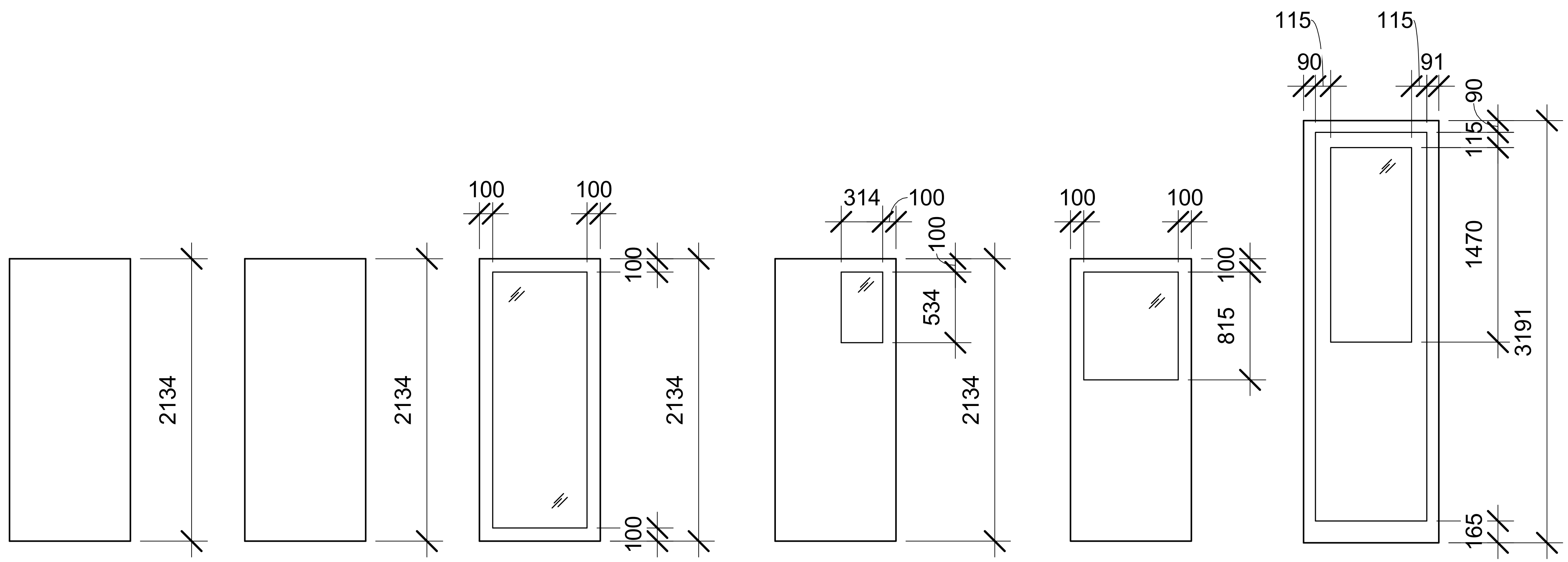


4.210 Colourboards

Room Finish Schedule						
AREA TYPES	**ROOM NAME**	**FLOOR FINISHES**	**BASE FINISHES**	**WALL FINISHES**	**CEILING FINISHES**	**REMARKS**
Basement						
TYPICAL WASHROOMS		PORCELAIN TILE	PORCELAIN TILE	CERAMIC TILE/GLASS	PAINTED DRYWALL/ WOOD SLATES	
CORRIDORS						
	TYPICAL COORIDOR	MARMOLEUM	WOOD/RUBBER BASE	PAINTED DRYWALL/	PAINTED DRYWALL/WOOD	
	HISTORICAL COORIDOR		WOOD	PAINTED DRYWALL/	PAINTED DRYWALL/WOOD	
STAIRS						
	1922	EXISTING		PAINTED DRYWALL		- EXISTING TREAD TO BE REPLACED WITH SLATE
	1946/1947	EXISTING				
	1958	EXISTING				
SPECIAL SPACES						
	LEVEL 2 GRAVITAS PLAZA	PORCELAIN TILE				
	LEVEL 2 SHARED SPACES	CARPET TILE/PORCELAIN TILE	PORCELAIN TILE/RUBBER BASE	PAINTED DRYWALL	ACOUSTICAL CEILING TILE/	
	THEATRES					
	LEVEL 2 LOBBY				WOOD SLATES	
	LEVEL 1 LOWER LOBBY					
	WINTER GARDEN					
ELEVATOR LOBBIES		PORCELAIN TILE	PORCELAIN TILE/RUBBER BASE	PAINTED DRYWALL	ACOUSTICAL CEILING TILE/	



Room Finish Schedule



TYPE 1
FLUSH DOOR
NON-LABEL
HM DOOR W/ PSF

TYPE 1B
FLUSH DOOR
ULC-LABEL
HM DOOR W/ PSF

TYPE 2
FULL LITE GLAZING
ALUMINUM DOOR
W/ ALUMINUM FRAME

TYPE 3
FLUSH DOOR
W/ GLZ
NON-LABEL
HM DOOR W/
PSF

TYPE 4
FLUSH
DOOR W/
HALF-
GLAZED
LITE
HM DOOR
W/ PSF

TYPE 5
EXISTING WD
DOOR W/ HALF
LITE TO BE
REFURBISHED

4.310 Door Type Elevations

DENT/PHARM DOOR SCHEDULE- LEVEL 1																			
LEVEL	NUMBER	FROM: ROOM NAME	TO: ROOM NAME	DOOR TYPE	WIDTH	HEIGHT	THICK	MATERIAL	FINISH	COLOUR	GLAZING	FRAME PROFILE	FRAME MATERIAL	FRAME FINISH	LABEL-ULC RATING	HARDWARE GROUP	SECURITY	KEYNOTE	REV
Level 1																			
Level 1	D101	VESTIBULE		2	1828	2134	50												
Level 1	D101A	VESTIBULE	CORR	2	1733	2134													
Level 1	D102.1	CORR	PROGRAMMABLE	1	914	2134	50												
Level 1	D102.2	CORR	PROGRAMMABLE	1	914	2134	50												
Level 1	D103	CORR	SLOWPOKE OFFICES	1	914	2134	50												
Level 1	D104.1	VESTIBULE	CORR	2	1733	2134													
Level 1	D104.2	VESTIBULE	STAIR #1	1B	1828	2134	50								1hr				
Level 1	D105.1	VESTIBULE		2	1828	2134	50												
Level 1	D105.2	STAIR #1	VESTIBULE	1B	1828	2134	50								1hr				
Level 1	D106.2	VESTIBULE	STAIR #1	1	914	2134	50												
Level 1	D107.1	VESTIBULE	STAIR #1	1B	1828	2134	50								1hr				
Level 1	D107.2	CORR.	VESTIBULE	1	1828	2134	50												
Level 1	D108.3	CORR.	PROGRAMMABLE	1	914	2134	50												
Level 1	D109.1	ELECTRICAL RM	CORR	1B	914	2134	50								1hr				
Level 1	D110	COMM	CORR	1B	914	2134	50								1hr				
Level 1	D111	CORR	UTR	1	914	2134	50												
Level 1	D112	STAIR #8		3	1828	2134	50												
Level 1	D114	LOADING DOCK	PROGRAMMABLE	1	914	2134	50												
Level 1	D115.2E	STAIR #7		Existing	1473	2134	50												
Level 1	D116	CORR.	LOADING DOCK	3	1828	2134	50												
Level 1	D117.3	CORR.	VESTIBULE	2	1828	2134	50												
Level 1	D117.4	CORR.	VESTIBULE	1	914	2134	50												
Level 1	D118	CORR	CORR.	1	1828	2134	50												
Level 1	D120	CORR	CUSTODIAL	1	914	2134	50												
Level 1	D120.2	VESTIBULE		2	1828	2134	50												
Level 1	D120.3	CORR	VESTIBULE	1	914	2134	50												
Level 1	D121.1	VESTIBULE	EXIT CORRIDOR	1	914	2134	50												
Level 1	D121.2	EXIT CORRIDOR		3	1828	2134	50												
Level 1	D122	ELEVATOR LOBBY	COMM	1B	914	2134	50								1hr				
Level 1	D123	ELEVATOR LOBBY	ELECTRICAL ROOM	1B	914	2134	50								1hr				
Level 1	D124.1	VESTIBULE		1	914	2134	50												
Level 1	D124.2	VESTIBULE		2	1828	2134	50												
Level 1	D124.3	CORR.	VESTIBULE	2	1828	2134	50												
Level 1	D124.4	CORR.	VESTIBULE	1	914	2134	50												
Level 1	D125	PROGRAMMABLE	PROGRAMMABLE	1	914	2134	50												
Level 1	D126.3E	STAIR #5		Existing	1473	2134	50												
Level 1	D127	UTR	CORR.	1	914	2134	50												
Level 1	D128	CORR.	COMM	1B	914	2134	50								1hr				
Level 1	D129	CORR.	ELECTRICAL RM	1B	914	2134	50								1hr				
Level 1	D131.2	CORR.	STAIR #4	1	914	2134	50												
Level 1	D132.1	PROGRAMMABLE		4	1829	2743							Door - Panel - Wood						
Level 1	D132.2	PROGRAMMABLE		4	1829	2743							Door - Panel - Wood						
Level 1	D133.1	VESTIBULE	CORR.	1	914	2134	50												
Level 1	D133.2	PROGRAMMABLE	VESTIBULE	1	914	2134	50												
Level 1	D133.3	STAIR #4	VESTIBULE	1B	914	2134	50								1hr				
Level 1	D134.1		STAIR #4	1B	1828	2134	50								1hr				
Level 1	D134.2	VESTIBULE		2	1828	2134	50												
Level 1	D135	STAIR #4	VESTIBULE	1B	1828	2134	50								1hr				
Level 1	D138.2	CORR.	PROGRAMMABLE	1	914	2134	50												
Level 1	D139.2	VESTIBULE		2	1828	2134	50												
Level 1	D141T	CORR.	PROGRAMMABLE	1	914	2134	50												
Level 1	D150L		CORR.	19	1830	2134	51												

Door Schedule Level 1

DENT/PHARM DOOR SCHEDULE- LEVEL 2																			
LEVEL	NUMBER	FROM: ROOM NAME	TO: ROOM NAME	DOOR TYPE	WIDTH	HEIGHT	THICK	MATERIAL	FINISH	COLOUR	GLAZING	FRAME PROFILE	FRAME MATERIAL	FRAME FINISH	LABEL-ULC RATING	HARDWARE GROUP	SECURITY	KEYNOTE	REV
Level 2																			
Level 2	D200.1A			1	914	2134	50												
Level 2	D200.2A			1	914	2134	50												
Level 2	D200.3A			2	1772	2413													
Level 2	D200.4A			1	900	2400													
Level 2	D200A			1	914	2134	50												
Level 2	D201.2			Existing															
Level 2	D201.3			Existing															
Level 2	D201.4	CORR.	COMMUNICATIONS	1B	914	2134	50								1hr				
Level 2	D201E	ENTRANCE LOBBY		5	2135	2743							Door - Frame						
Level 2	D202.1E	COUNCIL CHAMBERS	CORR	Existing	914	2134	50												
Level 2	D203.1	VESTIBULE	CORR.	2	1733	2134													
Level 2	D203.2	VESTIBULE	STAIR #1	1B	914	2134	50								1hr				
Level 2	D204.1	CORR.		1	914	2134	50												
Level 2	D204.2	PROGRAMMABLE	VESTIBULE	1	1828	2134	50												
Level 2	D204.3	VESTIBULE	STAIR #1	1B	914	2134	50								1hr				
Level 2	D205	ELECTRICAL ROOM	CORR.	1B	914	2134	50								1hr				
Level 2	D207	CORR.	PROGRAMMABLE	1	914	2134	50												
Level 2	D208	CORR.	VESTIBULE	1	1524	2134	50												
Level 2	D210	CORR.	UTR	1	914	2134	50												
Level 2	D212	CORR.	PROGRAMMABLE	1	1828	2134	50												
Level 2	D214	STAIR #6	VESTIBULE	1B	914	2134	50								1hr				
Level 2	D215	CORR.	ELECTRICAL ROOM	1B	914	2134	50								1hr				
Level 2	D216	CORR.	CUSTODIAL	1	914	2134	50												
Level 2	D217	CORR.	PROGRAMMABLE	1	914	2134	50												
Level 2	D218	CORR.	VEST.	1	1524	2134	50												
Level 2	D218.2	VEST.	VESTIBULE	6	1524	2134	50								1hr				
Level 2	D223.1	PROGRAMMABLE	VESTIBULE	1	914	2134	50												
Level 2	D223.2	VESTIBULE	CORR.	1	914	2134	50												
Level 2	D223.3	STAIR #4	VESTIBULE	1B	914	2134	50								1hr				
Level 2	D224	STAIR #4	VESTIBULE	1B	1828	2134	50								1hr				
Level 2	D225	CORR	EAST LECTURE THEATRE	Existing	914	2134	50												
Level 2	D226	EAST LECTURE THEATRE		1	1828	2134	50												
Level 2	D227	CORR.	PROGRAMMABLE	1	1828	2134	50												
Level 2	D228	CORR.	ELECTRICAL ROOM	1B	914	2134	50								1hr				
Level 2	D229	CORR.	COMMUNICATIONS	1B	914	2134	50								1hr				
Level 2	D232.5	CORR.	VESTIBULE	2	1733	2134													

4.321 Door Schedule Level 2

DENT/PHARM DOOR SCHEDULE- LEVEL 3																			
LEVEL	NUMBER	FROM: ROOM NAME	TO: ROOM NAME	DOOR TYPE	WIDTH	HEIGHT	THICK	MATERIAL	FINISH	COLOUR	GLAZING	FRAME PROFILE	FRAME MATERIAL	FRAME FINISH	LABEL-ULC RATING	HARDWARE GROUP	SECURITY	KEYNOTE	REV
Level 3																			
Level 3	D300.1A			1	914	2134	50												
Level 3	D300.2A			1	914	2134	50												
Level 3	D300.3A			1	914	2134	50												
Level 3	D300.4A			1	914	2134	50												
Level 3	D300.5A			1	900	2400													
Level 3	D301E	CORR.	READING ROOM	Existing	914	2134	50												
Level 3	D302E	CORR.		Existing	914	2134	50												
Level 3	D303.2E	COUNCIL CHAMBERS BALCONY	PROGRAMMABLE	1	914	2134	50												
Level 3	D303E	COUNCIL CHAMBERS BALCONY	CORR	Existing	914	2134	50												
Level 3	D304.2	VESTIBULE	STAIR #1	1B	1828	2134	50								1hr				
Level 3	D305E	PROGRAMMABLE	STAIR #1	Existing	914	2134	50												
Level 3	D306.1	VESTIBULE	STAIR #1	1B	914	2134	50								1hr				
Level 3	D306.2	PROGRAMMABLE	VESTIBULE	1	914	2134	50												
Level 3	D307E	VESTIBULE	PROGRAMMABLE	Existing	914	2134	50												
Level 3	D308	CORR.		1	914	2134	50												
Level 3	D312	CORR.	VEST.	1	914	2134	50												
Level 3	D312.2	VEST.	EXIT CORR.	1B	914	2134	50								1hr				
Level 3	D312.3	EXIT CORR.	STAIR #7	1B	914	2134	50								1hr				
Level 3	D316	CORR.	PROGRAMMABLE	1	1828	2134	50												
Level 3	D318	VESTIBULE	STAIR #6	1B	1828	2134	50								1hr				
Level 3	D318.2	PROGRAMMABLE	VESTIBULE	1	914	2134	50												
Level 3	D318.3	CORR.	VESTIBULE	1	914	2134	50												
Level 3	D319E	PROGRAMMABLE	EXIT CORR.	Existing	914	2134	50												
Level 3	D320	CORR.	VEST.	1	914	2134	50												
Level 3	D320.1	VEST.	EXIT CORR.	1	914	2134	50												
Level 3	D320.3	EXIT CORR.	STAIR #5	1B	914	2134	50								1hr				
Level 3	D321	CORR.	PROGRAMMABLE	1	1524	2134	50												
Level 3	D323	CORR.	COMMUNICATIONS	1B	914	2134	50								1hr				
Level 3	D324	CORR.	ELECTRICAL ROOM	1B	914	2134	50								1hr				
Level 3	D325.1	VESTIBULE	CORR.	1	914	2134	50												
Level 3	D325.3	STAIR #4	VESTIBULE	1	914	2134	50												
Level 3	D326E	VESTIBULE	PROGRAMMABLE	128	1014	2134	50												
Level 3	D328	COMMUNICATIONS	CORR.	1B	914	2134	50								1hr				
Level 3	D328.1	STAIR #4	VESTIBULE	1	1828	2134	50												
Level 3	D329	ELECTRICAL ROOM	CORR.	1B	914	2134	50								1hr				
Level 3	D329.1	EAST LECTURE BALCONY	PROGRAMMABLE	1	914	2134	50												
Level 3	D329.3E	EAST LECTURE BALCONY		Existing	914	2134	50												
Level 3	D330E	CORR.	PROGRAMMABLE	Existing	914	2134	50												
Level 3	D331	CORR.	ELECTRICAL ROOM	1B	914	2134	50								1hr				
Level 3	D332	CORR.	CUSTODIAL	1B	914	2134	50								1hr				
Level 3	D332.6	PROGRAMMABLE	EAST LECTURE BALCONY	128	1014	2134	50												

Door Schedule Level 3

DENT/PHARM DOOR SCHEDULE- LEVEL 4

LEVEL	NUMBER	FROM: ROOM NAME	TO: ROOM NAME	DOOR TYPE	WIDTH	HEIGHT	THICK	MATERIAL	FINISH	COLOUR	GLAZING	FRAME PROFILE	FRAME MATERIAL	FRAME FINISH	LABEL-ULC RATING	HARDWARE GROUP	SECURITY	KEYNOTE	REV
Level 2																			
Level 2	D458F	COMMUNICATIONS	CORR.	1B	914	2134	50								1hr				
Level 4																			
Level 4	D400.1A			1	914	2134	50												
Level 4	D400.2A			1	914	2134	50												
Level 4	D400.3A			1	914	2134	50												
Level 4	D400.4A			1	914	2134	50												
Level 4	D400.5A			1	900	2400													
Level 4	D401	CORR.	PROGRAMMABLE	1	1828	2134	50												
Level 4	D402.2	VESTIBULE	STAIR #1	1B	1828	2134	50								1hr				
Level 4	D403	VESTIBULE	STAIR #1	1B	914	2134	50								1hr				
Level 4	D403.2	PROGRAMMABLE	VESTIBULE	1	914	2134	50												
Level 4	D403.3	CORR.		1	914	2134	50												
Level 4	D404	SERVICE	CORR.	1B	914	2134	50								1hr				
Level 4	D405	COMM	CORR.	1B	914	2134	50								1hr				
Level 4	D406	CORR.	PROGRAMMABLE	1	914	2134	50												
Level 4	D410	CORR.	SERVICE	1	914	2134	50												
Level 4	D413	VESTIBULE	STAIR #6	1B	1828	2134	50								1hr				
Level 4	D416	CORR.	PROGRAMMABLE	1	914	2134	50												
Level 4	D417	CORR.	VEST.	1	1524	2134	50												
Level 4	D419	CORR.	COMM	1B	914	2134	50								1hr				
Level 4	D420	CORR.	SERVICE	1B	914	2134	50								1hr				
Level 4	D422	PROGRAMMABLE	VESTIBULE	1	914	2134	50												
Level 4	D422.2	VESTIBULE	CORR.	1	914	2134	50												
Level 4	D422.3	STAIR #4	VESTIBULE	1B	914	2134	50								1hr				
Level 4	D423	STAIR #4	VESTIBULE	1B	1828	2134	50								1hr				
Level 4	D425.2E	Room	Room	Existing	914	2134	50												
Level 4	D425E	Room	CORR	Existing	914	2134	50												
Level 4	D426E	Room	SERVICE	Existing	914	2134	50												
Level 4	D427	CORR	Room	1	914	2134	50												
Level 4	D428	CORR	PROGRAMMABLE	1	914	2134	50												
Level 4	D429	PROGRAMMABLE	CORR	1	1828	2134	50												
Level 4	D430	PROGRAMMABLE	CORR.	1	1828	2134	50												
Level 4	D431	PROGRAMMABLE	CORR	3	1828	2134	50												
Level 4 Attic																			
Level 4 Attic	D450E	SERVICE	SERVICE	Existing	914	1828	50												
Level 4 Attic	D451E	SERVICE	SERVICE	Existing	914	1828	50												
Level 4 Attic	D452E		SERVICE	Existing	914	1828	50												
Level 4 Attic	D453E		SERVICE	Existing	914	1828	50												
Level 4 Attic	D454E		SERVICE	Existing	914	1828	50												
Level 4 Attic	D455E		SERVICE	Existing	914	1828	50												
Level 4 Attic	D456E		SERVICE	Existing	914	1828	50												
Level 4 Attic	D457E	SERVICE		Existing	914	1828	50												
Level 4 Attic	D458E	SERVICE	SERVICE	Existing	914	1828	50												
Level 4 Attic	D459E	SERVICE		Existing	914	1828	50												
Level 4 Attic	D460E		SERVICE	Existing	914	1828	50												
Level 4 Attic	D461E		SERVICE	Existing	914	1828	50												
Level 4 Attic	D462E	SERVICE	SERVICE	Existing	914	1828	50												

4.423 Door Schedule Level 4

DENT/PHARM DOOR SCHEDULE- LEVEL 5

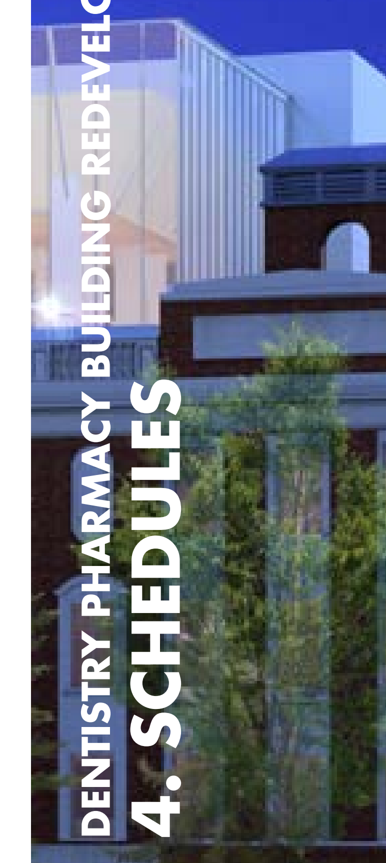
LEVEL	NUMBER	FROM: ROOM NAME	TO: ROOM NAME	DOOR TYPE	WIDTH	HEIGHT	THICK	MATERIAL	FINISH	COLOUR	GLAZING	FRAME PROFILE	FRAME MATERIAL	FRAME FINISH	LABEL-ULC RATING	HARDWARE GROUP	SECURITY	KEYNOTE	REV
Level 5																			
Level 5	D500.1A			1	914	2134	50												
Level 5	D500.2A			1	914	2134	50												
Level 5	D500.3A			2	1800	4067													
Level 5	D501	CORR.	PROGRAMMABLE	1	1828	2134	50												
Level 5	D502.2	VESTIBULE	STAIR #6	1B	1828	2134	50								1hr				
Level 5	D507.1	CORR.	VESTIBULE	1	914	2134	50												
Level 5	D507.2	VESTIBULE	EXIT CORR.	1B	914	2134	50								1hr				
Level 5	D508.1	EXIT CORR.	CORR.	1B	914	2134	50								1hr				
Level 5	D508.2E	CORR.		Existing	914	2134	50												
Level 5	D509.1	CORR.	VESTIBULE	1	914	2134	50												
Level 5	D509.2	VESTIBULE		1B	914	2134	50								1hr				
Level 5	D510	STAIR	CORR.	1B	914	2134	50								1hr				
Level 5	D510.2E		CORR.	Existing	914	2134	50												
Level 5	D511	CORR.	ELECTRICAL ROOM	1B	914	2134	50								1hr				
Level 5	D512	CORR.	COMMUNICATIONS	1B	914	2134	50								1hr				
Level 5	D513	CORR.	CUSTODIAL	1B	914	2134	50								1hr				

DENT/PHARM DOOR SCHEDULE- LEVEL 6

LEVEL	NUMBER	FROM: ROOM NAME	TO: ROOM NAME	DOOR TYPE	WIDTH	HEIGHT	THICK	MATERIAL	FINISH	COLOUR	GLAZING	FRAME PROFILE	FRAME MATERIAL	FRAME FINISH	LABEL-ULC RATING	HARDWARE GROUP	SECURITY	KEYNOTE	REV
Level 6																			
Level 6	D600.1A			1	914	2134	50												
Level 6	D600.2A			1	914	2134	50												
Level 6	D601	CORR.	PROGRAMMABLE	1	1828	2134	50												
Level 6	D602.2	VESTIBULE	STAIR #6	1B	1828	2134	50								1hr				
Level 6	D603	CORR.	ELECTRICAL ROOM	1B	914	2134	50								1hr				
Level 6	D604	CORR.	CUSTODIAL	1B	914	2134	50								1hr				
Level 6	D605	CORR.	COMMUNICATIONS RM	1B	914	2134	50								1hr				
Level 6	D607	CORR.	Room	1	914	2134	50												
Level 6	D607.2	Room	Room	1B	914	2134	50								1hr				
Level 6	D608	Room	STAIR #12	1B	914	2134	50								1hr				
Level 6	D608.1	Room	CORR.	1	914	2134	50												

DENT/PHARM DOOR SCHEDULE- LEVEL 7 MECHANICAL PENTHOUSE LEVELS

NUMBER	FROM: ROOM NAME	TO: ROOM NAME	DOOR TYPE	WIDTH	HEIGHT	THICK	MATERIAL	FINISH	COLOUR	GLAZING	FRAME PROFILE	FRAME MATERIAL	FRAME FINISH	LABEL-ULC RATING	HARDWARE GROUP	SECURITY	KEYNOTE	REV
Mechanical Penthouse																		
D701.2	CONTROL ROOM	PRESSURED VESTIBULE	1B	914	2134	50								1hr				
D701.3	STORAGE ROOM	PRESSURED VESTIBULE	1B	1828	2134	50								1hr				
D701.4	PRESSURED VESTIBULE	STAIR #6	1B	914	2134	50								1hr				
D701.5	PRESSURED VESTIBULE	MECHANICAL PENTHOUSE	1	1828	2134	50												
D703	VEST.	STAIR #11	1B	914	2134	50								1hr				
D703.2	MECHANICAL PENTHOUSE	VEST.	1	914	2134	50												
D705	STORAGE ROOM		1B	914	2134	50								1hr				
D706		MECHANICAL PENTHOUSE	1	914	2134	50												



Door Schedule Level 5 - 6 - 7

Stantec Architecture Ltd.

UNIVERSITY OF ALBERTA

DENTISTRY PHARMACY BUILDING REDEVELOPMENT

5. CODE AND SUPPORTING DRAWINGS

5

BUILDING CODE ANALYSIS - DESIGN DEVELOPMENT (13/11/05)
DENTISTRY PHARMACY BUILDING REDEVELOPMENT

A. Applicable code:

Alberta Building Code 2006

The following Code Analysis indicates how the Code will be approached with respect to the Dentistry Pharmacy Building Redevelopment. The building and its anticipated redevelopment has been reviewed as if a new building under the Code and those items in green reflect where the historic nature of the building does not align directly with the ABC 2006.

B. Volume 1

Section	Description	Reference
Part 1 - COMPLIANCE		
1.	**Application of this Code**	
1.1	Code applies to change in occupancy or alteration of any building.	1.1.1.1
1.2	Application of existing buildings applies of building legally built prior to September 2007.	1.1.1.2.1)
1.3	If a building is altered the level of life safety and building performance shall not be decreased.	1.1.1.2.2)
1.4	AHJ shall accept any construction or condition that lawfully existed if it does not constitute an unsafe condition.	1.1.1.2.3)
1.5	A change of use or alteration of a building is permitted if level of life safety or building performance is acceptable to AHJ.	1.1.1.2.4)
1.6	AHJ may accept an alternate that achieves an appropriate level of safety for the activity for which building will be used.	1.1.1.2.5)
1.7	AHJ may accept existing conditions not in complete compliance to this Code.	1.1.1.2.5)
1.8	Construction Site Safety under the AFC 5.6 needs to be addressed in the construction document stage and finalized once definite phasing is defined. A 1 hour FRR separation is needed to separate construction areas from occupied areas.	
1.9	Application of the 2006 ABC as outlined in items above (1.1 - 1.7) consider that the existing buildings were legally built and as shown in the following are considered acceptable.	

C. Volume 2

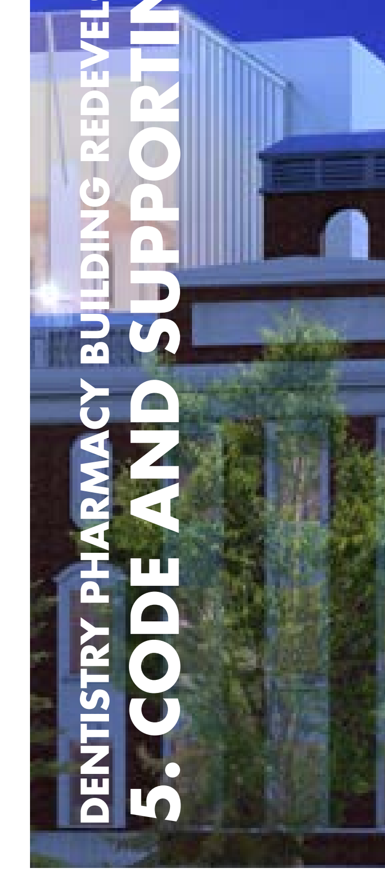
Section	Description	Reference
Part 3 - FIRE PROTECTION, OCCUPANT SAFETY AND ACCESSIBILITY		
1.	**Occupancy**	
1.1	Building is classified according to major occupancy (Table 3.1.2.1)	3.1.2.1.1)
1.2	Building used for more than one major occupancy shall be classified according to all major occupancies.	3.1.2.1.2)
1.3	Major occupancies for Dent Pharm may be: : A2 Assembly occupancies : D Business and personal services occupancies : E Mercantile : F3 Low-hazard occupancies	Table 3.1.2.1
1.4	Appendix A Major occupancy classification : A2 * lecture halls * art galleries * museums * schools and colleges : D * offices : E * retail : F3 * storage rooms	A.3.1.2.1
1.5	Major occupancies are to be separated from other major occupancies by fire separations with a fire resistance rating (Table 3.1.3.1). : A2 - D 1 hour : A2 - E 2 hour : A2 - F3 1 hour : D - E none : D - F3 none : E - F3 none	3.1.3.1
1.6	Requirements for fire spread and collapse for multiple major occupancies are based upon overall building height and building area.	3.2.2.5
1.7	Most restrictive occupancy shall apply to whole building.	3.2.2.6
1.8	If aggregate area of all major occupancies in a group or division is not more than 10% of the floor area of the storey than not considered a major occupancy under Building Size and Construction.	
2	**Non-combustible Construction** Refer to pages 5.020 to 5.035 and 5.040 to 5.047 to find the existing combustible construction and concealed spaces	
2.1	Non-combustible building to be constructed with non combustible materials.	3.1.5.1.1)
2.2	Non-combustible material permitted when tested to ULC-S135 and meets requirements.	3.1.5.1.2)
2.3	Minor combustible components are permitted.	
2.4	Combustible roofing materials are allowed on roof with an A, B, or C classification.	3.1.5.3.1)
2.5	Combustible roof sheathing and roof sheathing support are permitted if above a concrete deck at least 50mm thick, roof space not more than 1m, openings through concrete deck are protected by concrete shafts, parapet non-combustible and no building services in roof space (Pre-design Report sketches). Combustible joists, rafters, walls, and sheathing may have intumescent paint applied and a sprinkler system will be provided within attics.	 IGI email 2012/07/16
2.6	NA	
2.7	Combustible components in exterior walls are permitted if non structural (Pre-design Report sketches).	3.1.5.5
2.8	Wood nailing elements are permitted if attached directly to non combustible backing and concealed space is not large than 50mm.	3.1.5.6
2.9	Combustible millwork including shelves, millwork, handrails, doors and door frames, interior show windows, and frames are permitted.	3.1.5.7
2.10	Combustible flooring elements (Pre-design Report sketches). Plank wood floor in 1922 Building can be maintained if voids below are not accessible or open and slab below has spray fire proofing to achieve a 1 hour FRR separation.	3.1.5.8 IGI email 2012/07/16
2.11	Combustible interior finishes less than 1mm in thickness are allowed.	3.1.5.10.1)
2.12	Combustible interior wall finishes are permitted if not more than 25mm thick and flame-spread rating no more than 150.	3.1.5.10.2)
2.13	Combustible interior ceiling finishes are permitted if not more than 25mm thick and flame spreading rating not more than 25 or fire retardant treated wood. 10% of a fire compartment area ceiling can have a flame spread of not more than 150.	3.1.5.10.3)
2.14	Combustible insulation (not foamed plastic) is permitted if flame spread is less than 25.	3.1.5.12.1)
2.15	Foamed plastic is permitted if flame spread is less than 25 and is covered by a thermal barrier.	3.1.5.12.2)
2.16	Combustible insulation with flame spread no greater than 500 in a sprinklered building needs a thermal barrier as 3.1.5.12.2) in walls.	3.1.5.12.3)
2.17	Combustible insulation with flame spread no greater than 500 in a sprinklered building needs a thermal barrier as 3.1.5.12.2) in ceilings.	3.1.5.12.4)
2.18	Combustible elements in partitions are permitted (with restrictions).	3.1.5.13
2.19	Combustible ducts and associated materials will not be used.	3.1.5.15
2.20	Combustible piping materials are permitted with restrictions.	3.1.5.16
2.21	Combustible plumbing fixtures will not be used.	3.1.5.17
2.22	Wire and cable that is combustible is permitted with restrictions.	3.1.5.17
2.23	Non metallic raceways are permitted with restrictions.	3.1.5.20

Section	Description	Reference
2.24	Decorative wood cladding is permitted facing a street or access route if fire retardant treated (will not have).	3.1.5.21
3	**Fire-Resistance Ratings**	
3.1	Ratings are determined by results of tests or on basis of Appendix D. Existing wall construction meets required ratings for stairwells and shafts. Firestopping is required.	3.1.7.1
3.2	Ratings for exterior walls. See 7.3 of this analysis	3.1.7.2
3.3	Ratings of floors, roof, ceilings are for exposure from below, walls from both sides, and exterior walls from inside.	3.1.7.3
3.4	Walls, columns or arches that support a floor or roof shall have a fire resistance rating not less than required floor or roof.	3.1.7.5
3.5	Partitions or walls required to be a fire separations shall be continuous and have a fire resistance rating as defined and openings shall be protected by closures.	3.1.8.1
3.6	Combustible construction that abuts a non-combustible fire separation shall be constructed so its collapse will not cause collapse of fire separation (This is confirmed)	3.1.8.2
3.7	Fire separations must be continuous.	3.1.8.3
3.8	Fire protection rating of a closure shall be determined by tests and as per Table 3.1.8.4 3 hr. separation 2 hr. closure 1 hr. separation 45 min. closure	3.1.8.4
3.9	Maximum opening in a fire separation protected by a closure in a sprinklered building is 22m² with no dimension greater than 6m.	3.1.8.6
3.10	Fire dampers are required where a duct penetrates a fire separation.	3.1.8.7
3.11	Fire damper need not be provided if exhaust duct riser under negative pressure and air flow is upward. See also 3.6.3.4	3.1.8.8.1)
3.12	Fire dampers are not required in fire separations not required to have a fire resistance rating.	3.1.8.8.2).3)
3.13	Non combustible ducts with melting points above 760°C and exhaust directly to exterior at top of service space do not need dampers.	3.1.8.8.4)
3.14	Non-combustible duct will be used with melting point above 760°C penetrating a fire separation between suites can be without damper if duct extends 1m each face of separation.	3.1.8.8.5)
3.15	Kitchen exhaust duct does not need a damper where it passes through a fire separation.	3.1.8.8.6)
3.16	20 min. closures are allowed if rating of separation is 1hr. or less for a public corridor and suite or a corridor and adjacent classrooms, offices, or libraries in a A2 occupancy.	3.1.8.10
3.17	Self-closing device required in all doors in a fire separation.	3.1.8.11
3.18	Hold open devices are allowed on doors in fire separations except exit doors provided device is designed to release. Exit and vestibule doors can be on magnetic hold open (connected to FA) If forming part of corridor path.	3.1.8.12 IGI email 2012/07/16
3.19	Glass block or wired glass can be used for fire separation of not more than 1hr.	3.1.8.14
3.20	Temperature rise limit for doors to meet Table 3.1.8.15	
4	**Building Services in Fire Separations and Fire-Rated Assemblies**	
4.1	Fire stopping is required for mechanical and electrical services.	3.1.9.1
4.2	Services penetrations in a fire resistance rating shall be non-combustible.	3.1.9.2
4.3	Electrical penetrations need to meet this article.	3.1.9.3
4.4	Combustible piping meeting FS & SD values is permitted to penetrate fire separations in sprinklered building.	3.1.9.4
4.5	Membrane ceiling openings to ducts in ceiling space are limited.	3.1.9.5
4.6	A ceiling assembly used as a plenum shall conform to 3.6.4.3 (Max FS of 25 SD of 50).	3.1.9.6
4.7	Replacement of SAB Link as a walkway (with washrooms) does not require a fire wall to be constructed.	3.1.10
4.8	Concealed spaces in interior walls, ceiling, or crawl spaces shall be separated from concealed spaces in exterior walls and attics or roof spaces (Pre-design Report sketches).	3.1.11
4.9	Flame spread rating and smoke developed classification to be determined from testing.	3.1.12.1)
4.10	Interior finishes shall conform to Section 2.3 of Division 3, AFC.	3.1.13.1
4.11	Flame spread rating for walls and ceilings shall not be more than 150. Exits FS maximum 25. Lobbies (as exits) FS maximum 25. Vertical services spaces FS maximum 25.	3.1.13.2
4.12	Light diffusers and lenses can have FS up to 250 and smoke developed classification no more than 600.	3.1.13.4
4.13	Maximum FS of 50 for walls for public corridors, corridor used by public assembly occupancy, or a corridor serving classrooms if sprinklered.	3.1.13.6
4.14	NA	
4.15	NA	
4.16	Fire retardant treated wood roof systems from 3.2.2 to meet requirements. Sprinkler protection under 3.2.5.13.6	3.1.14.1
5	**Occupant Load**	
5.1	Occupant load of a floor area on number of fixed seats in an assembly occupancy or using Table 3.1.17.1. Refer to page 5.010 * Space with non fixed seats (assembly) 0.75m²/person * Space with non fixed seats and tables(assembly) 0.95m²/person * Standing space (assembly) 0.40m²/person * Classrooms (assembly) 1.85m²/person * Cafeteria space (assembly) 1.20m²/person * Offices (assembly) 9.30m²/person * Mercantile (if needed) 3.70m²/person (Basement, main) 3.70m²/person (Other storeys) 5.60m²/person * Storage 46m²/person	3.1.17.1
6	**Building Fire Safety**	
6.1	Roof top equipment, stair or service room are not considered a storey in building height.	3.2.1.1.1)
6.2	Mezzanines not considered a storey.	3.2.1.1.4)
6.3	Exceptions to structural protection are outlined within this Article.	3.2.2.3
6.4	Crawl space is called a basement if clear height is more than 1.8m.	3.2.2.9
6.5	Every building shall face a street. 89 Avenue is considered a street under the Code while the roadway between Dentistry Pharmacy and Power Plant is not considered a street or access for this building.	3.2.2.10
6.6	Roof top enclosures shall be constructed as type of construction required.	3.2.2.14
6.7	Group A, Division 2, up to 6 storeys, Any Area, Sprinklered. Non-combustible construction sprinklered throughout. Floor assemblies fire separation with a fire resistance rating of 1hr., mezzanines 1hr, and loadbearing 1hr. Multiple floor systems exist within the building. Those systems that do not meet the 1 hour FRR separation requirements will have spray fire proofing.	3.2.2.24
6.8	Group D, up to 6 storeys, sprinklered, maximum floor area 7200 m² Non-combustible construction sprinklered throughout. Floor assemblies fire separation with a FRR of 1hr., mezzanines 1hr, and load bearing 1hr. Multiple floor systems exist within the building. Those systems that do not meet the 1 hour FRR separation requirements will have spray fire proofing.	3.2.2.51
6.9	Group E, Any height, Any Area, Sprinklered. Non combustible construction sprinklered throughout floor assemblies fire separation with a fire resistance rating of 2hr, mezzanines 1hr, and load bearing 2hr. Floor systems do not meet 2 hour FRR separation and as such any group E occupancy can not exceed 10% of floor area it is on.	3.2.2.57
6.10	NA	
6.11	Group F, Division 3, Any height, Any Area, Sprinklered. Non-combustible construction sprinklered throughout. Floor assemblies fire separation with a FRR of 1hr., mezzanines 1hr, and load bearing 1hr. Multiple floor systems exist within the building. Those systems that do not meet the 1 hour FRR separation requirements will have spray fire proofing.	3.2.2.73

Section	Description	Reference
7	**Spatial Separation and Exposure Protection**	
7.1	Area of unprotected openings in exposed building face for applicable limiting distance shall be as Table 3.2.3.1.C	3.2.3.1.1)
7.2	Area of unprotected openings . Table 3.2.3.1.C for Group A2, D, F3 Table 3.2.3.1.D for Group E, F2	Tables 3.2.3.1.C 3.2.3.1.D
7.3	Area of exposing building face is the area of a fire compartment formed by fire separations of fire resistance rating not less than 45min. Refer to pages 5.050 and 5.051	
7.4	Wall with openings with limiting distance less than 1.2m shall be protected by closures.	3.2.3.5
7.5	Combustible projections more than 1m above ground level not allowed if limiting distance is less than 1.2m	3.2.3.6
7.6	Construction and cladding of exposing building faces must meet Table 3.2.3.7	3.2.3.7
7.7	For A2, D, F3 unprotected openings of: 0-25% 1hr FRR non-combustible (0-10) or combustible (10-25) non combustible cladding. 20-50% 45 min. FRR combustible or non-combustible and cladding. Group E must be less than 10% of floor area.	Table 3.2.3.7
7.8	Street level facing a street with limiting distance of 9m may have unlimited unprotected openings.	3.2.3.10
7.9	An opening in an exit that could be exposed to an opening in building at an angle less than 135° must be protected.	3.2.3.13
7.10	Openings in separate fire compartments parallel or at an angle less than 135° do not need protection is building is sprinklered.	3.2.3.14
7.11	Wall exposed to an adjoining roof allows windows and openings in roof if building is sprinklered.	3.2.3.15
7.12	If buildings are connected by walkways each building must be separated by 45 FRR. Walkway must be non-combustible. Walkway can not exceed 9m in width (washrooms exceed this limit). Interconnected floor space vestibule is not needed at connection to DPB	3.2.3.19
7.13	NA	
8	**Fire Alarm and Detection Systems**	
8.1	Fire alarm system is required.	3.2.4.1.1)
8.2	Fire alarm required to Dent-Pharm and SAB if there is an opening in a firewall between buildings.	3.2.4.2
8.3	A single or two stage system allowed. 2 stage system.	3.2.4.3
8.4	Description of fire alarm system.	3.2.4.4
8.5	Fire alarm verification required.	3.2.4.5
8.6	Silencing of alarm automatically not allowed for 20min and manual silencing switches only in fire control unit.	3.2.4.6
8.7	Fire alarm must notify fire department.	3.2.4.7
8.8	Annunciator required close to a building entrance on a street.	3.2.4.8.1)
8.9	Annunciator shall have separate zone indication.	3.2.4.8.2)
8.10	NA.	
8.11	Electrical supervision must be provided.	3.2.4.9
8.12	Fire detectors shall be connected to fire alarm system. Smoke detector at equipment.	3.2.4.10
8.13	Fire detector includes heat detectors and smoke detectors. Smoke detectors required in exit stairs shafts and at draft stops (3.2.8.7)	3.2.4.11
8.14	Air circulation systems that serve more than one storey, more than one suite on a floor area, or more than one fire compartment shall have duct-type smoke detectors to prevent circulation of smoke.	3.2.4.12
8.15	Does UA require central vacuum cleaning system. If so, must shut down on alarm.	3.2.4.13
8.16	Elevators with automatic emergency recall do need smoke detectors at all lobbies.	3.2.4.14
8.17	System monitoring of sprinklers activation is required and connected to fire alarm system. Zoning under NFPA 13 is required which includes 5000 SM maximum zone size.	3.2.4.15
8.18	Manual pull stations required at every principal entry and at every exit.	3.2.4.16
8.19	Audible signal devices can have alarm, alert and voice (including paging) but paging overridden by alarm, alert. No musak Visual alarms can be added. Mass notification is additional to FA, voice capable fire alarm signaling is required.	3.2.4.17
8.20	Audible alarms must meet conditions.	3.2.4.18
8.21	Visual signal devices if used must be visible from all of floor area.	3.2.4.19
8.22	Voice communication system is not required as building is not a high building.	3.2.4.21
9	**Provisions for Firefighting**	
9.1	Roof access to all main roof areas require direct access from floor area below by stairway or hatch or ladder	3.2.5.3
9.2	Building requires access route for fire department vehicles to south face.	3.2.5.4
9.3	Front access to be between 3m and 15m from the access route. 89 Avenue is considered a street under the Code. Distance exceeding 15m has been accepted and a fire hydrant will need to be added on 89 Avenue. Refer to page 5.060	3.2.5.5.1) IGI email 2012/07/16
9.4	Access allows pumper to be adjacent to hydrant and path of travel for firefighter from vehicle to building less than 45m.	3.2.5.5.2)
9.5	Access route meet requirements.	3.2.5.6
9.6	Water supply is adequate.	3.2.5.7
9.7	Standpipe system is required.	3.2.5.8
9.8	Standpipe system to meet NFPA 14. A fire pump is required to meet pressures required.	3.2.5.9
9.9	Hose connections shall be located in exits. Hose connections are not needed in floor area. 65mm hose connection.	3.2.5.10
9.10	Hose station and cabinets not required in a sprinklered building except all areas of building must be within 9m of a 30m hose.	3.2.5.11
9.11	All valves in standpipe system to electrically supervised.	3.2.5.12
9.12	Sprinkler system to be designed to NFPA 13.	3.2.5.13.1)
9.13	Sprinklers in elevator machine rooms to have temperature rating not less than intermediate temperature classification.	3.2.5.13.8)
9.14	In combustible construction sprinklers are required in attics, floor and ceiling spaces, and concealed spaces. Combustible joists, rafters, walls, and sheathing may have intumescent paint applied and a sprinkler system will be provided within attics.	 IGI email 2012/07/16
9.15	Combustible sprinkler piping not allowed.	3.2.5.14
9.16	Each mechanical room must be separately annunciated in fire alarm panel.	3.2.5.15.2)
9.17	Fire department connections for standpipes no more than 45m to a hydrant. This also applies to sprinkler connections. Connections between 3m and 15m from principal entrance.	3.2.5.16
9.18	Fire extinguisher to meet Alberta Fire Code and be in cabinets (comply to NFPA-10).	3.2.5.17.1)
9.19	Fire pump to meet NFPA 20 and have emergency power backup.	3.2.5.19
10	**Additional Requirements for High Buildings**	
10.1	High building for our uses is over 36m from grade to floor level of top storey. Under this we are not a High Building.	3.2.6.1
10.2	High building if over 18m from grade to floor level of top storey if total occupant load above first storey divided by 1.8 times the width of all exits stairs of that storey exceeds 300. Under this we are not a high building.	3.2.6.1
11	**Lighting and Emergency Power Systems**	
11.1	Exit, public corridor, or a corridor providing access to exit shall have lighting not less than 50lx at floor level.	3.2.7.1
11.2	Emergency lighting at not less than average 10lx at floor shall be provided in exits, principal routes to provide access to exit in open floor areas and service rooms, corridors used by public, public corridors, Group A2 areas over 60 people. Emergency lighting can be no less than 10lx.	3.2.7.3
11.3	Emergency power supply shall be provided to maintain emergency lighting by battery or generator for 30 minutes.	3.2.7.4
11.4	Fire alarm systems require emergency power supply by battery or generator and provide supervisory power for 24hr., and after that 30min.	

Section	Description	Reference
11.5	Emergency power for building services shall operate under full load for 2 hours for water supply for fighting, fans and electrical equipment needed to maintain air quality, and fans for venting under 3.2.8. All elevators (one at a time).	3.2.7.9
12	**Mezzanines and Openings through Floor Assemblies**	
12.1	Floor areas that do not terminate at an exterior wall shall terminate at a vertical fire separation with a 1hr FRR or conform to 3.2.8.3 - 9.	3.2.8.1
12.2	Building must be non-combustible.	3.2.8.3
12.3	Building must be sprinklered throughout.	3.2.8.4
12.4	An exit opening into an interconnected floor space shall be protected by a vestibule with doorways not less than 1.8m apart, is separated from remainder of floor area with a FRR (smoke separation), and is designed to limit passage of smoke so level of contamination in stair does not exceed limits of 3.2.6.2 (2). If an elevator opens into interconnected floor and floor levels above the interconnected floor area a vestibule is required to protect either doors in interconnected floor or those above. Vestibule as 3.2.8.5 (1).	3.2.8.5
12.5	A protected floor area may be used to satisfy 3.4.3.2 (6)(b). Separation to be 1hr and requires vestibules on openings as 3.2.8.5 (1).	3.2.8.6
12.6	A draft stop shall be provided at each floor level surrounding the opening and be 500mm deep. Close spaced sprinklers and smoke detectors required.	3.2.8.7
12.7	A mechanical exhaust system shall be able to remove air from interconnected floor space at a rate of 4 air changes per hour. Operates by manual switch near entrance for firefighter access.	3.2.8.8
12.8	Where ceiling height exceeds 8m limit of combustible contents is 16g/m^3 of volume of interconnected floor space.	3.2.8.9
13	**Safety within Floor Areas**	
13.1	Suites in occupancies other than Group D require a fire separation with 1hr FRR from each other. Suite means a single room or series of rooms operated under a single tenancy. Classification as Group D is beneficial.	3.3.1.1
13.2	Storage, handling, and use of hazardous substance to conform to AFC 2006. Cooking to be Part 6. Also applies to flammable liquids and combustible liquids.	3.3.1.2
13.3	Access to exit shall conform to 3.3.1.3, 3.3.2 to 3.3.5	3.3.1.3
13.4	Roof requires access to exit if used for occupancy.	3.3.1.3.3)
13.5	A roof top enclosure shall be provided with an access to exit that leads to an exit at roof level or at level immediately below. If area of enclosure exceeds 200m^2 then 2 means of egress are required.	3.3.1.3.5)6)
13.6	Each suite in a floor area requires a doorway into a public corridor.	3.3.1.3.8)
13.7	A point where egress in 13.6 occurs it shall be possible to go in opposite directions to 2 exits.	3.3.1.3.9)
13.8	No access to exit for an assembly occupancy may lead through a kitchen, service space, or storage room.	3.3.1.3.10)
13.9	A public corridor is required to be separated from remainder of storey by a fire separation.	3.3.1.4.1)
13.10	A storey that is sprinklered throughout no FRR is required for separation of public corridor.	3.3.1.4.3)
13.10.A	No fire separation is needed between a public corridor and the remainder of a storey provided travel distance from any part of floor area to an exit is not more than 45m.	
13.11	Two egress doors are required from a room or suite if occupancy load exceeds 60, in a sprinklered space travel distance to an egress exceeds 25m or the suite or room exceeds area of 200m^2 (A2, E, F2), 300 m^2 (D, F3).	3.3.1.5
13.12	If two egress points are required maximum travel distance in suite can not exceed that allowed in 3.4.2.5	3.3.1.6
13.13	Protection on floor areas with barrier free path of travel is provided by sprinklers.	3.3.1.7
13.14	Tactile warning strip is required in a barrier free path of travel at a downward change in elevation. 600mm wide 250mm from edge and full width of stair, ramp.	3.3.1.7.4)
13.15	Minimum headroom clearance in access to exit to be the same as exits. 3.4.3.4	3.3.1.8
13.16	Minimum width of public corridors is 1100mm.	3.3.1.9.1)

Section	Description	Reference
13.17	Obstructions located within 1980mm of floor can not project more than 100mm into corridor, if above 680mm.	3.3.1.9.3)4)
13.18	A dead end corridor can not be longer than 3m.	3.3.1.9.7)
13.19	Door shall swing on vertical axis if entering a corridor or from a room not in a suite. Door must swing in direction of travel if population exceeds 60.	3.3.1.11
13.20	Sliding doors can be used in place of swing doors in 3.3.1.11 if they break away in direction of travel.	3.3.1.12
13.21	Doors in path of egress must be operable without keys or special knowledge, door release hardware can only have action, and minimum door width is 800mm.	3.3.1.13
13.22	Stairs that are not exits must conform to dimensional, guard, handrail and slip-resistance of an exit stair.	3.3.1.14
13.23	Capacity of an access to egress based on occupancy load of floor area served.	3.3.1.17.1)
13.24	Access to exit ramps (less than 1 in 8, doorways, and corridors) have width based on 6.1mm/person.	3.3.1.17.2)
13.25	Width of a ramp over 1 in 8 shall be based in 9.2mm/person.	3.3.1.17.3)
13.26	Capacity of stairs in access to exits shall conform to 3.4.3.2	3.3.1.17.5)
13.27	Guards 1070mm high are required around openings into smoke shafts, at raised floors, galleries where difference in level is more than 600mm. Guard will prevent 100mm sphere passage, guard will not have climbable surfaces between 140 and 900mm above floor. (Front edge of loading dock does not need a guard).	3.3.1.18
13.28	Transparent doors and panels must be readily apparent, glass shall be laminated, tempered, or wired. Panels shall not be mistaken for doors.	3.3.1.19
13.29	NA	3.3.1.20
13.30	Custodial rooms separation does not require a FRR .	3.3.1.21
13.31	No obstructions that make means of egress less than 750mm allowed.	3.3.1.23
13.32	Storage room larger than 1m^2 in an assembly occupancy must have a fire separation with FRR of 1hr.	3.3.1.26
13.33	Non fixed seating in assembly occupancy must meet AFC.	3.3.2.3
13.34	Fixed seating, aisles, libraries. Council Chambers and East Chambers will need to meet 3.3.2.4 and 3.3.2.5 for configuration of seats and aisles.	3.3.2.4
14	**Exits**	
14.1	Exits include exterior doorway, interior passageway, stair.	3.4.1.4
14.2	Horizontal exits do not exist.	3.4.1.6
14.3	Every floor area must be served at least 2 exits. Travel distance from a suite can be measured from the egress door if it enters a corridor through fire separation with no FRR.	3.4.2.1
14.4	Exits shall be located so travel distance does not exceed 45m in a sprinklered building and are clearly identified and accessible at all times.	3.4.2.5
14.5	Exits must have width to accommodate occupant load.	3.4.3.1
14.6	Required width of exits is occupant load by 6.1mm/person for ramps less than 1 in 8, doorways, and corridors; 8mm/person for stairs with rise not more than 180mm and run not less than 280mm; and 9.2mm for ramps over 1 in 8 and stairs not as above. Refer to page 5.200 to 5.209	3.4.3.2.1)
14.7	Required exit width need not be cumulative if an exit serves floors above each other.	3.4.3.2.4)
14.8	Stair serving interconnected floor spaces need to be cumulative unless stairs provide 0.3m^2 of area of landings and treads for each occupant of interconnected floor or use of protected floor space of 0.5m^2 on each floor area.	3.4.3.2.6)
14.9	For multiple exits no single exit can accommodate more than half of required exit.	3.4.3.2.7)
14.10	Minimum width of exit is 1100mm for corridors, 1100mm for stairs, and 800mm for doorways.	3.4.3.2.8)
14.11	Nothing can be fixed within an exit to reduce exit width. Swinging doors shall not reduce width of exit stairs or landing to less than 750mm, or reduce width of corridor to less than required width, and handrails and construction below handrails can not reduce width more than 100mm on each side.	3.4.3.3
14.12	Headroom clearance of an exit (and access to exit) no less than 2100mm except doors at 2030mm and closers at 1980mm.	3.4.3.4
14.13	Exit shall have a fire separation with a 1hr. FRR.	3.4.4.1
14.14	NA	



Section	Description	Reference
14.15	Fire separation that separates an exit from building shall have no openings except for standpipe and sprinkler piping, electrical wires that only serve stairway, openings 3.2.6, exit doors.	3.4.4.4.1)
14.16	Fuel-fired appliance not allowed in an exit.	3.4.4.4.4)
14.17	Exit shall not be used as a plenum.	3.4.4.4.5)
14.18	Exit can only be used for exiting but can be used for access.	3.4.4.4.6)
14.19	A service room can not open directly into a exit.	3.4.4.4.7)
14.20	Washrooms, storage rooms or other ancillary rooms can not open directly into an exit.	3.4.4.4.8)
14.21	Every exit door must have an exit sign placed over it or adjacent to it, be visible from exit approach, be illuminated, say EXIT in red, 114mm high, 19mm strike, or in white 150mm high, 19mm strike, illumination on emergency power.	3.4.5.1
14.22	Stairs, ramps, landing, treads shall have slip resistant finish and shall have colour contrast at edge of tread and landing and top and bottom of ramp.	3.4.6.1
14.23	Minimum number of risers in a flight of interior stairs is 3.	3.4.6.2
14.24	Maximum rise of stairs is 3.7m between floors or landings. Width of a landing must be at least equal to width of stair except in a straight run need not be more than 1100mm.	3.4.6.3
14.25	Handrails needed in both sides of stairs if 1100mm or more in width. If width is over 2200mm than intermediate handrails no more than 1650 between is required.	3.4.6.4.1)2)
14.26	Handrails will be continuously graspable and have a circular cross section between 30 and 43mm or circular cross section with perimeter of 100 to 125mm and largest dimension is 45mm.	3.4.6.4.3)
14.27	Handrails to be not less than 865mm and not more than 965mm measured at nosing.	3.4.6.4.4)
14.28	At least one (1) handrail to be continuous through the length of stairs including landings.	3.4.6.4.5)
14.29	At least one (1) handrail at the side of the stair or ramp shall extend not less than 300 beyond top and bottom of stairway.	3.4.6.4.7)
14.30	Clearance from handrail to wall can be no less than 50mm or 60mm if wall surface is rough.	3.4.6.4.8)
14.31	Loading values on handrails of 0.9kn point load or 0.7kn uniform load.	3.4.6.4.9)
14.32	Guard required in exit stairs to be 920mm from nosing and 1070mm in landing and 1070mm for ramps. 100mm sphere passage must be prevented. Nothing between 140 and 900mm that facilitates climbing. Windows in stairs below 1070mm on landings require a guard or below 900mm above nosing. Guards meet loading under 4.1.5.15 and 4.1.5.17.	3.4.6.5
14.33	Ramp slope to have maximum slope of 1 in 10 (A2), 1 in 6 (E, F), 1 in 8 others. (See also barrier free)	3.4.6.6
14.34	Treads and risers : run not less than 280mm : rise between 125 and 180mm : rise and run shall be uniform : leading edge have radius or bevel between 6 and 10mm	3.4.6.7
	Existing stairs can be retained in their current condition: FRR of enclosure of 1 hr. will be provided.	IGI email 2012/07/16
14.35	Doors minimum distance from a stair riser and a leading edge of door swing shall not be less than 300mm. Minimum width of a door leaf is 610 if there is more than 1 leaf.	3.4.6.10
14.36	Every exit door shall swing on vertical axis and swing in direction of travel.	3.4.6.11
14.37	Exit doors must be on closers and can not have hold opens.	3.4.6.12
14.38	Door release hardware. Exit doors and principal entrance locking and latching to be opened in one action without knowledge. Panic hardware required on latching doors exit doors to exterior and from exit to a lobby. Electromagnetic locks are allowed under conditions.	3.4.6.15
14.39	Emergency access to floor areas is not required if building is not more than 6 storeys in height.	3.4.6.17
14.40	Floor numbering is required in all exits stairs, latch side, 60mm high, raised 0.7mm, 1350 AFF and 150 from door.	3.4.6.18
14.41	New exit stairs are needed on levels 5, 6 and 7 of the north wing.	

Section	Description	Reference
15	**Vertical Transportation**	
15.1	Elevators shall meet regulations under SCA and meet AEDARSA inspection, and CSA B44	3.5.2.1
15.2	Hoist ways for elevators to be a fire separation with a 1hr FRR.	3.5.3.1.1)
15.3	Passenger elevators (not fire fighters) are allowed to be located in an interconnected floor space without being enclosed from the remainder of building except elevator machine room is located in a room with a fire separation with 1hr FRR.	3.5.3.1.2)
15.4	Elevator machine room needs to be separated from remainder of building by fire separation of 1hr FRR.	3.5.3.3
15.5	At least one car shall have interior dimensions to accommodate and provide access for a stretcher. 1134Kg car with interior dimensions of 2032mm wide and 1295mm deep with right or left hand access door (1067mm) on long side or 915mm door on short side.	3.5.4.1
15.6	Floor numbers to be mounted on both jams of hoistway entrance (CSA B44).	3.5.4.2
16	**Service Facilities**	
16.1	Service rooms are not to be used for storage.	3.6.1.3
16.2	Fuel fired appliances installed on roof or outside building shall be 1.2m from property line and 3m from wall in building with a window within 3 storeys above and 5m horizontally.	3.6.1.4
16.3	Fire separations for service rooms: * 1hr FRR in rooms housing fuel fired appliances. (We have no fuel fired appliances) * electrical equipment required to be in a service room under electrical regulations shall be separated from remainder of building by a 1hr FRR separation. All electrical and communication rooms to be 1hr FRR. * all other service rooms in a sprinklered building shall have a separation.	
16.4	NA	
16.5	Electrical vaults if required by electrical regulations must comply with 3hr FRR fire separation from remainder of building if not sprinklered. Only ducts, fire protection necessary for operation can penetrate fire separation. Vault shall have ventilation system to maintain temperature below 40°C. System is separate from remainder of building system and shut down if fire in the vault.	
16.6	Emergency generator if in a room is separated from remainder of building by fire separation with 2hr FRR. Only generating set and related equipment allowed in room. Outside building (enclosed)	3.6.2.8
16.7	Vertical service spaces shall be separated from adjacent storey by a fire separation having a 1hr FRR. Must terminate at roof or lowest floor or have a 1hr FRR top or bottom. Only openings necessary for use of shaft are allowed.	3.6.3.1
16.8	If shaft contains an exhaust duct that serves more than 1 fire compartment exhaust fan to be near outlet so duct is under negative pressures.	
16.9	Horizontal service spaces include ceiling spaces, duct spaces, and attic or roof spaces.	3.6.4.1
16.10	Horizontal service space that penetrates a vertical fire separation it must be separated from space below by a separation with a FRR equal to shaft or 30 min if shaft is 45min.	
16.11	Using ceiling or roof space as a plenum is allowed if space does not have materials with FS over 25 or SD over 50.	3.6.4.3
16.12	Attic with space over 900mm high must have access hatch from below of at least 550mm x 900mm or by a stairway.	3.6.4.4
16.13	Horizontal service spaces over 1200mm high and 600mm wide require inspection doors 300mm square so entire interior space can be viewed.	3.6.4.5
16.14	Roof requires direct access by stair if roof is over 4m above grade.	3.6.4.7
16.15	All ducts are to be non combustible material. Duct sealants shall have FS less than 25 and SD less than 50.	3.6.5.1
16.16	Vibration isolation connectors shall be non combustible but some combustible connections are allowed with conditions.	3.6.5.2
16.17	Coverings, linings, insulation non combustible of heat is 120°c or more and if combustible FS less than 25 SD less than 50.	3.6.5.4 3.6.5.5
16.18	Combustible grilles for ventilation shall have FS and SD no more than requirements for surfaces they are in.	
16.19	Return air ducts can be combustible but will not be used.	3.6.5.8

Section	Description	Reference
17	**Barrier Free Design**	
17.1	Building is required to be barrier free and must comply with all requirements.	3.8.1.1
17.2	At least 50% of entrance to building must be barrier free.	3.8.1.2
17.3	Unobstructed barrier free path is minimum 920mm and any change over 13mm in elevation will be by floor slope or ramp. Barrier free path over 30m in length will have width increase to 1500 wide and 1500 long at intervals not exceeding 30m.	3.8.1.3
17.4	Controls must be operable by one hand and mounted between 400 and 1200mm above floor.	3.8.1.5
17.5	Barrier free path to be provided to all normally occupied floor areas. Barrier free path for persons using wheel chairs not required for service rooms, janitor rooms, to floor not served by elevators.	3.8.2.1
17.6	Washrooms in barrier free path should be barrier free. Barrier free stalls minimum of 1 per 10 stalls or part thereof.	3.8.2.3
17.7	Accessibility signage is required. Signage is in tender.	3.8.3.1
17.8	Sidewalks providing barrier free access shall be minimum 1100 wide, cross slope less than 1:50, have level area (1500x1500 min) at door, have a 75mm curb if there is 75mm or larger drop adjacent and there is no wall or railing and be designed as a ramp where slope exceeds 1 in 20.	3.8.3.2
17.9	Minimum clear width of doorway in barrier free path is 800mm, doors have lever handlers, all entrance that are barrier free should have power door operator. Closer operation, force to open door requirements set.	
17.10	Doors not equipped with power door operator shall have 600mm clearance on latch side if door opens toward approach and 300 if away from approach.	3.8.3.3.10)
17.11	Ramps in barrier free not more than 1 in 12 be level at top and bottom of at least 1500 x 1500. Ramp requires flat landing no more than 9m apart. If slope is steeper than 1 in 20 than is considered a ramp.	3.8.3.4
17.12	Barrier free seating is required in seating areas.	3.8.3.6
17.13	Assistive Listening Device are required in assembly occupancy areas over $100m^2$	3.8.3.7
17.14	Water closets that are barrier free shall be located in an enclosure meeting these item. See also BF Guidelines.	3.8.3.8 3.8.3.9
17.15	Urinals (barrier free) shall meet this item. See also BF Guidelines.	3.8.3.10
17.16	Lavatories in barrier free washrooms should meet requirements of this item. See also BF Guidelines.	3.8.3.11
17.17	Universal toilet room shall meet requirements of this item. See also BF Guidelines.	3.8.3.12
17.18	NA	
17.19	Counters shall have a barrier free section if over 2m in length.	3.8.3.14
18	**Structural Design**	
18.1	Dead load of existing building has been determined by inspection of existing drawing details and on site measurement to confirm materials and depth of structure. This is an on-going process as we undertake a program of intrusive survey work. A load of 1.0KN/m2 for future partitions has been provided where appropriate.	4.1.4.1
18.2	Live loads have been specified to correlate with the occupancy of the building as office areas or classrooms.	4.1.5.1
18.3	Following evaluation, there is not a change in use of the building, damage or deterioration or safety concerns because of defects that would require a structural evaluation.	Commentary L Section 6.0
18.4	Based on Table L-1 as there are no changes in use or occupancy loads, the Code/standard when built will be used for Loads and Material Standards. Existing structure can be used. Commentary L guidelines are followed.	Commentary L Section 15.0 IGI email 2012/07/16
18.5	The structural components of the building were designed prior to the benchmark version of the codes listed in Table L-2. The evaluation will be based satisfactory past performance under the conditions of Paragraph 18	Commentary L Section 17.0
18.6	Section 18 Compliance criteria:	
	a. The building has been examined by a professional engineer and there is no evidence of significant damage, distress or deterioration.	Commentary L Section 18.0
	b. The structural system is reviewed, including examination of critical details and checking them for load transfer.	Commentary L Section 18.0
	c. The building dates back to 1922 and has demonstrated satisfactory performance for more than 30 years.	Commentary L Section 18.0
	d. Following a review of the historical use of the building and the existing building drawings dating back to 1922, there have been no changes within the past 30 years that could significantly increase the loads on the building or affect its durability, and no such changes are contemplated during our works.	Commentary L Section 18.0
19	**Environmental Separation**	
19.1	This part is concerned with control of condensation and transfer of heat, air, moisture, and sound.	5.1.1.1
19.2	Building shall be designed to accommodate structural and environmental loads.	5.1.4.1
19.3	Building shall be designed to resist deterioration.	5.1.4.2
19.4	Building shall be designed to meet environmental loads and design procedures.	5.2.1
19.5	Building shall be designed to meet structural loads.	5.2.2
19.6	Building shall be designed to resist heat transfer.	5.3.1
19.7	Air barrier system shall be provided.	5.4.1
19.8	Vapour barrier shall be provided.	5.5.1
19.9	Building shall be protected from precipitation.	5.6.1
19.10	Building shall be protected from surface water.	5.7.1
19.11	Building shall be protected from moisture in ground.	5.8.1
20	**Heating, Ventilation and Air-conditioner**	
20.1	Exit Stairway HVAC: Do not use common air systems to heat/cool/ventilate exit stairways on buildings more than 1 storey.	6.2.1.12.1)
20.2	Required Ventilation: Outdoor air ventilation rates shall not be less than that prescribed in ASHRAE 62.	6.2.2.1.2)
20.3	NA	6.2.2.6
20.4	Crawl Spaces and Attic or Roof Spaces: Attics must be ventilated by natural or mechanical means.	6.2.2.7.1)
20.5	Fire Dampers: Conform to Article 3.1.8.9.	6.2.3.6.1)
21	**Plumbing Services and Health**	
21.1	Floor drains are required in washrooms equipped with an automatic flushing device.	7.2.1.4
21.2	Water closets determined by occupancy loads under 3.1.17.1 except business and personal services occupancies which can use $14m^2$ / person and equal men and women. Urinals can be substituted for 2/3 of number of water closets.	7.2.2.1
21.3	Fixture requirements: Refer to page 5.070 1 for 25 females, 1 for 35 males for dining rooms, restaurants and serving alcohol.	7.2.2.5
21.4	Fixture requirements for assembly occupancies shall be as required by this sentence.	
21.5	Fixture requirements for mercantile occupancies shall be 1 for 300 males and 1 for 150 females.	7.2.2.8
21.6	Fixture requirements shall be as this sentence for business and personal occupancies. Ref. to Table 21.6	7.2.2.9
21.7	Lavatories required as follows: 1 for first two fixtures and then 1 for each additional 2 fixture.	7.2.4.1
21.8	Food establishments shall meet requirements of this section.	7.5.1
21.9	Laboratories using biological agents shall be designed to suit Laboratory Biosafety Guidelines.	7.9.1

CALCULATIONS AND SUPPORTING DRAWINGS

5

Dentistry Pharmacy Building Redevelopment
Design Development Occupancy Calculations
Friday, April 05, 2013

Occupied Area		Basement			Level 1				Level 2			Level 3			Level 4			Level 5			Level 6			Penthouse		
Occupancy	Area/person	Occupied Floor Area*	Occupant Load	Notes	Occupied Floor Area	Occupant Load (PF)	Occupant Load (Exiting)	Notes	Occupied Floor Area	Occupant Load	Notes	Occupied Floor Area	Occupant Load	Notes	Occupied Floor Area	Occupant Load	Notes	Occupied Floor Area	Occupant Load	Notes	Occupied Floor Area	Occupant Load	Notes	Occupied Floor Area	Occupant Load	Notes
Total Programmed Area		**1607**			**3132**				**3676**			**3391**			**3205.1**			**1418**			**1314**			**0**		
Assembly																										
Space with Fixed Seats (Council Chambers/Theatre)									**532**	**240**	2	**165**	**84**	4												
Space with Non-fixed seats	0.75																									
Space with Non-fixed seats	0.75																									
Space with non-fixed seats and tables (Reading Room)	0.95											**120**	**126**													
Standing Space	0.40				**708**	**350**	**1769**	1																		
Standing Space (Lower Level Lobby)	0.40				**117**	**292**	**292**																			
Reading or Writing Rooms or lounges (Gravitas)	1.85								**178**	**96**																
Unassigned space	4.60	**467**	**102**																							
Business and Personal Services																										
Offices	9.30				**2816**	**303**	**303**		**2966**	**319**	3	**3107**	**334**		**3205**	**345**		**1418**	**152**		**1314**	**141**				
Student Connect	9.30				**317**		**317**																			
Industrial Uses																										
	4.60																									
Other Uses																										
Storage	46.00	**1140**	**25**																							
Kitchens	9.30																									
Total Occupied Area		**1607**			**3956**				**3676**			**3391**			**3205**			**1418**			**1314**			**0**		
Total Occupancy			**126**			**944**	**2680**			**655**			**544**			**345**			**152**			**141**		Note 5		

* Corridors including vestibules, mechanical spaces, washrooms and other unoccupied service spaces excluded.

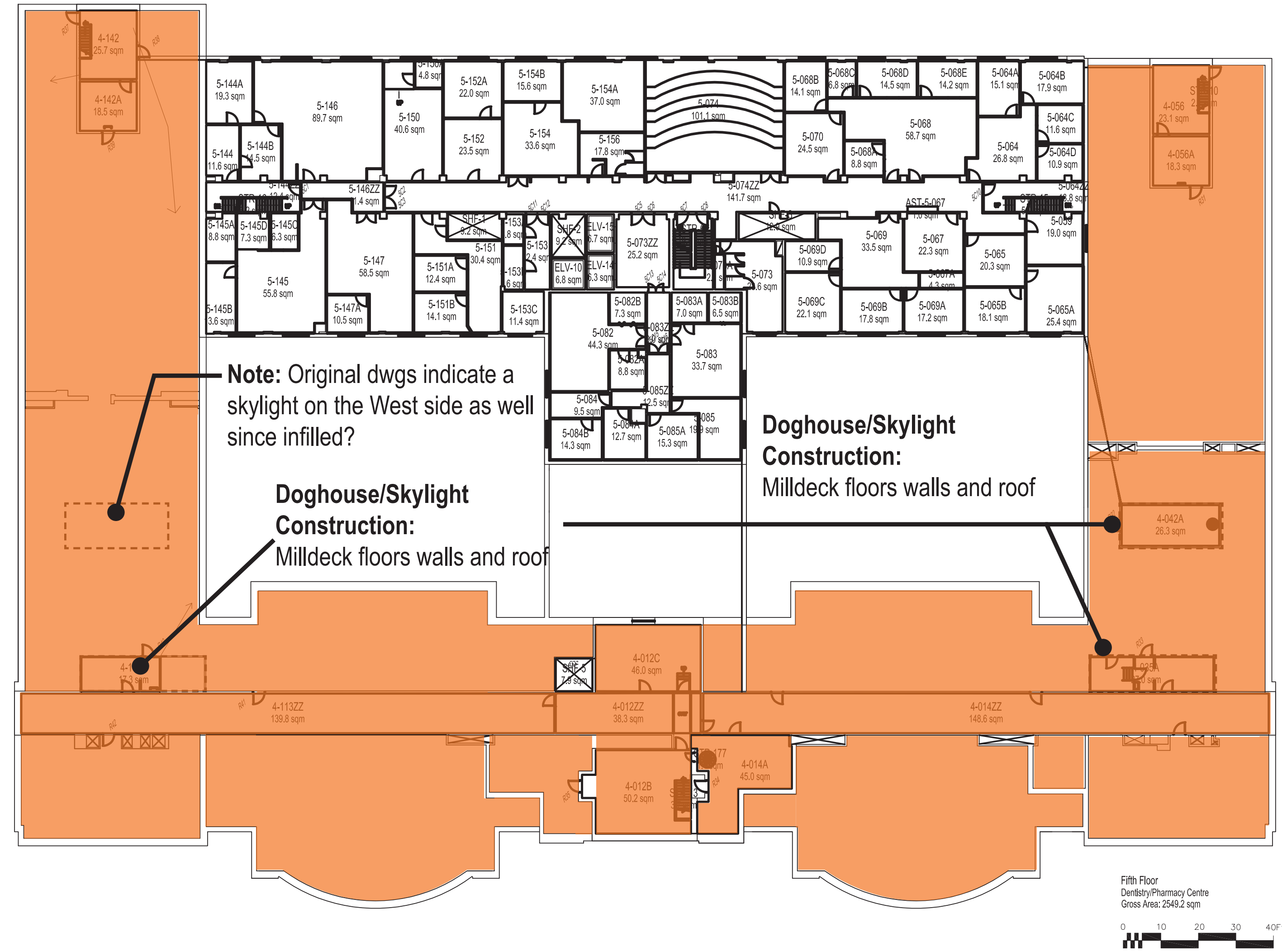
1. Use design occupancy of 350 people for Atrium Occupancy for fixture count use floor area for exiting for special event condition
2. Total of both Council Chambers and East Theatre. Assumes 120 fixed seats at Level 2
3. Includes programmable area and shared space.
4. Total of both Council Chambers and East Theatre. Assumes 25 fixed seats at Level 3
5. Service Space - no occupancy

Combustible Roof Construction

1. Typical roof construction over 1922 building:

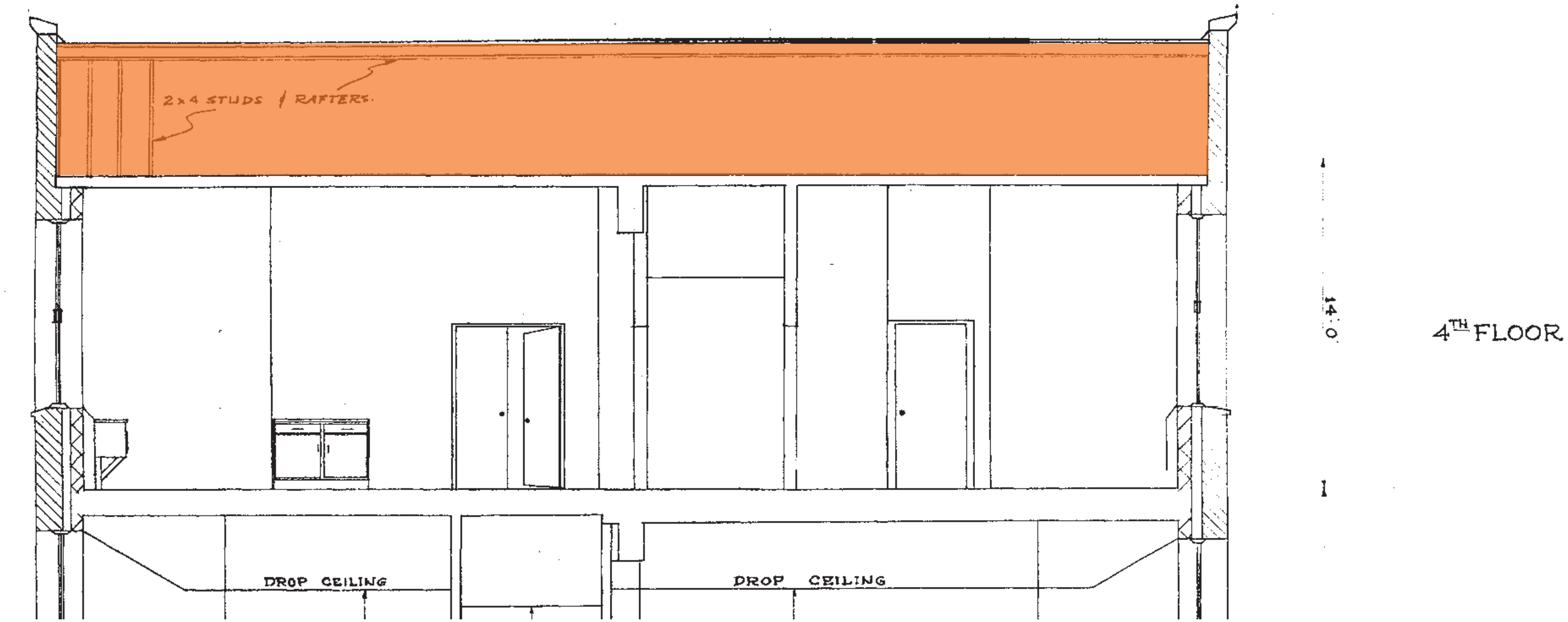
Attic Roof:
3/4" thick ship lap planks (1x6 nominal) on
2x4 wood rafters all supported on
2x4 knee walls bearing on
attic milldeck floor.

Attic Floor:
Double 2x8 wood joists spanning between concrete encased steel beams with 2x4 milldeck construction (milldeck typically spans parallel to wood joists (every 5th or 6th 2x4 spans full joist length with discontinuous 2x4s gang nailed to continuous members)
Plaster finish of fourth floor ceiling is hung from milldeck with steel rod or wire.
Note: In many locations newer T-bar ceiling is then hung from plaster/wire mesh.



Wood Frame/Combustible Construction

5.020 Combustible Construction - 1922 and 1946/47 Attics and Roof



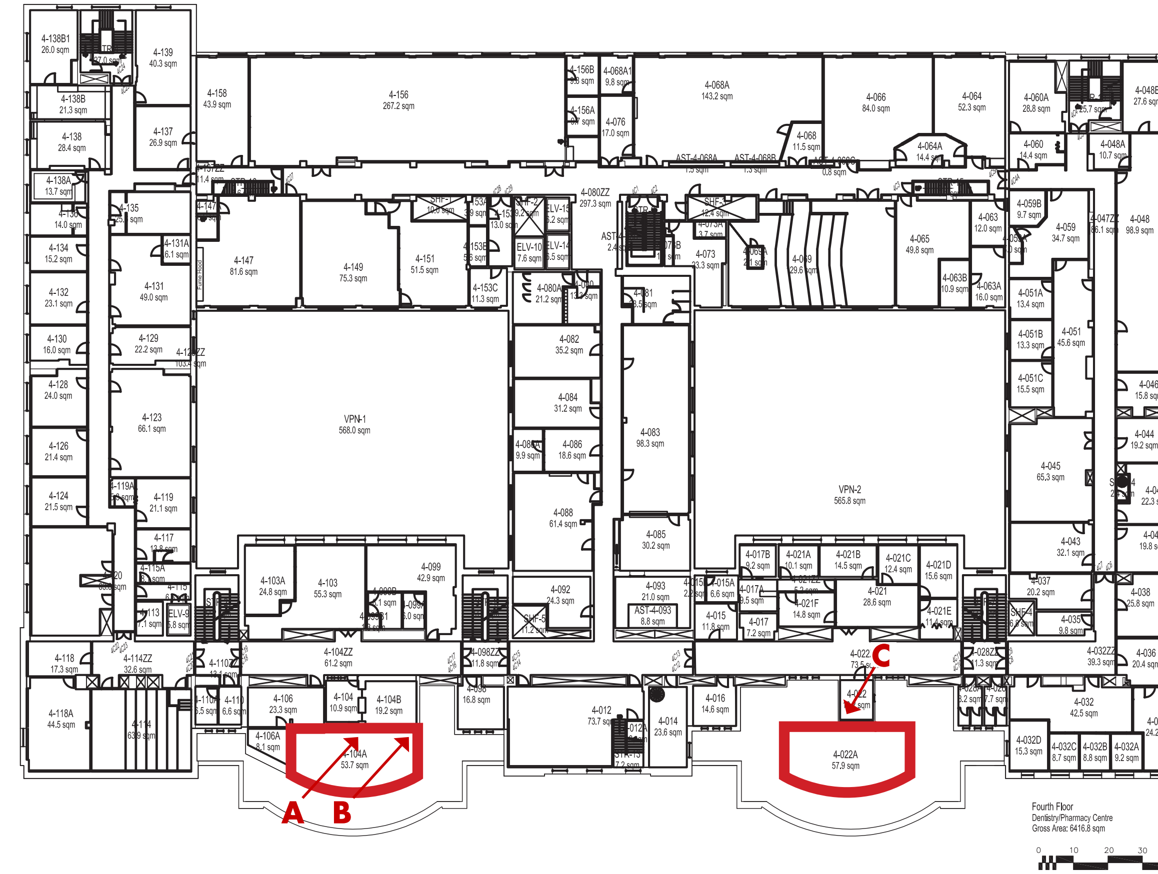
Combustible Construction - 1946/47 Attics and Roof

Roof Construction:

- 1x6 shiplap wood plank sheathing
- Tar paper
- Milldeck spanning between
- Steel Angle "Trusses"
- 1x3 wood strapping
- Plaster on metal mesh lath

A. Clerestory Roof North Slope

B. Clerestory Roof Assembly



C. Clerestory Wall Construction

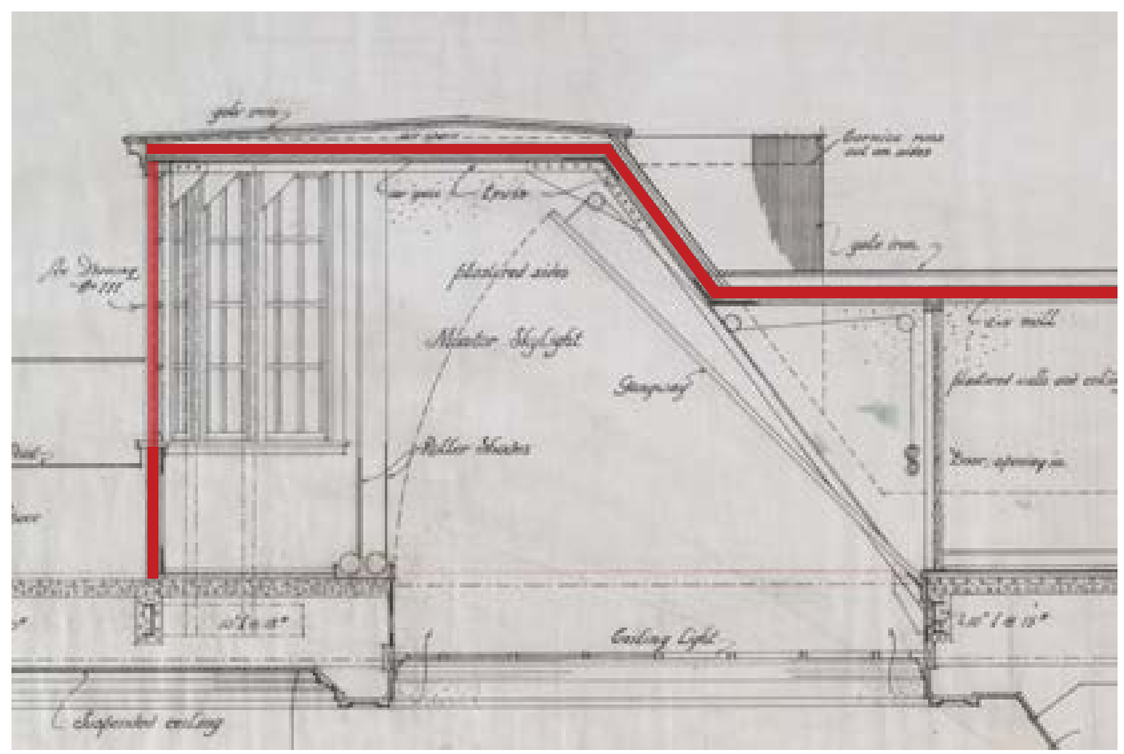


Diagram 2.5b:
Combustible walls supporting a roof. (Clerestory's mechanical doghouses, skylights etc.)

Theatre Clerestory

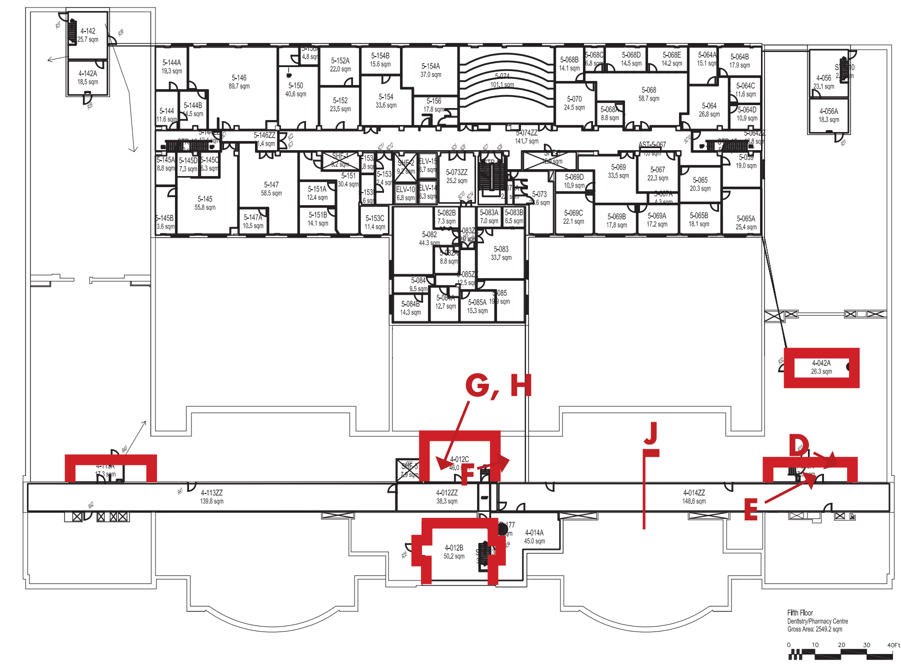
The clerestory structures above the third floor roof are wood frame structures with riveted steel angle "trusses" that form the geometry of the clerestory roof. Milldeck spans between the trusses on both the sloped and flat top portions of the roof capped with 1x6 wood plank sheathing. Walls of the clerestory are also wood frame in some cases made of milldeck in others stick framed wood (south walls).

5.022 Combustible Wall Locations - Theatre Clerestory

D. Typical Attic

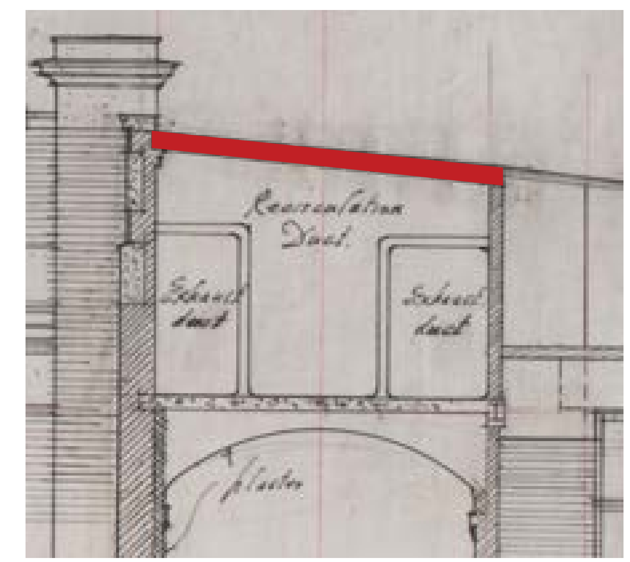
E. "Doghouse" construction

F. Attic with slab floor



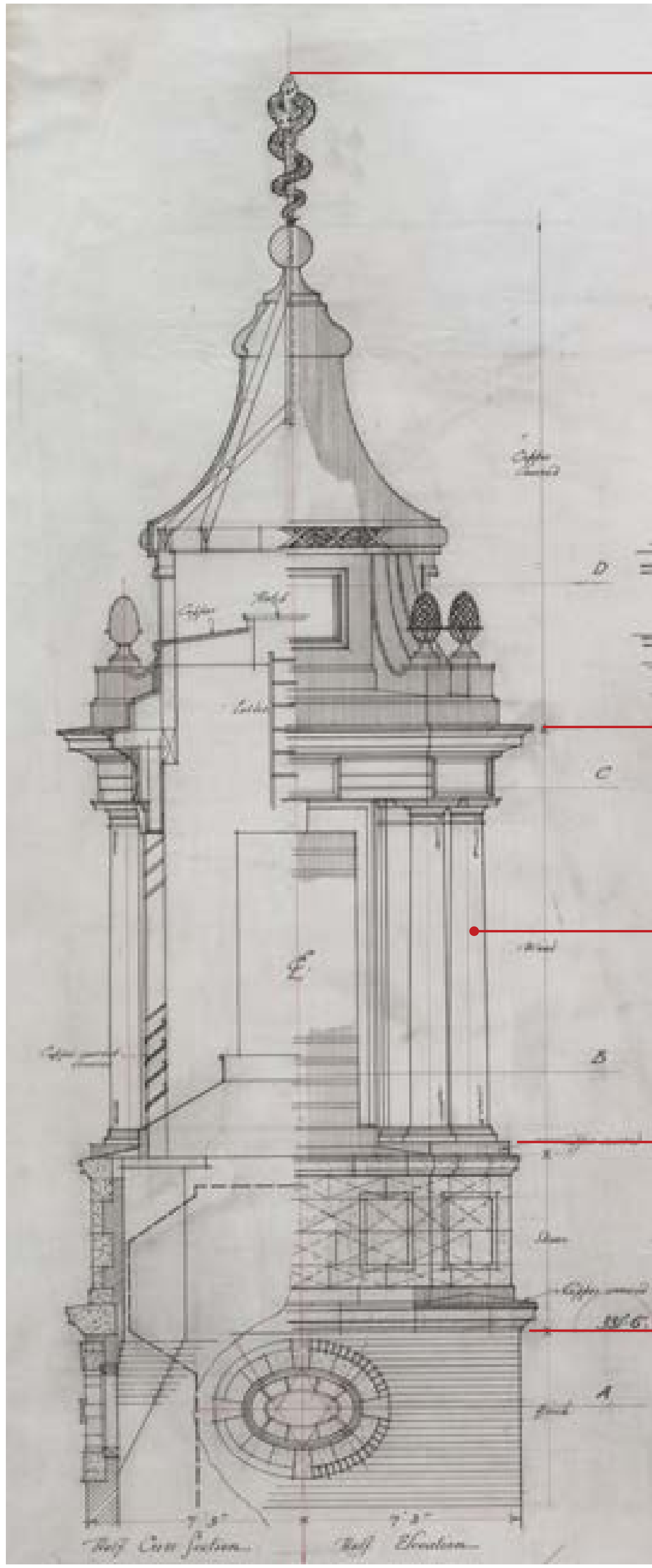
G. Mechanical Penthouse Gambrel Roof

H. Mechanical Penthouse Gambrel Roof



J. Windtunnel Roof

Combustible Construction - 1922 Attic



Copper clad wood

Wood

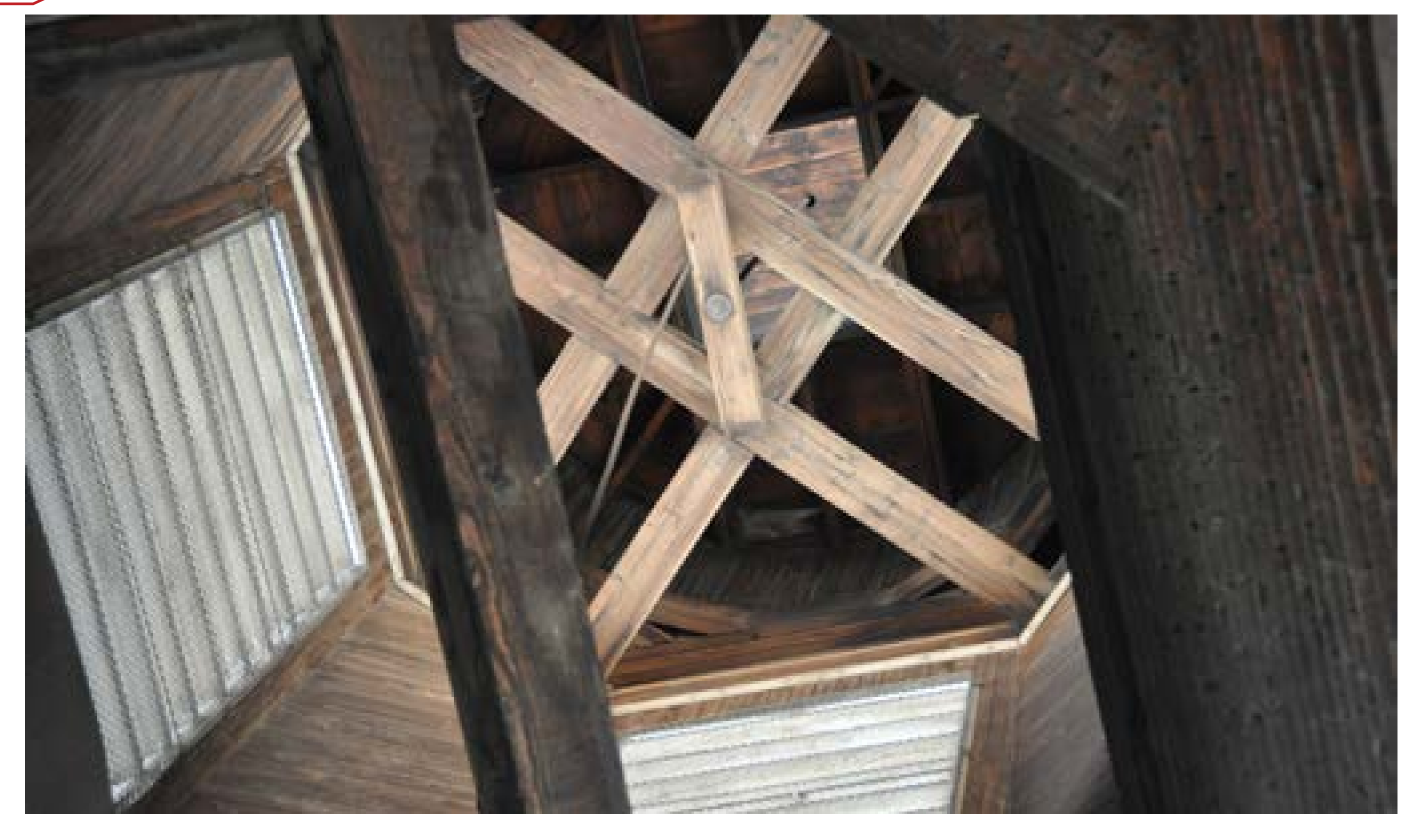
Stone

Brick

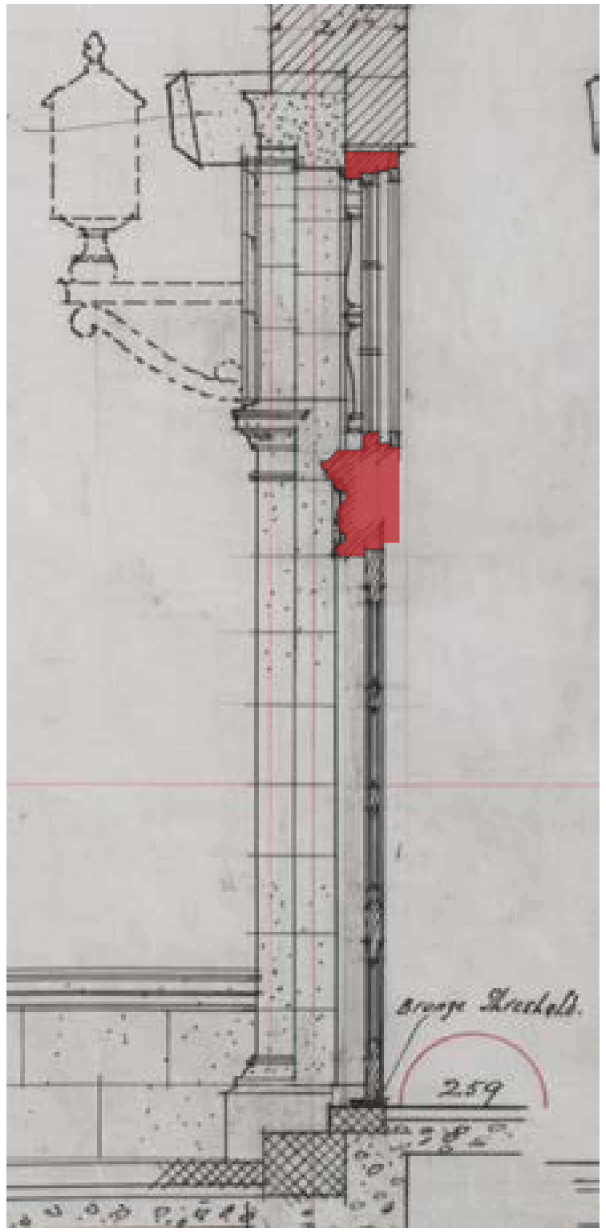
Decorative Cap:
Wood frame structure clad with copper

Spire construction:
Wood frame structure bearing on Corbelled brick masonry walls.

Wood column cladding

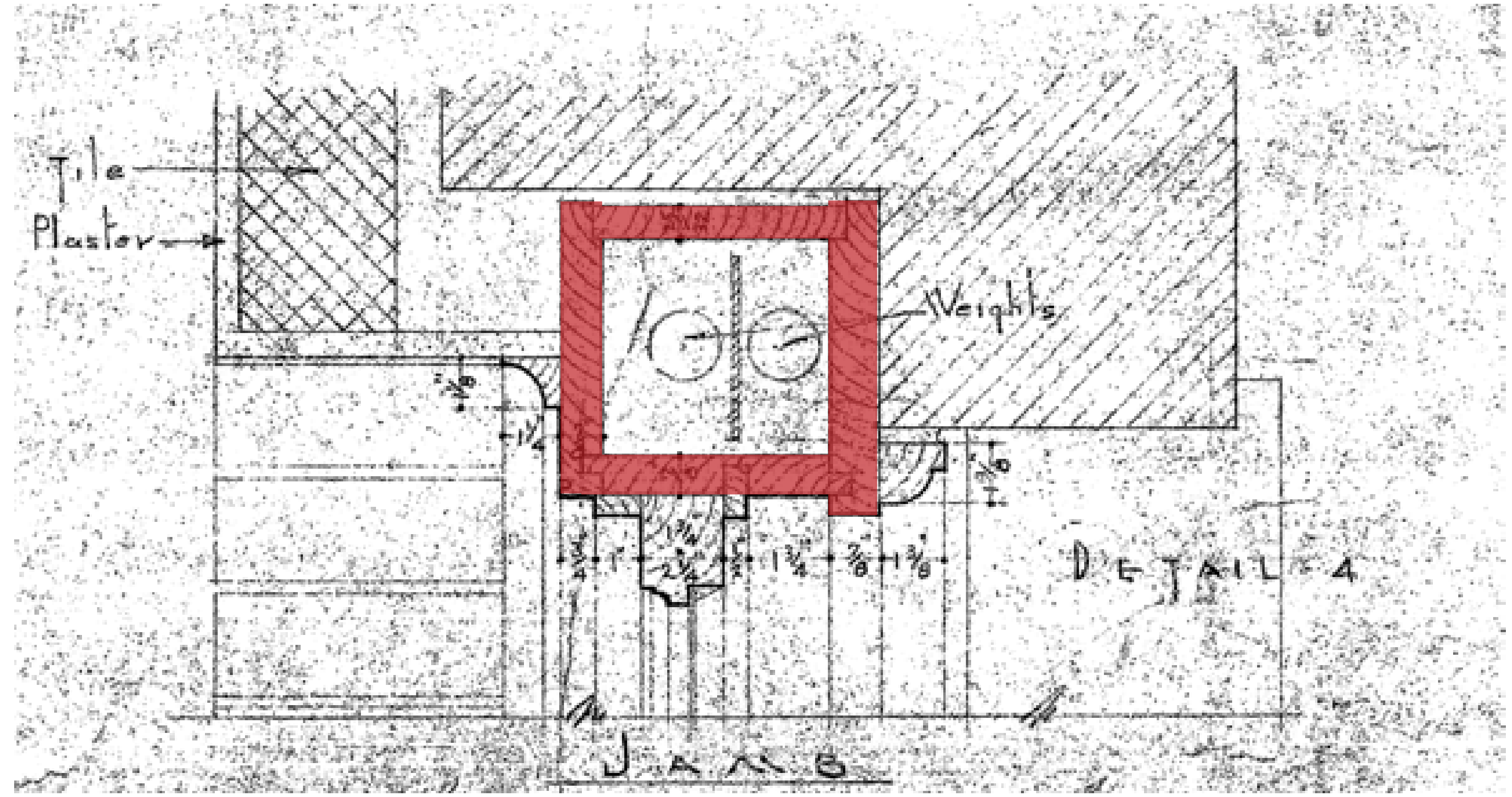


5.024 Combustible Construction - Spire



A. 1922 Window and Doors

In the original 1922 building rough buck wood framing and blocking may still exist in the masonry openings as fastening members for windows doors. Further selective demolition is required to confirm the as-built condition.

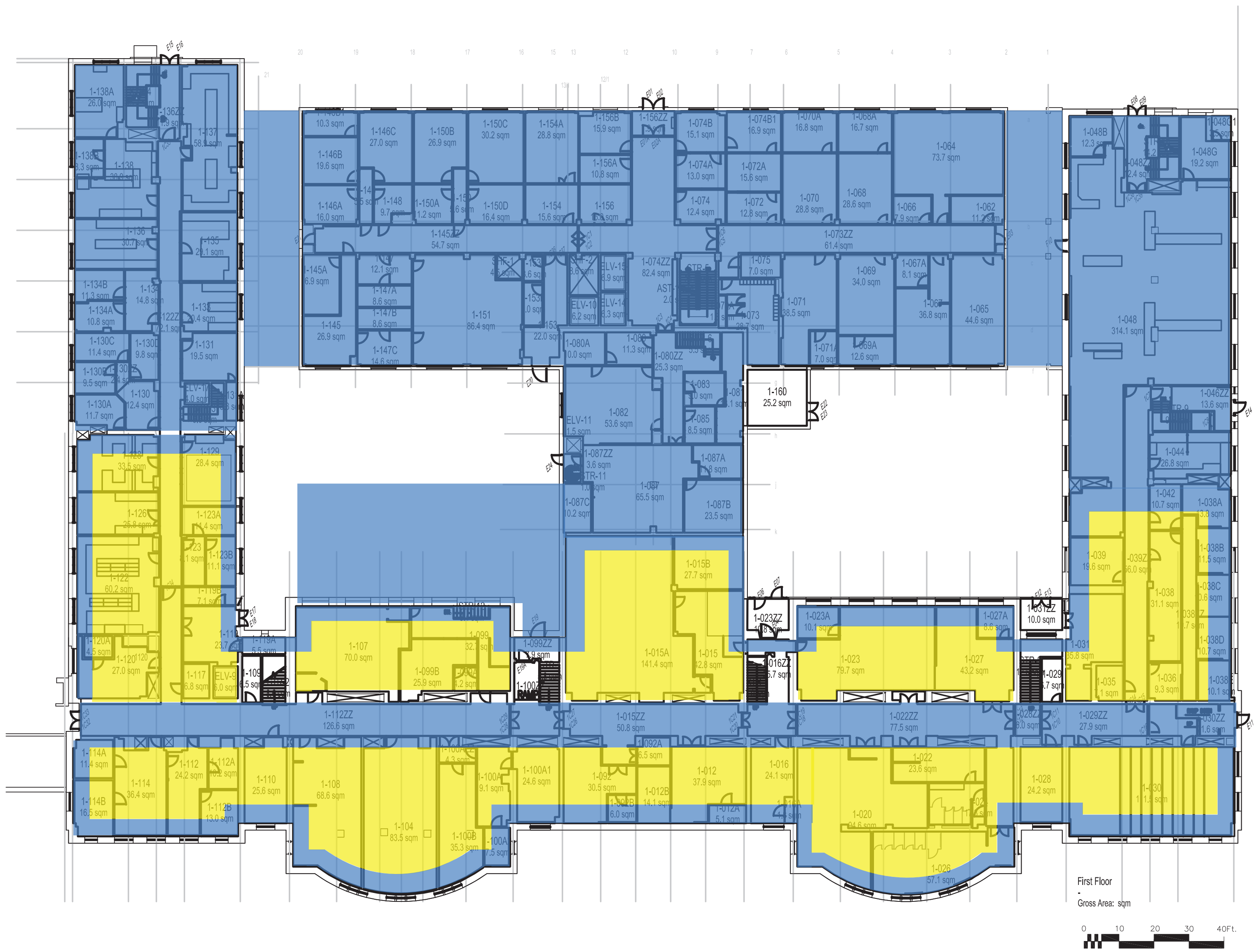


B. 1946/47 Window Jamb

Original window frames included wood box constructions for sash counterweights and pulley systems. While the original windows have since been replaced additional wood framing/blocking may have been installed to fill the voids left by the original construction or in some cases the original frames may have been left in place. Selective demolition of the windows will reveal the as-built condition.

Combustible Construction - Exterior Walls

Level 1- Combustible Construction



Wood Frame/Combustible Construction

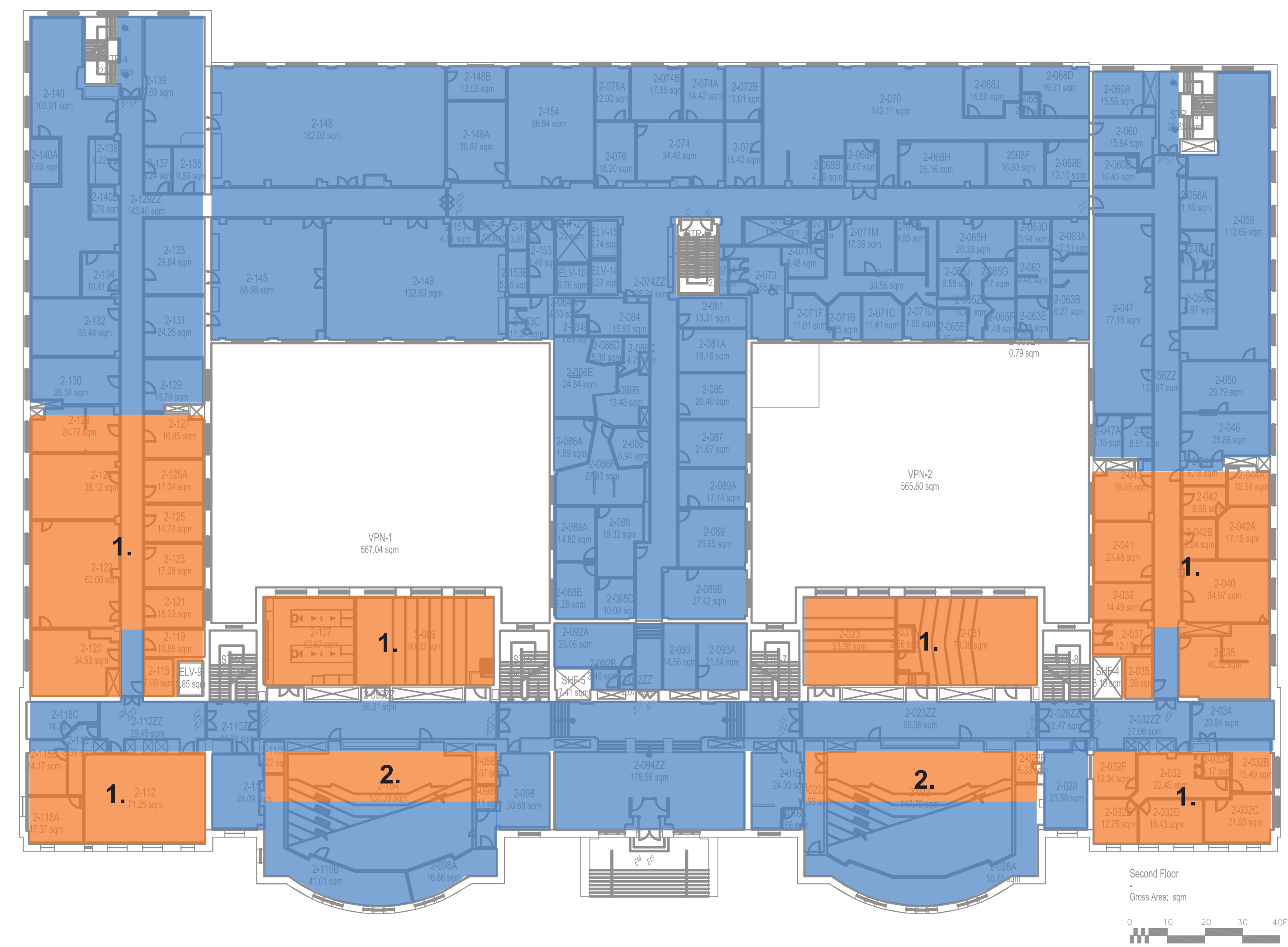
Slab on Grade

Suspended Reinforced Slab

Level 2 - Combustible Construction

1. Wood floor - 1-1/2" tongue and groove subfloor spanning between steel beams encased in concrete (inverted slab detail)

2. Lower 3 tiers of theatre are wood frame. Also portion of second floor beneath tiered seating is wood floor (as in 1. above).



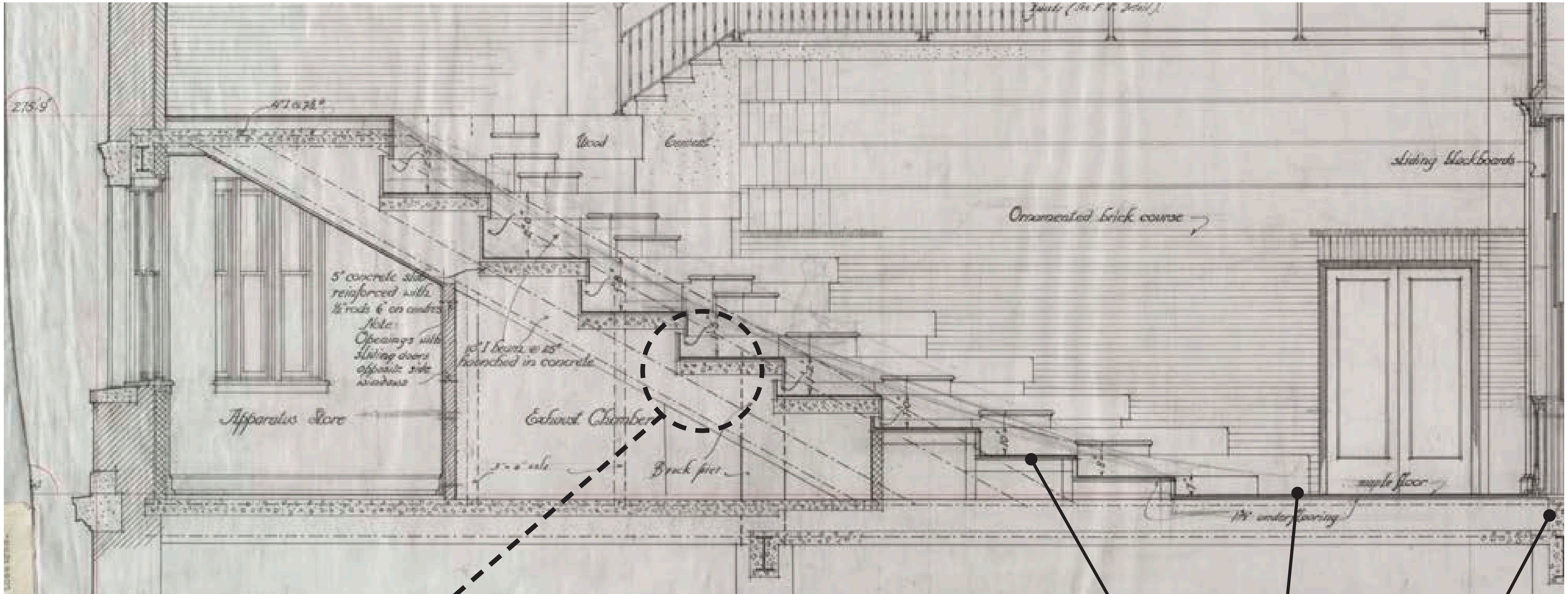
Wood Frame/Combustible Construction

Slab on Grade

Suspended Reinforced Slab

5.026 Combustible Construction - Level 1 and Level 2

Theatre Tiered Seating



Wood plank riser faces

Wood nailers cast into concrete tiers for attachment of floor finishes

Void

1-3/8” tongue and groove wood plank subfloor spanning between concrete encased steel beams

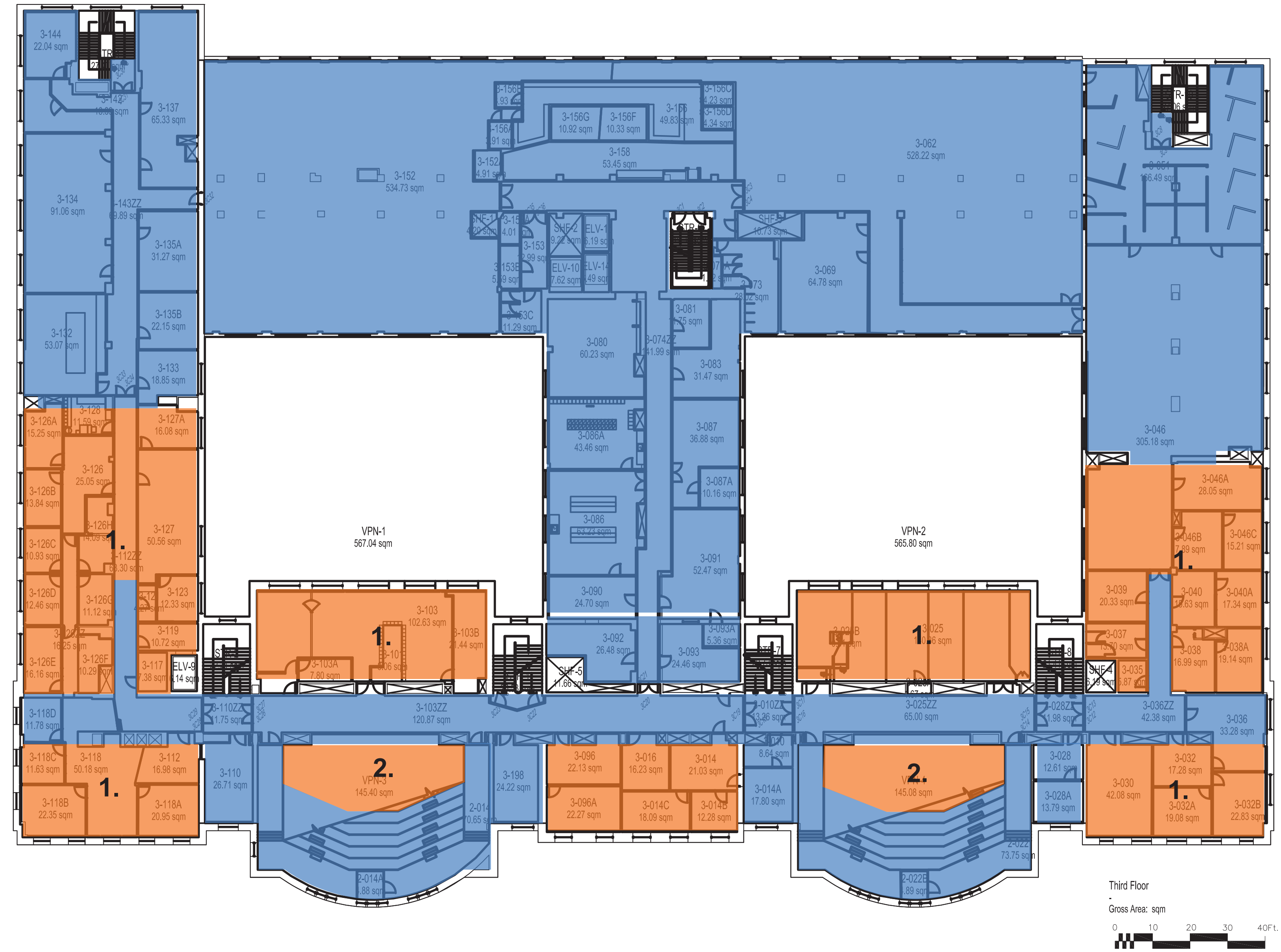
Lower three tiers constructed of wood frame and sheathing elements.

Combustible Construction - Level 2 Theatre

Level 3 - Combustible Construction

1. Wood floor - 1-1/2" tongue and groove subfloor spanning between steel beams encased in concrete (inverted slab detail)

2. Lower 3 tiers of theatre are wood frame. Also portion of second floor beneath tiered seating is wood floor (as in 1. above).



Wood Frame/Combustible Construction

Slab on Grade

Suspended Reinforced Slab

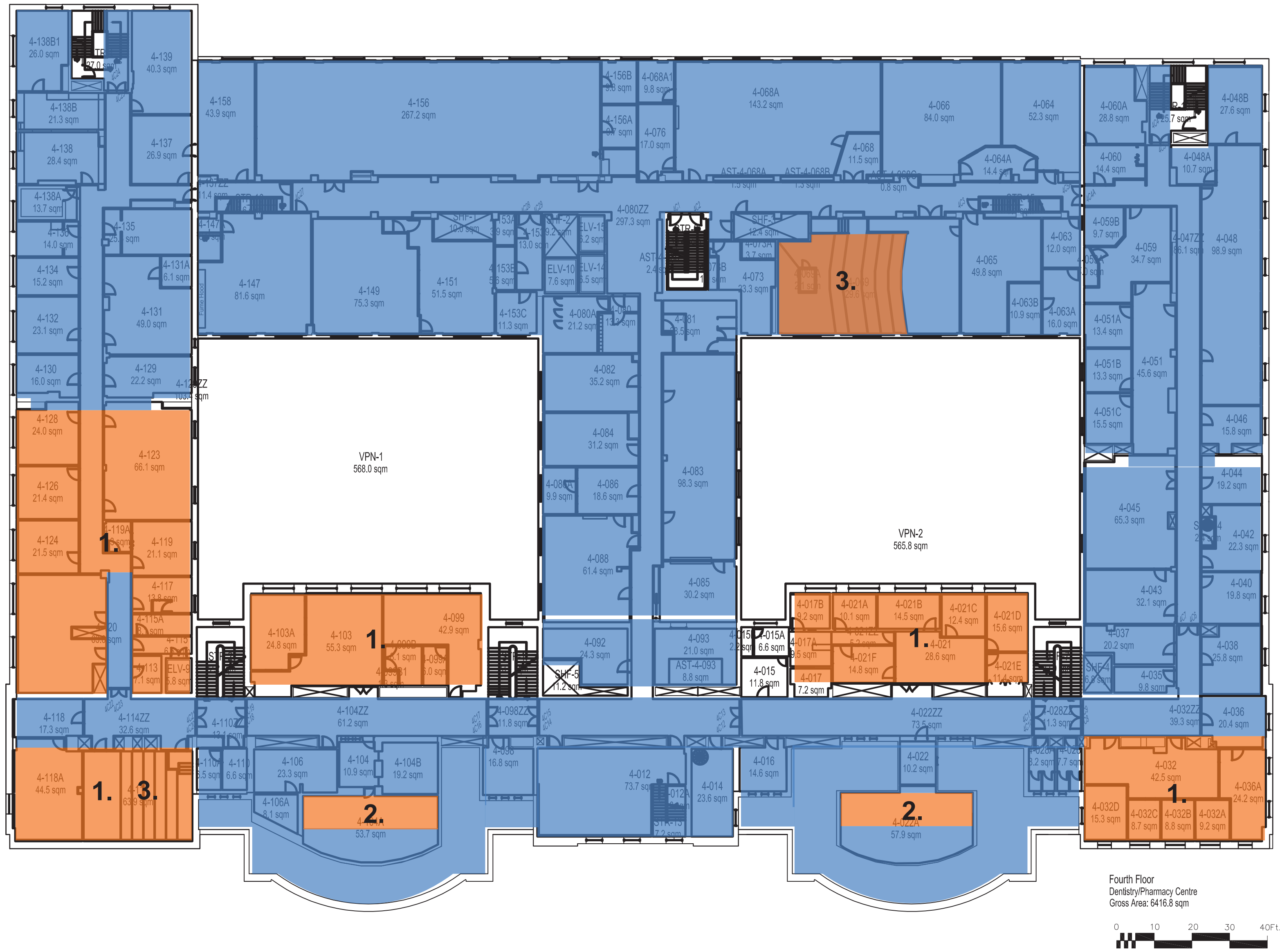
5.028 Combustible Construction - Level 3

Level 4 - Combustible Construction

1. Wood floor - 1-1/2" tongue and groove subfloor spanning between steel beams encased in concrete (inverted slab detail)

2. Theatre clerestory light well openings. West side is covered over with a diagonal ship-lap wood subfloor sheathing supported on a series of steel beams encased in concrete. Exterior walls and roof of the clerestory are 2x4 mill construction bolted to and spanning between steel angle frames.

3. Wood framed tiered seating [to be confirmed]



Wood Frame/Combustible Construction

Slab on Grade

Suspended Reinforced Slab

Combustible Construction - Level 4

Level 5 - Combustible Construction

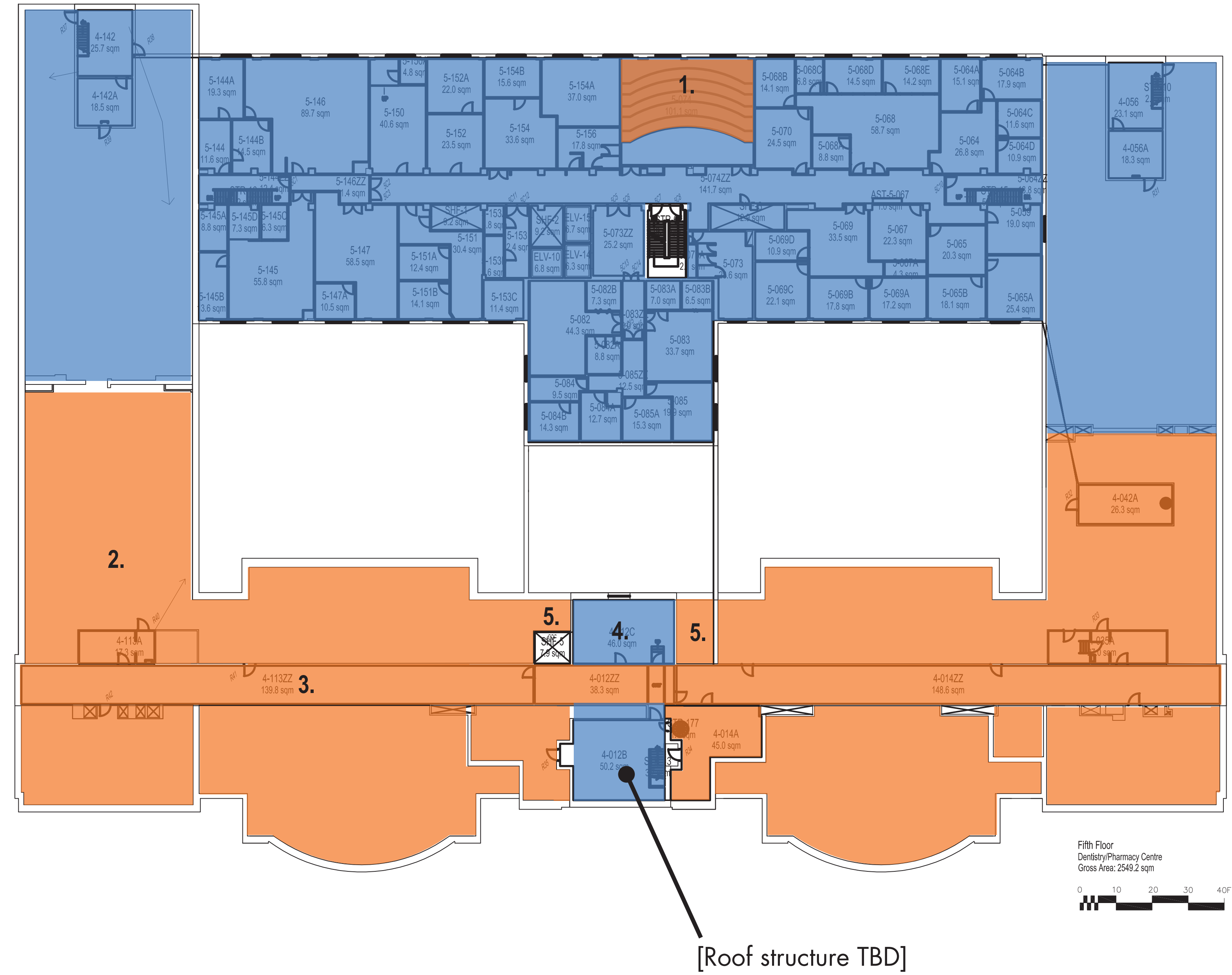
1. Wood frame tiered seating (to be removed)

2. 1x6 nominal ship lap wood plank roof sheathing on 2x4 rafters (typ.)

3. 2x4 Milldeck roof construction over central "wind tunnel" corridor bearing on masonry walls. Entire wind tunnel interior finish is plaster on terra cotta tile furring. Ceiling is also plaster on wire mesh fastened to mill deck.

4. Concrete slab floor, wood frame (2x6 rafters/1x6 wood plank sheathing) Gambrel roof.
Portions of roof framing bear on milldeck on interior, others bear on masonry walls.

5. Typical attic roof construction.



Wood Frame/Combustible Construction

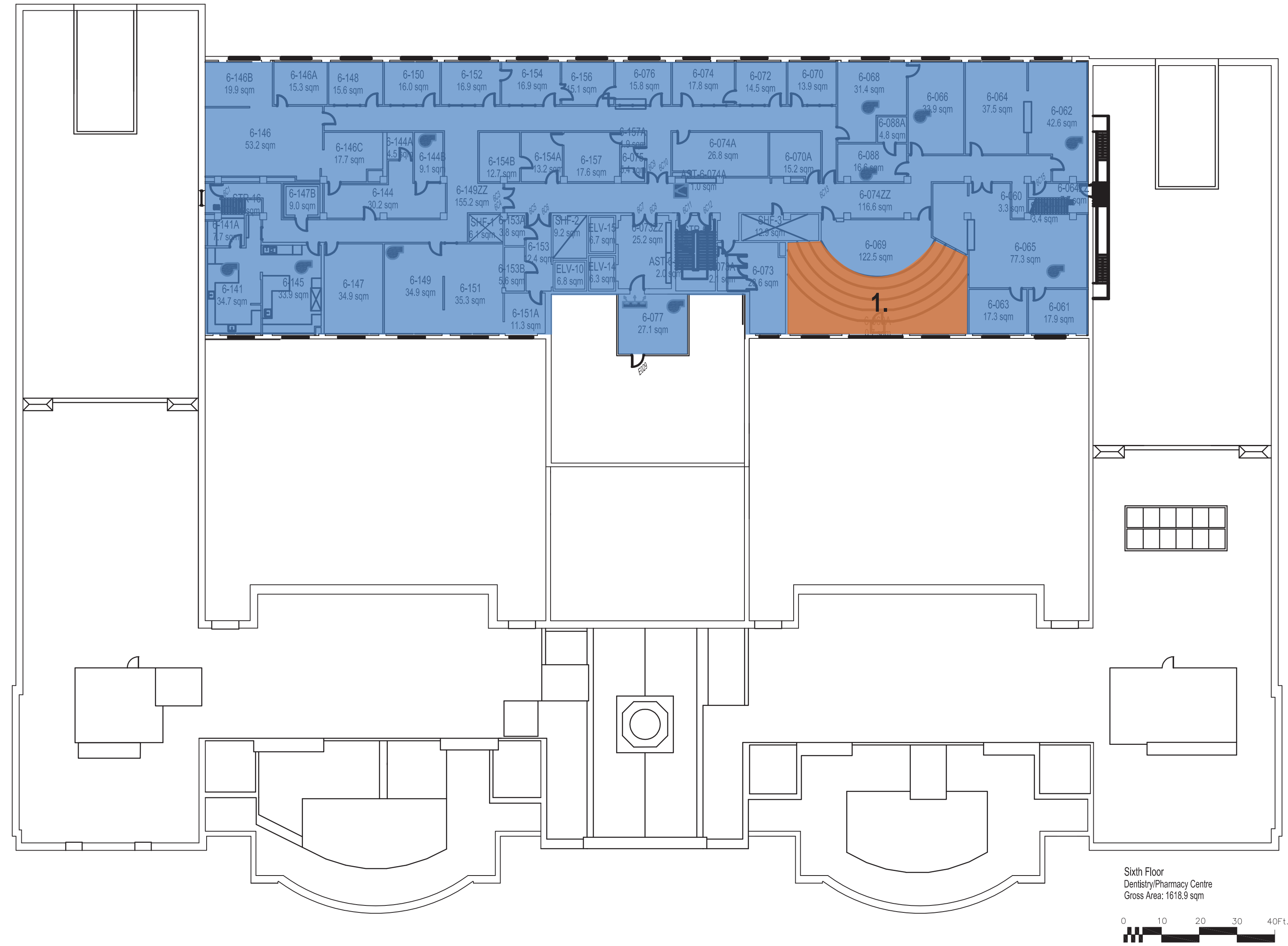
Slab on Grade

Suspended Reinforced Slab

5.030 Combustible Construction - Level 5

Level 6 - Combustible Construction

1. Wood frame tiered seating (to be removed)



Wood Frame/Combustible Construction

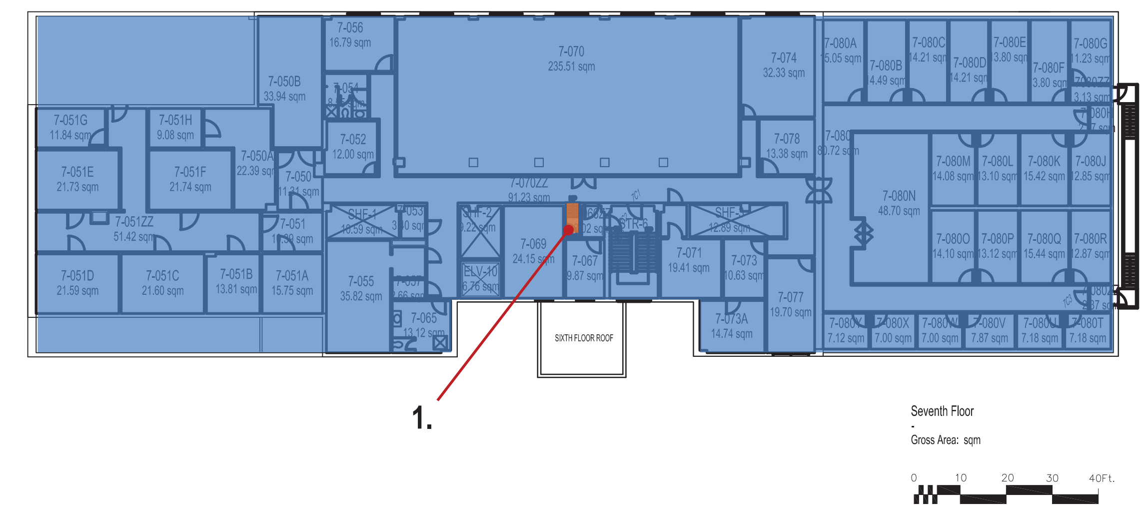
Slab on Grade

Suspended Reinforced Slab

Combustible Construction - Level 6

Seventh Floor - Combustible Construction

1. Wood frame stair (to be removed)

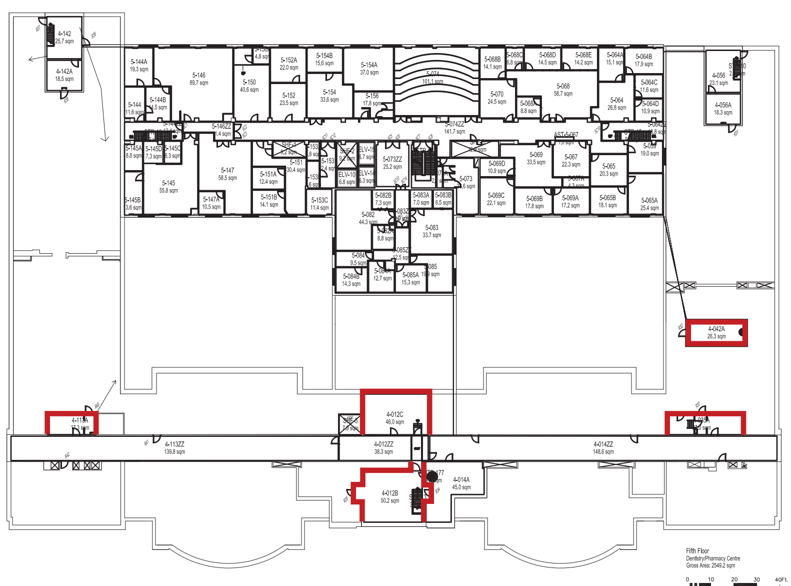


Wood Frame/Combustible Construction

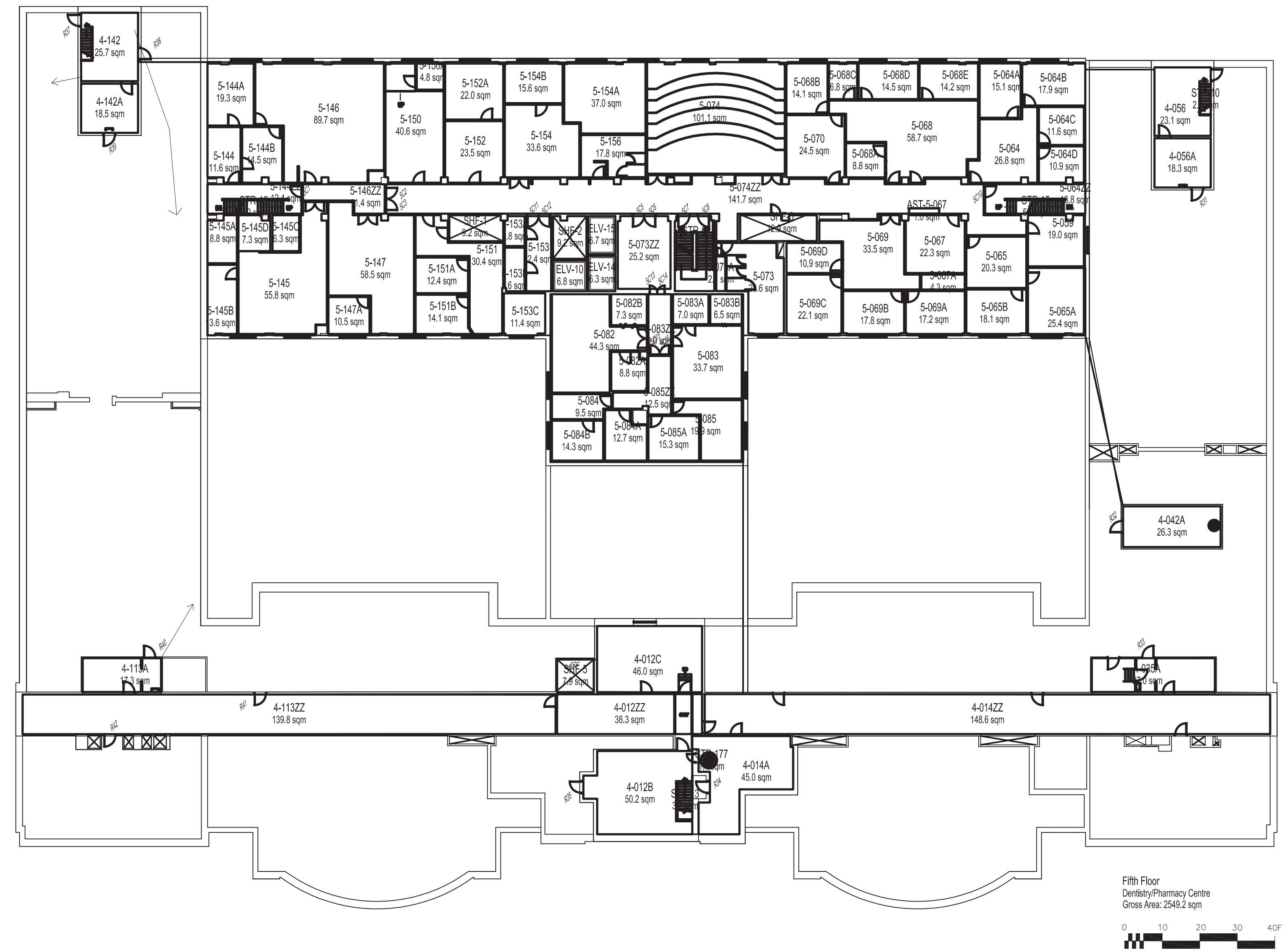
Slab on Grade

Suspended Reinforced Slab

5.032 Combustible Construction - Level 7



Mechanical Penthouse and Doghouse



Combustible Construction - Combustible Cladding

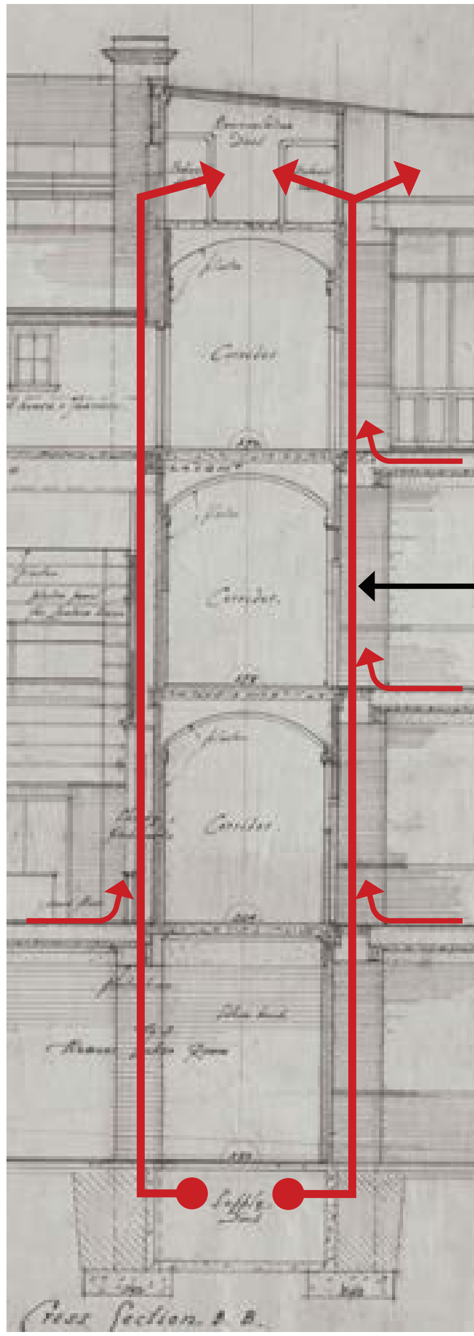
Basement - Concealed Spaces

1. Supply duct and pipe chase (both concrete encased) network beneath 1922 building - connected to vertical shafts through building and underground to north power plant.

Floor to floor connections

Service Tunnel

First Floor - Concealed Spaces



Within double structure lining central corridor of 1922 building masonry shafts extend from basement level (concrete supply duct beneath central corridor) to fourth floor attic and “wind tunnel” and are currently unprotected. Connections to these vertical shafts exist at each floor level.

A. 1922 Main Corridor Section

The original 1922 building has masonry shafts connecting the sub-basement supply duct with the “wind tunnel” running east west above the fourth floor corridor within the roof space. Connections exist at each floor and to the roof/attic space.

Floor to floor connections

Concealed space

Stantec Architecture Ltd.

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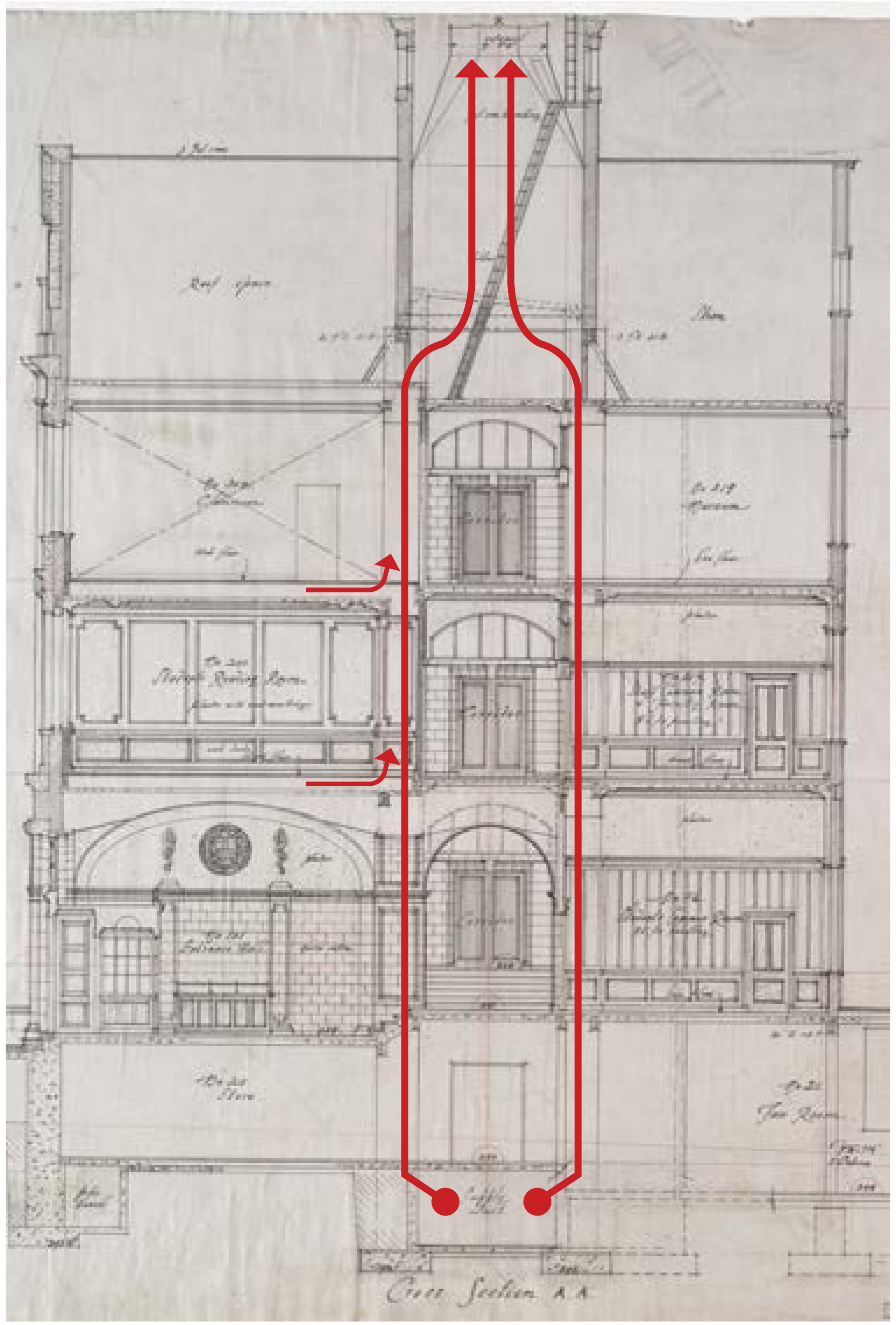
DENTISTRY PHARMACY BUILDING REDEVELOPMENT

5. CODE AND SUPPORTING DRAWINGS

CONCEALED SPACES

Concealed Spaces - Level 1

Second Floor - Concealed Spaces



A. 1922 Main Corridor Section

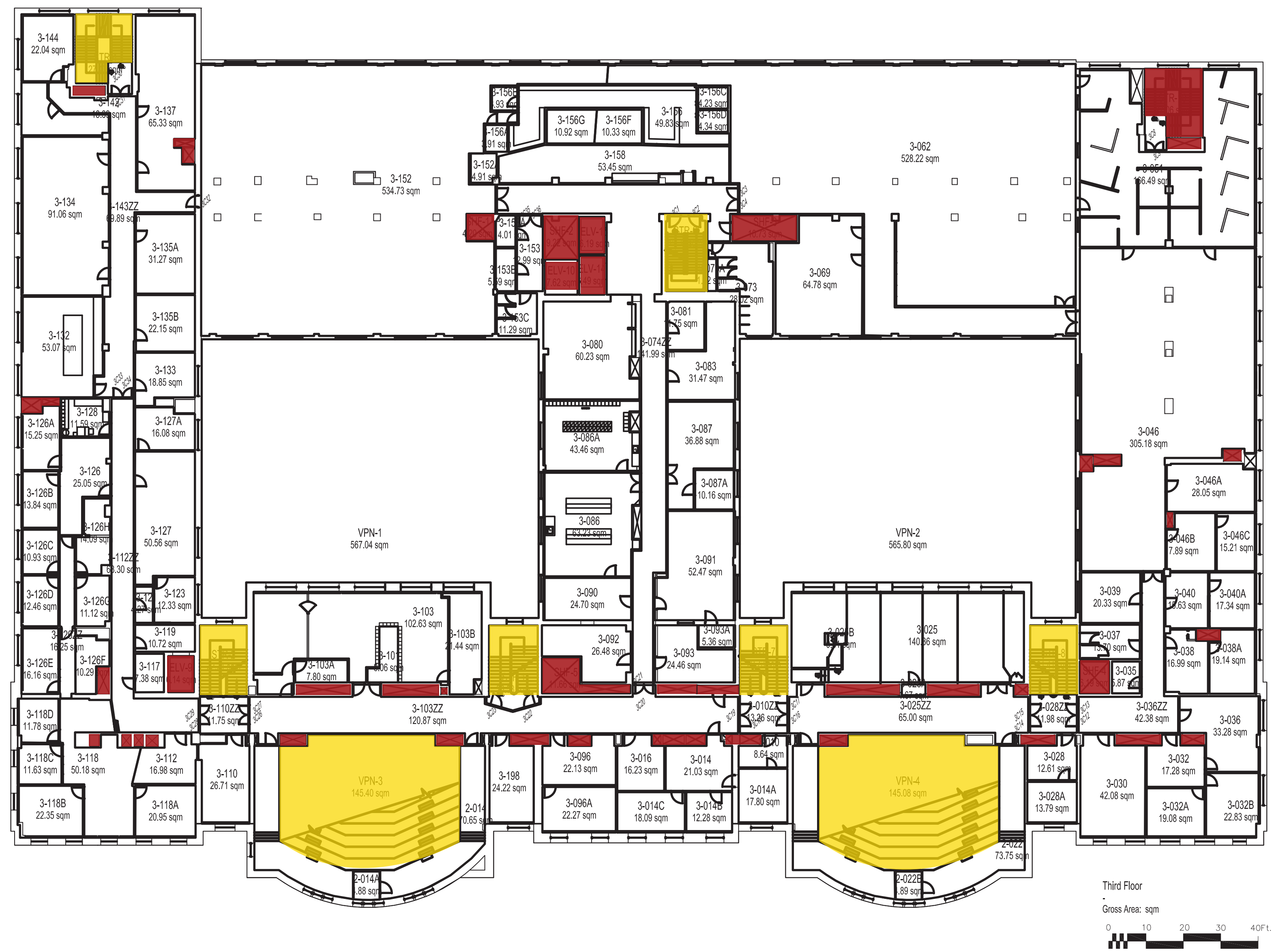
Assumed airflow of original mechanical system.

Floor to floor connections

Concealed Spaces

5.042 Concealed Spaces - Level 2

Third Floor - Concealed Spaces



Floor to floor connections

Concealed Spaces

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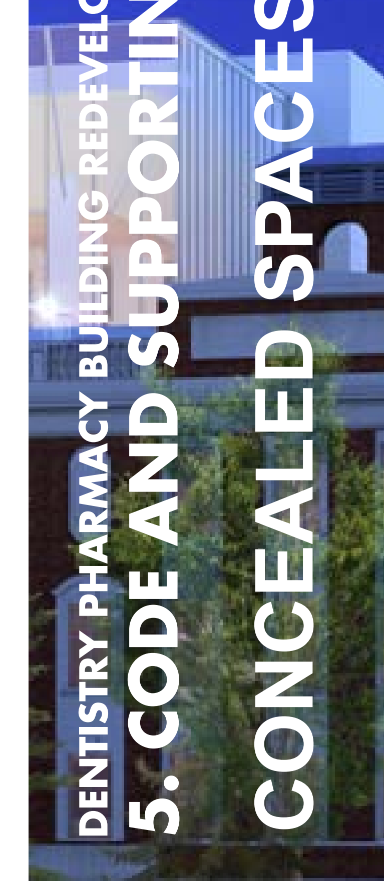


DENTISTRY PHARMACY BUILDING REDEVELOPMENT

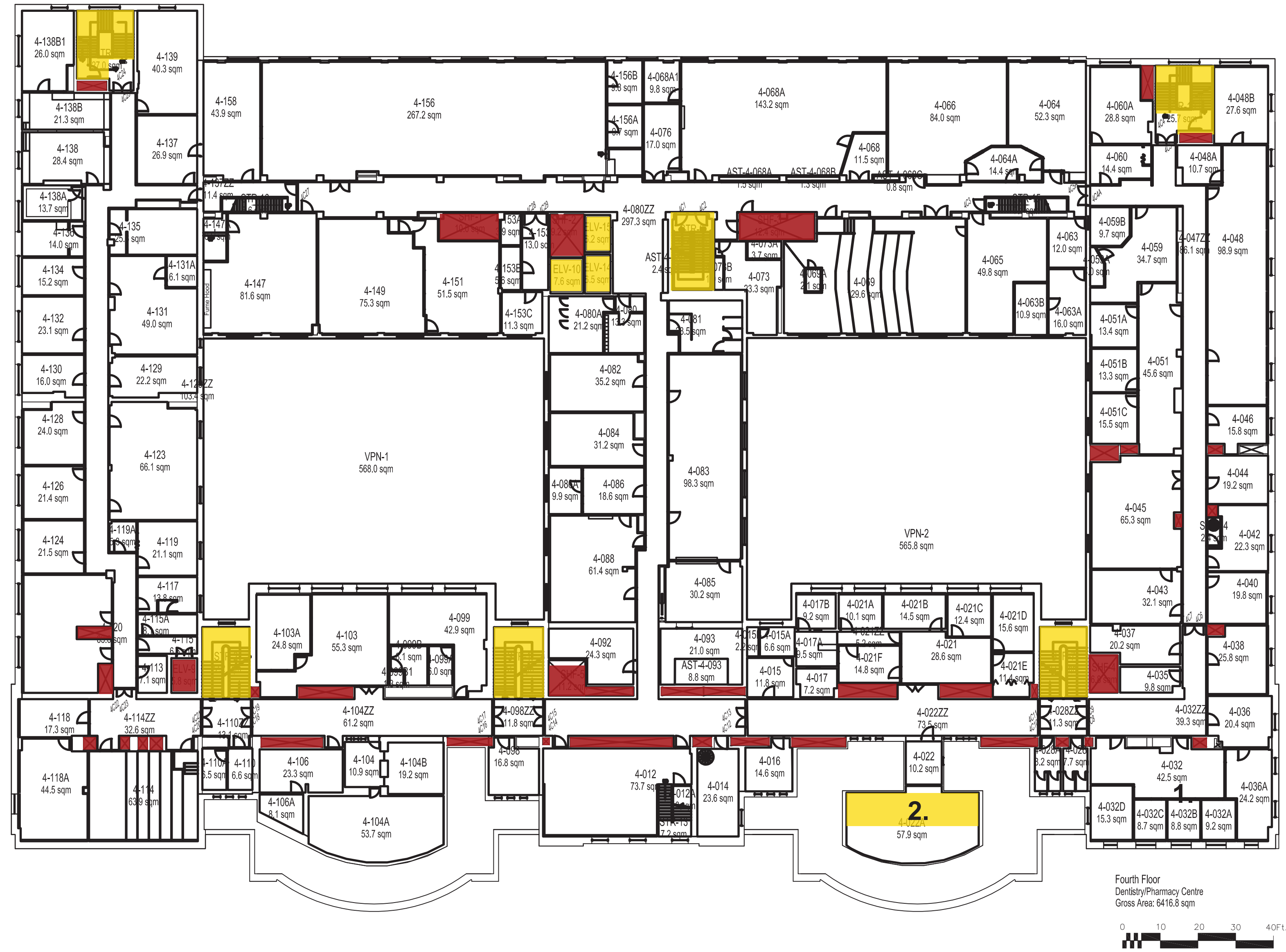
5. CODE AND SUPPORTING DRAWINGS

CONCEALED SPACES

Concealed Spaces - Level 3

5.043

Fourth Floor - Concealed Spaces

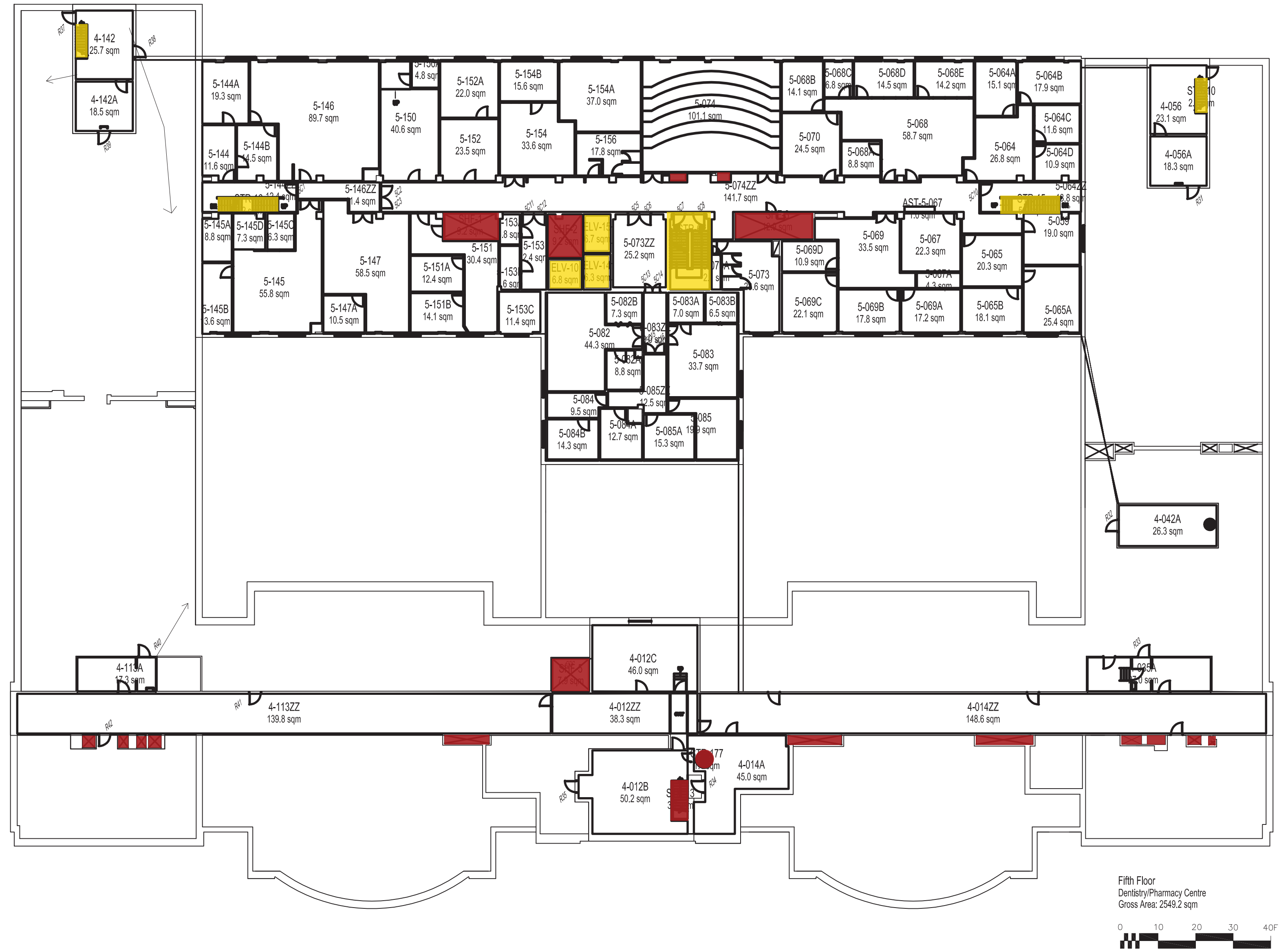


Floor to floor connections

Concealed Spaces

5.044 Concealed Spaces - Level 4

Level 5 - Concealed Spaces



Floor to floor connections

Concealed Spaces

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DENTISTRY PHARMACY BUILDING REDEVELOPMENT

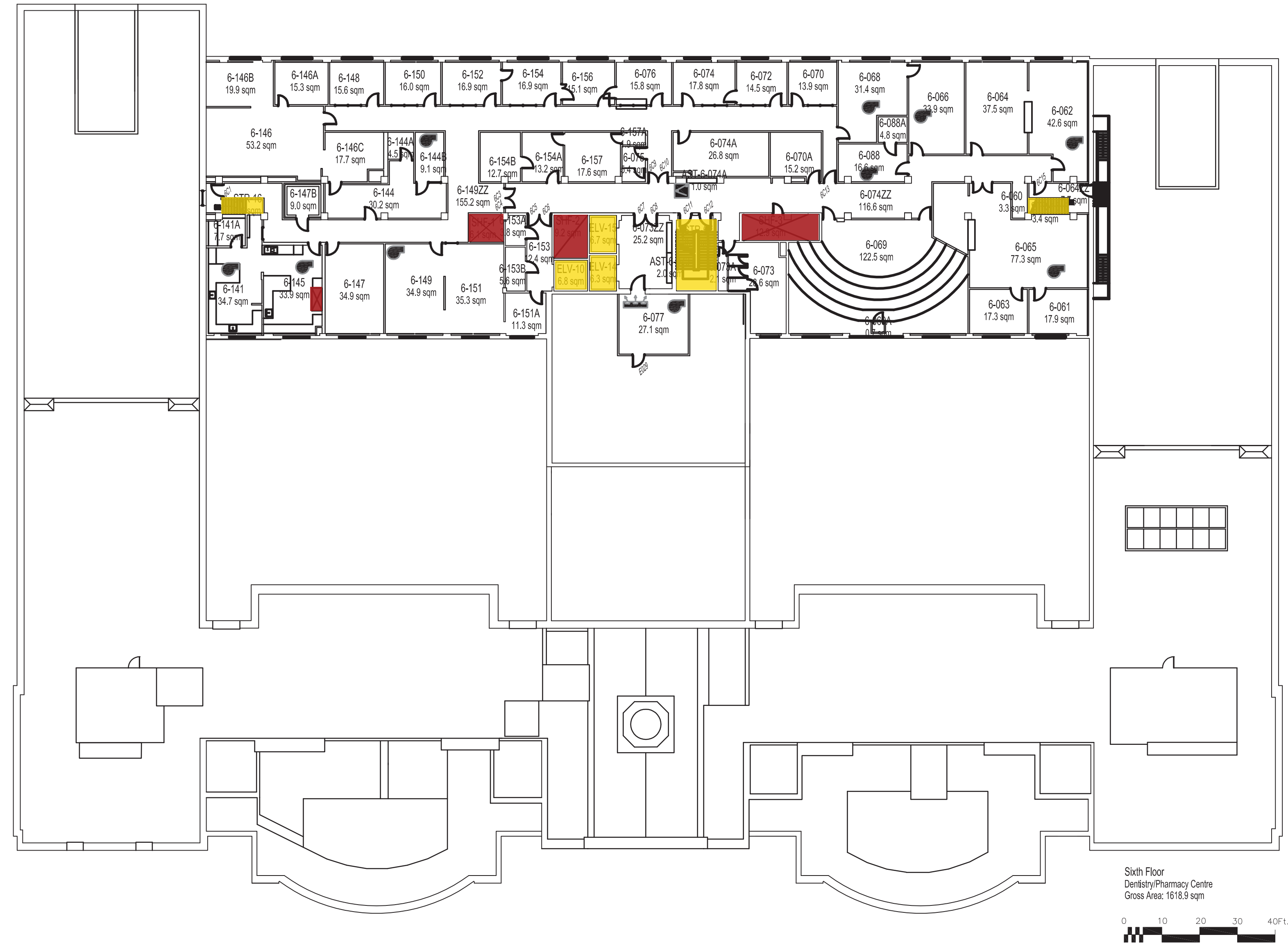
5. CODE AND SUPPORTING DRAWINGS

CONCEALED SPACES

Concealed Spaces - Level 5

Sixth Floor - Combustible Construction

1. Wood frame tiered seating



Floor to floor connections

Concealed Spaces

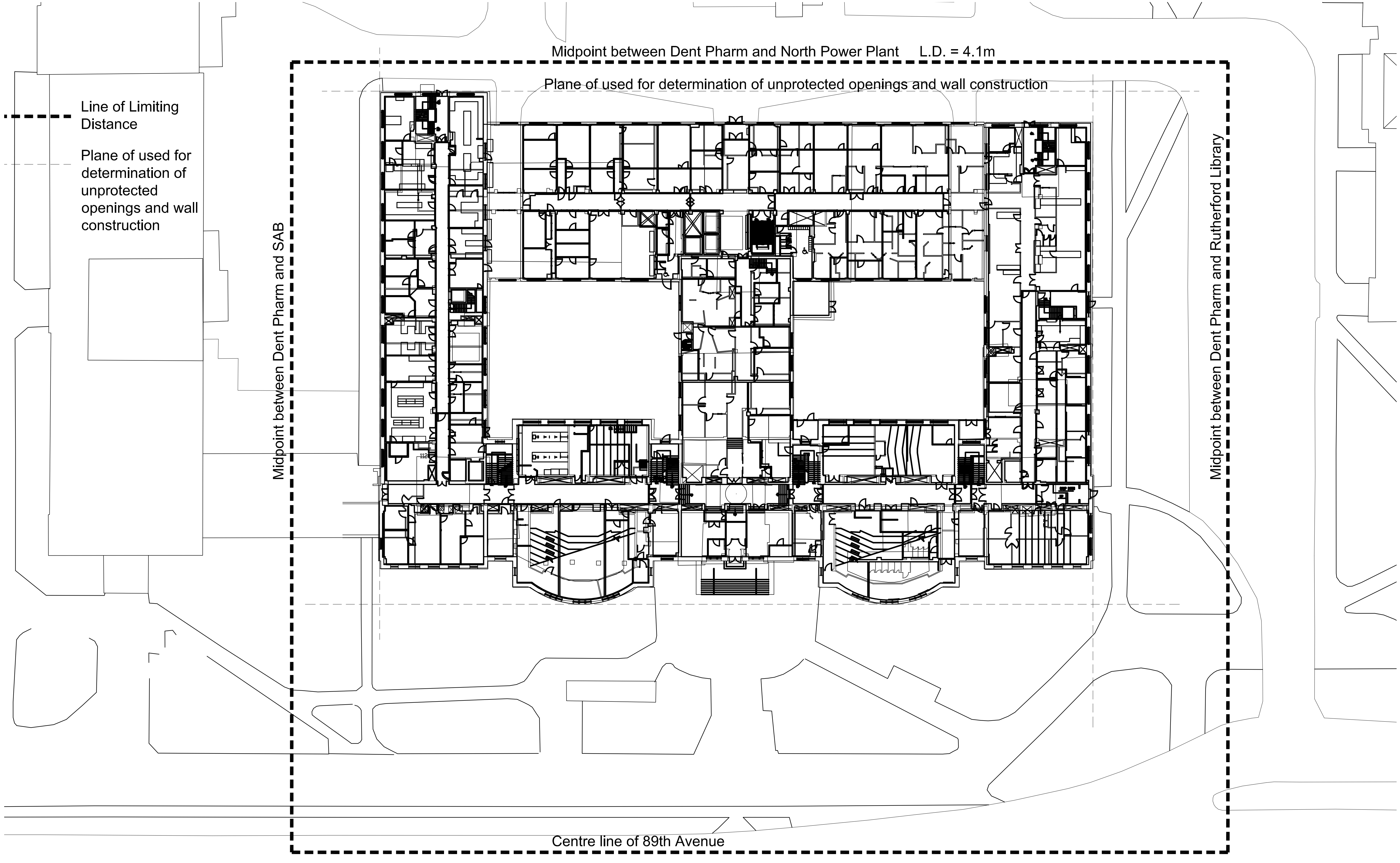
5.046 Concealed Spaces - Level 6

Seventh Floor - Combustible Construction

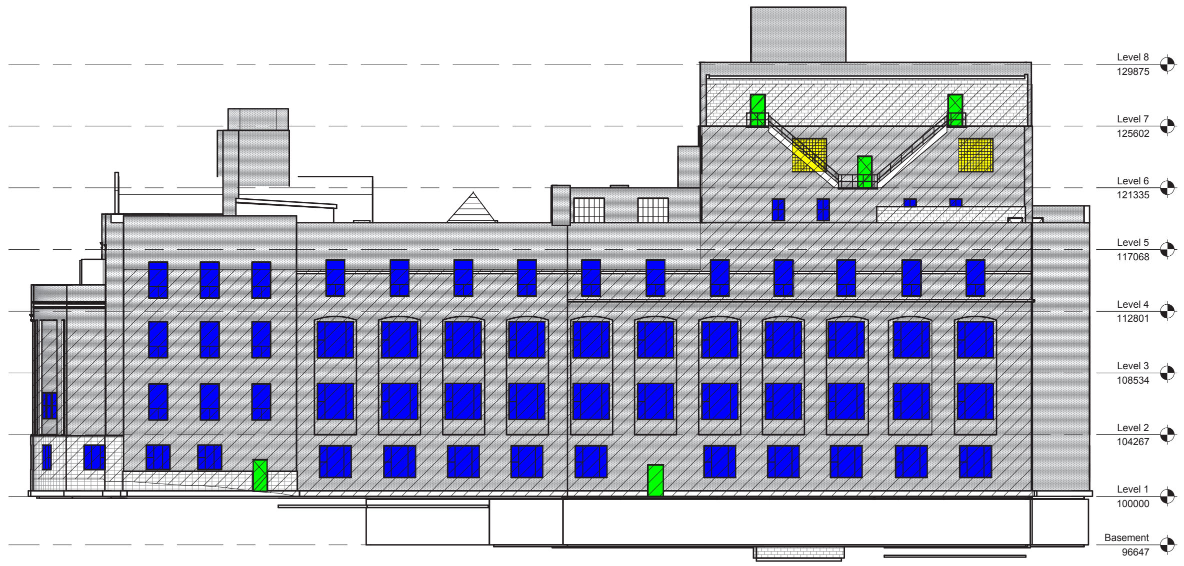
Floor to floor connections

Concealed Spaces

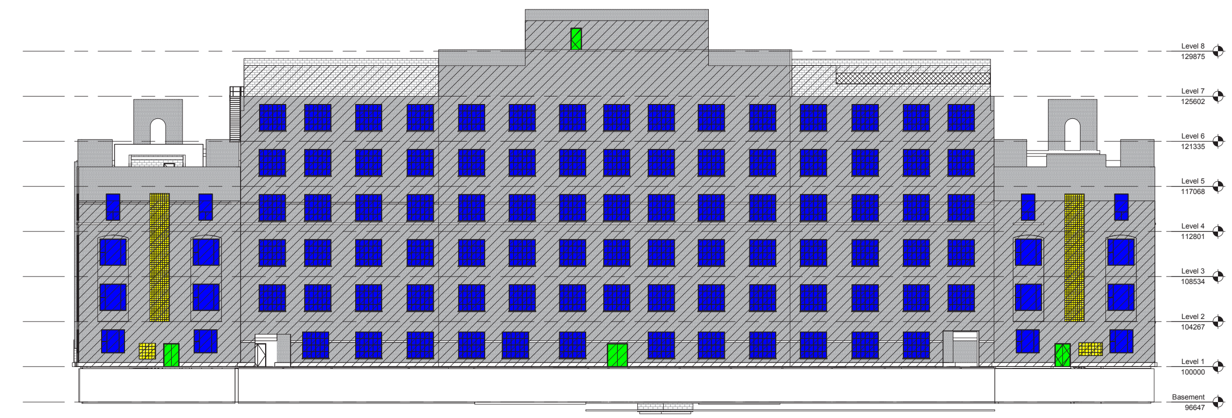
Concealed Spaces - Penthouse



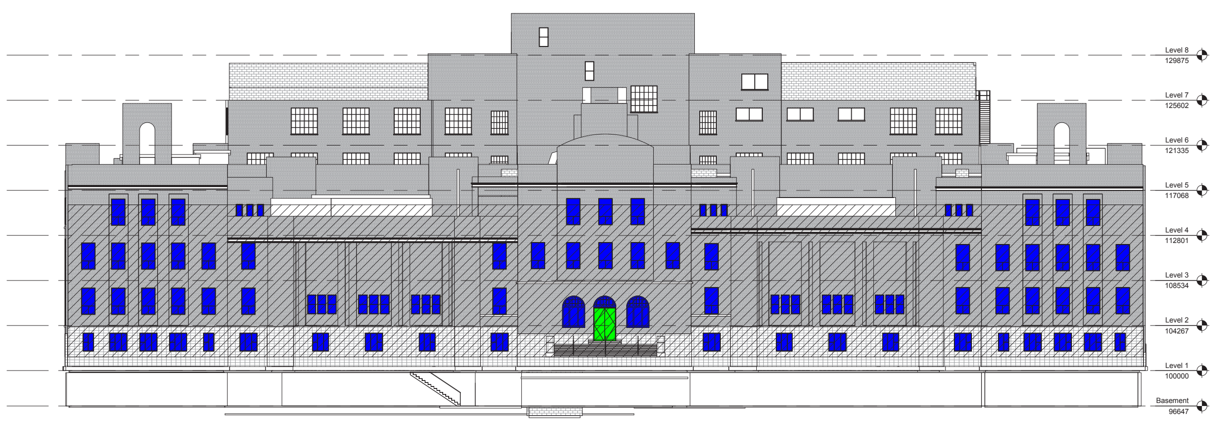
5.050 Limiting Distance



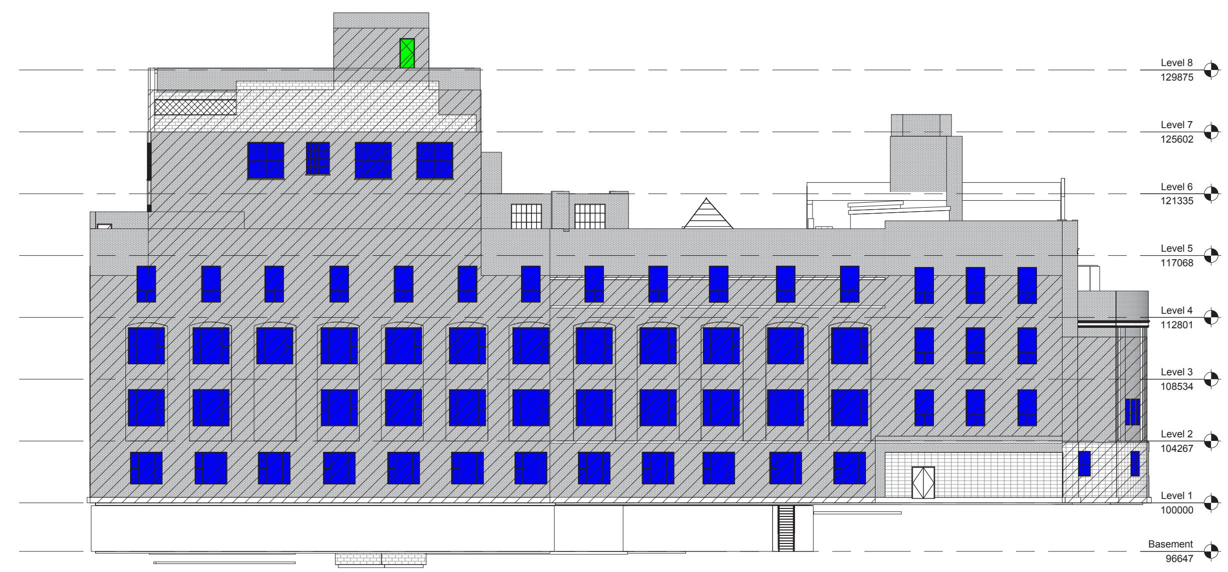
AREA OF BUILDING FACE = 1336.174 SQ. M.
AREA OF WINDOWS = 267.026 SQ. M.
AREA OF DOORS = 11.359 SQ. M.
AREA OF GLASS BLOCK = 10.891 SQ. M.



AREA OF BUILDING FACE = 2562.559 SQ. M.
AREA OF WINDOWS = 626.863 SQ. M.
AREA OF DOORS = 12.688 SQ. M.
AREA OF GLASS BLOCK = 50.049 SQ. M.



AREA OF BUILDING FACE = 1464.917 SQ. M.
AREA OF WINDOWS = 233.347 SQ. M.
AREA OF DOORS = 6.636 SQ. M.
AREA OF GLASS BLOCK = 0 SQ. M.



AREA OF BUILDING FACE = 1384.301 SQ. M.
AREA OF WINDOWS = 296.345 SQ. M.
AREA OF DOORS = 2.062 SQ. M.
AREA OF GLASS BLOCK = 0 SQ. M.

Dentistry Pharmacy Building Redevelopment

Spatial Separation and Exposure Protection

Wall	Area of Exposing Building Face		Area of Unprotected Openings		% Openings	Limiting Distance		Permitted Max % of Openings	Proposed % of Openings	FRR Req'd	Listed Design or Description	Type of Construction required	Type of Cladding Required
North	2562	m2	690	m2	26.9%	4.1	m	30%		45min		Combustible or Non Combustible	Non combustible
East	1336	m2	290	m2	21.7%	19.3	m	100%		45min		"	Combustible or Non combustible
South	1464	m2	240	m2	16.4%	35.6	m	100%		45min		"	Combustible or Non combustible
West	1384	m2	299	m2	21.6%	12.6	m	100%		45min		"	Combustible or Non combustible

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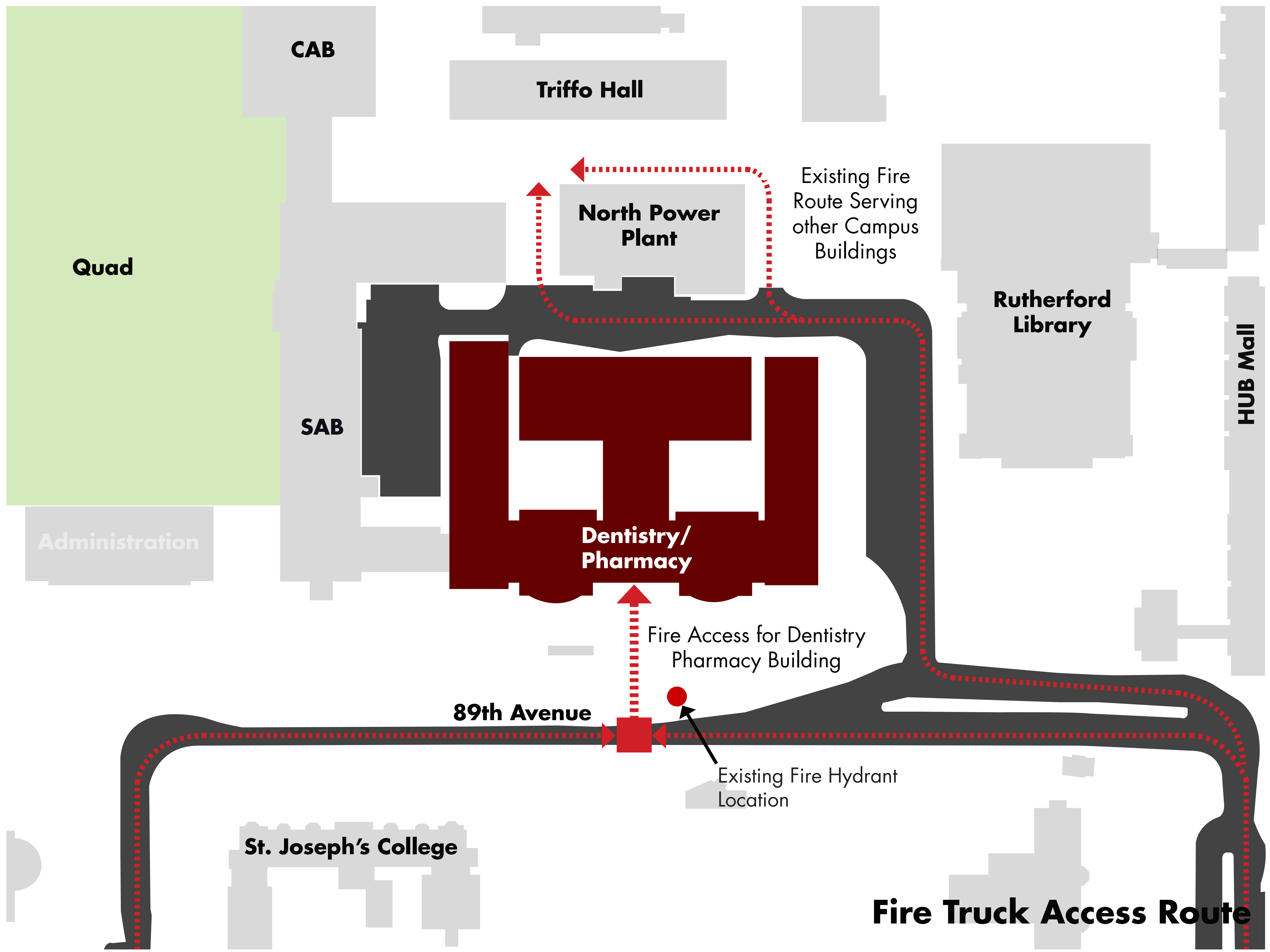
DENTISTRY PHARMACY BUILDING REDEVELOPMENT

5. CODE AND SUPPORTING DRAWINGS

SPATIAL SEPARATION

Unprotected Openings

5.051

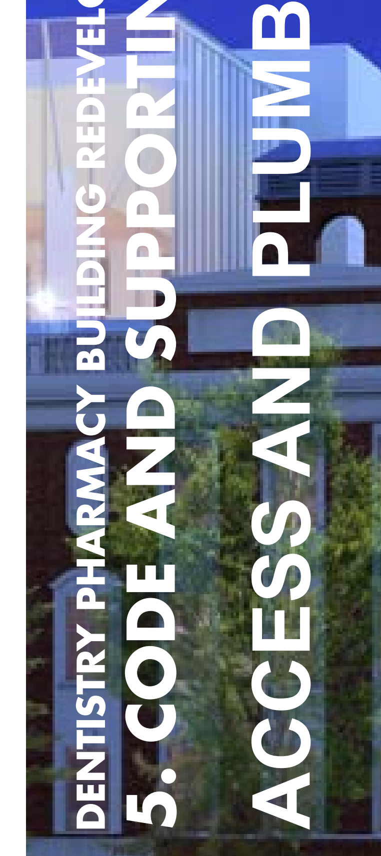


5.060 Fire Truck Access

Fixture Break Down by Location		Fixture Counts per sex													
		Required totals		**Provided totals**		**Male**				**Female**			**UTR/Unisex**		
		Male	*Female*	**Male**	**Female**		*Toilet*	*Urinal*	*Lavatories*		*Toilet*	*Lavatories*		*Toilet*	*Lav*
Basement	Central Core	4	4	4	4	4	2	2	2	4	4	2	0	0	0
Level 1	North Core					0	0	0	0	0	0	0	0	0	0
	East Core					6	2	3	4	8	8	4	1	1	1
	West Core					6	2	3	4	8	8	4	1	1	1
Level 1 Totals		12	16	12	16	12	4	6	8	16	16	8	2	2	2
Level 2	North East Core					2	1	1	1	3	3	2	0	0	0
	North West Core					2	1	1	1	3	3	2	1	1	1
	East Core					4	2	2	2	4	4	2	0	0	0
	West Core					4	2	2	2	4	4	2	0	0	0
Level 2 Totals		10	13	12	14	12	6	6	6	14	14	8	1	1	1
Level 3	North East Core					2	1	1	1	3	3	1	0	0	0
	North West Core					2	1	1	1	3	3	1	1	1	1
	East Core					2	1	1	1	2	2	1	0	0	0
	West Core					2	1	1	1	2	2	1	0	0	0
Level 3 Totals		9	11	9 *	11 *	8	4	4	4	10	10	4	1	1	1
Level 4	North East Core					2	1	2	1	2	2	1	1	1	1
	North West Core					2	1	2	1	2	2	1	0	0	0
	East Core					2	1	1	1	2	2	1	0	0	0
	West Core					2	1	1	1	2	2	1	0	0	0
Level 4 Totals		6	6	8	8	8	4	6	4	8	8	4	1	1	1
Level 5	North East Core					2	1	1	1	2	2	1	1	1	1
	North West Core					2	1	1	1	2	2	1	0	0	0
Level 5 Totals		4	4	4	4	4	2	2	2	4	4	2	1	1	1
Level 6	North East Core					2	1	1	1	2	2	1	1	1	1
	North West Core					2	1	1	1	2	2	1	1	1	1
Level 6 Totals		3	3	4	4	4	2	2	2	4	4	2	2	2	2
Level 7	Mechanical Penthouse	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Total Fixtures		48	57	53	61	52	24	28	28	60	60	30	8	8	8

* UTR used in count

Note: For the Level 1 Plumbing Fixture Count an occupancy load of 350 persons was used for calculation purposes to serve a seated dining type event. The design occupant load used for exiting assumes that the standing room occupancy is a temporary event only and washrooms would not be required to serve the increased population.

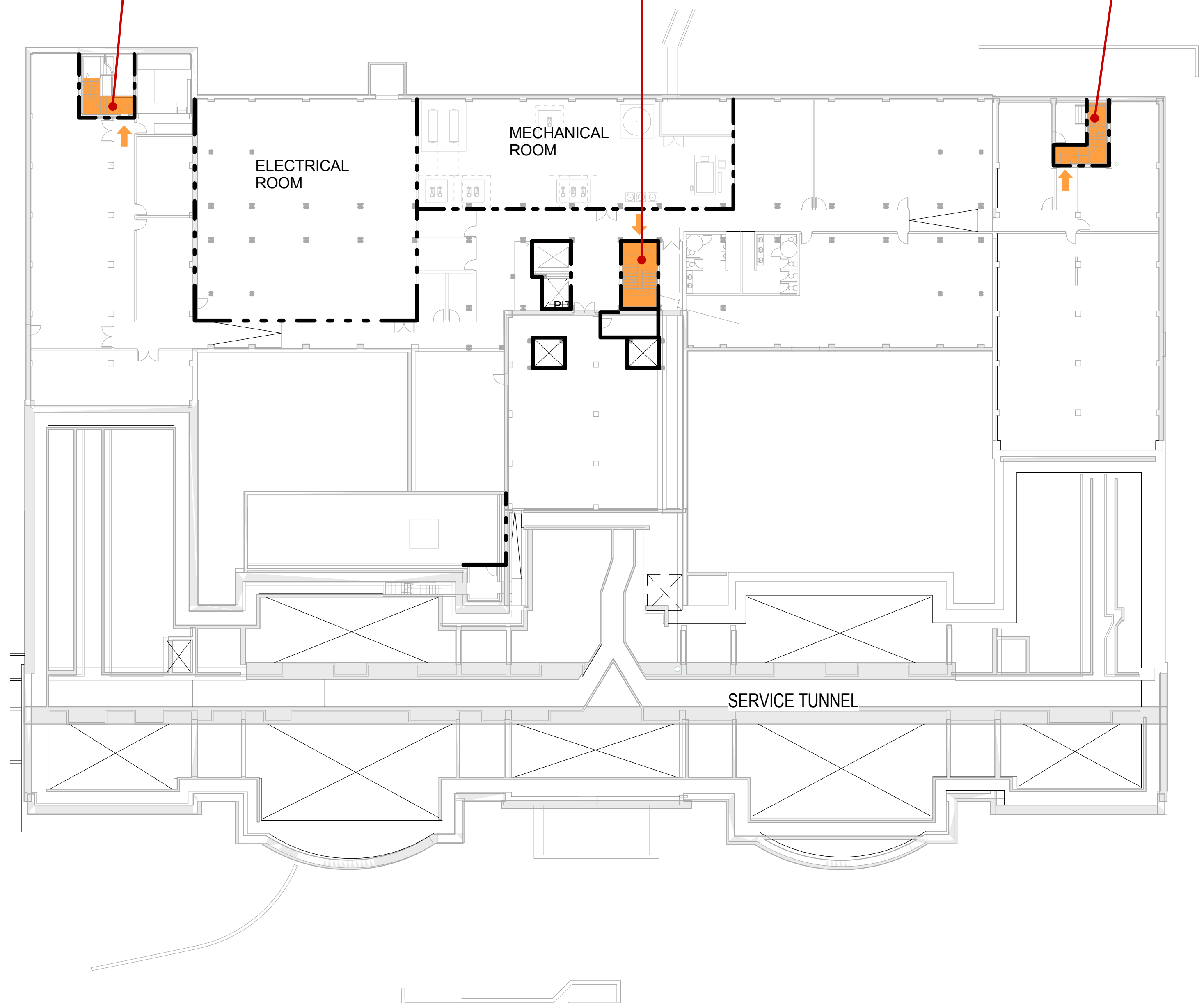


Plumbing Fixture Count

Stair #7
Door Width: 900mm (147 occupants)
Stair Width: 1715mm (214 occupants)
Capacity: 147 Occupants

Stair #6
Door Width: 900mm (147 occupants)
Stair Width: 1335mm (166 occupants)
Capacity: 147 occupants

Stair #5
Door Width: 900mm (147 occupants)
Stair Width: 1715mm (214 occupants)
Capacity: 147 Occupants



<u>Exiting Summary:</u>
Basement Occupant Load: 126 Occupants
Exit Capacity: 441

FIRE RESISTANCE RATINGS LEGEND

- EXIT
- PRESSURIZED VESTIBULE
- 1 HR FRR
- 2 HR FRR
- 3 HR FRR
- NON RATED FIRE SEPARATION

5.200 Basement - Fire Separations and Exit Capacity

Stair #7
Note: Not counted as a Level 1 exit. Used for upper floors exiting only.
Door Width: 1800mm
Capacity: 295 occupants

North-West Entry
Door Width: 2700mm
Capacity: 442

North Central Entry
Door Width: 3600mm
Capacity: 590

Stair #6
Note: Not counted as a Level 1 exit. Used for upper floor exiting only.
Door Width: 1800mm
Capacity: 277 occupants

North-East Entry
Door Width: 2700mm
Capacity: 442

Stair #5
Note: Not counted as a Level 1 exit. Used for upper floors exiting only.
Door Width: 1800mm
Capacity: 295 occupants

Level 1 Occupant Load: 2680 Occupants
Exit Capacity: 3486

East Exit
Door Width: 900
Capacity: 147 occupants

FIRE RESISTANCE RATINGS LEGEND

EXIT
PRESSURIZED VESTIBULE
1 HR FRR
2 HR FRR
3 HR FRR
NON RATED FIRE SEPARATION

Stair #1
Door Width: 1800mm (295 occupants)
Stair Width: 1638mm (204 occupants)
Capacity: 204 occupants

Level 1 West Entry
Door Width: 1800mm
Capacity: 295

Level 1 East Entry
Door Width: 1800mm
Capacity: 295

Stair #4
Door Width: 1800mm (295 occupants)
Stair Width: 1638mm (204 occupants)
Capacity: 204 occupants

Level 1 - Fire Separations and Exit Capacity

Stair #7
Door Width: 1800mm (295 occupants)
Stair Width: 1714mm (214 occupants)
Exit Area L2 to L1:
43.04m2 (143 occupants)

Capacity: 143 occupants

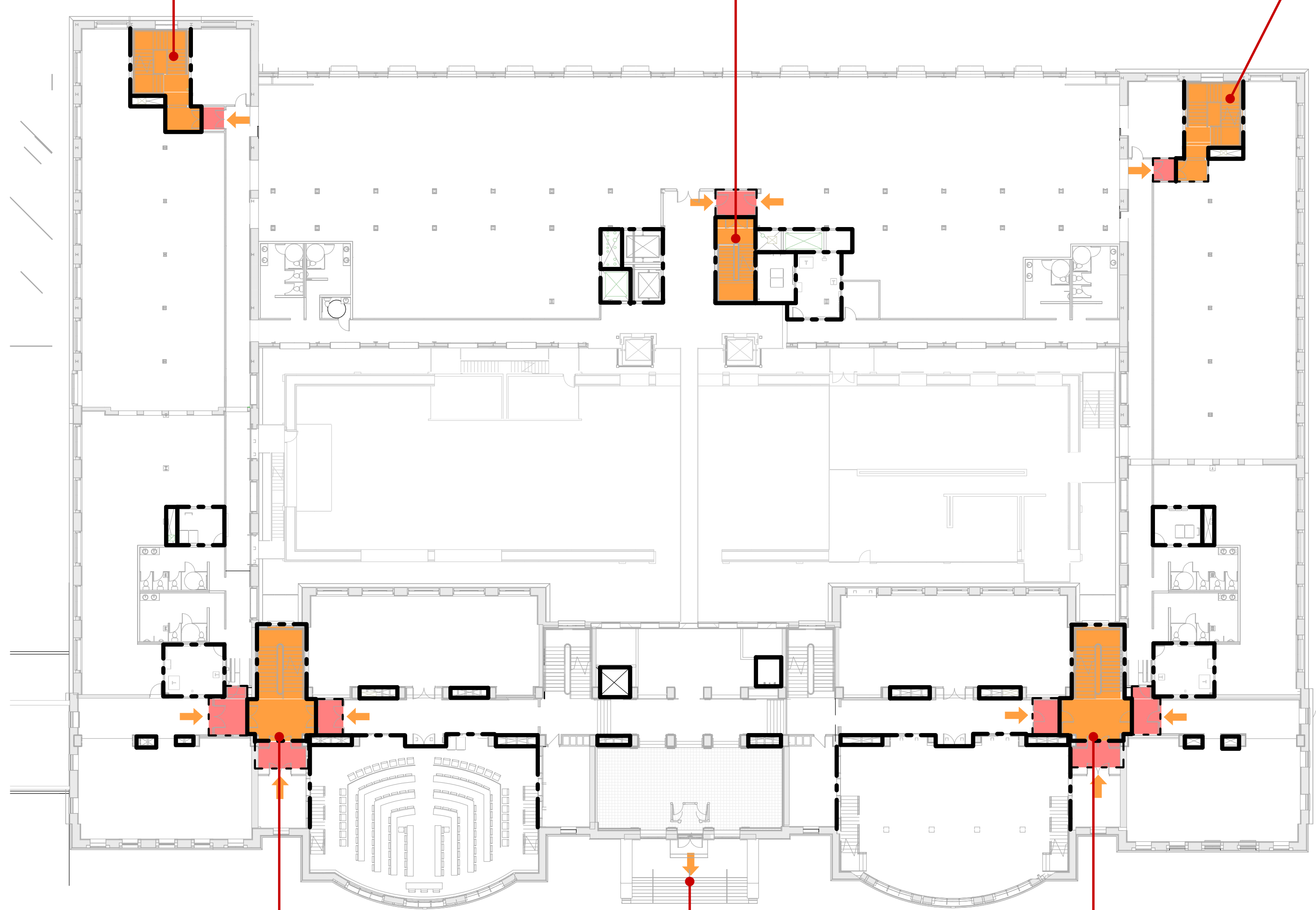
Stair #6
Door Width: 1800mm (295 occupants)
Stair Width: 1336mm (167 occupants)
Exit Area L2 to L1:
59.61m2 (199 occupants)

Capacity: 167 occupants

Stair #5
Door Width: 1800mm (295 occupants)
Stair Width: 1714mm (214 occupants)
Exit Area L2 to L1:
41.73m2 (139 occupants)

Capacity: 139 occupants

Exiting Summary:
Level 2 Occupant Load: 655 Occupants
Exit Capacity: 1102 occupants



FIRE RESISTANCE RATINGS LEGEND

EXIT
PRESSURIZED VESTIBULE
1 HR FRR
2 HR FRR
3 HR FRR
NON RATED FIRE SEPARATION

Stair #1
Door Width: 1800mm (295 occupants)
Stair Width: 1632mm (204 occupants)
Exit Area L2 to L1:
87.87m2 (293 occupants)

Capacity: 204 occupants

Level 2 Entry
Door Width: 1500mm (245 occupants)

Capacity: 245 occupants

Stair #4
Door Width: 1800mm (295 occupants)
Stair Width: 1632mm (204 occupants)
Exit Area L2 to L1:
86.1m2 (287 occupants)

Capacity: 204 occupants

5.202 Level 2 - Fire Separations and Exit Capacity

Stair #7
Door Width: 900mm (147 occupants)
Stair Width: 1714mm (214 occupants)
Exit Area L2 to L1:
56.16m2 (187 occupants)

Capacity: 147 occupants

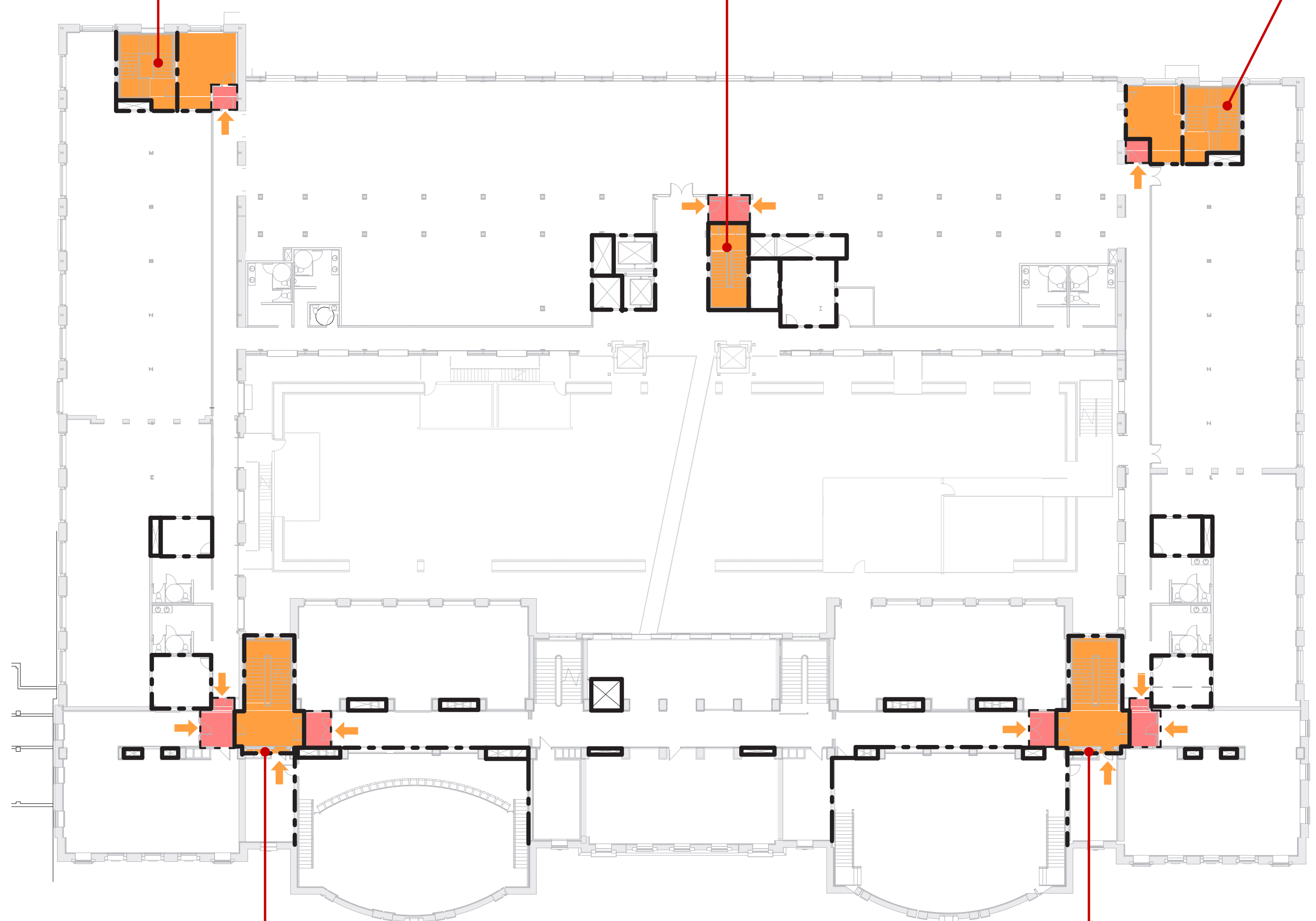
Stair #6
Door Width: 1800mm (295 occupants)
Stair Width: 1336mm (167 occupants)
Exit Area L2 to L1:
20.69m2 (69 occupants)

Capacity: 69 occupants

Stair #5
Door Width: 900mm (147 occupants)
Stair Width: 1714mm (214 occupants)
Exit Area L2 to L1:
53.36m2 (179 occupants)

Capacity: 147 occupants

Level 3 Occupant Load: 544 Occupants
Exit Capacity: 615



FIRE RESISTANCE RATINGS LEGEND

EXIT
PRESSURIZED VESTIBULE
1 HR FRR
2 HR FRR
3 HR FRR
NON RATED FIRE SEPARATION

Stair #1
Door Width: 1800mm (295 occupants)
Stair Width: 1632mm (204 occupants)
Exit Area L2 to L1:
37.98m2 (126 occupants)

Capacity: 126 occupants

Stair #4
Door Width: 1800mm (295 occupants)
Stair Width: 1632mm (204 occupants)
Exit Area L2 to L1:
37.98m2 (126 occupants)

Capacity: 126 occupants

Level 3 - Fire Separations and Exit Capacity

Stair #7
Door Width: 1800mm (295 occupants)
Stair Width: 1714mm (214 occupants)
Exit Area L2 to L1:
30.64m2 (102 occupants)

Capacity: 102 occupants

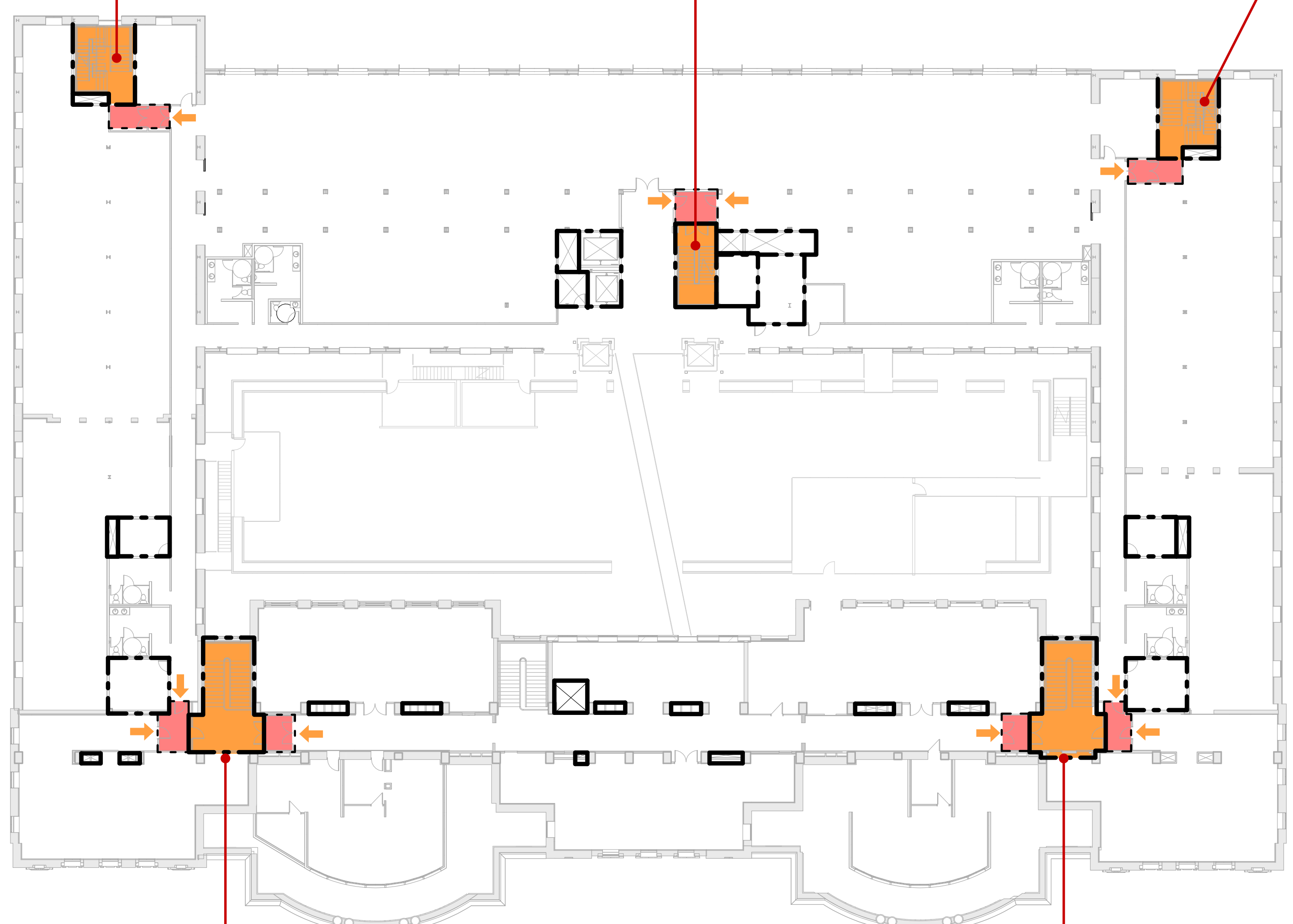
Stair #6
Door Width: 1800mm (295 occupants)
Stair Width: 1336mm (167 occupants)
Exit Area L2 to L1:
20.69m2 (69 occupants)

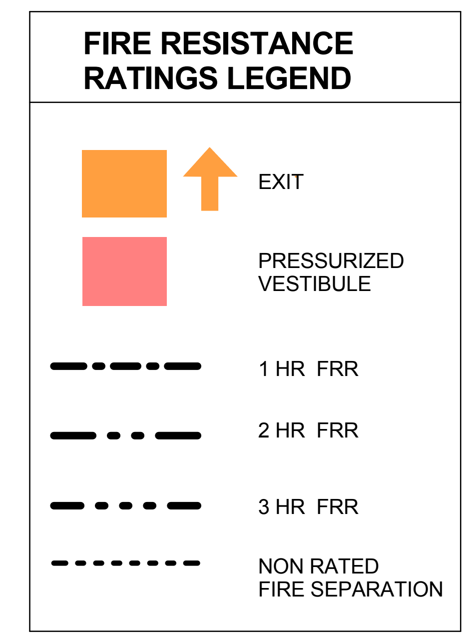
Capacity: 69 occupants

Stair #5
Door Width: 1800mm (295 occupants)
Stair Width: 1714mm (214 occupants)
Exit Area L2 to L1:
29.33m2 (98 occupants)

Capacity: 98 occupants

Level 4 Occupant Load: 345 Occupants
Exit Capacity: 615 occupants





Stair #1
Door Width: 1800mm (295 occupants)
Stair Width: 1632mm (204 occupants)
Exit Area L2 to L1:
37.98m2 (126 occupants)

Capacity: 126 occupants

Stair #4
Door Width: 1800mm (295 occupants)
Stair Width: 1632mm (204 occupants)
Exit Area L2 to L1:
37.98m2 (126 occupants)

Capacity: 126 occupants

5.204 Level 4 - Fire Separations and Exit Capacity

Stair #7
Door Width: 900mm (147 occupants)
Stair Width: 1714mm (214 occupants)
Exit Area L2 to L1:
89.86m2 (299 occupants)

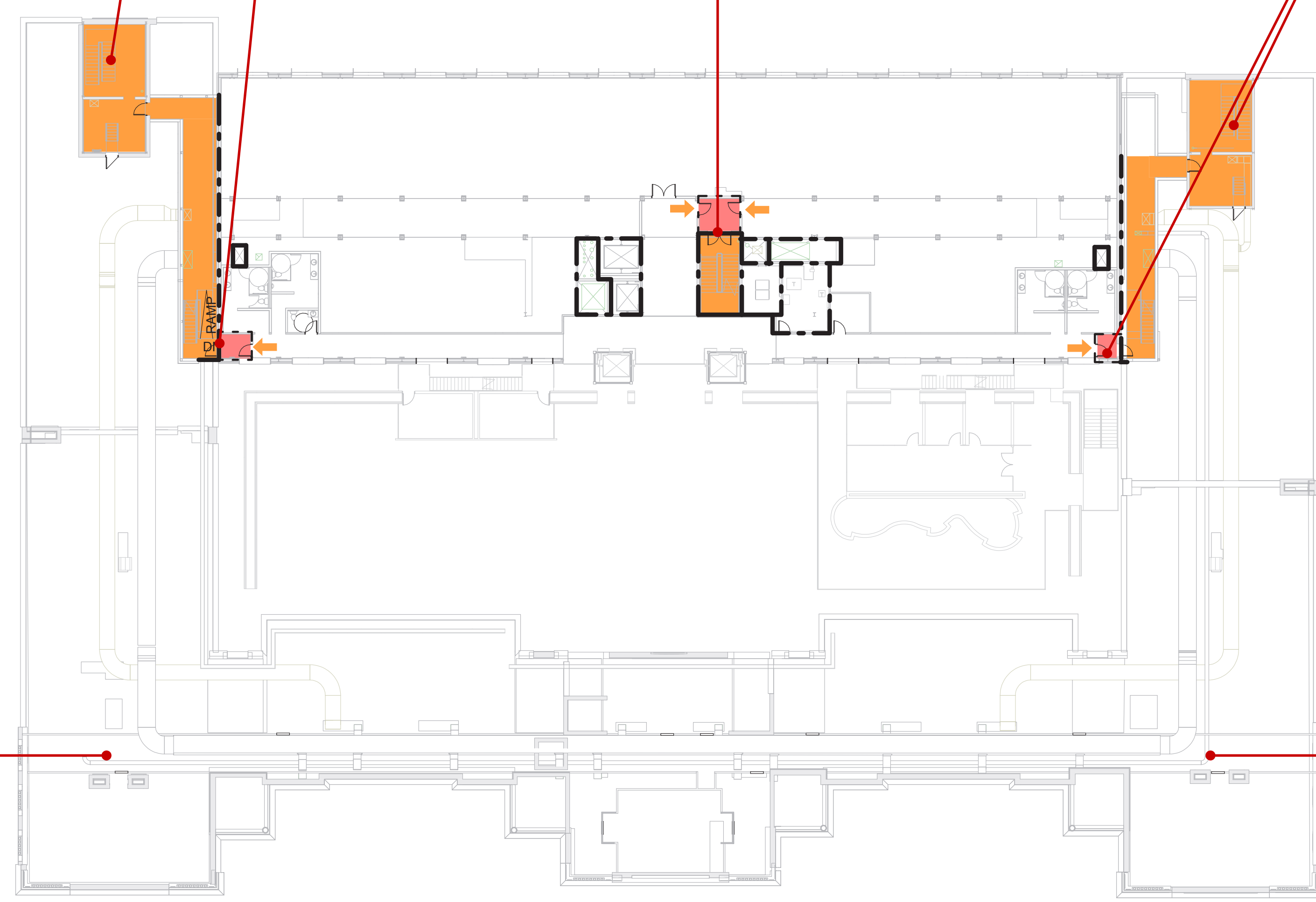
Capacity: 147 occupants

Stair #6
Door Width: 1800mm (295 occupants)
Stair Width: 1336mm (167 occupants)
Exit Area L2 to L1:
20.69m2 (69 occupants)

Capacity: 69 occupants

Stair #5
Door Width: 900mm (147 occupants)
Stair Width: 1714mm (214 occupants)
Exit Area L2 to L1:
76.65m2 (255 occupants)

Capacity: 147 occupants



Access Ladder to Level 4

Access Ladder to Level 4

Exiting Summary:
Level 5 Occupant Load: 152 Occupants
Exit Capacity: 363

FIRE RESISTANCE RATINGS LEGEND

EXIT
PRESSURIZED VESTIBULE
1 HR FRR
2 HR FRR
3 HR FRR
NON RATED FIRE SEPARATION

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Level 5 - Fire Separations and Exit Capacity

Stair #11
Door Width: 900mm (147 occupants)
Stair Width: 1100mm (138 occupants)
Exit Area L6 to L5:
13.56m2 (45 occupants)

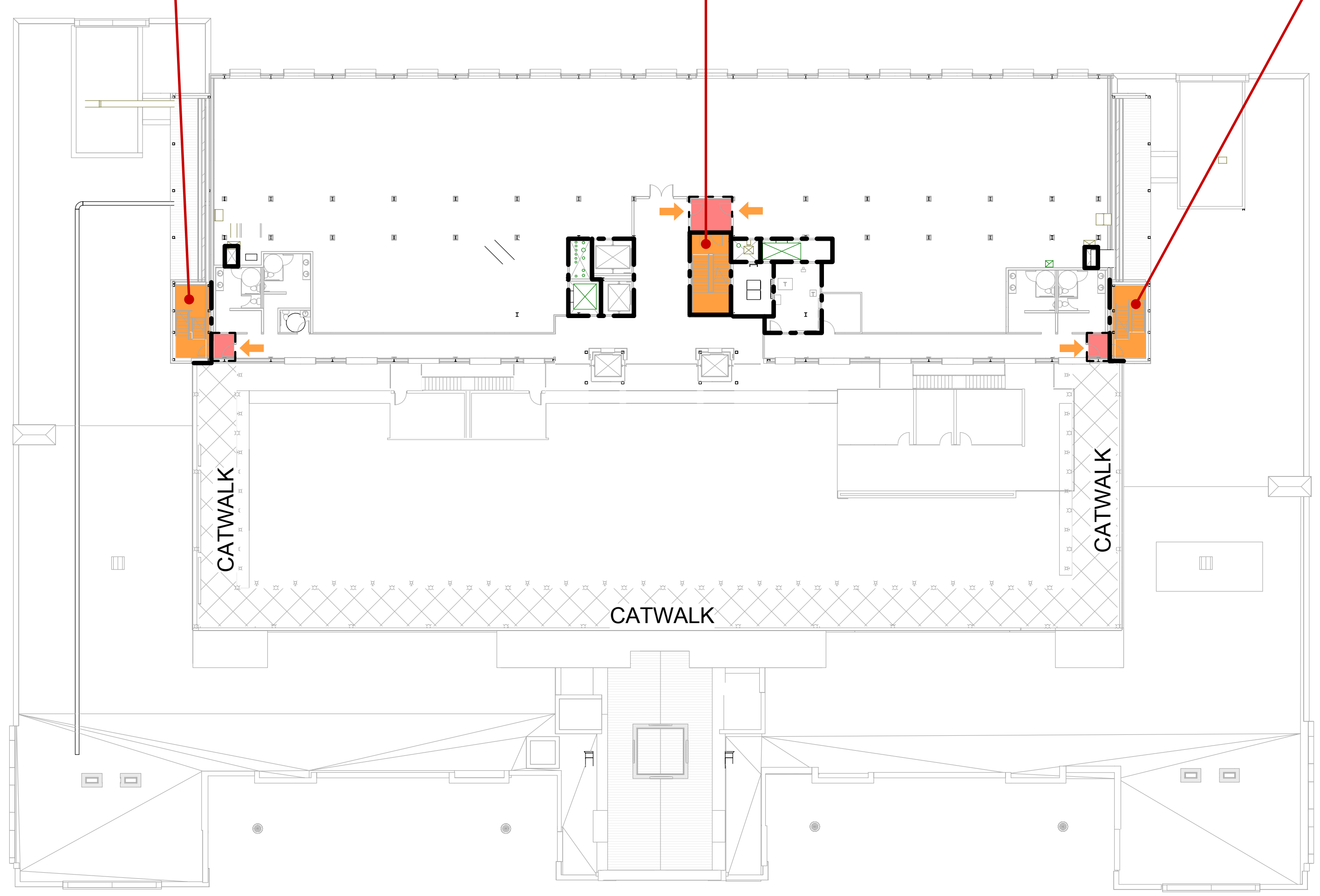
Capacity: 45 occupants

Stair #6
Door Width: 1800mm (295 occupants)
Stair Width: 1336mm (167 occupants)
Exit Area L2 to L1:
20.69m2 (69 occupants)

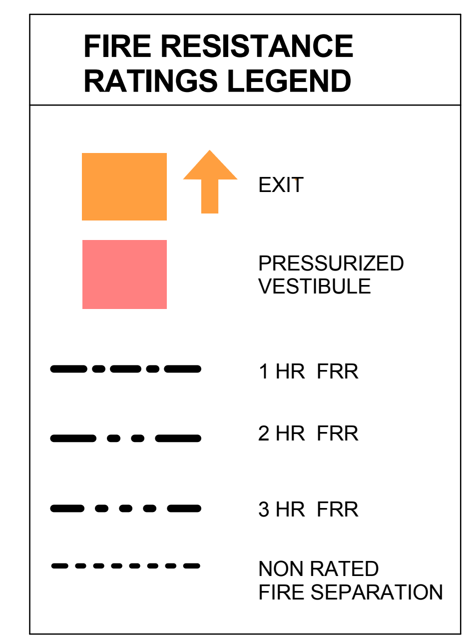
Capacity: 69 occupants

Stair #5
Door Width: 900mm (147 occupants)
Stair Width: 1714mm (138 occupants)
Exit Area L2 to L1:
13.56m2 (45 occupants)

Capacity: 45 occupants



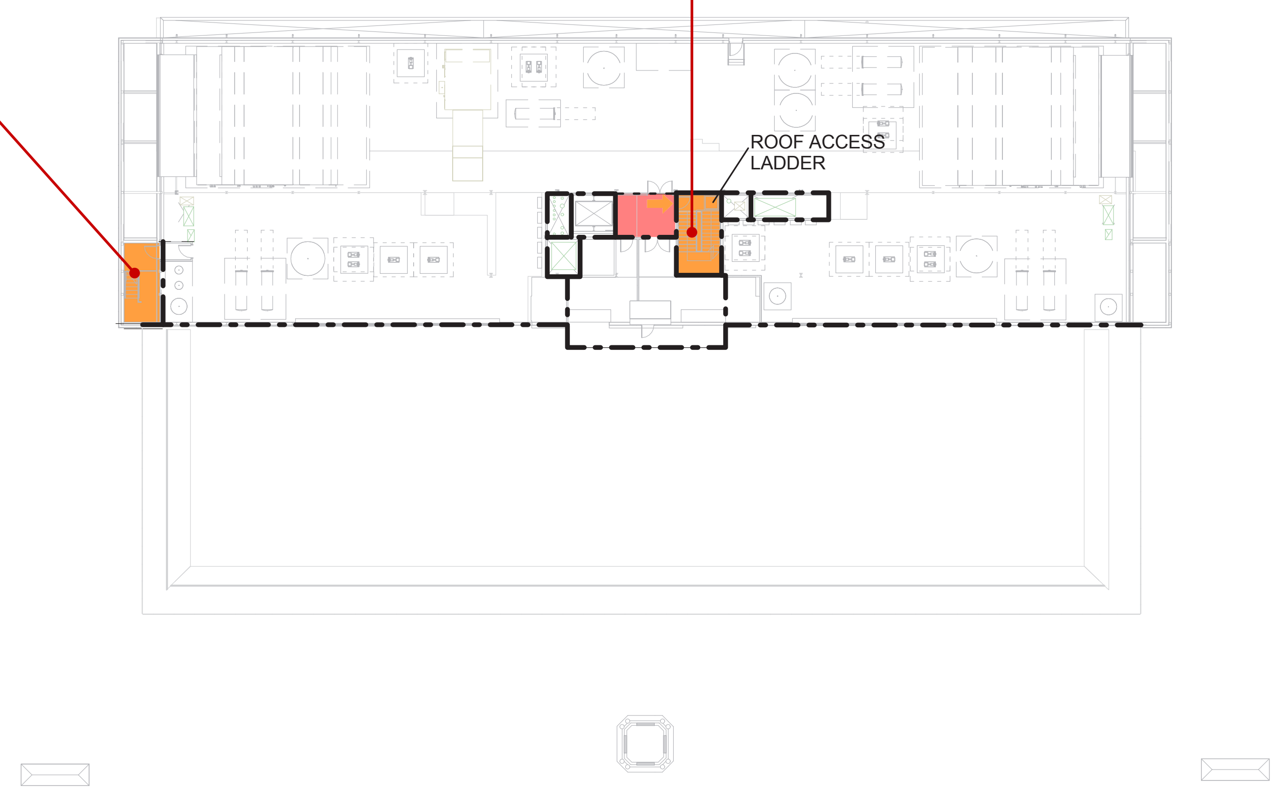
Exiting Summary:
Level 6 Occupant Load: 141 Occupants
Exit Capacity: 159 occupants



5.206 Level 6 - Fire Separations and Exit Capacity

Stair #11
Door Width: 900mm (147 occupants)
Stair Width: 1714mm (214 occupants)
Capacity: 147 occupants

Stair #6
Door Width: 1800mm (295 occupants)
Stair Width: 1336mm (167 occupants)
Capacity: 167 occupants



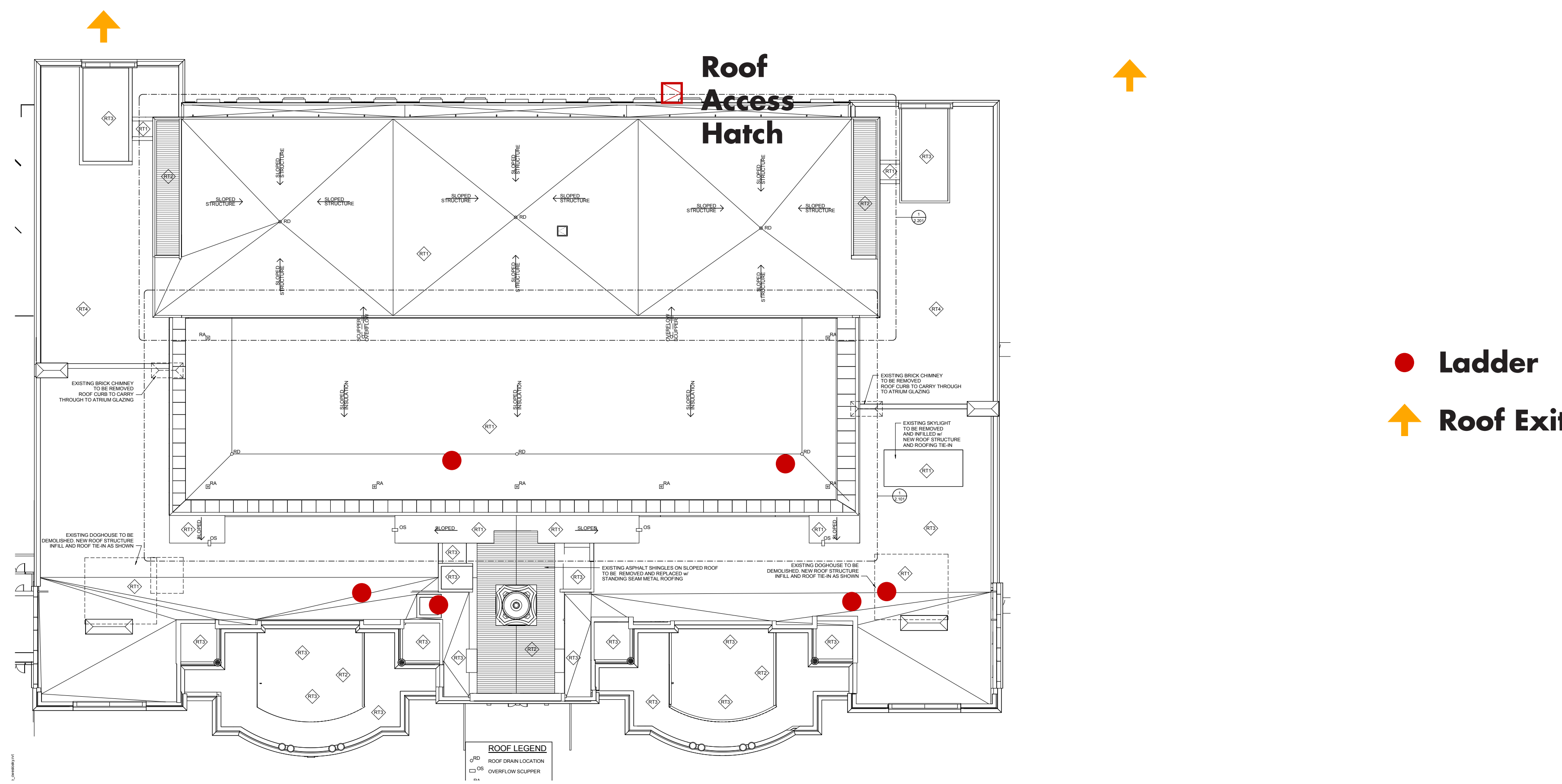
Exiting Summary:
Penthouse Occupant Load: 0 Occupants
Exit Capacity: 314

FIRE RESISTANCE RATINGS LEGEND

- EXIT
- PRESSURIZED VESTIBULE
- 1 HR FRR
- 2 HR FRR
- 3 HR FRR
- NON RATED FIRE SEPARATION

DENTISTRY PHARMACY BUILDING REDEVELOPMENT
5. CODE AND SUPPORTING DRAWINGS
FIRE SEPARATION AND EXITING

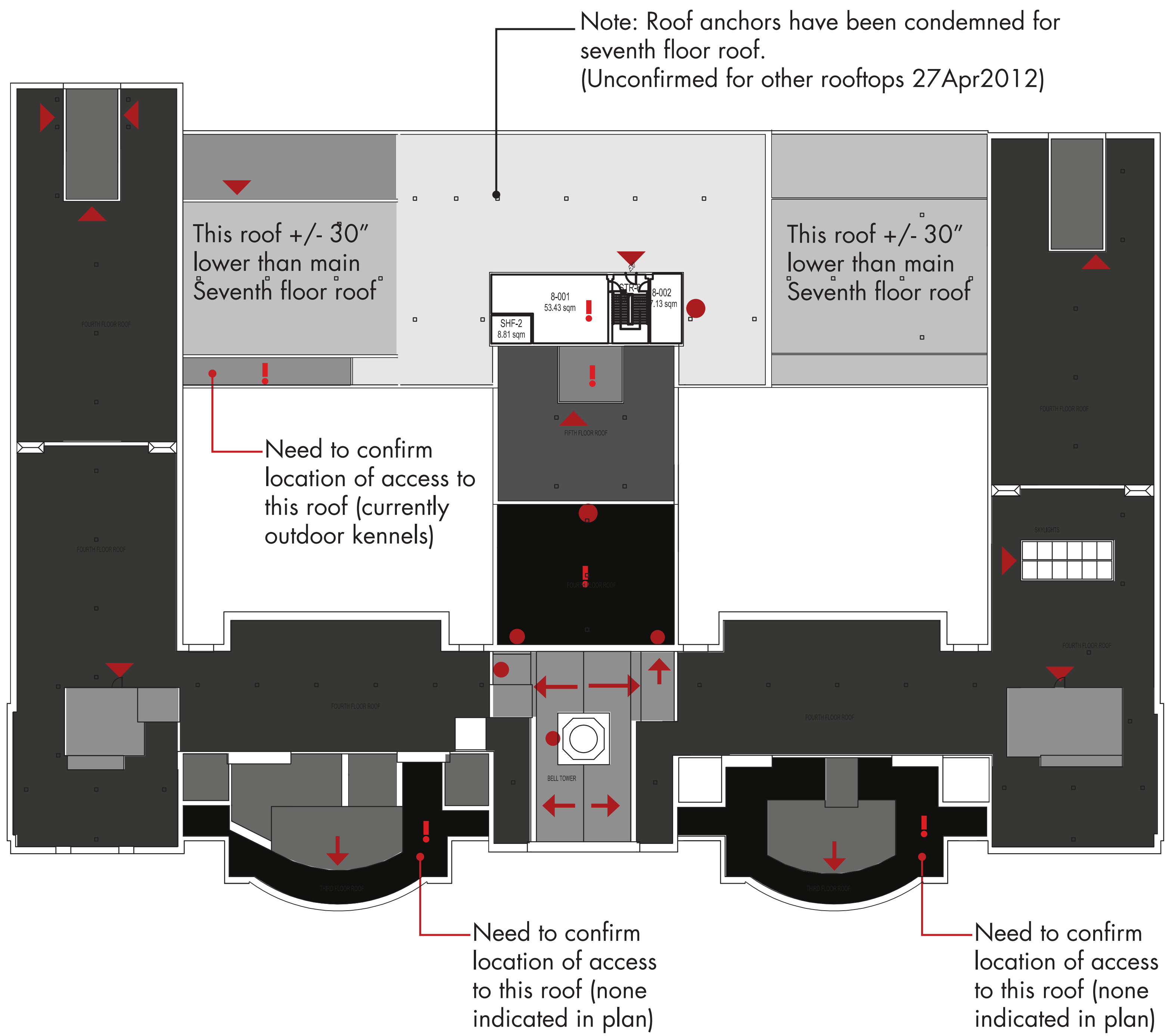
Mechanical Penthouse - Fire Separations and Exit Capacity



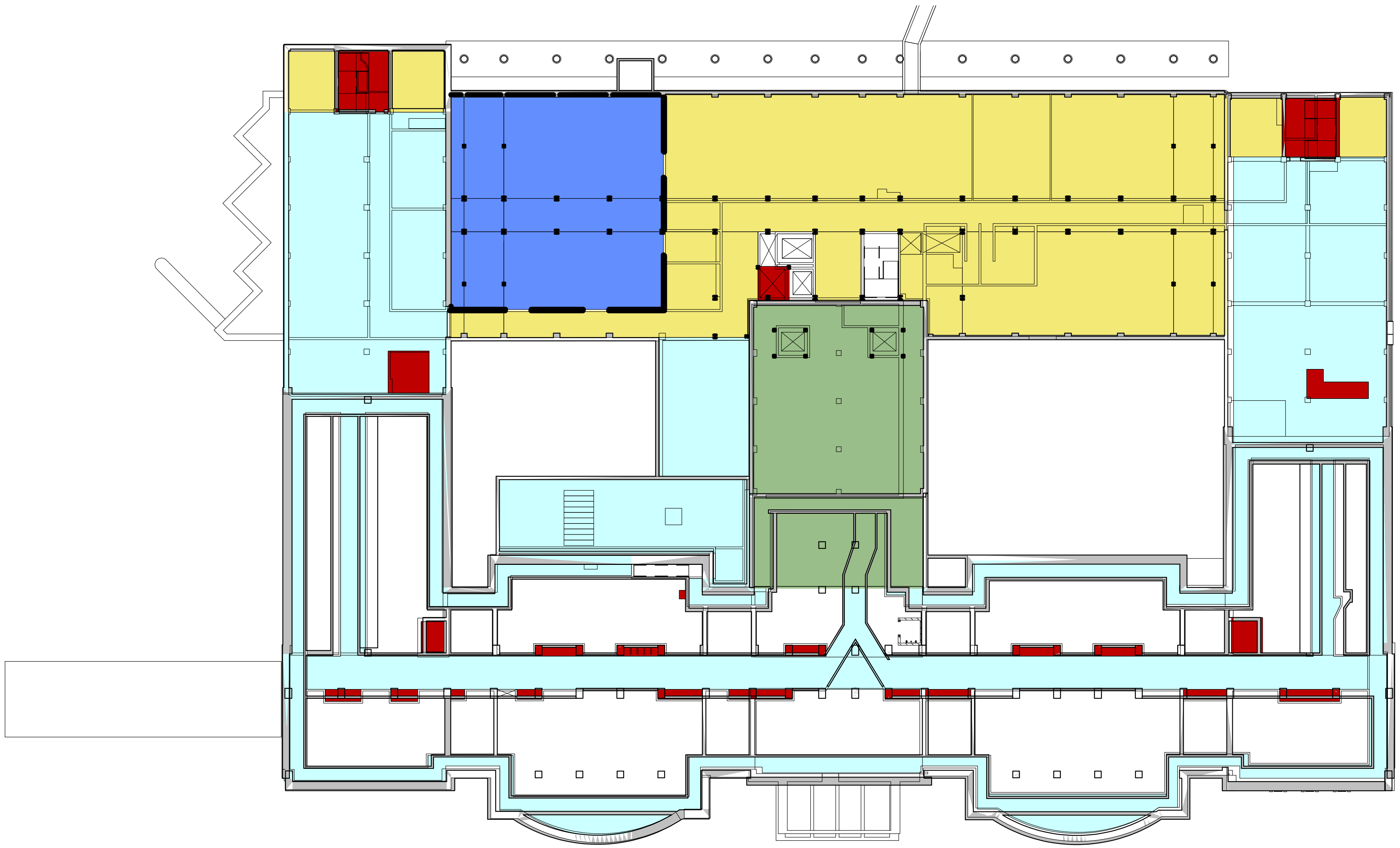
5.208 Roof - Access and Exiting

Roof
Exit Locations

- Fourth Floor Lower Roof
- Fourth Floor Roof
- Fifth Floor Roof
- Sixth Floor Roof
- Seventh Floor Roof
- Penthouse Roof
- ! No access/exit from this roof area
- Sloped roof
- Roof access point
- Roof Ladder



Existing Exit Locations



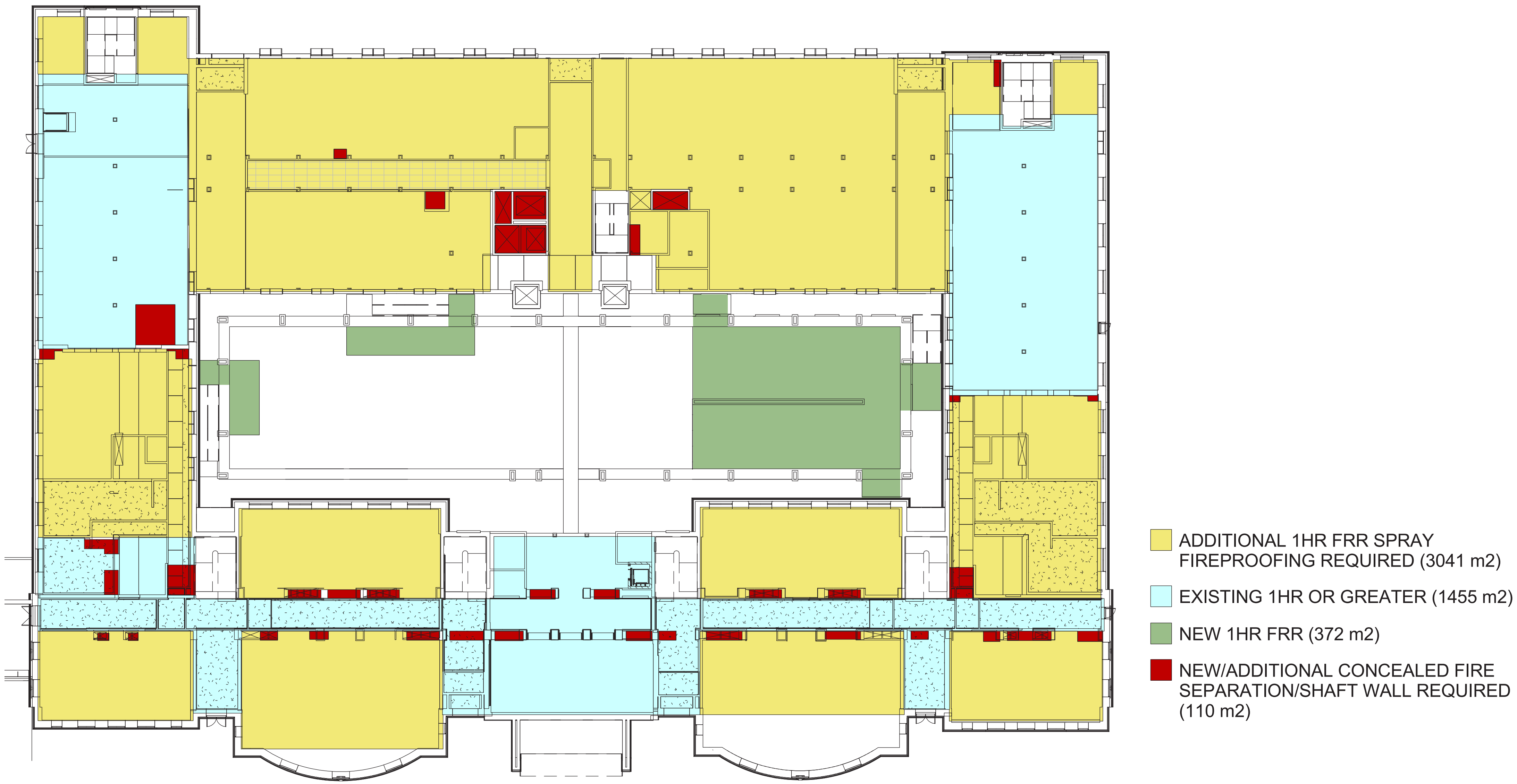
ADDITIONAL/NEW FIREPROOFING (3HR) REQUIRED (383 m2)

ADDITIONAL FIREPROOFING REQUIRED (1583 m2)

EXISTING 1HR OR GREATER (1908 m2)

NEW/ADDITIONAL CONCEALED FIRE SEPARATION REQUIRED (175 m2)

5.300 Basement (Level 1 Floor FRR) - Spray Fireproofing



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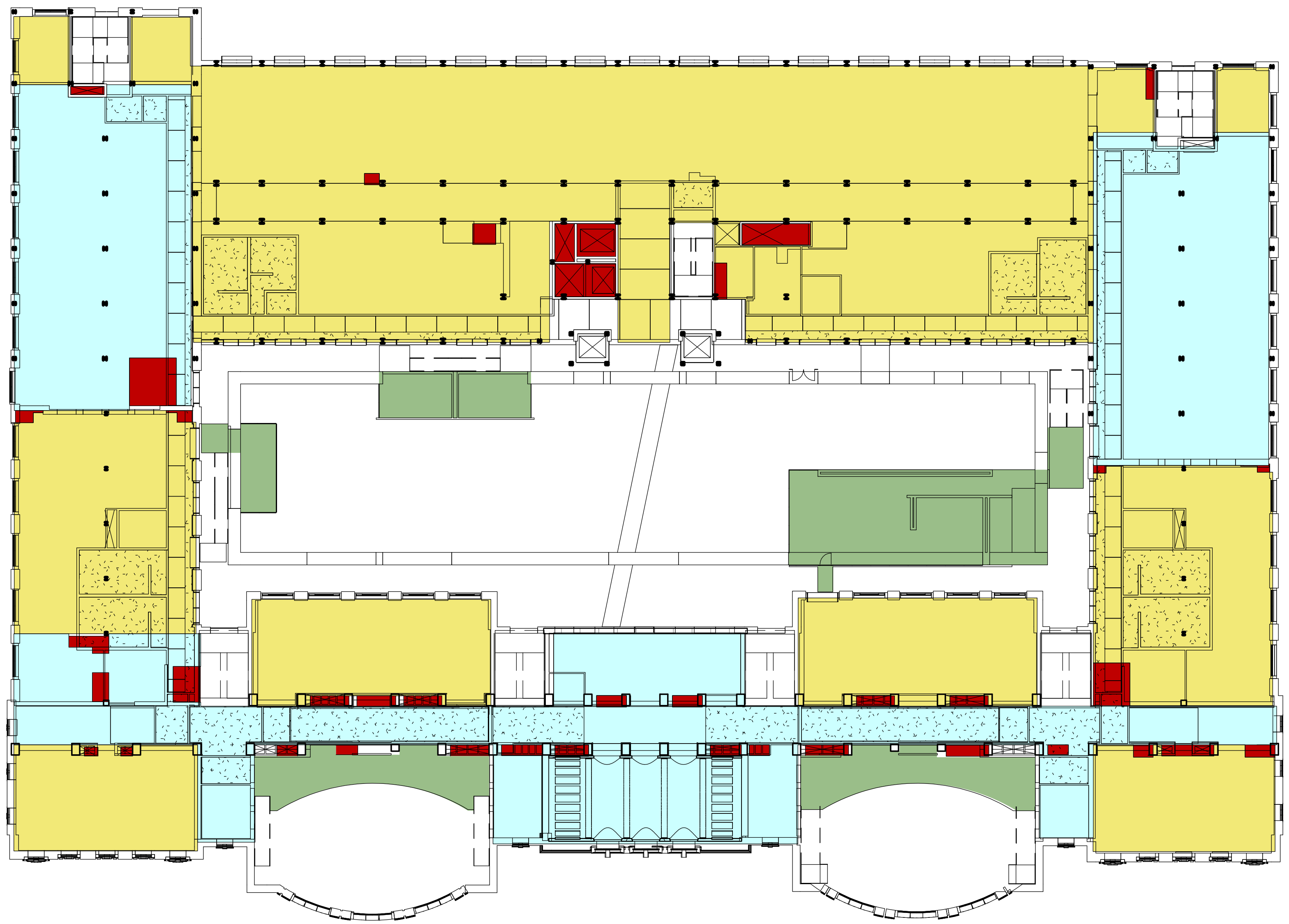
DENTISTRY PHARMACY BUILDING REDEVELOPMENT

5. CODE AND SUPPORTING DRAWINGS

SPRAY FIREPROOFING

Level 1 (Level 2 Floor FRR) Spray Fireproofing



ADDITIONAL 1HR FRR SPRAY FIREPROOFING REQUIRED (3041 m2)

EXISTING 1HR OR GREATER (1455 m2)

NEW 1HR FRR (372 m2)

NEW/ADDITIONAL FLOOR TO FLOOR FIRE SEPARATION/SHAFT WALL REQUIRED (110 m2)

5.302 Level 2 (Level 3 Floor FRR) - Spray Fireproofing

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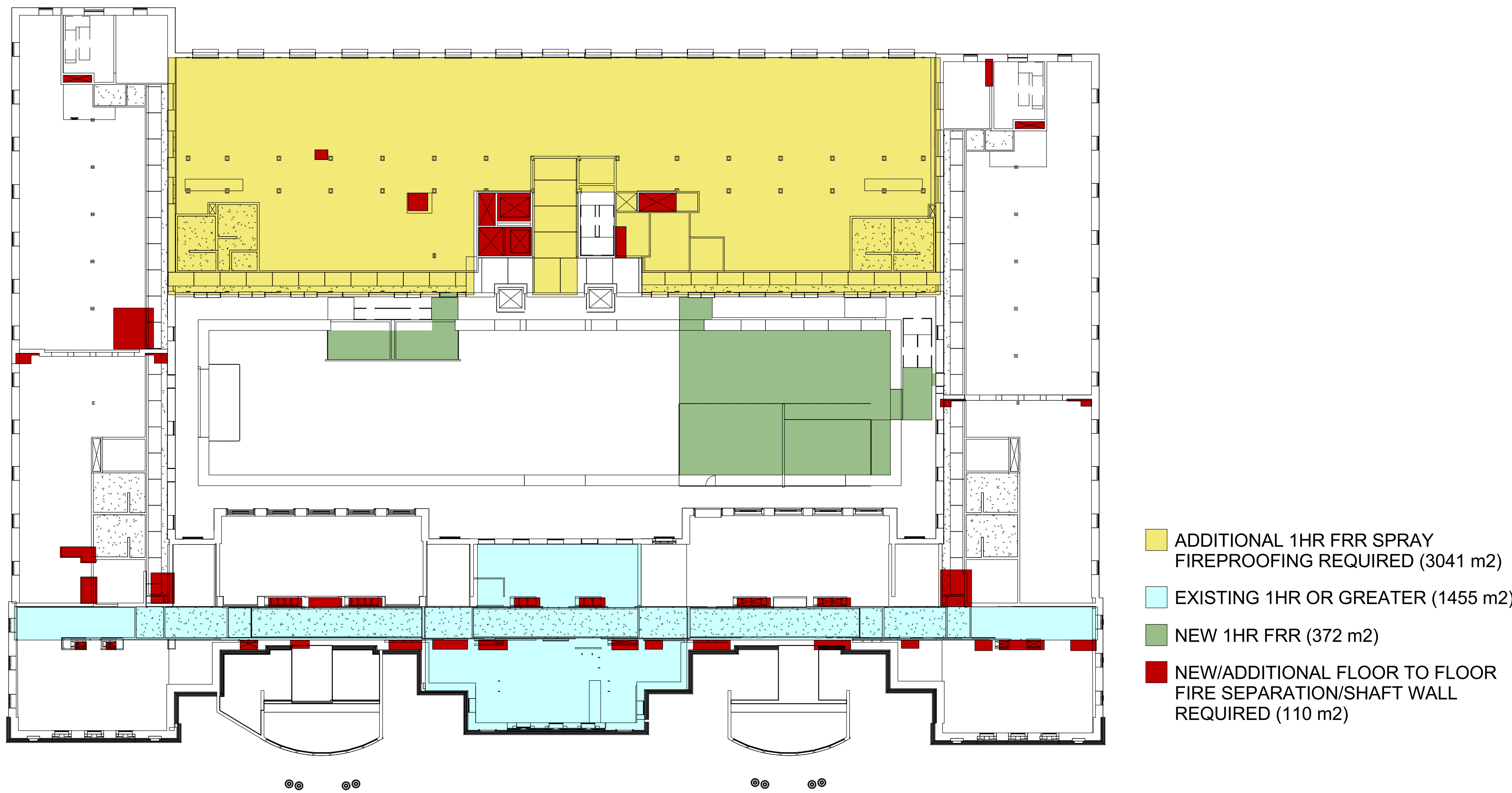
DENTISTRY PHARMACY BUILDING REDEVELOPMENT

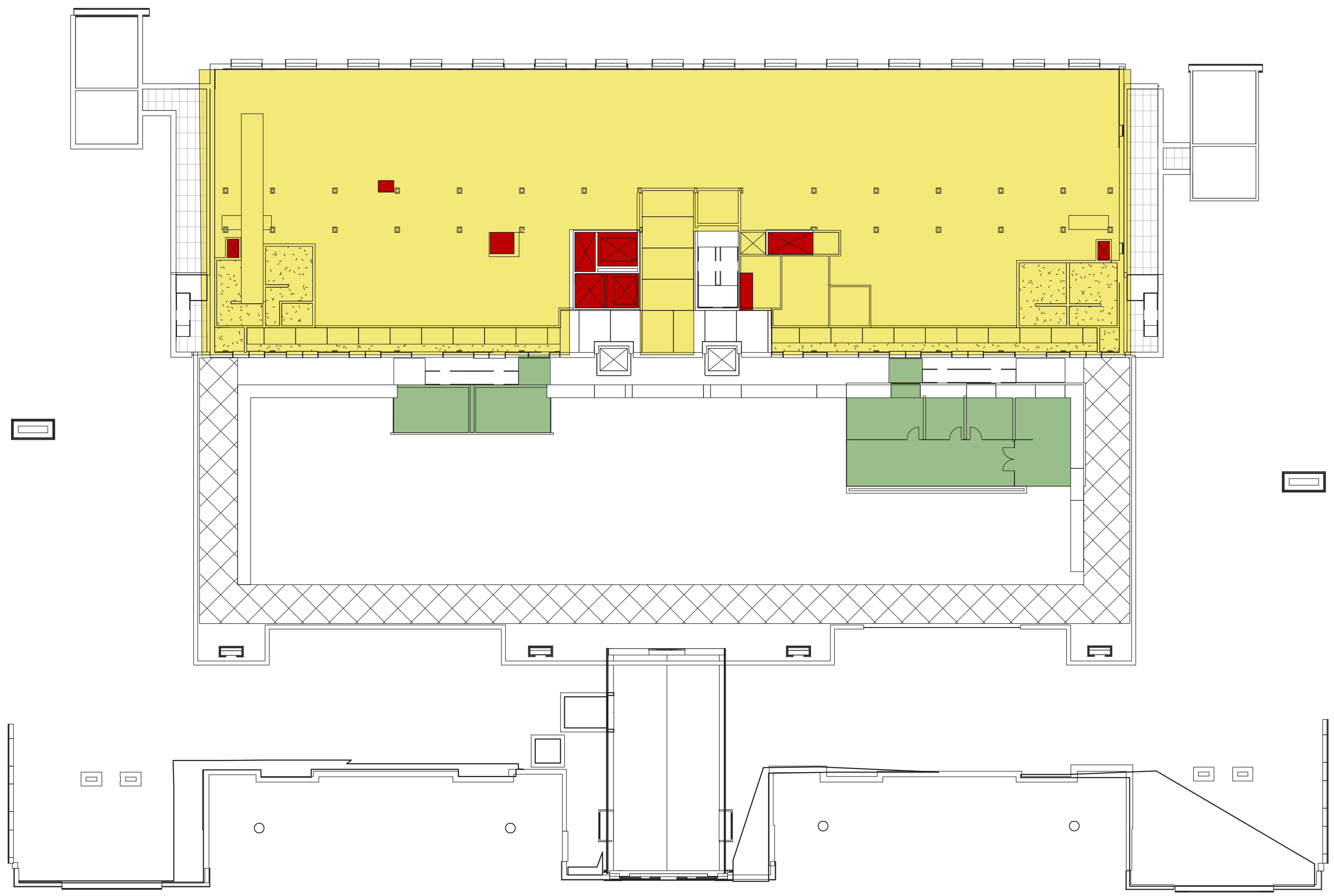
5. CODE AND SUPPORTING DRAWINGS

SPRAY FIREPROOFING

Level 3 (Level 4 Floor FRR) Spray Fireproofing



5.304 Level 4 (Level 5 Floor FRR) - Spray Fireproofing



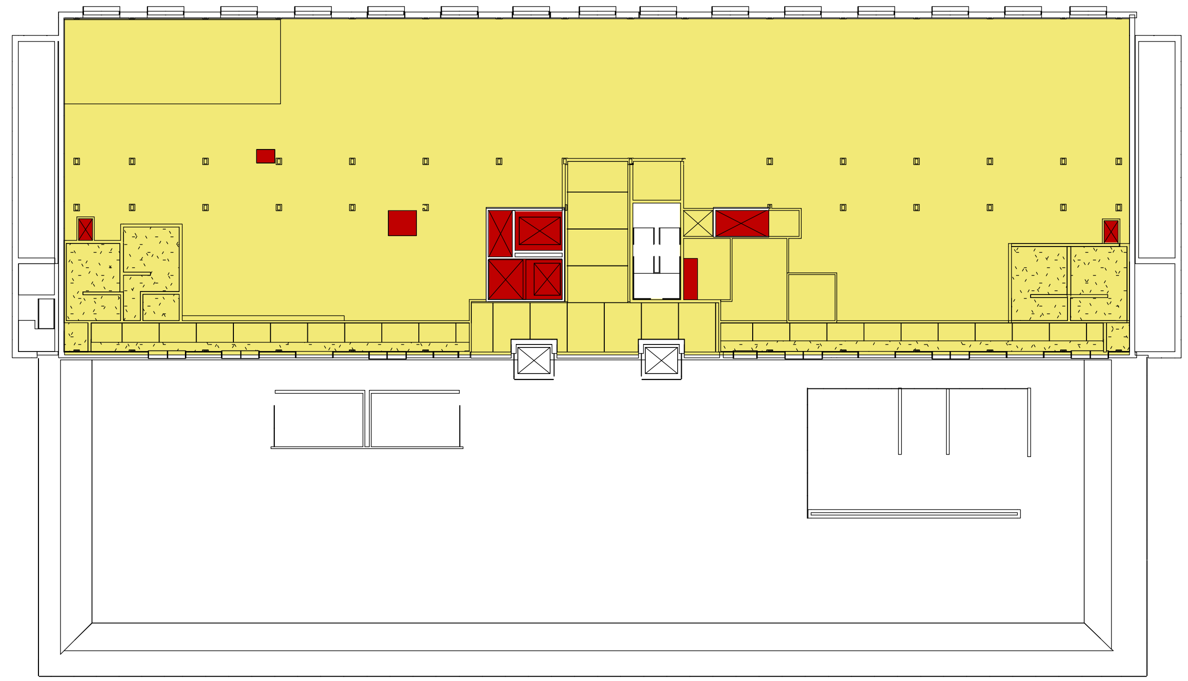
ADDITIONAL 1HR FRR SPRAY FIREPROOFING REQUIRED (3041 m2)

EXISTING 1HR OR GREATER (1455 m2)

NEW 1HR FRR (372 m2)

NEW/ADDITIONAL FLOOR TO FLOOR FIRE SEPARATION/SHAFT WALL REQUIRED (110 m2)

Level 5 (Level 6 Floor FRR) Spray Fireproofing



ADDITIONAL 1HR FRR SPRAY FIREPROOFING REQUIRED (3041 m2)

EXISTING 1HR OR GREATER (1455 m2)

NEW 1HR FRR (372 m2)

NEW/ADDITIONAL FLOOR TO FLOOR FIRE SEPARATION/SHAFT WALL REQUIRED (110 m2)

5.306 Level 6 (Level 7 Floor FRR) - Spray Fireproofing

UNIVERSITY OF ALBERTA

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Design Development Report

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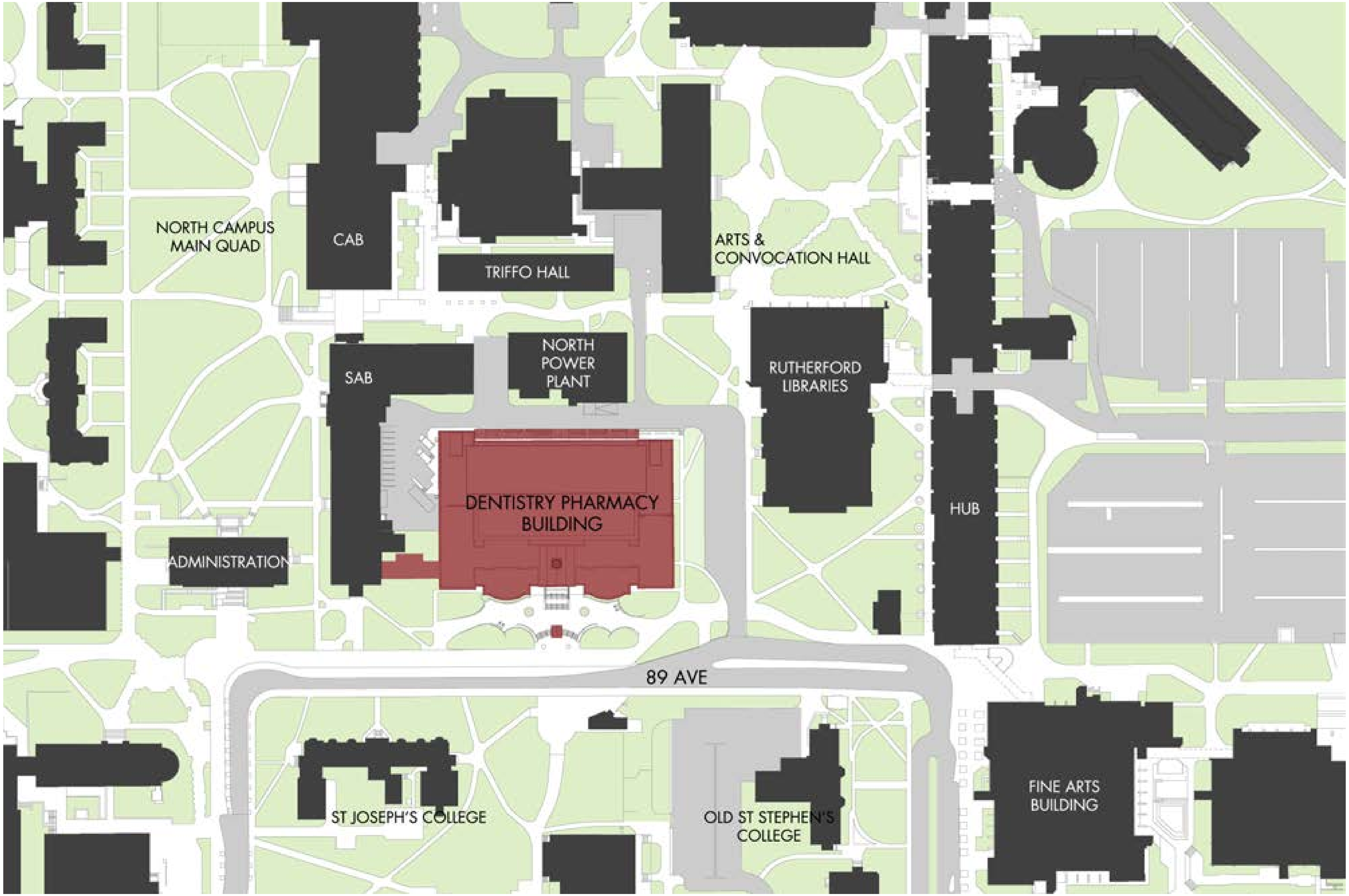
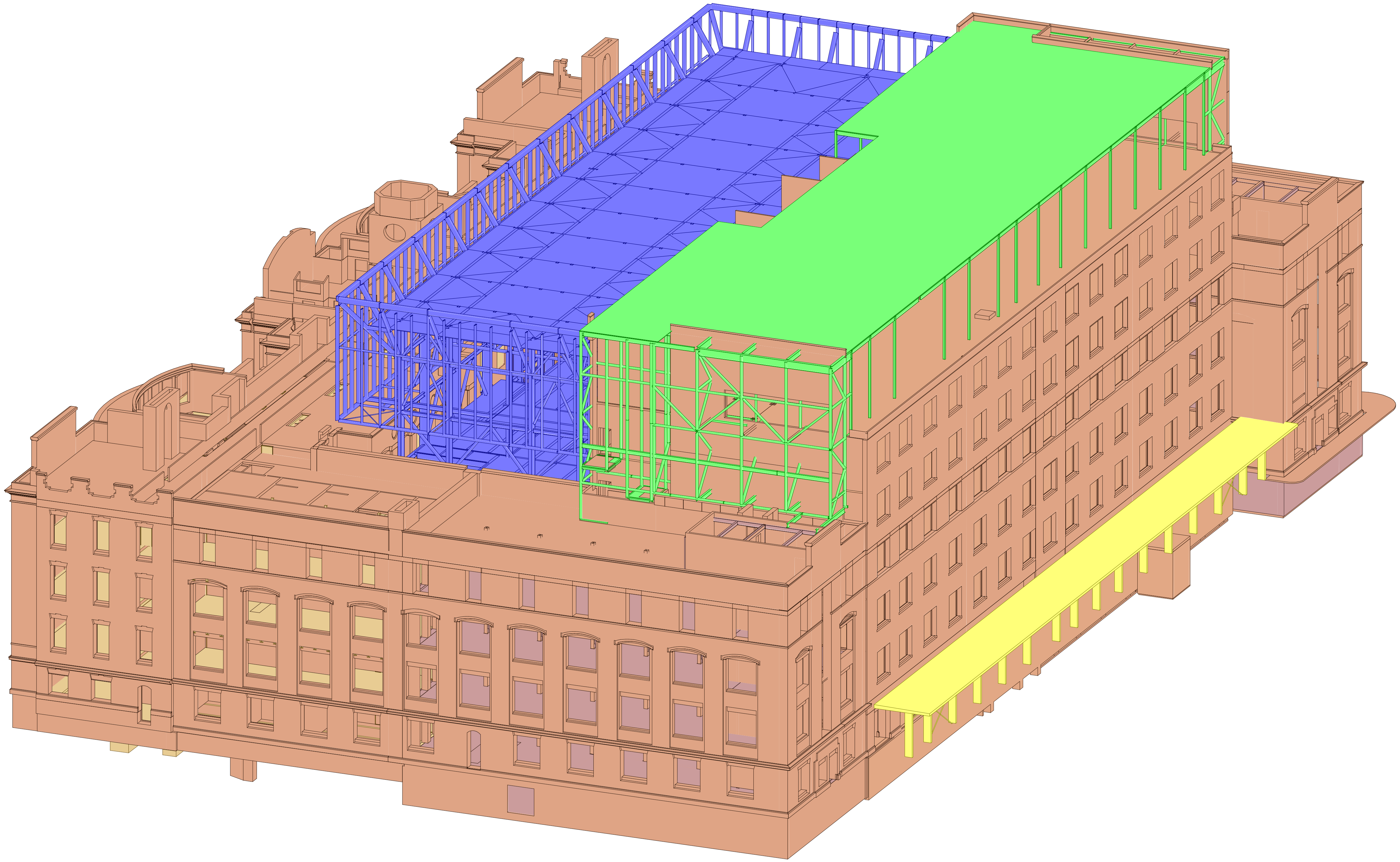

NORTH CAMPUS MAIN QUAD
CAB
TRIFFO HALL
ARTS & CONVOCATION HALL
NORTH POWER PLANT
SAB
RUTHERFORD LIBRARIES
DENTISTRY PHARMACY BUILDING
HUB
ADMINISTRATION
89 AVE
ST JOSEPH'S COLLEGE
OLD ST STEPHEN'S COLLEGE
FINE ARTS BUILDING



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DENTISTRY PHARMACY BUILDING REDEVELOPMENT

6. STRUCTURAL

6

6

Structural Design Concepts

Table of Figures

6.1 Introduction

The structural design for the Dentistry Pharmacy Building Redevelopment involves the following components:

- Modifications to the Existing Building
- Construction of new Penthouse
- New Atrium within the building courtyard and structural elements within
- New SAB Link

This report summarizes the structural design development for the above aspects of the project and incorporates findings from the program of investigative demolition.

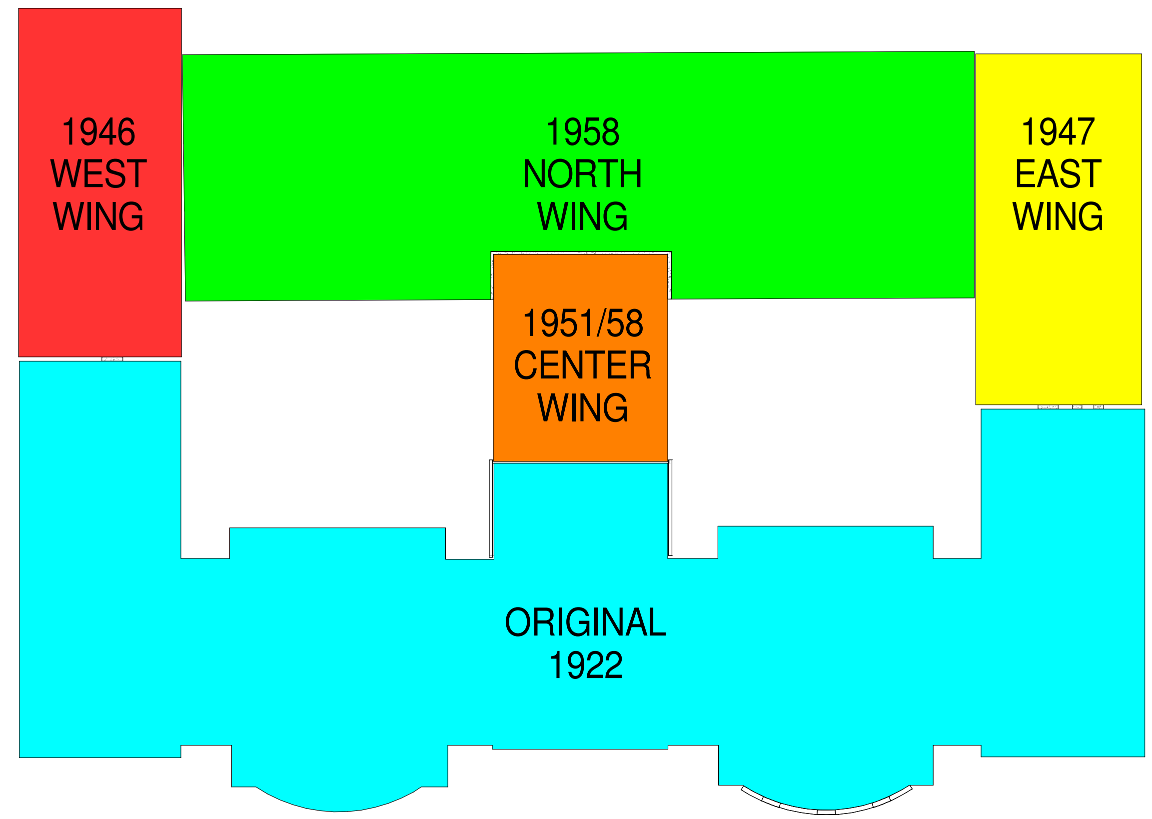
6.2 Building History

The Dentistry Pharmacy Building has been built over a number of years. We summarize in the table below the structural form of each section of the building as it developed. Our observations to date have been based on visual inspections on site and a review of archive drawings.

Summary of Building Construction:

Building	Frame	Foundation
Original 1922	Concrete and wooden floors supported on load bearing masonry walls and piers	Ground bearing spread and strip footings
1946 West Wing & 1947 East Wing	Concrete floors supported on steel frame	Ground bearing spread and strip footings
1951 Central Wing	Load bearing masonry building supporting steel beams supporting concrete floor slabs	Ground bearing spread and strip footings
1958 North Wing	Steel framed building using open web steel joists to support concrete floor slabs	Cast in place concrete belled piles with slab on grade in basement

Key Plan:



6.3 Code compliance

6.3.1 New Build
The structural design will conform to the Alberta Building Code 2006 along with the material standards referenced in the code.

6.3.2 Existing Building
We have developed the design to satisfy the guidelines provided in Commentary L Upgrading of Existing Buildings within the User's Guide – NBC 2005 Structural Commentaries (Part 4 of Division B).

6.4 Design Loads

6.4.1 Climatic and Site Information
Importance Category – Normal
Snow Load, 1/50 – Ss = 1.7 kPa; Sr = 0.1 kPa
One Day Rain, 1/50 – 97 mm
Hourly Wind Pressure, 1/50 – 0.45 kPa
Terrain – Rough
Seismic Data – Sa(0.2) = 0.12; Sa(0.5) = 0.06; Sa(1.0) = 0.02; Sa(2.0) = 0.01; PGA = 0.06
Seismic Site Classification – C
Seismic Site Coefficients – Fa = 1.3; Fv = 1.4

6.4.2 Gravity Loads

- Roofs
  Snow Load – 1.46 kPa plus drifts, taking into consideration parapets and adjacent structures.

  Rain Load – Determined based on design roof slopes assuming that the drains are accidentally plugged for a period of 24 hours.

  Wind Uplift – Determined based on roof geometry.

  Live Load – 1.0 kPa

  Superimposed Dead Load – 1.15 kPa

- Floors
  Dead load determined based on individual floor type

  Live Load (office areas) – 2.4 kPa

  Live Load (service areas) – 7.2kPa

  Live Load (other areas) – 4.8 kPa

  Superimposed Dead Load including partition allowance – 1.5 kPa

  Superimposed Dead Load for winter garden plant /soil area – 30.0 kPa

6.5 Geotechnical conditions

Subsurface conditions have been determined by reference to the Thurber Engineering Ltd Evaluation of Site Classification for Seismic Response report (28th June 2010 File 15-27-110) and the Medical Building Soil report (1958) by Materials Testing Laboratories Ltd.

Nature of the Subsoil

The upper two feet consists of principally organic topsoil fill. Underlying this fill and extending to a depth of 7.3m inorganic clay strata containing sand lenses is present. This strata is stiff to very stiff. From a depth of 7.3m to 12.5m there exists a fine sandy silt which is in a very dense state. Below this depth the glacial till deposits normal in this area were encountered. Traces of groundwater were encountered at depths of 11.2m.

Foundations

The 1922 Original Building, 1946 West Wing and 1947 East Wing have ground bearing foundations taking the form of continuous strip footings and spread footings.

To supplement the existing foundation drawn information and confirm the as-built condition trial pits were excavated and observed in 6 locations to confirm the foundation type and size. The foundations to the Original 1922 building are 1520mm wide strip footings founded 2355mm below ground level (b.g.l). The 1946 and 1947 wings consist of a series of spread and strip footings. The spread footings are 2600mm square and located at each column position at a depth of 2250mm b.g.l. A 1520mm wide strip runs between the spread footings supporting the external wall of the building. The Center wing has a similar foundation scheme. The 1958 North Wing is a piled building with bored bell piles of 760-915mm diameter constructed to a depth 10.0m b.g.l at each column location. A basement wall runs between the piles.

Our approach has been to calculate the bearing pressure on the existing footings and compare them to the allowable bearing pressures provided in the site investigation reports. We have also observed the building to identify any signs of distress or settlement that could indicate that the underlying soils are overstressed. From our visual survey of the perimeter walls at ground level we have not identified any cracking or settlement of the masonry walls that would indicate ground movement.

Based on the occupancy loads stipulated the applied loads at foundation level following the redevelopment works do not exceed those calculated for the existing building.

6.6 Existing building

In order to avoid a code upgrade of the entire building modifications to the existing building have been minimized to ensure we comply with the code requirements within Commentary L Upgrading of Existing Buildings. With reference to Clause 18 Evaluation Based on Satisfactory Past Performance we need to ensure:

> *There have been no changes within the past 30 years that could significantly increase the loads on the building or affect its durability and no such changes are contemplated.*

The modifications to the existing building that require structural intervention include the following:

- Structural modifications to both theatres
- Widening of select doors and windows to allow better access to the building
- Provision of new external loading dock along the West elevation
- Alterations to existing elevator shaft to accommodate new passenger/service elevator
- Removal of existing structure at Level 7 of the 1958 building and providing Penthouse structure
- Strengthening of roof structure to 1922, 1946 and 1947 sections to accommodate additional snow loading as a result of the adjacent taller Atrium building
- South Plaza

Details of all the modifications are illustrated on plan drawings available in 6.12 Appendix

6.7 Penthouse

The existing construction above level 7 will be demolished to facilitate the construction of a new single storey Penthouse. The building has been framed in steel extending up from the columns of the existing 1958 building and is cross braced in both directions.

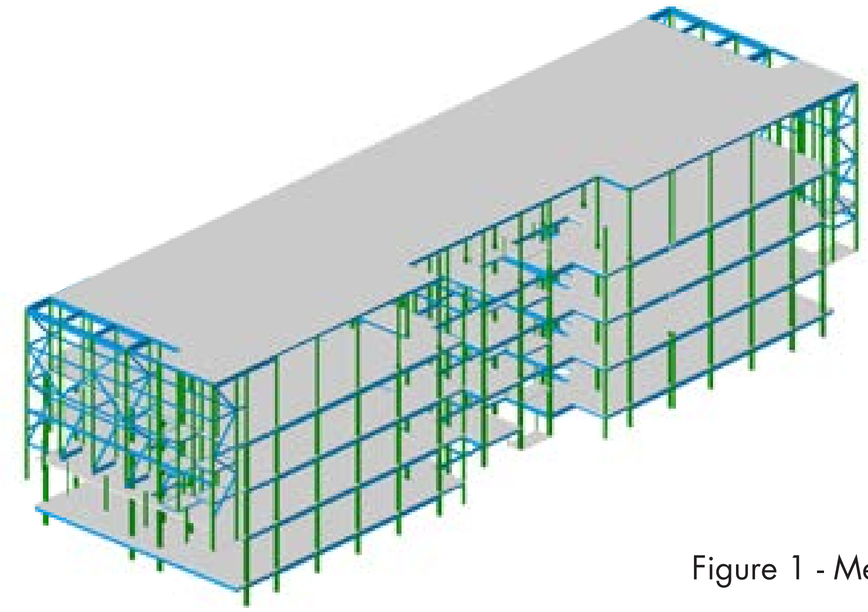


Figure 1 - Mechanical Penthouse

The roof deck has been designed as a stiff diaphragm to transfer horizontal loads back to the braced bays. To avoid a net increase in load on the 1958 building the new penthouse has been framed in steel and clad with a lightweight panel system to match the load reduction from the removal of the existing masonry frame building at this level. To provide access to the 1946 and 1947 buildings new staircases have been added to east and west ends of the Penthouse.

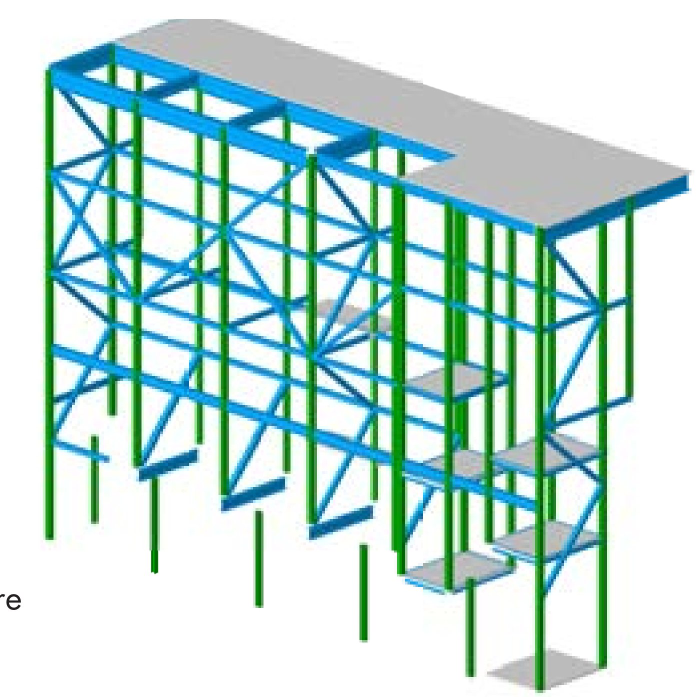
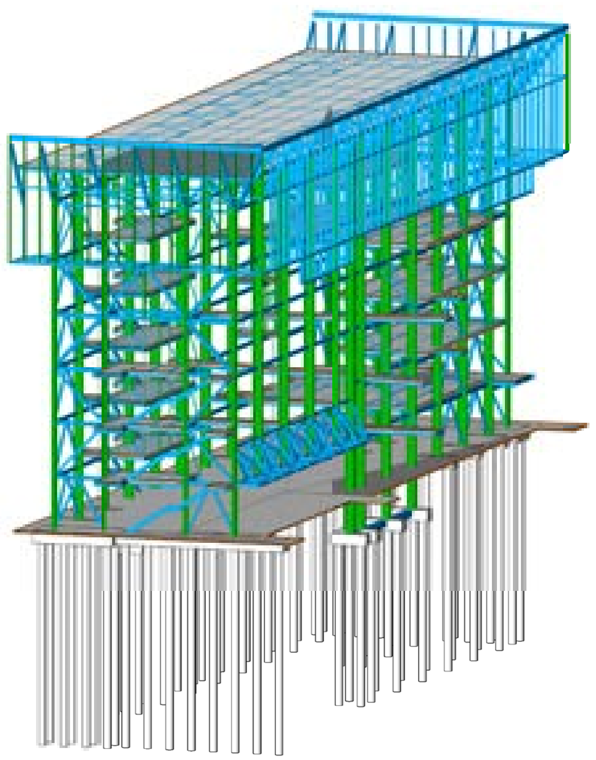


Figure 2 - Penthouse Stair Structure

6.8 Atrium structure

The development of the design of the Atrium has been guided by a number of parameters.

To ensure code compliance of the existing building and the need not to increase the loads on the building significantly the Atrium has been designed so that it supports both vertical and lateral loads independently of the existing building. The presence of the Slowpoke within the west courtyard impacts the design and construction of the Atrium. For this reason we have not located any columns over the footprint of the Slowpoke. The centre wing divides the existing courtyards from a structural perspective this creates two tall structures with relatively small footprints. Removal of the centre wing allows us to share and distribute load through the entire structure avoiding duplication of structural systems, efficiencies in repetition and a reduction in the number of braced bays. It also avoids the need for a cantilever structure to span across the Slowpoke which due to the small footprint of the courtyard and the resultant short backspan will be inefficient and expesive to construct.



The atrium consists of steel frames on a 6.0m grid that rise 30m to support a horizontally braced roof. The roof is comprised of steel decking fastened to a series of open web steel joists spaced at 3.0m centres that are supported on the primary steel trusses running in a north-south direction. Lateral stability to the frame is provided on all four sides by the inclusion of vertical bracing within the walls of the structure. Together with the braced roof plate these act to transfer horizontal loads to the piled foundations. The glass façade is supported approximately 3.0m from the primary structural grid through the extension of cantilever truss elements from the main structural roof trusses. The setback of the frame to the atrium perimeter allows us to place the piled foundations in board of the existing building foundations.

Figure 3 - Atrium Structure

The Atrium includes a number of elements within the perimeter of the structural box including:

- Bridges suspended from the main frame and roof structure
- Meeting rooms that are suspended from the main frame
- Staircases that cantilever from the main frame on the north, east and west elevations
- Office suites that include the Winter Garden

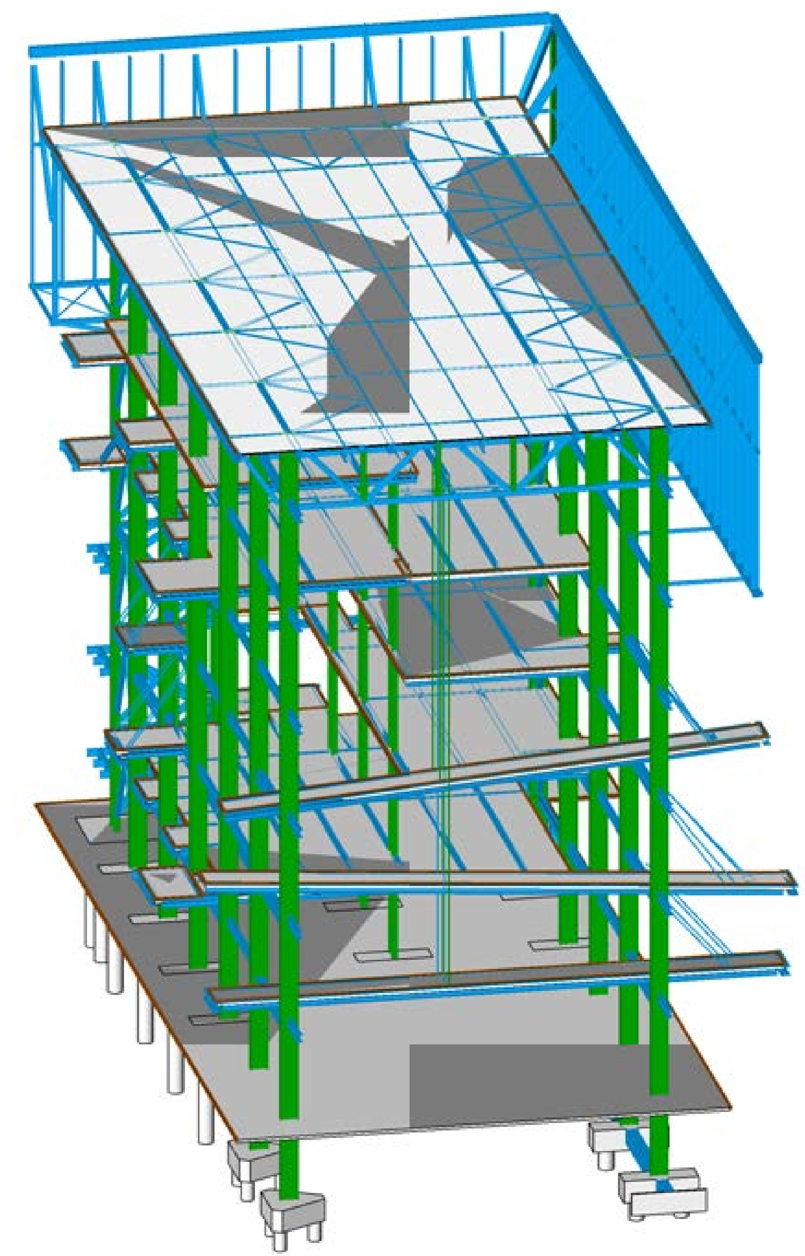


Figure 4 - Atrium Structure

6.9 SAB Link

For details of SAB Link refer to Section 12

6.10 Council Chambers

The existing east and west lecture theatres will be taken back to the core shell and recomposed as a new council chamber on the west side and as a new lecture theatre on the east side. From a structural viewpoint there is not a change of use but a re-configuration of the seating loading to suit the revised use of the space and the introduction of a mezzanine seating area. The mezzanine has been supported with a combination of columns and steel hangers supported from the existing roof structure.

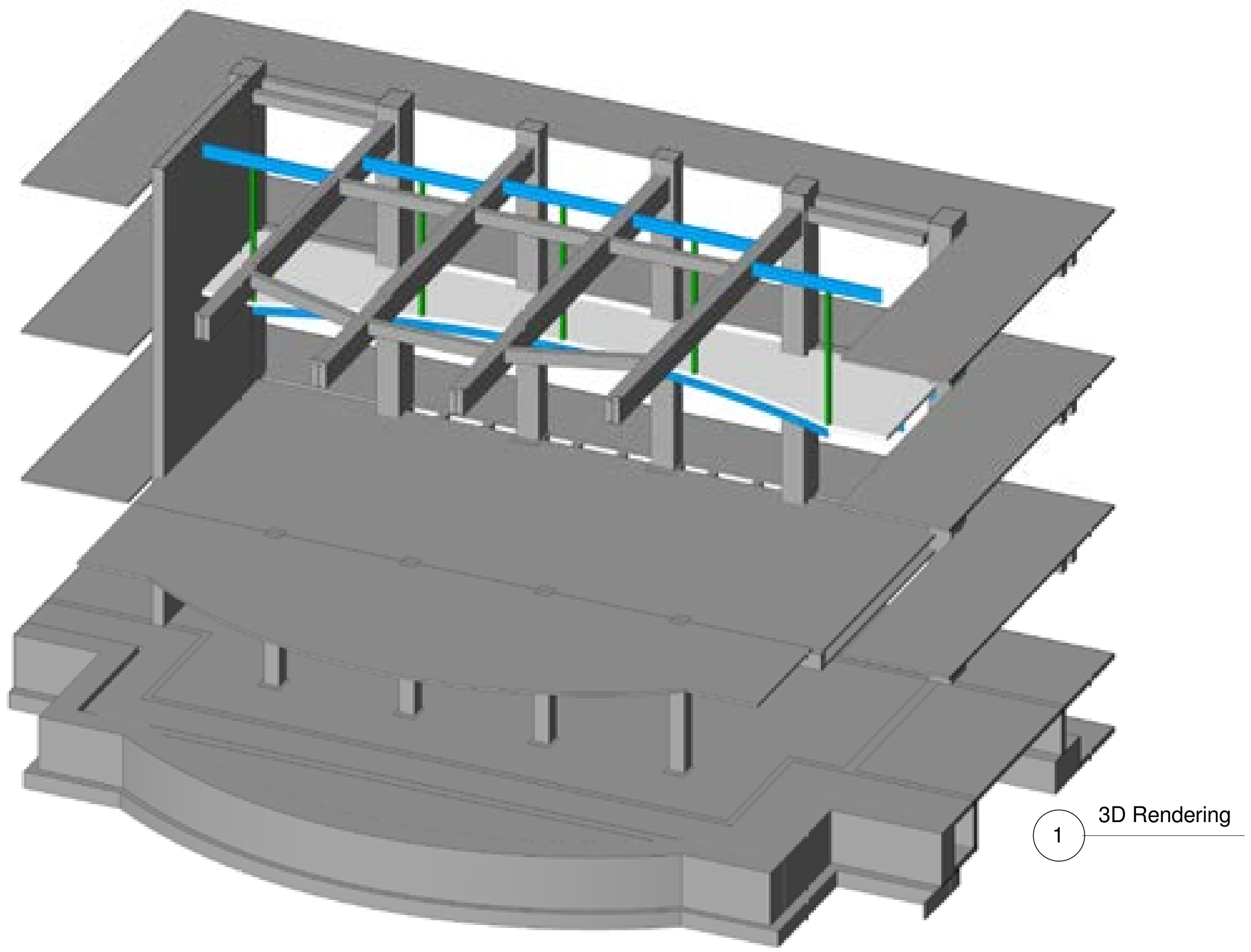
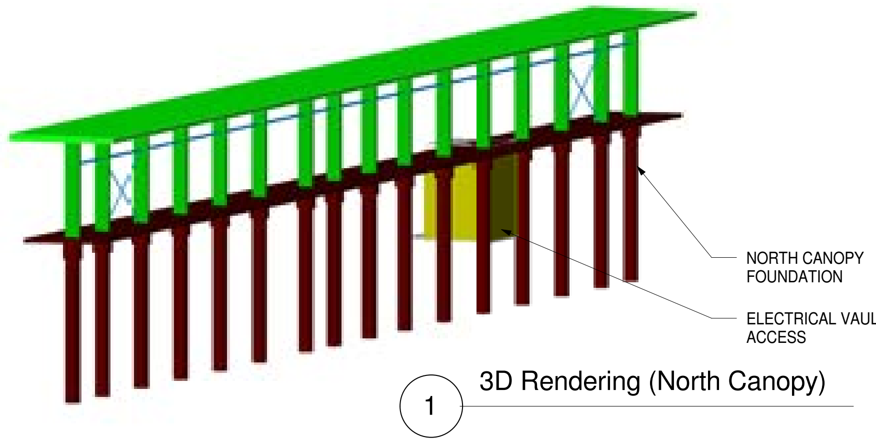


Figure 5 - Council Chambers

6.11 North Canopy

To the northern façade of the 1958 building a new canopy has been added to the full length of the building. We have designed a homogeneous concrete structure that is supported on a piled foundation. The cantilever roof slab provides protection and is supported on a series of columns spaced on a grid that relates to the 1958 building. The frame is cross braced in the east-west direction and the columns cantilever in the north south direction.



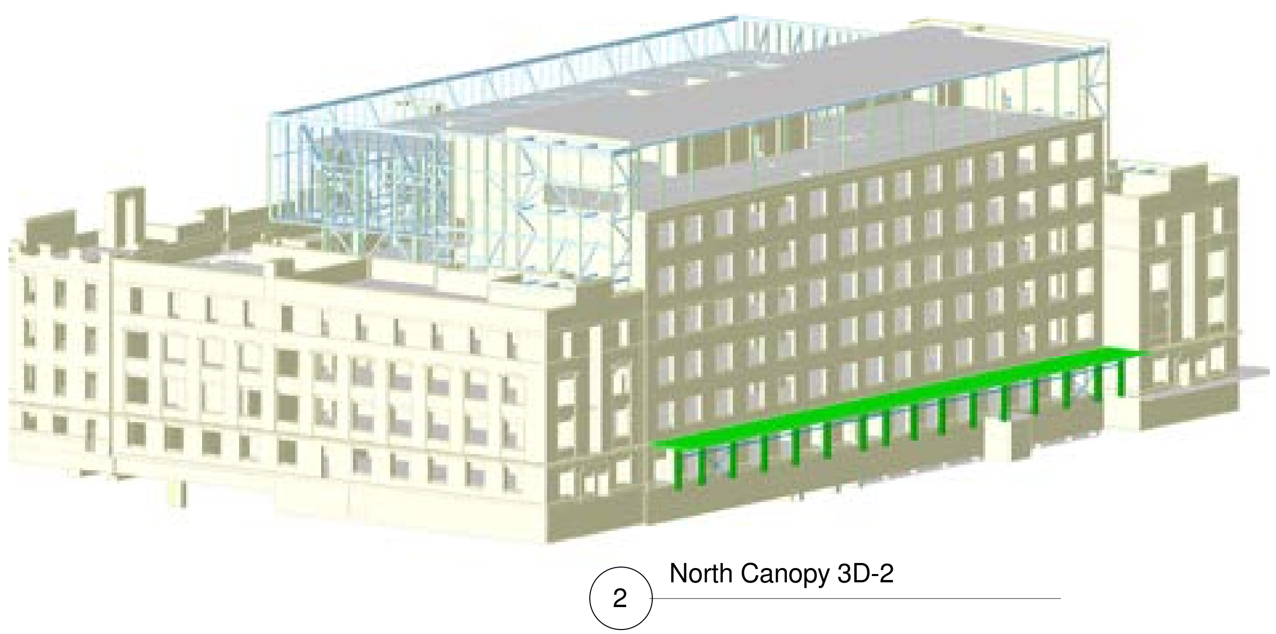
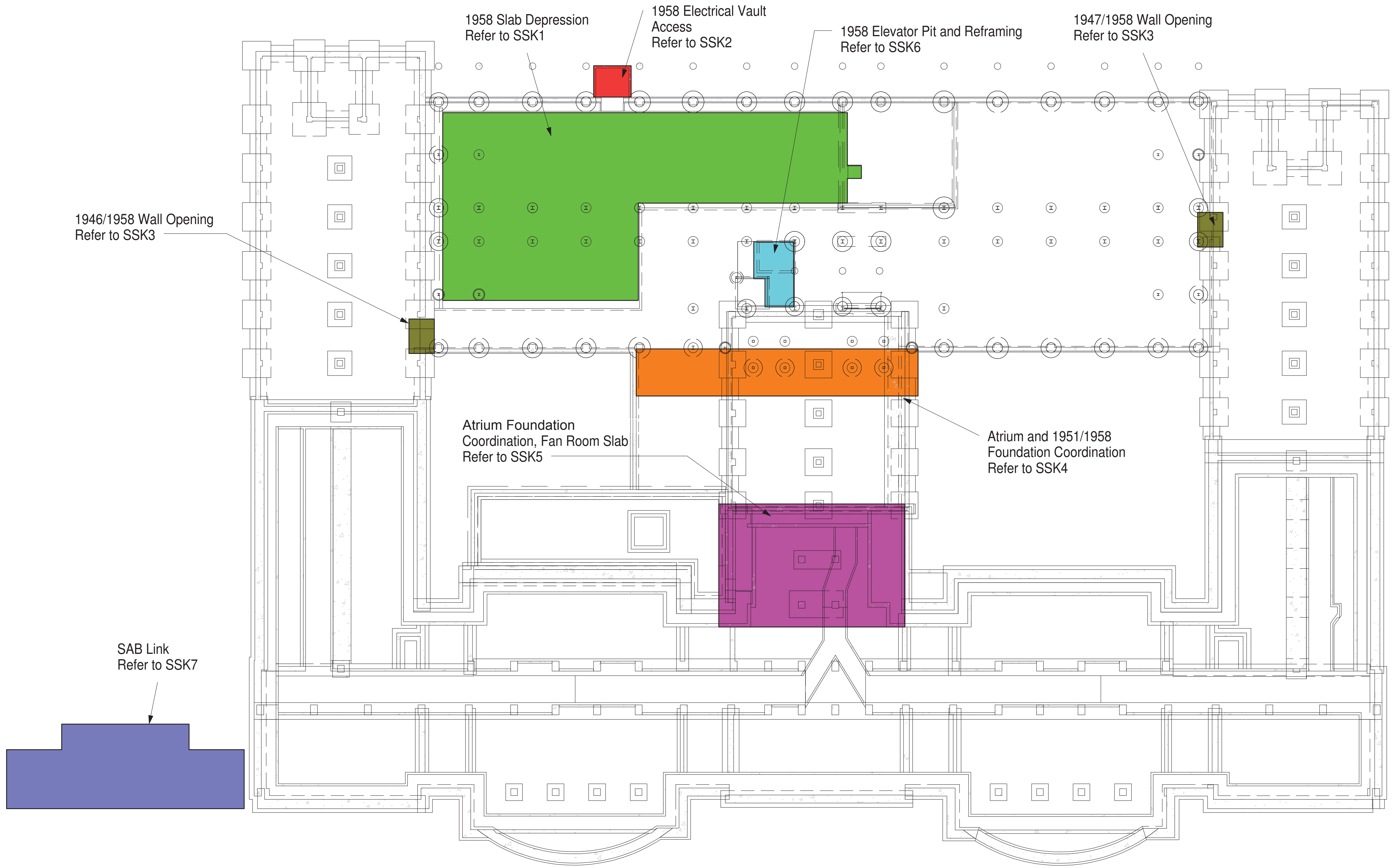


Figure 6 North Canopy

6.12 Appendix

6.12.1 Structural drawings

.1 S100 - Basement Plan
.2 S101 - Level 1
.3 S102 - Level 2
.4 S103 - Level 3
.5 S104 - Level 4
.6 S105 - Level 5
.7 S106 - Level 6
.8 S107 - Level 7
.9 S108 - T.O. Penthouse
.10 SSK1.1 - T1958 Basement Depression Plan
.11 SSK1.2 - 1958 Basement Depression Sections
.12 SSK1.3 - 1958 Basement Depression Sections
.13 SSK2.1 - 1958 Electrical Vault 3D Rendering & Basement Plan
.14 SSK2.2 - 1958 Electrical Vault Sections
.15 SSK3.1 - 1946_1947&1958 Basement Wall Opening Basement Plan
.16 SSK3.2 - 1946&1958 Basement Wall Opening Sections
.17 SSK3.3 - 1947&1958 Basement Wall Opening Sections
.18 SSK4.1 - Atrium&1951_1958 Foundation Coordination Basement Plan
.19 SSK4.2 - Atrium&1951_1958 Foundation Coordination Sections
.20 SSK4.3 - Atrium&1951_1958 Foundation Coordination 3D Rendering 3
.21 SSK4.4 - Atrium&1951_1958 Foundation Coordination 3D Rendering 2)
.22 SSK5.1 - Tunnel at Fan Room Basement Plan)
.23 SSK6.1 - 1958 Elevator Coordination Basement and Level 1 Plan)
.24 SSK8.1 - 1946_1947&1958 Brick Wall Opening Sections
.25 SSK9.1 - North Canopy 3D Rendering
.26 SSK9.2 - North Canopy Level 1 Plan & Front Elevation
.27 SSK9.3 - North Canopy Sections
.28 SSK10.1 - 1922 South Wall Opening Sections
.29 SSK11.1 - 1922 North Wall Opening Sections
.30 SSK12.1 - 1922 Elevator Lift Shaft Opening Sections
.31 SSK13.1 - Loading Dock 3D Rendering
.32 SSK13.2 - Loading Dock Level 1 Plan
.33 SSK13.3 - Loading Dock Sections
.34 SSK14.1 - Atrium Structure 3D Rendering 1
.35 SSK14.2 - Atrium Structure 3D Rendering 2
.36 SSK14.3 - Atrium Structure Level 1
.37 SSK14.4 - Atrium Structure Level 2
.38 SSK14.5 - Atrium Structure Level 3
.39 SSK14.6 - Atrium Structure Level 4
.40 SSK14.7 - Atrium Structure Level 5
.41 SSK14.8 - Atrium Structure Level 6
.42 SSK14.9 - Atrium Structure Level 7
.43 SSK14.10 - Atrium Structure T.O. Atrium Truss
.44 SSK14.11 - Atrium Structure North Elevation
.45 SSK14.12 - Atrium Structure East and West Elevation
.46 SSK14.13 - Atrium Structure South Elevation
.47 SSK15.1 - 1958 Infill Slab 3D and Elevations)
.48 SSK15.3 - 1958 Infill Slab Plan View
.49 SSK15.3 - 1958 Infill Slab Sections
.50 SSK16.1 - Council Chambers 3D Rendering
.51 SSK16.2 - Council Chambers Level 4 Plan
.52 SSK16.3 - Council Chambers Mezzanine Level Plan
.53 SSK16.4 - Council Chambers Sections
.54 SSK17.1 - Mechanical Penthouse & Stair Structure 3D Rendering
.55 SSK17.2 - Mechanical Penthouse 3D Rendering
.56 SSK17.3 - Mechanical Penthouse Plan
.57 SSK17.4 - Mechanical Penthouse Stair Structure Rendering
.58 SSK17.5 - Mechanical Penthouse Stair Structure Plan
.59 SSK17.6 - Mechanical Penthouse 7th Floor Remedial Work Plan
.60 SSK18.1 - Attic Floor Remedial Work Plan
.61 SSK18.2 - Attic Roof Remedial Work Plan
.62 SSK19.1 - Level 1 Slab Plan
.63 SSK19.2 - Level 1 Slab Sections
.64 SSK19.3 - Level 1 Slab Sections
.65 SSK20.1 - Glass Lanterns Elevation
.66 SSK20.2 - Glass Lanterns Plan and Section
.67 SSK20.3 - Glass Lanterns Sections
.68 SSK20.4 - Glass Lanterns Plan



6.200 S100 - BASEMENT PLAN

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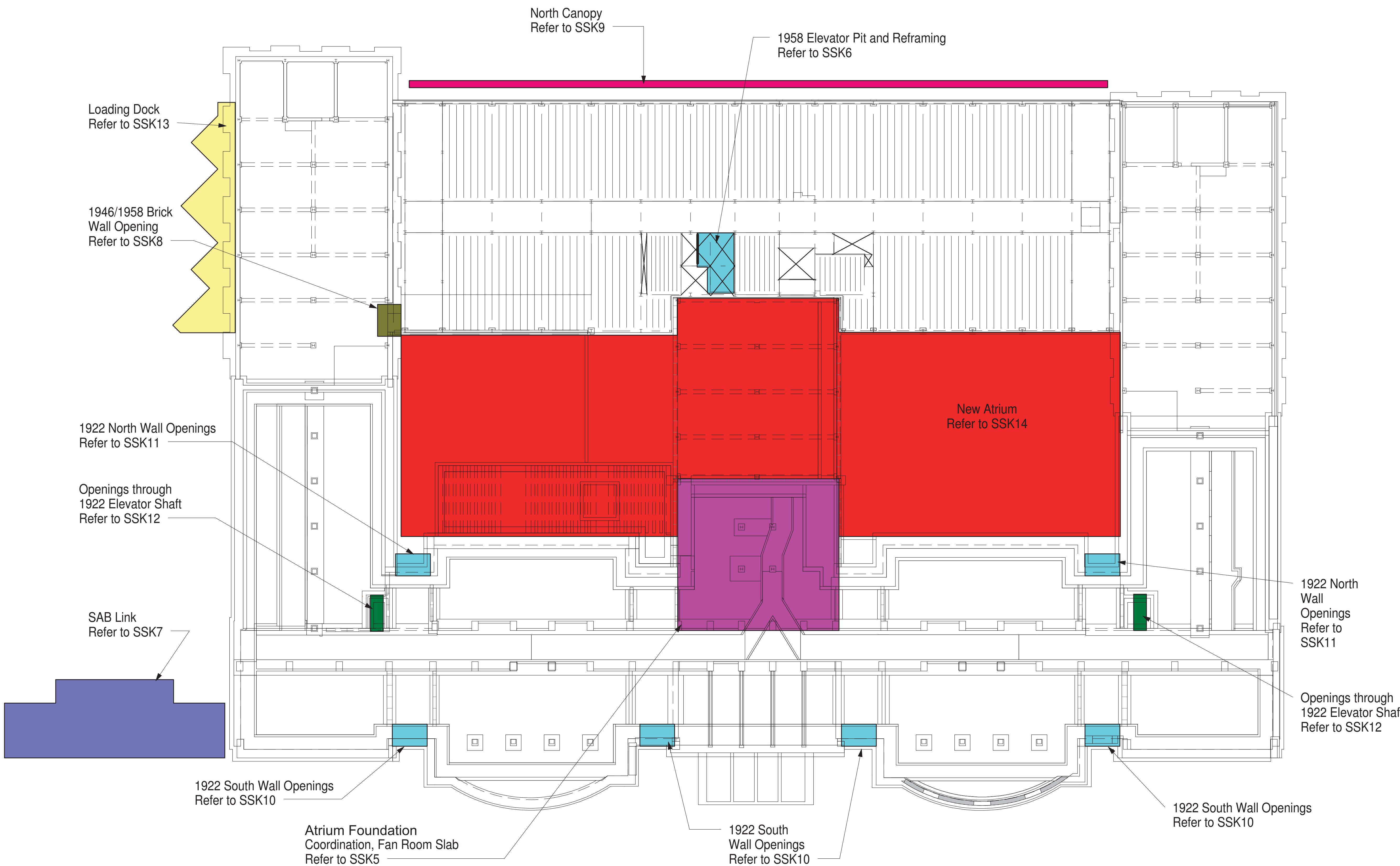
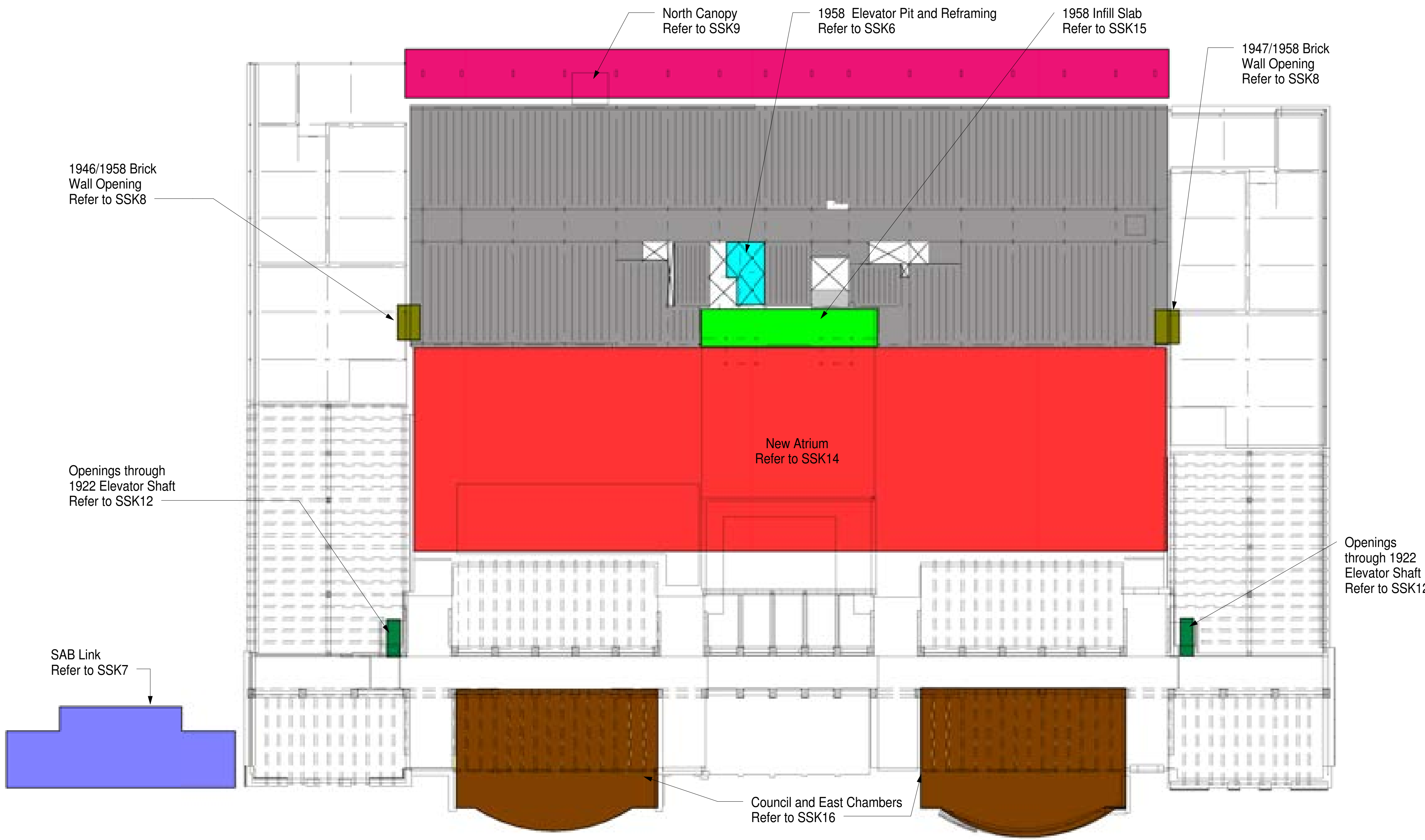
6. STRUCTURAL

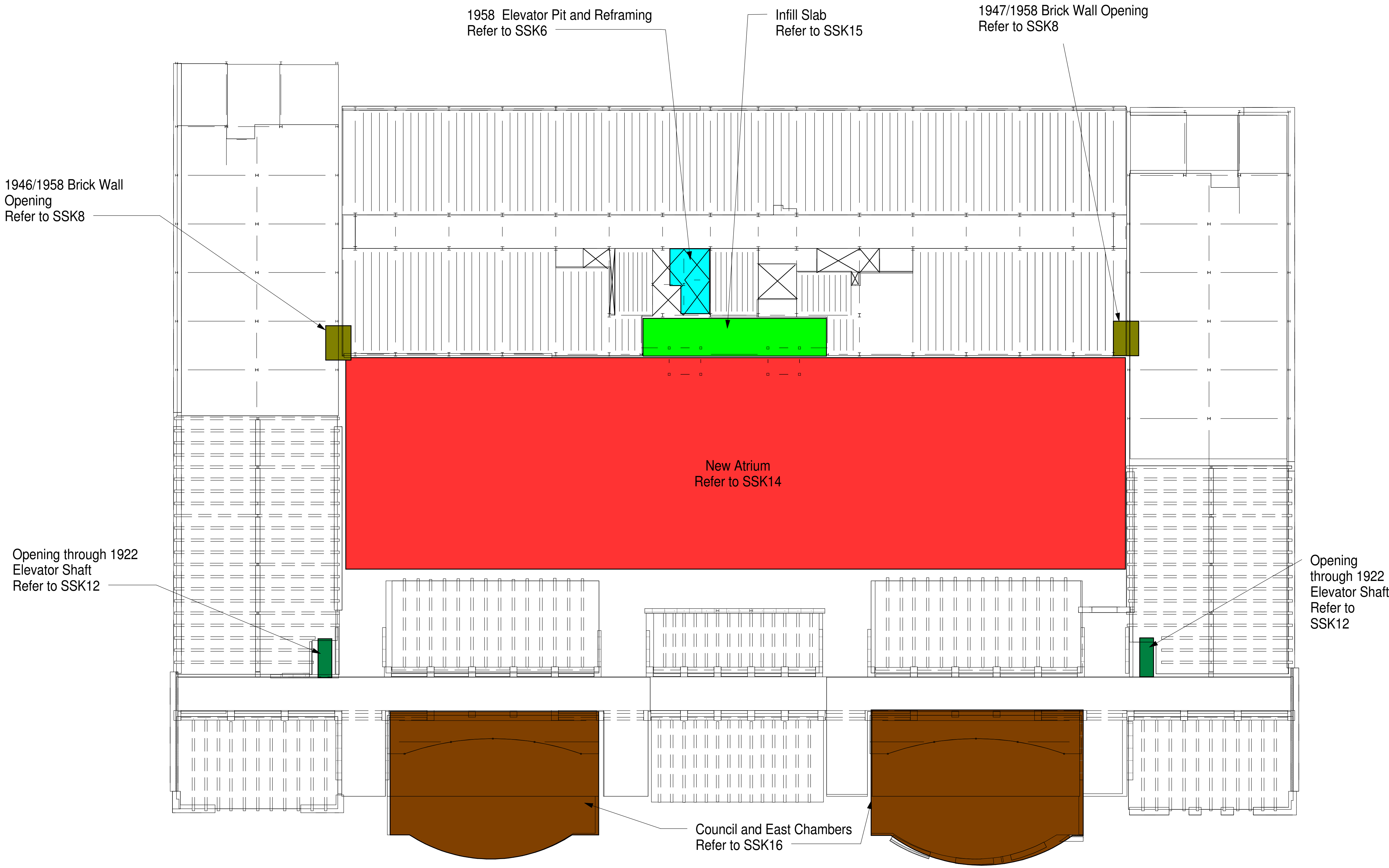
STRUCTURAL DRAWINGS



S001 - LEVEL 1



6.202 S102 - LEVEL 2



S103 - LEVEL 3

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6. STRUCTURAL

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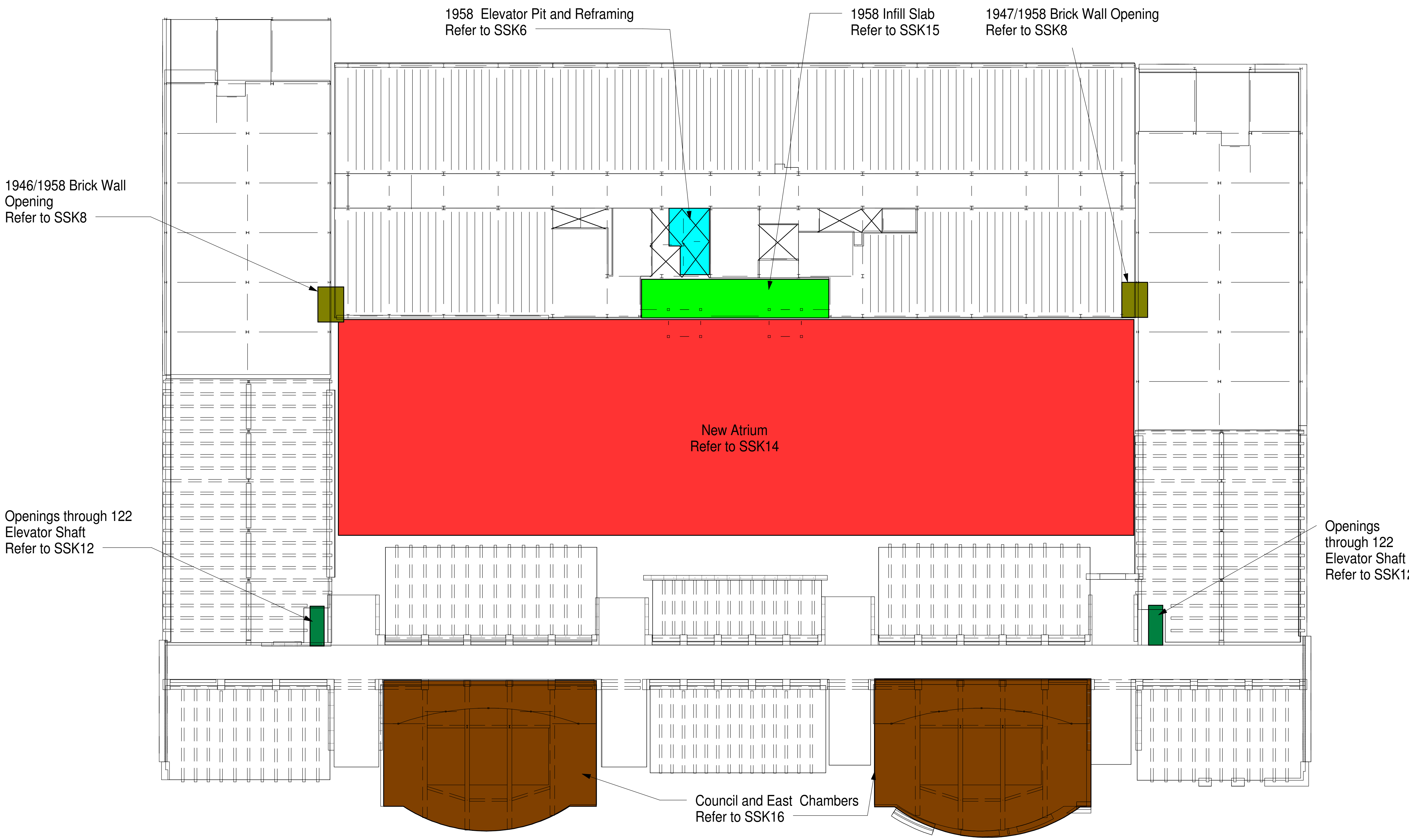
6.203



6 .204 S104 - LEVEL 4

Stantec
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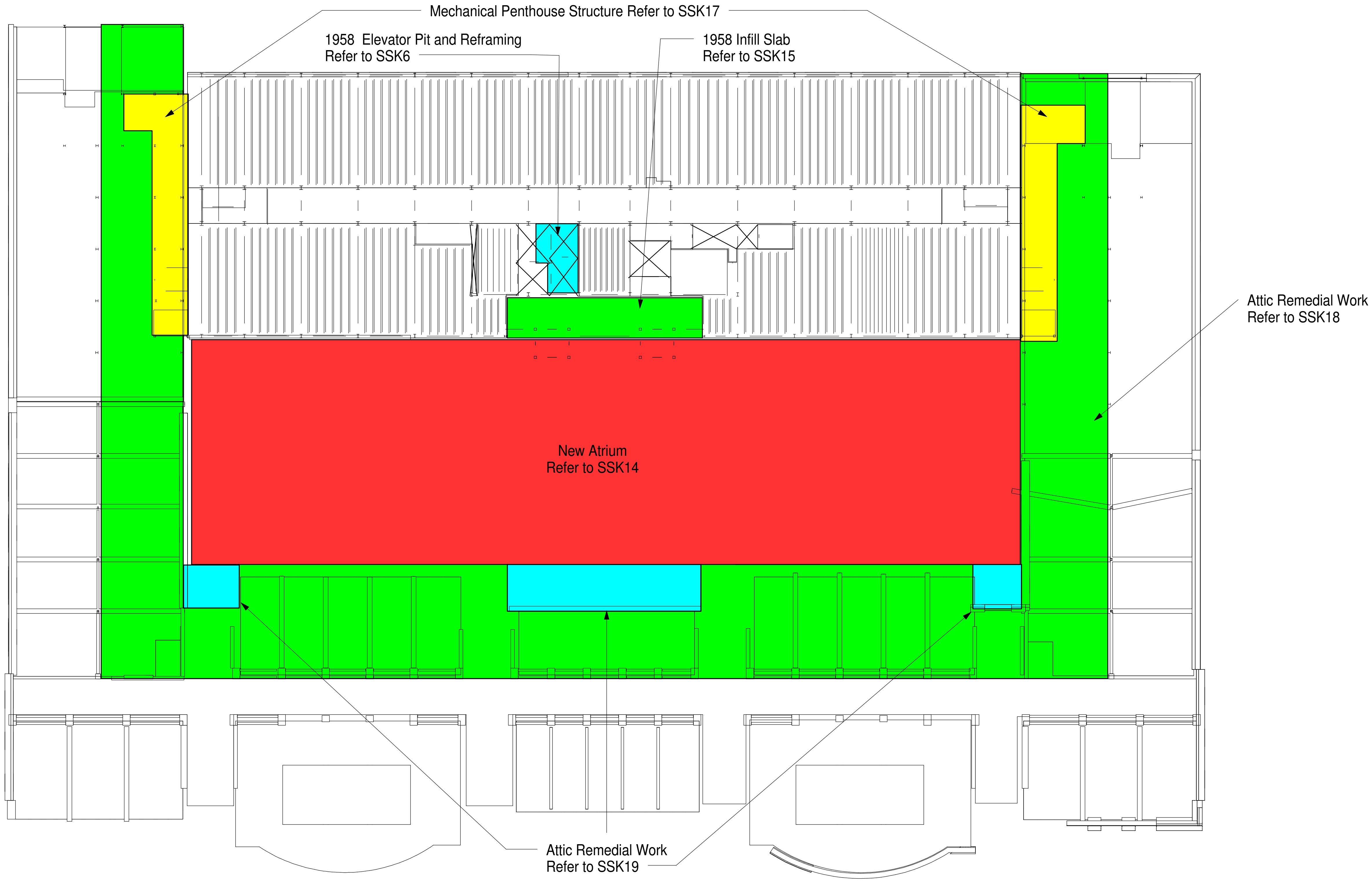
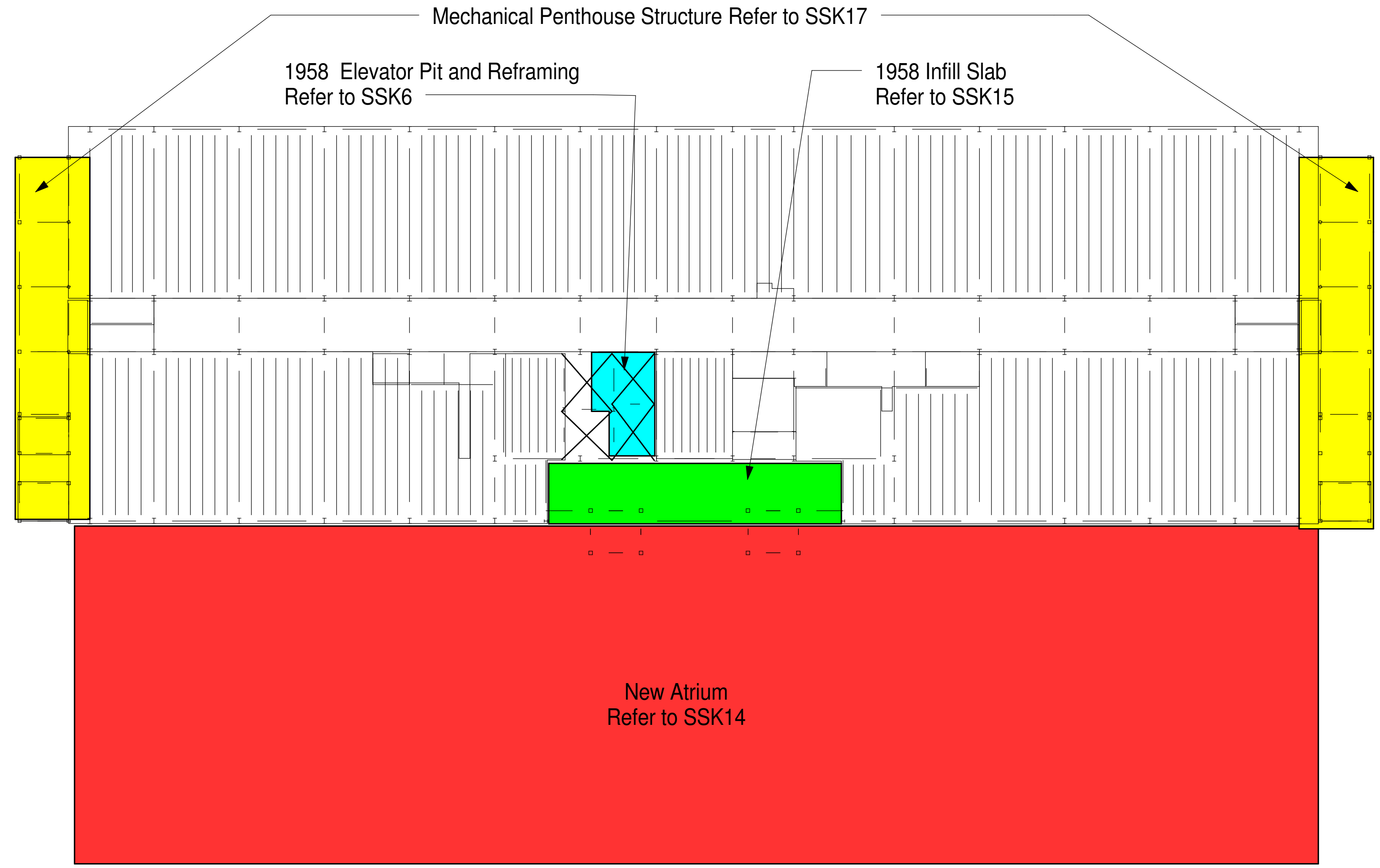
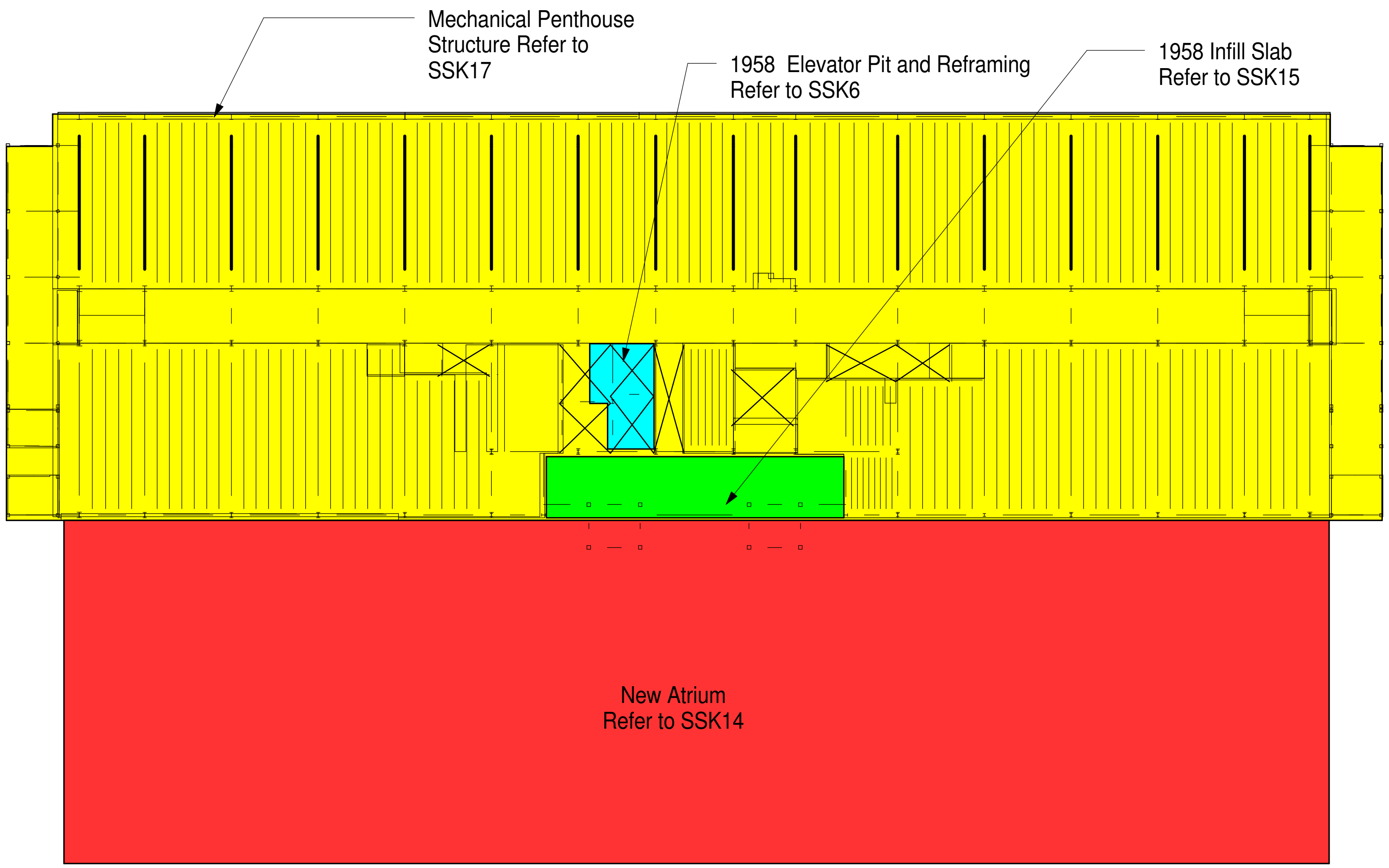
STRUCTURAL DRAWINGS



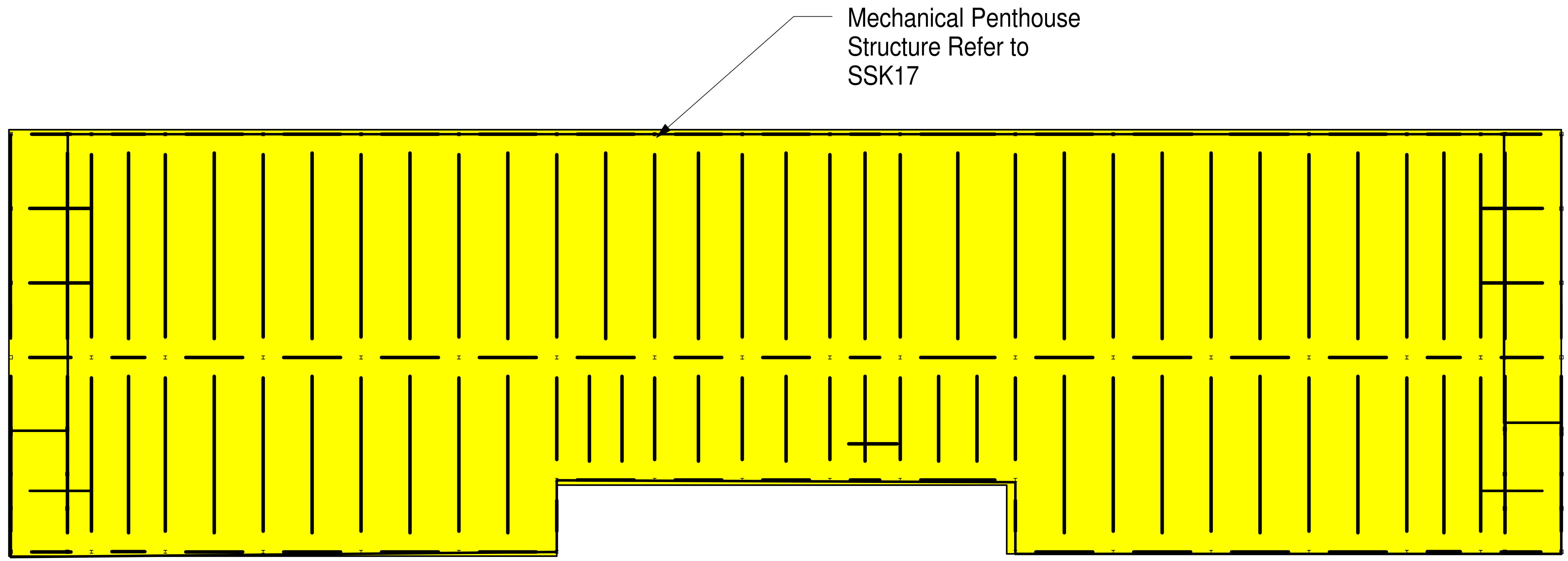
S105 - LEVEL 5



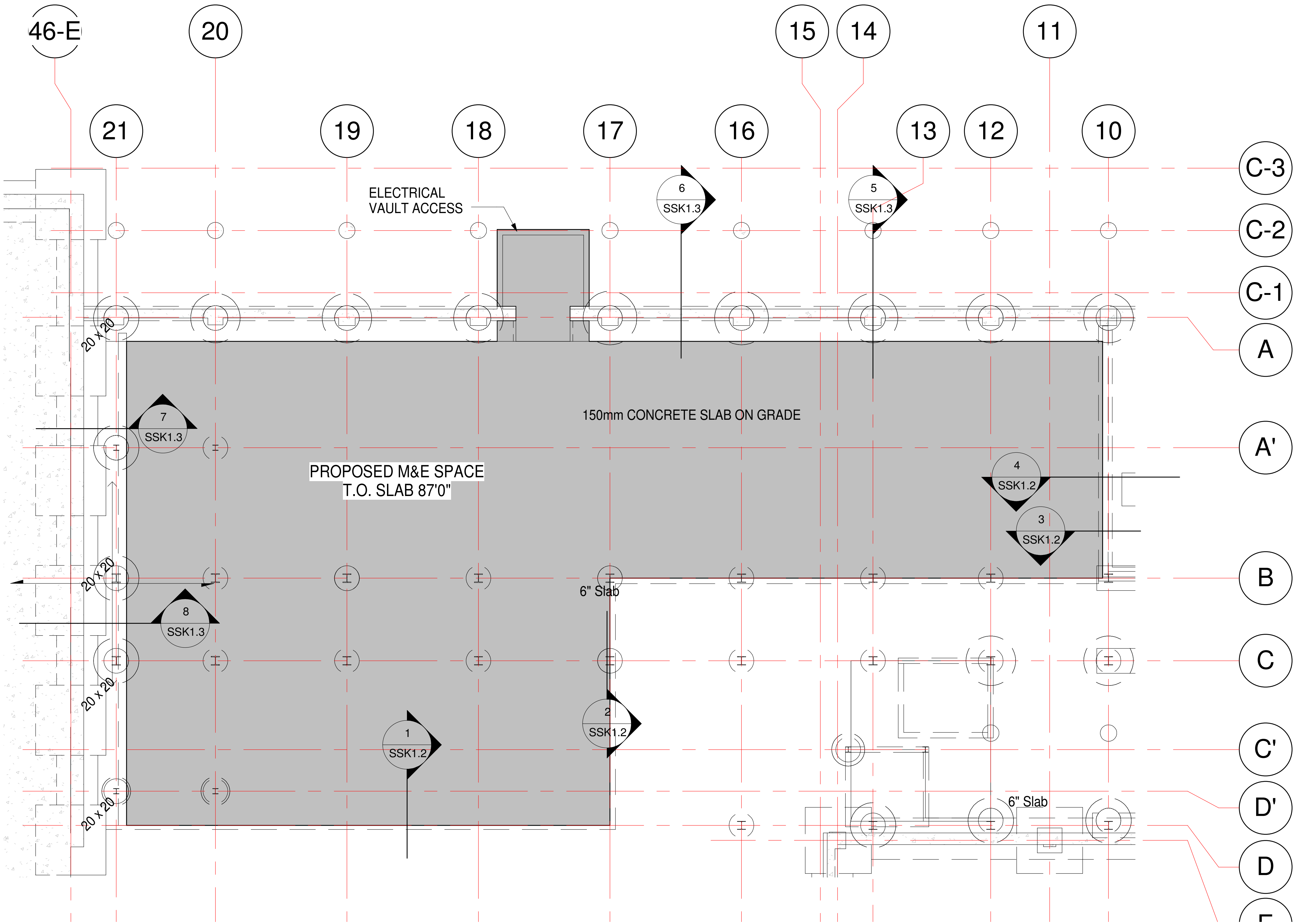
6 .206 S106 - LEVEL 6


Mechanical Penthouse
Structure Refer to
SSK17
1958 Elevator Pit and Reframing
Refer to SSK6
1958 Infill Slab
Refer to SSK15
New Atrium
Refer to SSK14

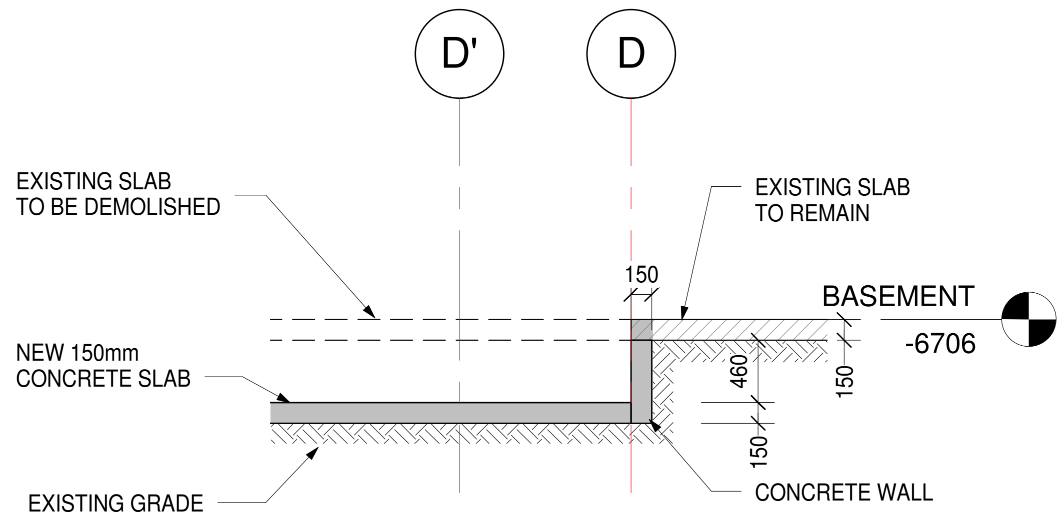
S107 - LEVEL 7



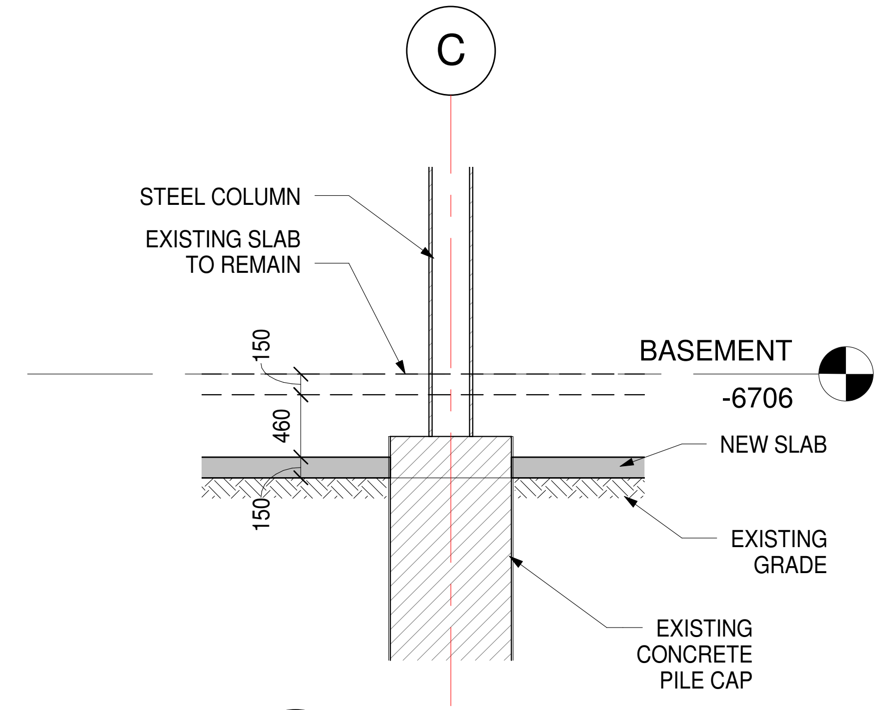
6 .208 **S108 - T.O. MECHANICAL PENTHOUSE**



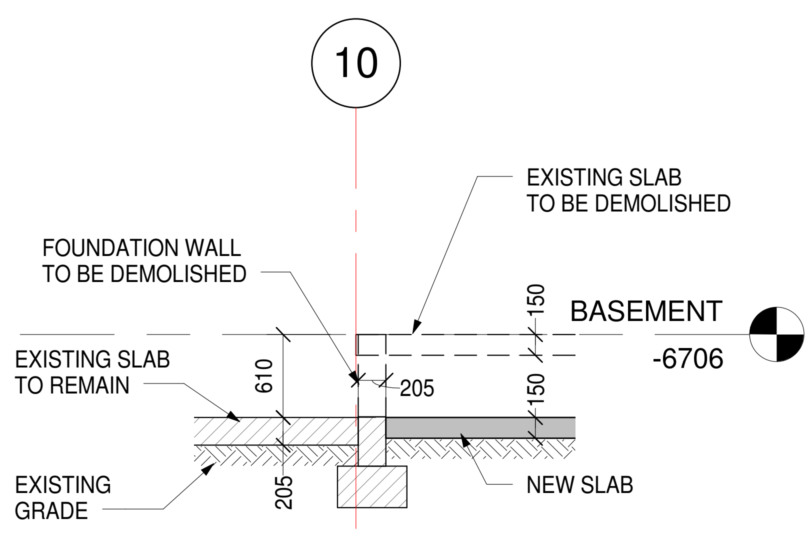
SSK1.1 - 1958 Basement Depression Plan



1
SSK1.2
SECTION
1 : 50



2
SSK1.2
SECTION
1 : 50



3
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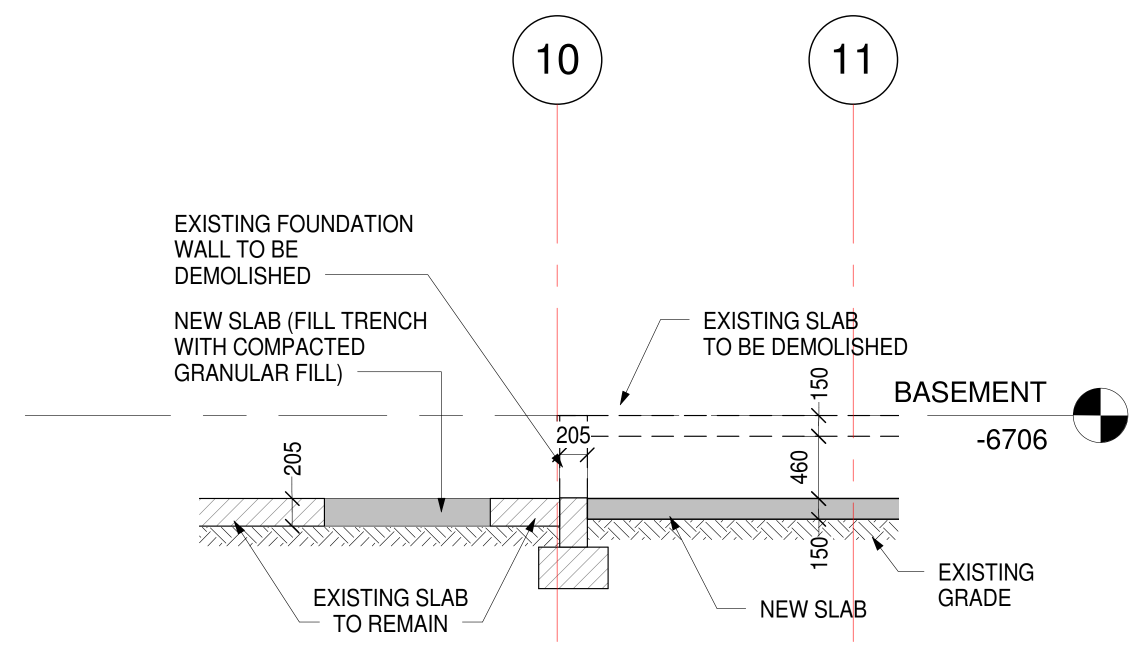
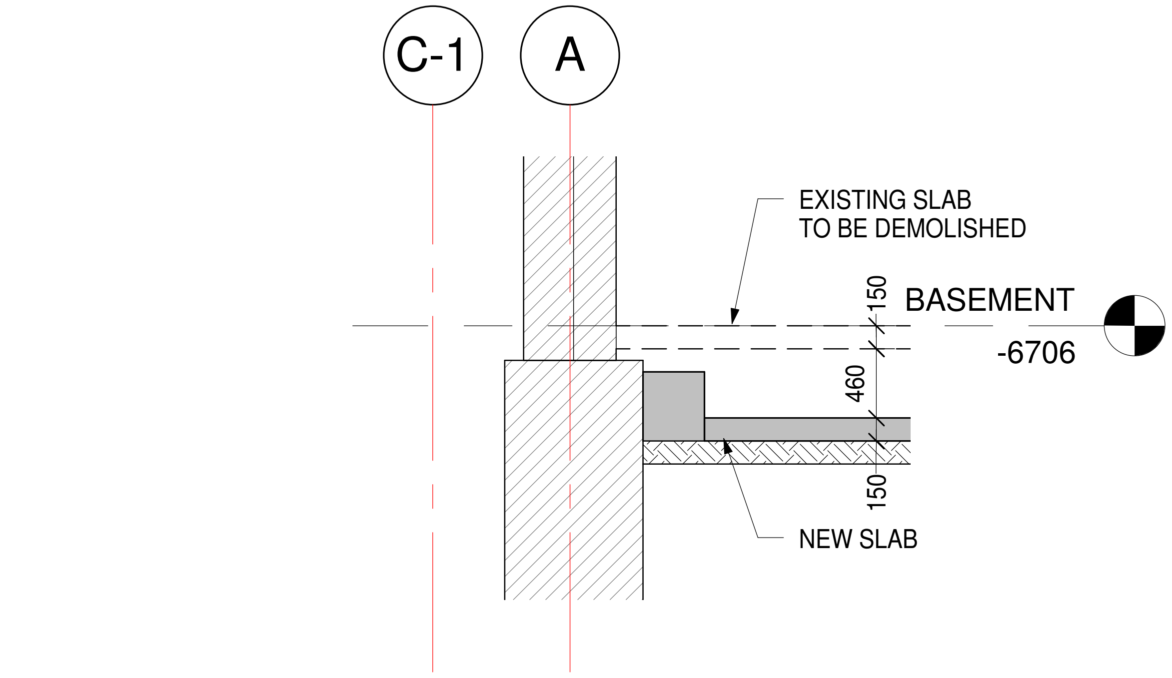
SECTION
1 : 50

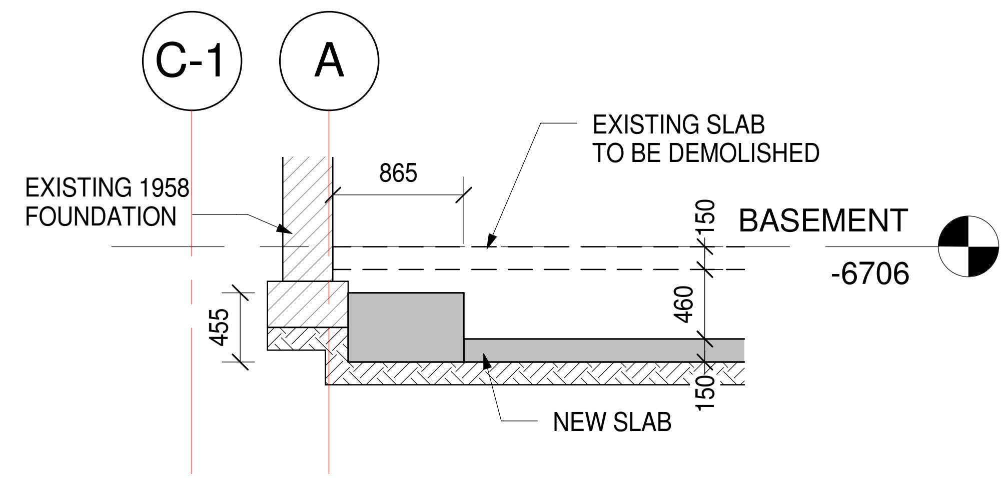


4
SSK1.2
SECTION
1 : 50

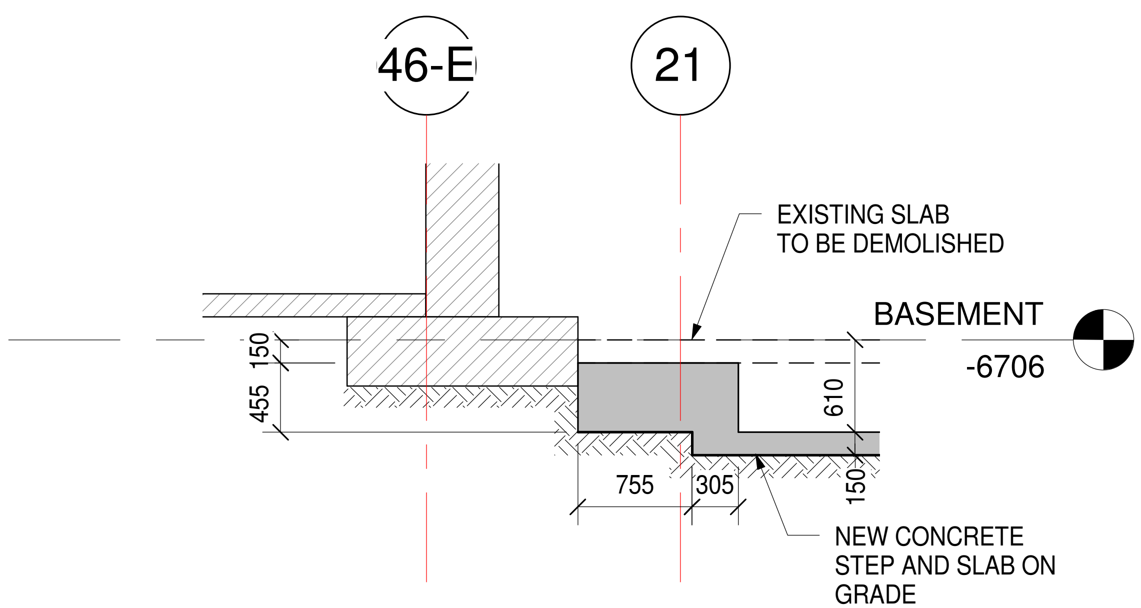
6 .210 SSK1.2 - 1958 Basement Depression Sections



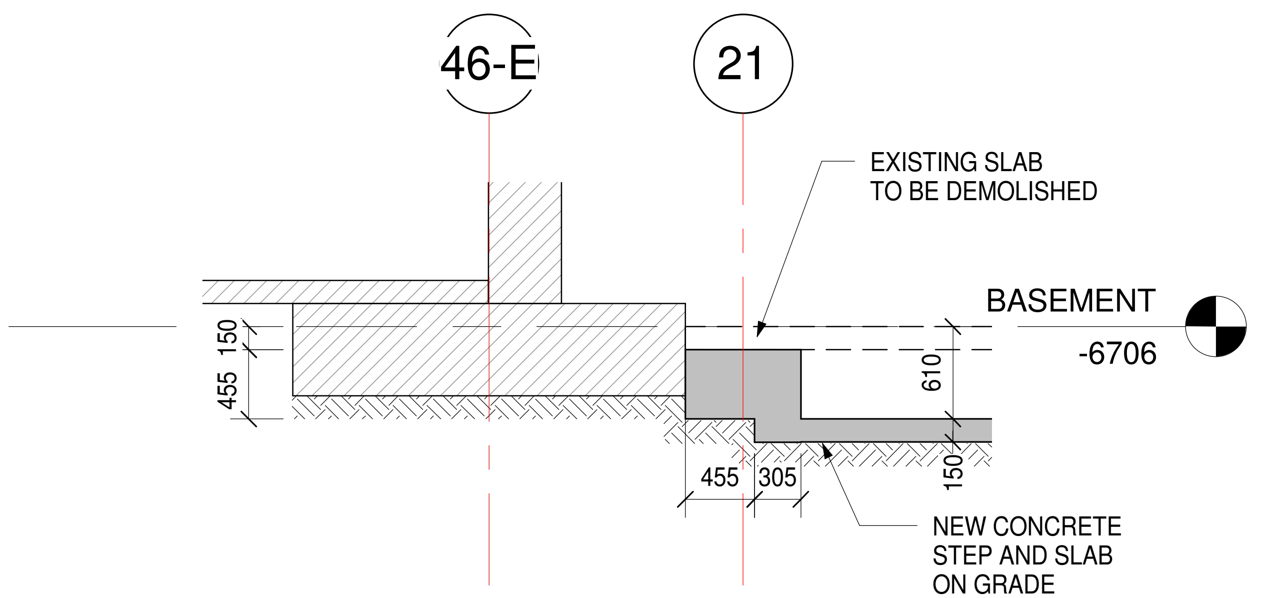
5 SSK1.3 SECTION 1 : 50



6 SSK1.3 SECTION 1 : 50



7 SSK1.3 SECTION 1 : 50



8 SSK1.3 SECTION 1 : 50

SSK1.3 - 1958 Basement Depression Sections

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6. STRUCTURAL

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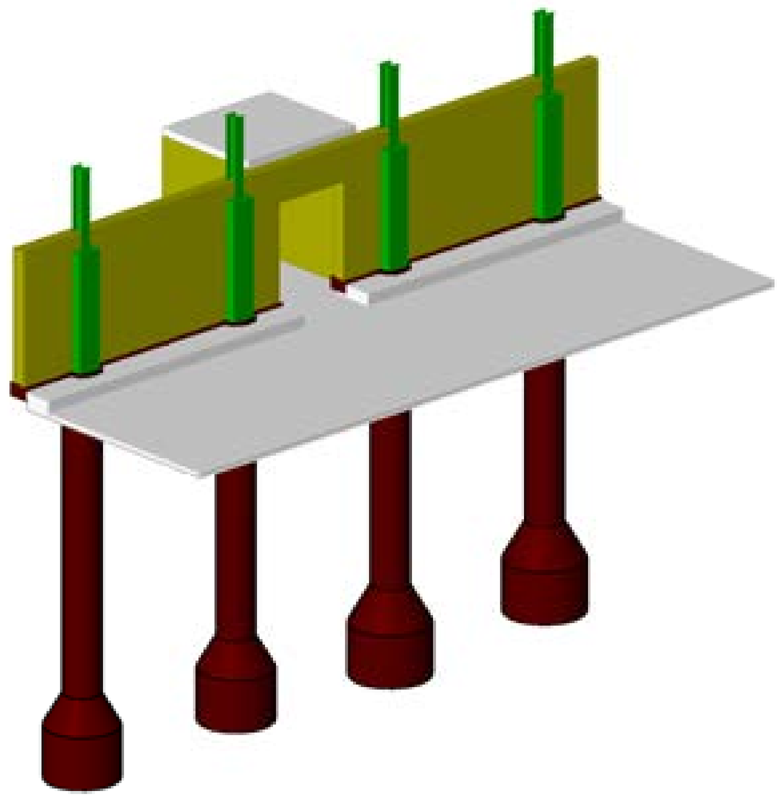
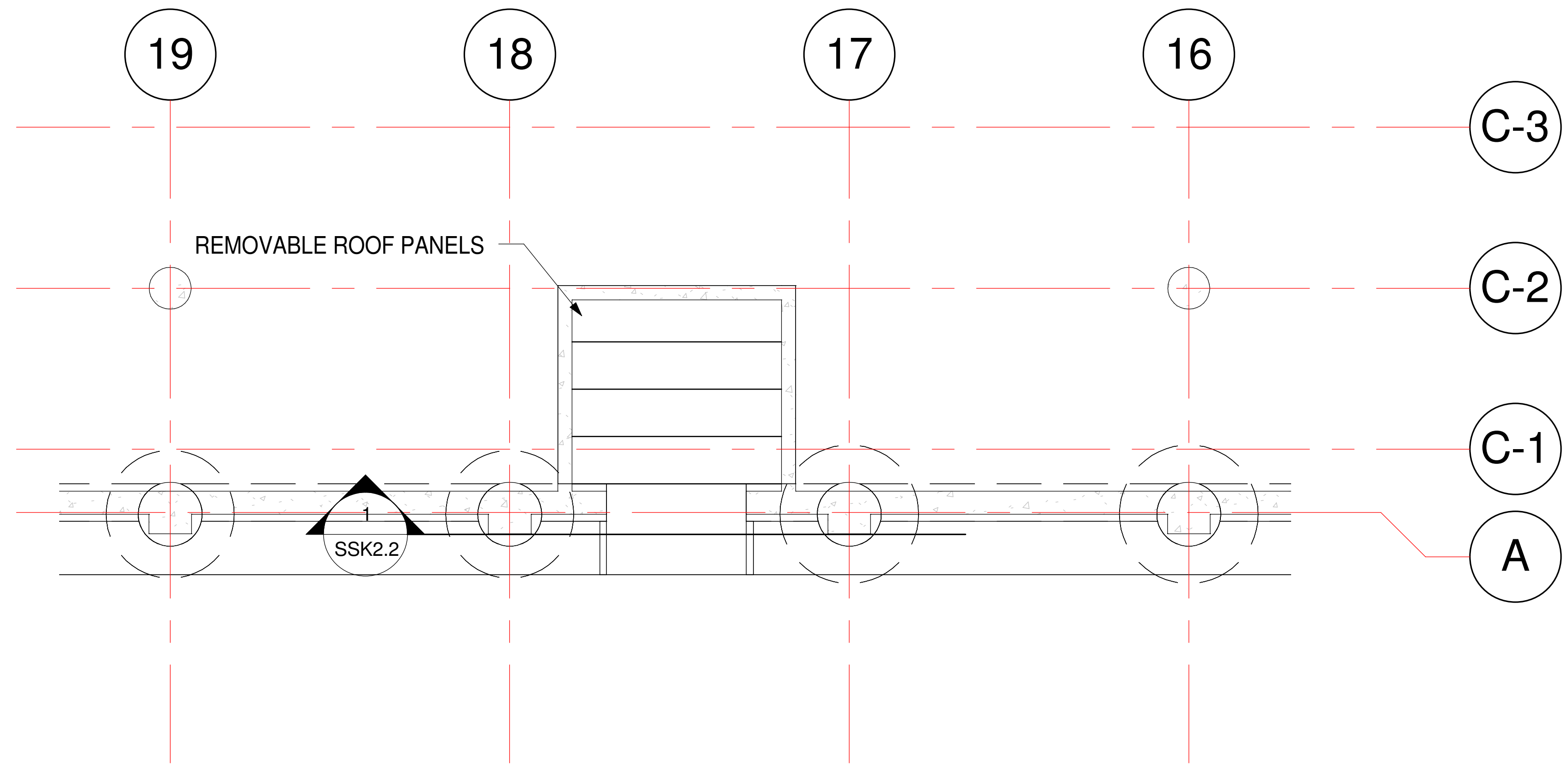
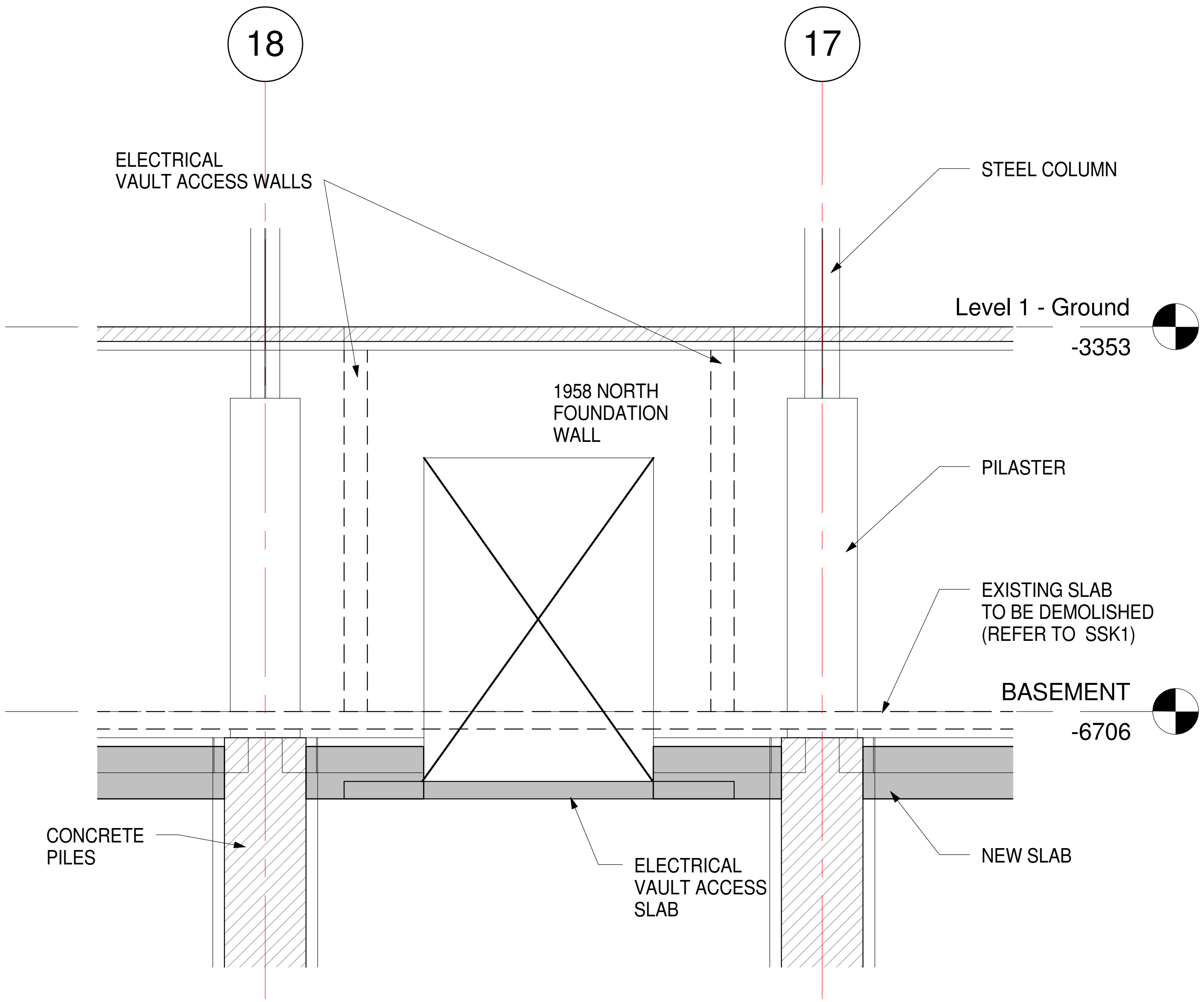


1 Electrical Vault Access



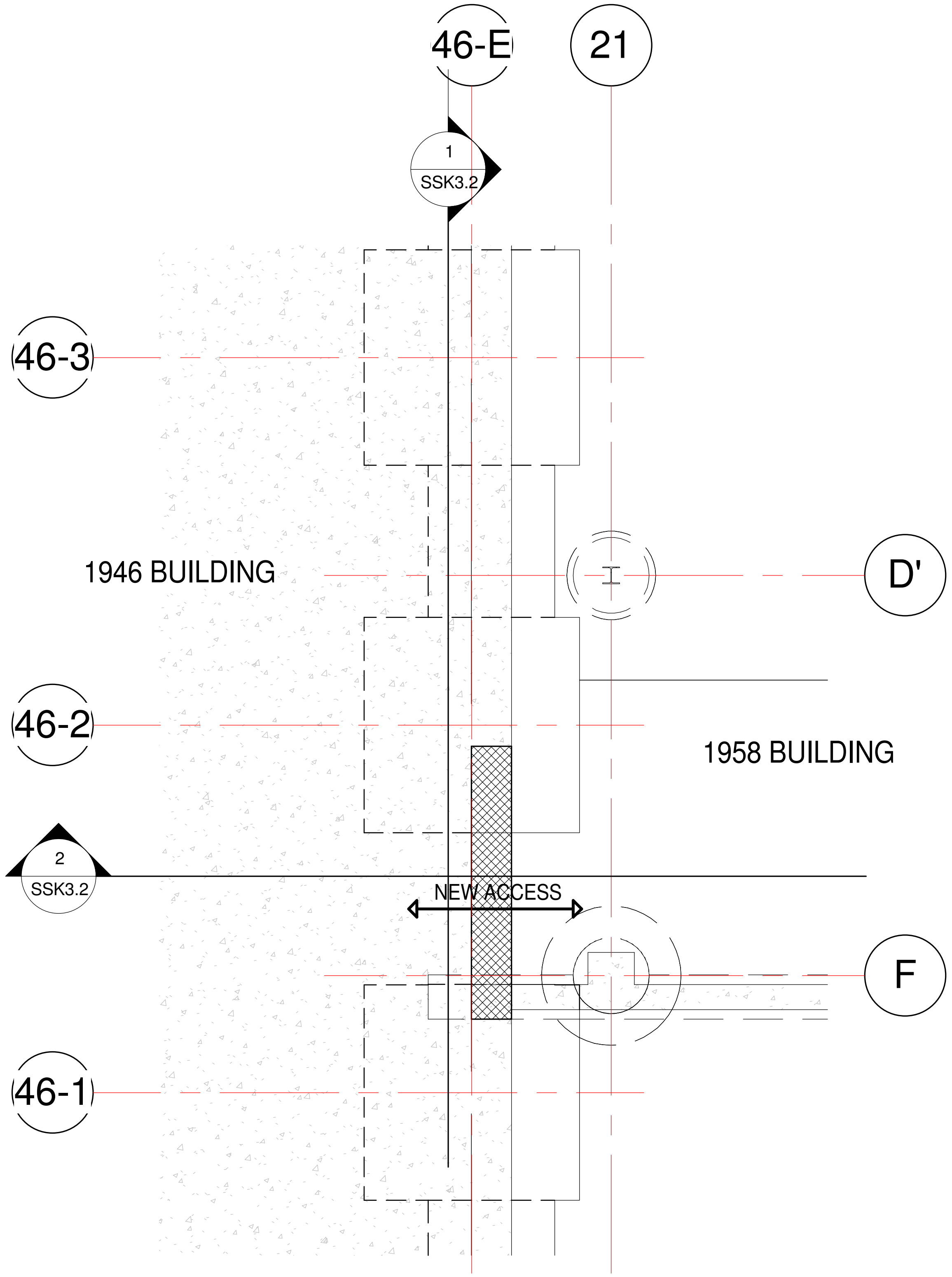
2 BASEMENT PLAN
SSK2.1 1 : 100

6.212 SSK2.1 - 1958 Electrical Vault 3D Rendering & Basement Plan

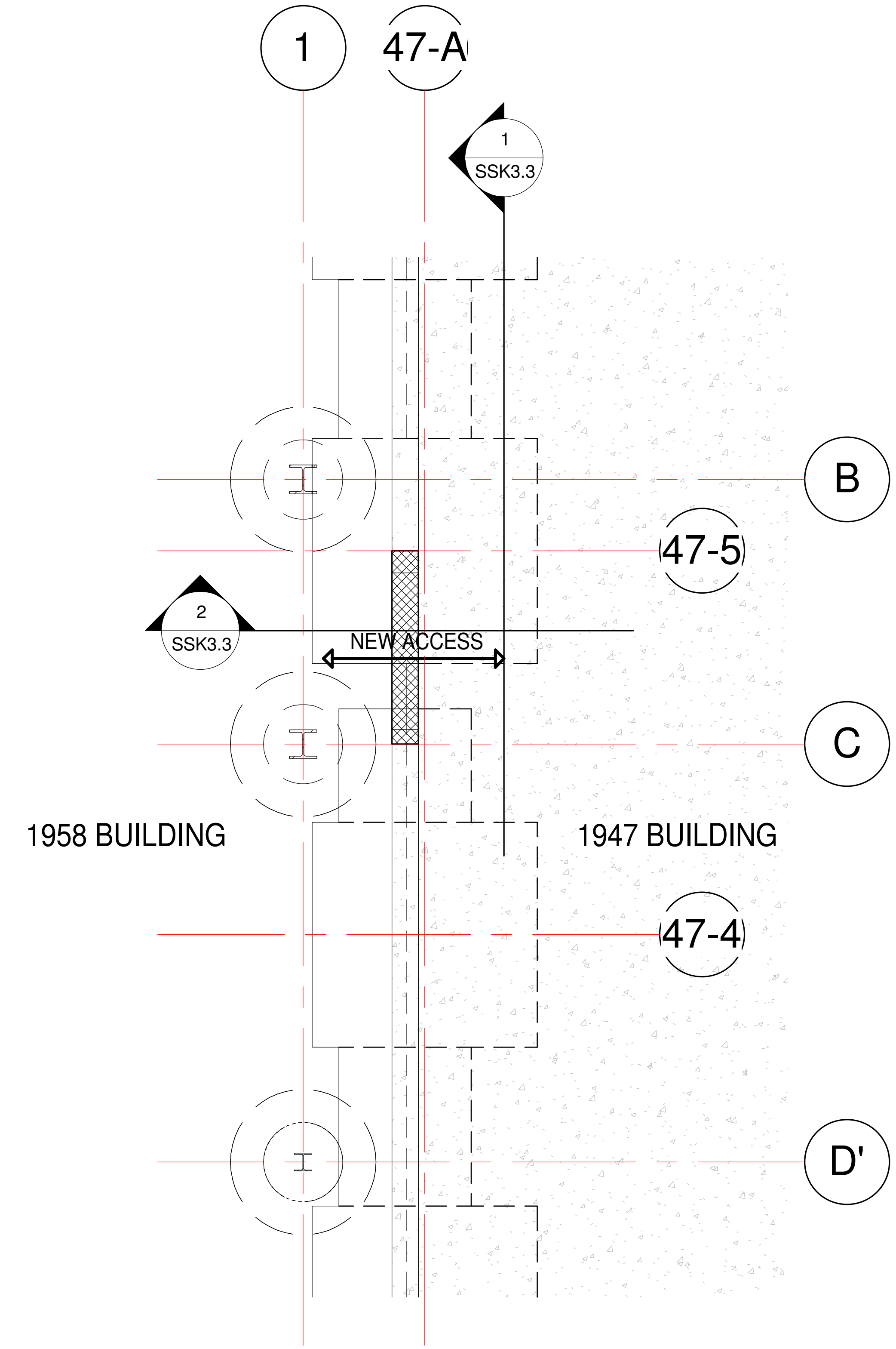


1 SSK2.2 SECTION
1 : 50

SSK2.2 - 1958 Electrical Vault Sections

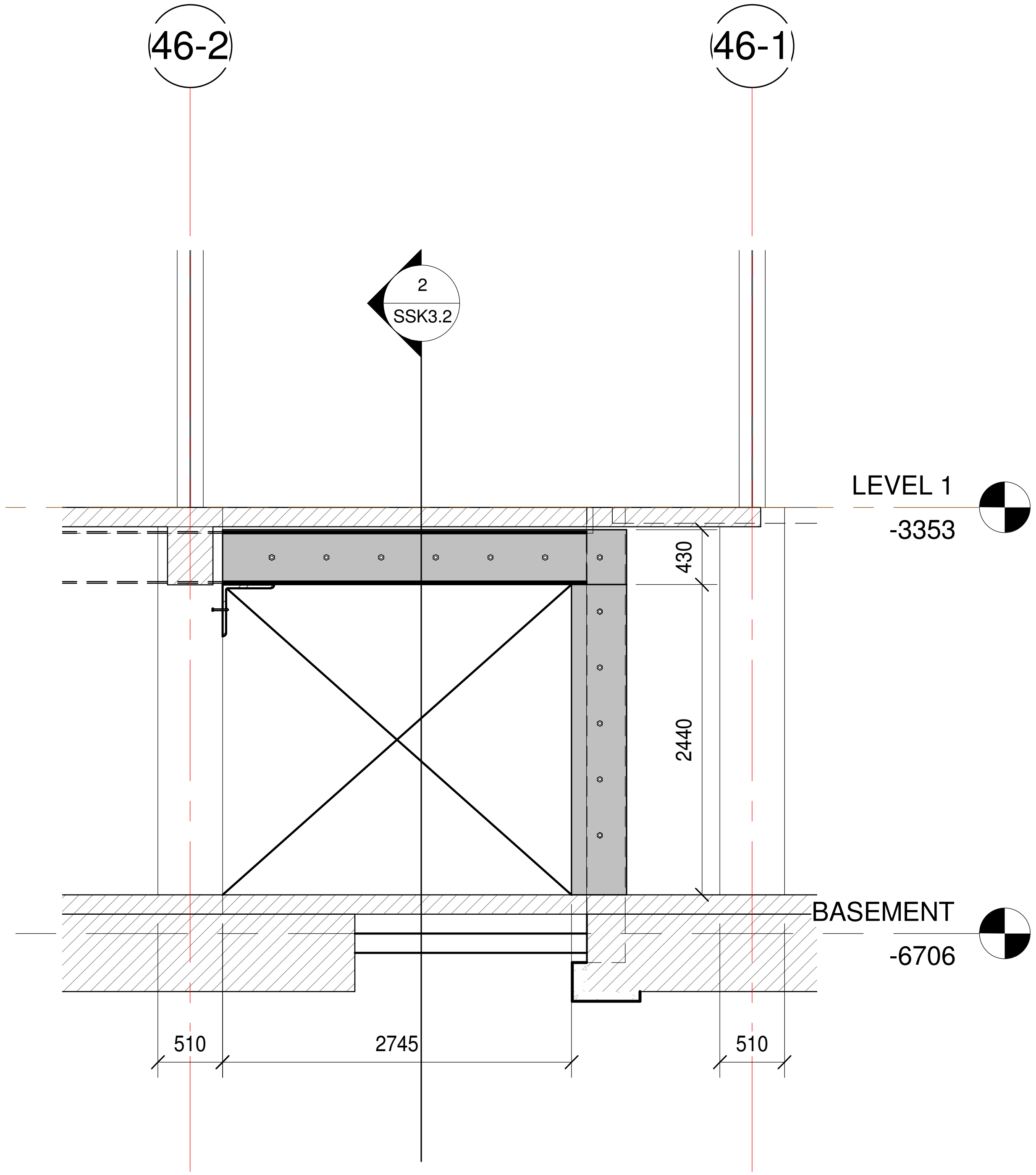


1 SSK3.1 1946/1958 - BASEMENT PLAN
1 : 75



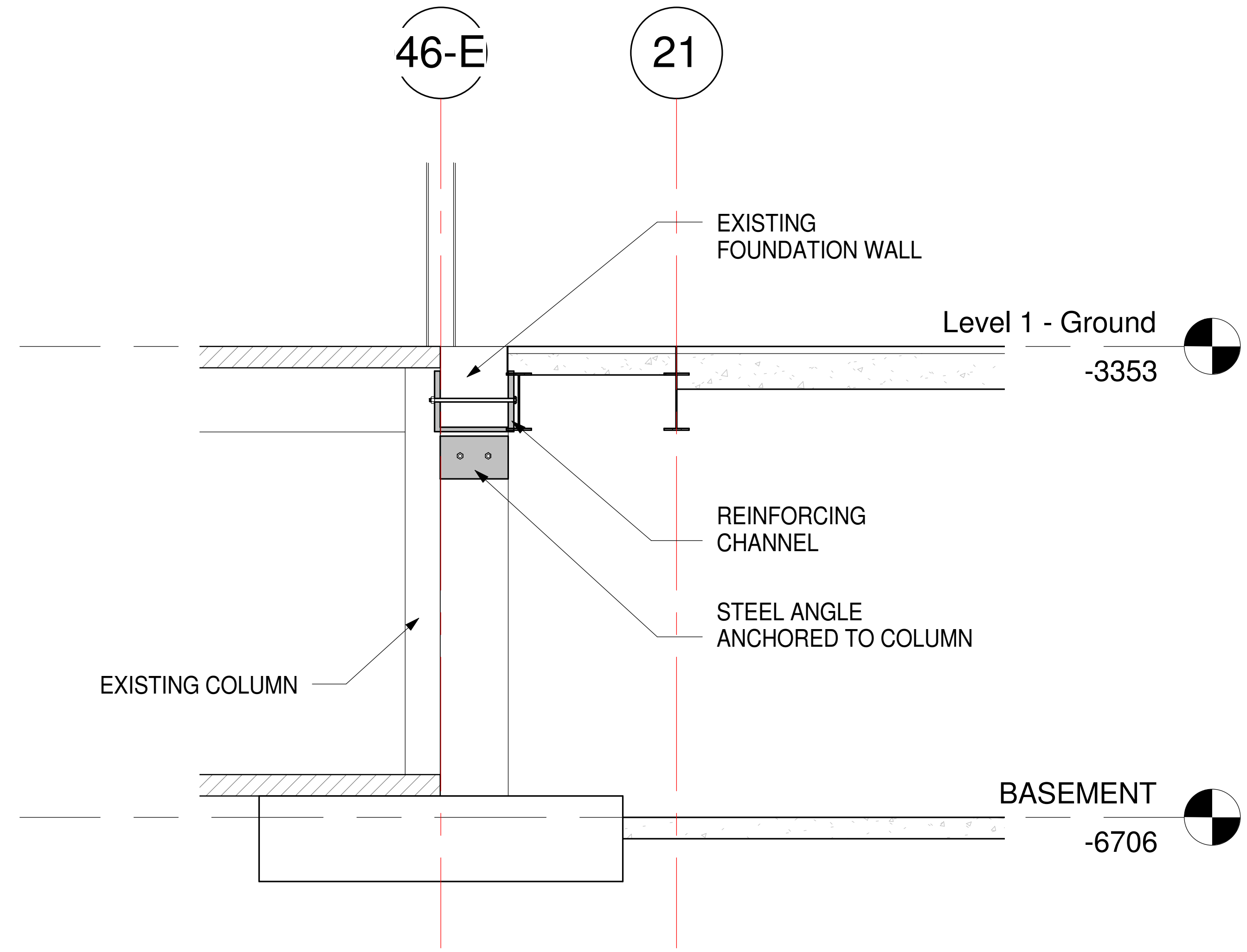
2 SSK3.1 1947/1958 - BASEMENT PLAN
1 : 75

6.214 SSK3.1 - 1946_1947&1958 Basement Wall Opening Basement Plan



1 SSK3.2 SECTION - 1946/1958

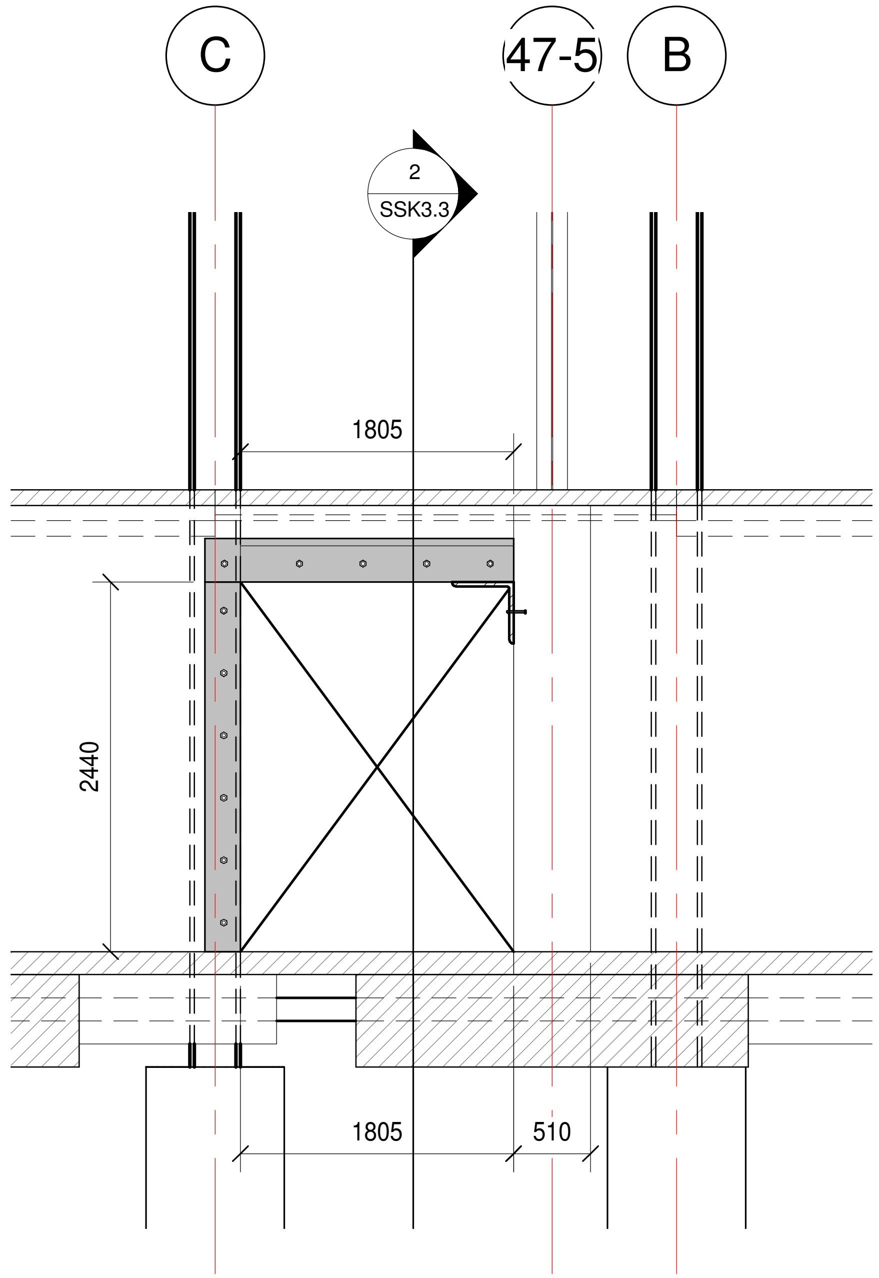
1 : 50

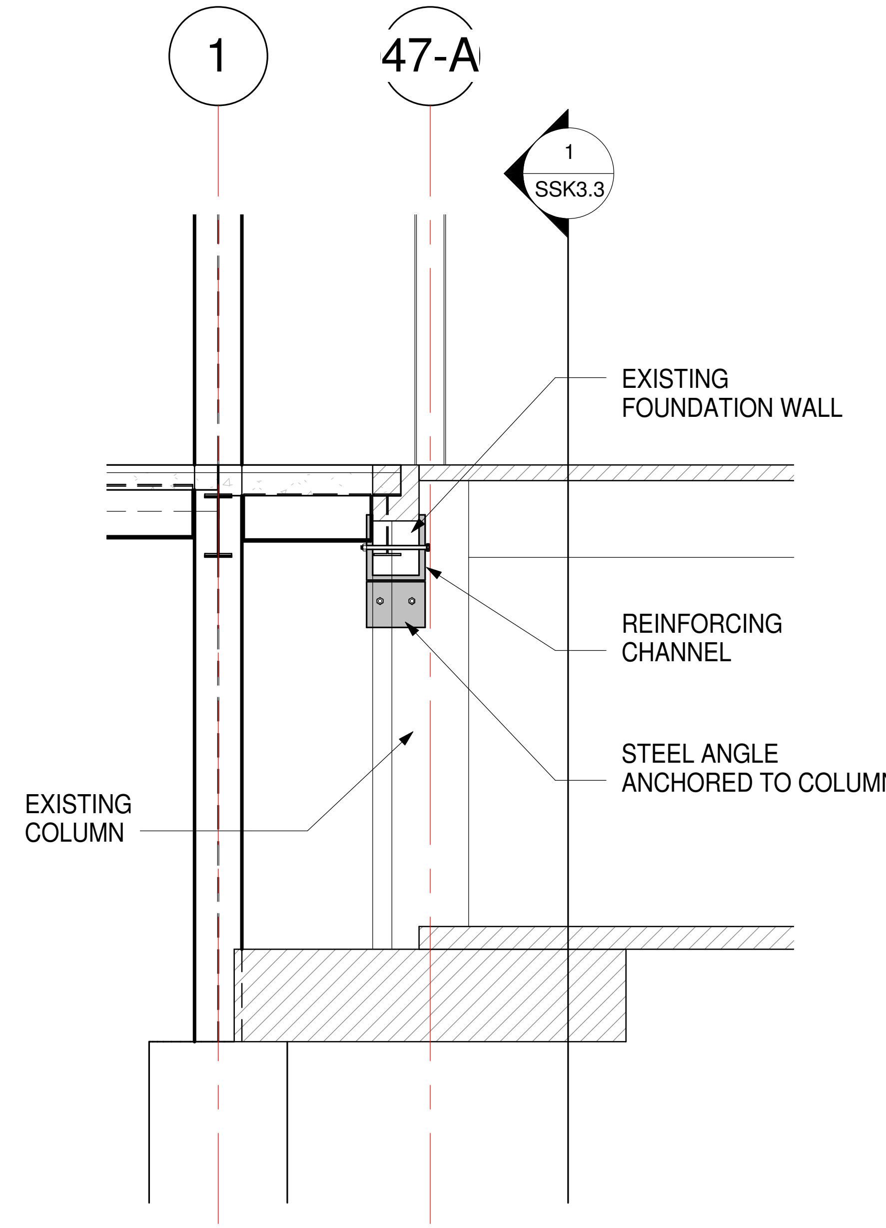


2 SSK3.2 SECTION - 1946/1958

1 : 50

SSK3.2 - 1946&1958 Basement Wall Opening Sections





1 SSK3.3 SECTION - 1947/1958
1 : 50

2 SSK3.3 SECTION - 1947/1958
1 : 50

6 .216 SSK3.3 - 1947&1958 Basement Wall Opening Sections

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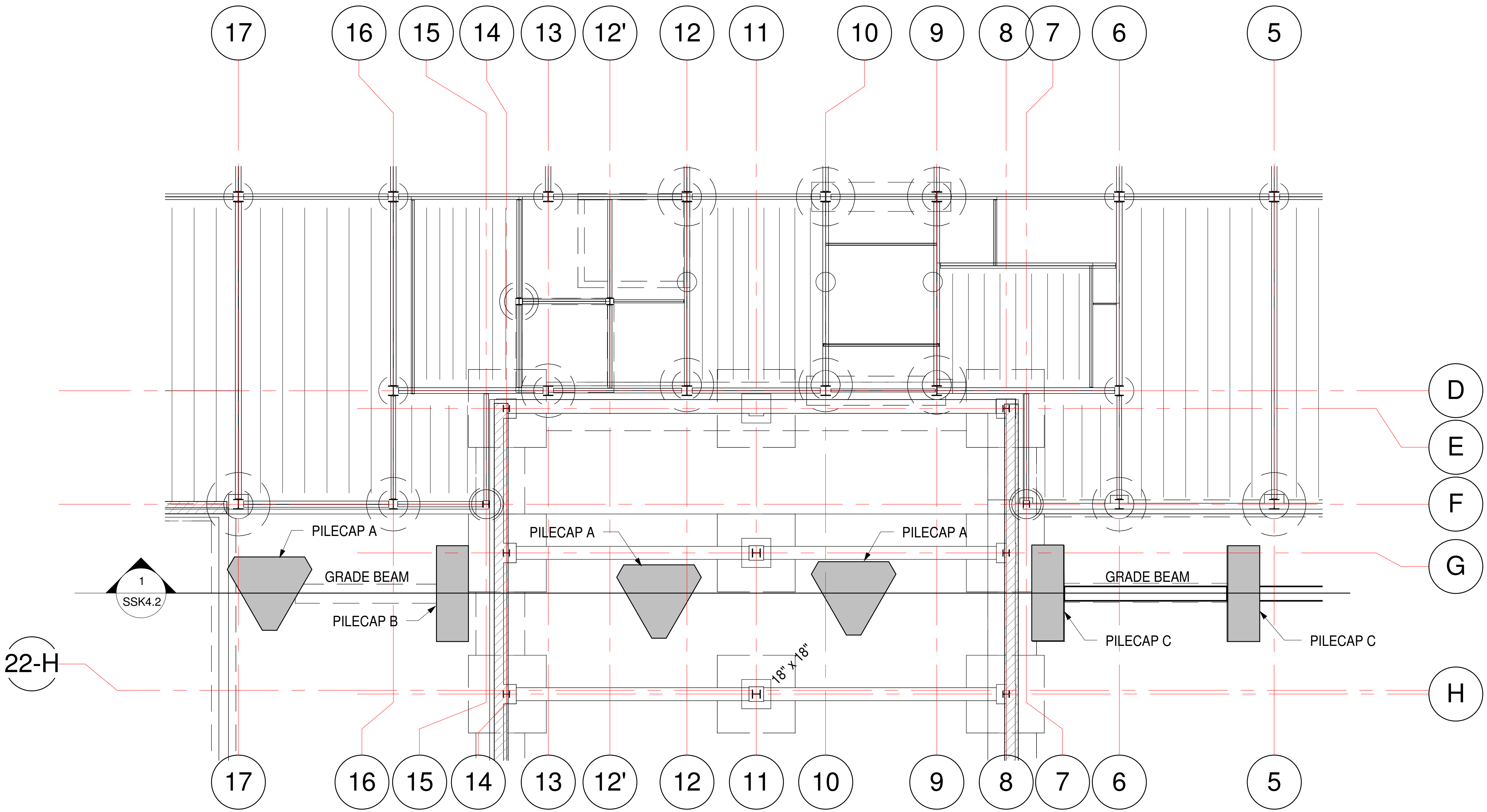


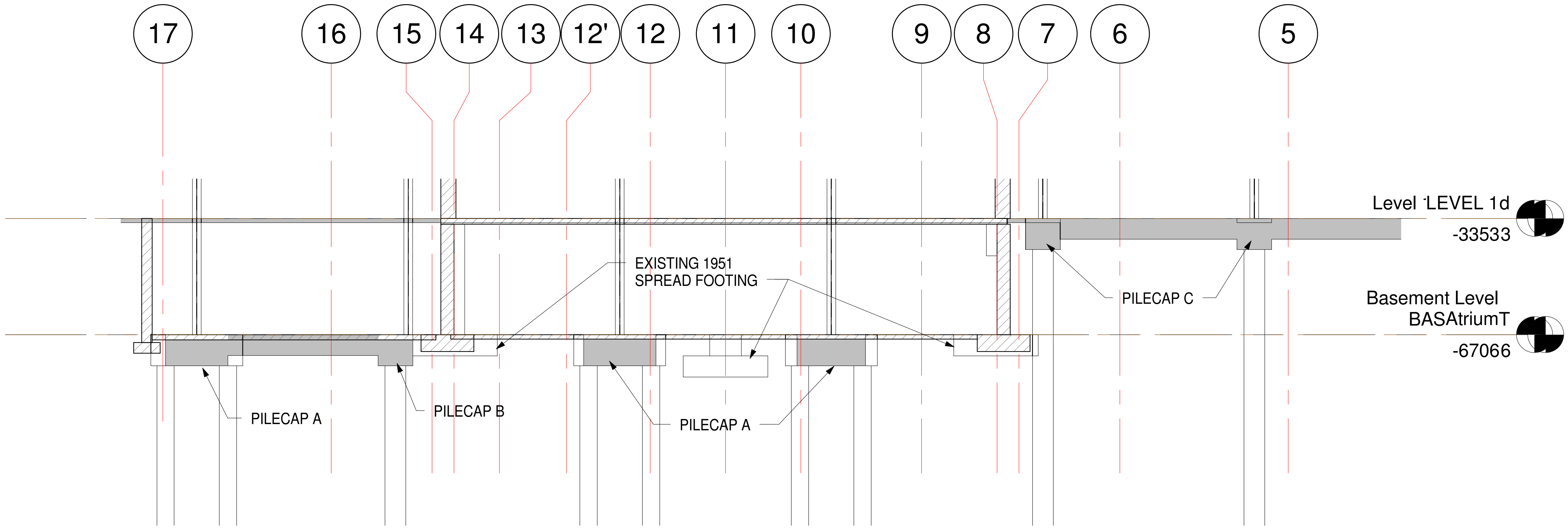
1
SSK4.1
BASEMENT PLAN
1 : 130

DENTISTRY PHARMACY BUILDING REDEVELOPMENT

6. STRUCTURAL

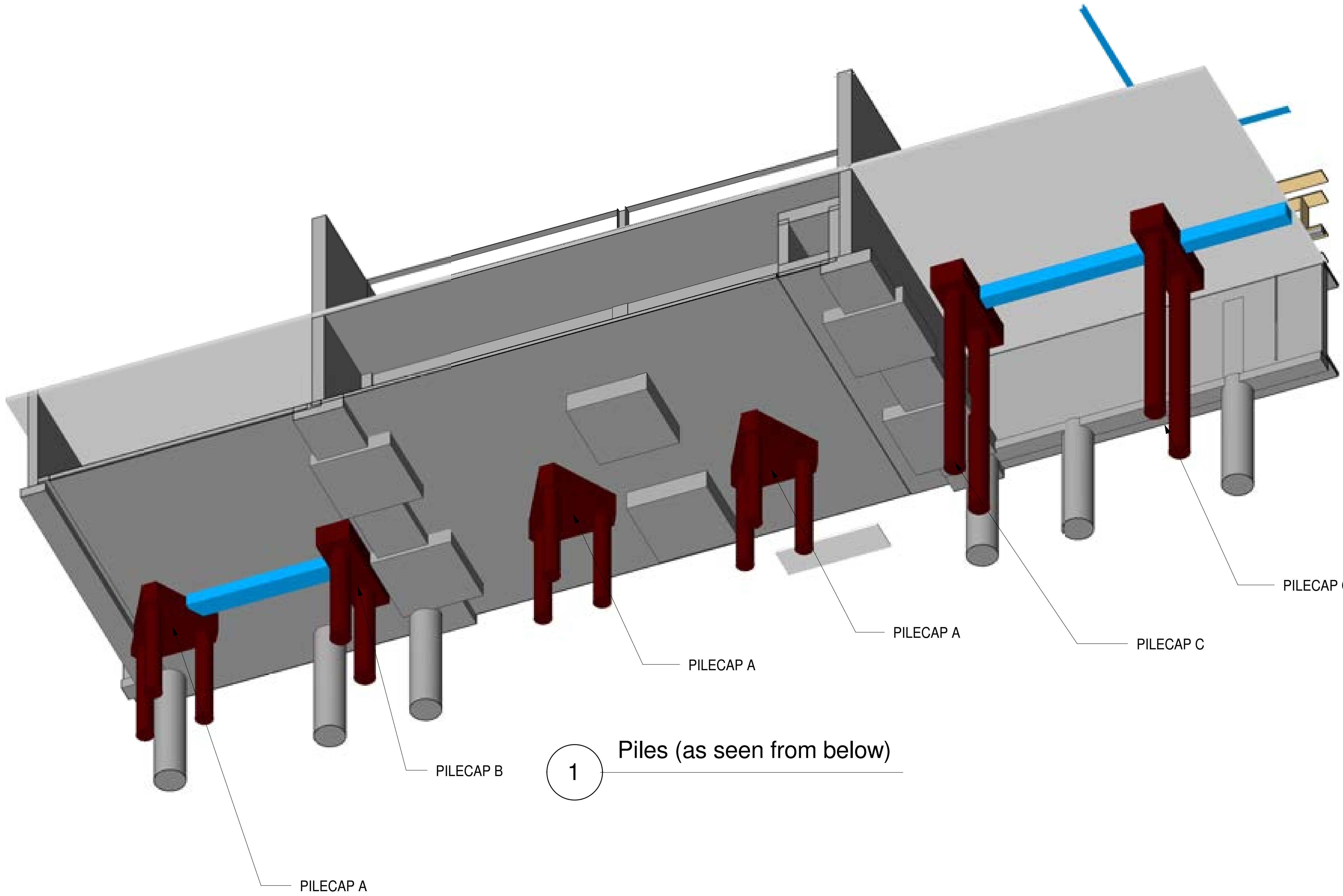
STRUCTURAL DRAWINGS

SSK4.1 - Atrium&1951_1958 Foundation Coordination Basement Plan

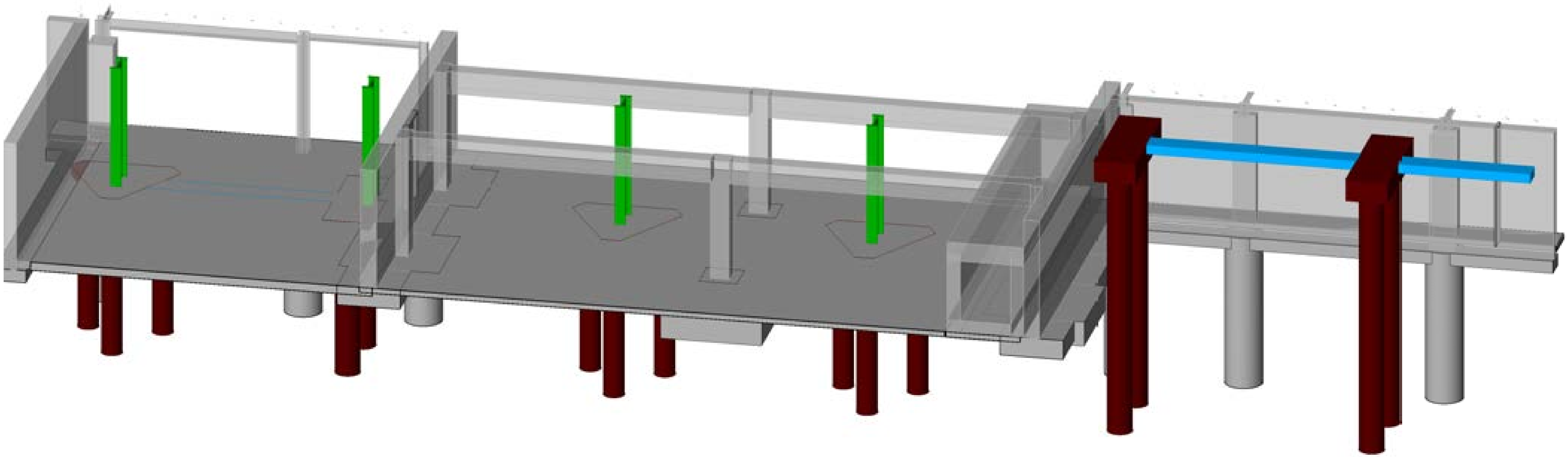


1 SECTION
SSK4.2 1 : 130

SSK4.2 - Atrium&1951_1958 Foundation Coordination Sections



SSK4.3 - Atrium&1951_1958 Foundation Coordination 3D Rendering 3

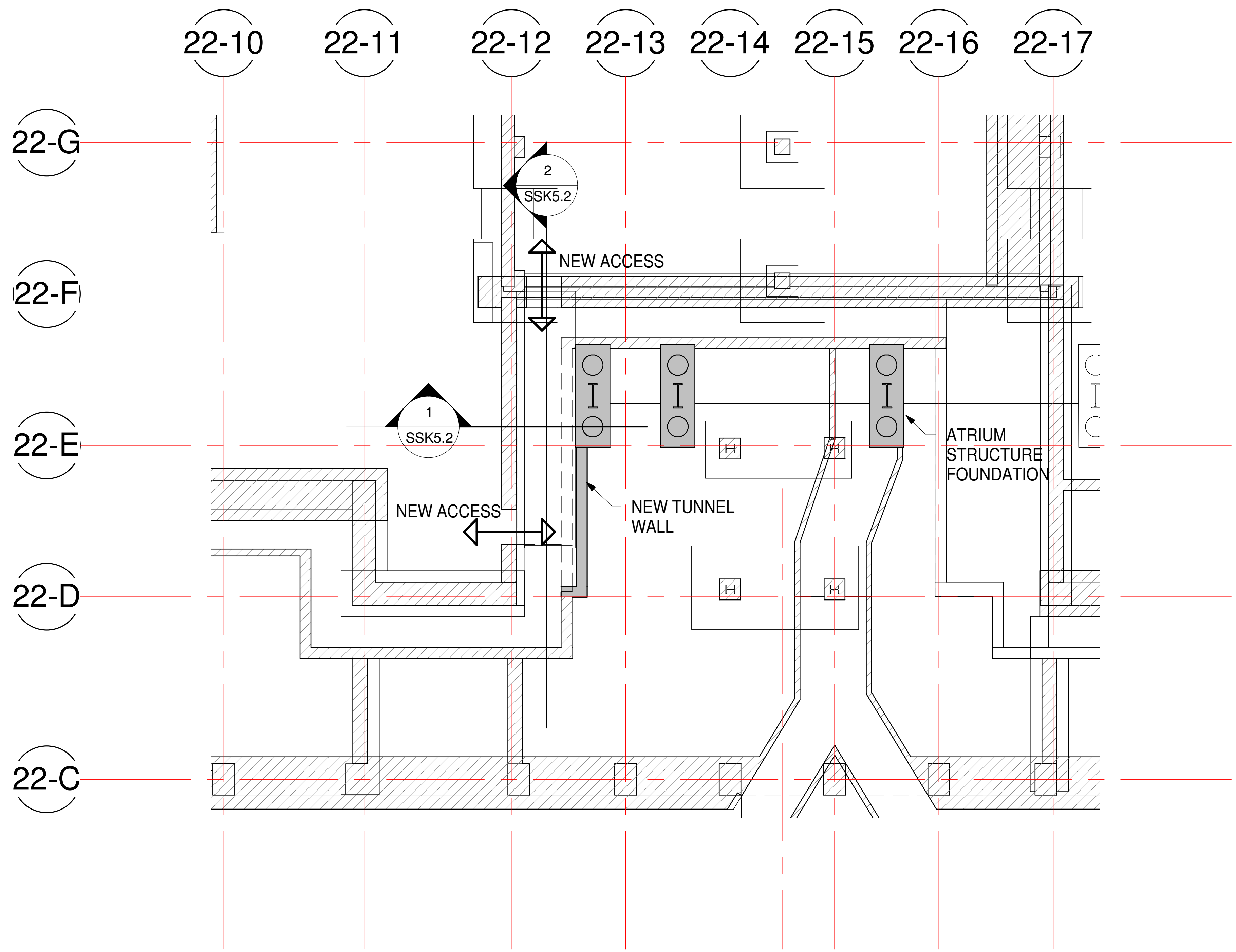


1

SSK4.4

PILES (AS SEEN FROM ABOVE)

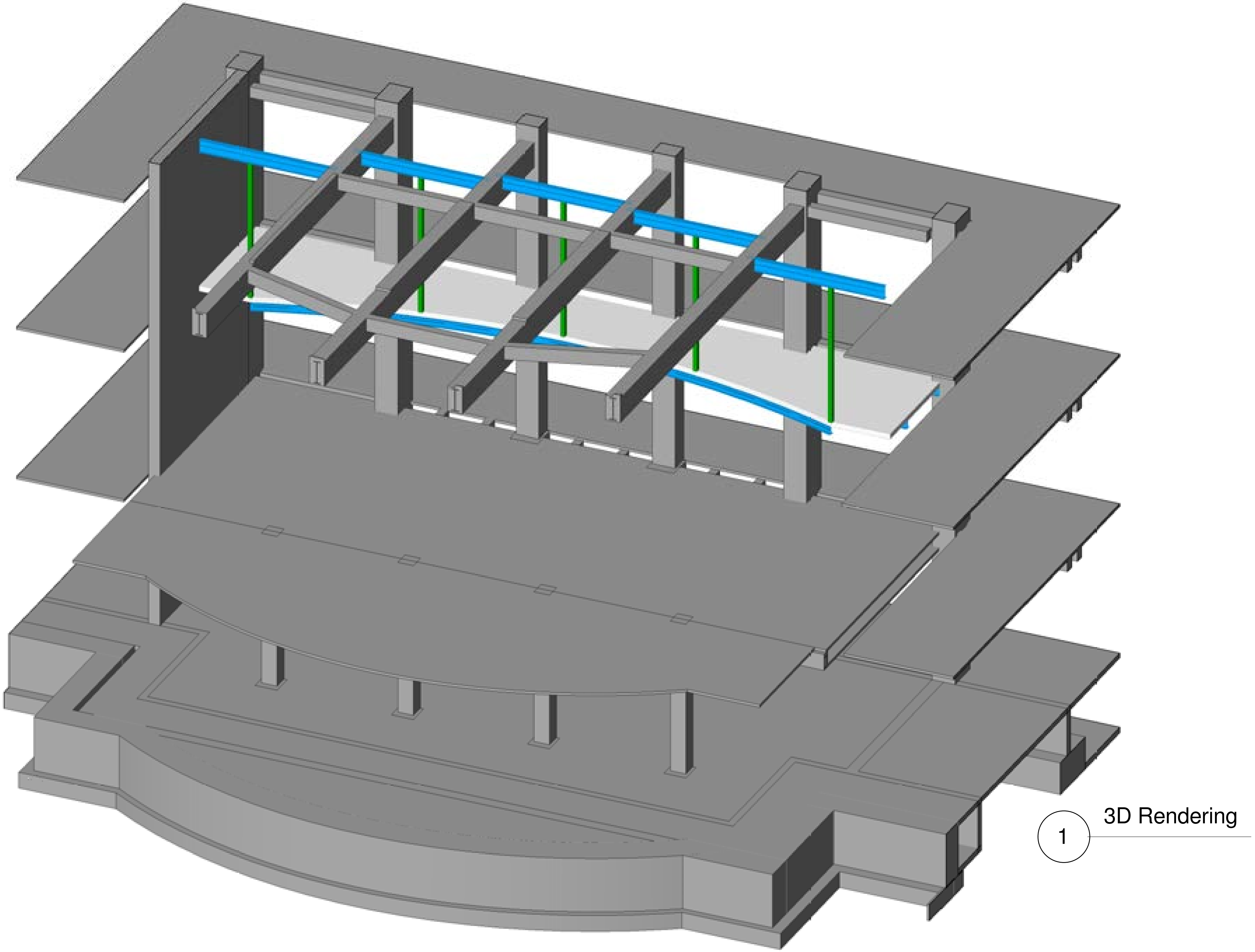
SSK4.4 - Atrium&1951_1958 Foundation Coordination 3D Rendering 2



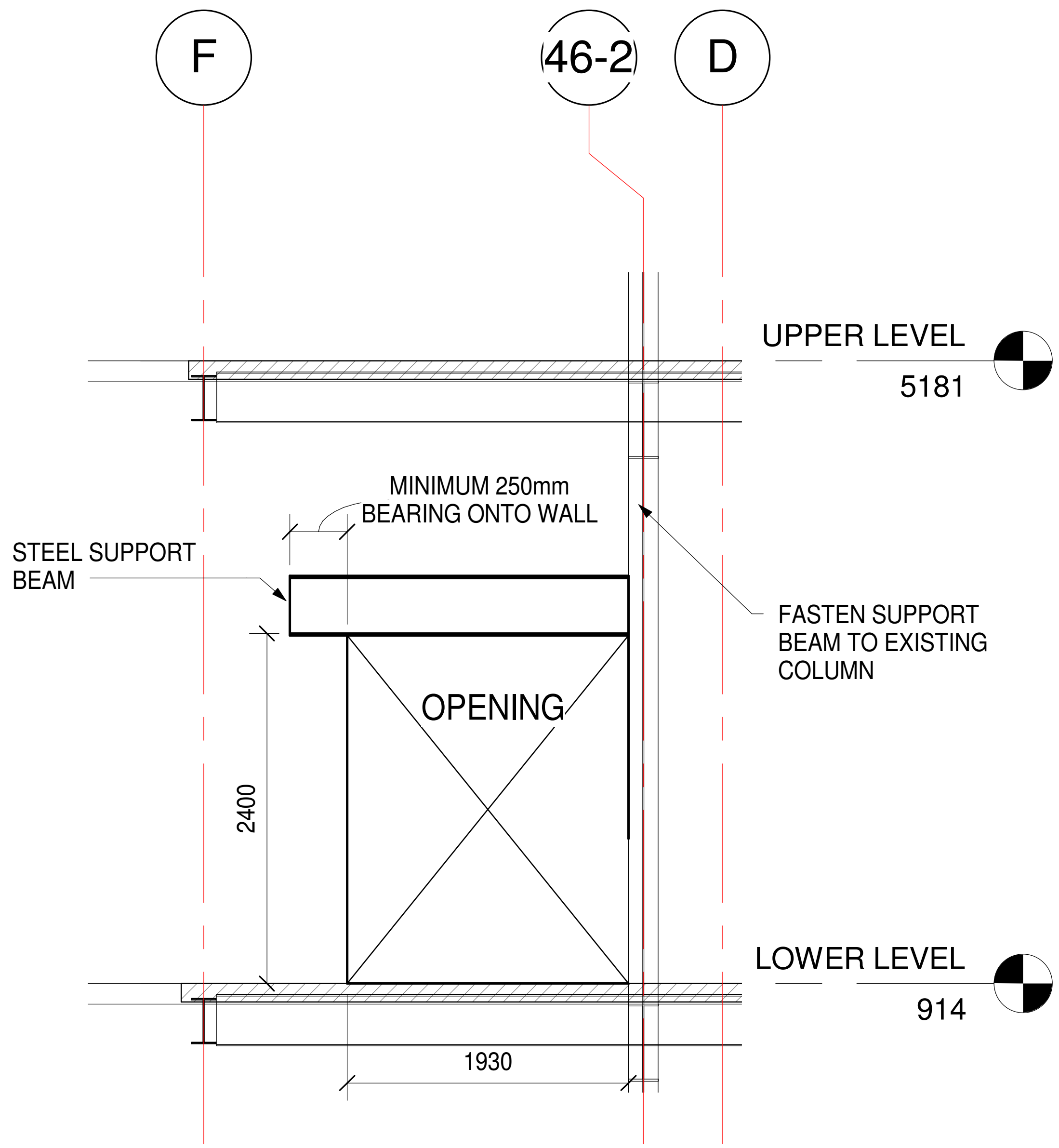
1 Basement Plan

1 : 150

SSK5.1 - Tunnel at Fan Room Basement Plan

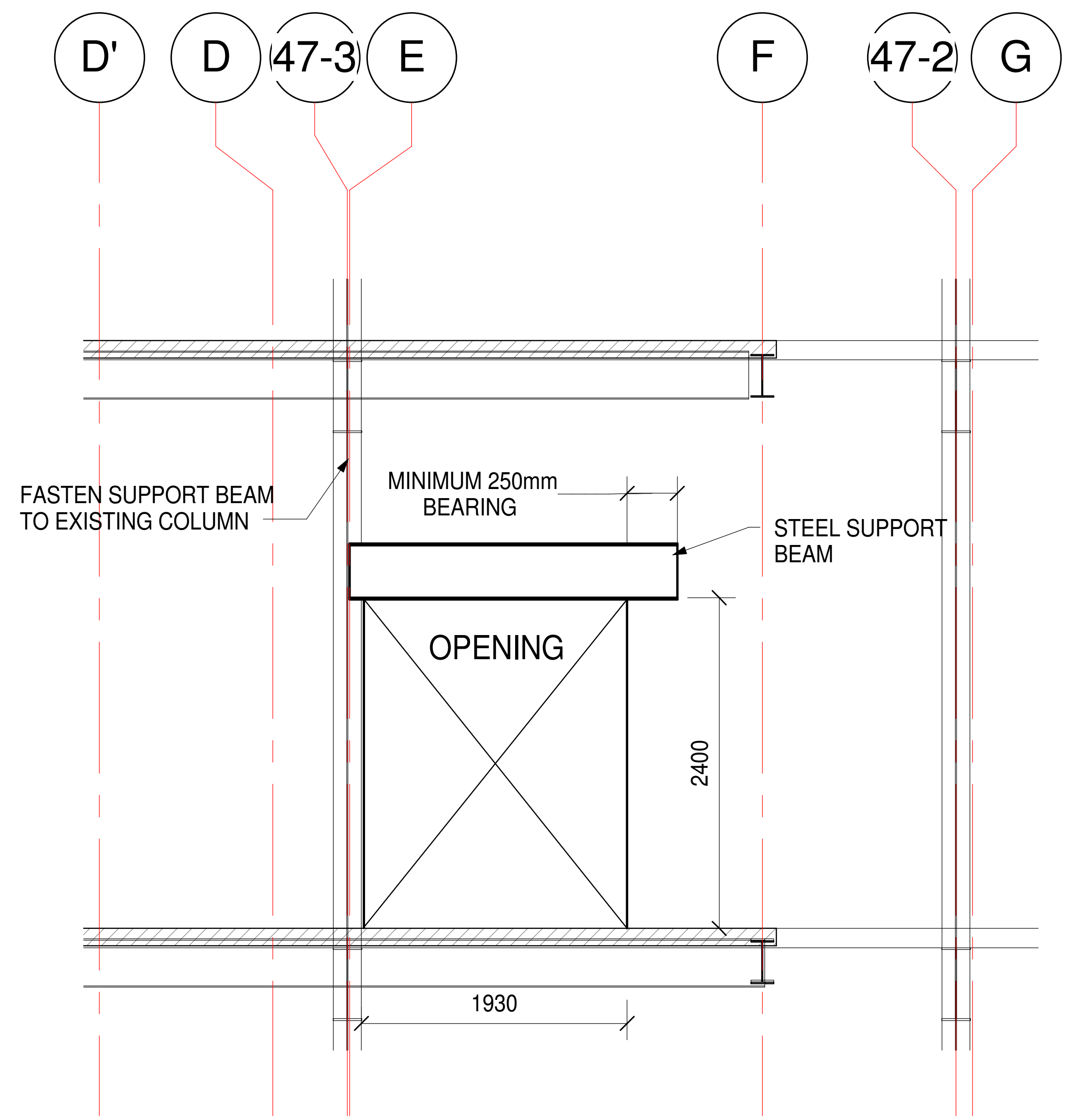


6 .222 **SSK6.1 - 1958 Elevator Coordination Basement and Level 1 Plan**



1 SSK8.1 1946/1958 BRICK WALL OPENING SECTION

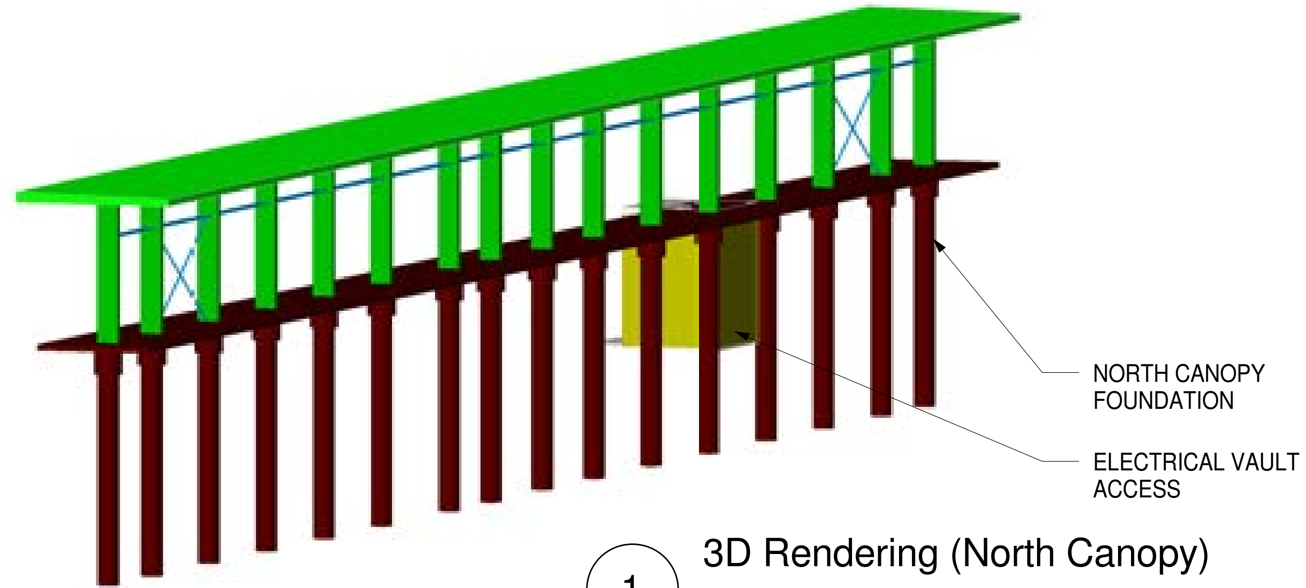
1 : 50



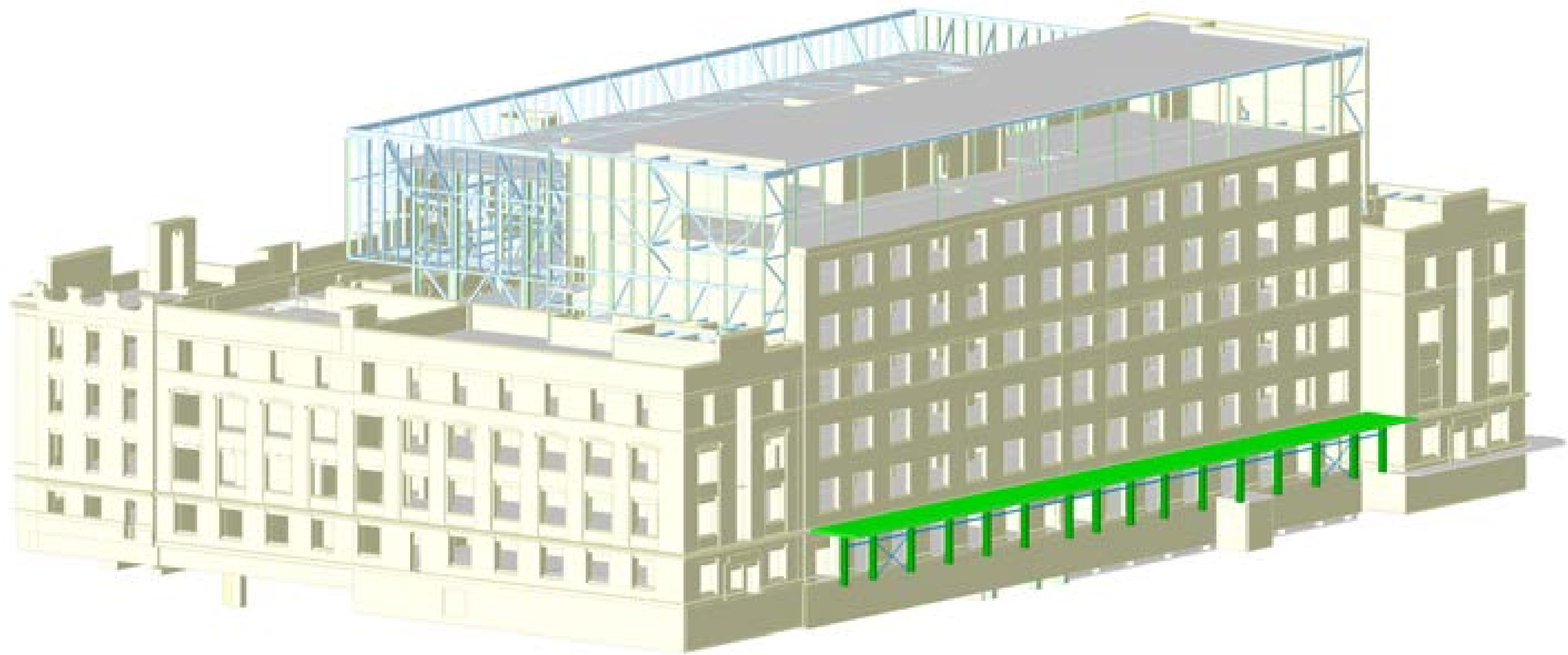
2 SSK8.1 1947/1958 BRICK WALL OPENING SECTION

1 : 50

SSK8.1 - 1946_1947&1958 Brick Wall Opening Sections

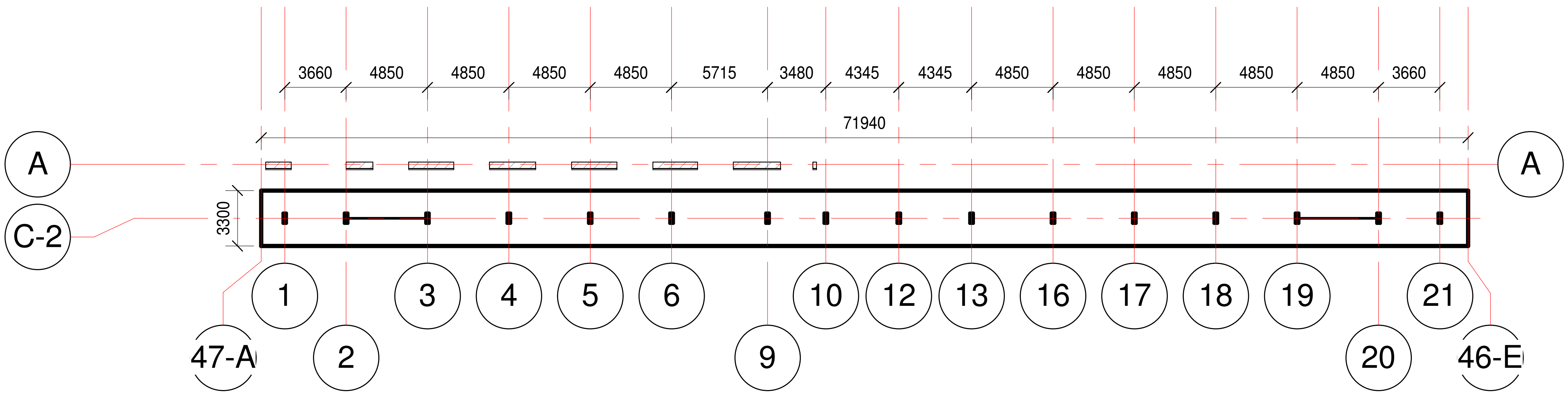


1 3D Rendering (North Canopy)



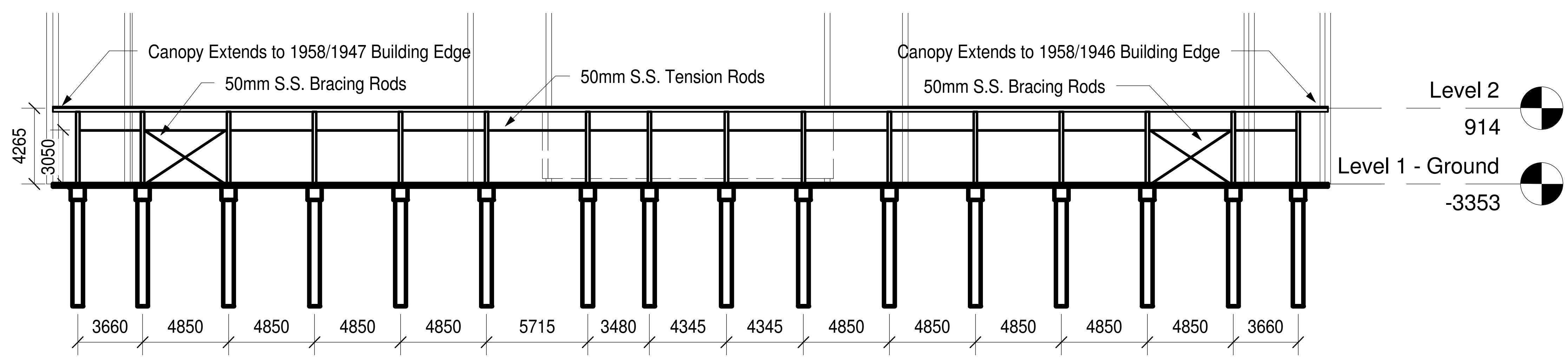
2 North Canopy 3D-2

6 .230 SSK9.1 - North Canopy 3D Rendering



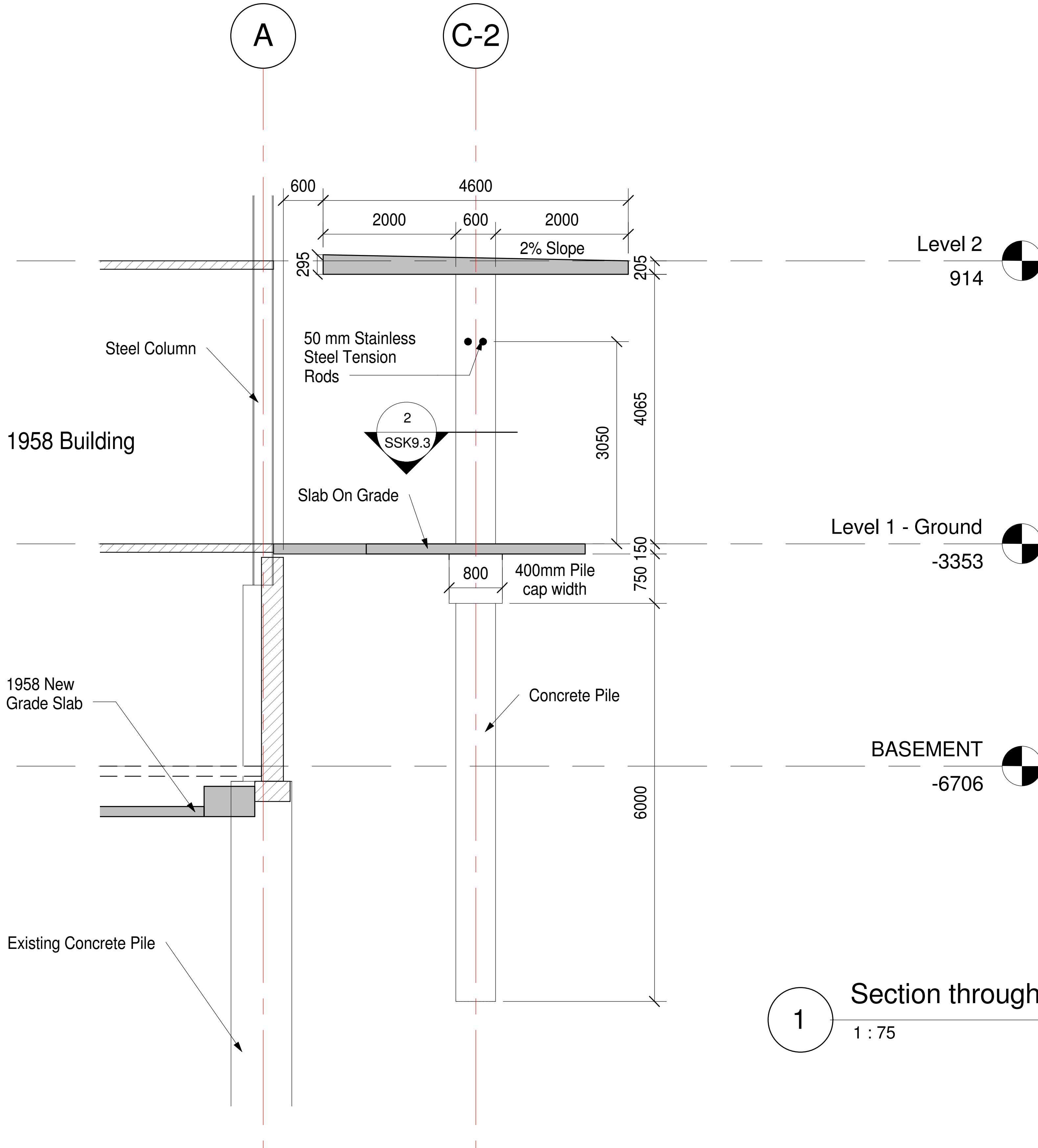
1 Level 1 Plan
1 : 300

North Elevation
2
SSK9.2

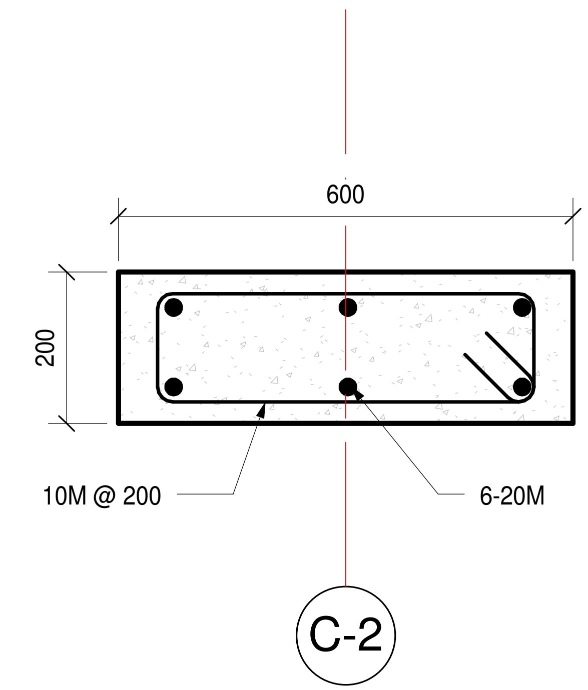


2 North Elevation
1 : 300

SSK9.2 - North Canopy Level 1 Plan & Front Elevation

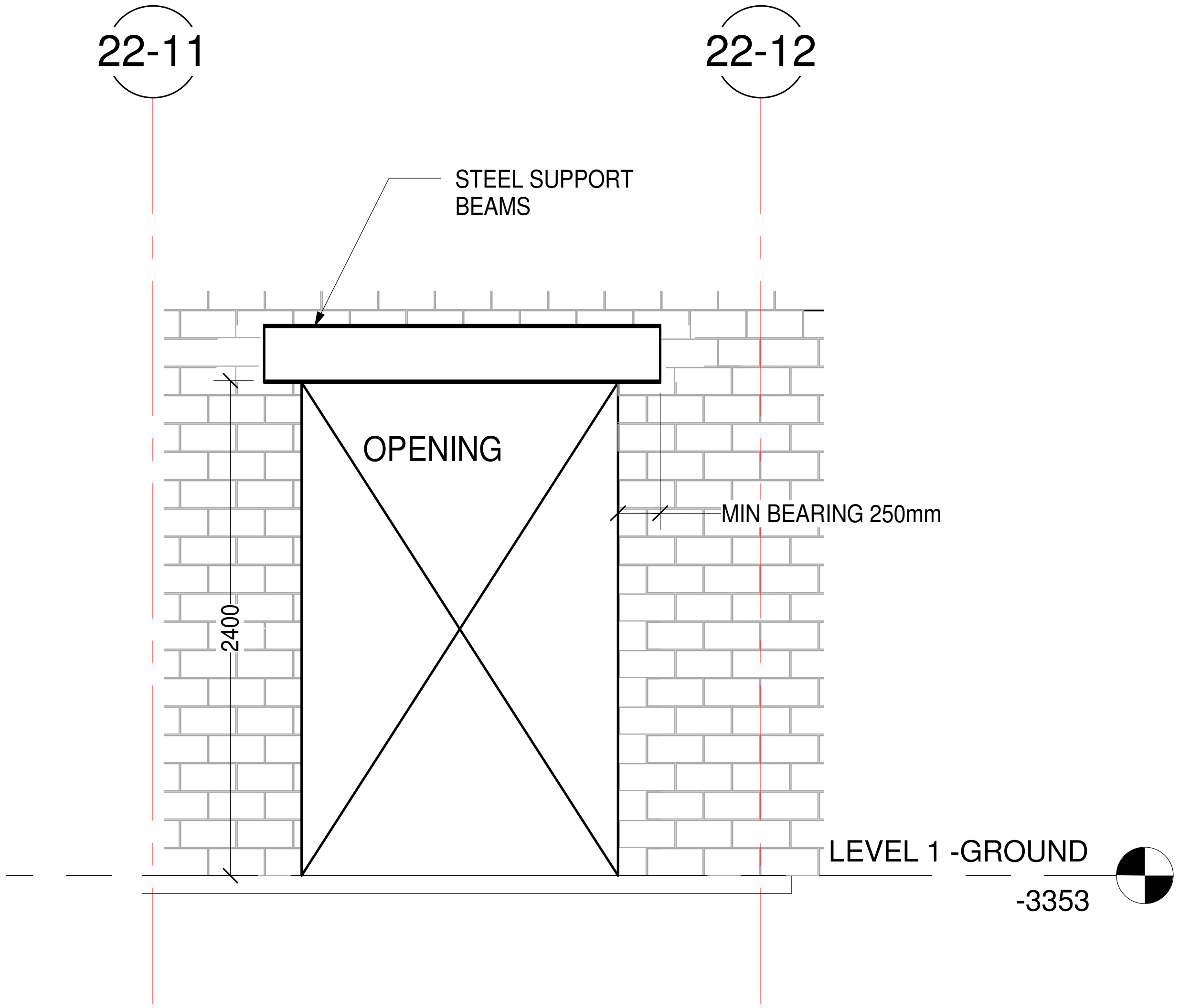


1 Section through North Canopy
1 : 75

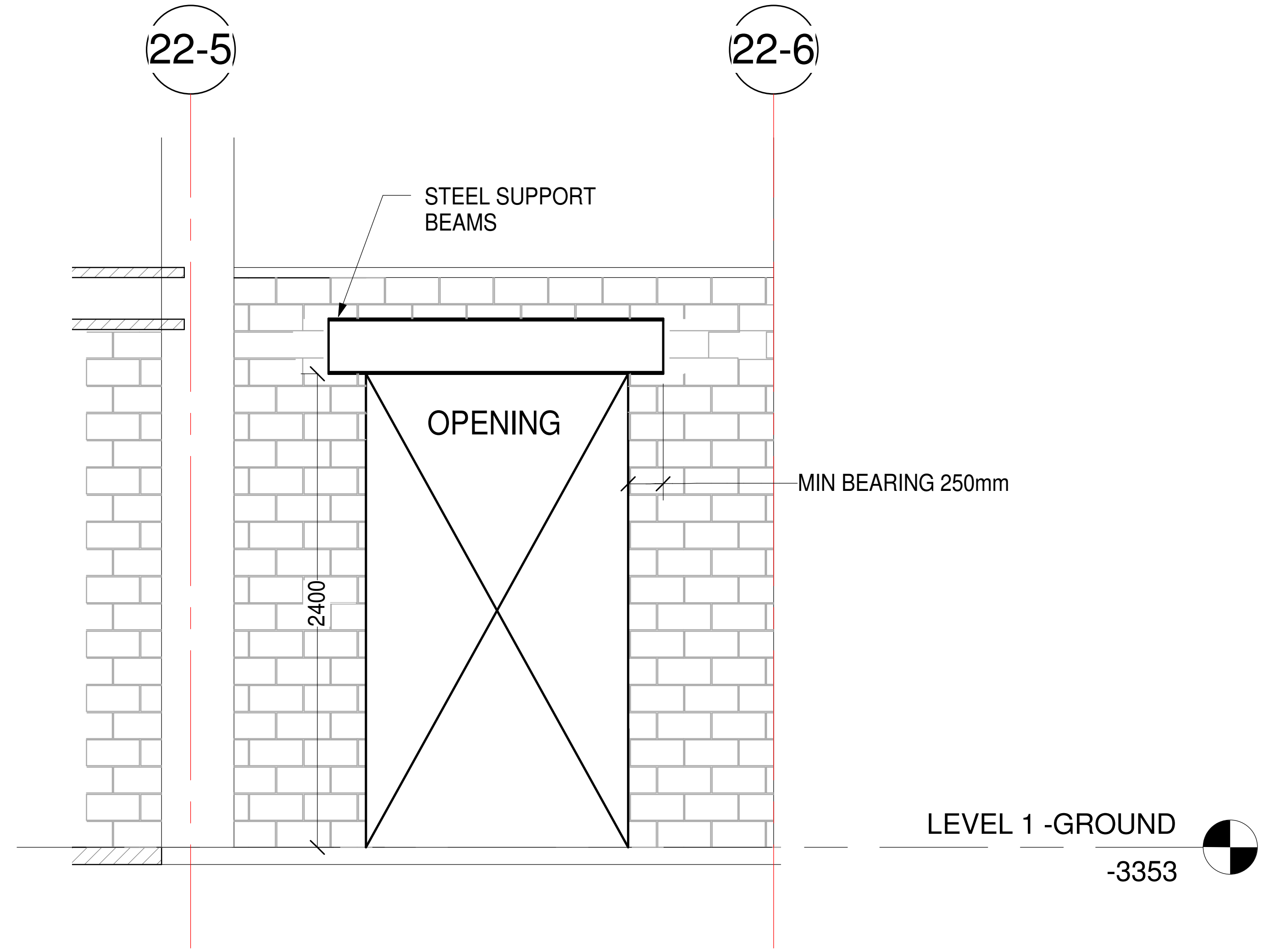


2 Column Detail
1 : 10

6.232 SSK9.3 - North Canopy Sections

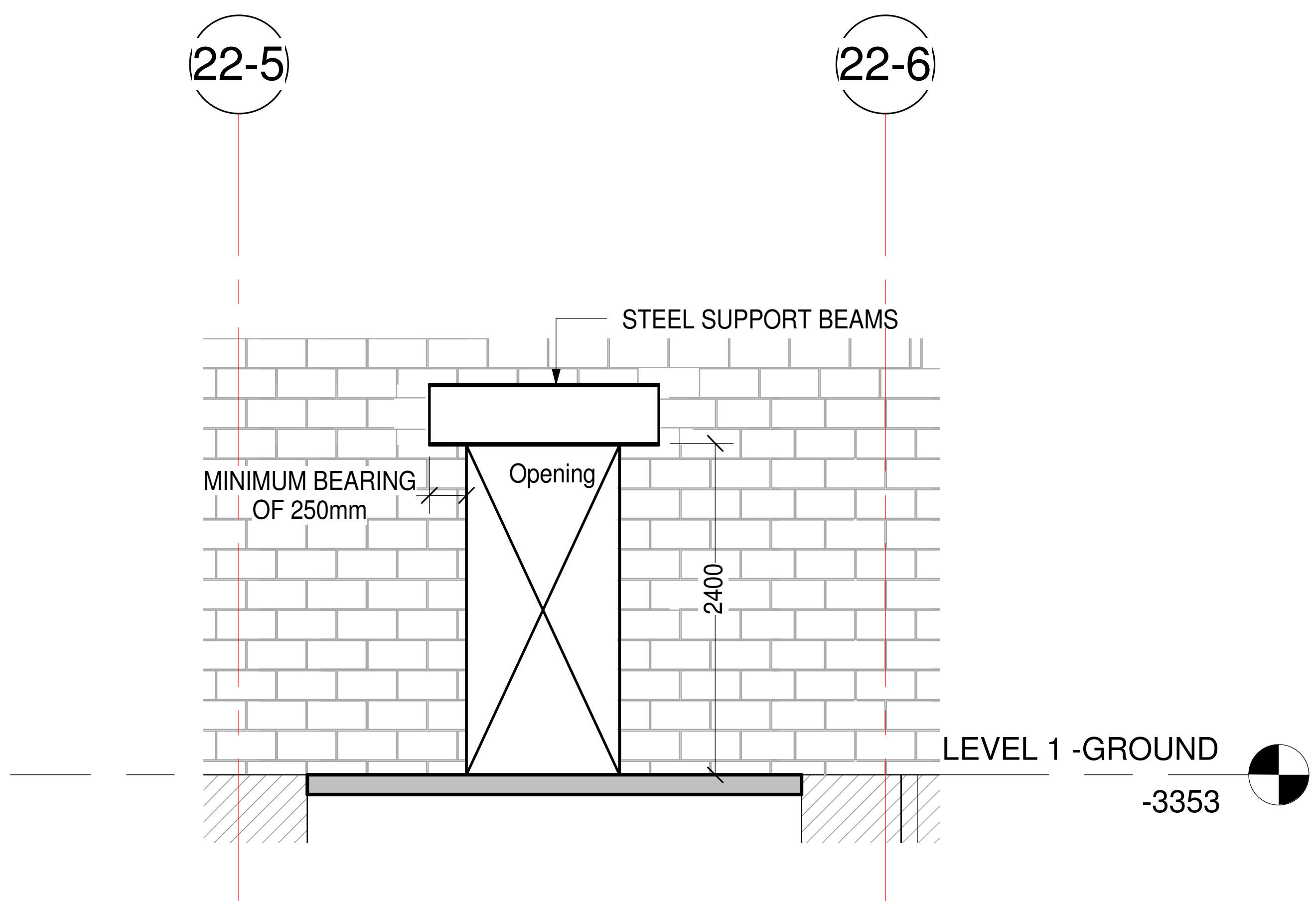


1 SSK10.1 RECESSED DOORS SOUTH 1922
1 : 50

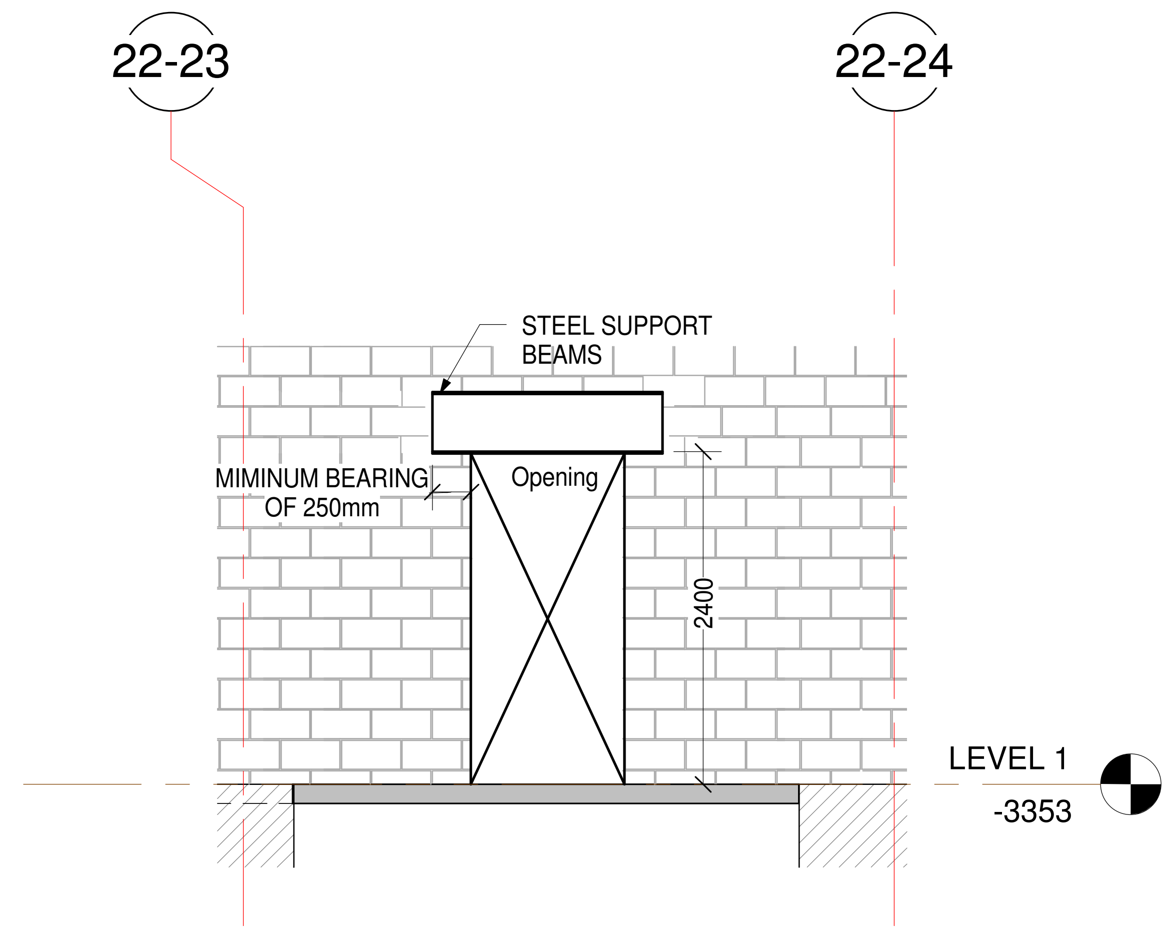


2 SSK10.1 NON-RECESSED DOORS SOUTH 1922
1 : 50

SSK10.1 - 1922 South Wall Opening Sections

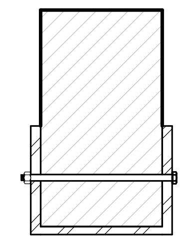


1
SSK11.1
SECTION
1 : 50

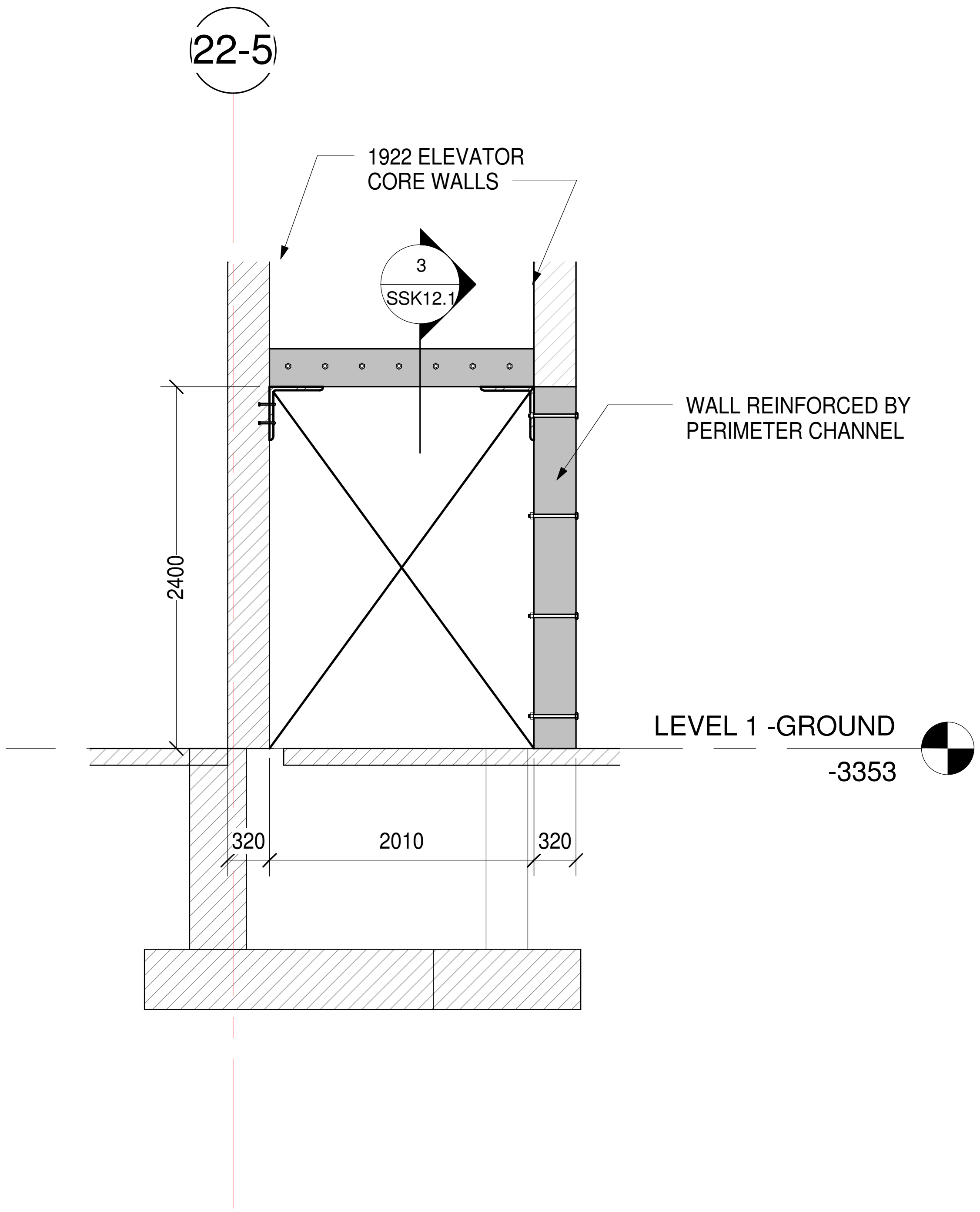


2
SSK11.1
SECTION
1 : 50

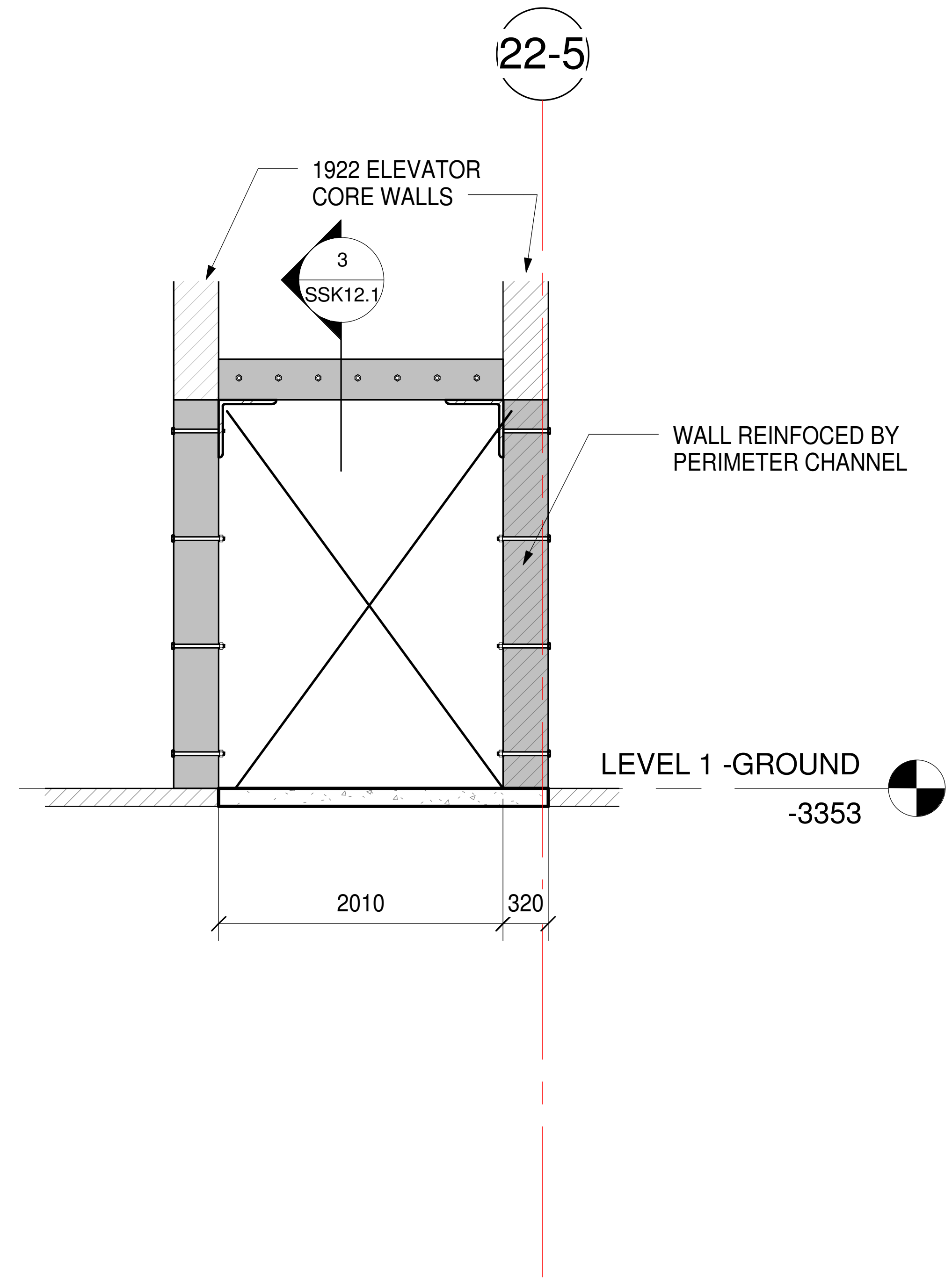
SSK11.1 - 1922 North Wall Opening Sections



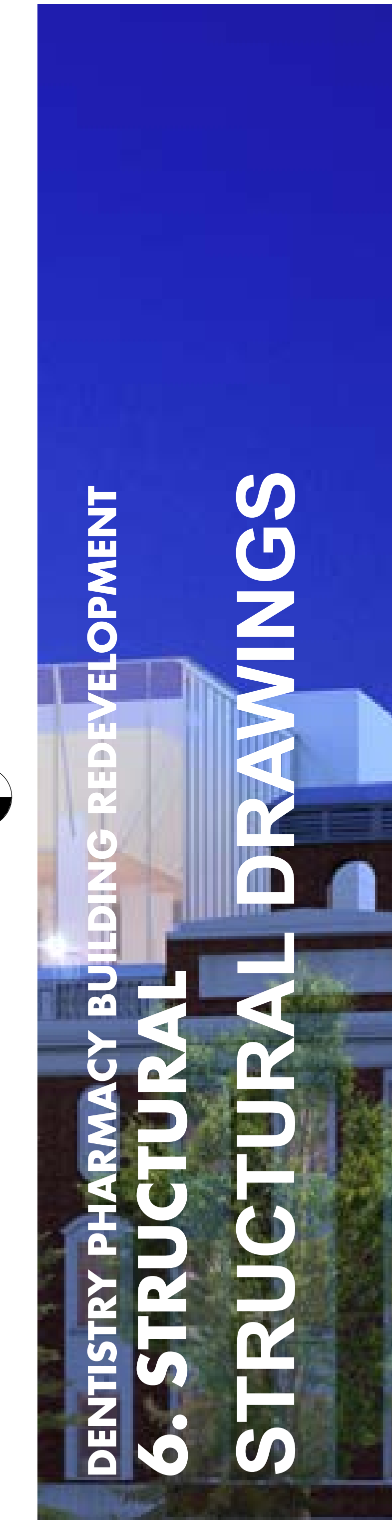
3 Typical
1 : 30



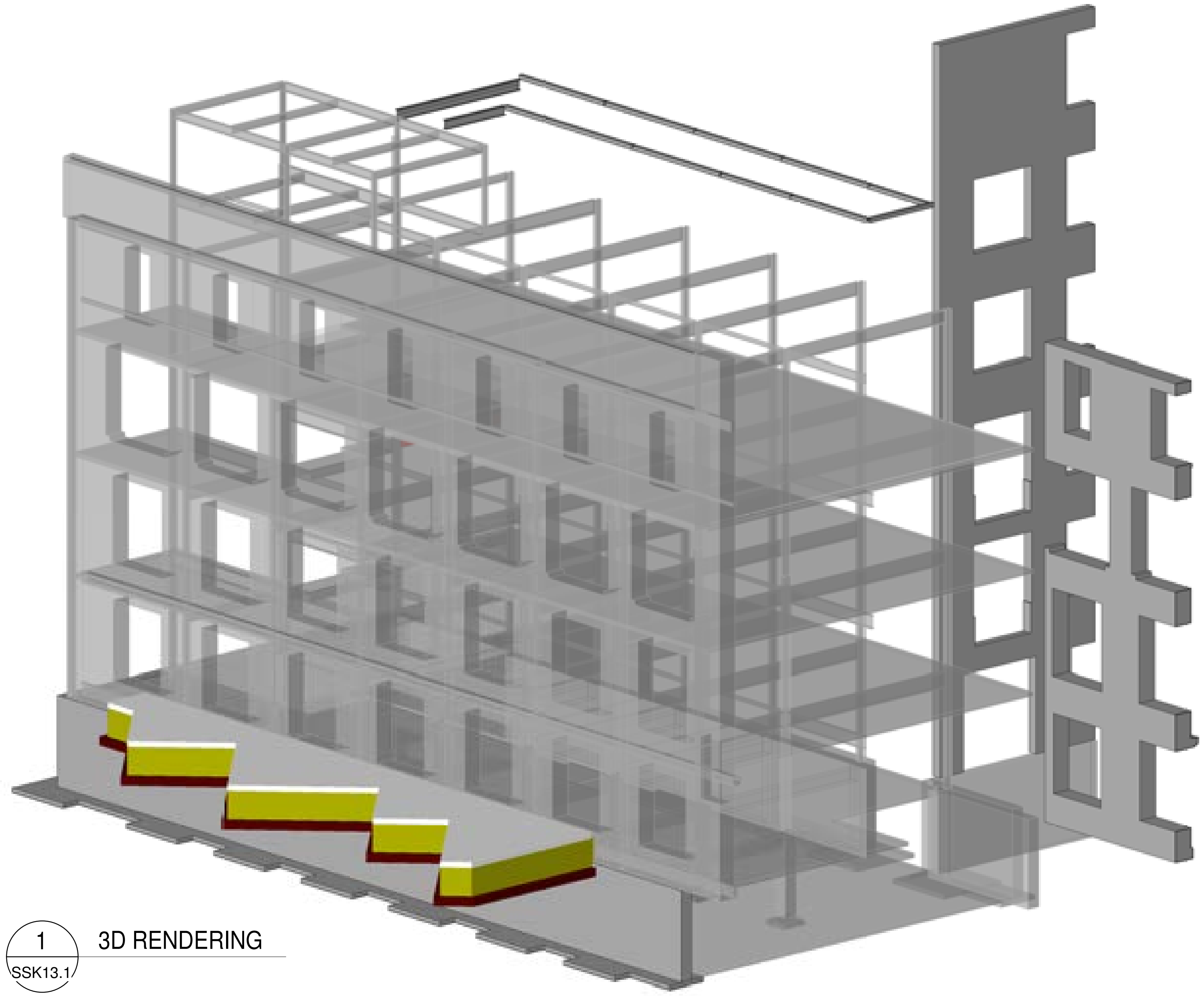
1 SSK12.1 Elevator Core - North Opening
1 : 50



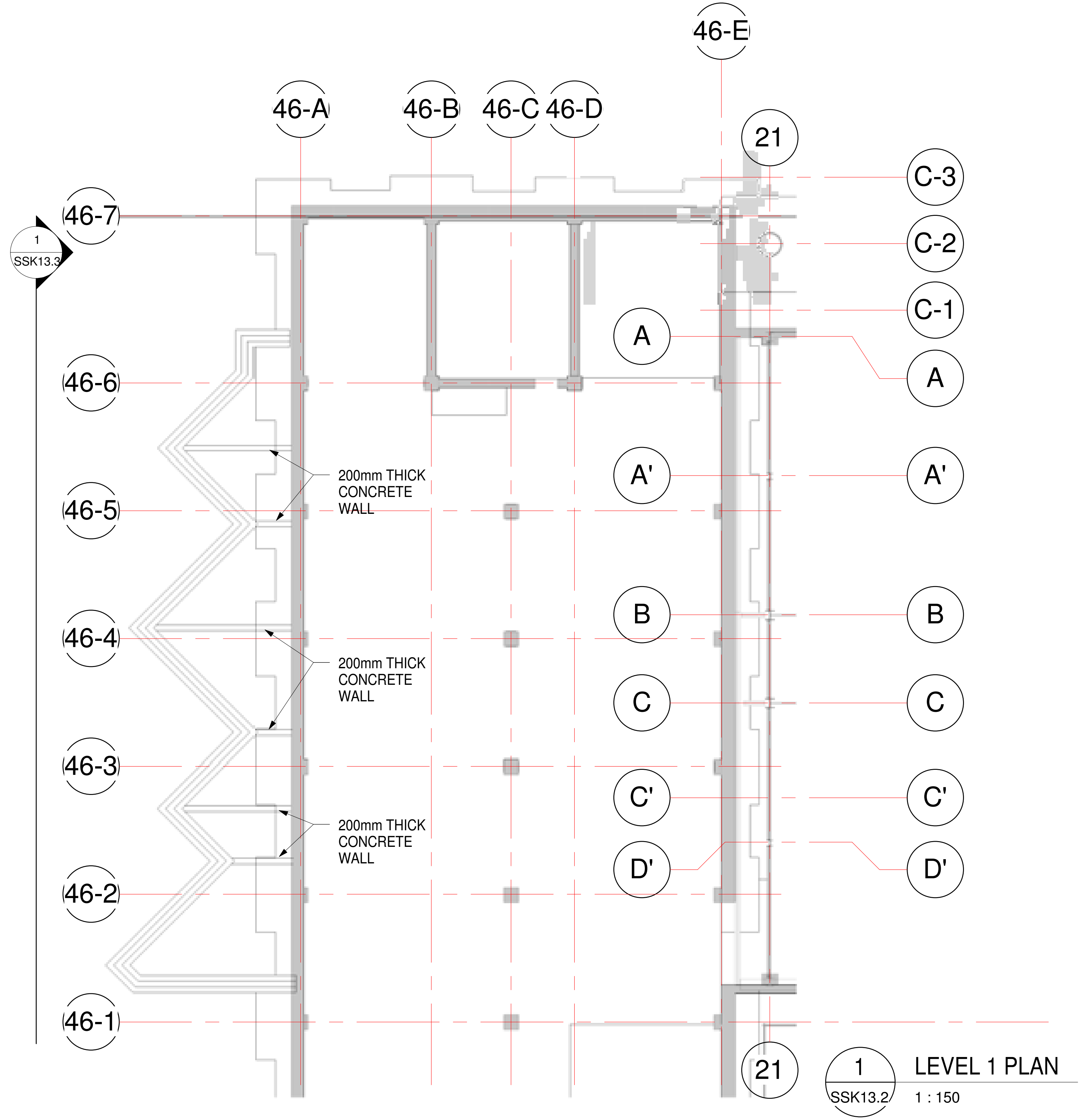
2 SSK12.1 Elevator Core - South Opening
1 : 50



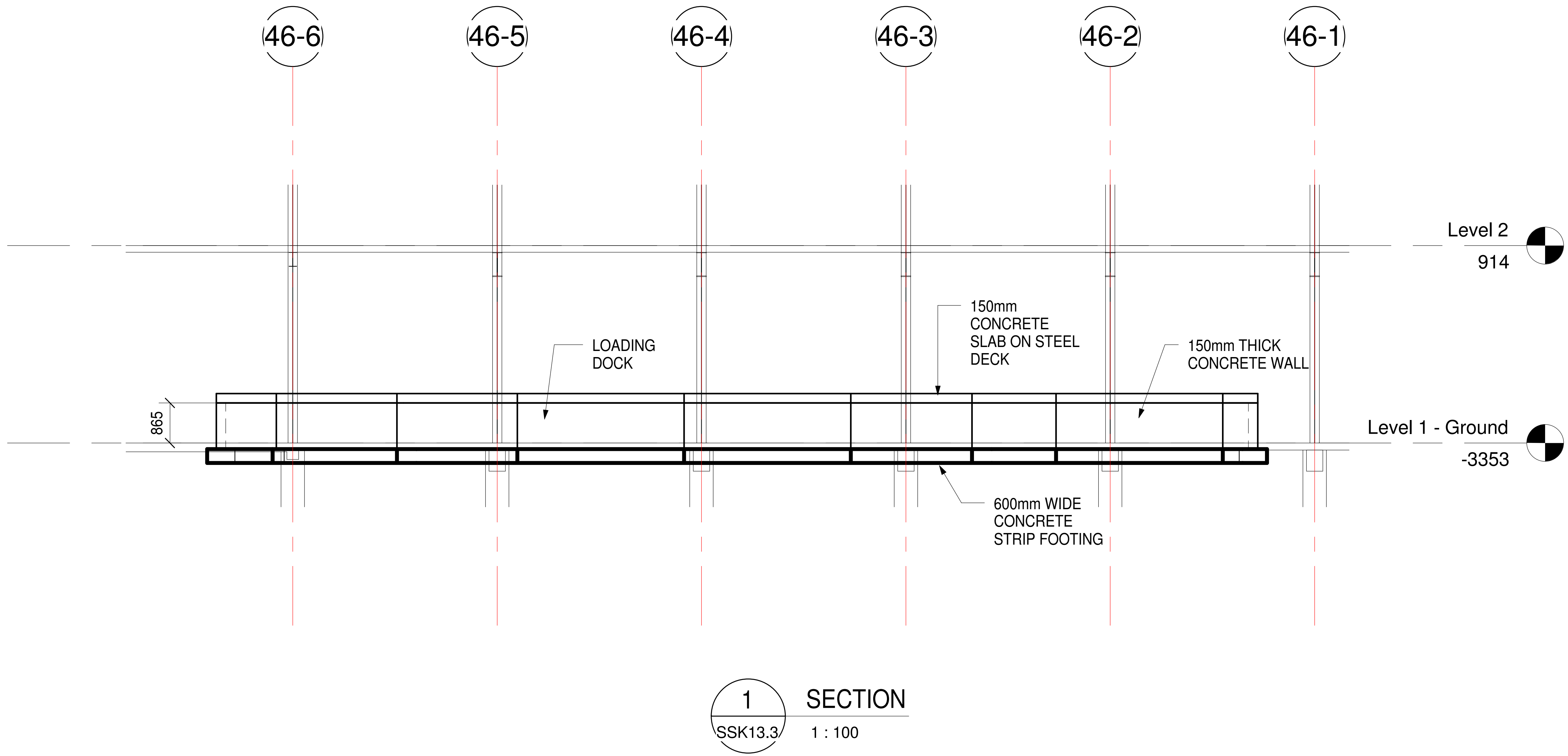
SSK12.1 - 1922 Elevator Lift Shaft Opening Sections



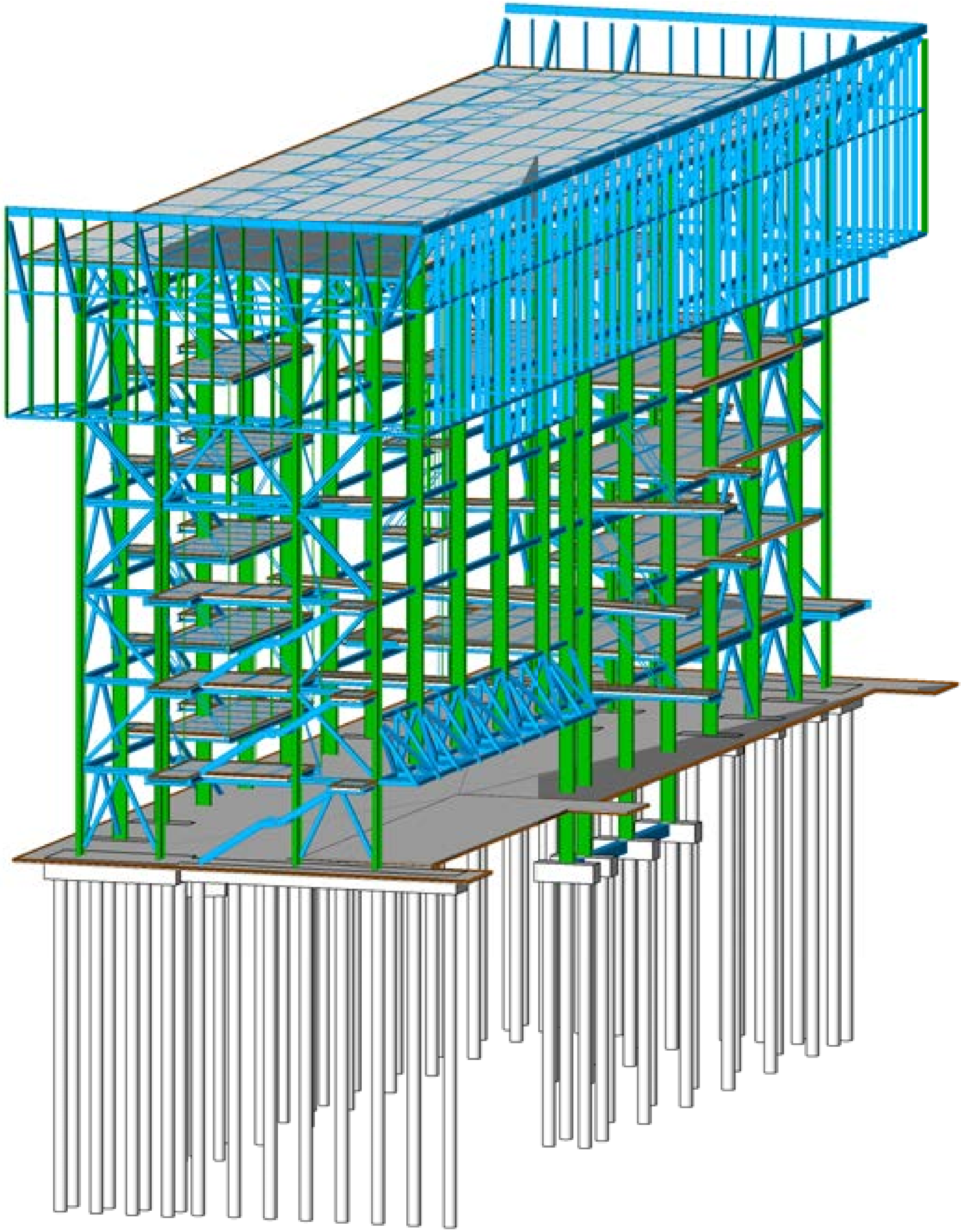
6 .236 SSK13.1 - Loading Dock 3D Rendering



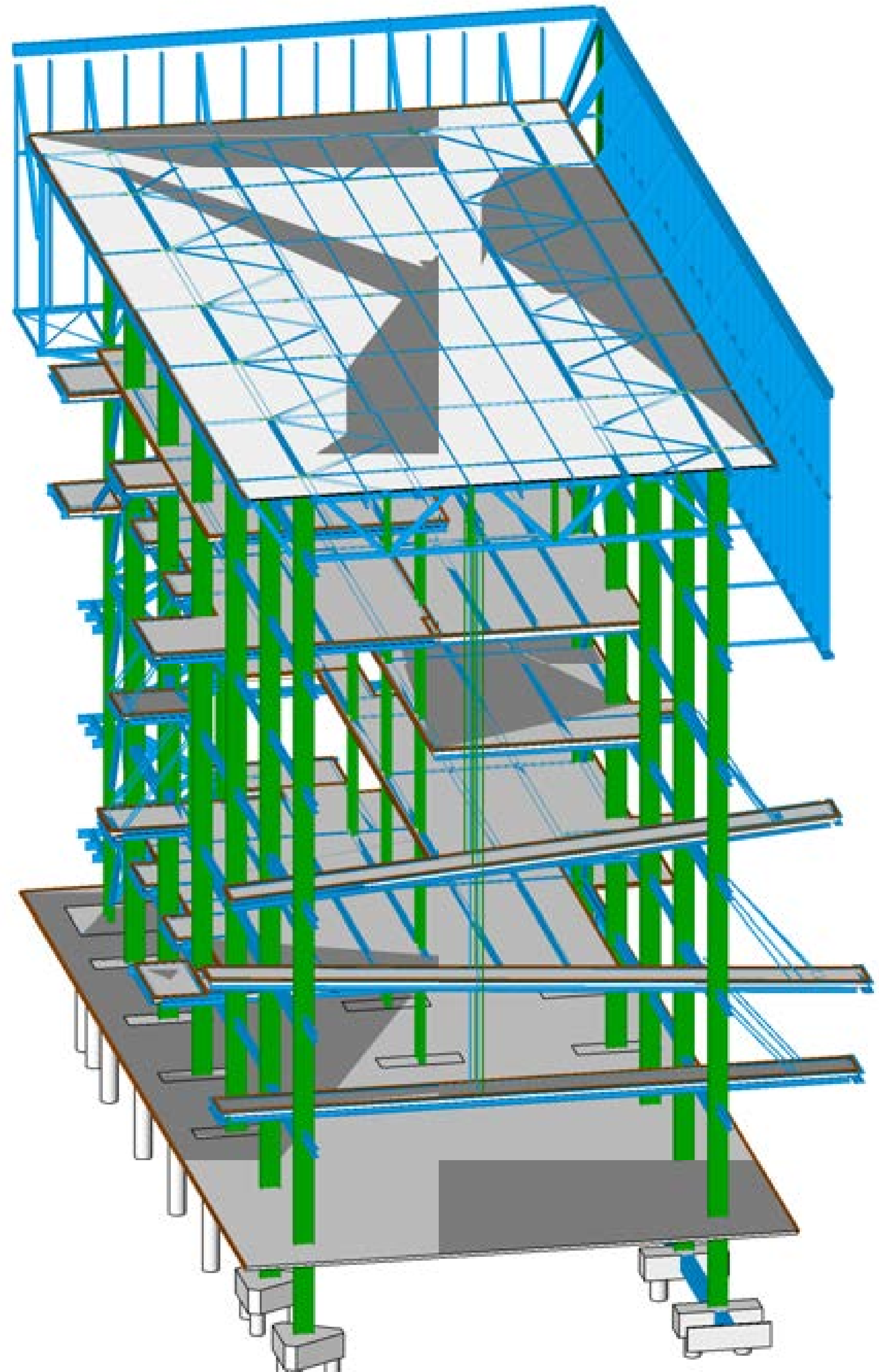
SSK13.2 - Loading Dock Level 1 Plan



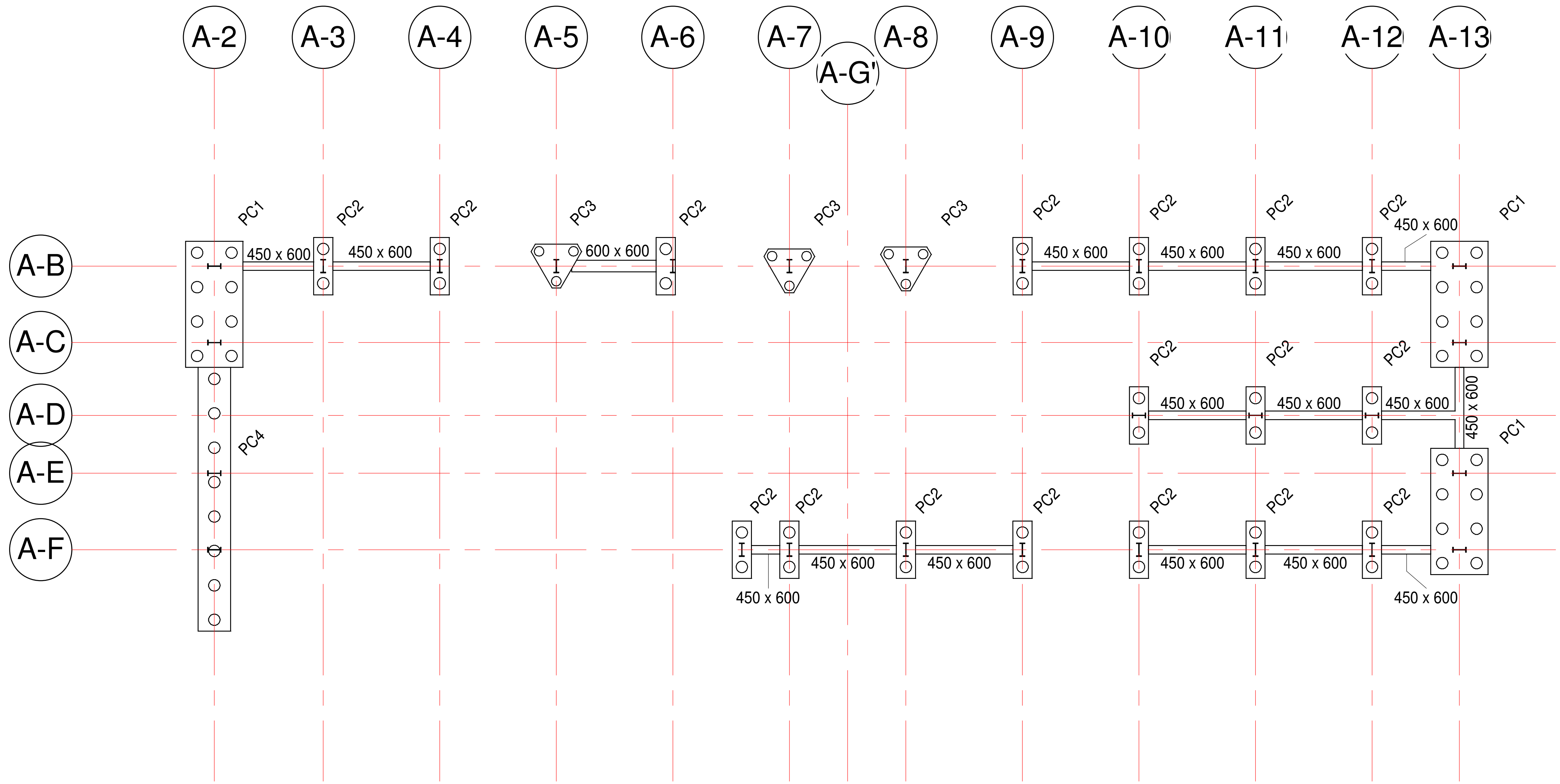
6.238 SSK13.3 - Loading Dock Sections



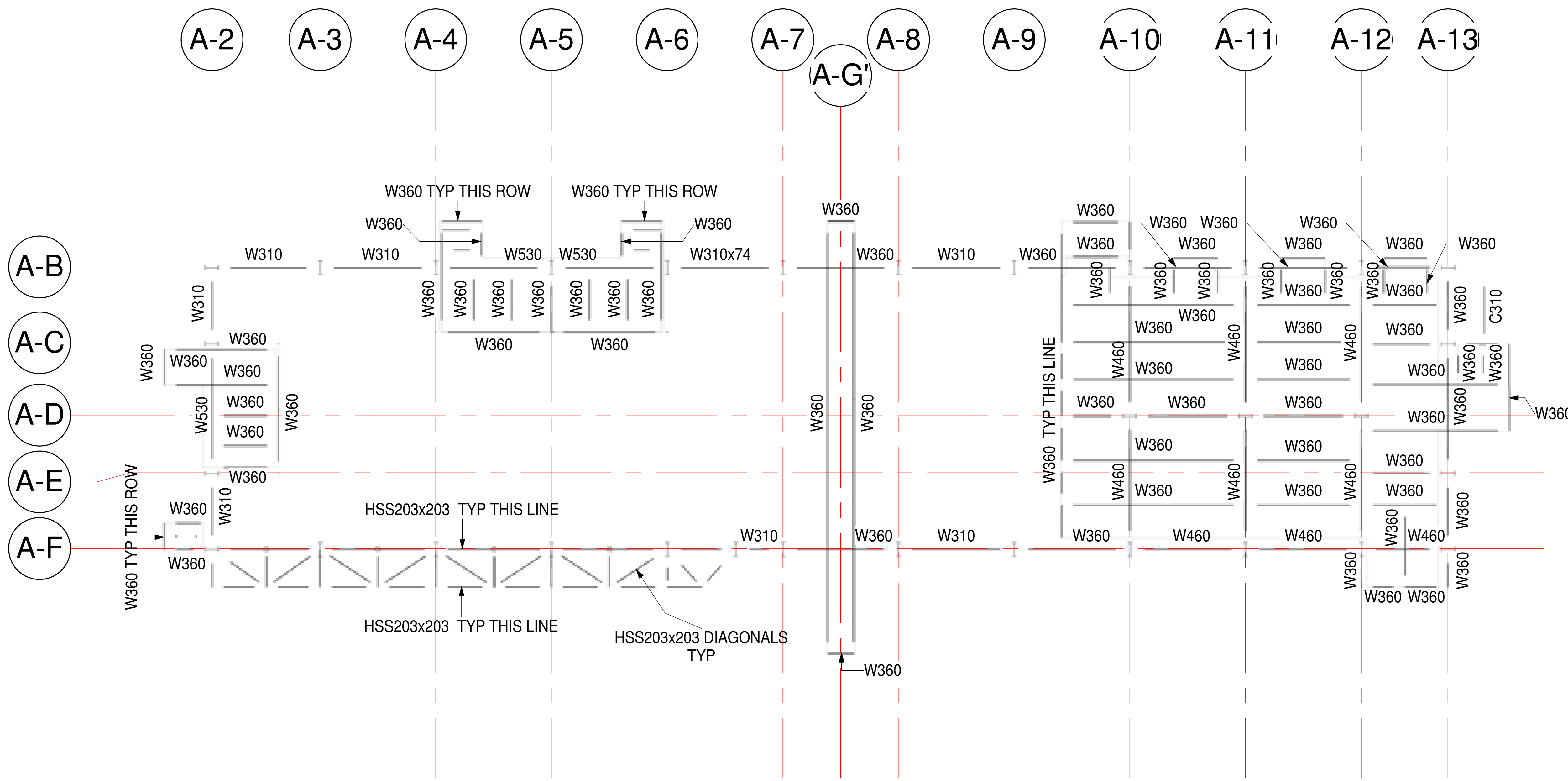
SSK14.1 - Atrium Structure 3D Rendering 1



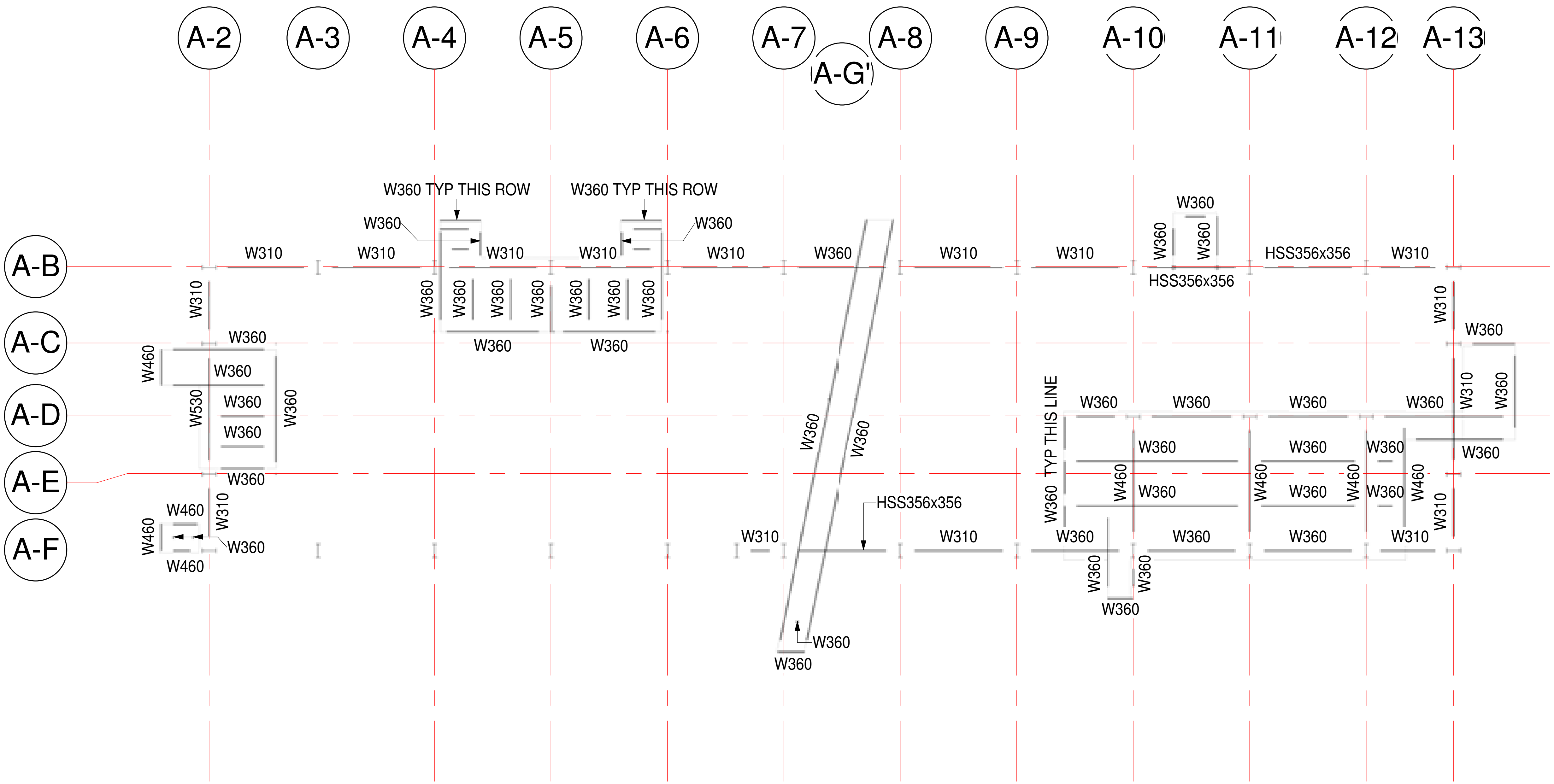
6 .240 **SSK14.2 - Atrium Structure 3D Rendering 2**



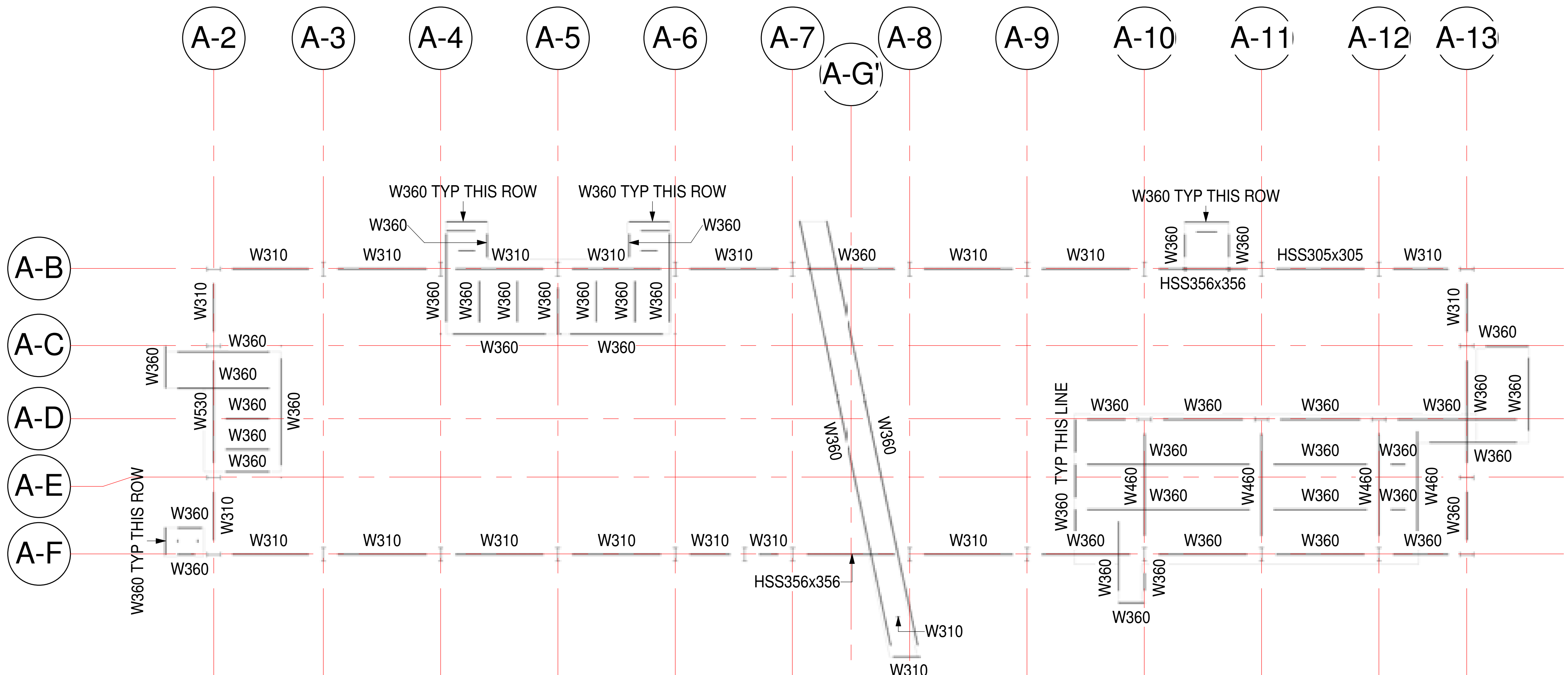
SSK14.3 - Atrium Structure Level 1



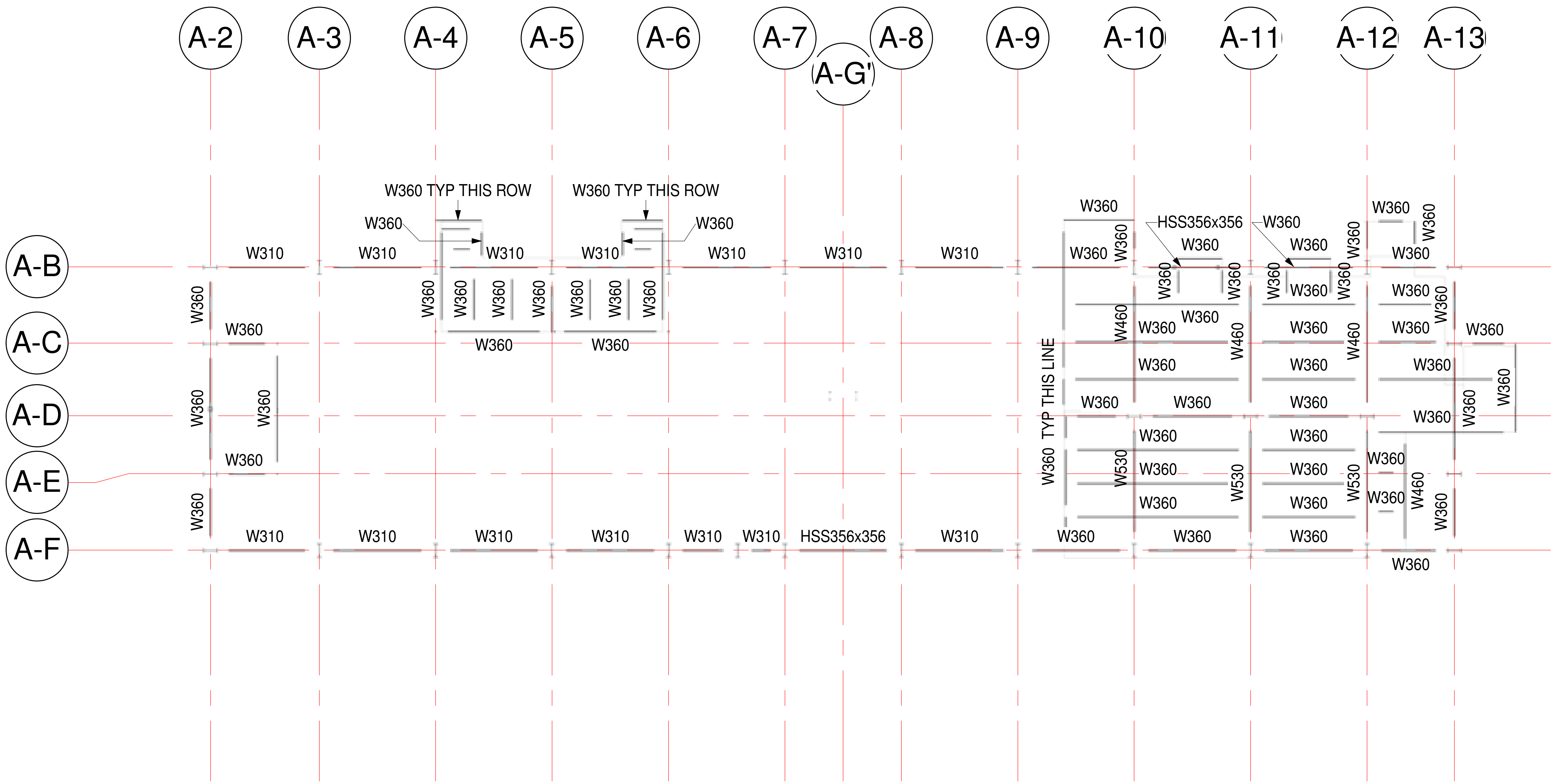
6.242 SSK14.4 - Atrium Structure Level 2



SSK14.5 - Atrium Structure Level 3



6 .244 SSK14.6 - Atrium Structure Level 4



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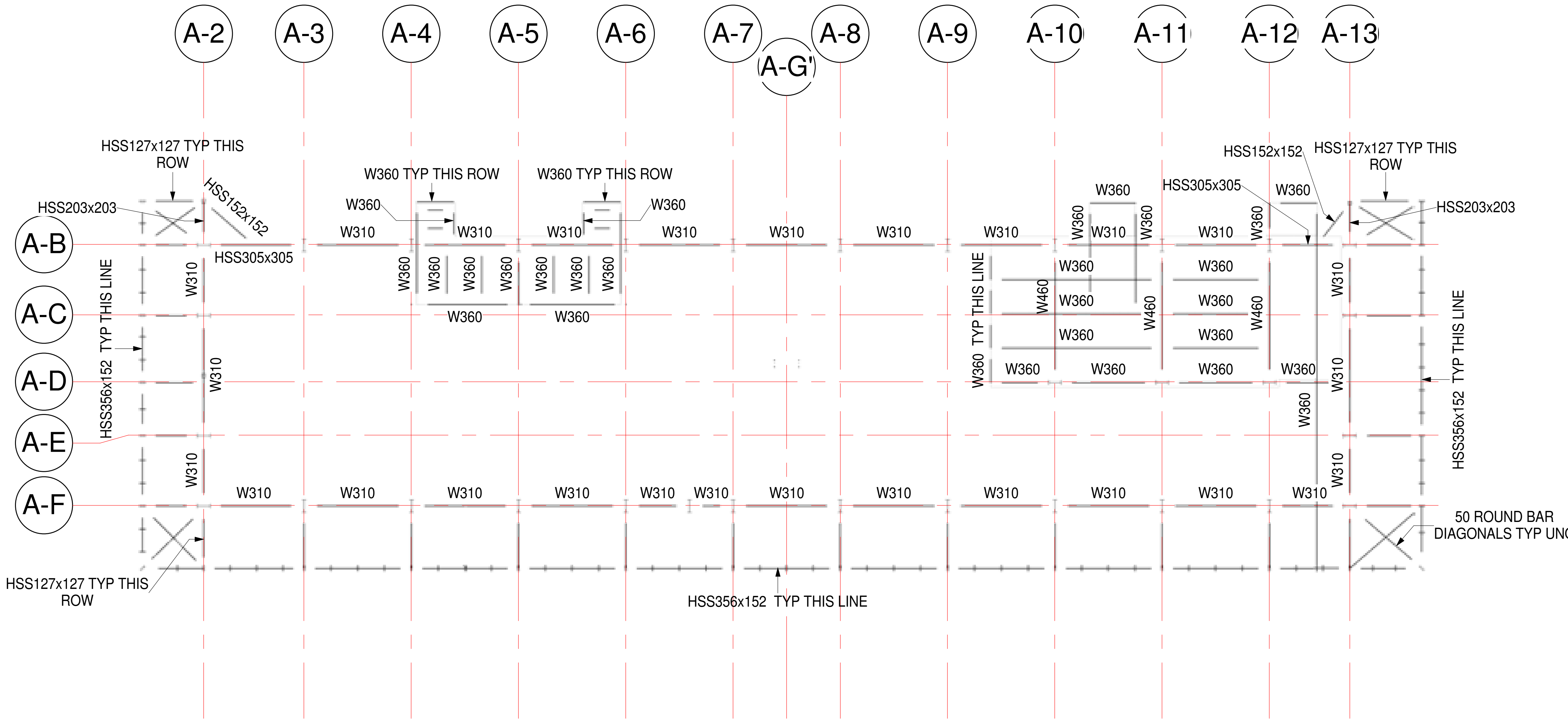

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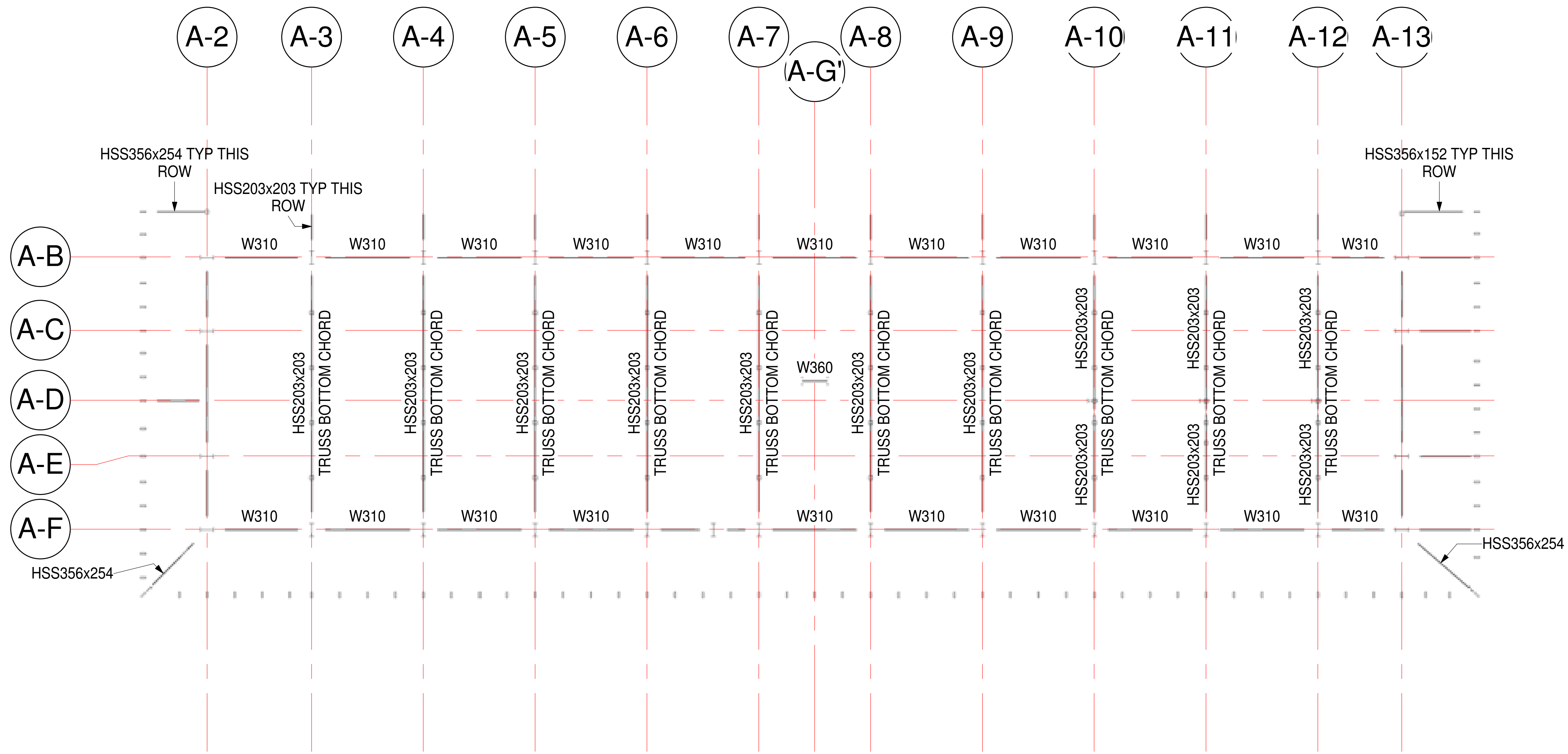

SSK14.9 - Atrium Structure Level 7

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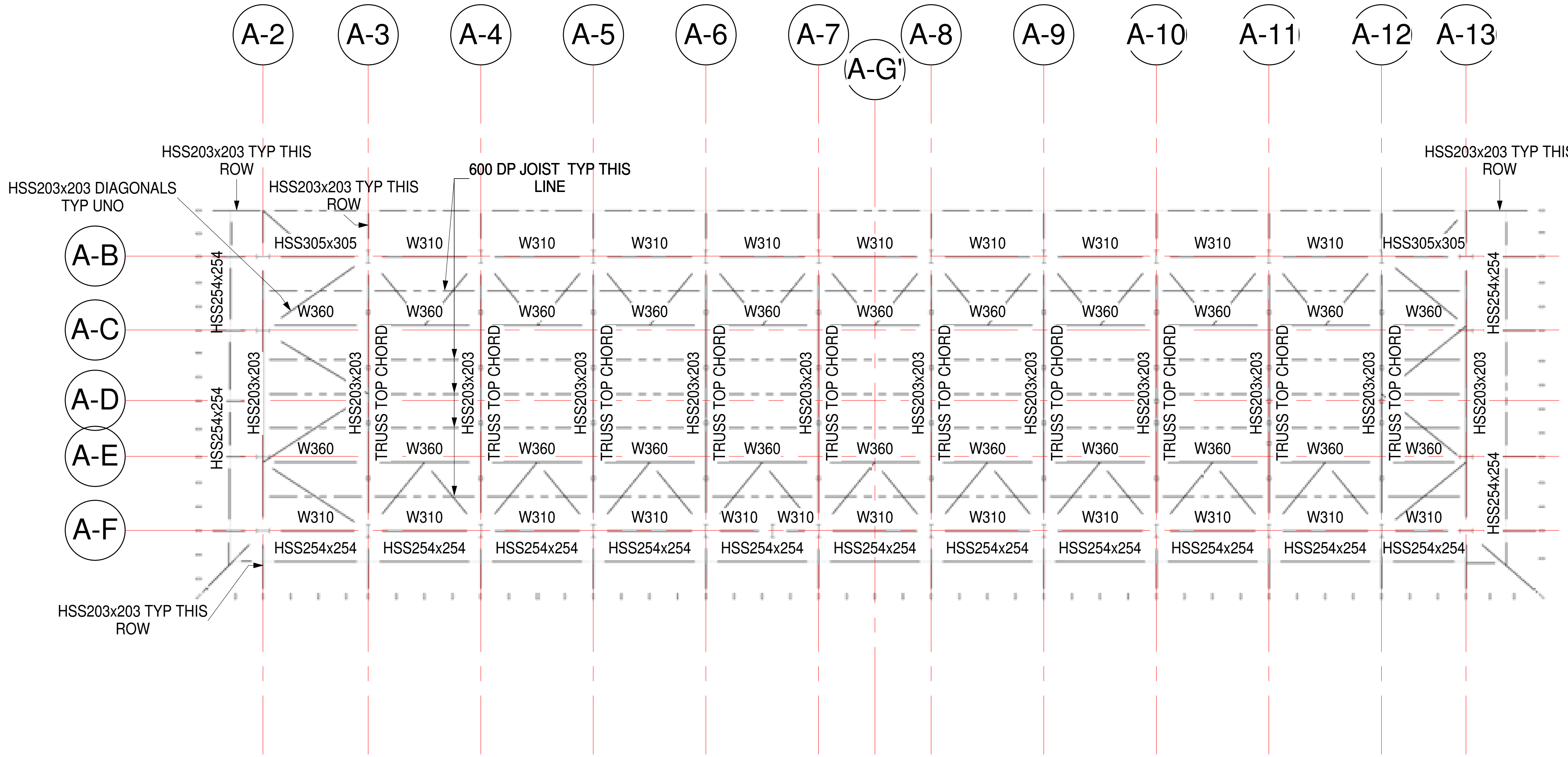
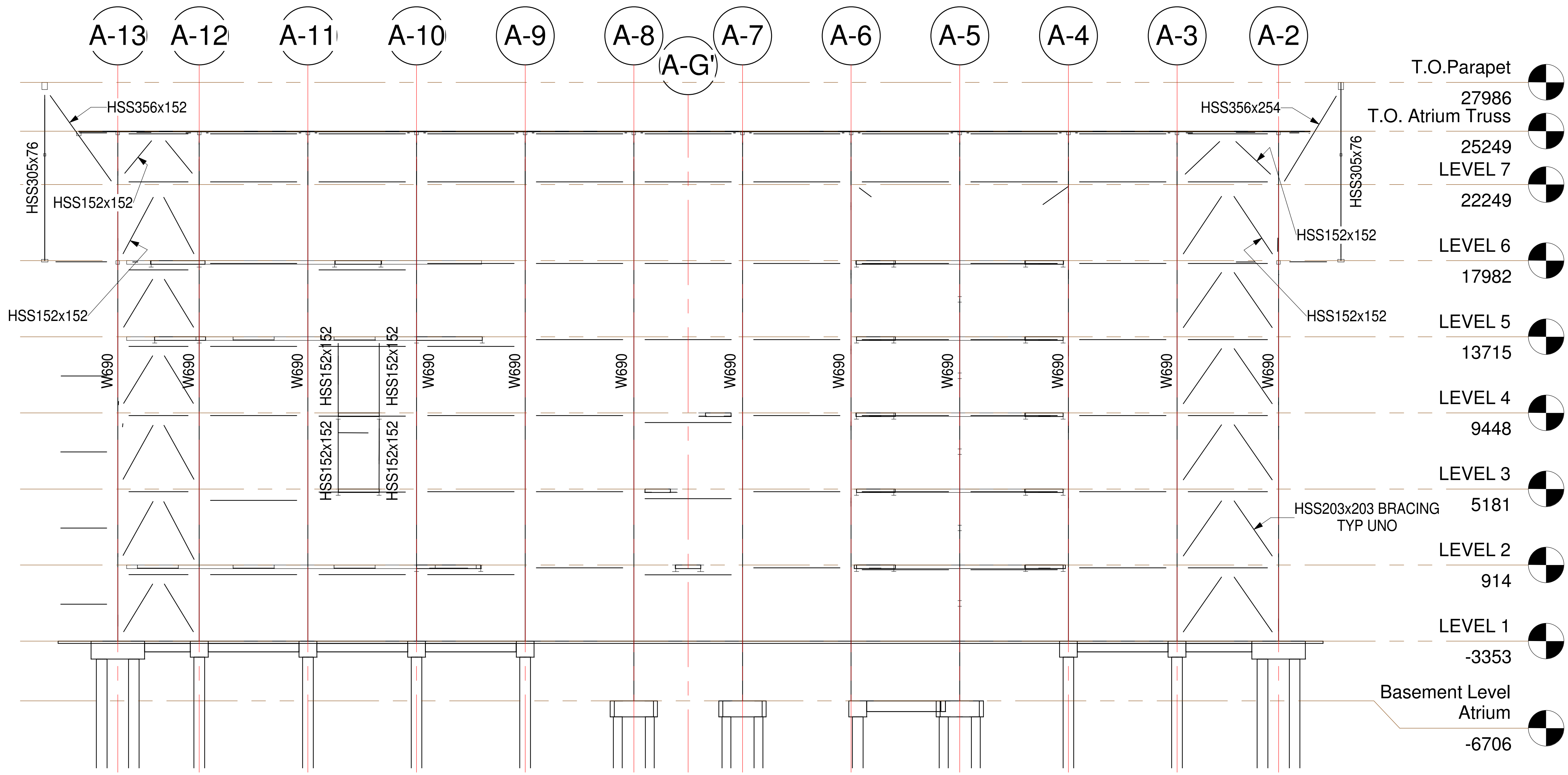
STRUCTURAL DRAWINGS



6.248 SSK14.10 - Atrium Structure T.O. Atrium Truss



SSK14.11 - Atrium Structure North Elevation

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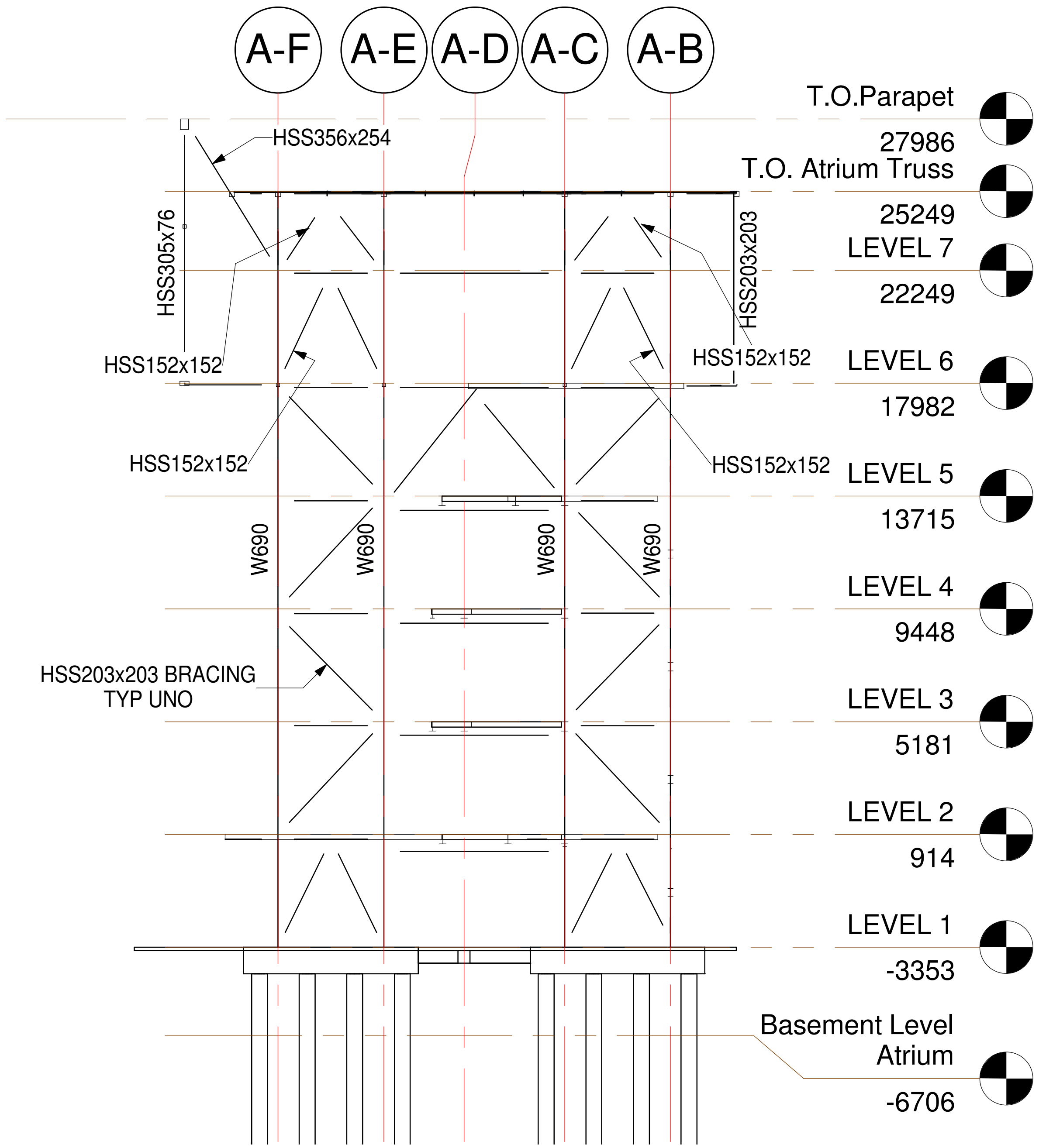
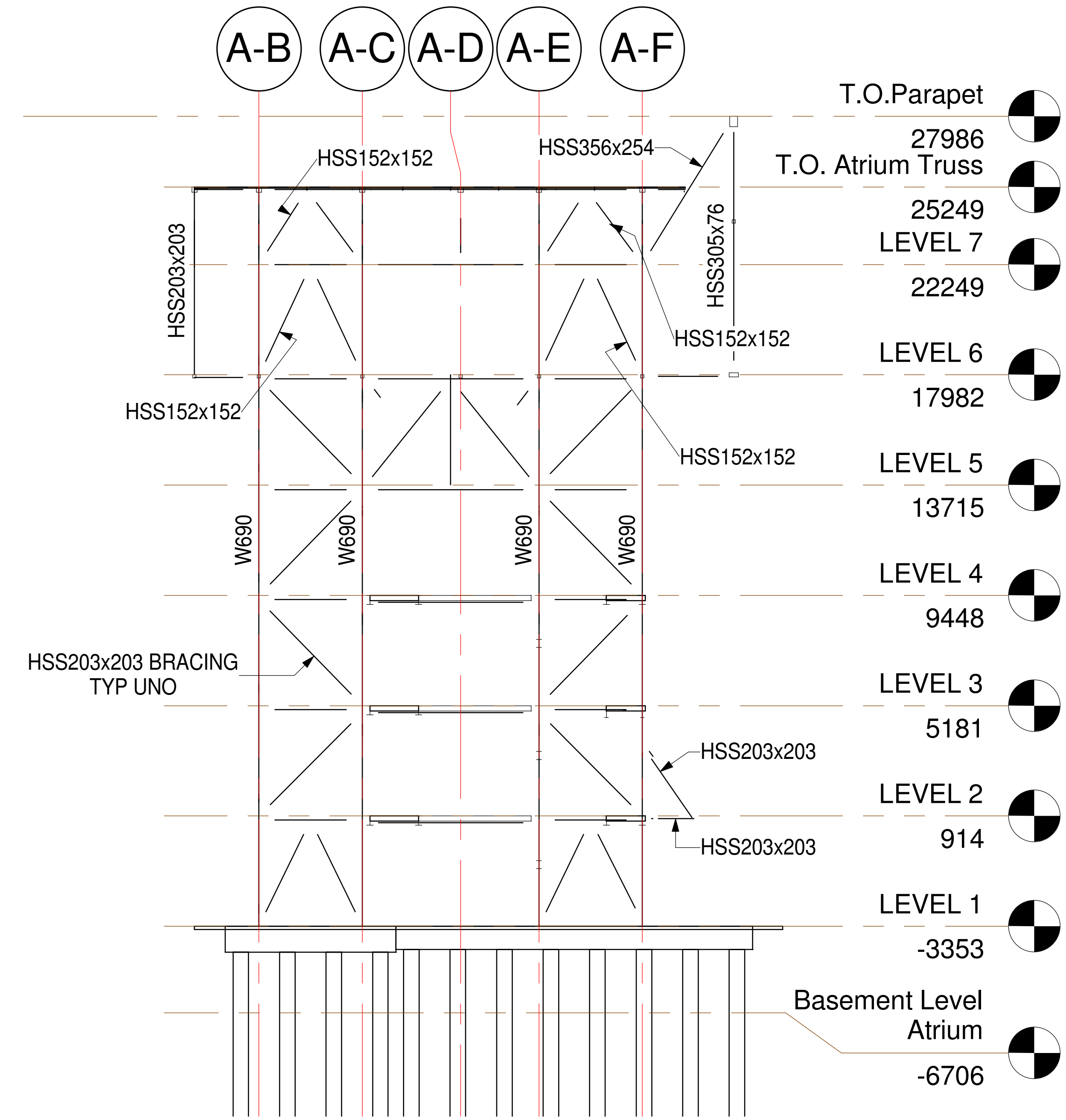
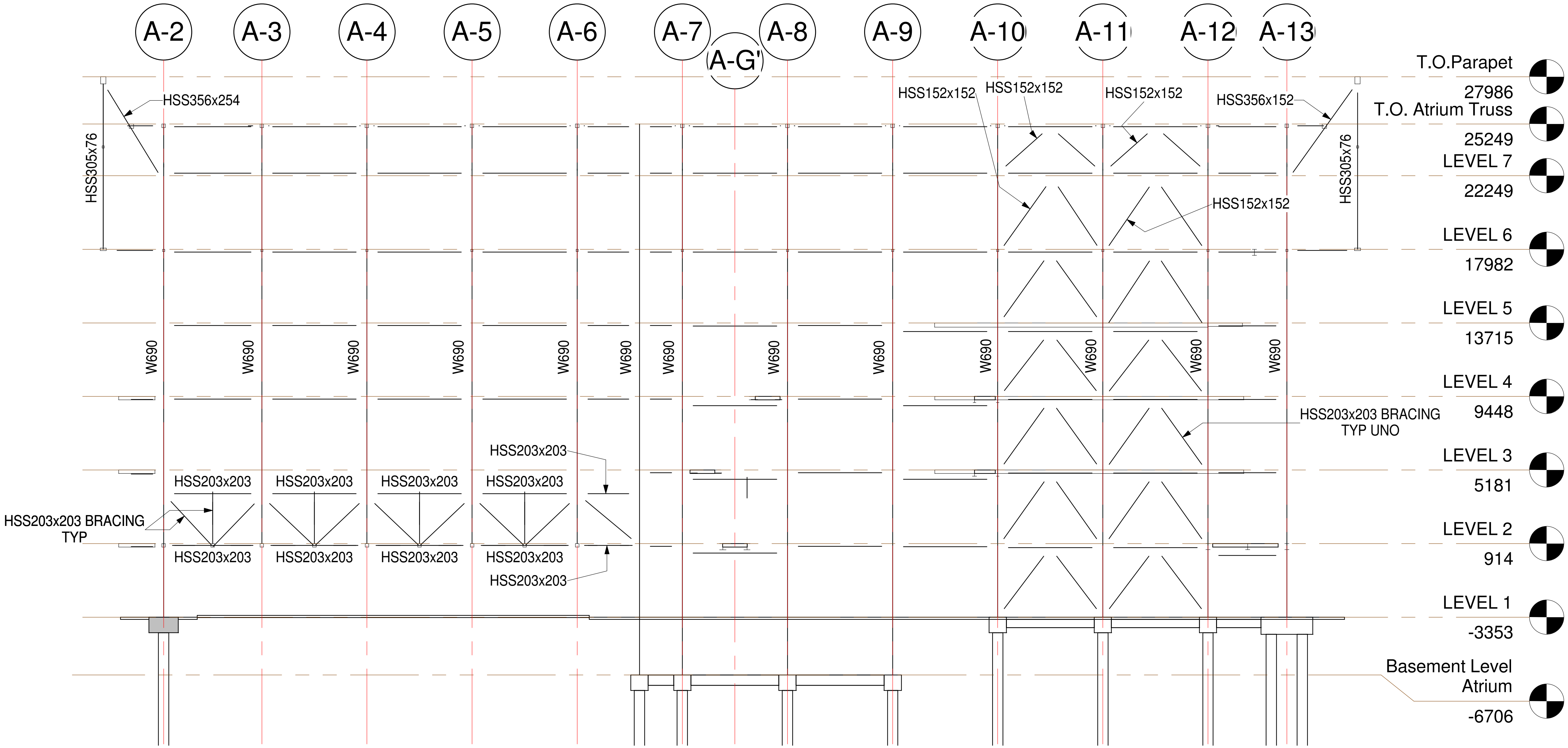
STRUCTURAL DRAWINGS





6.250 SSK14.12 - Atrium Structure East and West Elevation



SSK14.13 - Atrium Structure South Elevation

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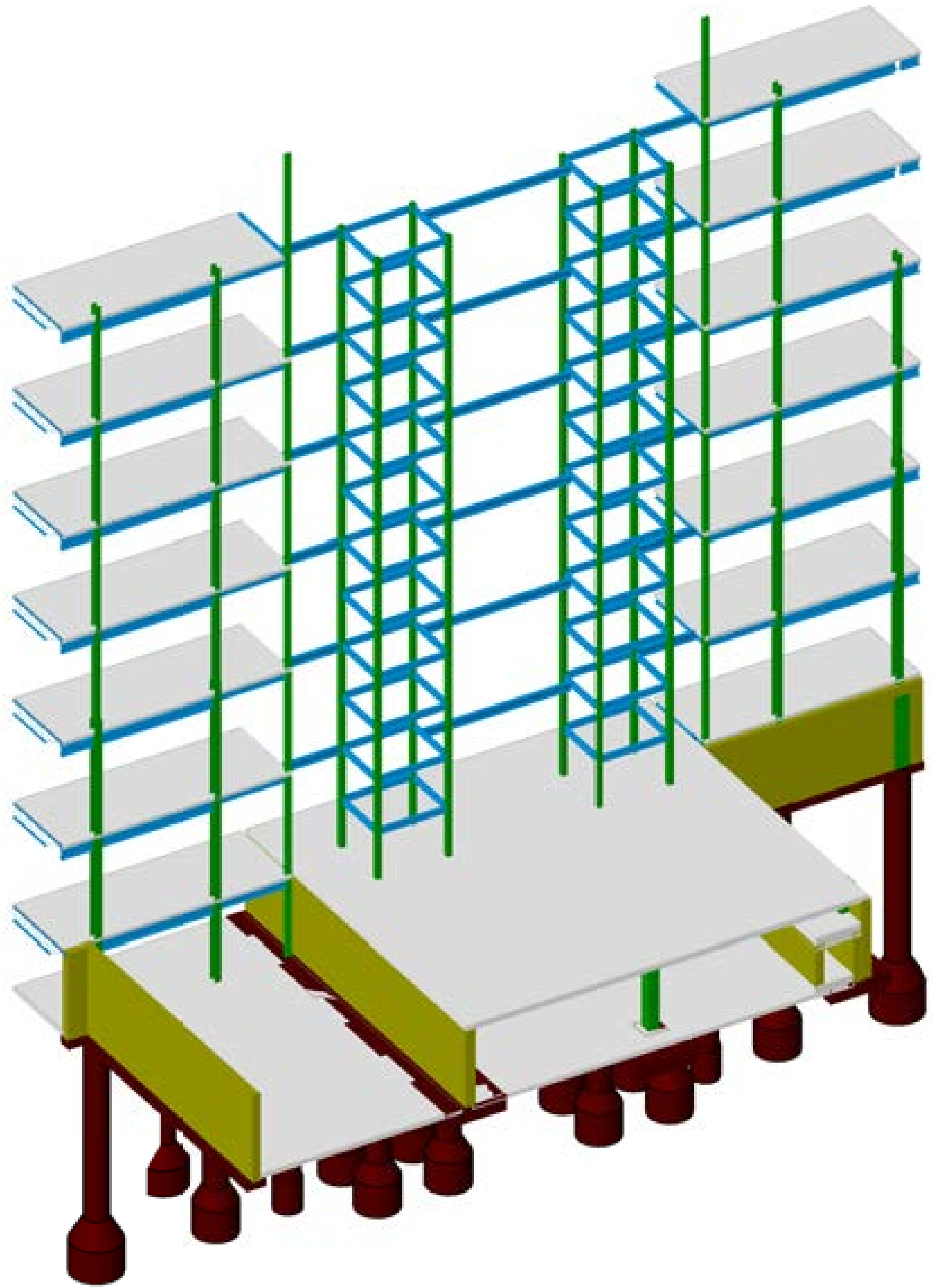
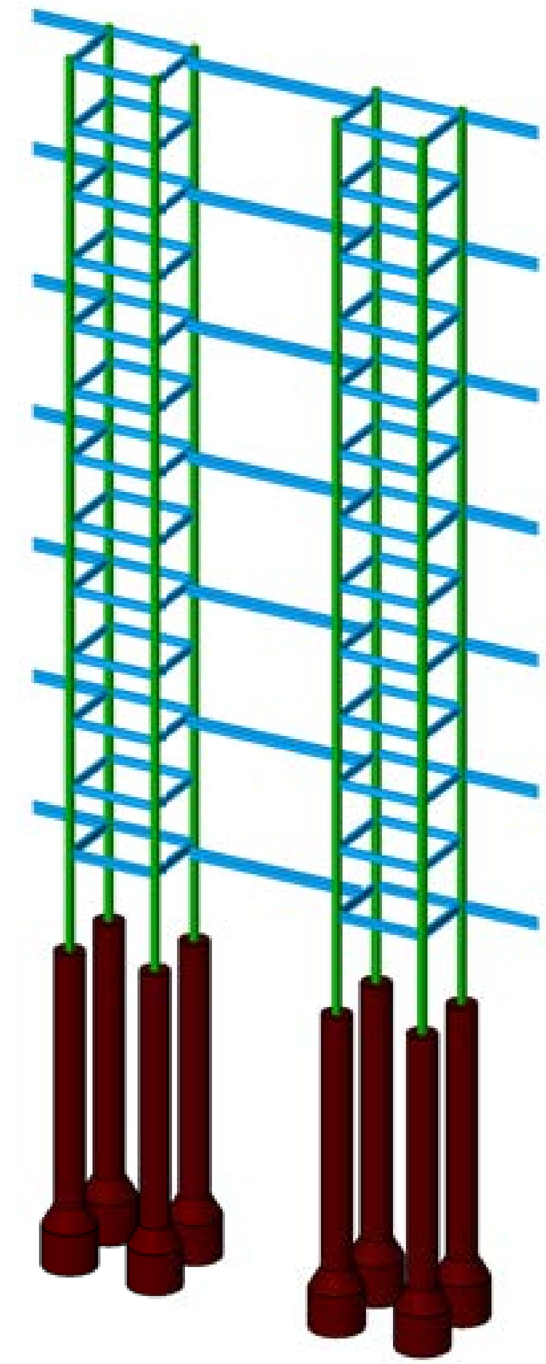
6. STRUCTURAL

STRUCTURAL DRAWINGS

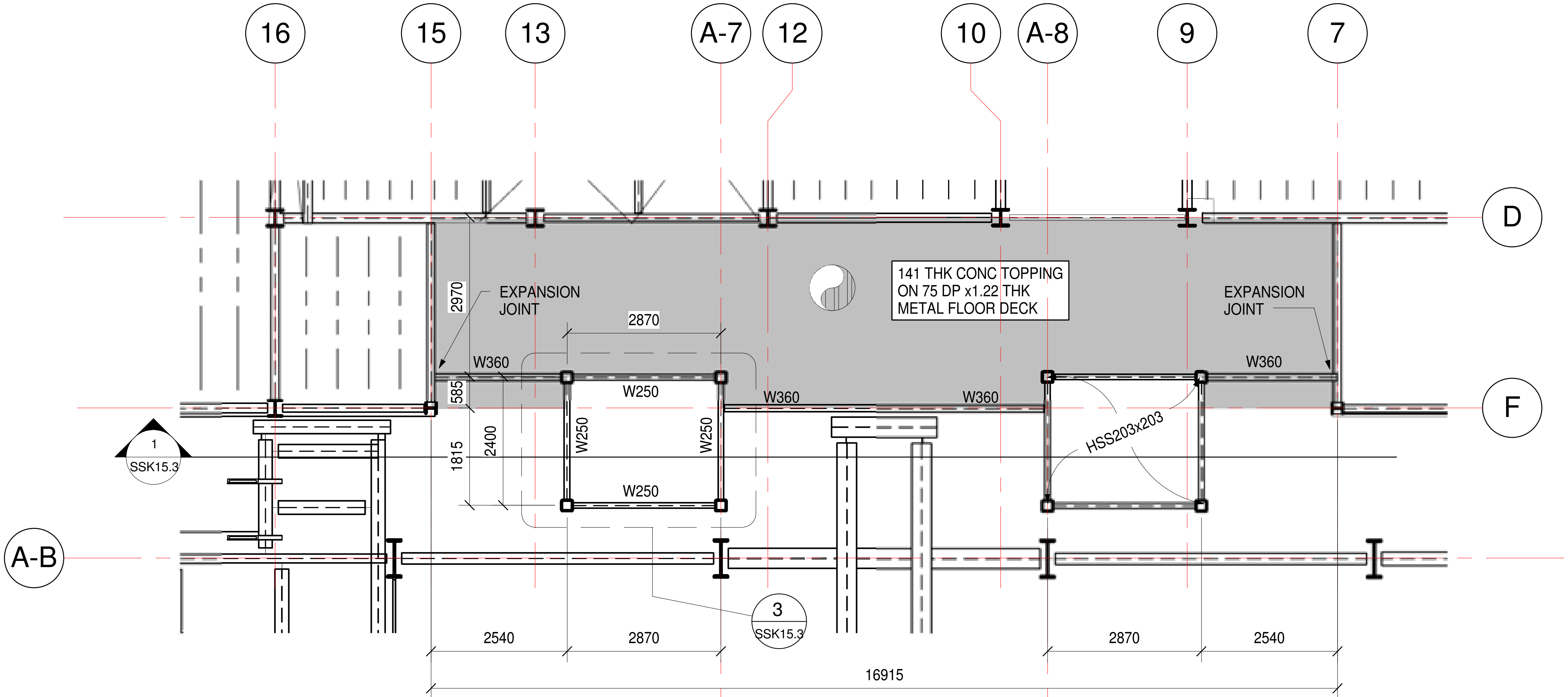


2 1958/Atrium - New Elevator Framing



1 1958/Atrium - New Elevator Framing

6 .252 SSK15.1 - 1958 Infill Slab 3D and Elevations



1 Level 2 Plan (Typ.)
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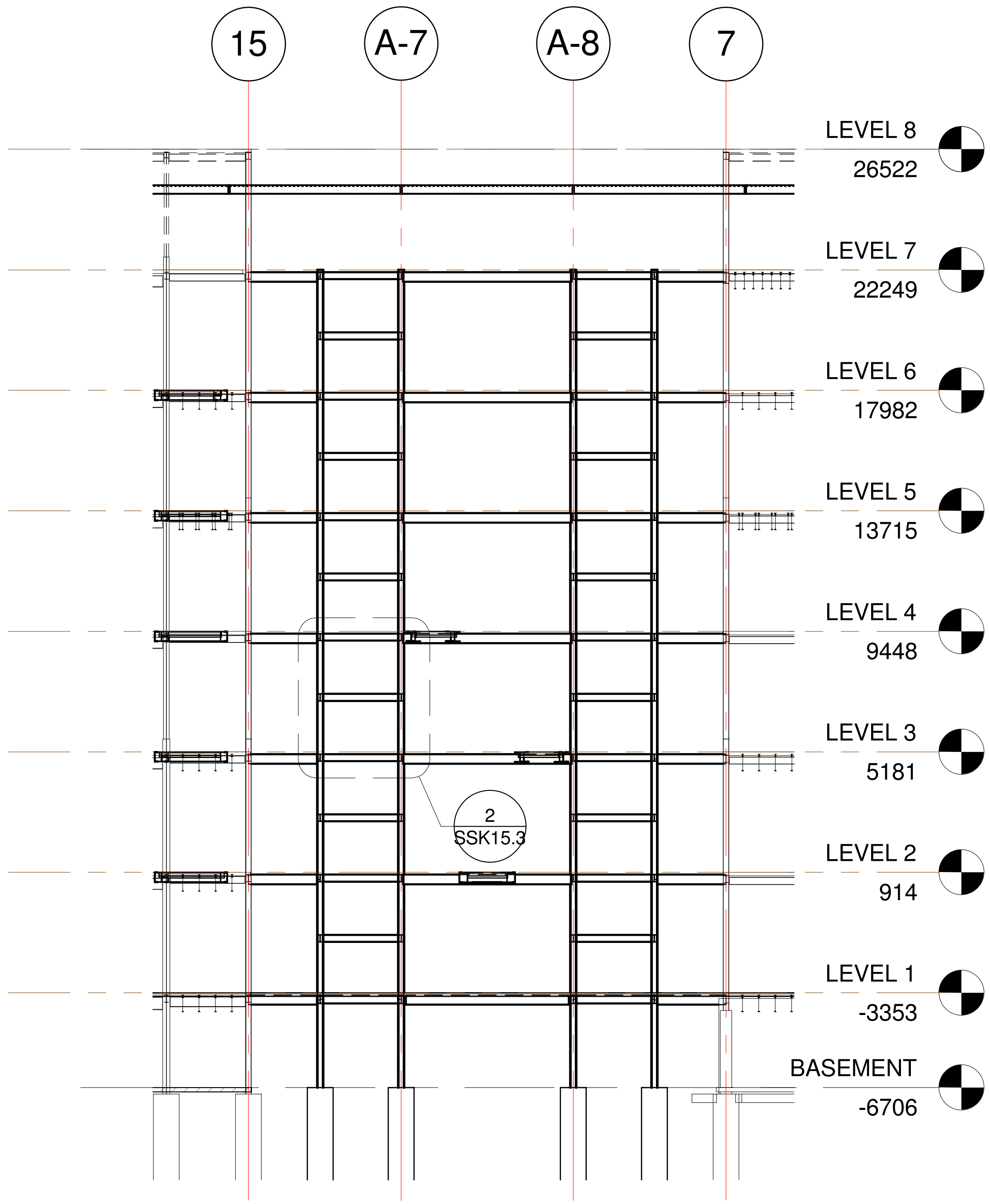
SSK15.2 - 1958 Infill Slab Plan View



1 Section
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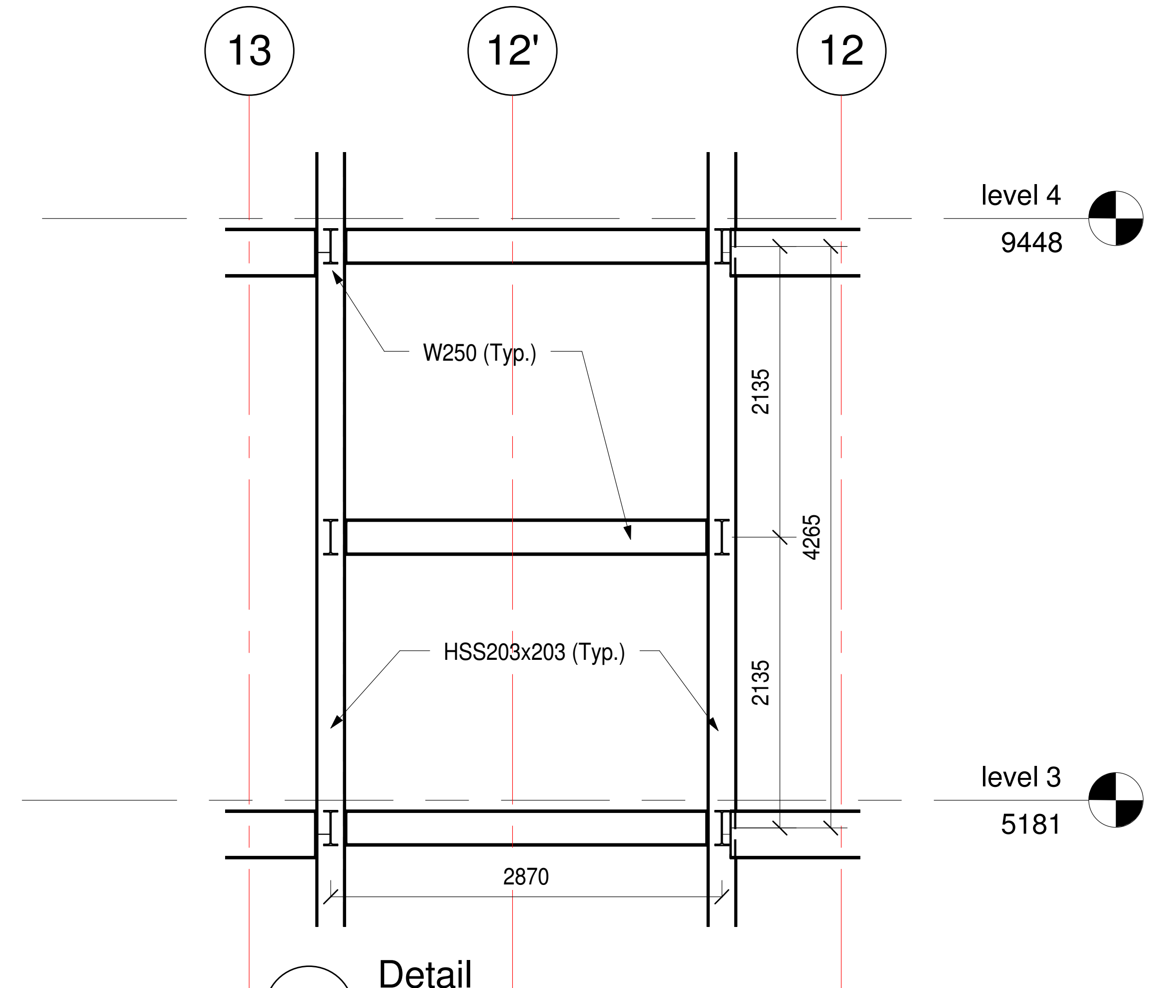

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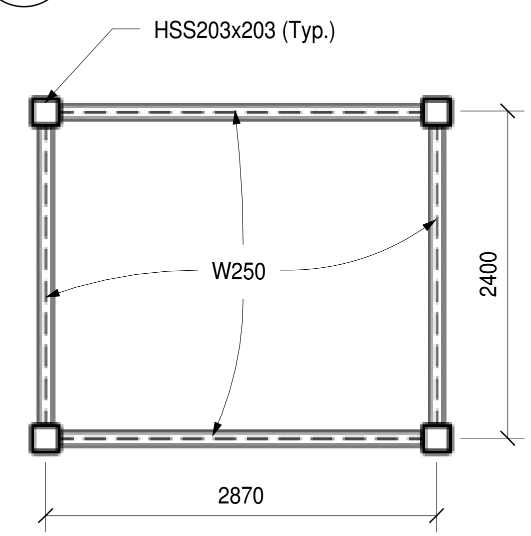
1 : 50



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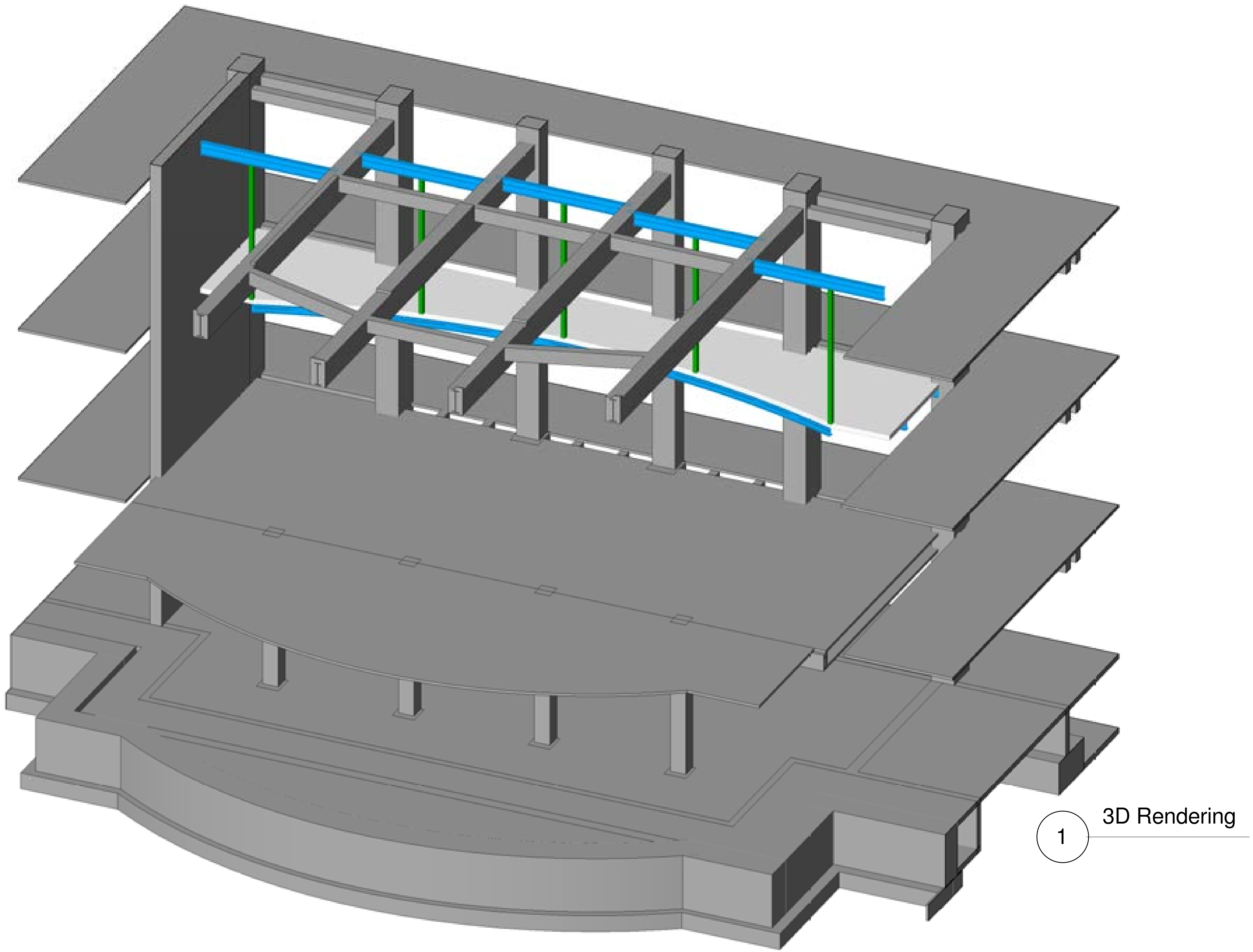
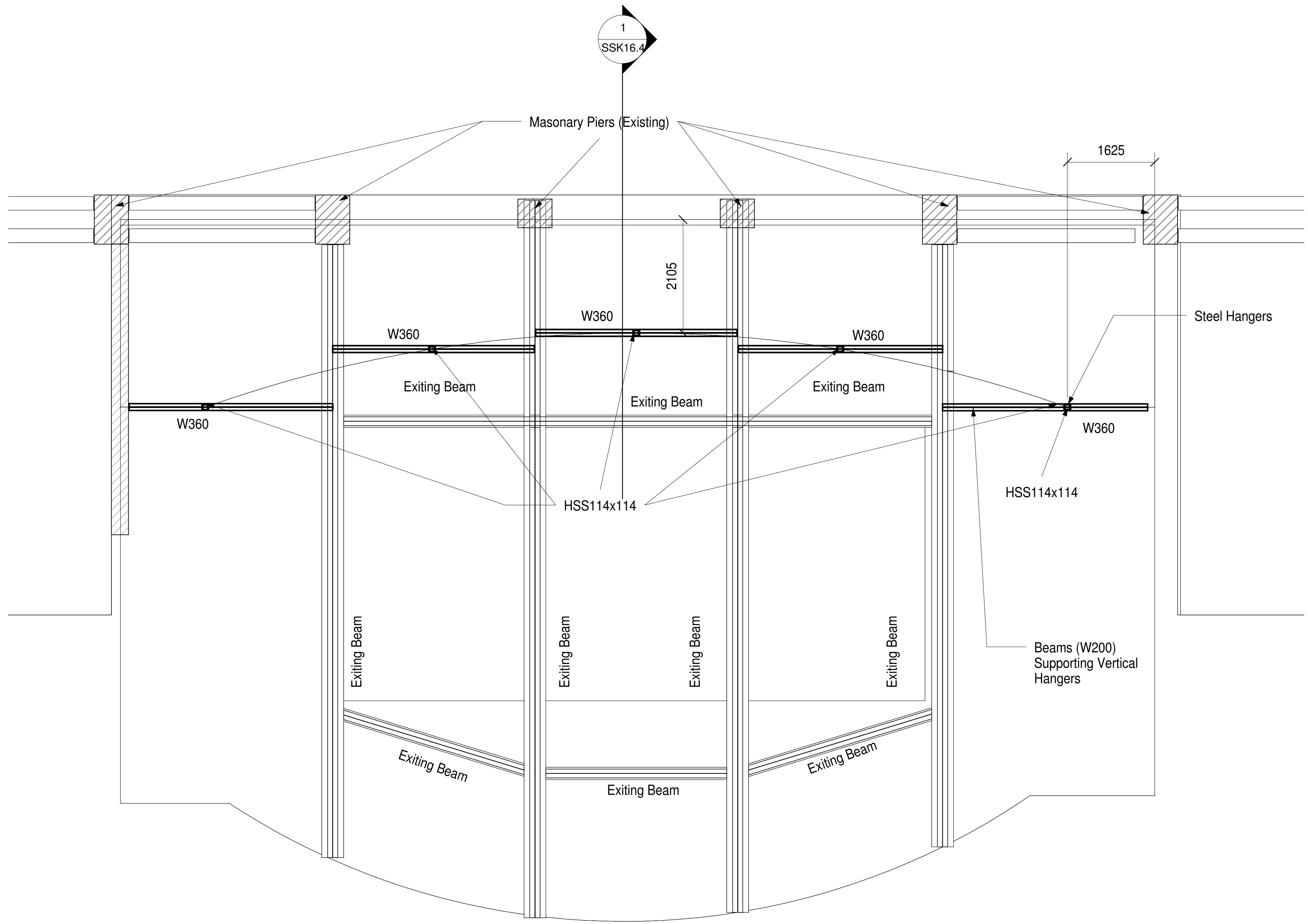
SSK15.3 - 1958 Infill Slab Sections

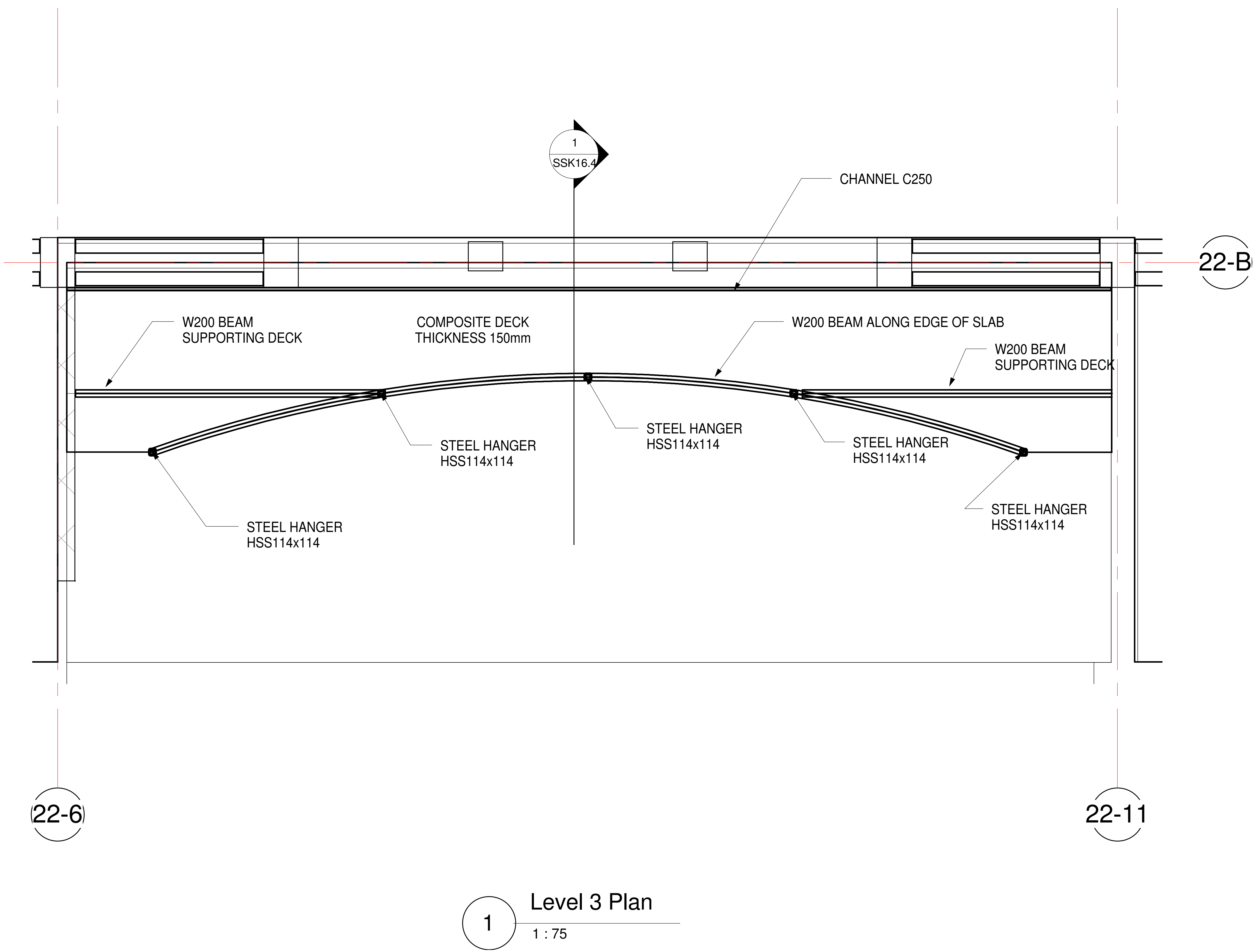


SSK16.1 - Council Chambers 3D Rendering

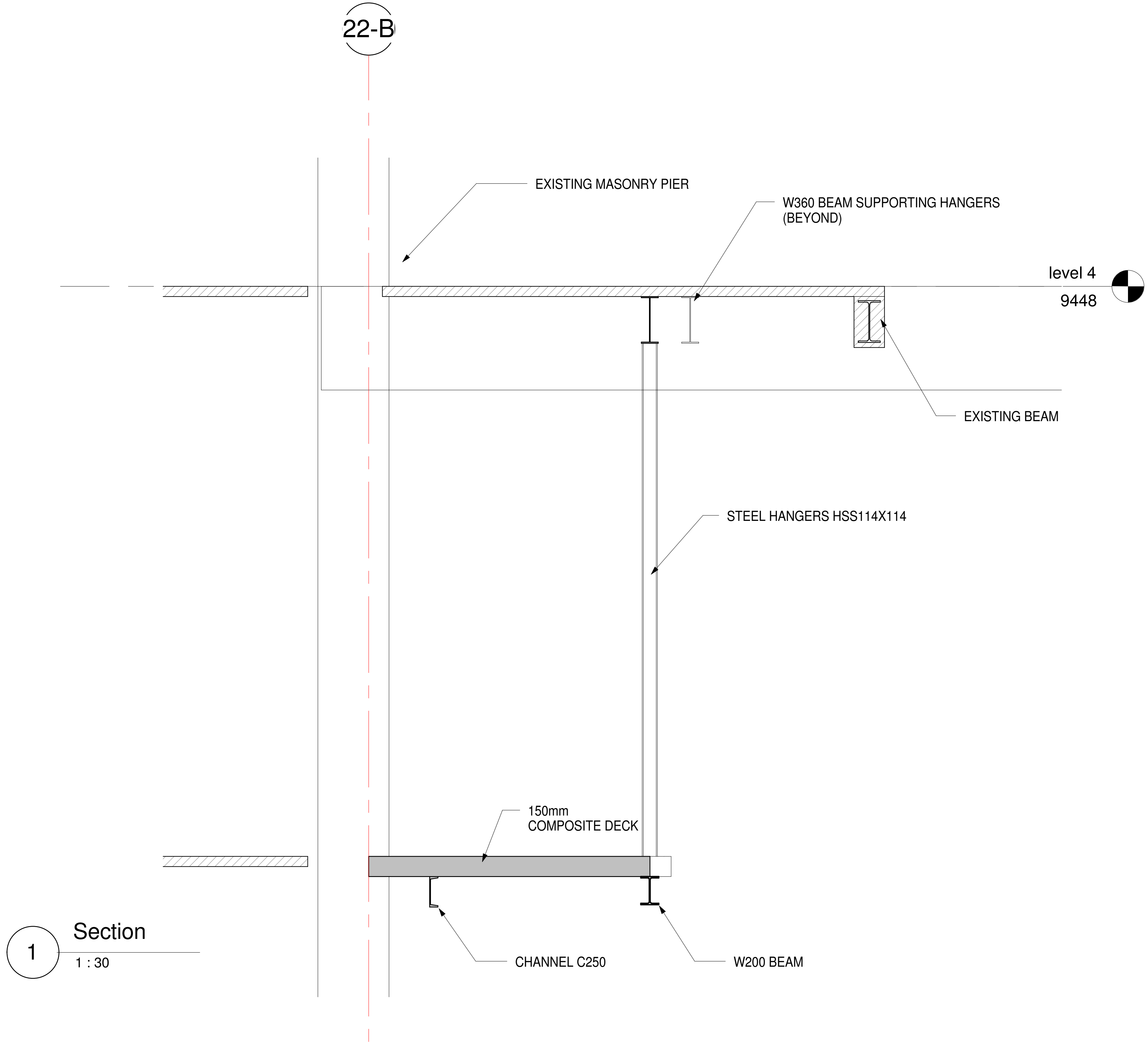


1 Level 4 Plan
1 : 75

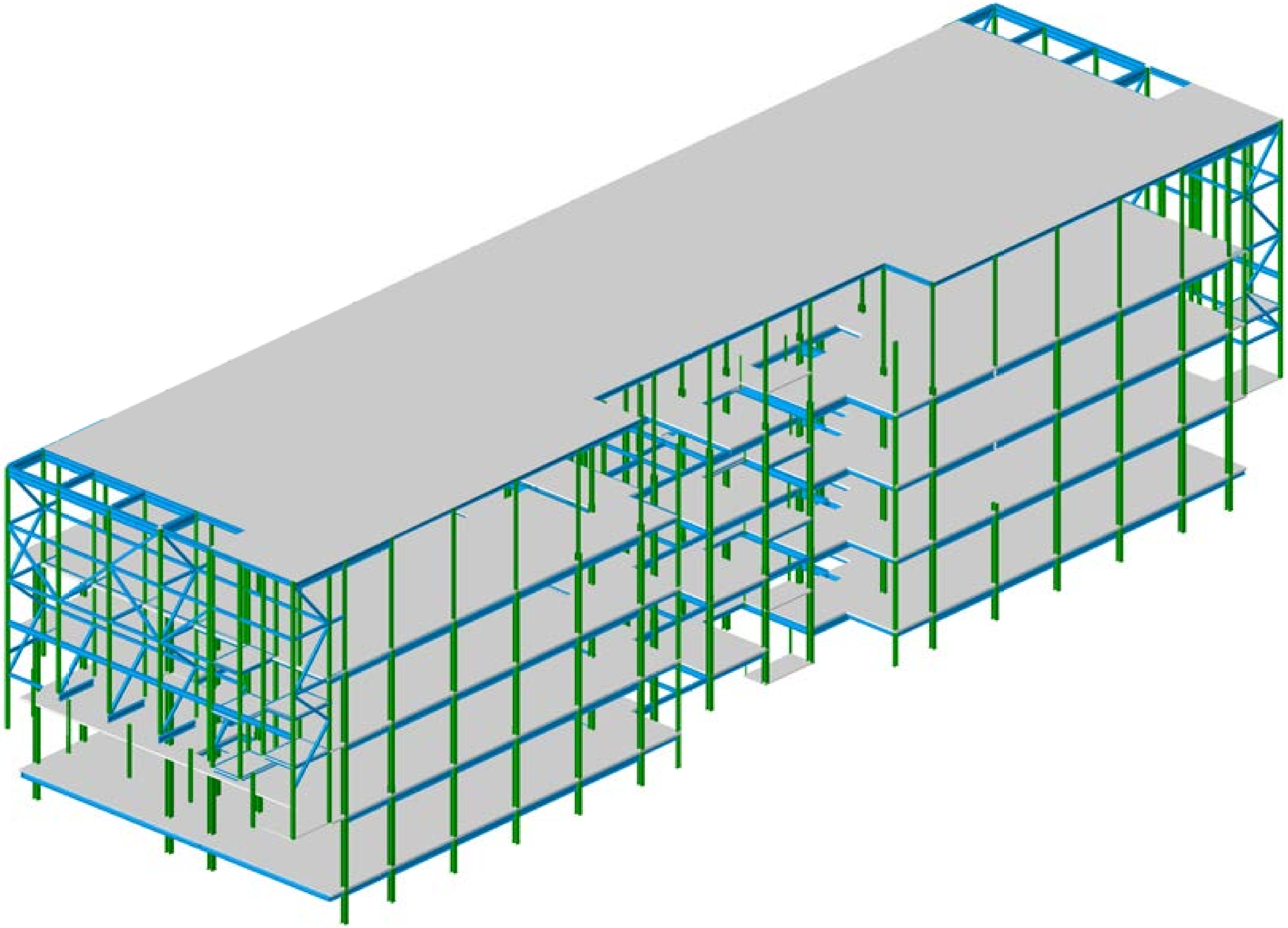
6 .256 SSK16.2 - Council Chambers Level 4 Plan



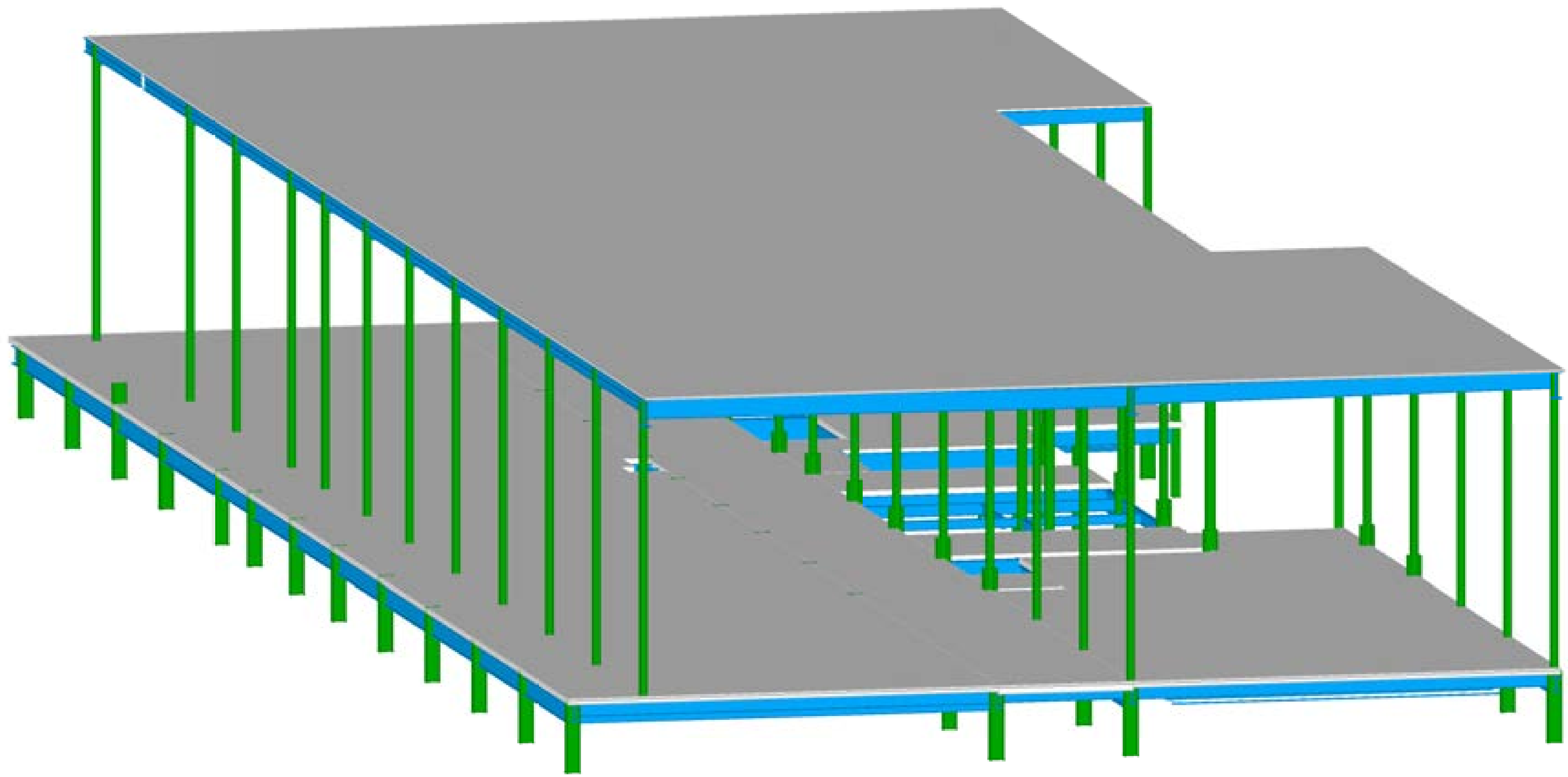
SSK16.3 - Council Chambers Mezzanine Level Plan



6 .258 SSK16.4 - Council Chambers Sections



SSK17.1 - Mechanical Penthouse & Stair Structure 3D Rendering



6 .260 **SSK17.2 - Mechanical Penthouse 3D Rendering**

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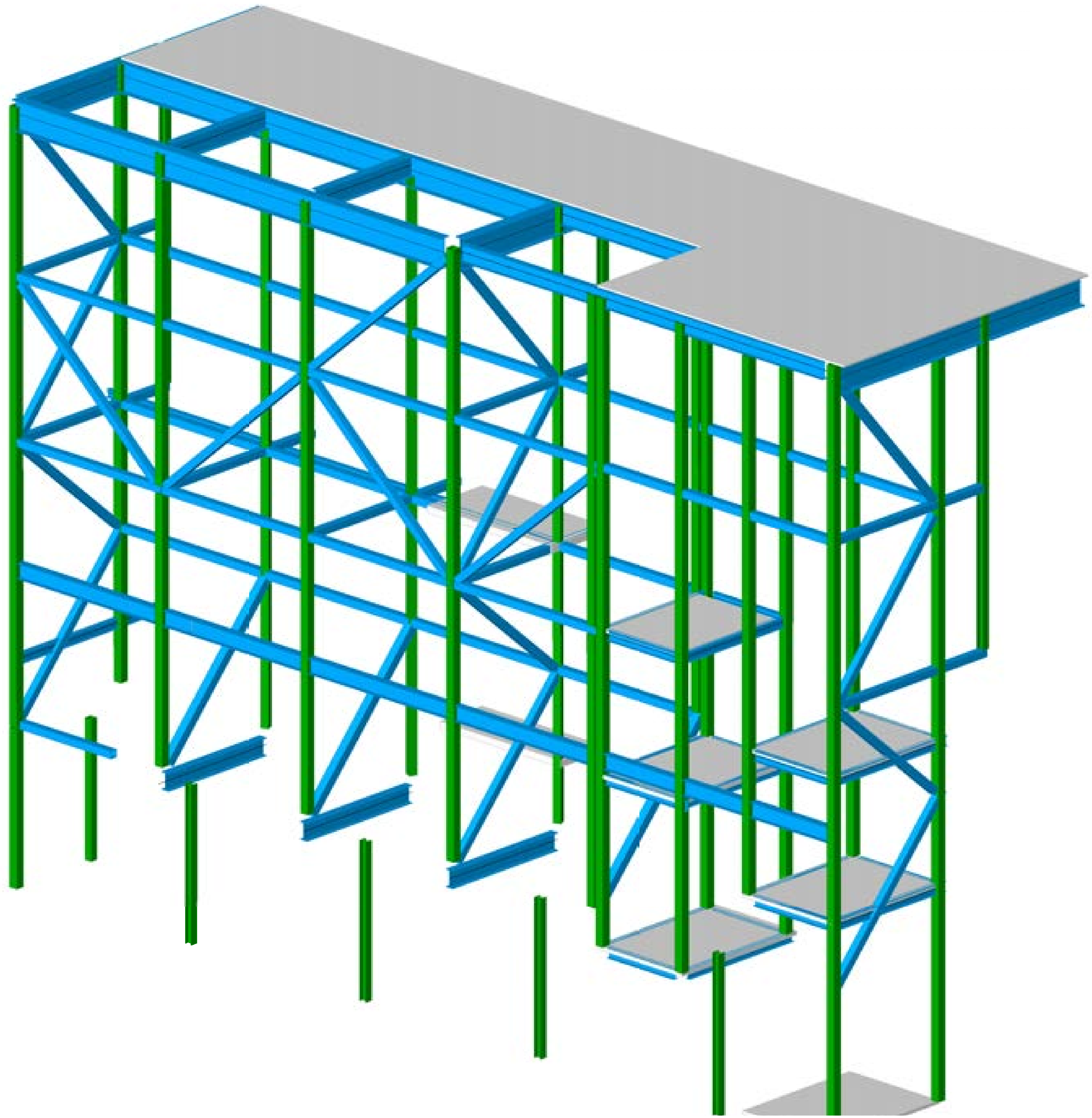
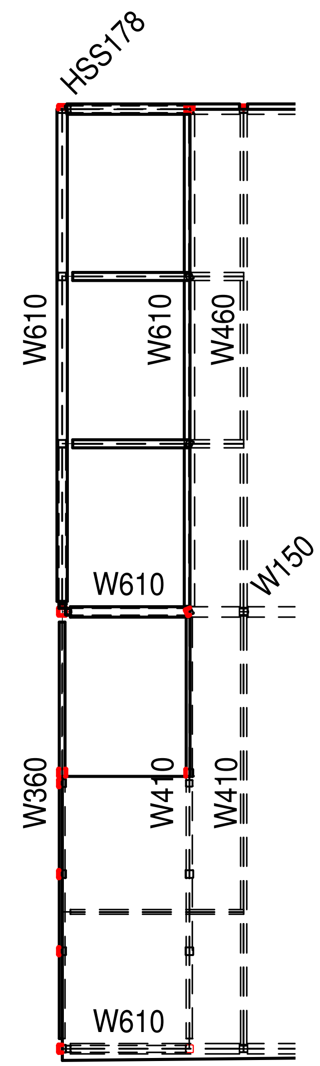
6. STRUCTURAL

STRUCTURAL DRAWINGS

SSK17.3 - Mechanical Penthouse Plan



6 .262 **SSK17.4 - Mechanical Penthouse Stair Structure Rendering**

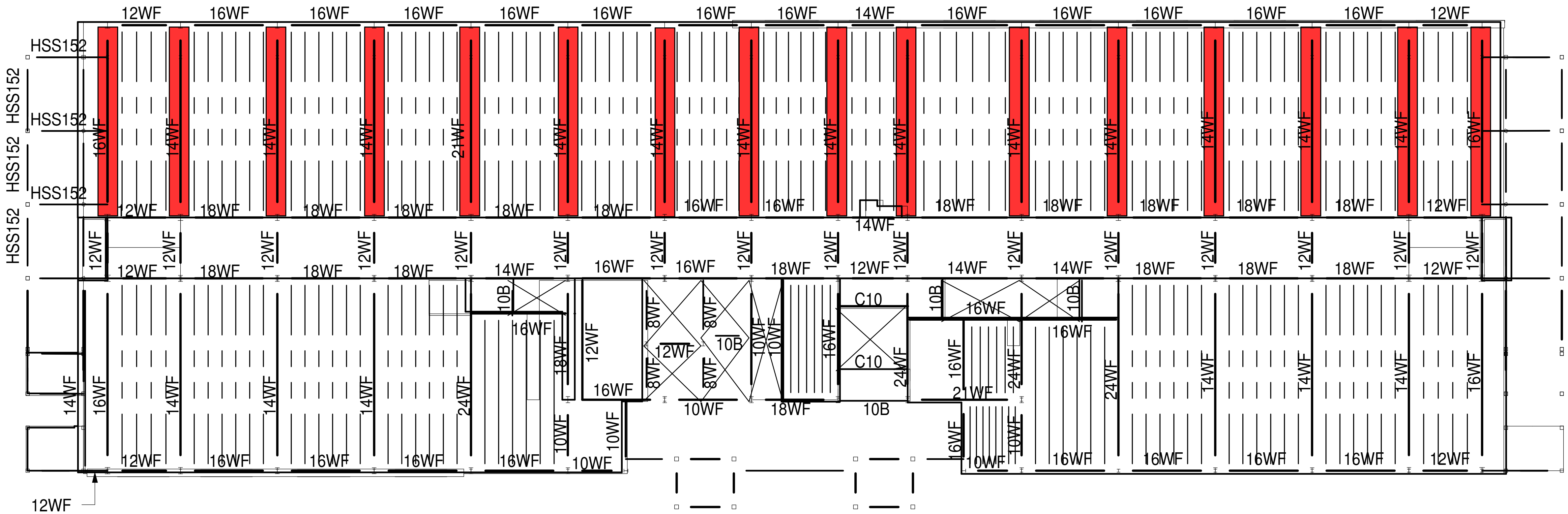


SSK17.5 PLAN VIEW OF T.O. MECH
PENTHOUSE STAIR STRUCTURE

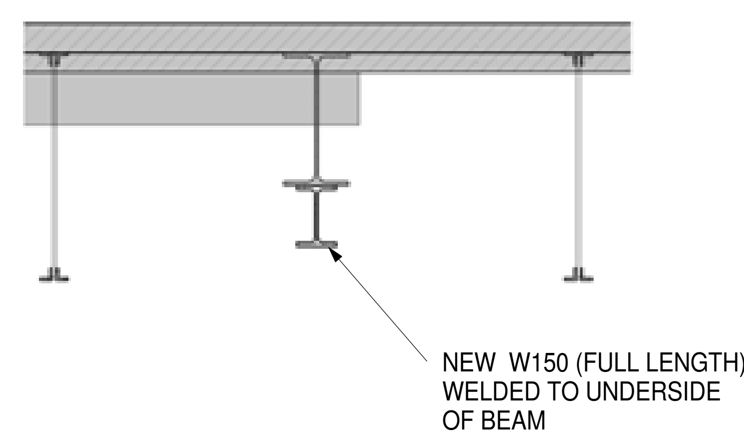
1

1 : 200

SSK17.5 - Mechanical Penthouse Stair Structure Plan

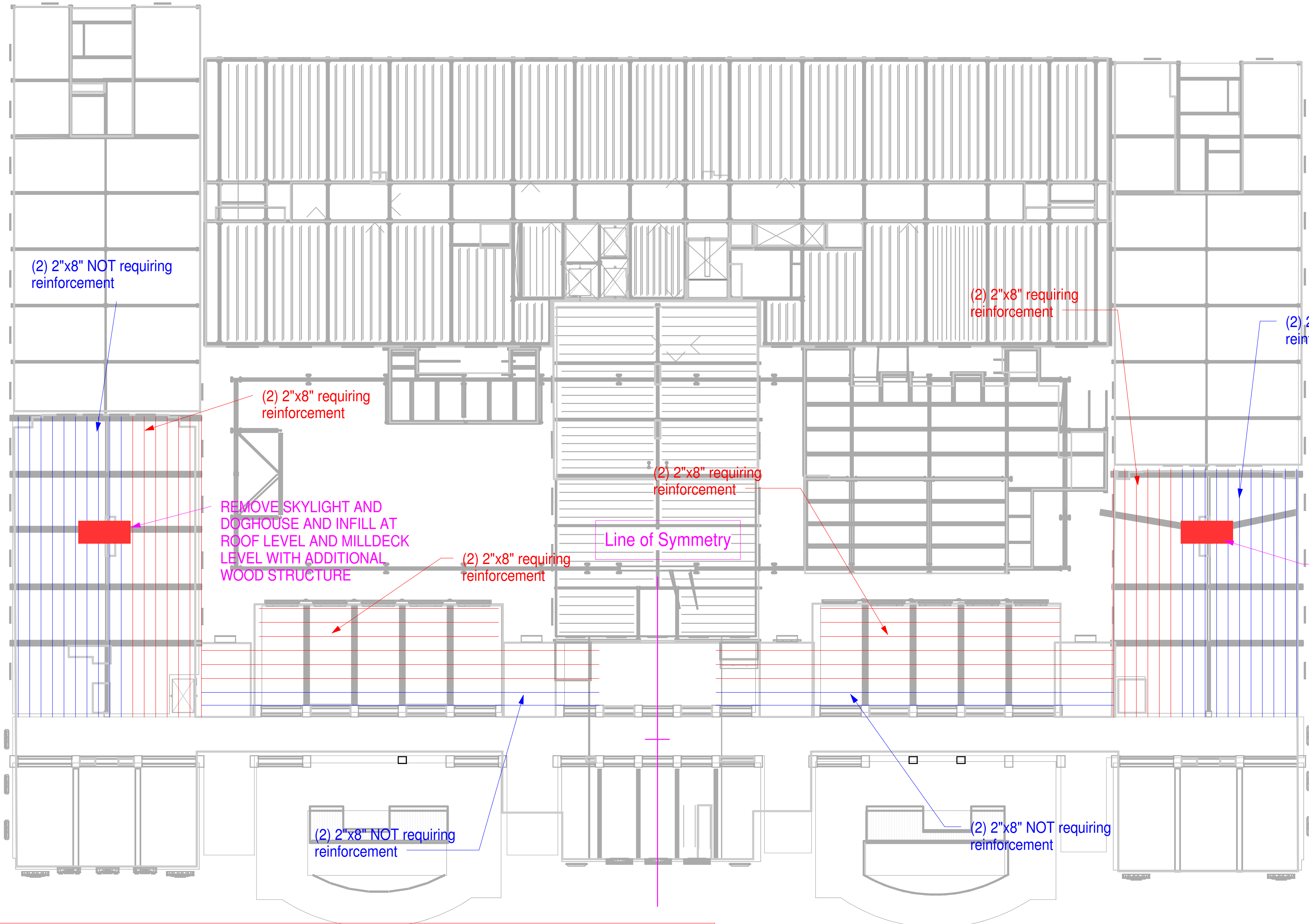


LEVEL 7



1
SSK17.6
SSK17.7 SECTION OF BEAM STRENGTHENING
1 : 20

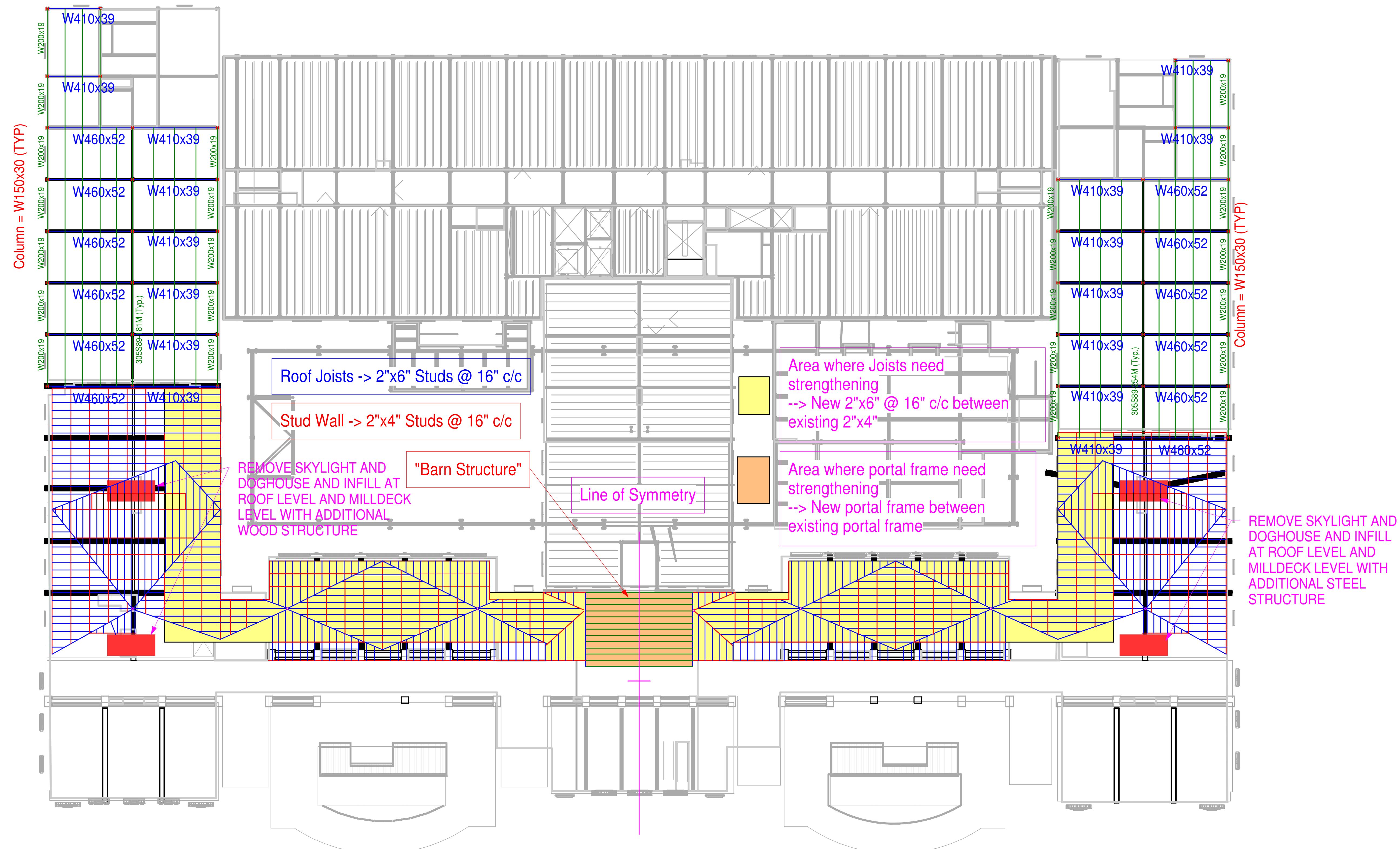
 SSK17.6 - Mechanical Penthouse 7th Floor Remedial Work Plan



Note:
Scope of works illustrated has been based on a initial visual inspection of the roof spaces which are not fully accessible at this stage, The scope of work will therefore be subject to change following the completion of opening up works during the initial phase of the project

1 SSK18.1 LEVEL 5 PLAN - 1922 ATTIC FLOOR REMEDIAL WORK
1 : 350

SSK18.1 - Attic Floor Remedial Work Plan



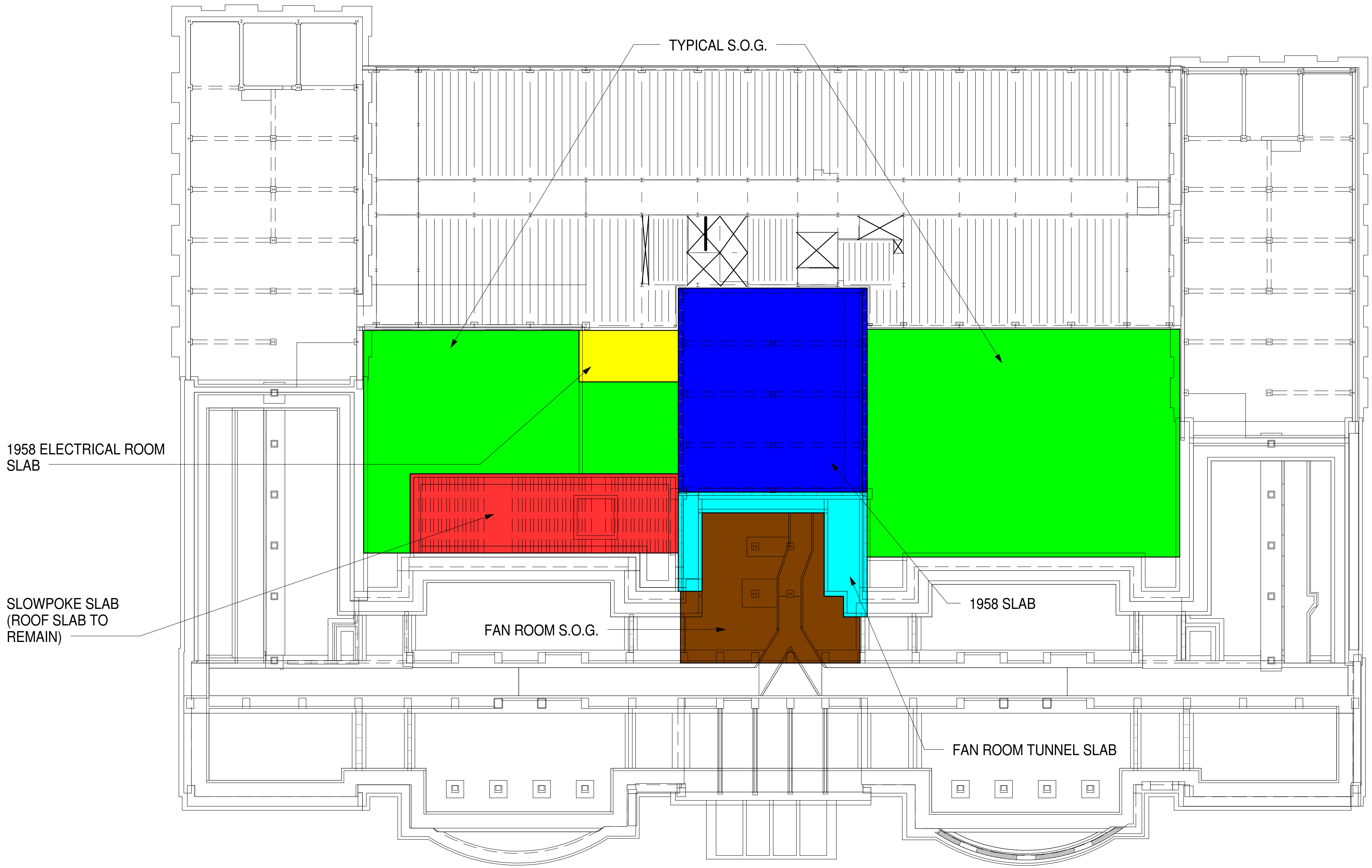
Note:
Scope of works illustrated has been based on a initial visual inspection of the roof spaces which are not fully accessible at this stage, The scope of work will therefore be subject to change following the completion of opening up works during the initial phase of the project.

1
SSK18.2

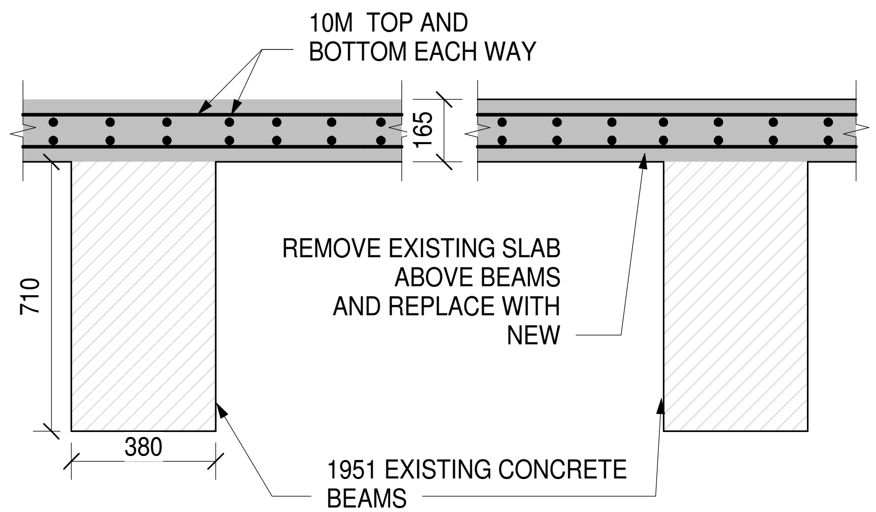
LEVEL 5 PLAN - 1922,46,47 ATTIC ROOF REMEDIAL WORK

1 : 350

6.266 SSK18.2 - Attic Roof Remedial Work Plan

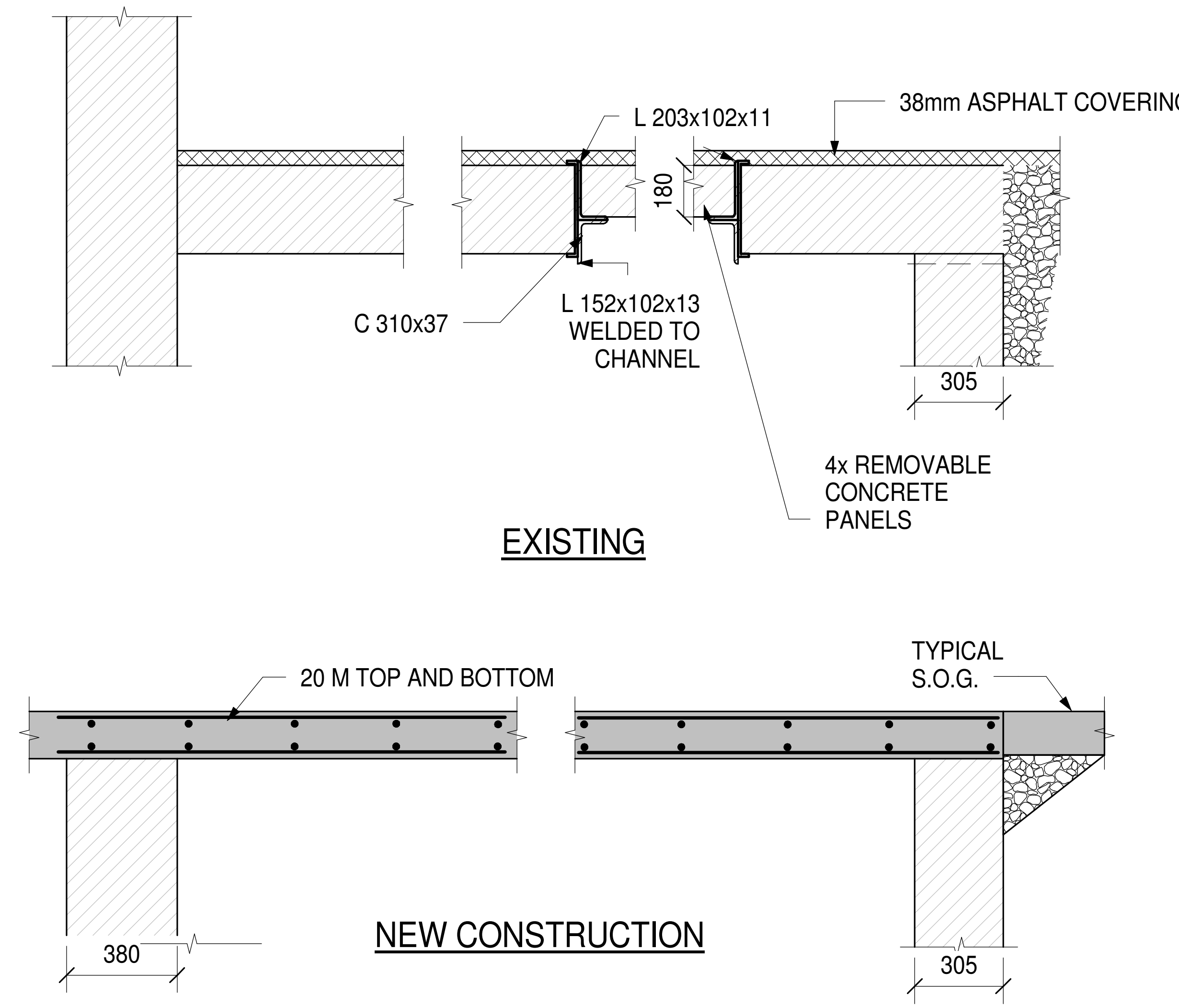


SSK19.1 - Level 1 Slab Plan



1 1951 SLAB

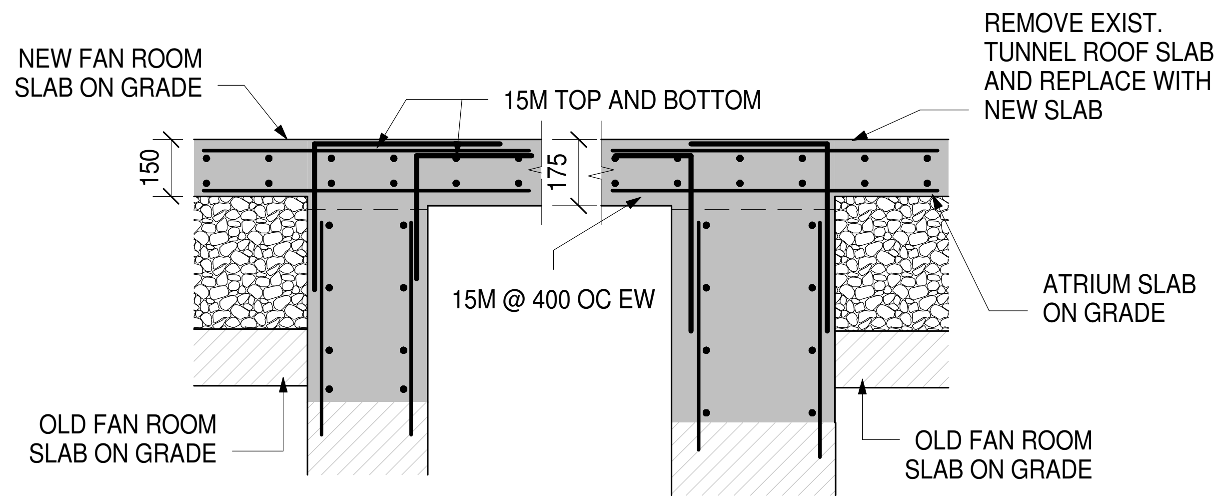
1 : 20



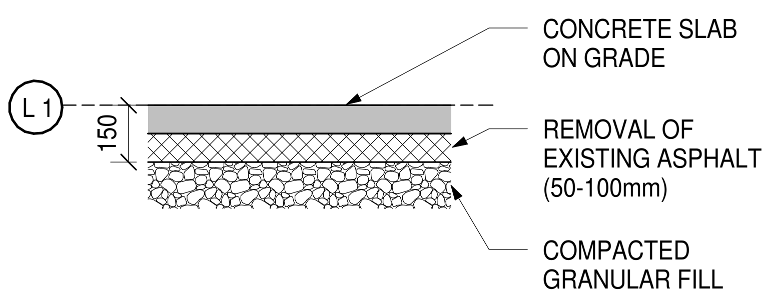
2 SSK19.2 1958 ELEC. VAULT N

1 : 25

SSK19.2 - Level 1 Slab Sections



1 SSK19.3 FAN ROOM TUNNEL SLAB
1 : 20



2 SSK19.3 TYPICAL S.O.G.
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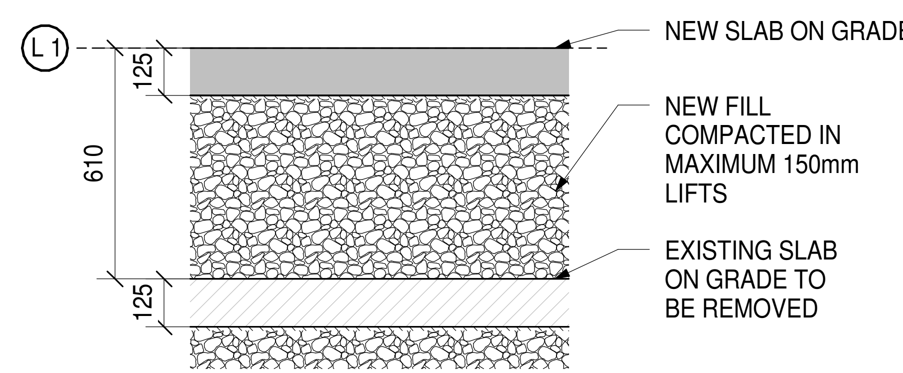
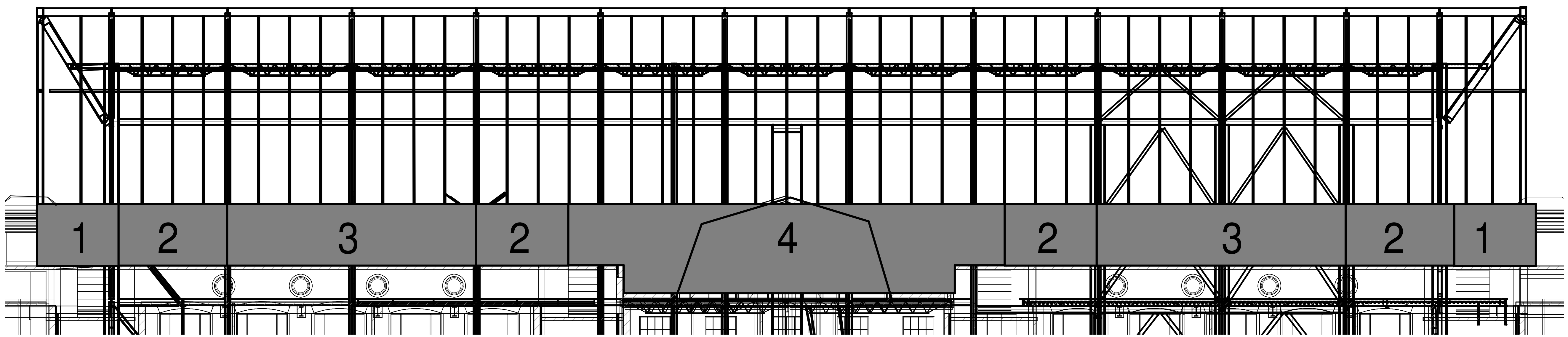


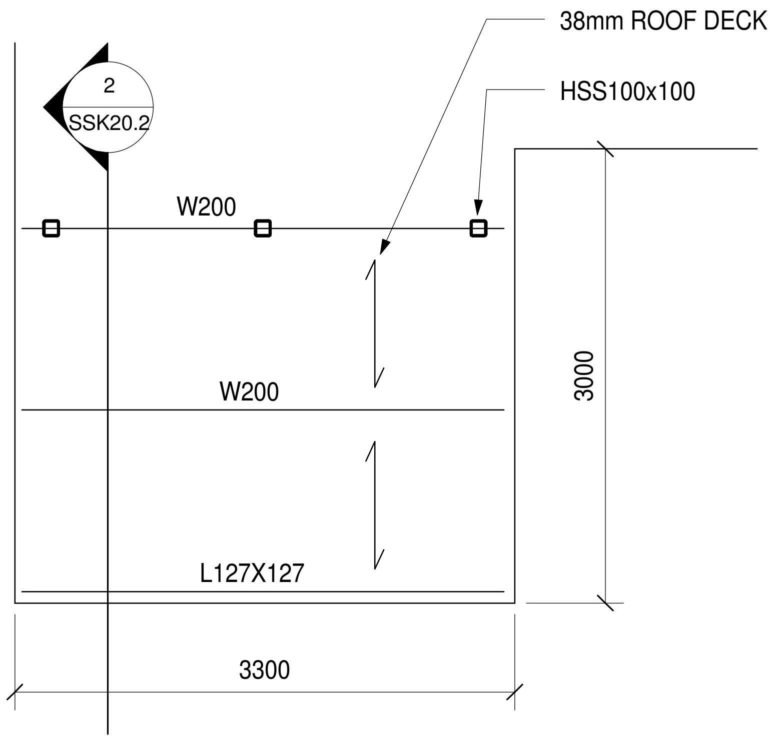
3 SSK19.3 FAN ROOM S.O.G.
1 : 20

SSK19.3 - Level 1 Slab Sections

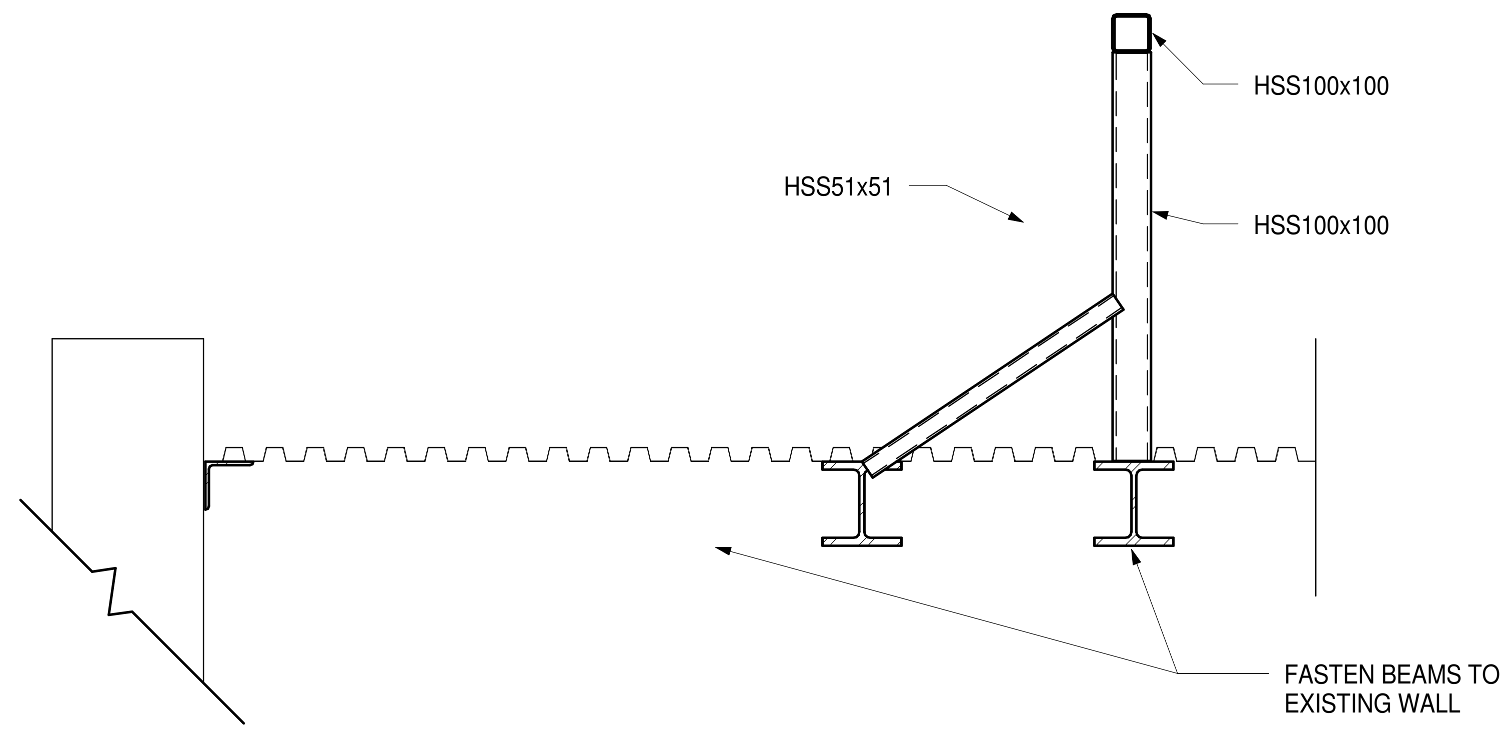


GLASS LANTERN TYPES 1-4

6 .270 **SSK20.1 - Glass Lanterns Elevation**

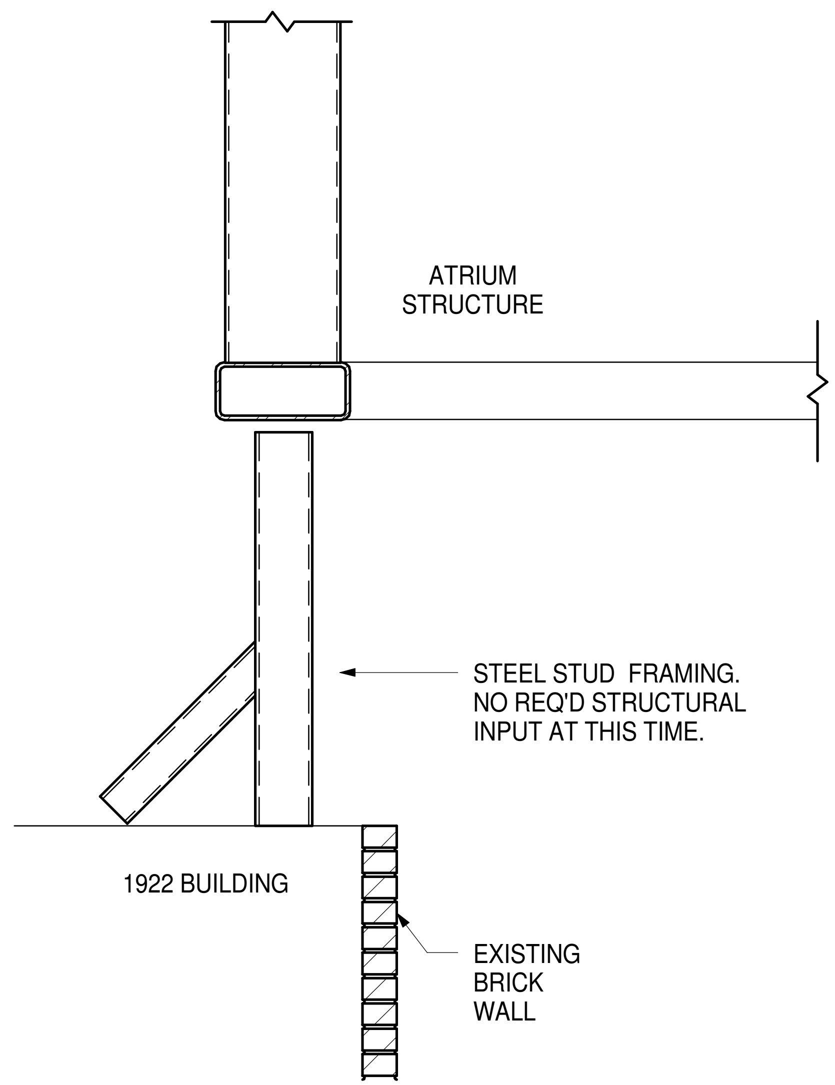


1 SSK20.2 GLASS LANTERN 1 PLAN
1 : 50

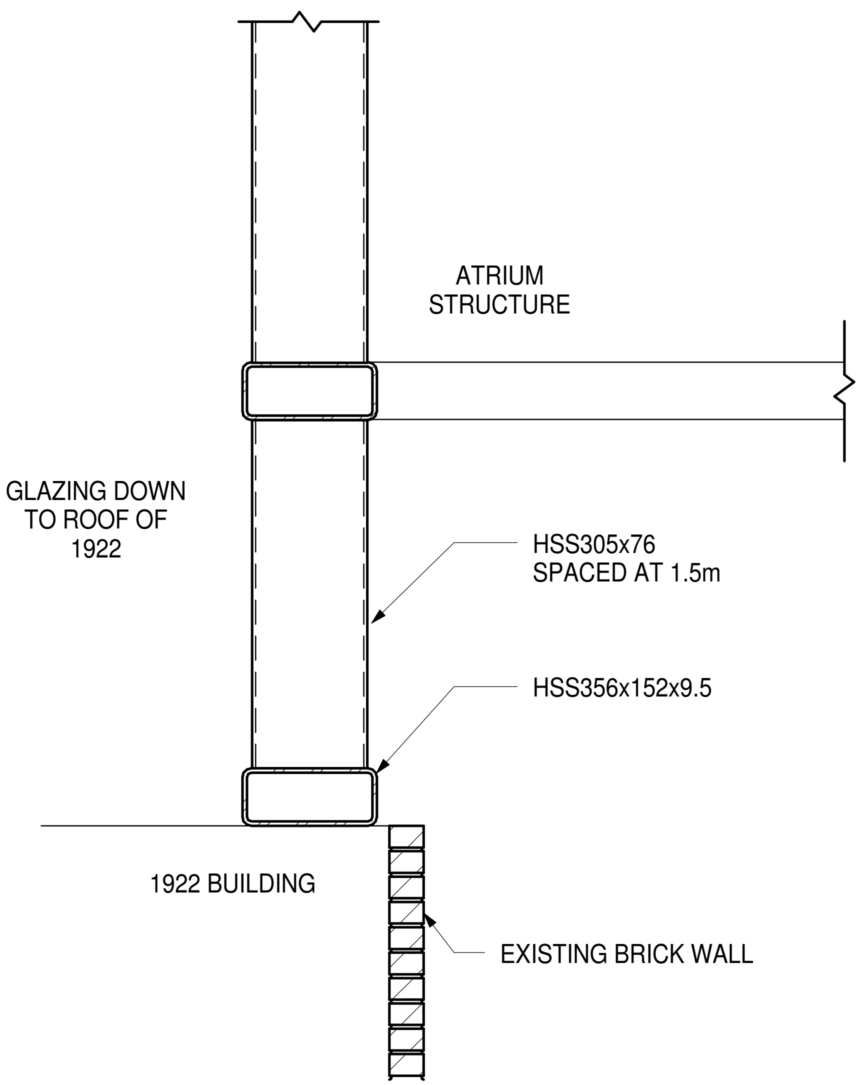


2 SSK20.2 GLASS LANTERN 1 SECTION
1 : 20

SSK20.2 - Glass Lanterns Plan and Section

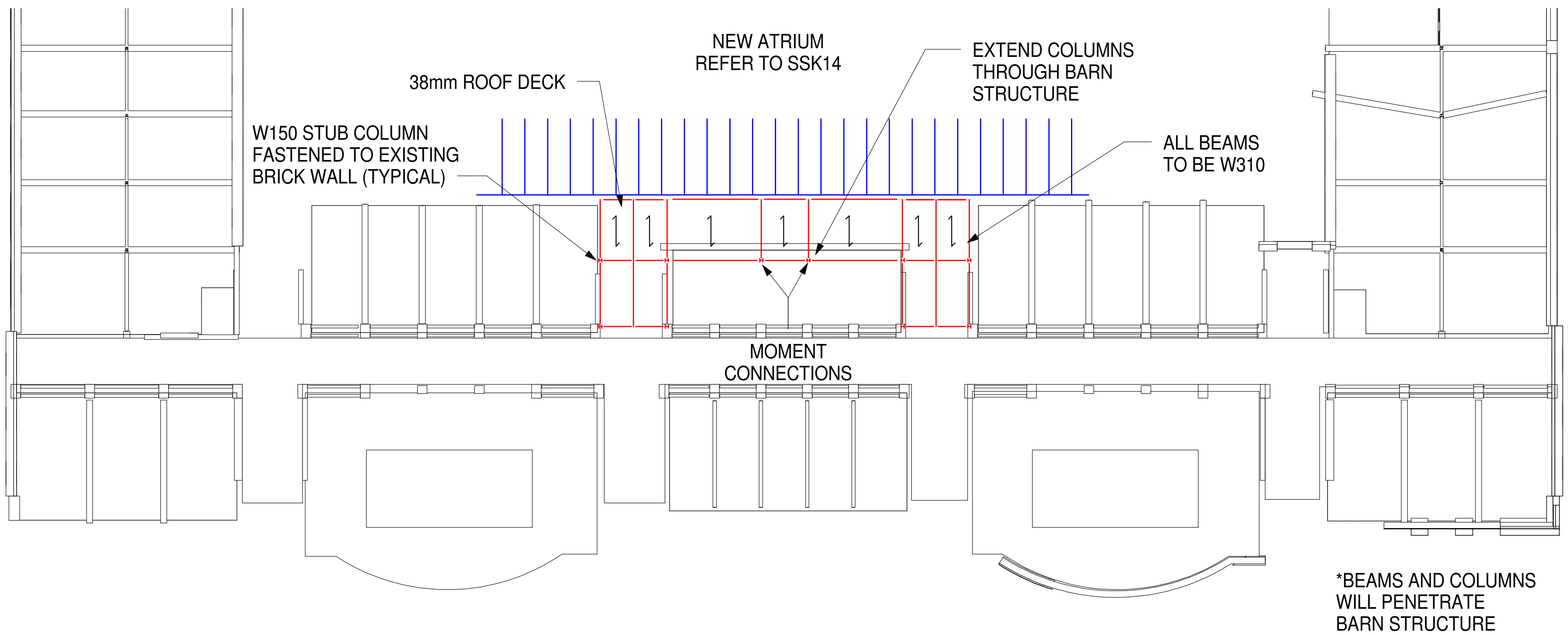


1 GLASS LANTERN 2 SECTION
SSK20.3 1 : 20



2 GLASS LANTERN 2 SECTION
1 : 20

SSK20.3 - Glass Lanterns Sections



LEVEL 5

1
SSK20.4
GLASS LANTERNS 4
1 : 375

SSK20.4 - Glass Lanterns Plan

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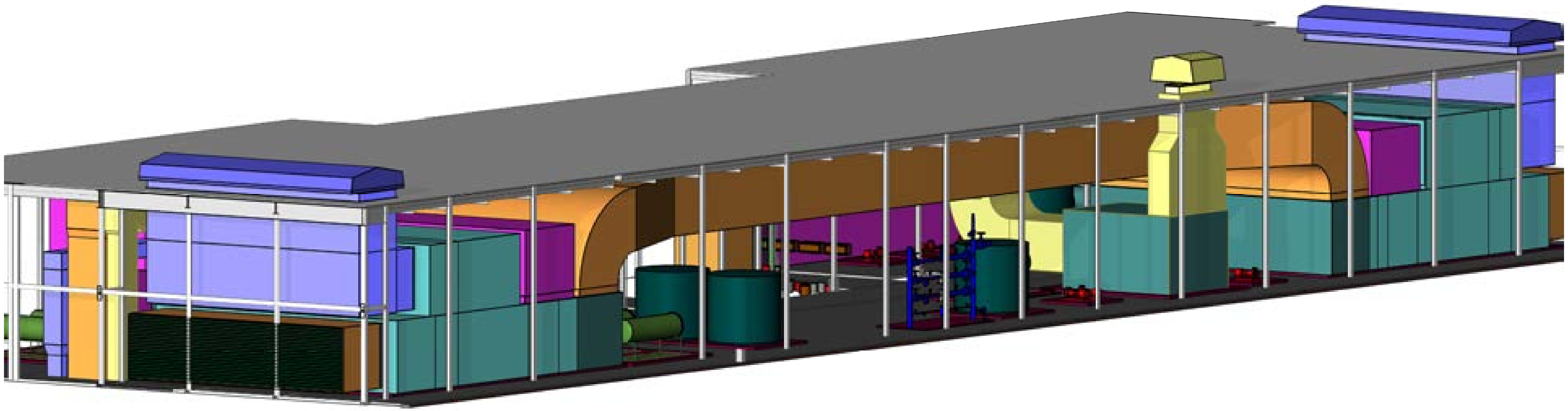


DENTISTRY PHARMACY BUILDING REDEVELOPMENT

7. MECHANICAL

7

7

Mechanical Design Concepts

Table of Figures

7.1 General

The existing mechanical systems in the Dentistry Pharmacy Building will be removed in their entirety and replaced with new systems.

New mechanical systems will be designed to meet the following goals:

- Meet the Program requirements
- Meet the operational needs of Facilities and Operations
- Provide cost effective and maintainable solutions that integrate with other design disciplines
- Contribute to a healthy comfortable working environment
- Contribute to sustainable solutions, consistent with Green Globe assessments
- Provide life safety systems consistent with Alberta Building Code Requirements and applicable NFPA, ASHRAE, and CSA Standards
- Provide mechanical systems consistent with the University of Alberta, Facilities and Operations, Design Guidelines

7.2 Mechanical design criteria

7.2.1 Codes and standards

Requirements from the following codes and standards will be incorporated into the mechanical design as they apply to this project.

- Alberta Building Code
- U of A Facilities and Operations Design Guidelines
- ASHRAE Standard 90.1 - 2007: Energy Efficient Design of New Buildings except Low Rise Residential Buildings
- ASHRAE Standard 62 – 2010: Ventilation for Acceptable Indoor Air Quality
- NFPA 13 – Installation of Automatic Wet Sprinkler System
- NFPA 14 – Installation of Standpipe and Hose System
- National Energy Code

7.2.2 Heating systems

Load calculations have been carried out to determine the building envelope heat loss. Load calculations have been based on the following peak heating load design conditions:

- Winter outside air temperature: -34°C
- Indoor air temperature: 22°C ±1°C
- Indoor relative humidity: 20%.

Winter outdoor design temperature is consistent with that defined in the Alberta Building Code and referenced in the U of A Design Guidelines. Control of indoor relative humidity will be governed by limitations of the existing building envelope.

7.2.3 Cooling systems

Cooling load calculations have been carried out to determine the building's peak cooling demand during summer conditions. Load calculations have been based on the following peak cooling load design conditions:

- Summer outside air temperature: 30°C dry bulb; 20°C wet bulb
- Indoor air temperature: 21°C ±2°C

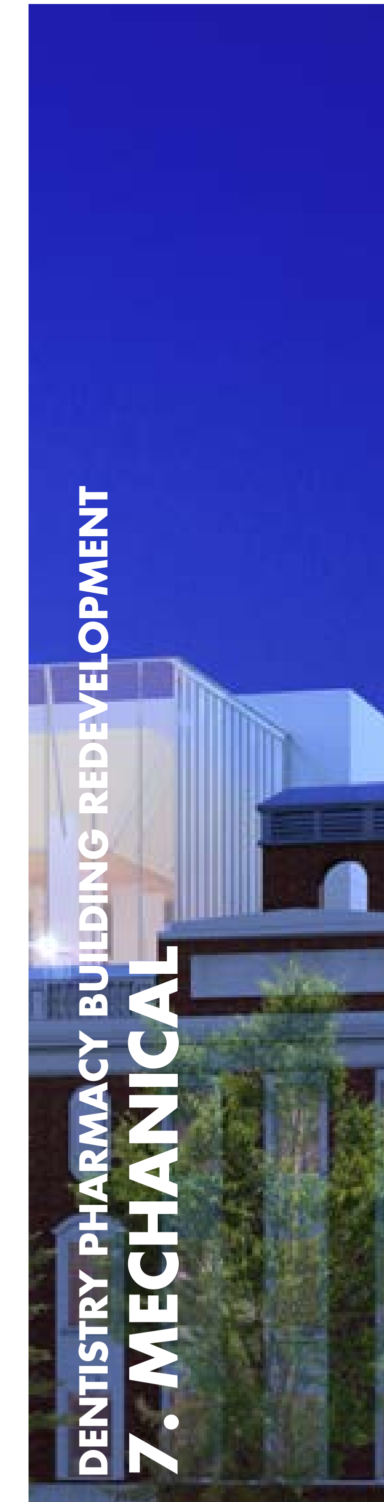
Summer outdoor design conditions are consistent with those defined in the Alberta Building Code and referenced in the U of A Design Guidelines.

7.2.4 Load calculation space criteria

The following are space criteria used in the cooling load calculations:

Office Spaces
- Lights: 11.5 W/m2
- Computers: 250 W per workstation
- People: 73.2 W per person (sensible)
  58.6 W per person (latent)

Council Chamber / East Chamber
- Lights: 11.5 W/m2
- Audio/Visual (AV): 1.5 kW
- People: 71.7 W per person (sensible)
  30.7 W per person (latent)



Meeting Rooms

- Lights: 14 W/m2
- Audio/Visual (AV): 1.5 kW
- People: 71.7 W per person (sensible)
  45.4 W per person (latent)

Communication Rooms and Electrical Rooms

- Specific heat gains defined by Electrical Consultant

7.2.5 Heating load calculations - Summary

A summary of peak heating load estimates comparing the existing building, new building with atrium and the new building with atrium as per ASHRAE 90.1 was completed and tabulated. Provisions of the clerestory and roof over the Atrium result in a net heating load reduction.

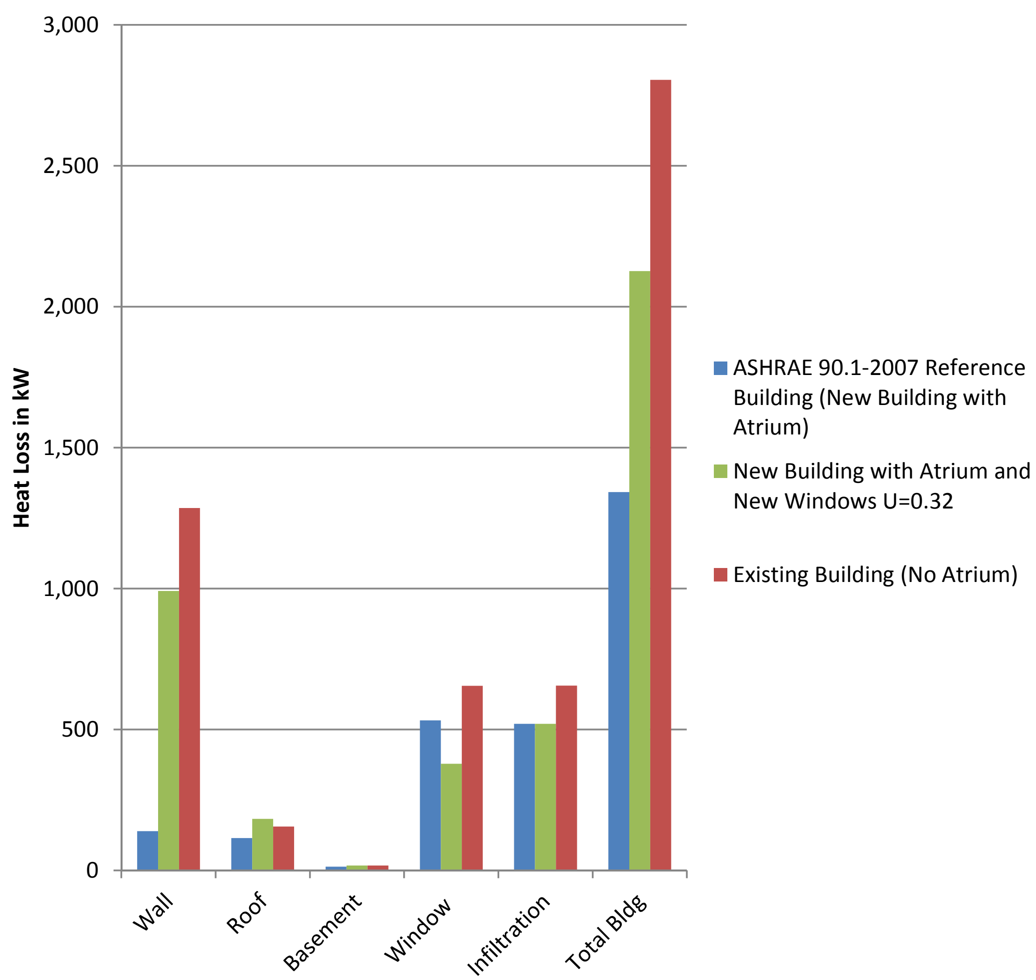


Figure 1 Building Peak Heat Loss Comparison

7.3 Site utility requirements

7.3.1 General

A new wet mechanical room with secure access to the utility tunnel will be incorporated into the design. Existing utilities will be removed from the tunnel between the South Power Plant and the Dentistry Pharmacy Building and replaced with new services.

7.3.2 Steam supply

The existingA 200 mm high pressure steam service 1034 kPa (150 psi) and 150mm condensate service that currently enters the building from the utility tunnel into the existing basement north wet mechanical room will be replaced with new pipe of the same size.

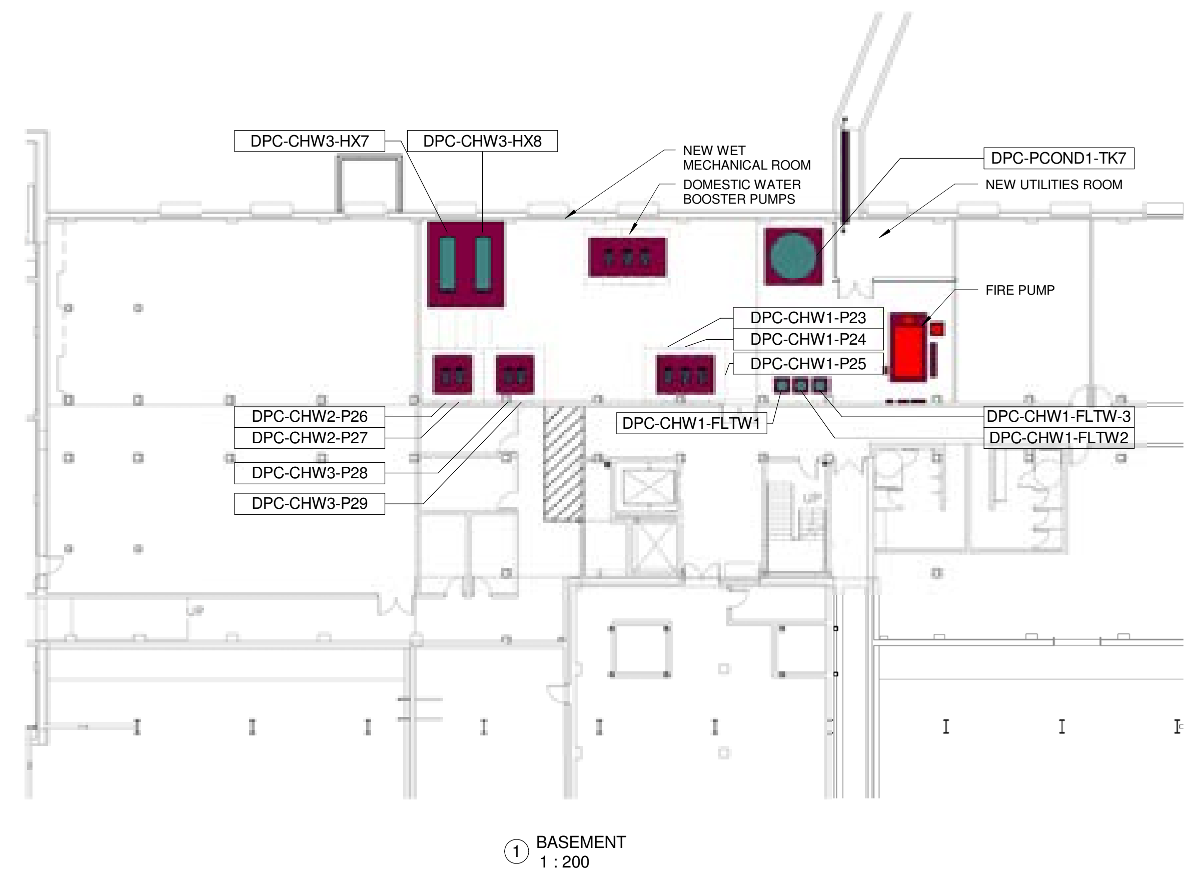


Figure 2 Basement Wet Mechanical Room Plan

7.3.3 Chilled water supply

The existing 250mm chilled water supply and return mains that currently enters the building from the utility tunnel will be replaced with new piping of the same size. A centrifugal separator will filter the chilled water; circulating pumps will deliver chilled water to building systems.

7.3.4 Domestic water supply

The existing 200mm combined domestic water/fire water supply pipe that enters the building from the existing utilities tunnel. The existing 200mm combined water line must remain operational through construction until the existing fire hydrant on the south side of the building has been re-serviced from utilities in 114 St.

The new water service will be offset into the new adjacent wet mechanical room, which will incorporate a domestic water pressure booster pump and fire booster pump.

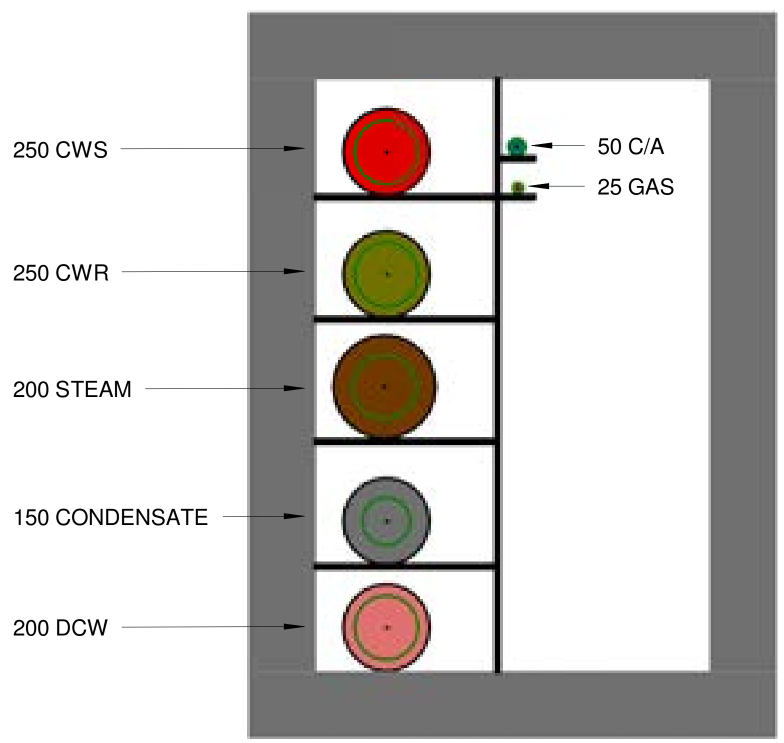


Figure 3 Utility Tunnel Service

Building Service	Line Size (mm)	Capacity
Chilled Water	200	2000 Kw
High Pressure Steam (1034.2 KPA)	200	13,400 Kg/hr
Domestic Cold Water/Fire	200	40 L/s (Fire)
		2500 Fixture Units (DCW)

Figure 4 Building Services Demand Table

7.3.5 Building Fire Hydrant

A new fire hydrant will be provided within 45 mm of the building main entry (i.e. south entrance) which, when complete, will allow the existing 200 mm pipe to be removed.

7.3.5 Sanitary and Storm Sewer

Existing sanitary and storm sewer mains leaving the building have been reviewed with a piping camera and are confirmed to be suitable to connect new building storm and sanitary services.

All storm and sanitary sewer services within the building will be new construction. Existing buried services will not be reused.

Existing tunnels below the 1922 building will be utilized for routing new sanitary and storm water piping as appropriate.

7.3.6 Support services

New natural gas will be supplied to two new natural gas fired emergency generators west of the building. A new natural gas service will be connected to campus utilities at the south west corner of the South Academic Building (SAB), and extended through SAB and underground across the courtyard between SAB and the Dentistry Pharmacy Building to service the new generators.

Existing utility supplied natural gas and compressed air will be replaced with new pipe and extended from the north wet mechanical room to service new laboratory facilities associated with the SLOWPOKE Reactor laboratory spaces.

7.4 Ventilation systems

7.4.1 Design criteria

- Minimum outdoor ventilation rates prescribed in ASHRAE 62.1-2010 will be met or exceeded
- Minimum ventilation rates in occupied spaces will be designed for 4 air changes/hr.
- Toilet exhaust will be designed for 10 L/som² (2 cfm per square foot)
- Atrium smoke exhaust will be designed for 4 air changes/hr.

7.4.2 Air system comparisons

Heating, ventilation and cooling systems are integrated and the choice of ventilation systems is impacted by several variables, such as:

- Capital cost
- Utility operating cost
- Maintenance operating cost
- Flexibility for change
- Flexibility for multiple temperature control zones
- Acoustical Performance

These variables were assessed in a qualitative assessment matrix.

System	Order of Magnitude (% of relative costs)	Relative Operating Cost	System Complexity	Maintainability	HVAC System Reconfiguration Flexibility	Indoor Air Quality	Thermal Comfort	Acoustics	Physical Plant Size	Estimate of Ceiling Space Required, Ft
Dual Duct VAV with perimeter radiant panel	100%	100%	Most Complex	Normal; centralized equipment	Substantial	Excelllent -systems provide 100% O/A during free cooling	Excellent; very good zoning control	Good. Attention to HVAC system noise required	100%	4 to 5
Single Duct VAV with perimeter radiant panel	80%	85%	Normal	Normal; centralized equipment	Normal	Excelllent -systems provide full 100% O/A during free cooling	Excellent; very good zoning control	Good. Attention to HVAC system noise required	75%	3 to 4
4-Pipe Fan Coil, 100% ODA Ventilation Unit	85%	75%	Normal	Substantial; distributed maintenance	Substantial	Acceptable - minimum outdoor air for Ventilation	Fair-overhead delivery of warm/cool air; limited zoning	Concern with location of fan coil units; radiated cabinet noise is problematic	50%	4
Chilled beams; 100% O/A Ventilation supply; perimeter radiant panel	66%	60%	Simple	Normal; some distributed maintenance	Normal	Acceptable-minimum O/A for ventilation	Very good; good zoning control; need to consider humidity	Good. Attention to HVAC system noise required	50%	2 to 3

Figure 5 Mechanical Systems Comparative Matrix

The recommended system is a decoupled ventilation system that will supply primary 100% outside air and is temperature independent of occupied spaces.

In this regard, we recommend that a tempered air supply system with medium pressure distribution be utilized, interfaced with a system of wet perimeter ceiling mounted radiant heating/cooling panels and ceiling mounted induction style "cold beams" to offset building envelope and internal heat gains.

It was established that the air system capacity will be designed to deliver 94,400 L/s (200,000 cfm) during maximum operating capacity.

Several iterations of physical size and locations for air handling units were considered, including:

- Multiple compartmental style air handling units, located two (2) per floor in the northwest and northeast corners at 9,400 L/s (20,000 cfm) each
- Centralizing two (2) air handing unit per floor at 9,400 L/s (20,000 cfm) each.
- Consolidating onto the 7th Floor to accommodate multiple air handling units; five (5) units at 18,900 L/s (40,000 cfm) each.
- Reducing the number of air handling units to two (2) on the 7th Floor, incorporating fan arrays to minimize single point failures maintenance requirements.

Expanding the 7th floor to provide new mechanical rooms east and west of the existing 7th Floor Mechanical Room was a best fit for program space constructability, phasing, and operations and maintenance.

Accordingly, two (2) major air systems will be utilized within the 7th floor penthouse, each at 47,200 L/s (100,000 cfm). The air systems will incorporate the following components:

- Intake and exhaust louvres with motorized dampers
- Silenced intake, exhaust, supply and return plenums
- MERV14 filtration (90% efficient)
- Glycol pre-heat coil
- Heat recovery enthalpy wheel
- Cooling coil
- Glycol Tempering/re-heat coil
- Steam grid humidification
- "Fan Array" style (multiple fan) for supply and return fans, constant volume fans grouped into redundancy.

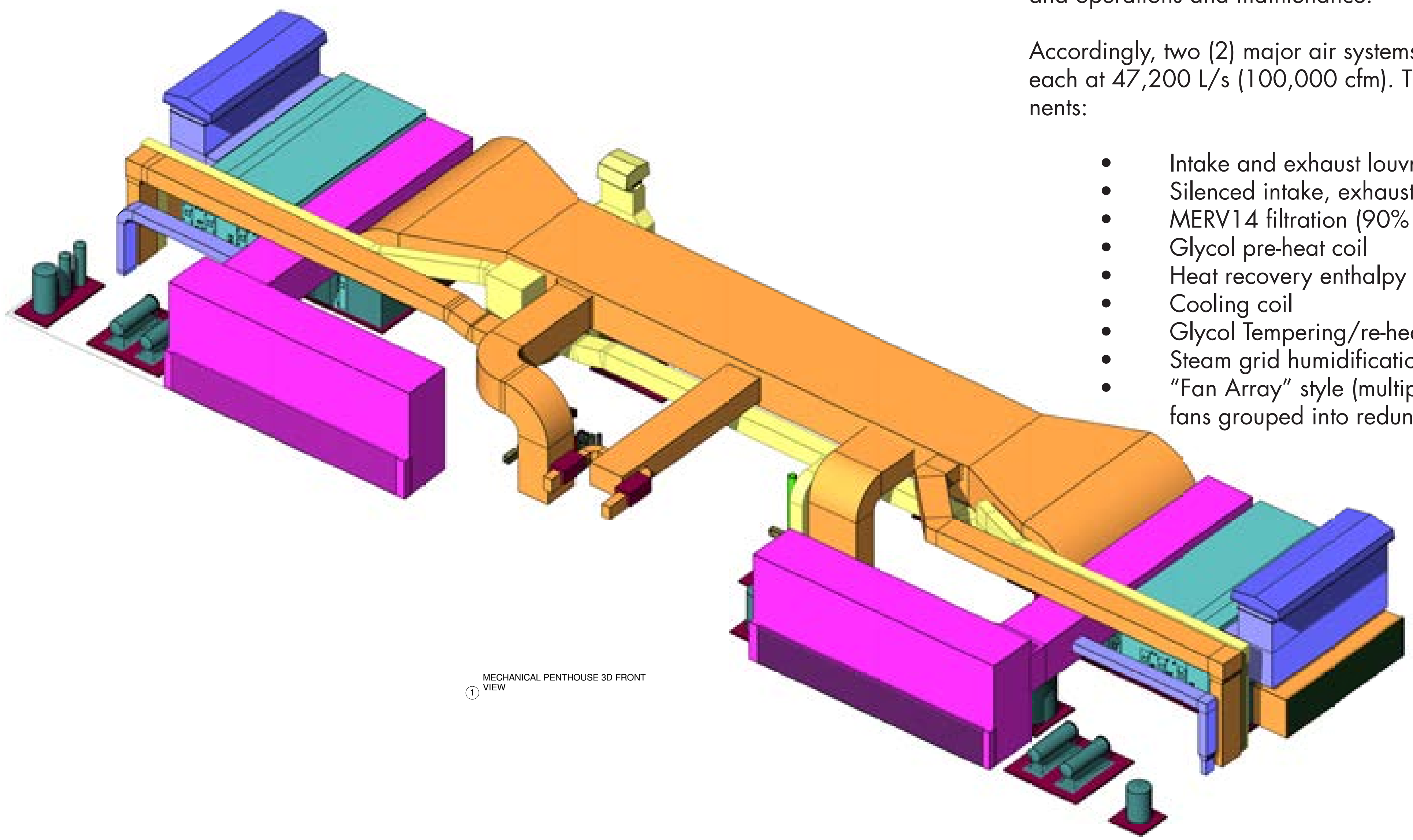


Figure 6 Penthouse Mechanical Room Isometric

Structural integrity was confirmed acceptable to accommodate the weight of the air systems within the 7th floor penthouse space in the north building.
New walls and roof will be constructed to allow for the installation of the air handling units and will house the air handling equipment.
Vibration isolation and silencing components will be incorporated into the system, consistent with recommendations put forward by the Acoustic Consultant.
A waterproof floor finish will be coordinated with the architect.

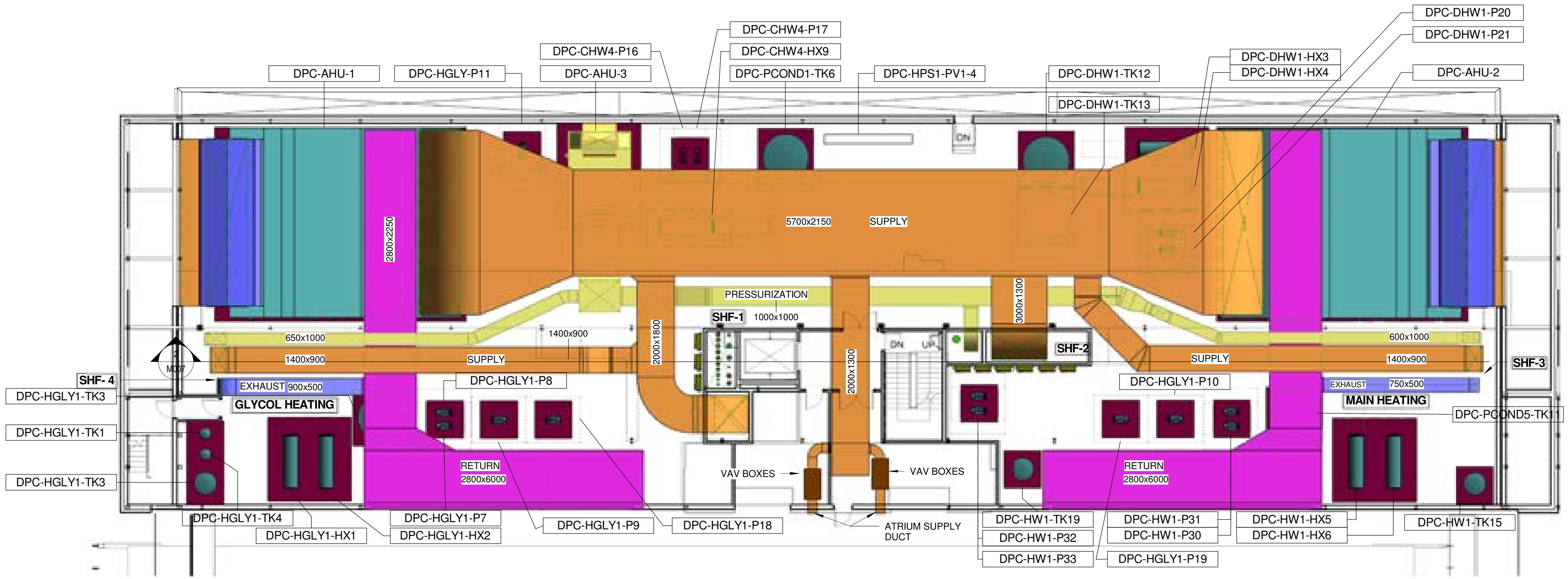


Figure 7 Penthouse Mechanical Room Plan

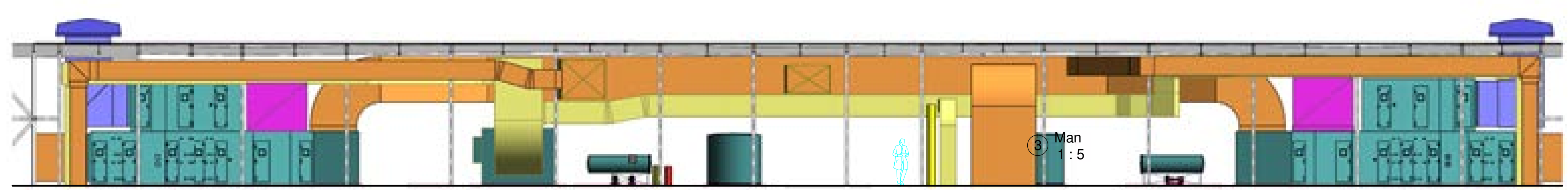


Figure 7 Penthouse Mechanical Room Section

7.4.3 Heat recovery

Two alternate heat recovery systems were subject to life cycle cost analysis. The two systems studied were:

- Heat recovery using enthalpy wheels
- Heat recovery using "Konvekta" packaged "run around" style coils and pumping.

Life cycle costs were estimated over a 40 year life of the building and brought to "Present Worth".

The analysis shows that heat wheels have a better life cycle performance than the "Konvekta" recovery system (detailed study calculations can be provided). Capital cost allowances for the system comparison included for a reduced height of building for the "Konvekta" system. Present Worth results for one 47,200 L/S (100,000 cfm) air system are summarized as follows (please note there are two (2) air systems AHU-1 & AHU-2):

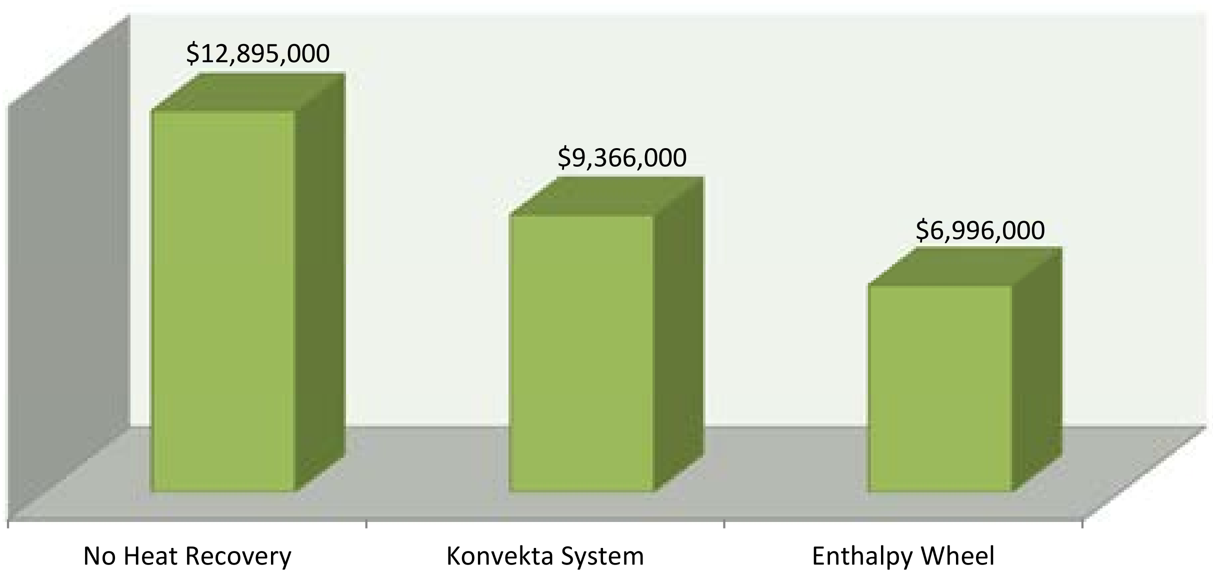


Figure 8 Present Value Life Cycle Assessment (Cost/Air Handling Unit) (Over 40 years)

7.4.4 Primary air distributions

Insulated medium pressure supply ducts with maximum 500 mm (20") height will develop a distribution main around each floor. The duct mains will be strategically located near the centre of the occupied floor space to avoid confliction with main piping system distribution and cable trays.

Single duct, variable volume, digital controlled air terminal units will be utilized to deliver primary outside air to occupied spaces. Terminal units will each be fitted with hot water tempering coils and discharge silencers. Terminal units will be controlled by "Application Specific Controllers", incorporating inputs from space temperatures, occupancy sensors, and carbon dioxide monitors to regulate the volume of air delivered to the space.

7.4.5 Secondary air distributions

Supply air from individual terminal units will be ducted to "cold beam" terminals and supply grilles or diffusers in low velocity insulated ductwork.

7.4.6 Return air distributions

Transfer grilles in the ceiling will allow air from occupied spaces to migrate into the ceiling plenum, and air will be routed to the Atrium space. Sound traps will be provided on air transfers to limit noise transmissions.

Return air louvers/grilles at the top of the Atrium will be utilized to route the return air directly to fans in the air handling units in the 7th floor penthouse. Using the Atrium as a return plenum will provide several benefits:

- Less fan energy is utilized compared to ducted return systems
- In winter months, solar gain through clerestory glazing will warm the return air, thereby enhancing heat recovery efficiencies
- Air supply requirements to cool the Atrium space are minimized due to the high air change rate provided by the return air

7.4.7 Atrium Ventilation

Air will be supplied to the Atrium through vertical duct risers connecting to linear sidewall diffusers. Air volume delivery will be designed at 10 L/s per person (20 cfm per person) to accommodate the programmed maximum occupancy, presently defined as 2,000 people on main floor plus 1,700 people on the mezzanine level. Diffusers will be selected with low NC level.

In accordance with Alberta Building code requirements, the Building will be exhausted at a rate of 4 air changes per hour. The definition of volume relating to Atrium space will be a function of doorways that isolate the Atrium in conjunction with access corridors.

7.4.8 Toilet exhaust ventilation

Washroom spaces and custodial rooms will be exhausted at 10 L/som² (2 cfm per square foot). Some washrooms will have dedicated roof mounted exhaust fan while other washrooms and duct system will direct toilet exhaust to the heat recovery inlets in the air handling unit exhaust section before the exhaust air is directed to atmosphere.

7.4.9 Vestibule pressurization

100% tempered outside air must be delivered to pressurize stairwell vestibules in compliance with the Alberta Building Code.

Air supply must be secure for 1 hour fire rated delivery. A Dedicated air supply unit (AHU-3), approximately 18,900 L/s (40,000 cfm) will deliver tempered outside air into the vestibules associated with each emergency egress stair interconnecting with the Atrium.

7.5 Heating system

7.5.1 Central plant conversions

High pressure steam at 1034 kPa (150 psi) will enter into the building in the new basement wet mechanical room from the existing utilities tunnel. The high pressure steam will then be piped in an isolated shaft to the new penthouse mechanical room and then immediately reduced to low pressure steam at 82.7 kPa (12 psi). Pressure relief valves will be set at 103.4 kPa (15 psi). The pressure reducing valve assembly will consist of the following single stage valves in parallel:

- Two (2) control valves, each at 2/3 of maximum design flow
- One control valve at 1/3 of maximum design flow
- One pilot operated self-contained valve at 100% of maximum design flow
- Pressure relief valve(s) on low pressure side discharge piped to atmosphere
- High pressure drip assembly with discharge from trap through a flash leg and interfaced with the low pressure steam header

A condensate tank and transfer pump assembly will collect low pressure condensate and connect to the pumped condensate main in the utility tunnel.

All steam piping (high pressure and low pressure), valves and fittings will be insulated using bag type covers.

Low pressure steam is directly used for steam humidification for each main air handling unit (AHU-1 & 2). Humidity systems will be designed to maintain a maximum 20% relative humidity level in occupied spaces during winter months. Operating levels will be defined by the building envelope consultant.

7.5.2 Heat exchange systems

Low pressure steam will be piped to the following three heat exchange systems:

- Duplex heat exchangers to generate year round hot water for building heating systems:
    - Terminal unit reheat coils
    - Entrance heating units
    - Double wall, duplex heat exchangers to generate tempered water for domestic hot water use heating

- Duplex heat exchangers to generate hot water for the change-over heating systems:
    - Perimeter radiation
    - In-slab Atrium heating

- Duplex heat exchangers to generate hot glycol for distribution to pre-heating and heating coils in air handling units, the vestibule pressurization unit, and the south plaza snow melt systems.

7.5.3 Pumping systems

Where duplex pumping is shown on schematic drawings, each pump will be 100% duty/stand-by. Each pump will utilize independent VFDs and full size impellers to optimize pumping efficiencies.

7.5.4 Heating Distribution Systems

Secondary pumping from steam to hot water systems will utilize insulated reverse return piping distribution, looped on each floor for the year round heating system (entrance heat, and terminal unit heating coils) and change over system (perimeter heat and Atrium in-slab heat).

Secondary piping from steam to glycol heat exchangers will utilize insulated, reverse return piping to pre-heat and heating coil sections in the air handling units.

7.5.5 Atrium heating

PVC tubing with an oxygen barrier will be cast into the Atrium floor (excluding the slowpoke vault roof and central wing slab) to provide heating for the space. Each zone will include a three-way control valve and secondary pump with header connections to the PVC pipe. In-floor heating manifolds will be housed in cabinets located in basement spaces.

Upper levels will incorporate finned tube elements incorporated into the architectural design to offset heat loss from clearstory glazing.

7.5.6 Perimeter heat

The building perimeter will utilize ceiling mounted, radiant heating panels (600 mm wide) continuously along the perimeter.

7.5.7 Entrance heat

Fan coils will be used for entrance vestibule heating, with ducted recirculate air supplies to direct air flow to effectively blanket the entrance.

7.5.8 Attic heat

Bare fin radiation elements will be utilized to provide heat into attic spaces. The attic spaces must be kept above freezing to accommodate wet sprinkler system distribution.

7.6 Cooling systems

Upon entry into the building, utility chilled water will be cleaned using centrifugal separators and primary chilled water pumps will boost pressure for delivery into the piping distribution.

Primary chilled water will be directed to cooling coils in air handling units.

Chilled water will be circulated through the change-over system heat exchanger to interface with the radiant panel distribution and circulate "high temperature chilled water" to perimeter radiant panels and Atrium in-slab piping during summer months.

A second heat exchanger will be used to circulate "high temperature chilled water" year round (i.e. plug load cooling) to cold beams in occupied spaces; and in addition, will provide cooling for high heat generation spaces such as server rooms, electrical rooms and communication rooms.

During winter months, the cooling coils in the air systems will be switched over to generate chilled water, thereby avoiding use of utility chilled water and improving the heat efficiency of the air handling systems. This system can be used for cooling server rooms, electrical rooms, and communication rooms.

Office zones will utilize active cold beams for cooling internal and perimeter heat gains.

Council Chambers, East Chambers, and Atrium spaces will utilize cool air supply to cool the occupants and maintain comfortable conditions.

Communication rooms and electrical rooms will utilize chilled water fan coils to maintain temperatures. If fan coil units are not able to generate the required cooling capacity, heat pump units will be used.

7.7 Plumbing systems

A new 200 mm combined domestic/fire water service will enter the building into the basement wet mechanical room. The service will be split into a domestic service with reduced pressure back flow preventer assembly and a fire water service with double check back flow preventer assembly.

Both the fire water and domestic water service will be pressure boosted for delivery and distribution to the building.

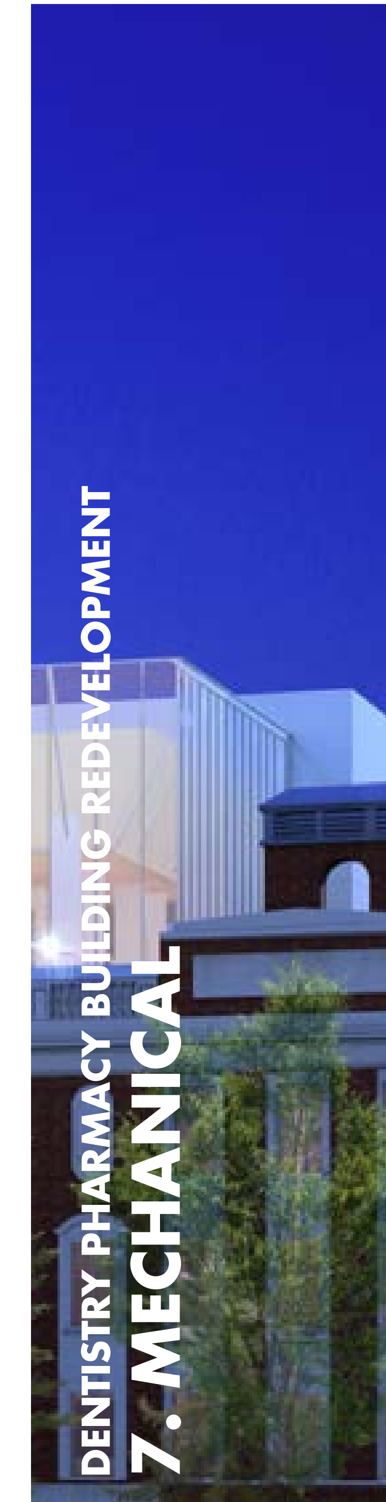
The domestic water pressure booster will utilize variable frequency drives in a packaged assembly. Pressure boost will be designed to avoid pressure reducing valves on lower levels.

Domestic (tepid) hot water at 25°C will be generated in a double wall heat exchanger using building heating hot water as a heating media. Small capacity storage or "buffer" blending tanks will be utilized to achieve a uniform, blended temperature before distribution to fixtures.

Tepid domestic warm water will be the only water delivered to all hand wash sinks with recirculating piping; domestic cold water will not be extended to the sinks.

Domestic cold water will be extended to urinals and water closets. Low volume infrared sensing flush valves will be used on urinals; hand operated low volume flush valves will be used on water closets.

Non-freeze hose bibs will be strategically located along the building perimeter.



7.8 Fire protection systems

The incoming water service will be pressure boosted in an approved assembly. Piping distribution will be extended to the sprinkler zones throughout the building:

- Floors 2 - 4 (two zones per floor)
- Atrium will be separately zoned
- Attic spaces will be separated zoned

The main electrical room will be constructed to meet fire ratings that will not require this space to be sprinklered.

Sprinkler systems will be hydraulically calculated to NFPA 13.

Pendant sprinkler heads will be installed as Tenant Improvement Fit-Outs are completed.

Close space pendant type sprinkler heads will be installed at the perimeter of the atrium as per NFPA 13. The atrium will be sprinklered as per NFPA 13.

Fire valves in cabinets for hose connections will be located as required by the Alberta Building Code and in accordance with provisions in NFPA 14. Standpipes only with valve cabinets spaced to allow connection to 30m hose with a 9m spray (3 per floor in addition to the standpipe in exit stairwells).

Hand-held extinguishers will be provided in cabinets to comply with NFPA 10 (23 m in travel distance between extinguishers).

Service spaces, such as mechanical rooms, custodial rooms, electrical rooms (except main electrical room), communication rooms and attic spaces will be serviced with exposed, upright heads.

A new hydrant and fire department connection will be provided at the south entrance to the building. The existing fire department connections at the north entrance will be removed.

7.9 Controls

The controls system will be capable of “standalone” operation and will communicate with the University’s existing control network.

BAS communication systems will be BACnet/IP at the Master controller level and BACnet MS/TP at the terminal control level.

Major components of the Building Automation System will include:

- A network of Distributed Control Panels
- Instrumentation required for control sequences and monitoring
- Application software
- Hard wired interconnections and interlocks on equipment and system interfaces
- Space temperature sensors, controllers, CO2 sensors, control valves, damper motor operator’s components, and installation for space temperature control
- Interface with electrical lighting system relating to occupancy sensors and space temperature and volume setbacks during unoccupied periods

BAS Building Architecture:

- BAS Automation Level will include the DDC controllers that interface with field sensors and control components including Distributed Control Panels and Terminal Controllers (Application Specific Controllers with pre-packaged operating sequences).
    - Field Level will include instrumentation interfaced to the BAS Automation Level DDC controllers, such as temperature, humidity, level sensors, pressure sensors and switches, valve and damper actuators, and control relays
    - Field panels to a BACnet BTL standard certified

Instrument air controls will be provided to service large valve and damper actuators.

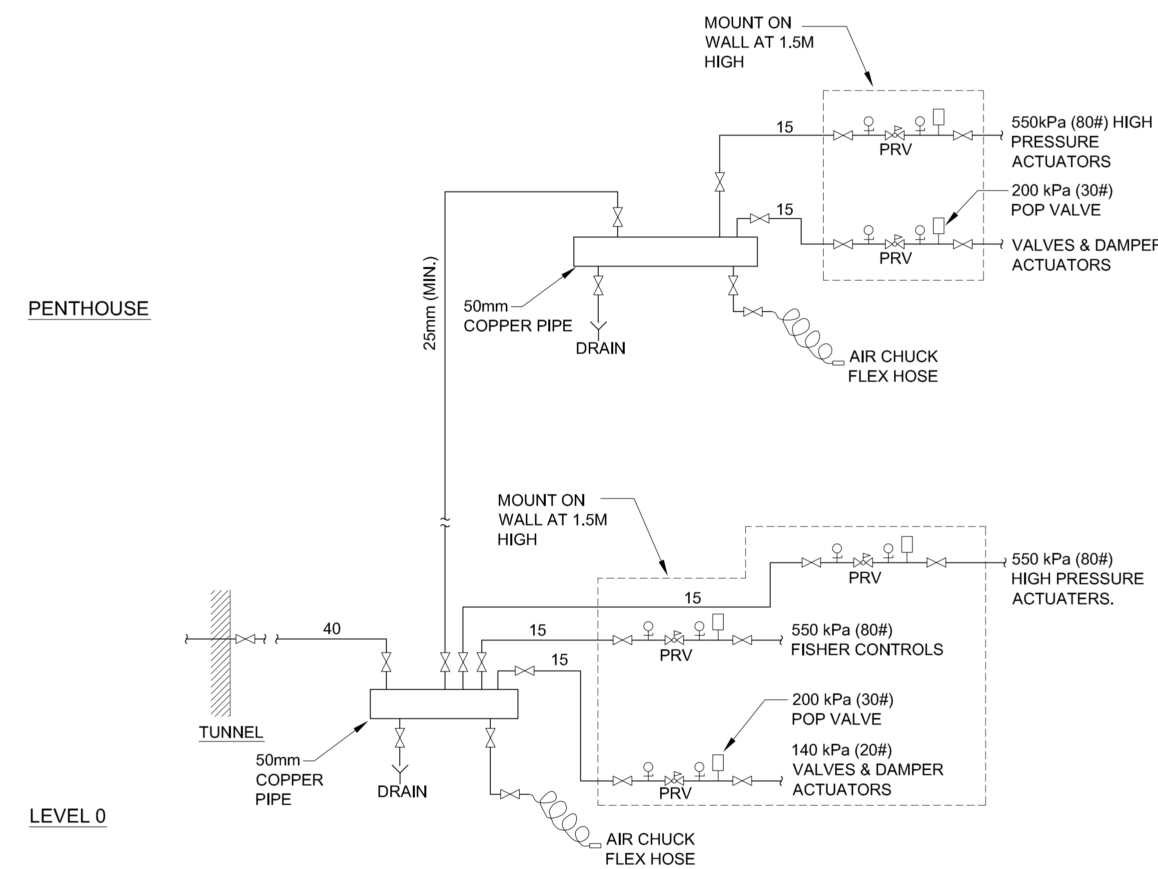


Figure 9 Instrument Air Schematic

7.10 Sustainable design initiatives

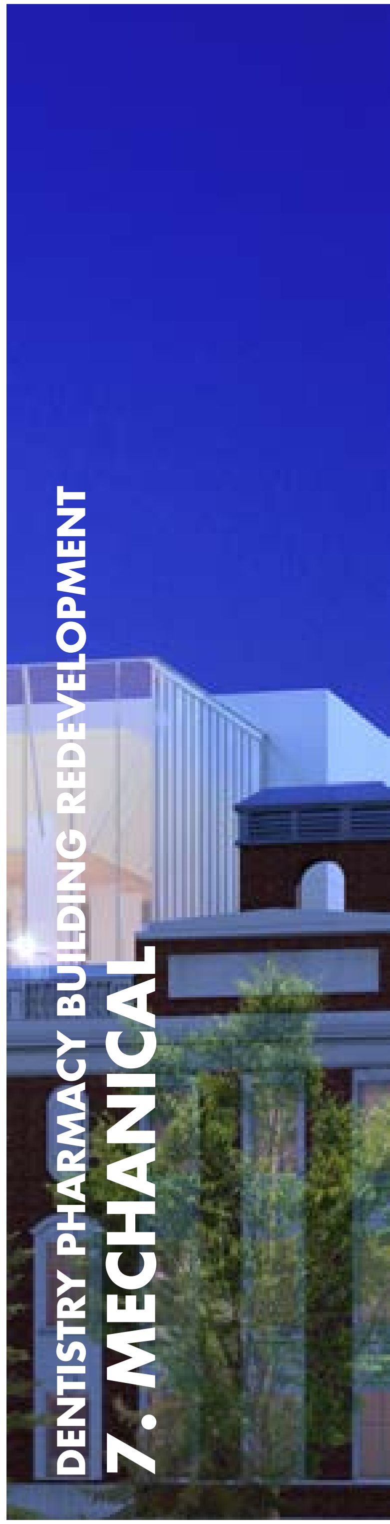
The following energy saving initiatives will be incorporated into the mechanical design:

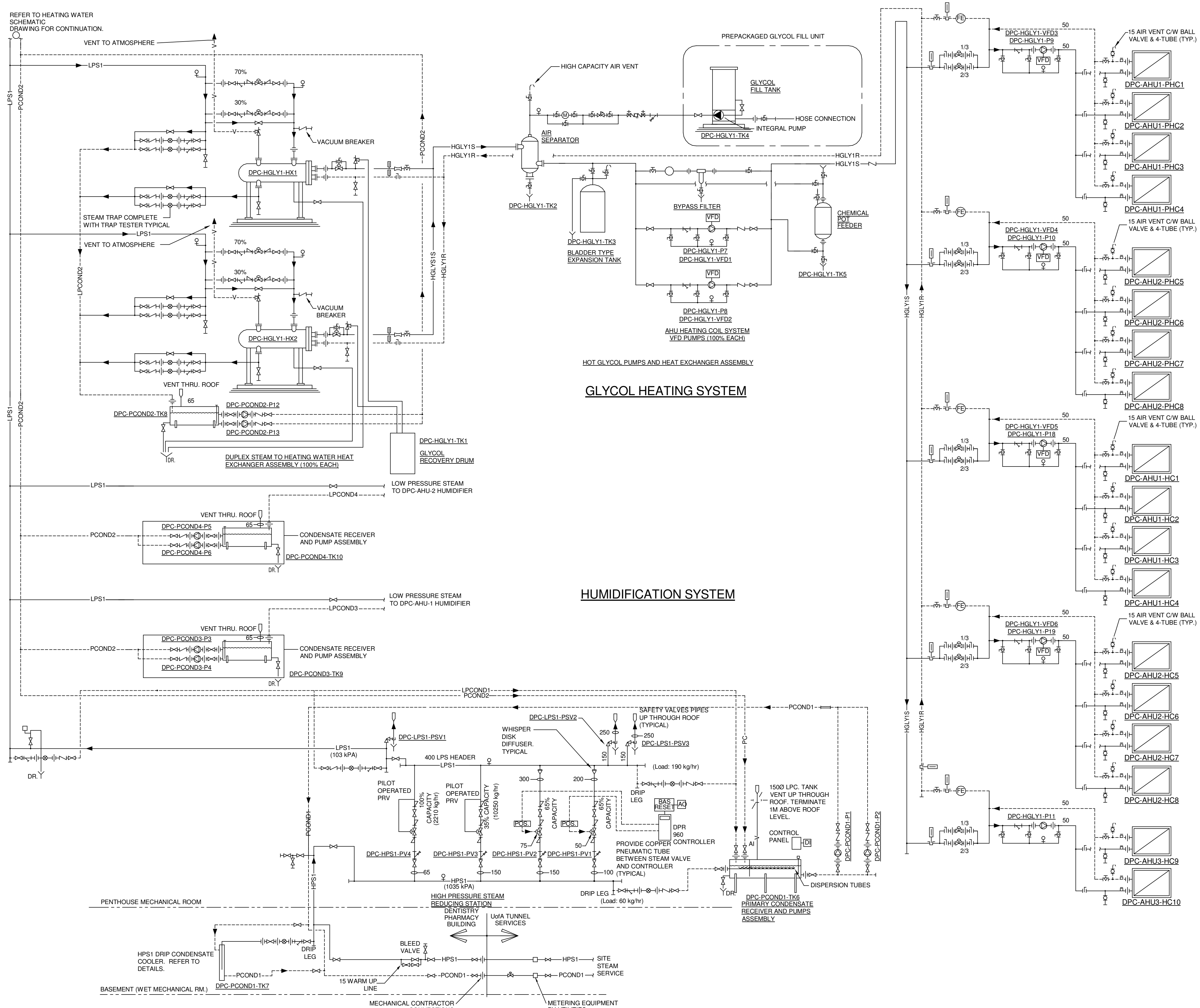
- Decoupled ventilation air from the cooling system; separate space temperature control by hydronic control, thereby lowering net power use
- Utilize internal heat gains to pre-heat ventilation air and generate chilled water for cooling internal heat gains during winter months
- Utilize heat content in building exhaust air flows to pre-heat outside air through heat recovery methods
- Utilize change-over cooling to perimeter radiant panels and in-slab systems to reduce fan power usage
- Utilize occupancy sensors to reduce ventilation air supplies and setback space temperature control during unoccupied periods
- Utilize variable frequency drives on fans and pumps to reduce motor power consumption to meet load demand
- Utilize low volume plumbing fixtures
- Design duct distribution systems for low pressure drop
- Utilize multiple variable frequency "fan array" systems in air handling systems with direct drive fan assemblies
- Utilize effective insulation thickness (consistent with ASHRAE and NEC) on hot and cold piping systems and primary duct distribution systems
- Utilize high efficiency motors

7.11 Appendix

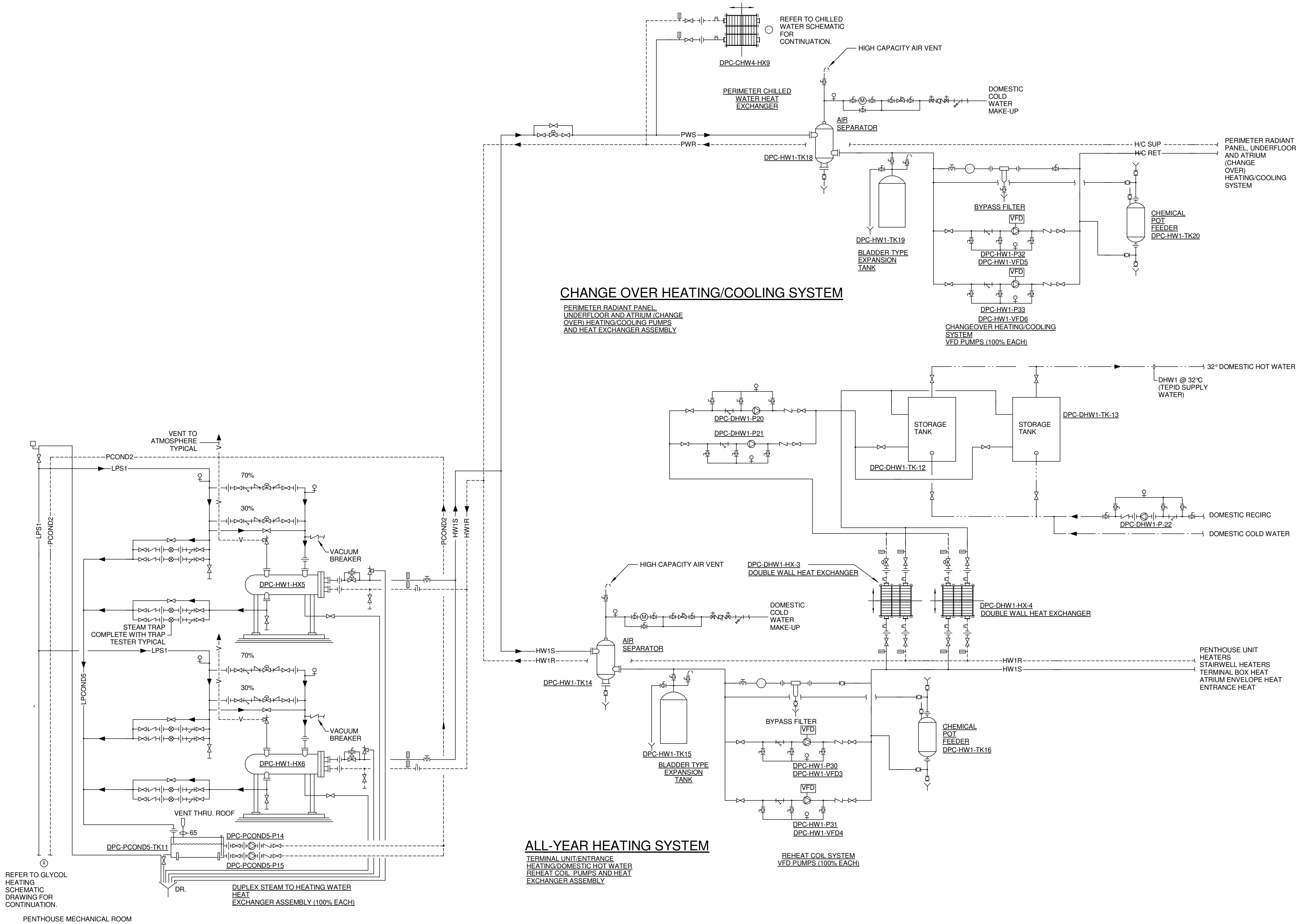
7.11.1 Mechanical drawings

.1 Steam/Hot Water System Schematic (1)
.2 Steam/Hot Water System Schematic (2)
.3 Chilled Water System Schematic
.4 Building Ventilation Schematic
.5 Plumbing Riser Schematic
.6 Level 2 - Typical HVAC Distribution
.7 Level 5 - Typical HVAC Distribution
.8 Level 6 - Typical HVAC Distribution
.9 Foundation Plan





7.112 STEAM/HOT WATER SYSTEM SCHEMATIC (1)



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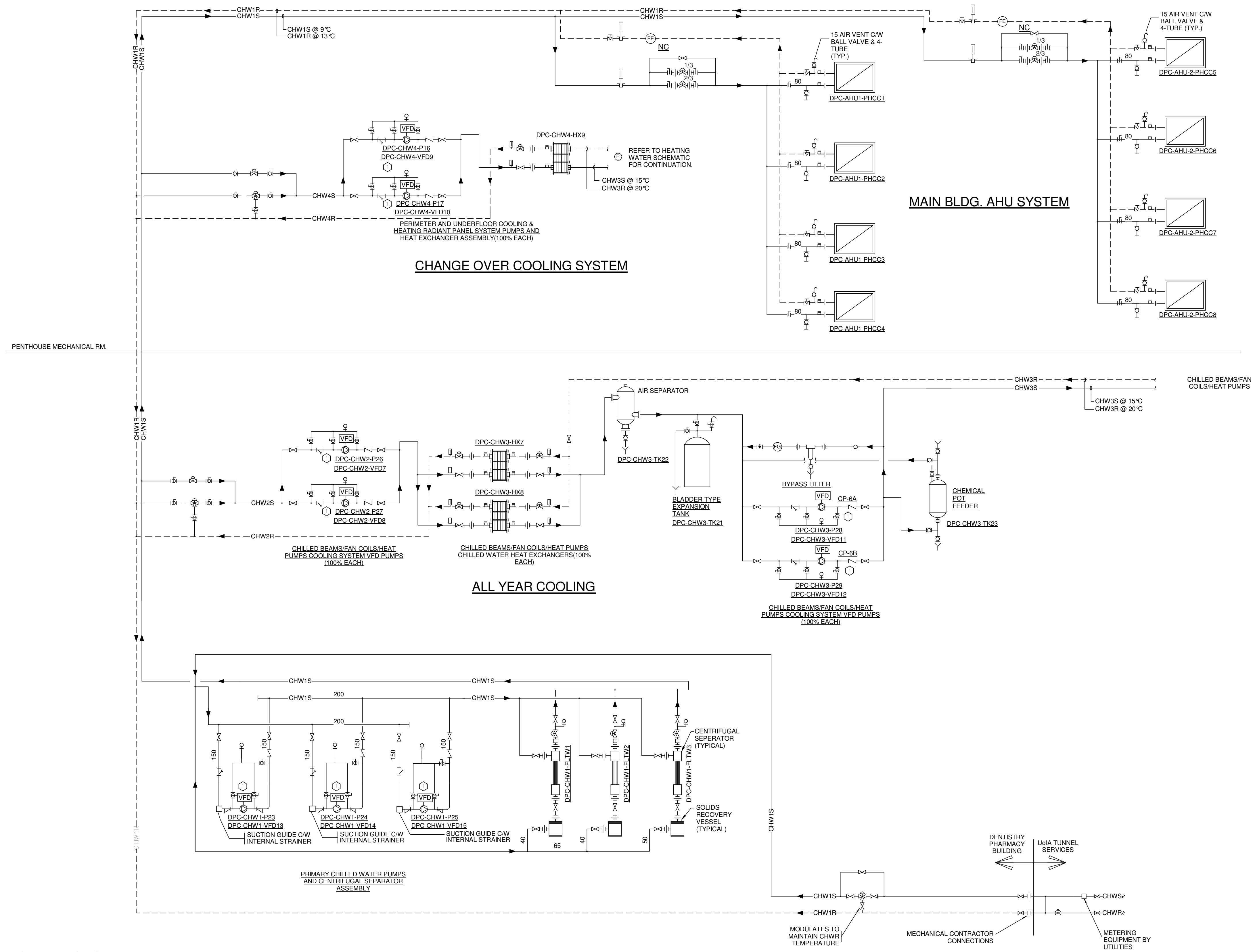
7. MECHANICAL

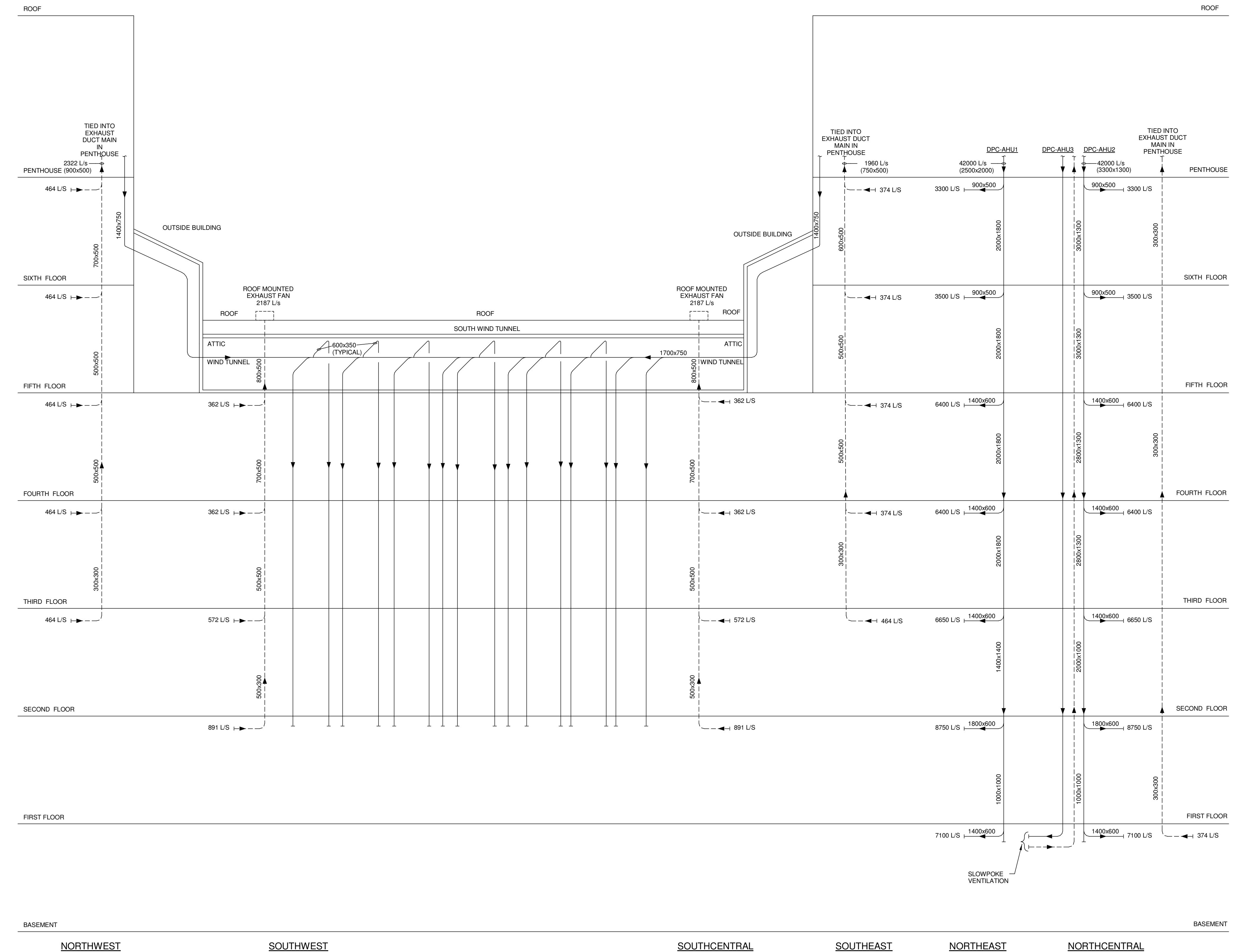
MECHANICAL DRAWINGS

STEAM/HOT WATER SYSTEM SCHEMATIC (2)



1 COOLING SCHEMATIC
1 : 1

7.201 CHILLED WATER SYSTEM SCHEMATIC



VENTILATION RISERS

1 VENTILATION RISERS
1 : 1

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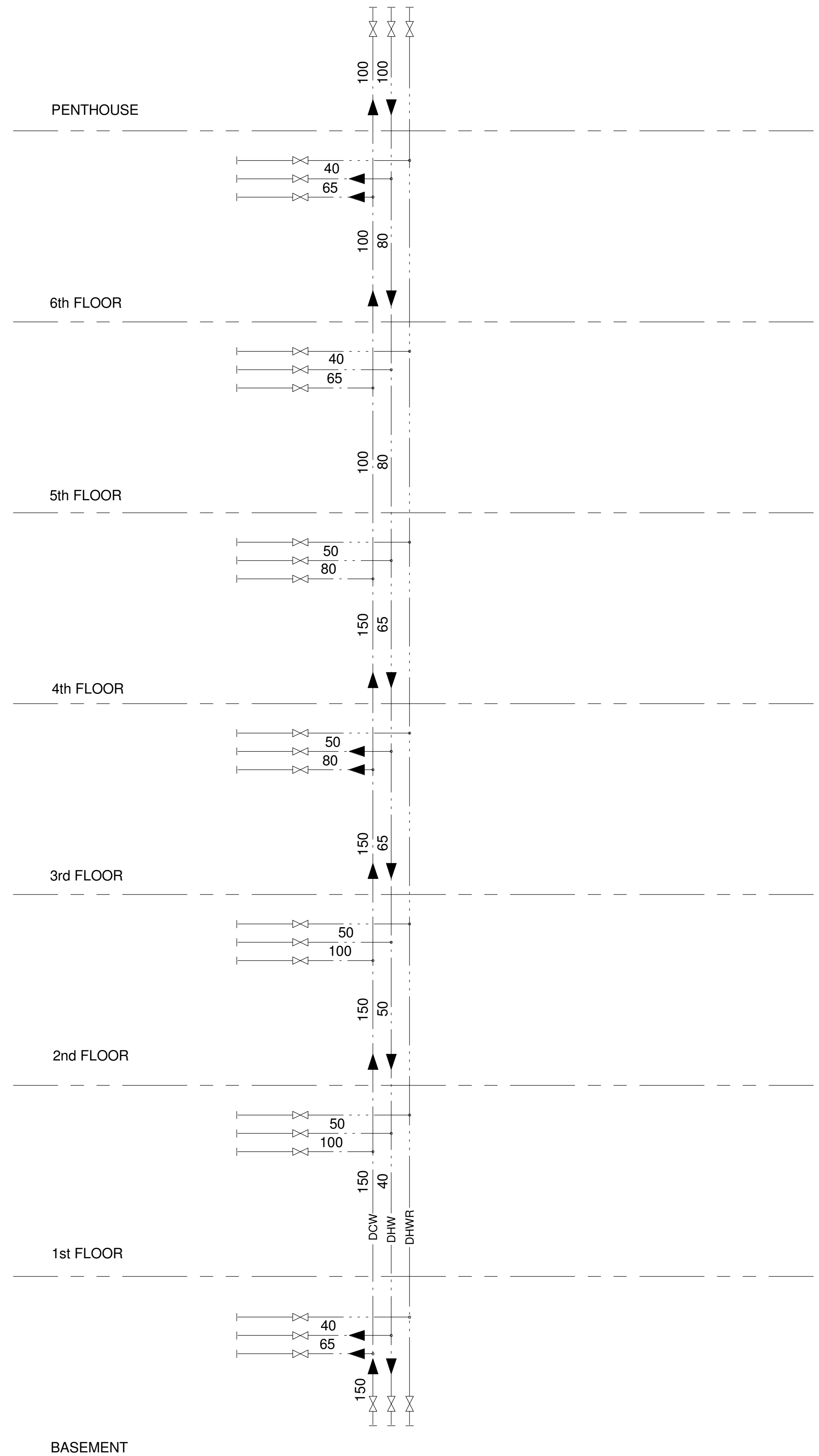
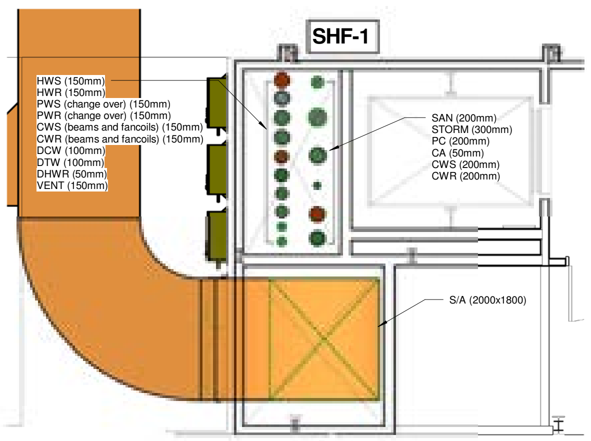
7. MECHANICAL

MECHANICAL DRAWINGS

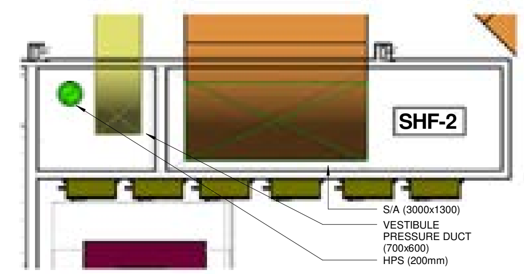
BUILDING VENTILATION SCHEMATIC



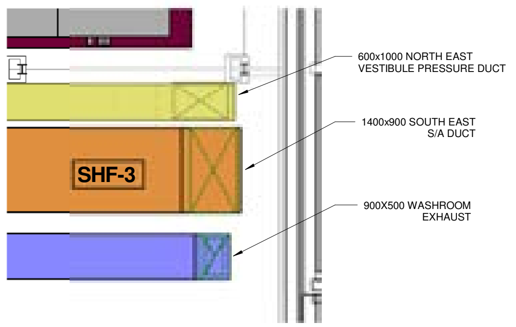
7.203 PLUMBING RISER SCHEMATIC



CENTRAL SHF-1
1 : 50



CENTRAL SHF-2
1 : 50



EAST SHF-3
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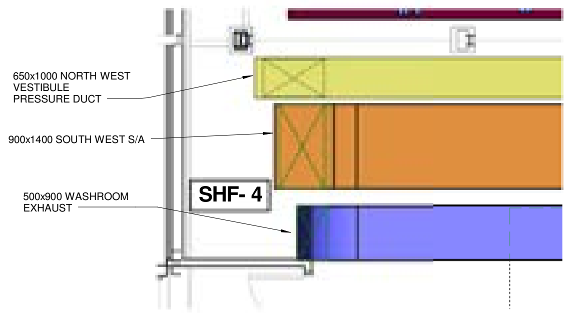
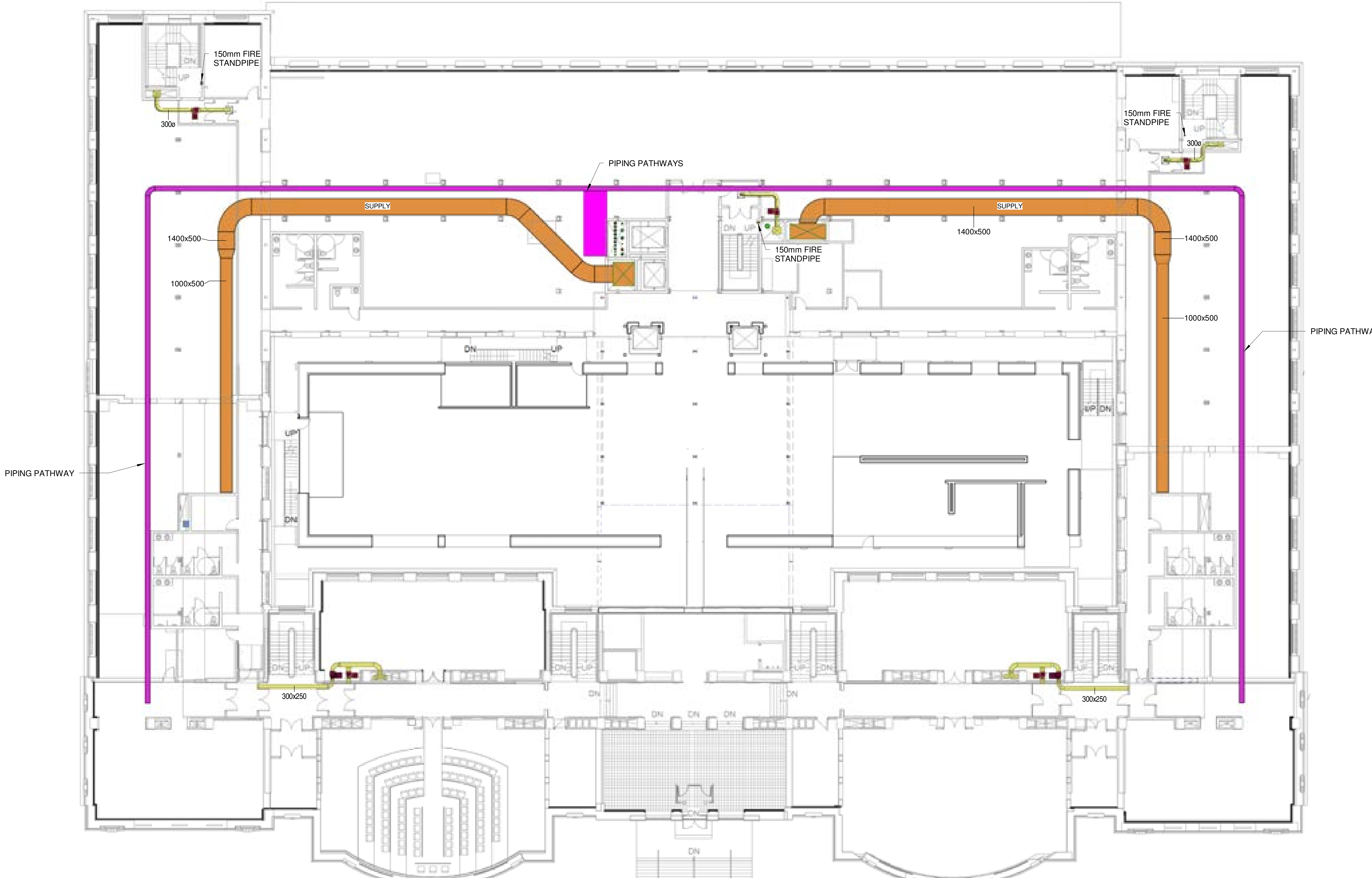
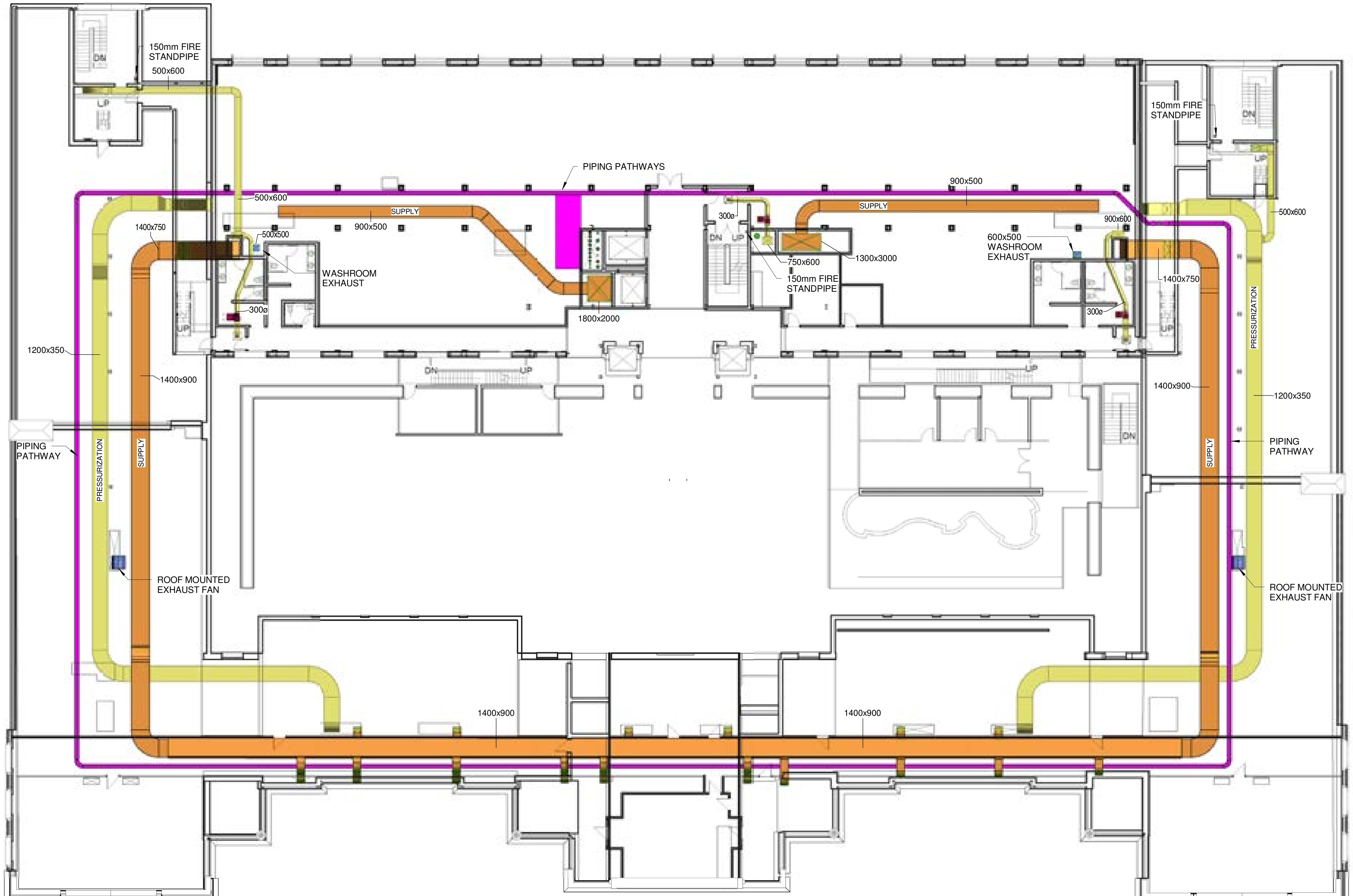


WEST SHF-4
1 : 50

MECHANICAL SHAFT DETAILS



7.205 LEVEL 2 - TYPICAL SP DISTRIBUTION



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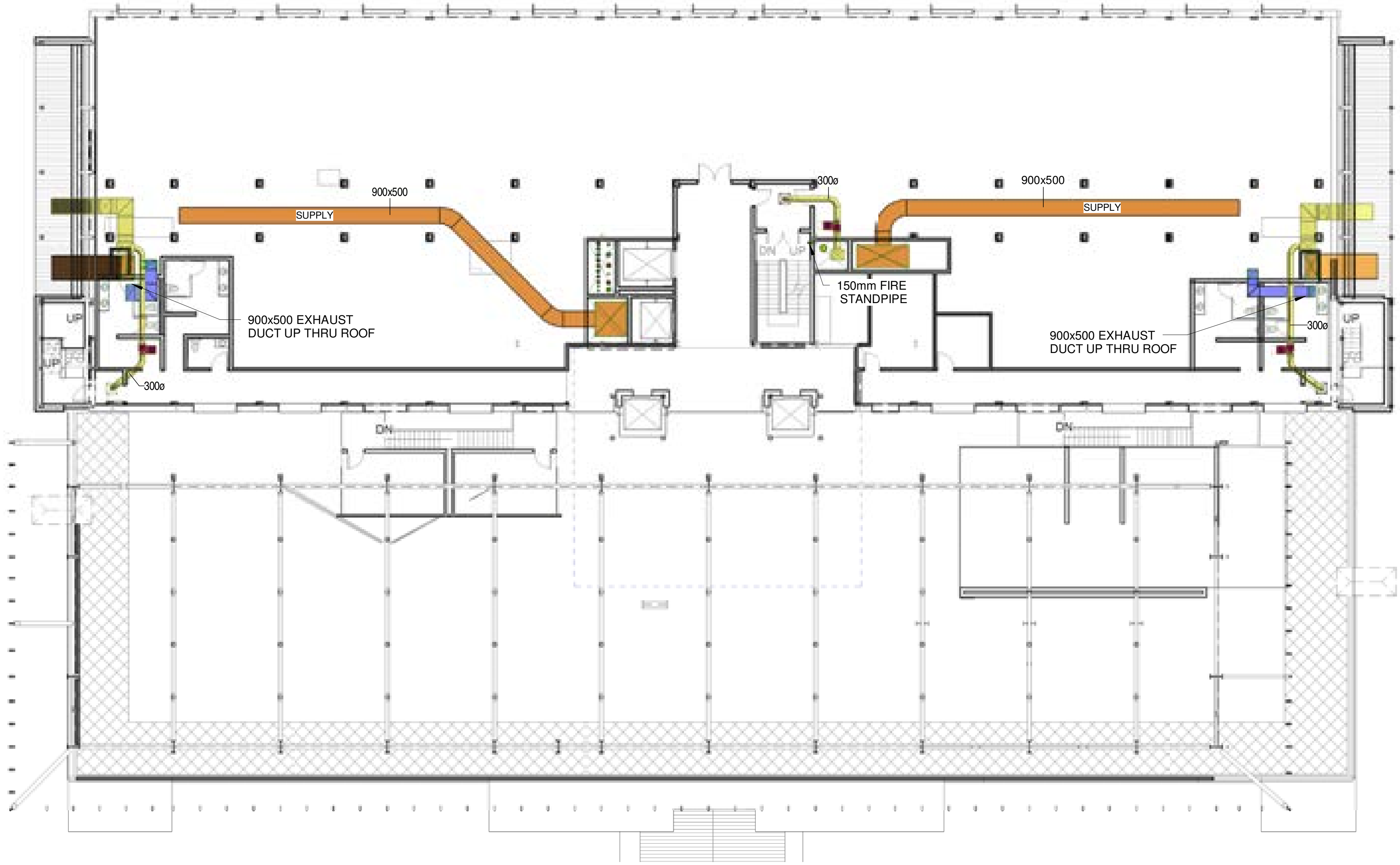
7. MECHANICAL

MECHANICAL DRAWINGS

LEVEL 5 - TYPICAL SP DISTRIBUTION



7.207 LEVEL 6 - TYPICAL HVCA DISTRIBUTION

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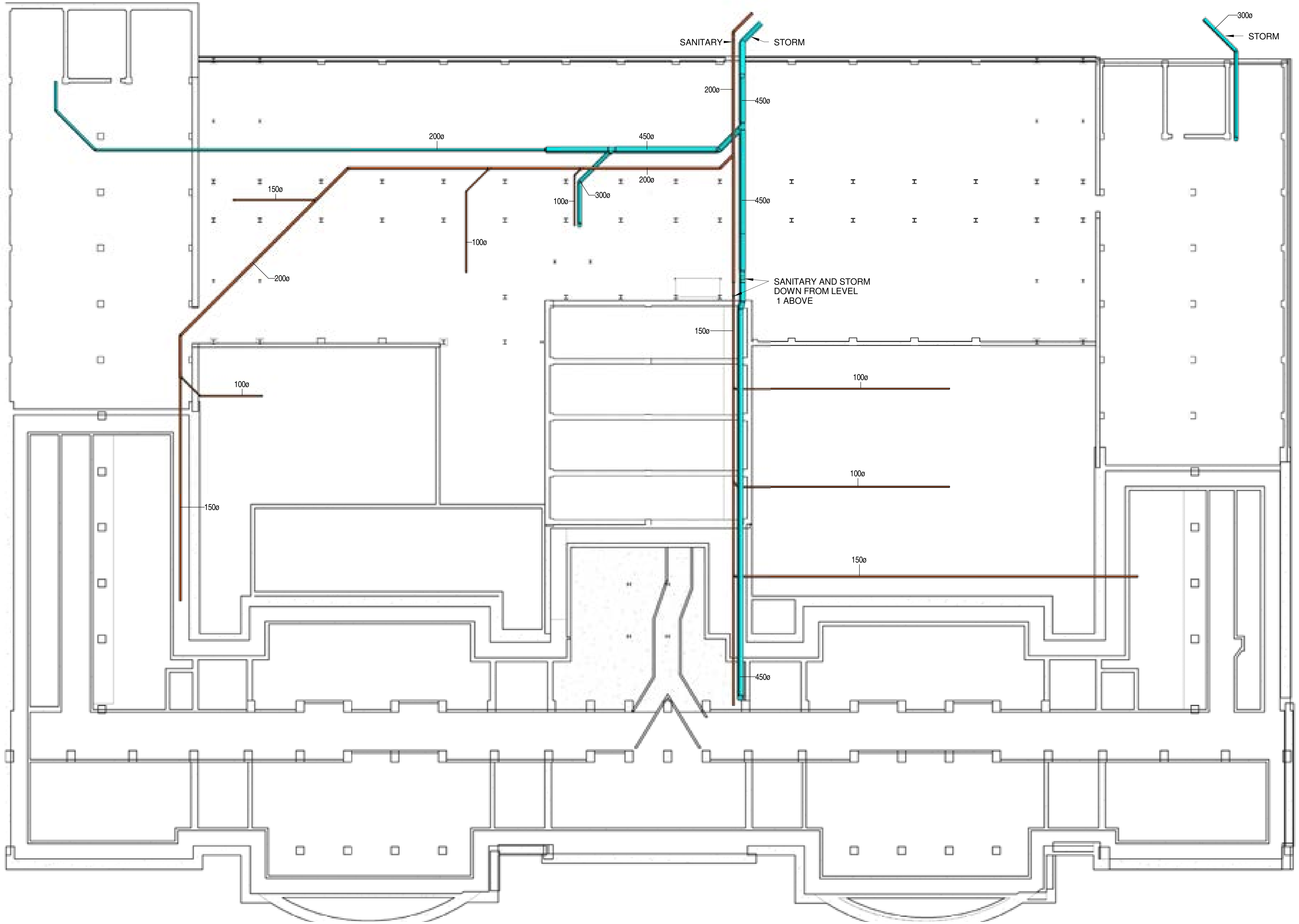
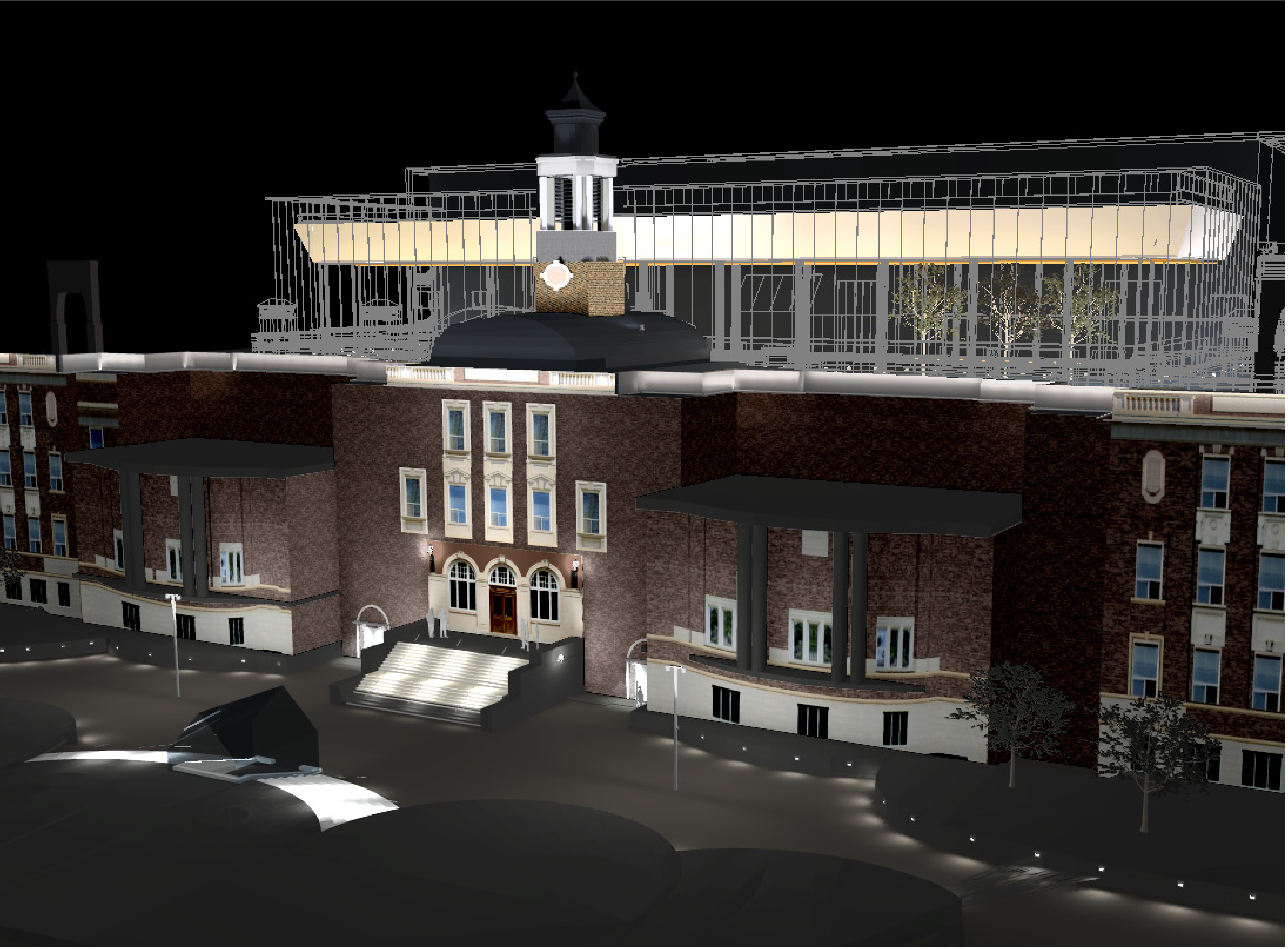
7. MECHANICAL

MECHANICAL DRAWINGS



FOUNDATION PLAN

7.208



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DENTISTRY PHARMACY BUILDING REDEVELOPMENT

8. ELECTRICAL

8

8

Electrical

Table of Figures

8.1 Preliminary Investigations and Recommendations

8.1.1 Introduction

A basic outline of the perceived strategies for power distribution, extra low systems, communication systems, and life safety systems for the proposed Dentistry Pharmacy Building Redevelopment have been included to summarize discussions and concepts developed to date for base building core and shell.

The electrical services proposed for the Dentistry Pharmacy Building Redevelopment are based on the calculated load for an anticipated gross building area of 31,725 m².

The electrical design is based on the following University of Alberta, provincial code(s) and applicable standards including:

- University of Alberta, Facilities Management Commissioning Manual
- University of Alberta, Electrical Design Guidelines
- University of Alberta, Fire Alarm Design Standards
- University of Alberta, Electric Utility Standards
- CSA Safety Standard for Electrical Equipment
- C22.1-12, 2012 Canadian Electrical Code – Part I
- Regulations of the Alberta Electrical Protection Branch – Safety Codes Act
- 2006 Alberta Building Code
- CSA Standard B651-95 Barrier Free Design
- Latest CAN/ULC Fire Alarm System Standard
- CSA B44-09 Elevator Code
- CSA C282.09 Emergency Electrical Power Supply for Buildings
- CSA CAN/CSA-B72-M87 (R2003) Lightning Protection Standards
- Latest Illuminating Engineering Society of North America (IESNA) Standards.
- Academic Information and Communication Technologies Guidelines

8.1.2 Code analysis review

In review of the updated Building Code Analysis, the following items require to be addressed within the electrical scope of work:

.1 All exit doors with magnetic holds shall release under fire alarm stage 1 condition.
.2 Provide new fire-stopping at all floor and fire rated penetrations.
.3 All light diffusers shall be rated FS (flame spread) between 250-600. This item is more noted for future lighting fit ups.
.4 Fire alarm zoning shall coordinate with the sprinkler zones and all required fire separations. No zone shall be greater than 5,000 m².
.5 Fire alarm system shall include a voice communication system/mass notification system to meet University of Alberta standards.
.6 Emergency lighting shall be provided to not less than an average of 10 lux at the floor.
.7 Emergency power supply shall operate full load for minimum 2 hours, including fire pumps and all elevators (one at a time).

8.1.3 Sustainability

The electrical design will focus on providing occupant comfort and energy efficient design using the following techniques:

.1 Occupancy sensors will be provided throughout the building with direct connection into the building management system (BMS).
.2 Daylight sensors will be provided for perimeter spaces complete with local on/off control.
.3 Lighting power densities will be considered to be less than 30% of ASHRAE 90.1 2004 standards.

8.1.4 Demolition

A complete demolition of every floor shall be completed to accommodate a new core and shell space intended for future fit up. Careful coordination is required to stage system shut downs to accommodate the demolition. All existing electrical distribution and switchgear shall be removed.

8.1.5 Electrical design loads

.1 Power Distribution System Design
System planning for an electrical distribution system requires a close and clear examination of the critical needs and objectives of a facility. In making recommendations and then settling on a final design, the following factors have been taken into consideration:

Safety: There should not be any compromise on this issue. The choice of equipment used will result in optimization of the operational safety for personnel and the performance of the electrical system. For instance, equipment fully rated for the available fault current at that point of the power distribution system and operational safety will be employed.

Reliability: The level of continuity of service required varies with customer needs. The higher the level of continuity required the greater the level of redundancy that must be built into the electrical system. A system topology where more than one route of continuity is available by means of switching tiebreakers or switches greatly increases the reliability of the system. Typically, two or more primary feeders to a facility are incorporated whenever the continuity of service becomes paramount. Ideally, each of these feeders would originate from a separate utility substation. One of the requirements of this type of an arrangement is the need for fully rated equipment. Fully rated equipment will be able to withstand the maximum load current values that may be present on the system under a worst-case condition.

Simplicity of Operation: The level of safety and reliability is directly associated with the degree of simplicity of the system. Unnecessary complications in the configuration of the system may leave confusion in the minds of operational personnel.

Maintenance: The electrical system should lend itself to being fully serviceable and repairable with the least amount of disruption to the operations of the facility. This requires that the equipment be accessible and available for inspection and repair. Ideally the equipment should be easily available from a local supplier in the event that replacement is required.

Flexibility: The configuration of the electrical system should allow for future needs and additions. The allowance for increasing load demands and the meeting of these requirements without adversely affecting the present system reflects the resilience of the initial profile.

.2 Power Distribution - Summary

The total connected load for the Dentistry Pharmacy Building is estimated at 2,337 kW based on a building size of 32,948m^2 determined by input from the University of Alberta Electrical Utilities. One 13.8 kV double-ended substation will be provided adjacent to the utility tunnel. Two power transformers will be provided rated at 2500 kVA complete with forced fan cooling. The design provides for a minimum of 25% reserve capacity at the power transformer. The main electrical room will consist of new service entrance utility switchgear combined with 600V switchgear and will be located in the basement along the north wall. This location was deemed to be the most suitable because of the location of incoming feeders from the existing manhole along the north end service road and the ease of access to the electrical equipment for removal and maintenance.

.3 Power Distribution – Approach

While investigating the power distribution philosophy to the building, it was determined that the main power feeder to the building will be supplied from the North Power Plant, directly north of the Dentistry Pharmacy Building. The design approach for this facility is to use a dual primary system on the primary 13.8 kV side with a 600 V secondary selective radial distribution. The key reasons for this configuration are:

- **Flexibility" "Reliability" "Safety:** By incorporating two (2) separate primary feeders, system reliability is improved. Each primary feeder has the capability of supplying the entire load. Failure of one system does not jeopardize the entire system; there is no single point of failure.

- **"Maintenance" "Simplicity of Operation" "Safety:** Selective operation of the primary load break switches provides an allowance for repair, replacement, and re-routing of service. If only one primary switch is used, the requirement to service or repair without disruption of the electrical system is not possible.

Transformers require regular maintenance and inspection. A secondary selective topology will allow for continuity of service while preventative and/or emergency maintenance of a main transformer takes place.

The standard operating, distribution and utilization voltages for the Dentistry Pharmacy Building will be 600 V, 3-phase, 3-wire and 120/208 V, 3-phase, 4-wire. The power distribution system will be complete with a 600V, 3-phase, 3-wire bus duct riser system distributed through three (3) sets of electrical rooms on each floor complete with 600/208/120V step down transformers and associated distribution centers.

.4 Power Distribution Estimated Load Calculations

DENTISTRY PHARMACY ESTIMATED TOTAL ELECTRICAL LOAD CALCULATION				Project Development Report								
				BASIC DESIGN REFERENCE DATA			Calculation Parameter			Connected Load [KVA]	Estimated Demand [%]	Total Est. Demand Load
				Q'ty	Unit	Reference	Q'ty	Unit	Reference			
E-1	**Lighting**											
	Interior Lighting	General	Basement	7	$[W/M^2]$	ASHRAE 90.1-2004 LEED < 30%	1,762	$[M^2]$	DESIGN DRAWING	**13**	60	**8**
			Level 1				4,756			**34**	60	**20**
			Level 2				4,094			**29**	60	**17**
			Level 3				3,415			**24**	60	**14**
			Level 4				3,383	$[M^2]$		**24**	60	**14**
			Level 5				1,589			**12**	60	**7**
			Level 6				1,570			**11**	60	**7**
			Penthouse				1,570	$[M^2]$		**11**	60	**7**
E-2	**Receptacle/Power**											
	Receptacle	Office, Processing & Common Area	Basement	50	[W/M2]	Tab 14 CEC	1,762	$[M^2]$	DESIGN DRAWING	**89**	60	**53**
			Level 1				4,756	$[M^2]$		**238**	60	**143**
			Level 2				4,094	$[M^2]$		**205**	60	**123**
			Level 3				3,415	$[M^2]$		**171**	60	**103**
			Level 4				3,383	$[M^2]$		**170**	60	**102**
			Level 5				1,589	$[M^2]$		**80**	60	**48**
			Level 6				1,570	$[M^2]$		**79**	60	**47**
			Penthouse				1,570	$[M^2]$		**79**	50	**40**
E-3	**Elevator**											
	Elevator			35	[KVA/Set]		4	[Set]	DESIGN DRAWING	**140**	80	**112**
E-SUB	**Electrical Load Sub-total**									**1,409**	**61**	**865**
M-1	**Mechanical/HVAC**											
		Mechanical Pumps(various)		170	[KW]	Update Motor List Assume (0.85 pf)	1		Update Motor List Assume (0.85 pf)	**200**	50	**100**
		FAN COILS (various)		30	[KW]		1			**35**	71.43	**25**
		AHU (various)		526	[KW]		1			**619**	100	**619**
M-2	**Mechanical/Plumbing & Fire Suppression**											
		SPRINKLER FIRE PUMP(s)		40	[KVA/Set]		2	[Set]		**94**	50	**47**
M-SUB	**Mechanical Load Sub-total**									**948**	**83**	**791**
		Total Estimated Load								**2,357**	**70**	**1,656**

.5 Power Distribution - Summary

Power would be distributed on a floor by floor basis via three (3) 600V bus duct risers. The risers are logistically located in the East, West and North wings. The results as seen below express where the loads are distributed through the three (3) bus duct risers. The values are expressed as estimated loads as tenant loads are assumed to be office space.

Floor	Spaces Defined in DDreport	Data		Connected Load [KVA]
		sqm	W/sqm	
Basement	Slow Poke Labs	278	100	28
	Slow Poke	231	100	23
	Washrooms	27	30	1
	Programmed Area	2,014	50	101
	Circulation	485	20	10
E_SUB_B		3,035		162
Level 1	Programmed Area East Riser	1,250	50	63
	Programmed Area West Riser	1,250	50	63
	Programmed Area North Riser	1,250	50	63
	Welcome Center	166	100	17
	Atrium	770	20	15
E_SUB_1		4,686		220
Level 2	Programmed Area East Riser	939	50	47
	East Letcure	233	100	23
	Programmed Area West Riser	1,250	50	63
	Council Chambers	311	100	31
	Programmed Area North	1,250	50	63
	Atrium Shared Space	588	100	59
E_SUB_2		4,571		285
Level 3	Programmed Area East Riser	1,250	50	63
	Programmed Area West Riser	1,250	50	63
	Programmed Area North Riser	1,448	50	72
E_SUB_3		3,948		197
Level 4	Programmed Area East	1,250	50	63
	Programmed Area West Riser	1,250	50	63
	Programmed Area North Riser	1,448	50	72
E_SUB_4		3,948		197
Level 5	Programmed Area North Riser	1,416	50	71
	Ciculation	507	20	10
	W/C	85	20	2
	Service	66	20	1
	Shared Space	152	100	15
E_SUB_5		2,226		99
Level 6	Programmed Area North Riser	1,441	50	72
	Ciculation	507	20	10
	W/C	85	20	2
	Service	66	20	1
	Shared Space	152	100	15
E_SUB_6		2,251		100
Mics	Elevator	1	140	0.140
	Mechancial HVAC Load	1	940000	791
				-
				-
				-
E_SUB_7		2		791.140
E_Total		3		2,052

Riser N	11,397		560
Penthouse Mech			791
Riser E	4,922		258
Riser W	5,311		281

.6 Emergency Power Distribution

A study has been completed to estimate how much load is required to be connected to the emergency power required for the facility. As per the new 2012 Canadian Electrical Code, this study is separating the life safety loads from the essential loads.

Floor	Spaces Defined in SD report	EMERGENCY POWER			Connected Load
		Estimated KVA	Non- essential	Life Safety	
Basement	Slow Poke Labs	45	x		108
	Slow Poke	15	x		
	Council Chambers	75	x		
	Level 1 Slow Poke Labs	75	x		
Level 1	Area East	30		x	132
	Area West	30		x	
	Area North	30		x	
Level 2	Area East	30		x	72
	Area West	30		x	
	Area North	30		x	
Level 3	Area East	30		x	72
	Area West	30		x	
	Area North	30		x	
Level 4	Area East	30		x	72
	Area West	30		x	
	Area North	30		x	
Level 5	Area North	30		x	24
Level 6	Area North	30		x	24
Penthouse	Area North	30		x	24
	Elevator	35	x		35
	Mechancial HVAC Load	600		x	600
E_SUB_EM(KVA)		1295			1163
Slow Poke		210			
Riser N(Life Safety)		245			
Penthouse Mech		600			
Riser E		120			
Riser W		120			

Emergency power for the Dentistry Pharmacy Building was assessed at approximately 1000 kW including mechanical, power, and lighting loads. For the purpose of future unknown tenant emergency power requirements, a new 1500kW natural gas generator will be located south of the loading dock.

Note: Final size of the generator is to be confirmed with the University of Alberta once user requirements are determined.
Two distinct emergency power distribution systems will be provided for essential and non-essential loads within the building.

.7 Emergency Generators

One natural gas generator is proposed for the building emergency and life safety loads. The emergency generator is to be located outside in the SAB courtyard as per the electrical site plan in the appendix. This generator(1500KW) is strictly for the dentistry pharmacy building life safety and non-essential loads defined by the UofA.

The generators are anticipated to be enclosed in a heated walk in enclosure with a sound dampening enclosure to approximately 70dB at 7ft.

The enclosures shall have all required dampers and sized opening for the generator air intake and cooling requirements. The generator enclosures shall include; small electrical panel board to connect; space heating, maintenance lighting and power receptacles for convenience.

.8 Grounding

A complete new grounding system will be provided in accordance with Canadian Electrical Code and the electrical inspection authority standards. All grounding conductors, clamps, bars, strap, etc. to be copper. 50mm x 6mm copper ground busses mounted on insulating standoffs to be provided at all base building electrical and communication rooms.

Continuity of ground to all components of security, telephone system, cable television distribution system, fire alarm system, and all communications systems to be provided.

8.1.6 Lighting design

Established standards and parameters for an administration facility will be used for the design of the lighting system. The Illuminating Engineering Society of North America (IESNA) standards and the University of Alberta lighting design guide will be the key references. The objective to achieve Green Globe certification will at times result in variances being made to these key references. Energy consumption considerations and lighting levels will be carefully weighed with the benefits of achieving a Green Globe certification.

The lighting power density will be designed to meet or exceed the University of Alberta's standard of minimum 8.0 w.m^2 without impacting the light levels required by the University of Alberta.

The lighting system for the Dentistry Pharmacy Building Redevelopment will be designed to provide integration of numerous lighting techniques to provide a vibrant and attractive atmosphere that is both inviting and engaging for the people within the space. Layered lighting within public circulation and gathering areas will enhance the building's profile on campus. It will both augment and add to the architectural elements of the space in providing a visually stimulating environment that is comfortable and welcoming. The design will integrate the various aspects of the lighting system with the building's space functions, mechanical systems, and architectural elements.

LED lighting will be considered where feasible and in areas that may have a higher maintenance cost.

The general lighting source to be used in the facility will be fluorescent. A mixture of T8 and T5HO linear lamps along with LED sources will be used throughout the building. Reasonable attempts will be made to limit the number of different fixture types and lamp types, while providing good quality lighting. The rationale for using fluorescent lamps is their high lumen efficacy and color rendering properties. The building exterior lighting will be modified to meet the University of Alberta Lighting Design Guidelines in order to maintain the historical nature of the building. Fluorescent luminaires will utilize programmed start and instant start electronic ballasts with a minimum 97% power factor.

Selected luminaires in public spaces and paths of egress will be connected to the emergency power system to provide the Code required egress lighting. This lighting will also operate as the 24/7 night lighting for the space.

Exit lights shall be single circuit with LEDs, 120 V fed from emergency power. It is anticipated that "EXIT" signage will utilize the new international "running person" and backlight green pending the adoption of the revisions to the Alberta Building Code.

8.1.7 Lighting control

All building lighting will be controlled to decrease energy use, allow flexibility, and to meet the requirements of the University of Alberta and applicable standards. The lighting control system will be a stand-alone system that will allow interface with the Building Management System. Controls will include:

.1 Strategically placed daylight sensors that come with on/off controls for luminaires installed throughout all perimeter and atrium spaces.
.2 Occupancy sensors will be provided in all storage rooms, washrooms, and similar spaces.
.3 Manual switches (digital) will be provided in all rooms for local control.
.4 All building lighting will be controlled using a central astrological time clock control.
.5 Additional control options may be included after further discussion during programming with the University of Alberta. This may include:

  .1 Room lighting control through local PC via Building Management System.
  .2 Addressable Individual fixture control via the Building Management System.

8.1.8 Atrium Lighting

Although the atrium space will be supplemented with a large amount of natural daylight, additional lighting would be required for night time event and major architectural features. Lighting would be controlled via daylight controls within the new low voltage lighting control. Refer to Figure 1 Atrium Lighting.

Figure 1 Atrium Lighting

8.1.9 Public corridors

Through the design process it was identified that there would be two different corridor schemes. The south 1922 corridor consists of a full barrel gypsum ceiling and the recommendation is to preserve this historic element. Therefore the 1922 corridor would have an upgrade to a new pendant bowl luminaire similar to below.

Within the 1945/47/58 East, West and North corridors a new suspended ceiling is being provided. This corridor will typically make the perimeter between the new Atrium and the future tenant spaces. Lighting will consist of recessed linear narrow slot fluorescent luminaire and cove accent via continuous fluorescent linear cove lighting.

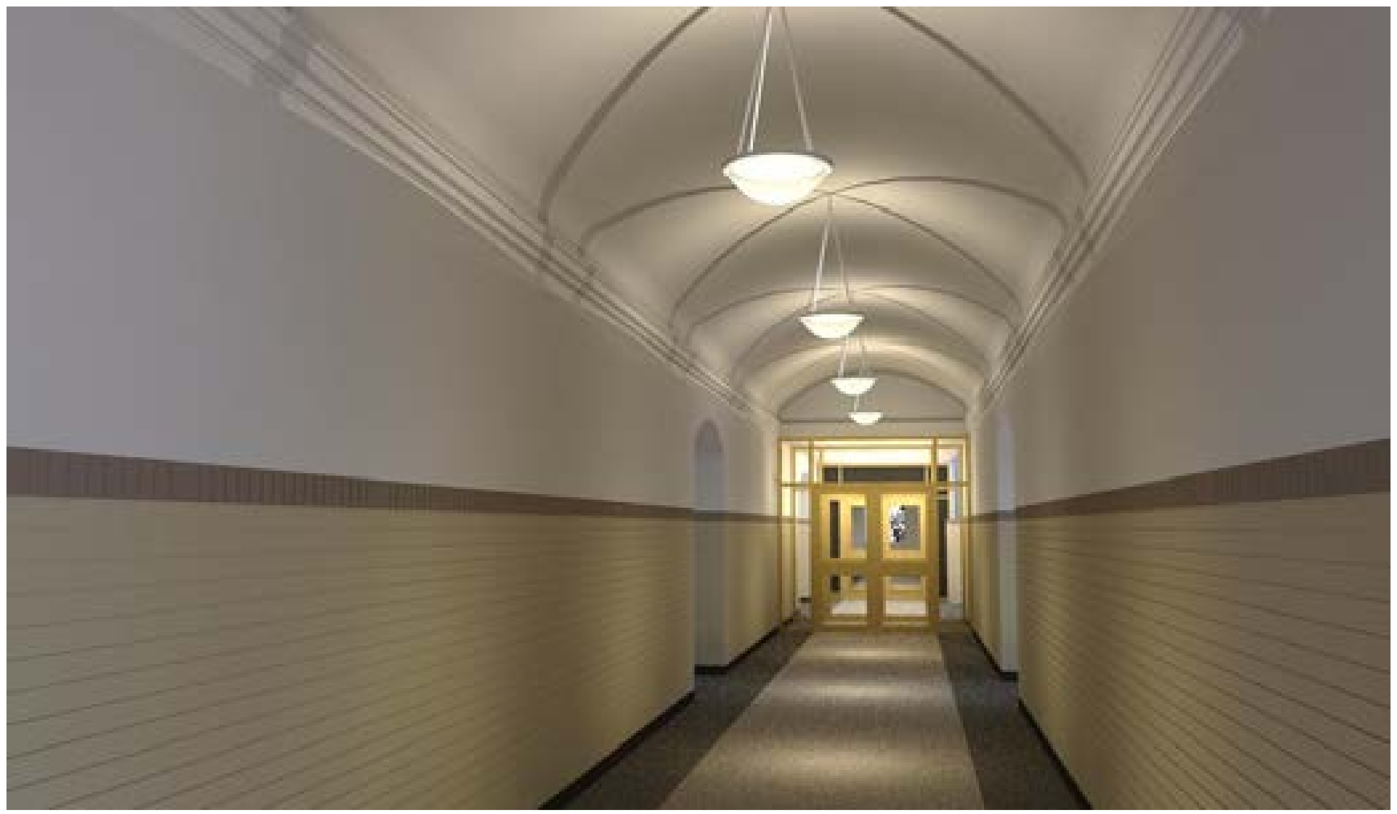


Figure 2 Typical 1922 Corridor Complete with Decorative Pendant Luminaires

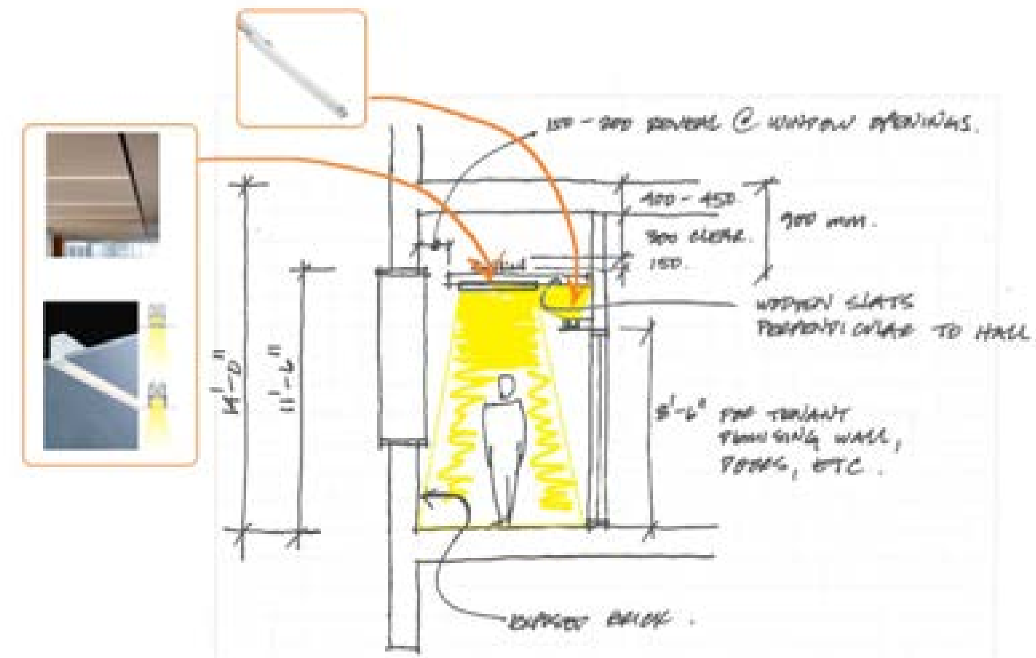


Figure 3 Typical 1945/47/58 Corridor Lighting Selection

8.1 Preliminary Investigations and Recommendations

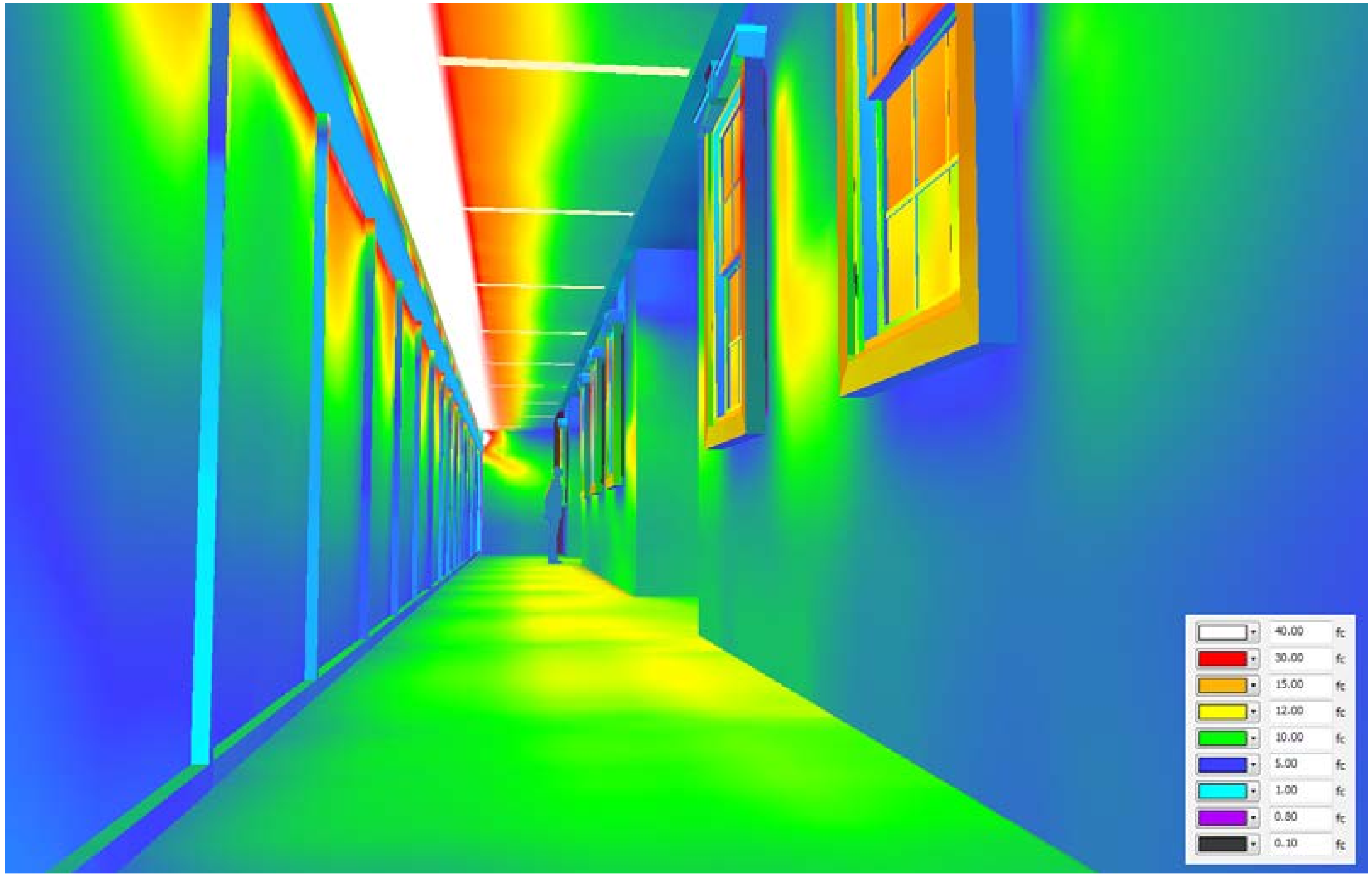


Figure 4 Typical 1945/47/58 Corridor Lighting Performance (**Average Illuminance: 15-20fc**)

Figure 5 Typical 1945/47/58 Corridor Lighting Rendering (Image does not show architectural finishes)

8.1.10 Gravitas Space

The Gravitas Space located in Level 2 is a featured space that overlooks the atrium floor from on the east side. The space is sopen to Level 5. Due to the higher ceiling within the Gravitas Space, the investigation of fiber optic light systems was conducted. A decorative suspended fiber optic lighting system shall be suspended in the Gravitas Space. The LED/HID fiber optic drivers are anticipated to be located in accessible ceiling spaces on the floor adjacent to the Gravitas Space ceiling. Additional wall lighting shall be provided on the north wall of the Gravitas Space as well as lower level lamps standards fixed to the floor/furniture for lower level lighting. All lamp standards must be anchored to the floor and or tables to eleminate the risk of theft.

Figure 6 Gravitas Space (Image does not show architectural finishes)

8.1.11 Atrium Bridge Lighting

Within the atrium space there will be three suspended bridges that will be located centeral from east to west. The intent of these bridges is to provide users a central path to access from north to south and vice versa. These bridges are constructed with steel, glass and concrete topping for the floor finish. The lighting strategies for these bridges are mainly decorative with subtle marker lighting. Floor recessed LED luminaires will accent the path way for way finding.

Figure 7 Typical Atrium Bridge Lighting

8.1.12 North Canopy

A new canopy complete with seating provision on the north elevation of the building. The canopy element is a detached structure is a homogeneous concrete. The lighting strategy for the north canopy is to wash the underside of the concrete ceiling with wall mounted ceramic metal halide luminaires complete with asymmetrical reflectors. There are three building entrances along the north elevation. The intent is to provide column mounted luminaires on the large entrance marked columns. These luminaires are surface mounted ceramic metal halide luminaires.

Figure 8 - Architectural Rendering- North Canopy
(Image does not show architectural finishes)

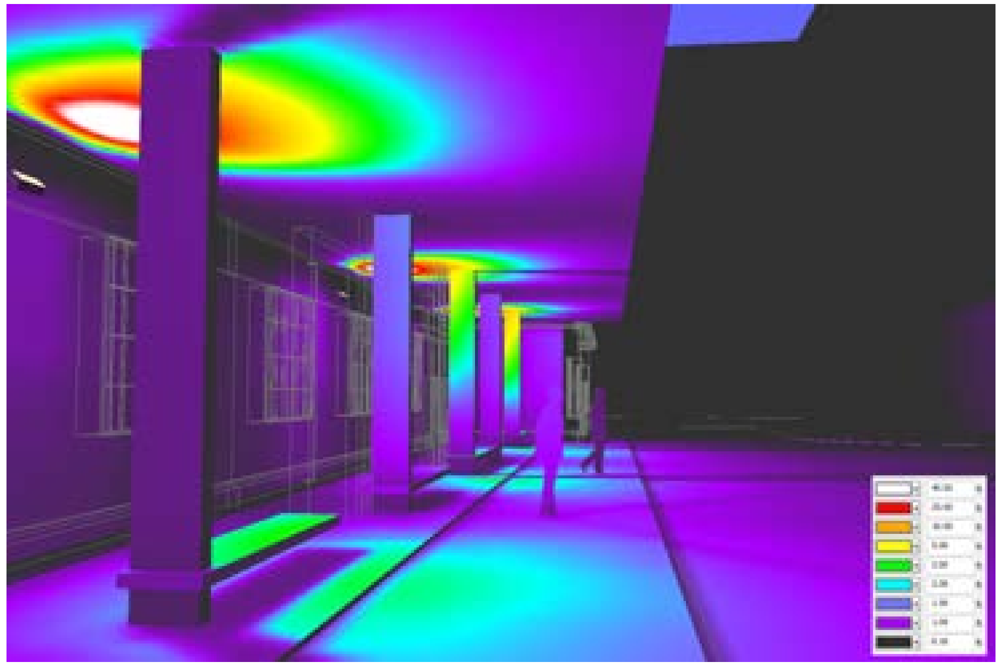


Figure 9 False Color Rendering- North Canopy
(Image does not show architectural finishes)

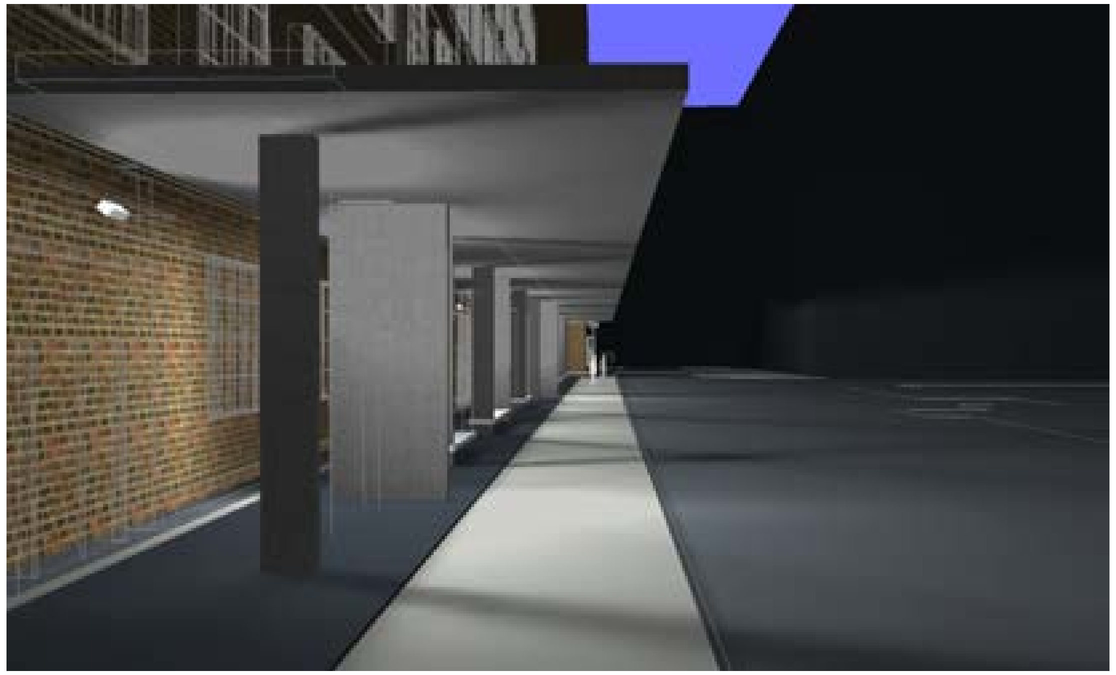


Figure 10 Lighting Rendering- North Canopy
(Image does not show architectural finishes)

8.1 Preliminary Investigations and Recommendations

8.1.13 South Plaza

The South Plaza is being introduced to connect the existing building entrance and two (2) additional entrances at Level 1 are being provided to allow barrier free access to the Atrium space. With the new entrances, a lower level lighting system has been planned to accommodate illuminating the new walkway surfaces.

Figure 11 South Plaza New Typical Entrance

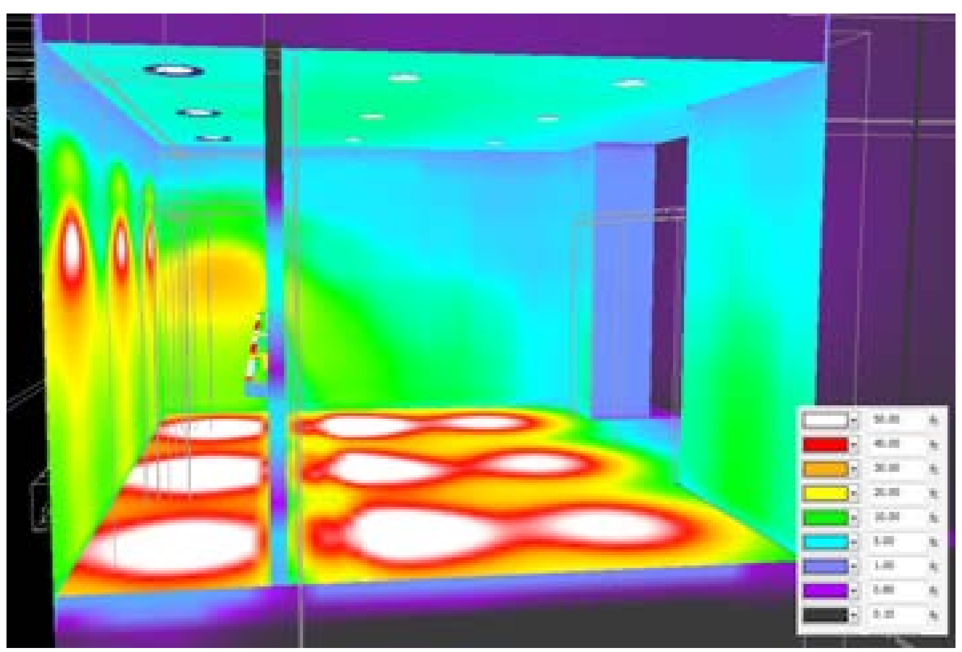


Figure 12 South Plaza New Typical Entrance (**Average Illuminance: 30-40Fc**)

8.1.14 South Plaza Walkways

In order to accommodate lower level site lighting, recessed LED or HID lighting is proposed to be provided within the new retaining walls to provide “marker” lighting of the new plaza. This allows a level of contrast on the walkway. For areas such as stairs that require higher illumination for safety, the use of LED light handrails is recommended. As handrails are required, as per Alberta Building Code, it will be cost effective have an illuminated handrail assembly.

Figure 13 South Plaza Marker Lighting

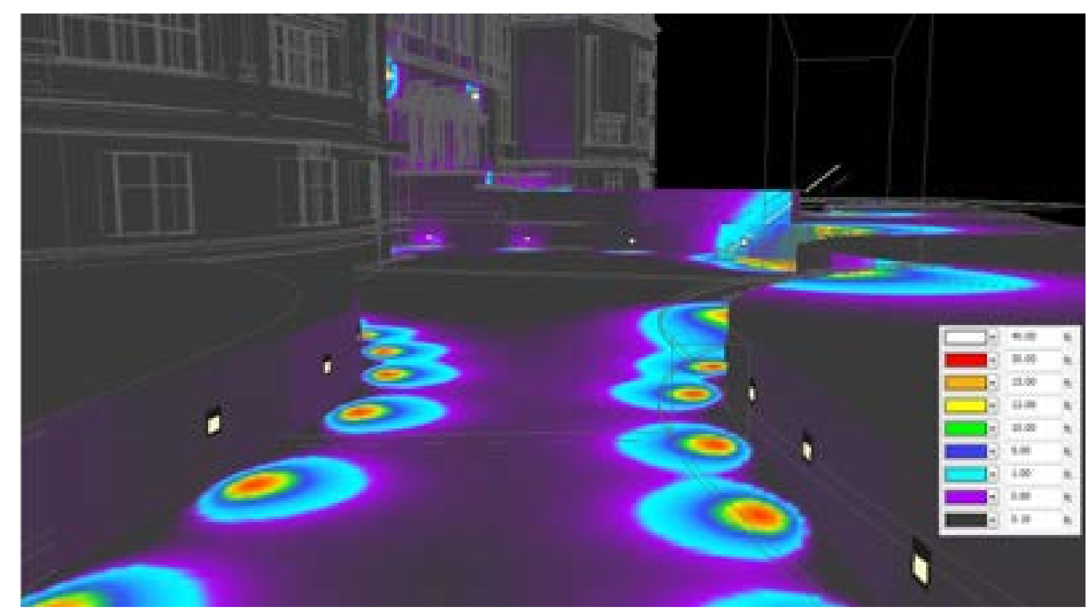


Figure 14 South Plaza Marker Lighting

Figure 15 South Plaza Product Concepts

8.1.15 The existing main entrance

As a simple feature, the front entrance will remain as is architecturally. There are two (2) existing wall sconce luminaires that are large and tend to retain the historic appearance of the building and will remain in their current location. As the walkways are being revised, there will be a curb and glass railing added to gain access to the existing main entrance. The lighting of this walkway shall match the adjacent walkways.

Figure 16 South Plaza Existing Main Entrance New Lighting

Figure 17 South Plaza Existing Main Entrance New Lighting Rendering

Note: The two new east and west lower level entrances seen above are well lit and provide a beacon for way finding to these new entrances.

8.1.16 The cupola

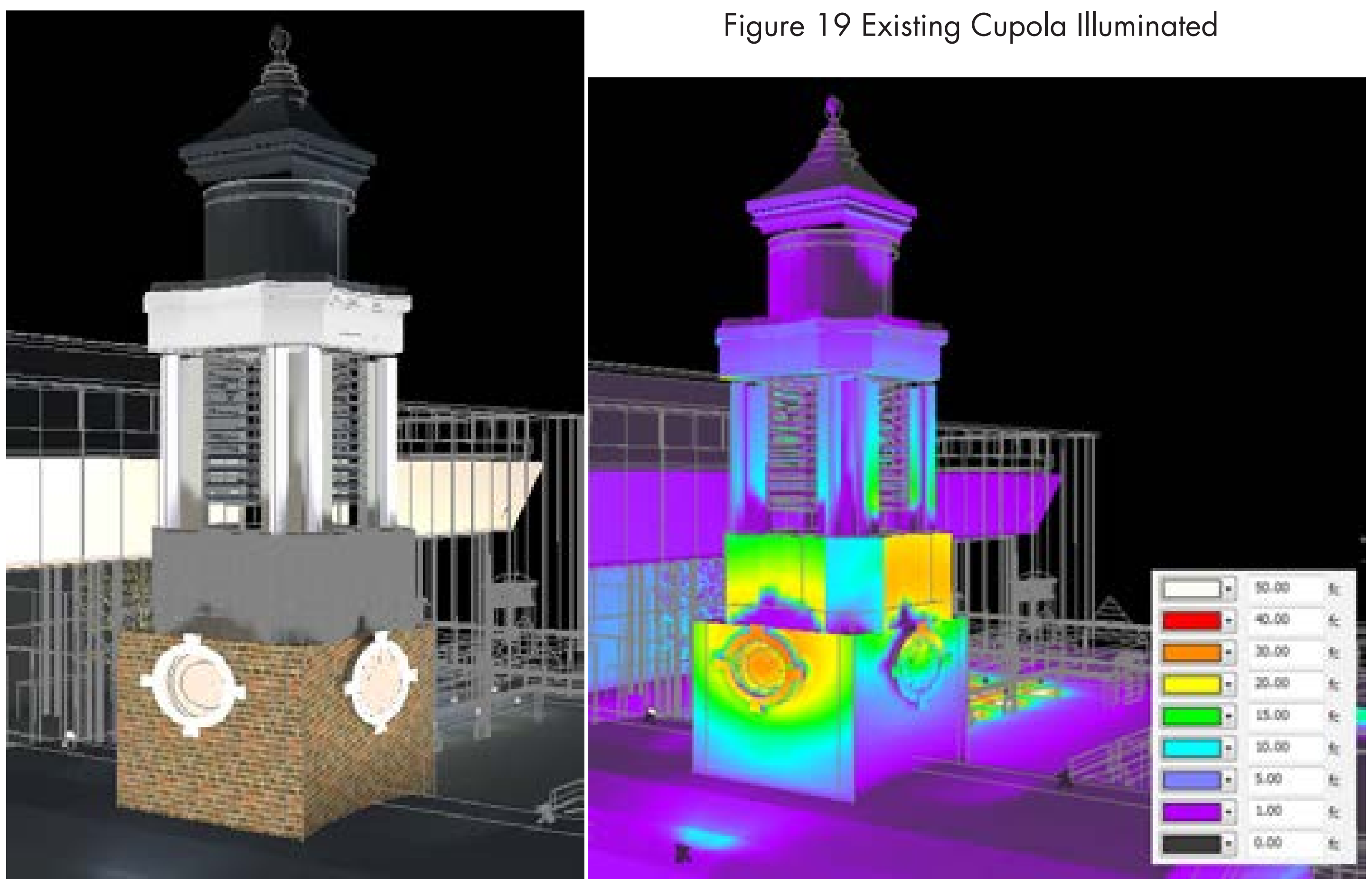
The existing cupola creates a great opportunity to landmark this site. This feature carries great historic detailing; a white/silver column finishes, stone and metal cladding.

It is seen a major component on the building that requires a great amount of lighting to landmark this site. Since a new glass atrium is in the background of the cupola, it will require a light source that will contrast with the atrium. The current strategy is to have the ceiling up lighting within the atrium to have a warmer color temperature (~2700K).

In contrast, the cupola will be illuminated using a cool white color temperature (~4000k -5000k). With this, the cupola will appear much more illuminated compared to the atrium background, to which it will maintain itself as the pinnacle feature to the historic building and site.

Figure 18 Existing Cupola

Figure 19 Existing Cupola Illuminated



8.1.17 The south site

Once all the lighting components noted above are combined, it will create a very well illuminated walkway for pedestrians. It will also properly accent the historic elements of the space.

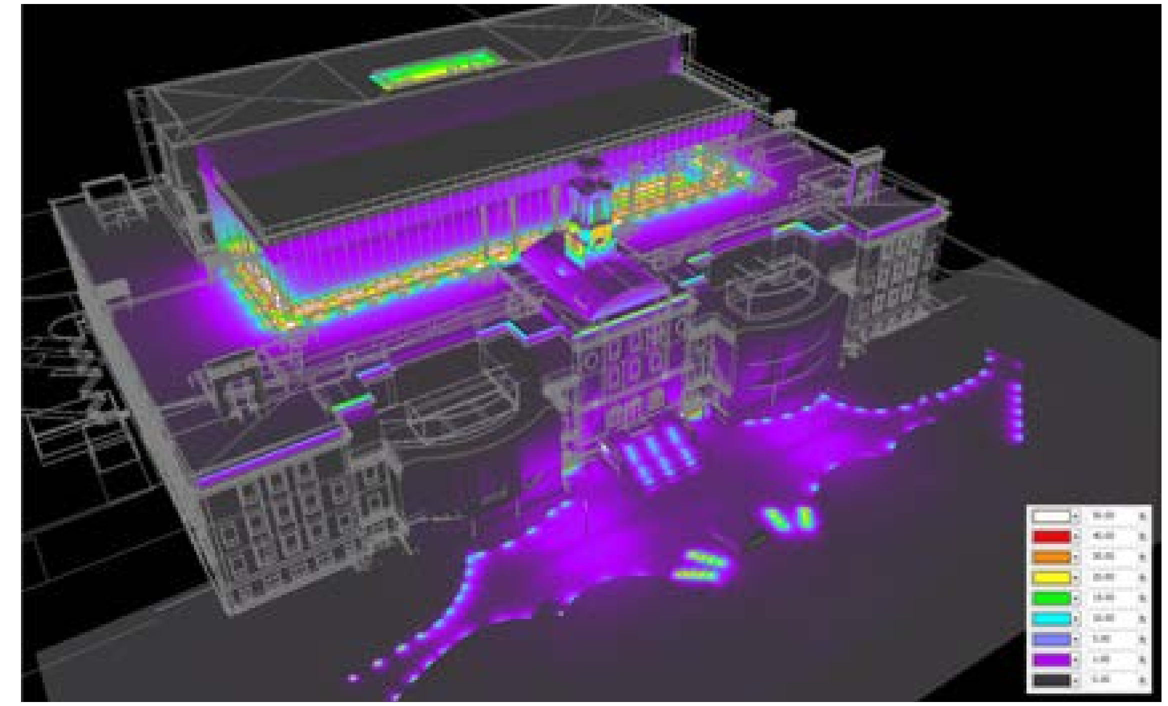


Figure 20 South Site Lighting Complete – False Color Rendering

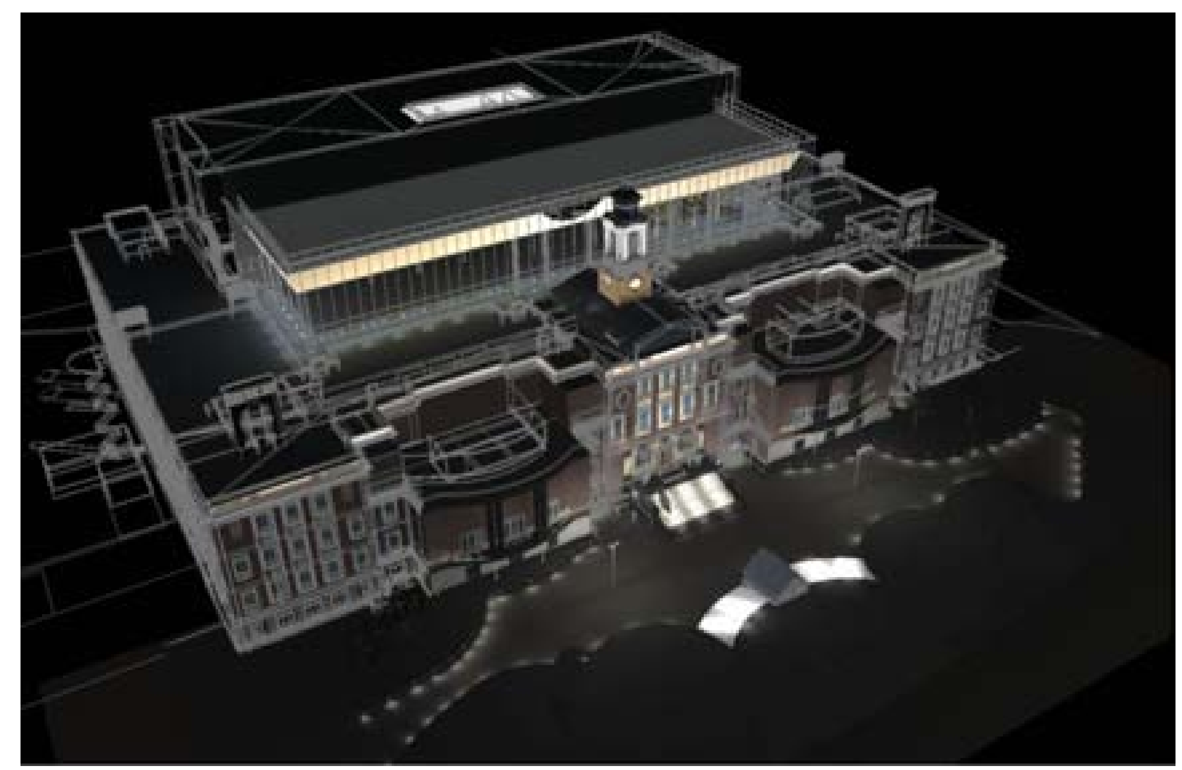


Figure 21 South Site Lighting Complete - Rendering

8.1.18 Spaces

In future fit-ups, it is anticipated that the lighting will be a combination of recessed and suspended direct/indirect fluorescent luminaires controlled by low voltage switching. These design details are limited and will be reviewed further once tenant programming is provided in future. Until fit are planned and implemented, the lighting will consist of suspended strip fluorescent luminaires mounted within each structural bay. Shell lighting shall be locally controlled at all stairwell core areas and automated to turn off during non-business hours through the scheduling within the low voltage lighting control.

8.1.19 Fire alarm system

A new fire alarm system will be designed for this facility. The fire alarm system will be a two-stage, addressable with voice communication, CACF, Class A-wired, and electrically supervised system. The design of the fire alarm system shall conform to the current Alberta Building Code and CSA CAN/UL S524-06 standards.

Extra care and review will be required when interfacing the new South Academic Building link to the South Academic Building and Dentistry Pharmacy Building in order to be properly networked and programmed. Further review to define the fire separation will be reviewed and assessed with architectural design team.

Smoke aspiration systems such as VESDA detection systems will be required for interconnected floor spaces and ease of maintenance.

The program space fire alarm system will be complete with combination speaker/strobes mounted from the ceiling with a flexible cable looped for future tenant fit up installation.

The fire alarm system will be designed with provisions to connect into the University of Alberta mass notification system. An audio input will be provided for “messaging capabilities”. The fire alarm system shall be connected to the University of Alberta “Alertus Notification System”.

Low voltage systems and class 2 circuits

This section of the report discusses the various extra-low voltage and security systems that are envisioned to be installed in the Dentistry Pharmacy Building.

.1 Clock System:

The clock system will be an IP based system integrated with the University of Alberta mass notification system throughout the facility. Further coordination is required with the University of Alberta facilities group for final device and component architecture. During the preparation of the construction documents.

.2 Public Address System:

A building wide public address system will NOT be provided.

8.1.20 Communication Infrastructure

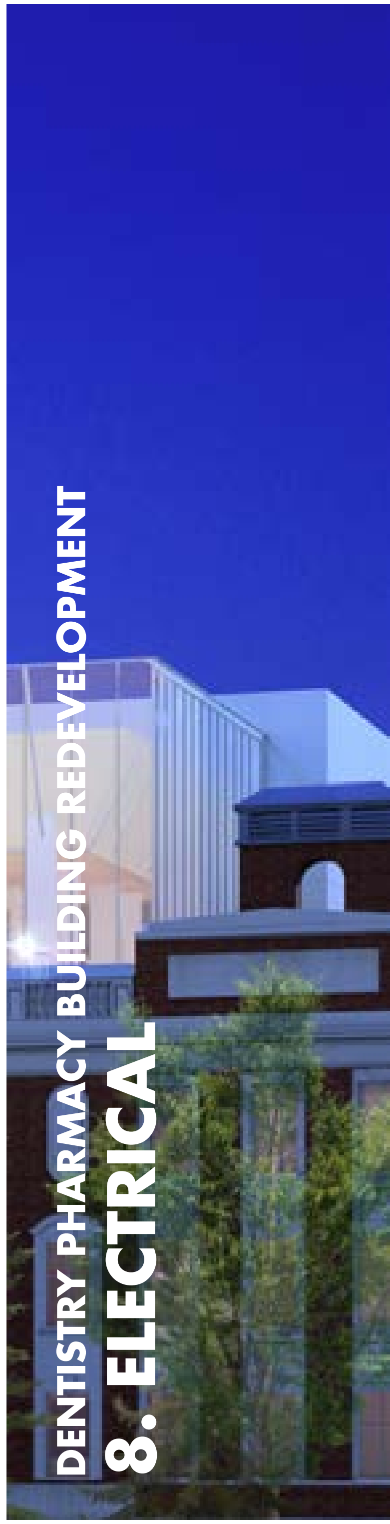
.1 Fiber Service Requirements:

The fiber service requirements for the building will be provided from two locations to ensure that there is redundancy to the building in the event that one service fails. We will coordinate with the University of Alberta AICT to establish final locations. During the preparation of the construction documents.

An FMNet building edge switch supplied by the contractor will be required in the main communications room in Dent-Pharm. That switch will be fed via a 2x 12 strand pre-terminated single mode fiber cable pulled from room SB-19 in the existing Central Academic Building (CAB). The fiber will be routed underground via the utility corridors which run from CAB through North Power Plant and into Dent-Pharm. Fiber cabling will likely need to be pulled by U of A Trades staff under the construction capital project.

.2 Main Communication Room – Service Entrance:

Communication room to be located along the north wall of the basement adjacent the existing utility tunnel. The new communication room will include switches for voice/data systems, racks, and associated infrastructure including cable management system and cable tray system.



.3 Communication Rooms:

Three (3) communication rooms located on each floor will house all the switches for data/voice and wireless infrastructure. Where required, the communication rooms will house IP based lighting controls, building access and controls, fire alarm and security systems. Each of these rooms will support the University of Alberta needs for equipment, cabling, and access control and will house the necessary UPS back up requirements.

.4 Structured Cabling Pathways:

Communication cabling will be installed in conduits, stubbed up to the closest cable tray and run to the designated communications room. Two (2) cable trays in the corridors will be provided one for voice and one for data/network cabling. Each tray shall be 105 mm deep by 305 mm wide.

Routing of horizontal structured cabling will be accomplished by utilizing the main cable trays within the corridors, and providing conduit stubs into the ceiling space from future voice/data outlets complete with free air cabling using J-Hooks to cable tray system.

.5 Server Room:

In discussions with the University of Alberta AICT group a server room complete with UPS system will not be required. The servers and respective UPS (uninterruptible power supply) system will be provided within each communication room on each floor.

8.1.21 Security system

.1 Access Control System:

It is planned that the Dentistry Pharmacy Building will be equipped with card access system. All hardware, conduit, and cabling system will be provided complete with all necessary power supplies, end devices, and electrified hardware devices.

The current design criterion is to provide door security via a combination of monitoring and card reader access to all perimeter level one entrances. Only a select few entrances shall be card reader access. The intent is to have access control doors from Level 2 to Level 7 at major shared corridor entrances. All public corridors will have limited access after hours.

All electrical rooms and communication service rooms shall be access via University of Alberta Abloy key system.

.2 Security Television System:

Security television design requires further discussion with the University of Alberta; however, it is envisioned that the building, public spaces will contain security television cameras with head end equipment located within the communication rooms. All security cameras shall be POE (Power over Ethernet) Therefore a dedicated CAT 6 cable shall be install to all new camera locations and routed back to the nearest communication room via conduit pathways. Cable tray is not recommended for sensitive cabling such as security cameras. Security cameras on the site will be limited. Four cameras are estimated to be located on the four primary entrances on Level 1. One outdoor rated camera is anticipated to be located on the roof overlooking the South Academic Building courtyard and new loading dock. All exterior cameras require a dedicated emergency 120V circuit for lens heaters to eliminate the risk of lens fog on shoulder seasons.

8.1.22 Mechanical systems

In general, all motors 0.37 kW and smaller will be single phase, 120 V and all motors at 0.56 kW and larger will be 600 V, 3 phase. Supply and installation of all motor protection switches, starters, and disconnect switches for mechanical equipment will be provided. Time delay relays and power factor correction capacitors for all motors 25 hp and larger will be provided.

Variable speed drive starters for all required variable fan type motors to be provided by the mechanical contractor.

8.1.23 Elevators

Four (4) new elevators shall be provided within the facility. An elevator control rooms shall be incorporated in accordance with Alberta Elevating Devices & Amusement Rides Safety Association (AEDARSA) and Alberta Building Code standards, including new services to local disconnect for power and cab lighting, fire alarm and telecommunication connections to elevators cabs and within the elevator control rooms.

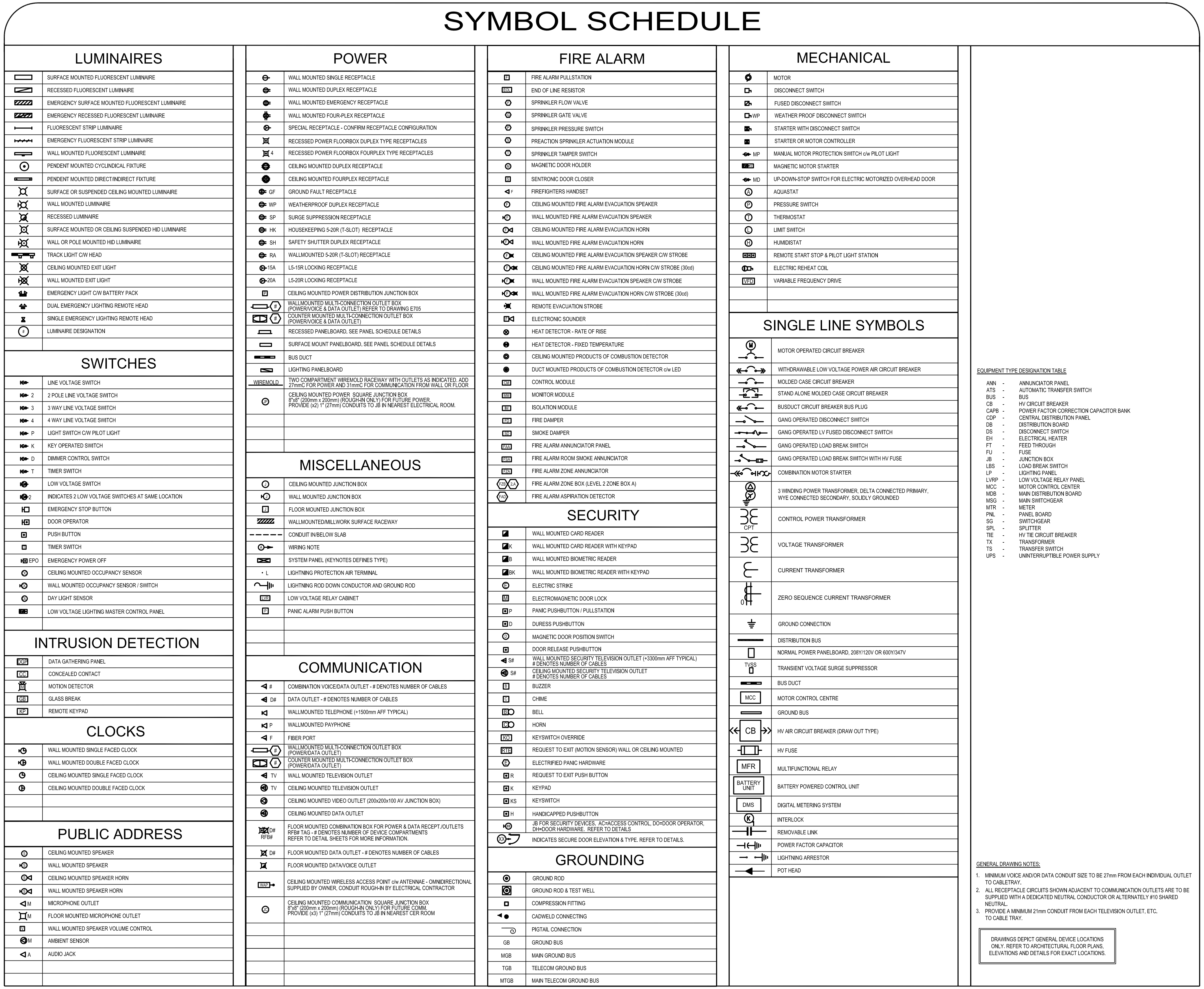
During the course of the demolition and construction, it is anticipated that the existing freight elevator shall remain operational via temporary service feeder. The freight elevator shall be replaced in a later phase of construction.

The existing electrical systems in the Dentistry Pharmacy Building will be removed in their entirety and replaced with new systems.

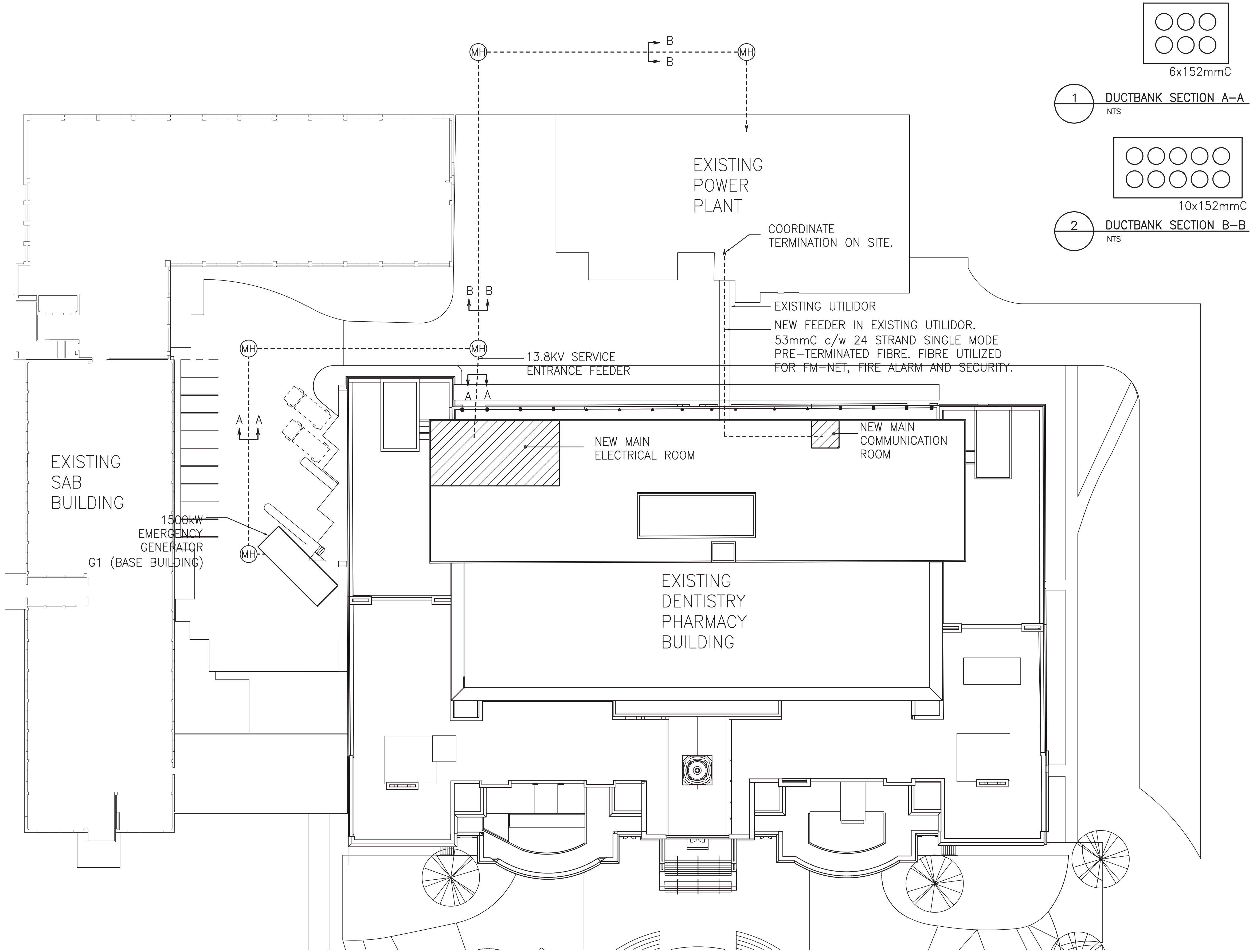
8.2 Appendix

8.2.1 Electrical drawings

- .1 E000 - Symbol Schedule
- .2 E001 - Electrical Site Plan Layout
- .3 E002 - Basement Electrical Room Keyplan
- .4 E100 - Basement Main HV Substation
- .5 E101 - Basement Main HV Substation Details
- .6 E102 - Basement Main Communication Room (West)
- .7 E103 - Electrical & Communication Room Keyplan (Typical)
- .8 E202 - Typical Floor Core and Shell Lighting
- .9 E302 - Typical Floor Power, Communication & Fire Alarm System
- .10 E402 - Typical Electrical Equipment Layout (Level 2)
- .11 E407 - Typical Floor Fire Alarm Zones
- .12 E500 - Security and Access Control - Level 1
- .13 E501 - Security and Access Control - Level 2
- .14 E509 - Electrical Equipment Layout (Council Chamber) - Level 2
- .15 E600 - Electrical & Communication Room (Main Level)
- .16 E601 - Electrical & Communication Rooms Equipment Layout (Typical)
- .17 E602 - Electrical Section (Looking South)
- .18 E603 - Typical Details
- .19 E700 - Single Line Diagram
- .20 E701 - Fire Alarm Riser
- .21 E702 - Lighting Control Riser Diagram
- .22 E703 - Wireless Lan Riser Diagram
- .23 E704 - Communications System Riser Diagram



8.200 E000 - SYMBOL SCHEDULE



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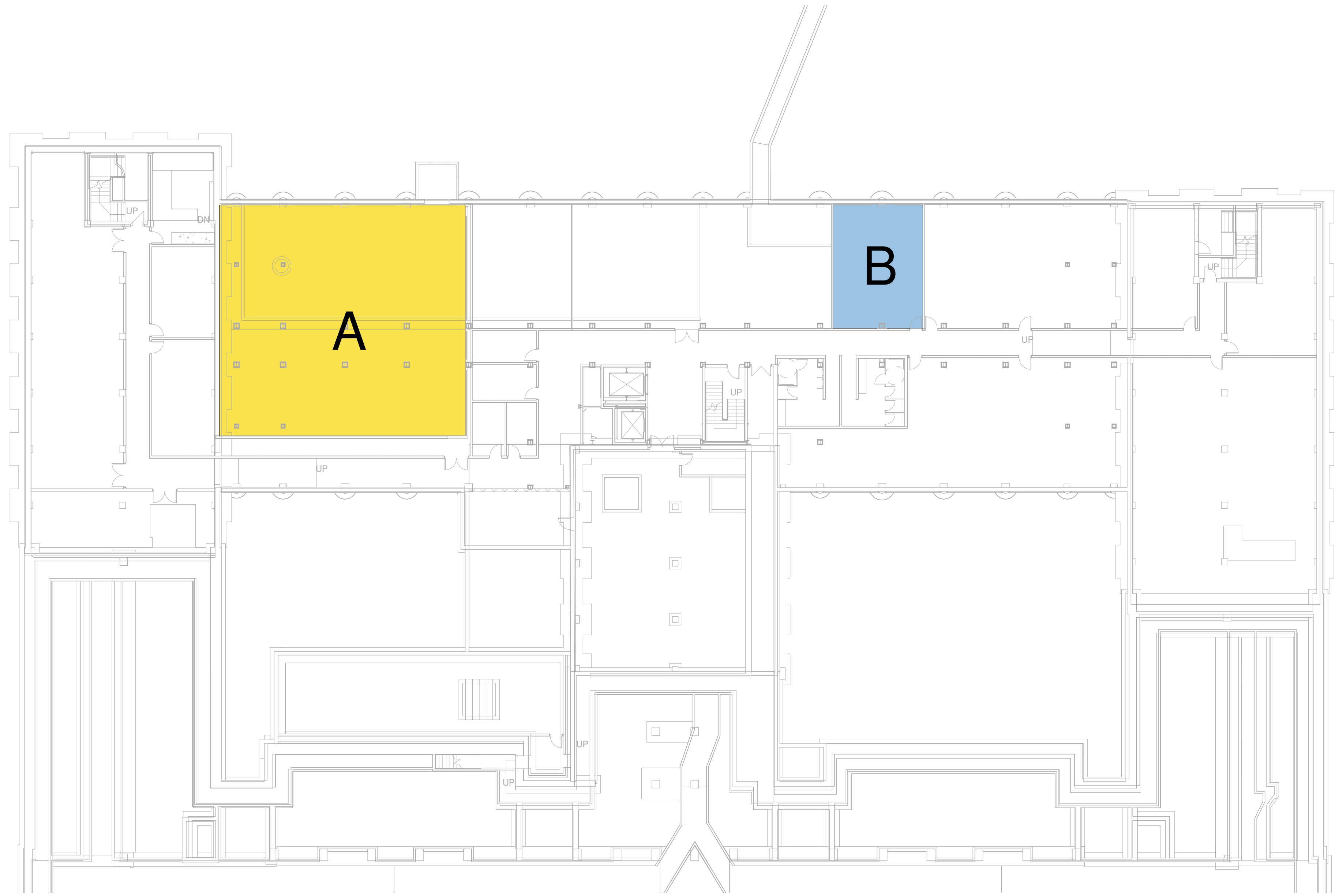
DENTISTRY PHARMACY BUILDING REDEVELOPMENT

8. ELECTRICAL

ELECTRICAL DRAWINGS

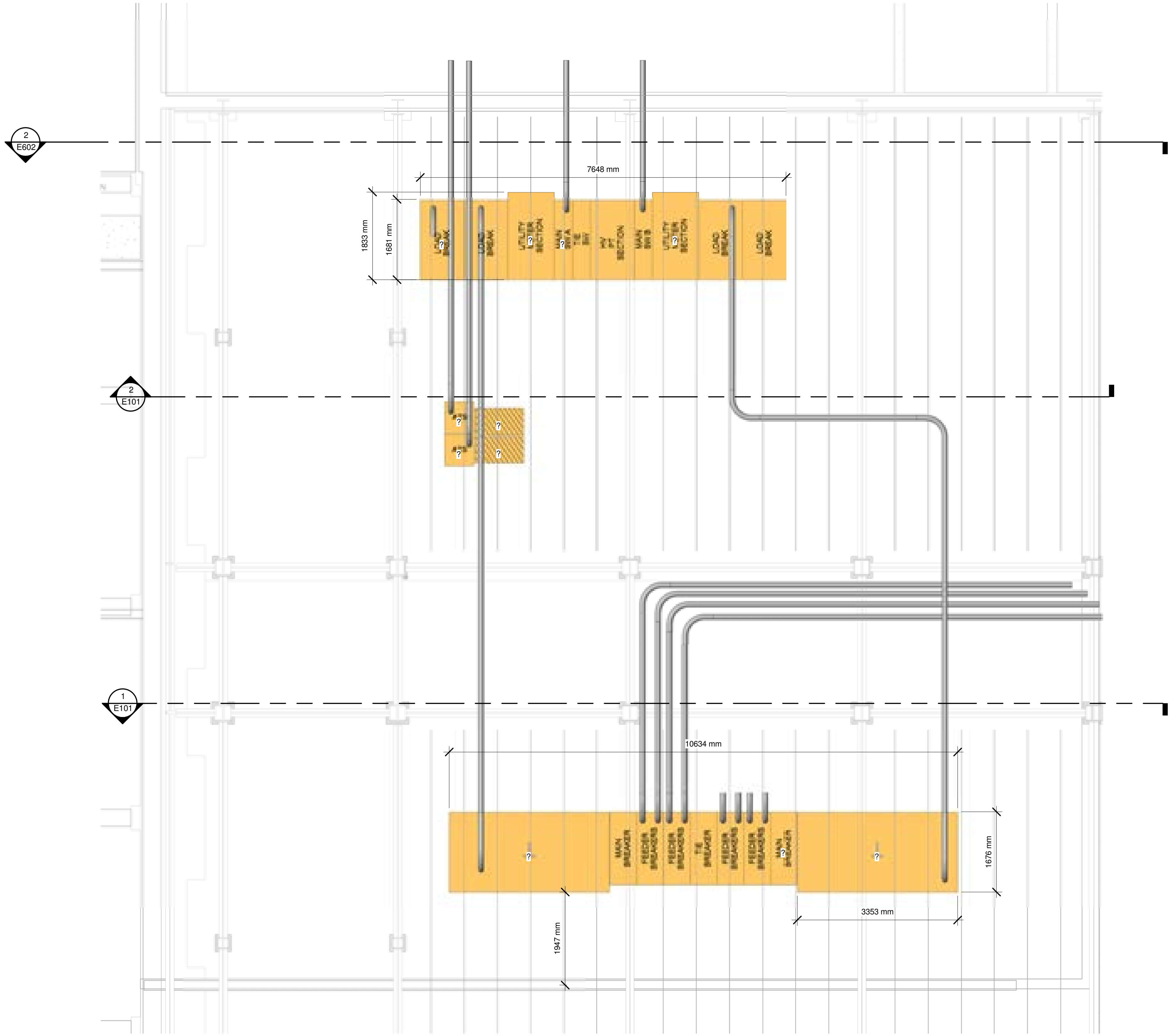
E001 - ELECTRICAL SITE PLAN LAYOUT



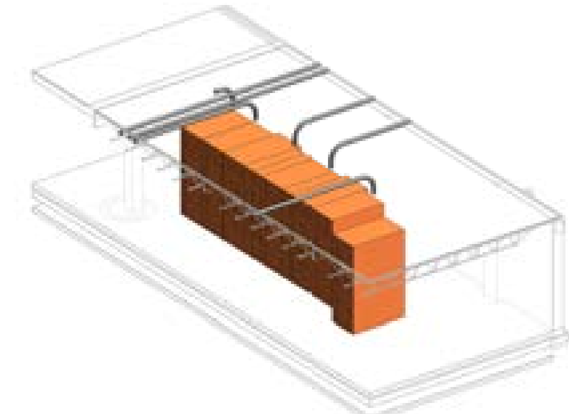
LEGEND

SYMBOL	ELECTRICAL AREA	NOTES:
A	MAIN ELECTRICAL SUBSTATION ROOM	
B	MAIN COMMUNICATION ROOM	

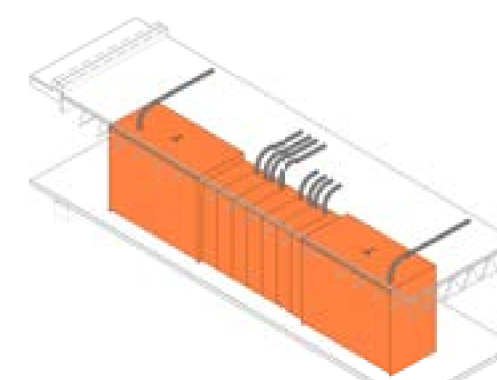
8 .202 E002 - BASEMENT ELECTRICAL ROOM KEYPLAN



1 E100 Equipment Layout - Basement Level (Electrical Rm.)
1 : 50

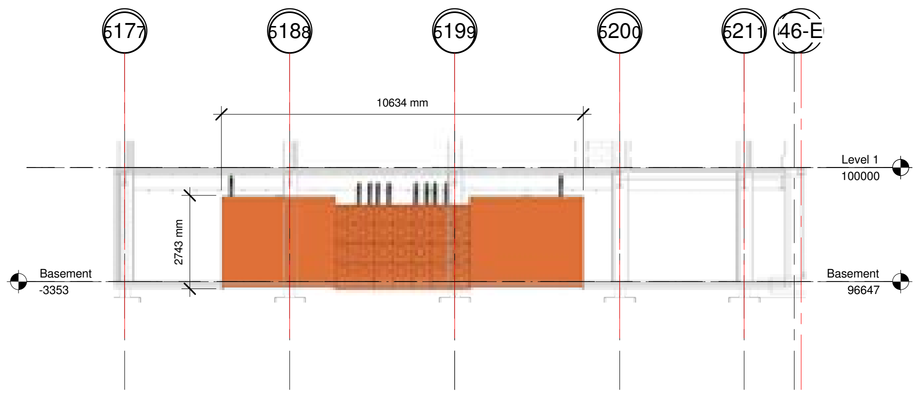


2 E100 HV Switchgear

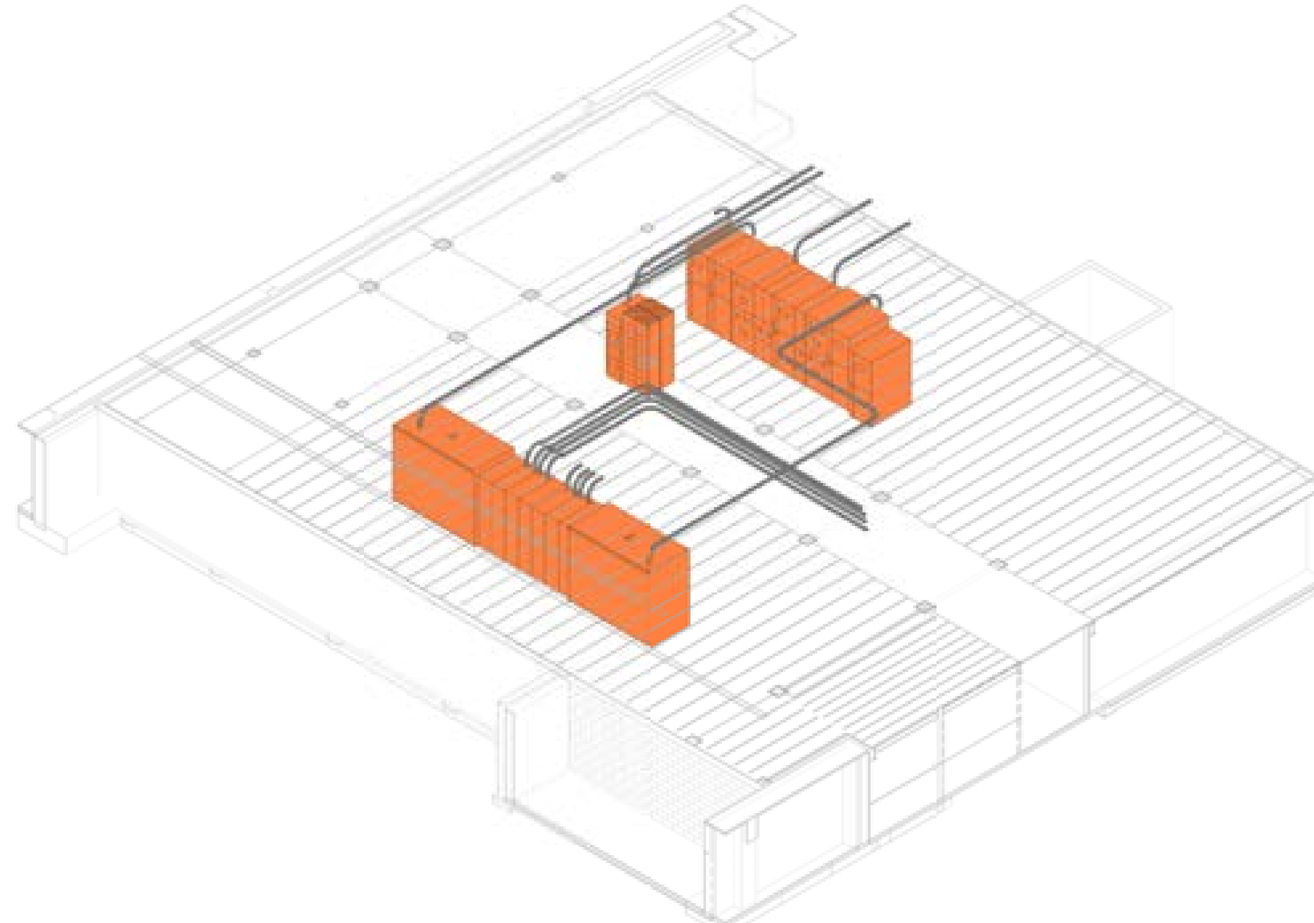


3 E100 600V Switchgear

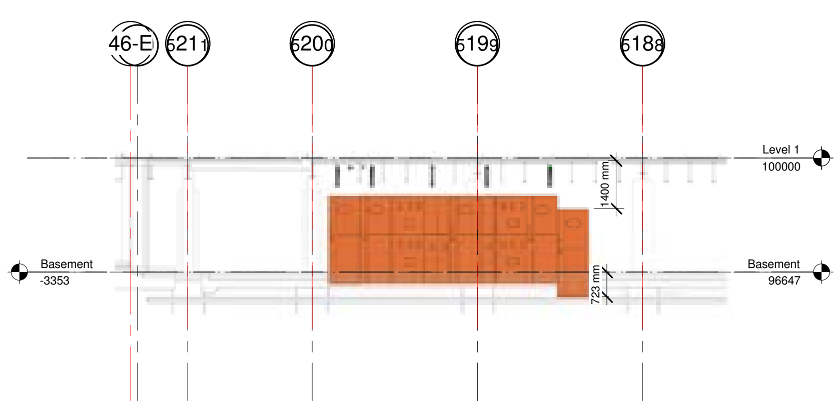
E100 - BASEMENT MAIN HV SUBSTATION



1 E101 600V Elevation (South)
1 : 100

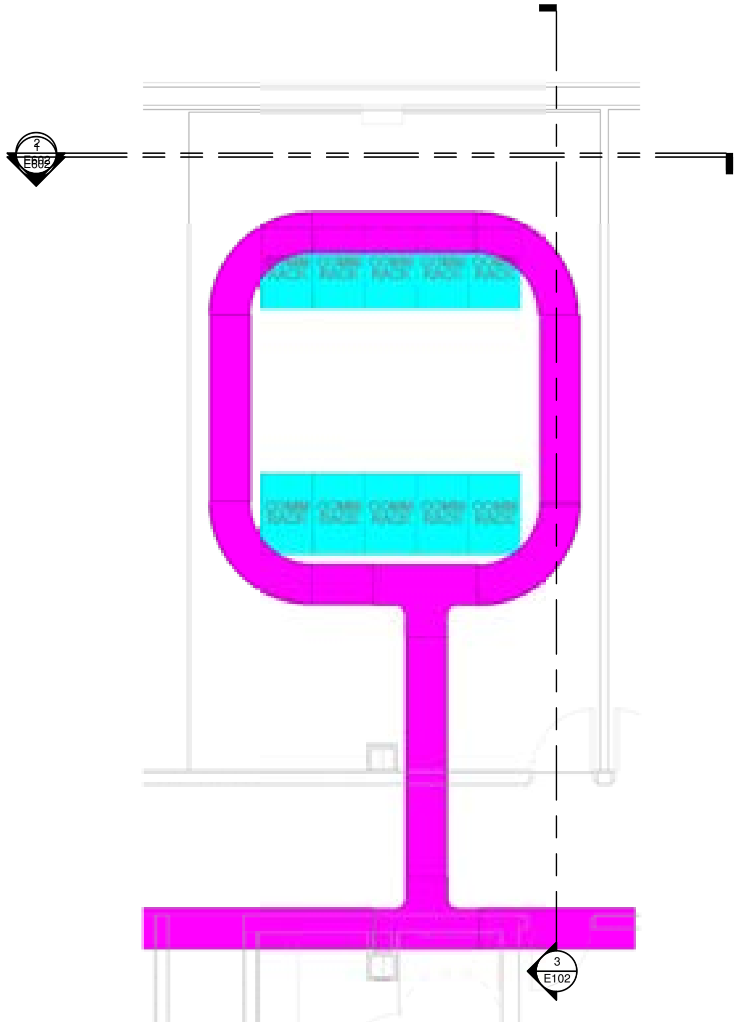


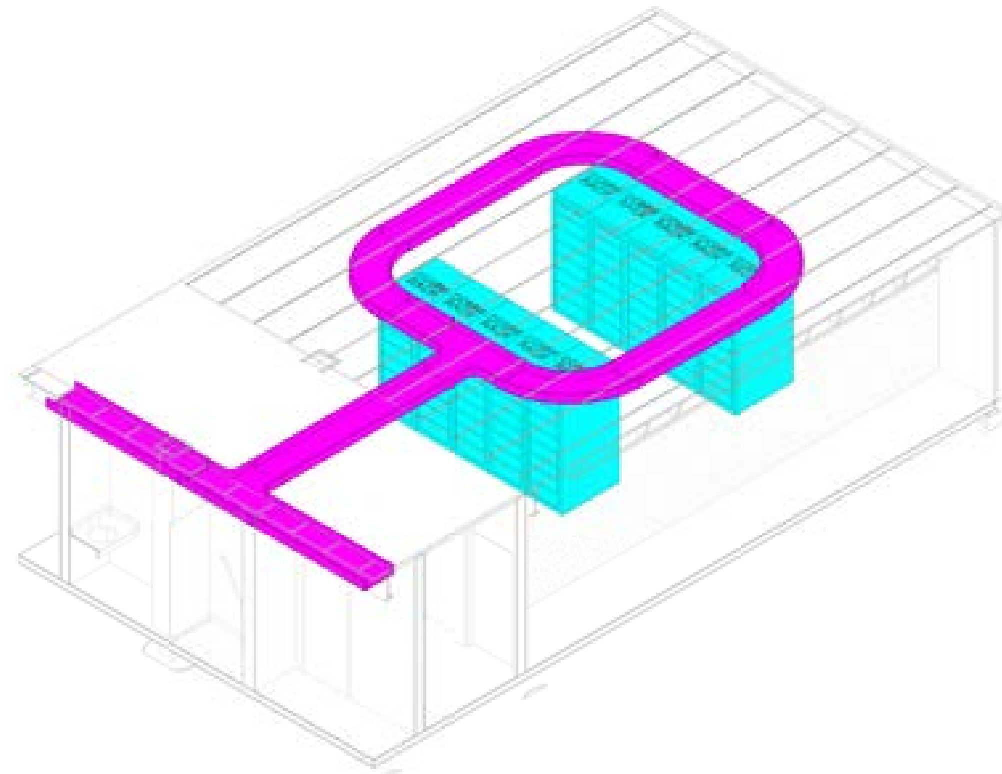
3 E101 HV Substation

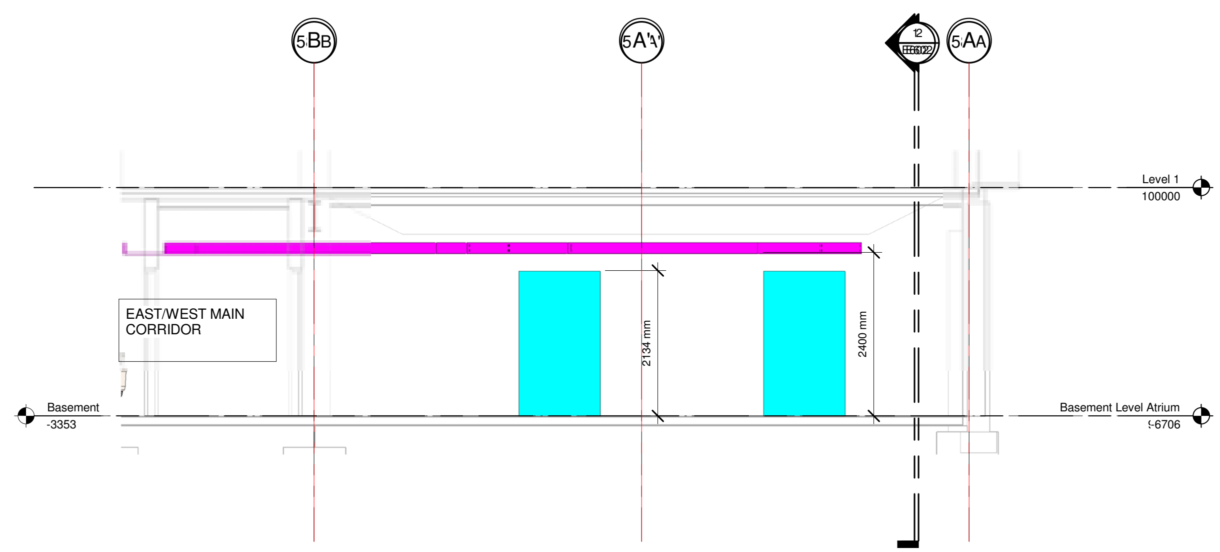


2 E101 HV Switchgear Elevation (North)
1 : 100

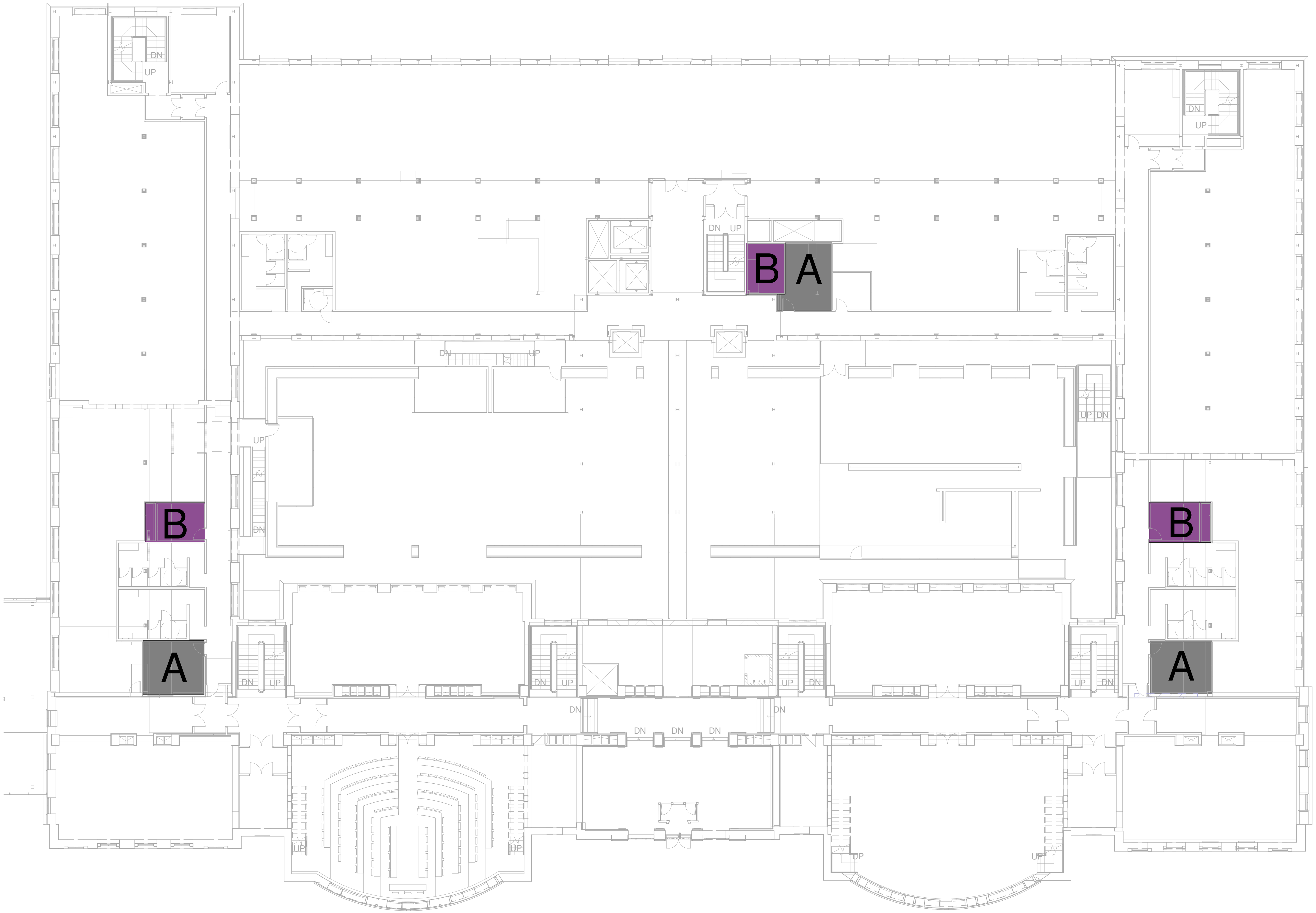
8 .204 E101 - BASEMENT MAIN HV SUBSTATION DETAILS







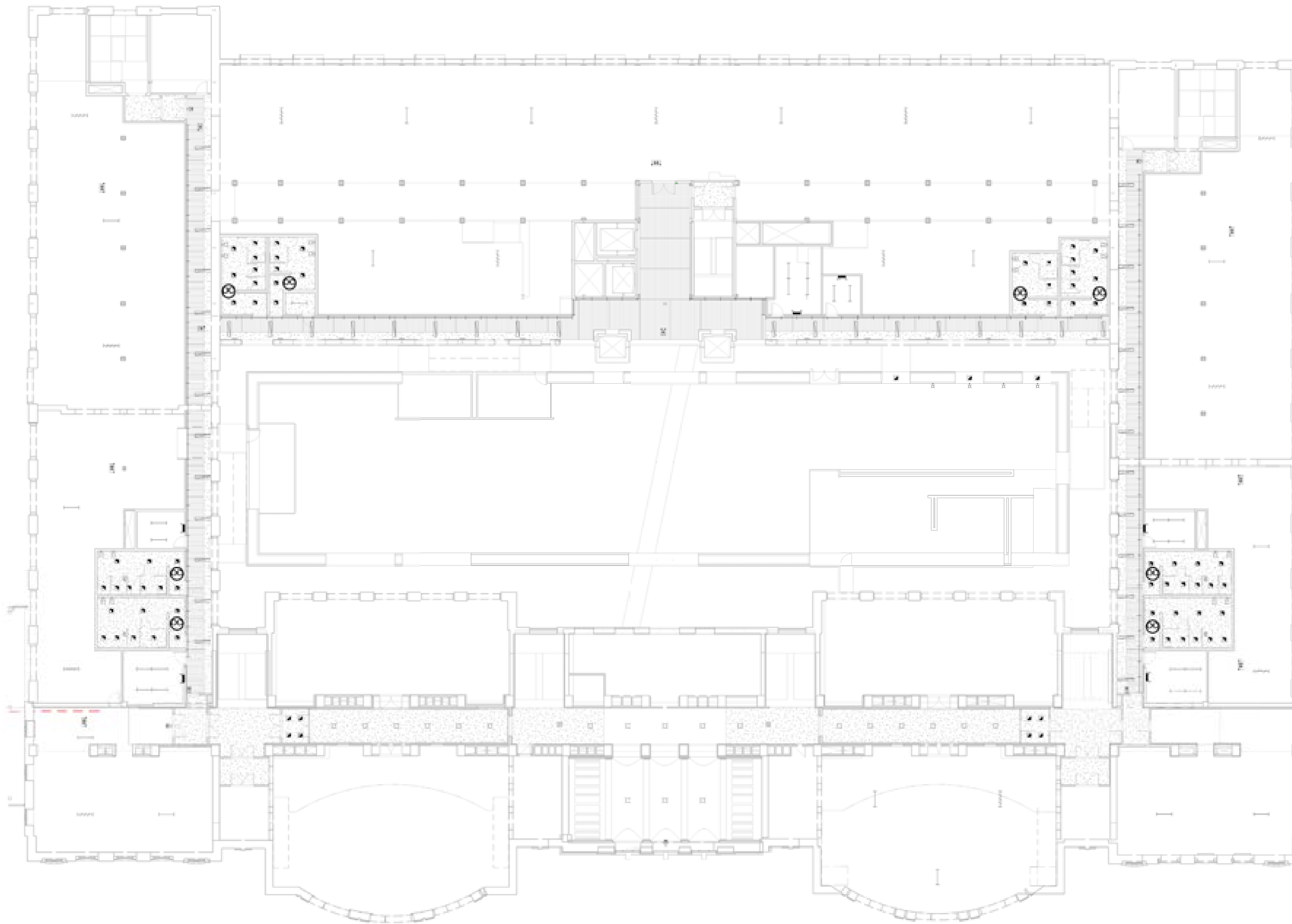
E102 - BASEMENT MAIN COMMUNICATION ROOM



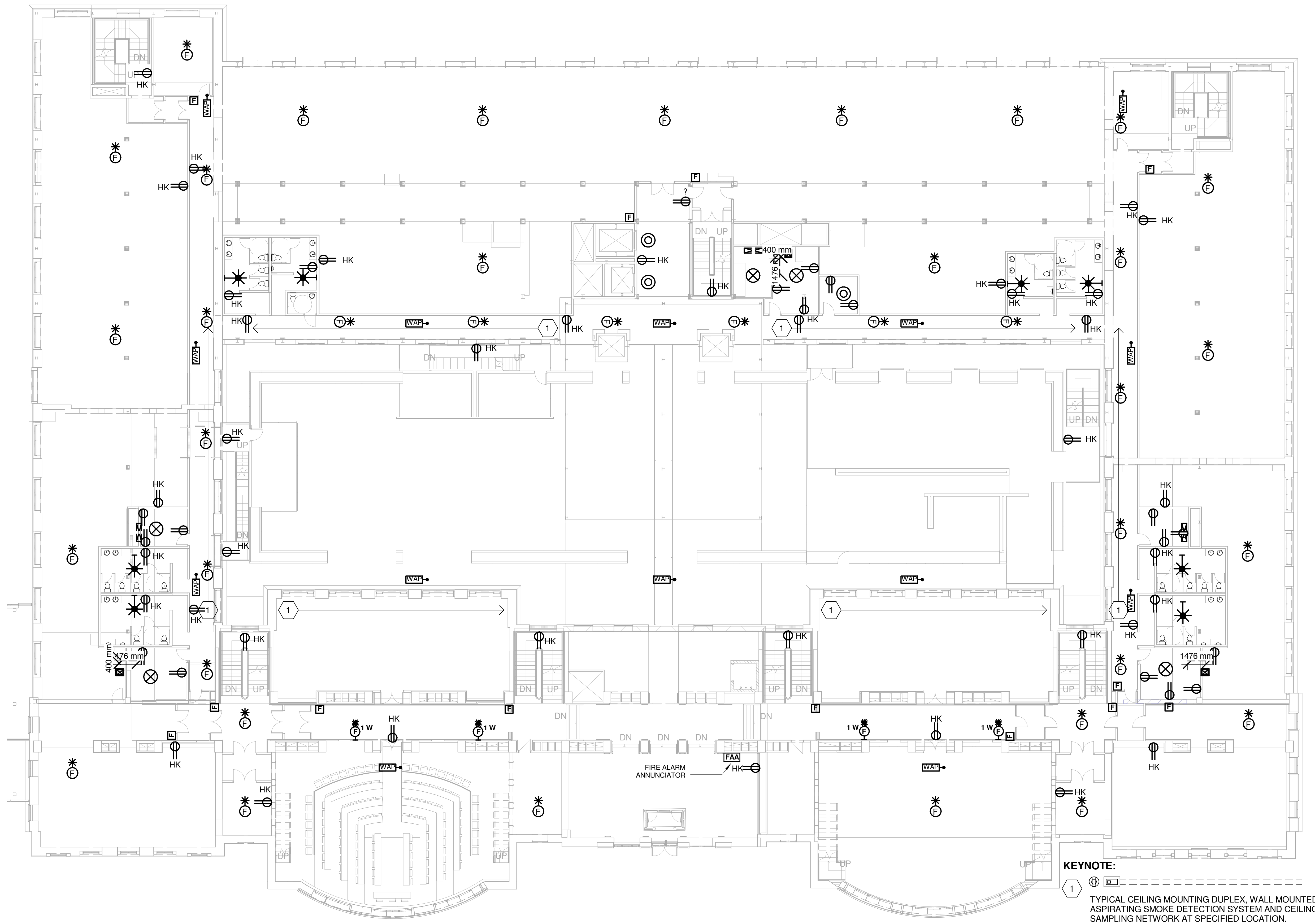
LEGEND

SYMBOL	ELECTRICAL AREA	NOTES:
A	TYPICAL ELECTRICAL ROOM	
B	TYPICAL COMMUNICATION ROOM	

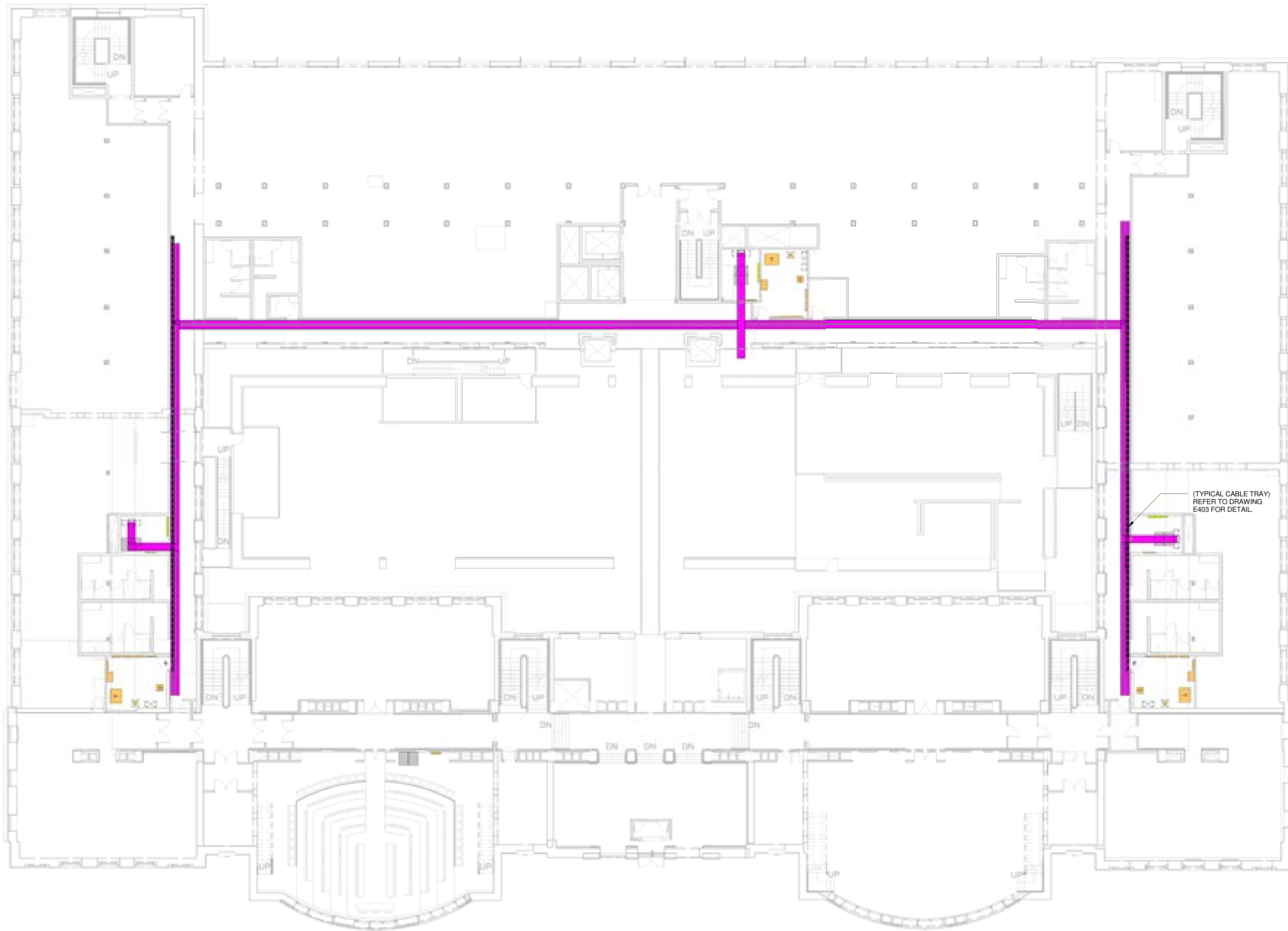
8.206 E103 - ELECTRICAL & COMMUNICATION ROOM KEYPLAN (TYPICAL)



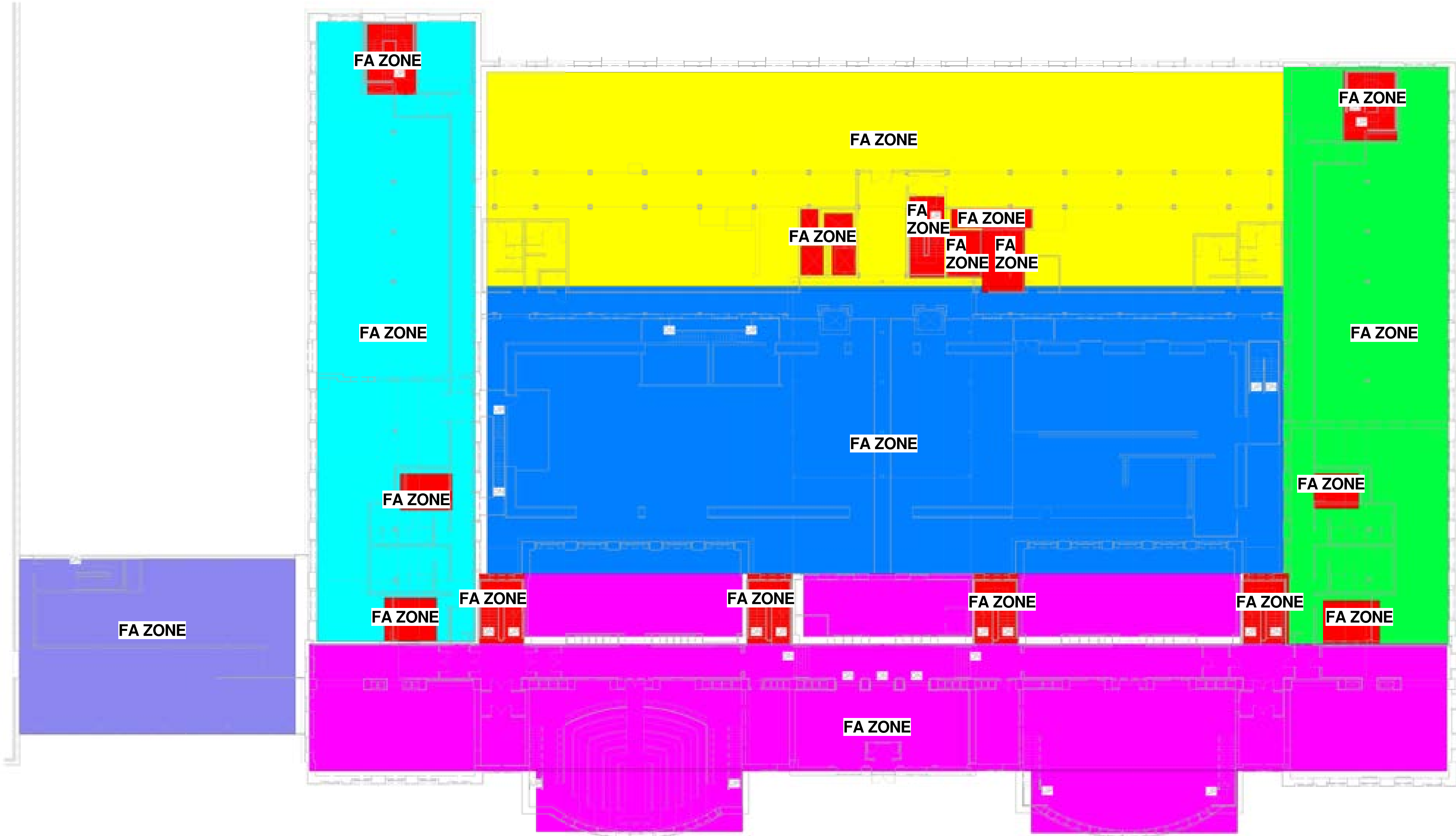
E202 - TYPICAL FLOOR CORE AND SHELL LIGHTING



8 .208 E302 - TYPICAL FLOOR POWER, COMMUNICATION & FIRE ALARM SYSTEM

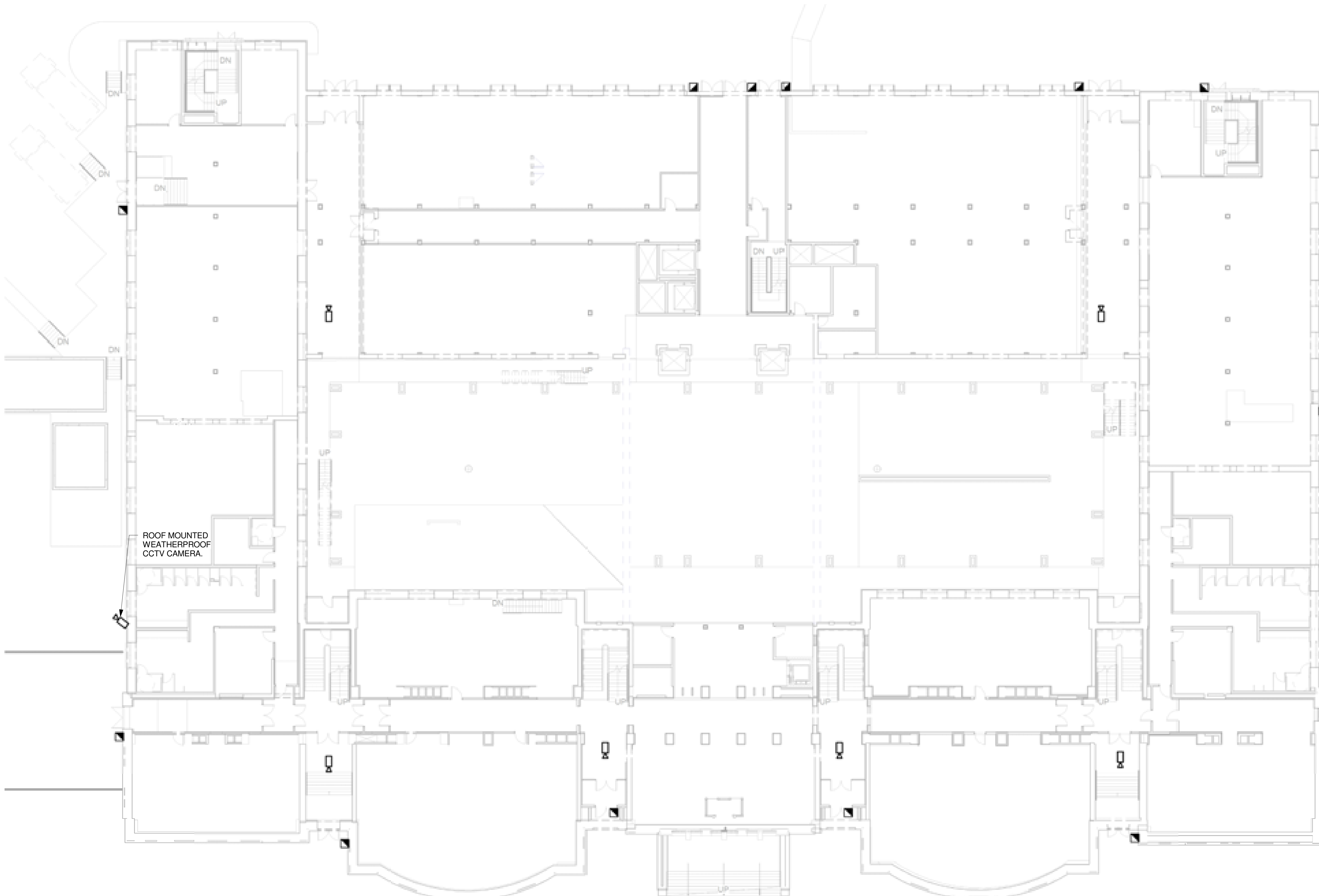


E402 - TYPICAL ELECTRICAL EQUIPMENT LAYOUT (LEVEL 2)

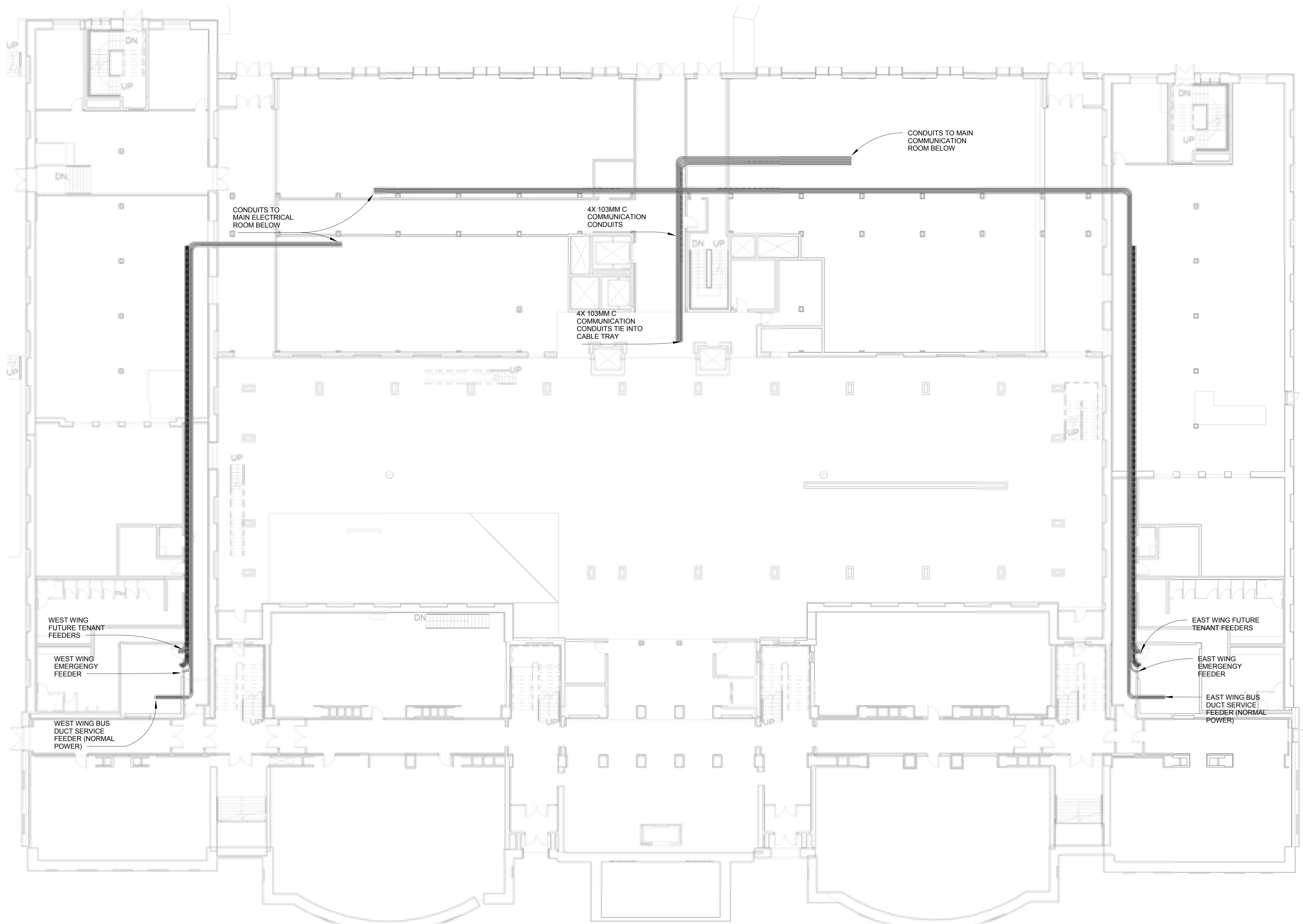


1 E407 Fire Alarm Zones (Typical)
1 : 200

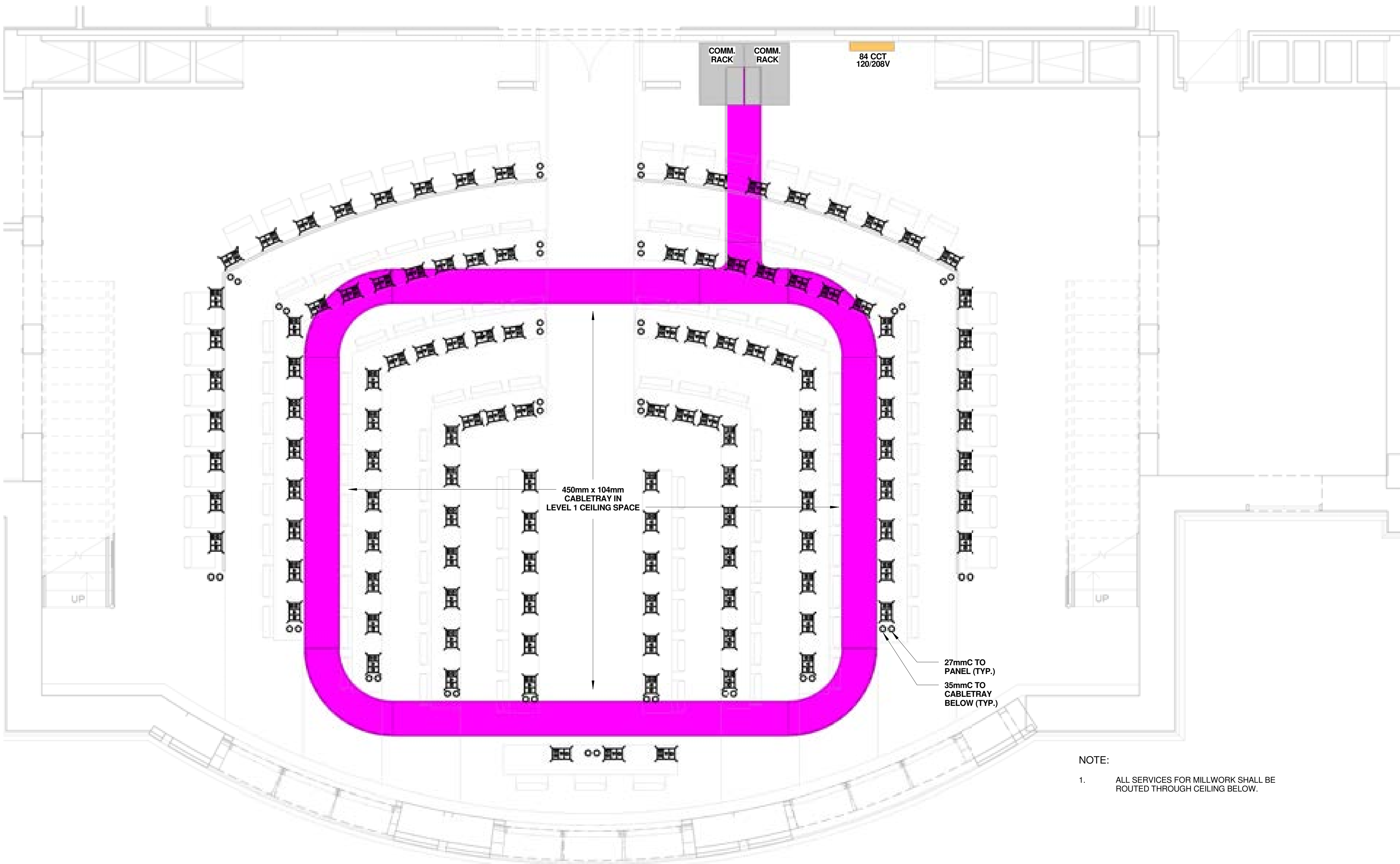
8.210 E407 - TYPICAL FLOOR FIRE ALARM ZONES



E500 - SECURITY AND ACCESS CONTROL - LEVEL 1



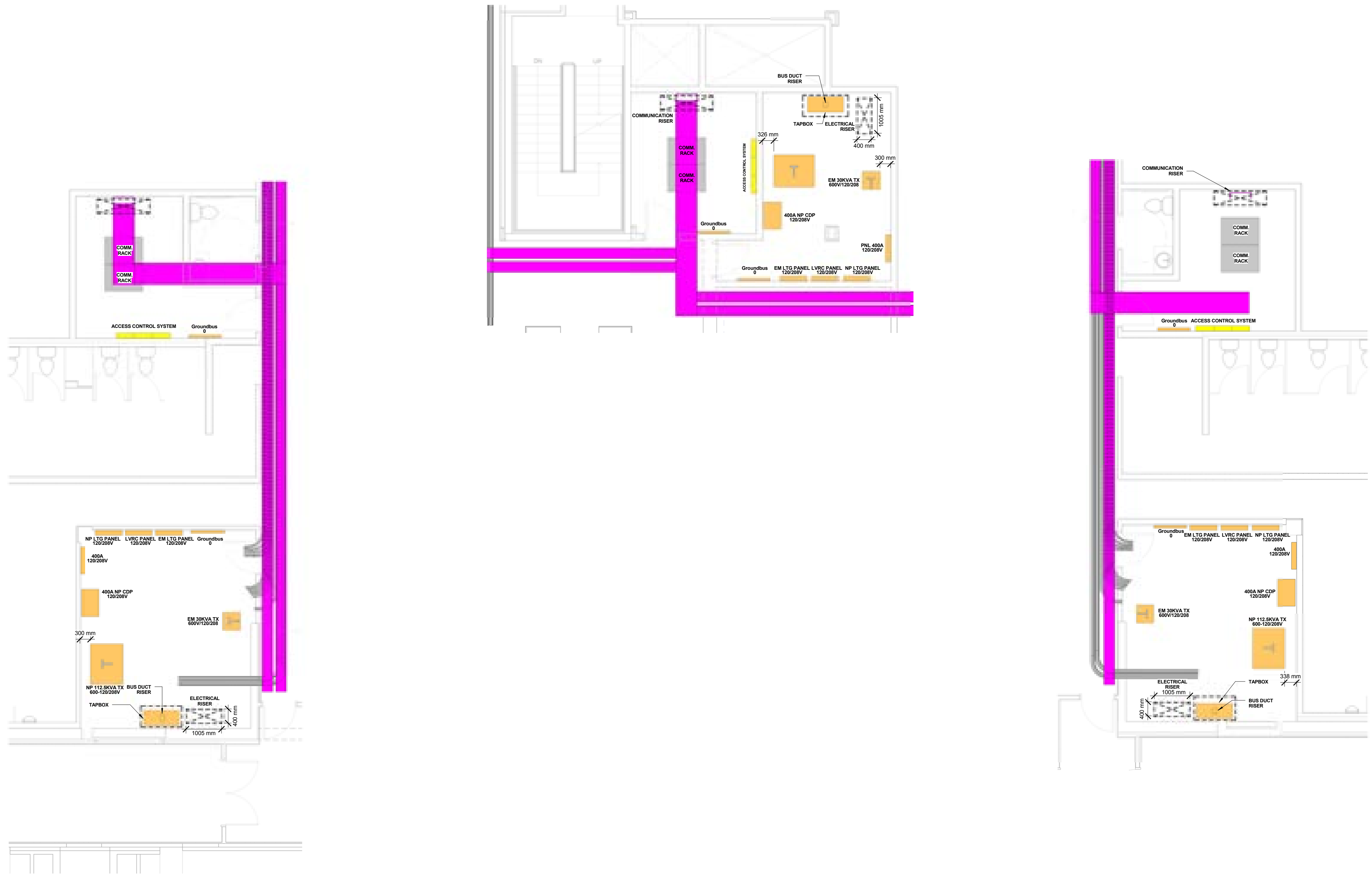
8 .212 MAIN SERVICE CONDUIT - MAIN LEVEL 1-200



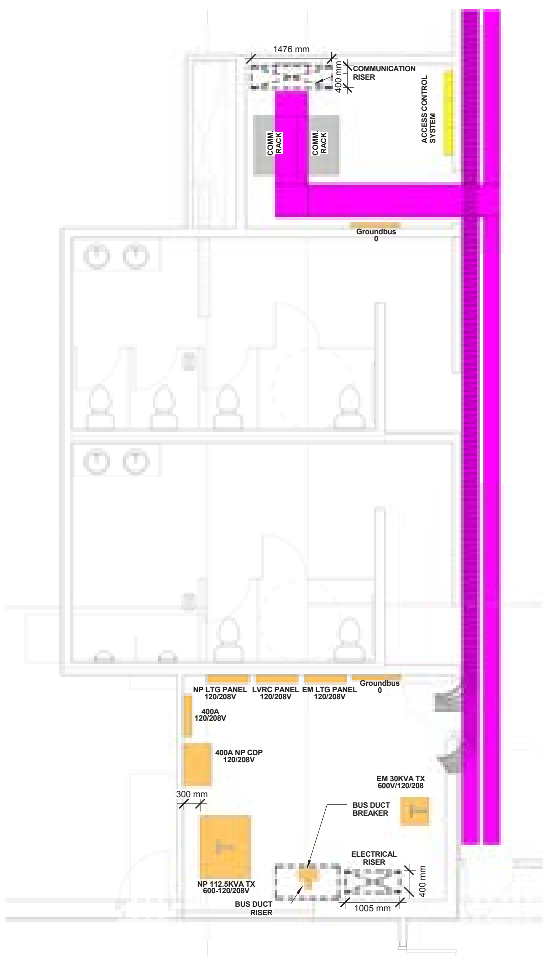
NOTE:

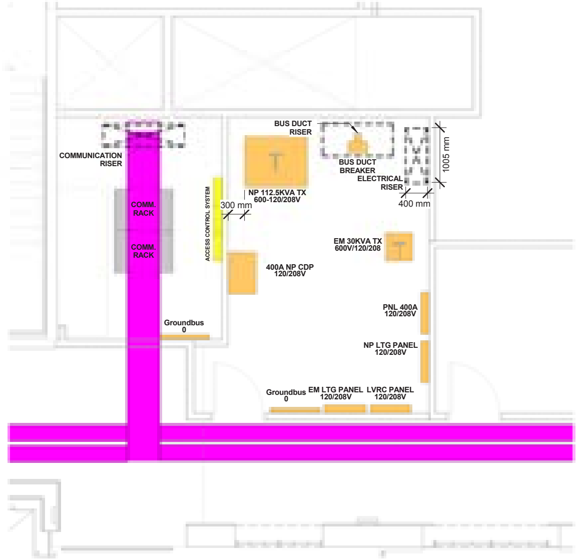
1. ALL SERVICES FOR MILLWORK SHALL BE ROUTED THROUGH CEILING BELOW.

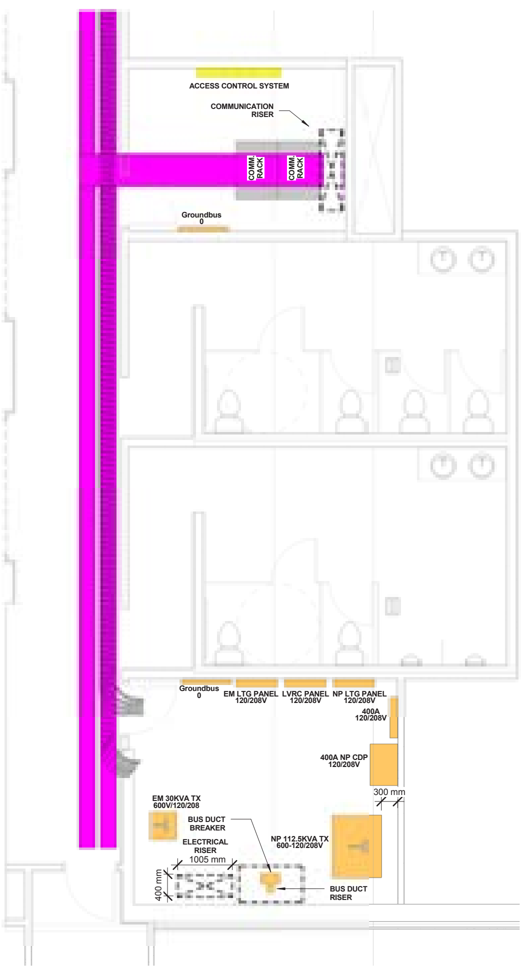
E509 - ELECTRICAL EQUIPMENT LAYOUT (COUNCIL CHAMBER) - LEVEL 2



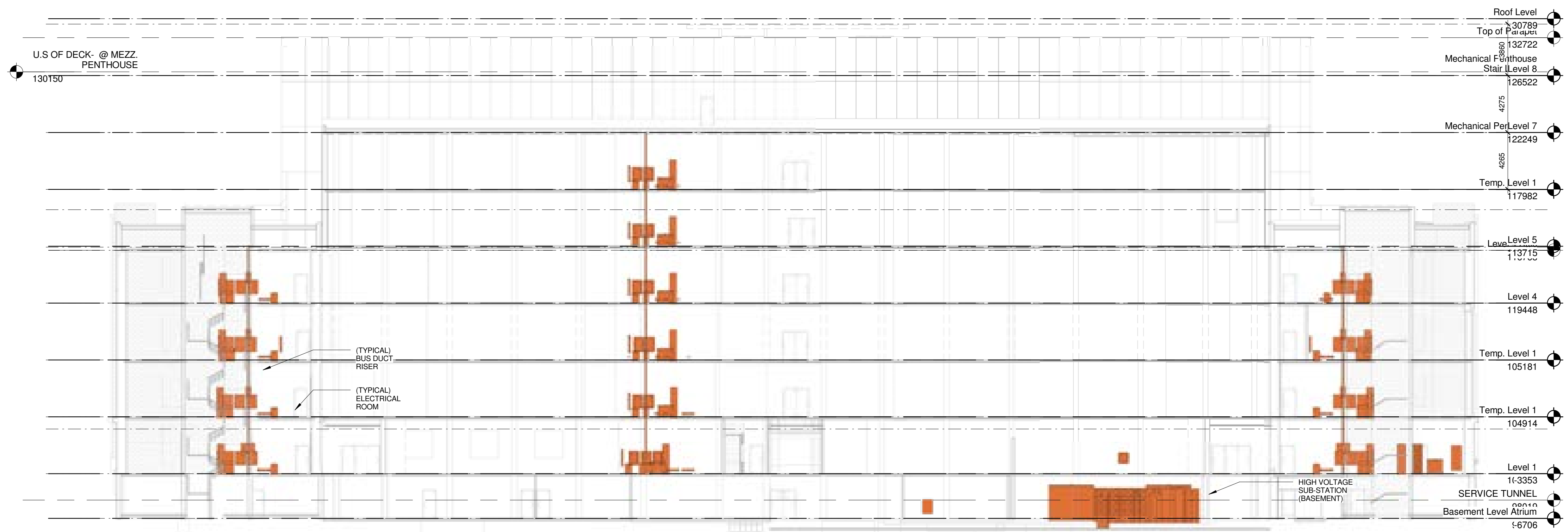
8 .214 E600 - ELECTRICAL & COMMUNICATION ROOM (MAIN LEVEL)



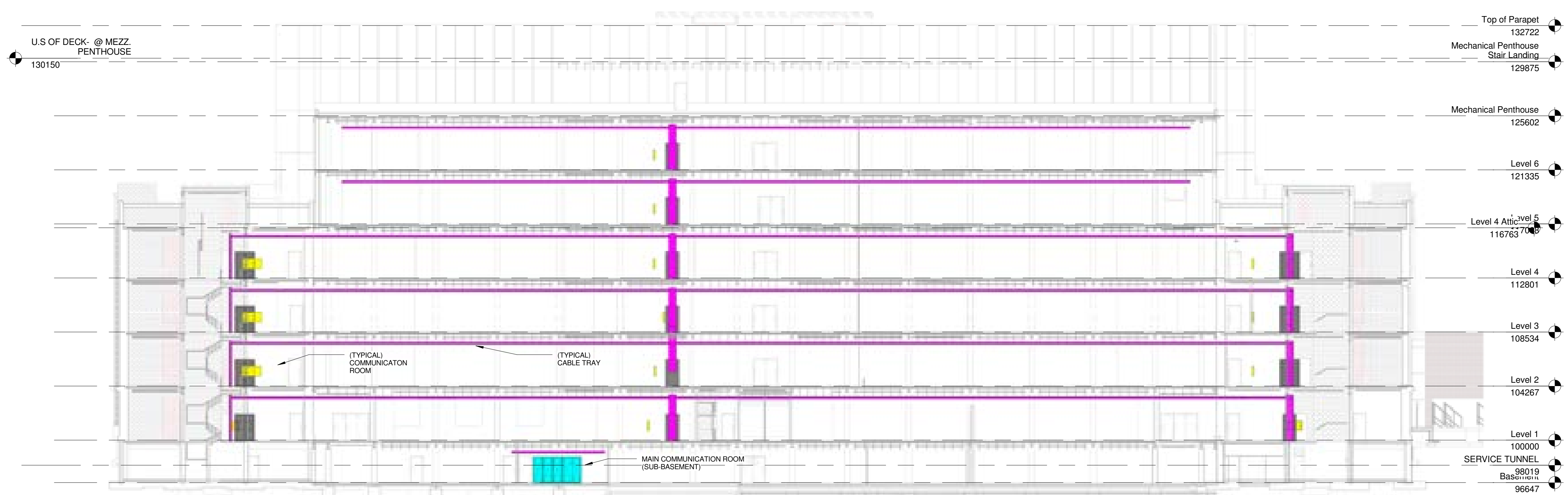




E601 - ELECTRICAL AND COMM. ROOMS EQUIPMENT LAYOUT (TYPICAL)

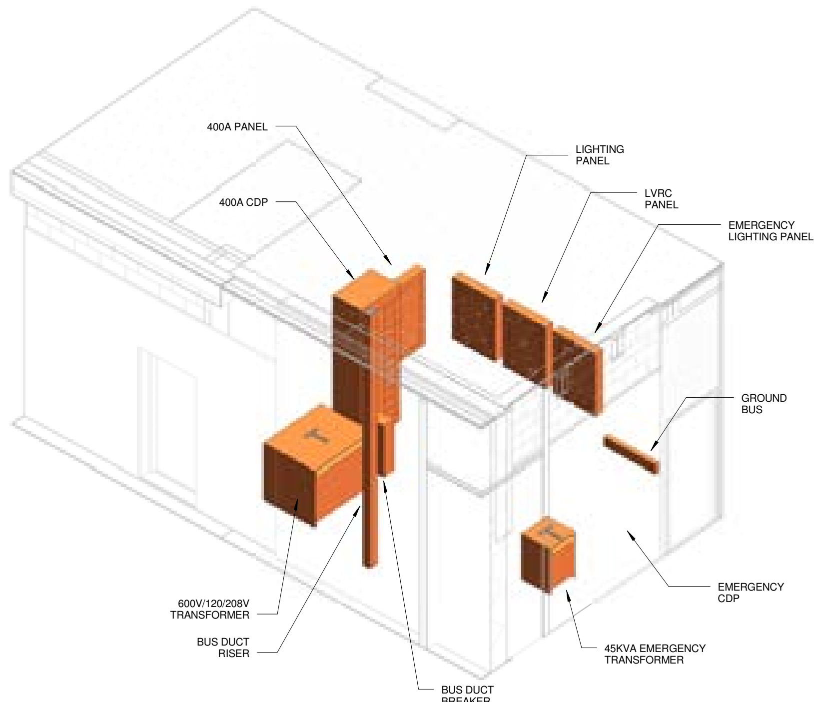


1
E602
South Section Electrical Room
1 : 200

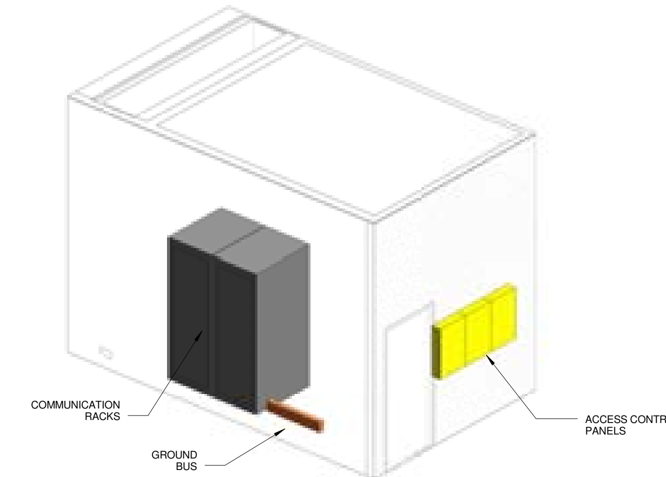


2
E602
South Section - Communication Room
1 : 200

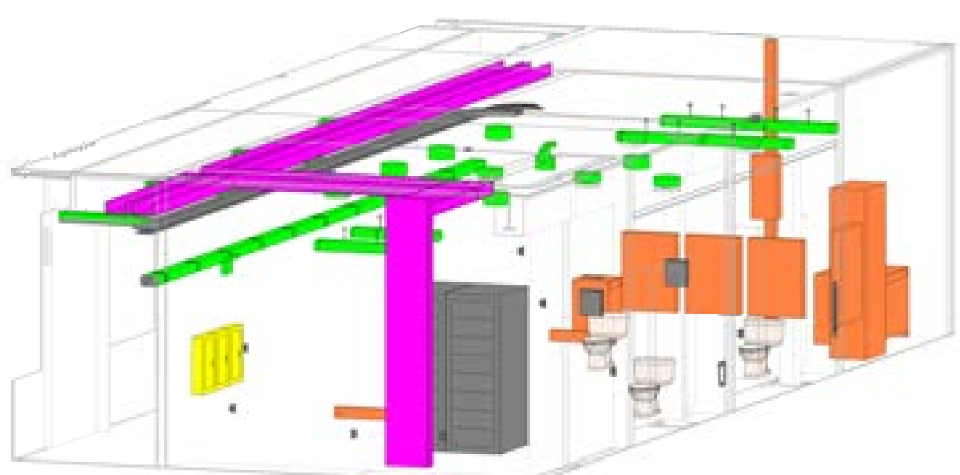
8 .216 E602 - ELECTRICAL SECTION (LOOKING SOUTH)



1 E603 Electrical Room - Equipment Layout (Typical)

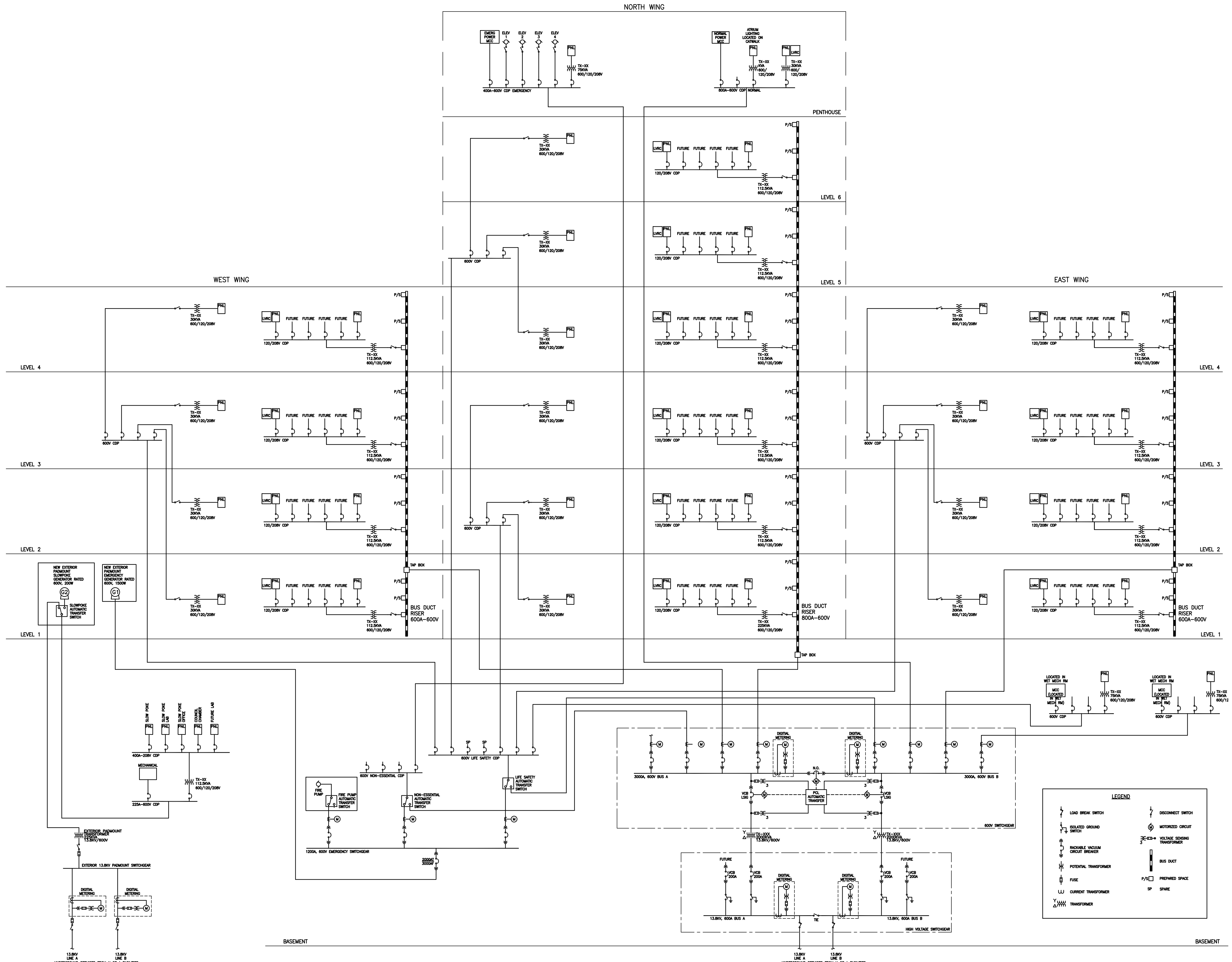


2 E603 Communication Room - Equipment Layout (Typical)

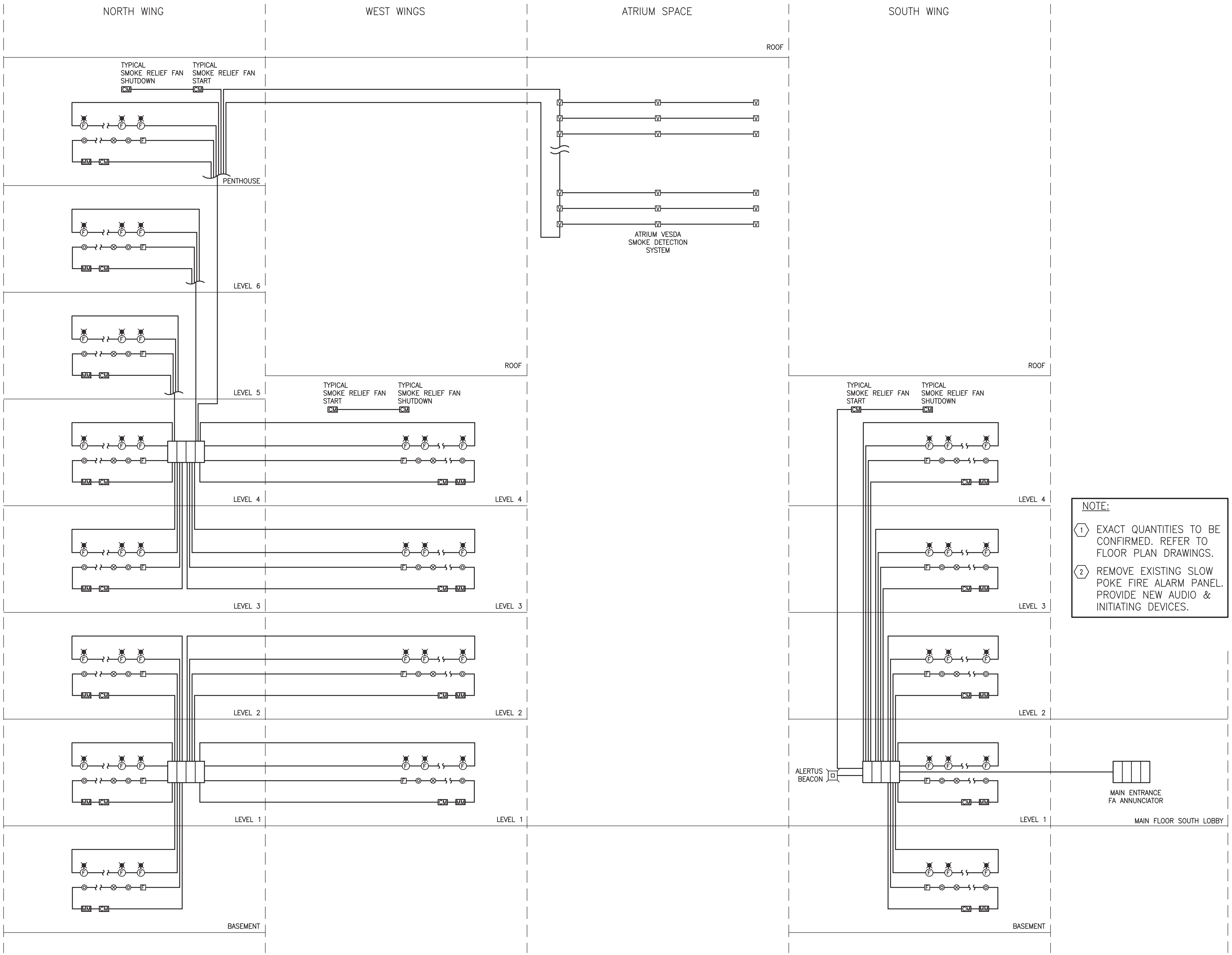


3 E603 TYPICAL CORRIDOR ISO

E603 - TYPICAL DETAILS



8.218 E700 - SINGLE LINE DIAGRAM



NOTE:

1. EXACT QUANTITIES TO BE CONFIRMED. REFER TO FLOOR PLAN DRAWINGS.
2. REMOVE EXISTING SLOW POKE FIRE ALARM PANEL. PROVIDE NEW AUDIO & INITIATING DEVICES.

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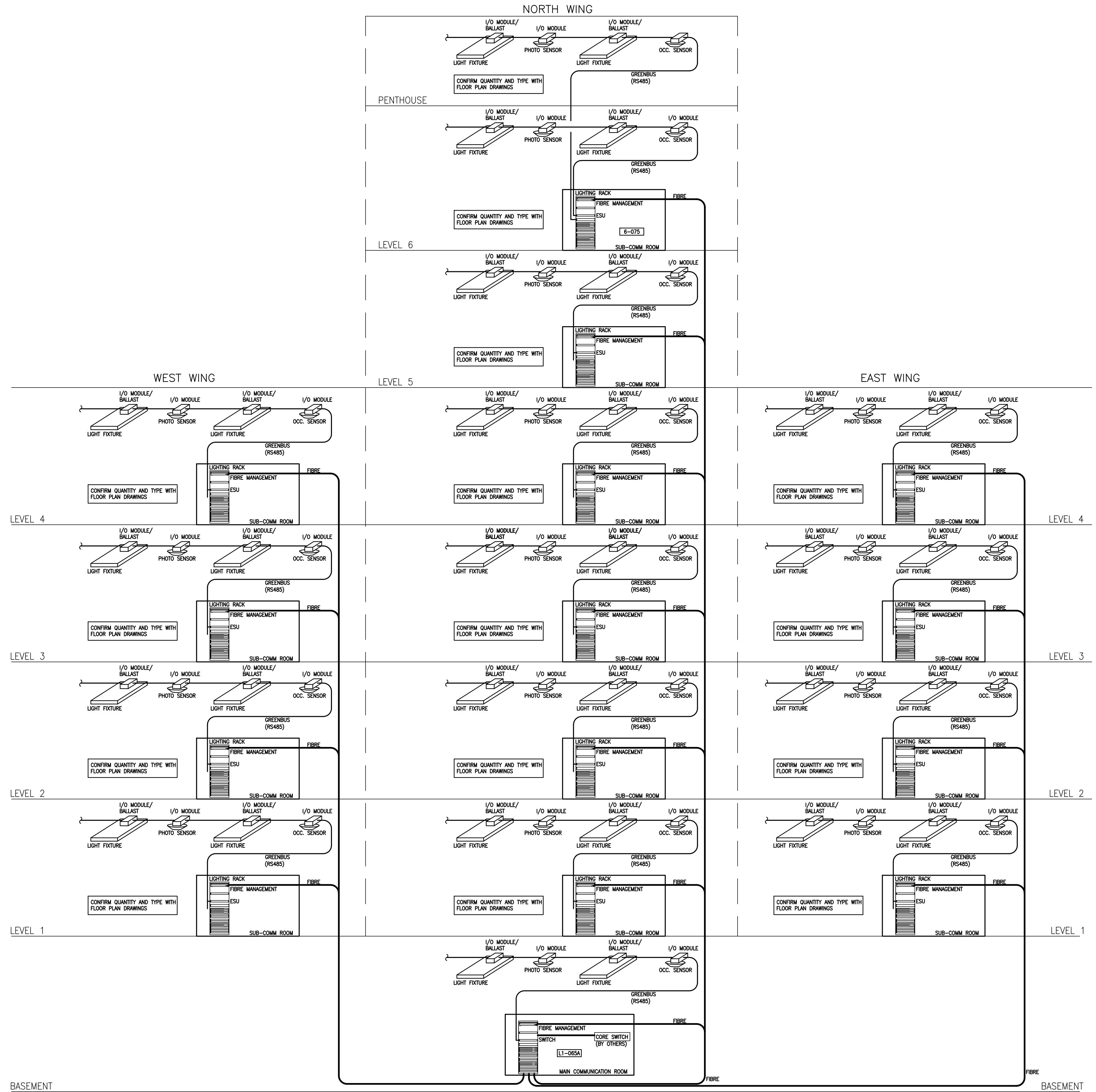
DENTISTRY PHARMACY BUILDING REDEVELOPMENT

8. ELECTRICAL

ELECTRICAL DRAWINGS

E701 - FIRE ALARM RISER



8 .220 E702 - LIGHTING CONTROL RISER DIAGRAM

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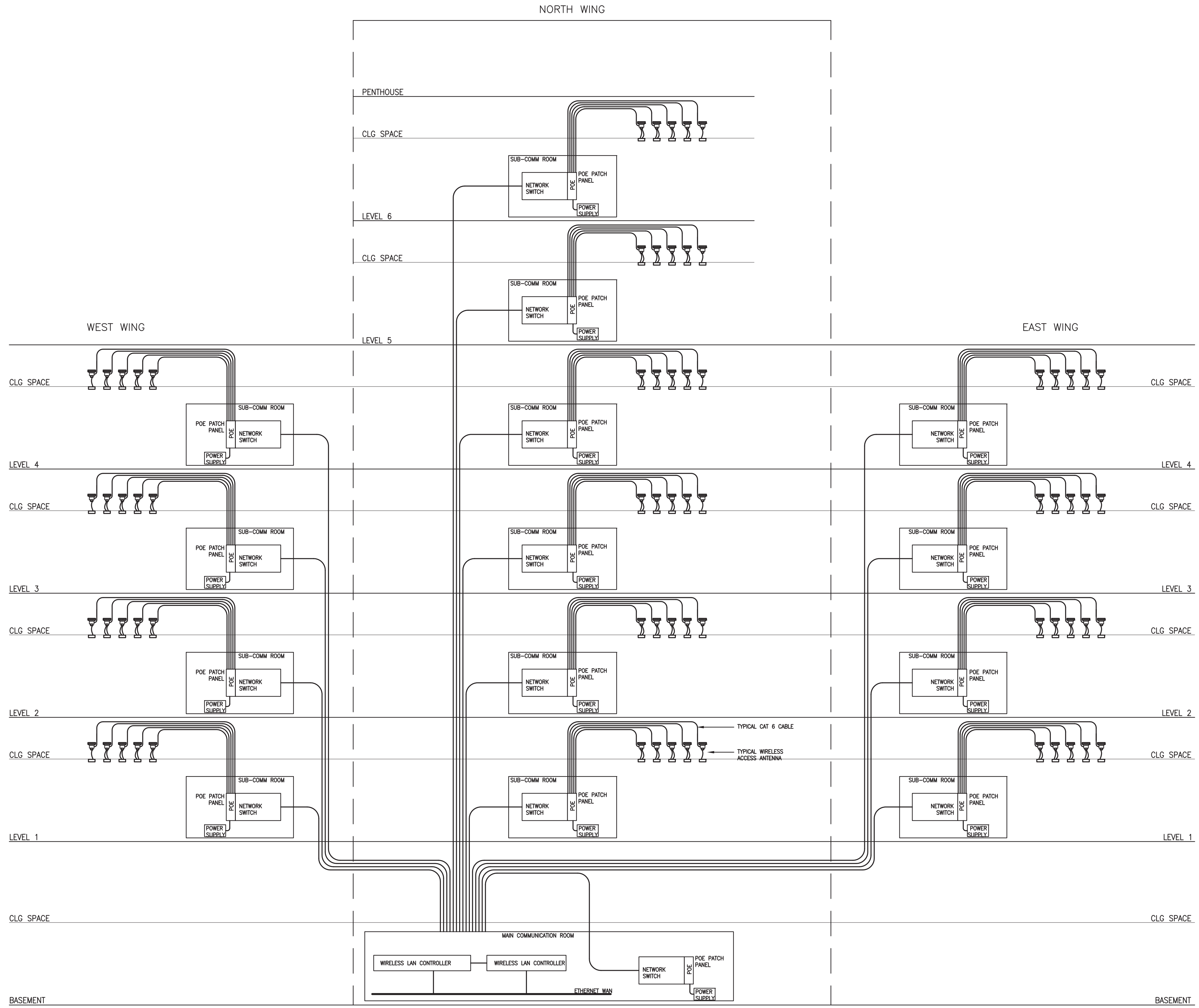
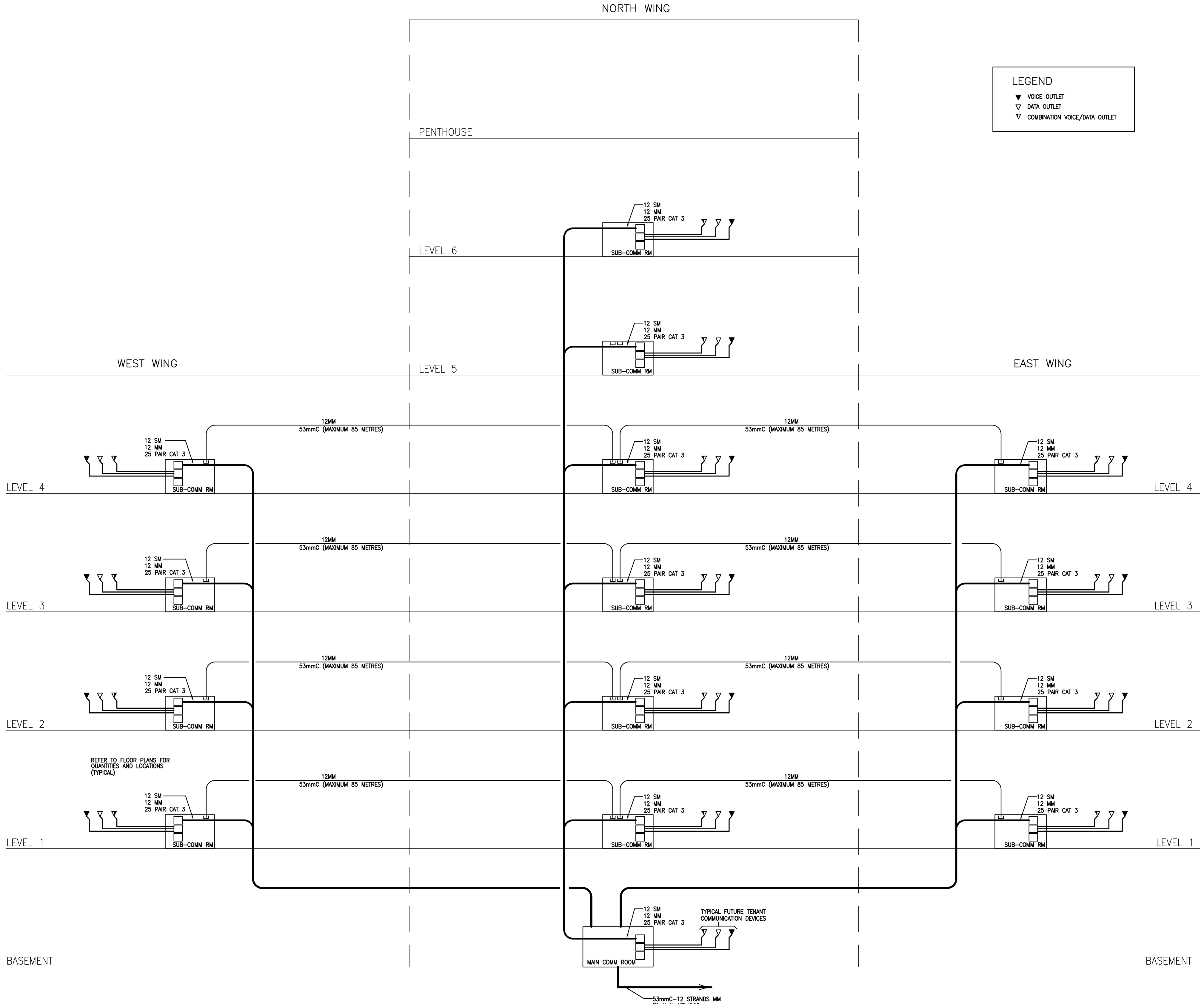
DENTISTRY PHARMACY BUILDING REDEVELOPMENT

8. ELECTRICAL

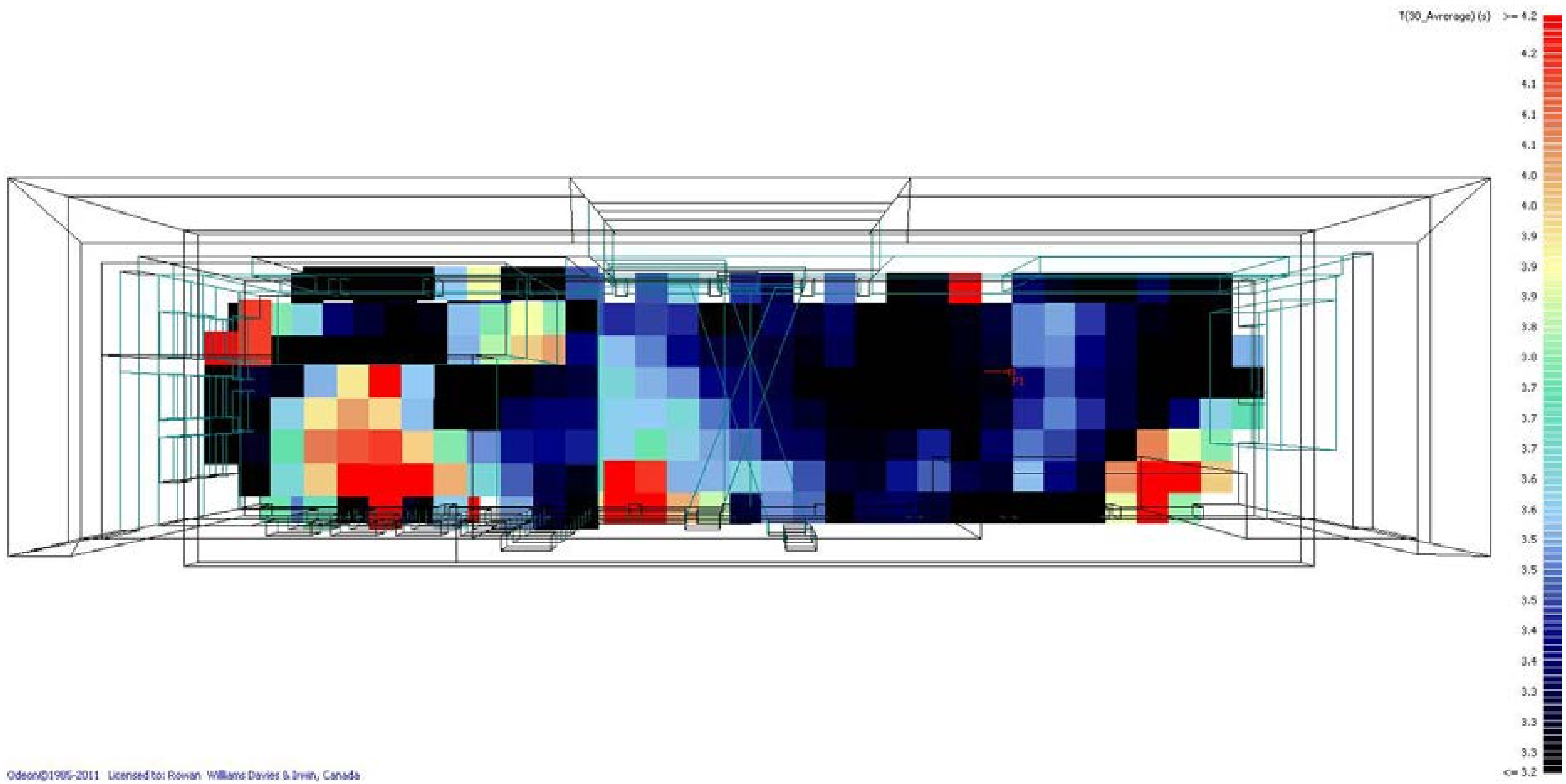
ELECTRICAL DRAWINGS



E703 - WIRELESS LAN RISER DIAGRAM



8 .222 E704 - COMMUNICATION SYSTEM RISER DIAGRAM



Reverberation Time (RT60) Plot of Proposed Finishes (3 to 4 seconds)

ATRIUM ACOUSTIC DESIGN REVIEW

RWDI has developed a three-dimensional acoustic model of the Atrium using the Sketchup model provided by Stantec Architecture on January 28, 2013. The acoustic performance of the Atrium has been evaluated in detail using ODEON Room Acoustics software. This summary provides results for four design scenarios:

- Scenario 1 – current geometry without any acoustical treatment
- Scenario 2 – current design
- Scenario 3 – current design with recommended additional acoustical treatment
- Scenario 4 – current design with sill grilles

Auralizations for each of the scenarios were created from the acoustic models and are are available upon request. The reverberation time without acoustical treatment would be about 6.0 seconds; with the acoustical treatments currently included in the design the overall reverberation time is about 3.2 seconds; with the additional treatment recommended the overall reverberation time on average is about 2.3 seconds; and the overall reverberation time of the current design with the addition of sill grilles will be about 3.0 seconds.

The auralizations are based on a person speaking to a group of listeners using a representative distance of 10m. The simulation is for a speaker standing on the podium, facing across the room (i.e. across the short dimension of the atrium). This simulation was based on the assumption that the atrium might occasionally be used for a speaker to address a small gathering of people. While we understand that there is no definite plan to accommodate such use of the atrium, it seems to be a reasonable scenario that will provide an impression of the acoustic characteristics of the room.

The design team has advised that having listened to the auralizations they did not perceive a noticeable difference in speech intelligibility between the as-designed scheme and the option to add additional acoustic insulation. The design team will continue to work with RWDI in the next stage of the project to refine the acoustic performance of the project relative to the capital costs and report to the steering committee.

We understand that there has been some discussion of the possibility of addressing groups of up to 300 persons in the atrium, on an infrequent basis, with the audience likely to be seated at tables. This use of atrium would require a carefully arranged speaker system, incorporating at least 6 individual speakers with time delays, to provide reasonable speech intelligibility. An appropriate system could be purchased or rented by the University.

As requested, RWDI has summarized the relevant acoustic design requirements of slat/slot ceilings, in terms of the percentage of open area and width of the slats.

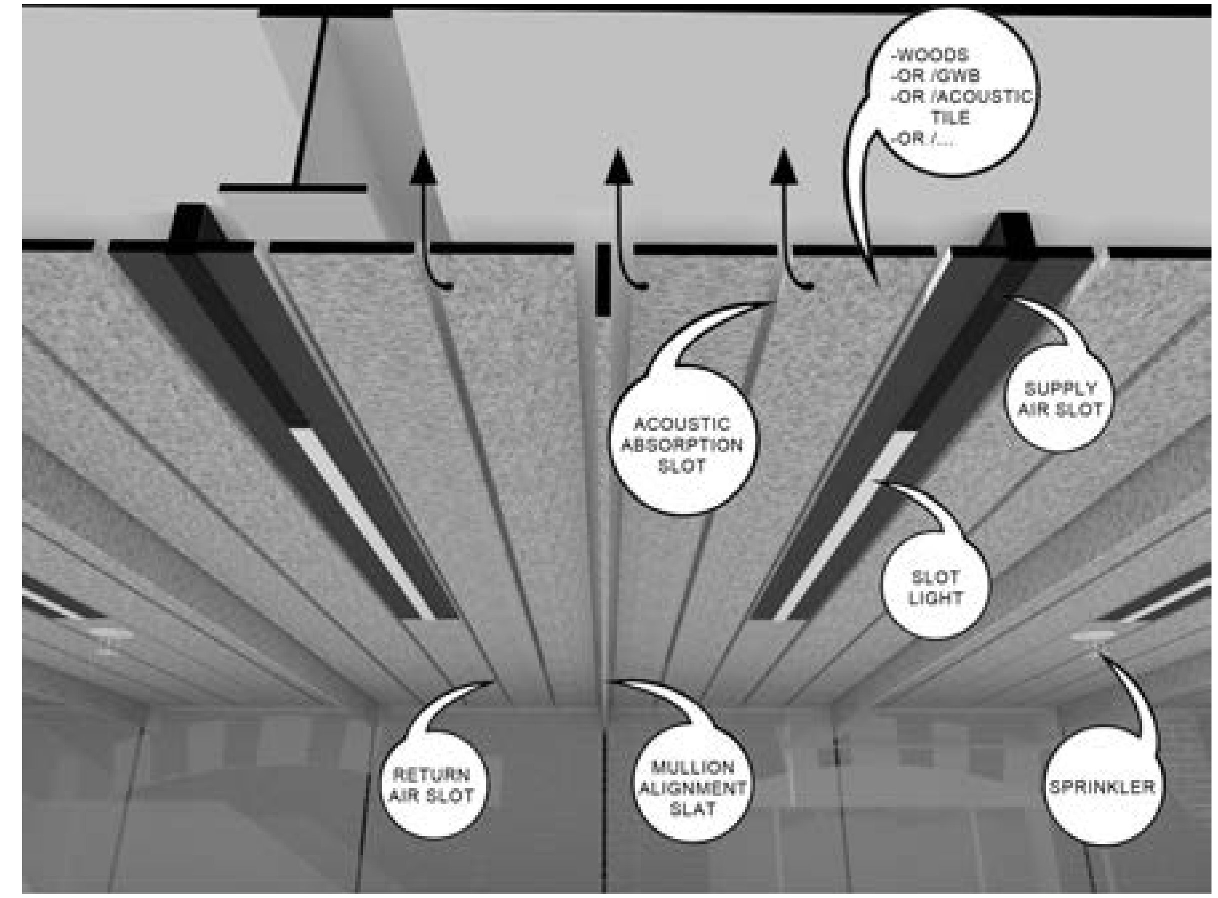


Figure 1 – ‘Slats and Slots’ ceiling sketch (provided to RWDI on March 1, 2013) marked up with comments concerning acoustics.

For reference, here are some examples of similar commercially available wood slat ceiling systems:

- 9Wood Panelized Linear Ceiling (http://9wood.com/styles/index/2100)
- Hunter Douglas Multi-Box 2 Ceiling (http://www.hunterdouglascontract.com/ceilings/woodwright)
- BCL Acoustic Ceilings (http://www.bcltimberprojects.co.uk/internal-products/internal-ceilings.html)

From an acoustic perspective, the main issue is to keep the open area between the slats to a minimum of 20% of the total area – we have shown an example for 25% open area, which we recommend. For any of the four locations (atrium, corridors, offices or suspended meeting rooms), we suggest a configuration similar to that shown in the slats/slots sketch – 60mm slats with 20mm slots. The airspace behind the slat/slot ceiling should be as great as possible/reasonable; this will improve the low frequency performance of the slat/slot ceiling, which is helpful in reducing the ‘boominess’ of a space.

For the atrium, we recommend that the slab above the slat/slot ceiling be covered with 100mm of acoustically absorptive material having a minimum density of 48 kg/m3 (3pcf). One alternative is Johns-Manville duct liner board. This will also be helpful in absorbing low frequency noise from HVAC equipment. For meeting rooms, offices and corridors we recommend 50mm of this material above the slat ceiling. In locations where return air flow through the slat/slot ceiling is not required, the absorption should be placed directly above the slot/slat ceiling over an acoustically transparent fabric. Again, this will improve low frequency sound absorption.

For Scenario 3, in addition to the acoustic wood slat ceiling and acoustic slat wall (as shown in purple in Figures 1&2), we have examined the reverberation times that would result from adding 500 m2 of acoustic finishes (as shown in red in Figures 1&2) having a Noise Reduction Coefficient (NRC) of about 0.7. There are many acoustic products available to suit a desired aesthetic (i. e. plaster, wood, metal, and stone).

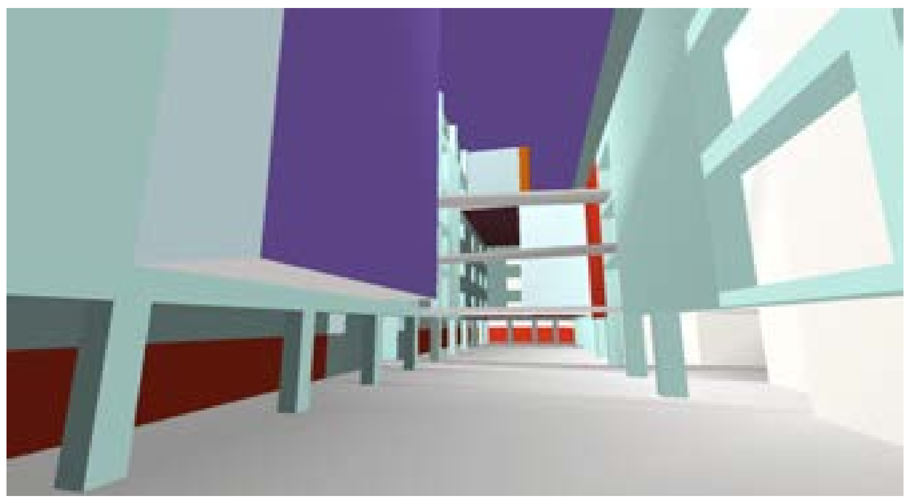


Figure 2 – Atrium with Recommended Acoustical Treatment (Facing East from Ground Level)

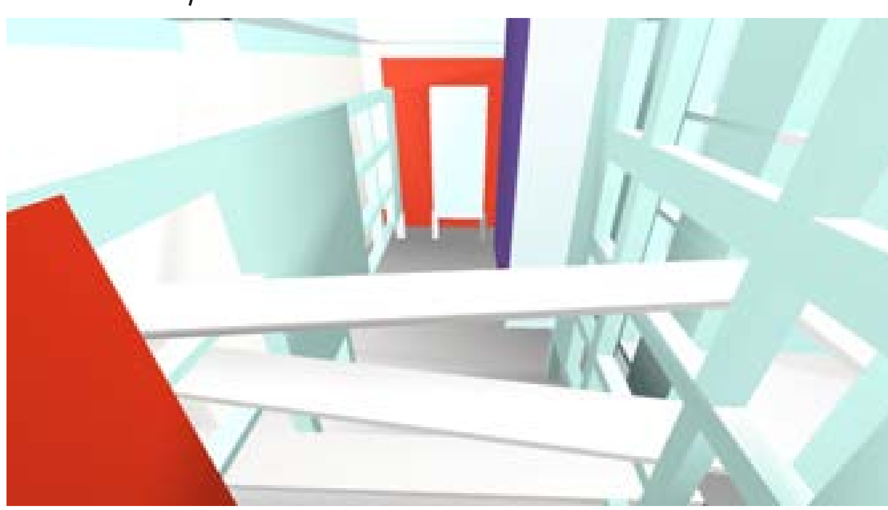


Figure 3 – Atrium with Recommended Acoustical Treatment (Facing West from Upper Level)

Adding a total of about 500 m2 of acoustically absorptive finishes, both in the interior of the atrium and in the outer coupled volume, provides a significant reduction in reverberation time from 3.2 to 2.3 seconds overall, and will improve speech intelligibility within the space. Speech intelligibility will depend on the mechanical system background noise, the reverberant level in the room, and the direct noise created by competing conversations from various groups within the atrium. These calculations assume that acoustical ceiling tile will generally be used for the ceilings other than acoustic wood slat ceiling.

For Scenario 4, we have investigated the effect of adding 'sill grilles' to the current design on the overall reverberation time of the atrium. The sill grille positions were indicated in a drawing provided to RWDI on March 1, 2013 and are shown in light purple in Figure 3. The reverberation time with the sill grilles will be approximately 3.0 seconds overall, this is a reduction of about 0.2 seconds from the current design. The sound absorption property of the sill grilles has been modelled as about NRC 0.7; if the sill grilles are kept in the atrium design, the slat and slot dimensions, and acoustic insulation thickness, density and placement should be reviewed to confirm their sound absorption performance.

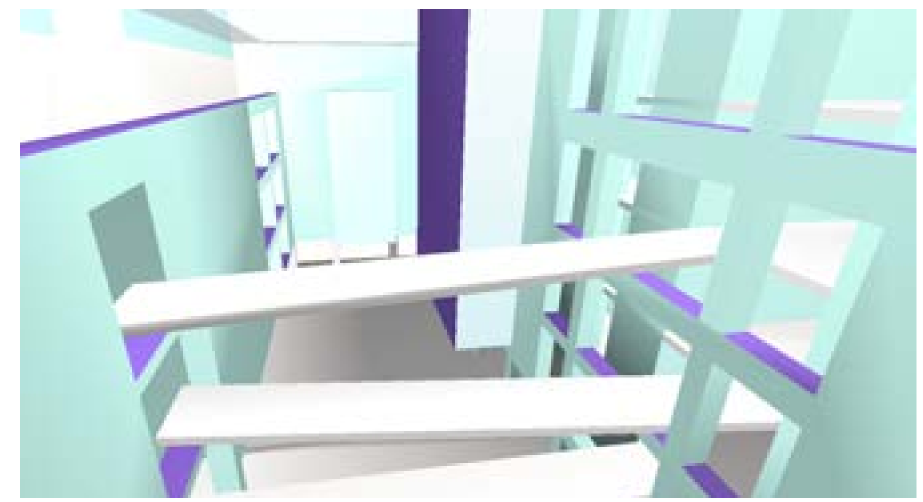


Figure 4 – Atrium with Sill Grilles (Facing West from Upper Level)

Stantec
Architecture Ltd.

UNIVERSITY OF ALBERTA

New Elevator Planning Report

Dentistry Pharmacy Building Redevelopment
Edmonton, AB

April 4, 2013

Prepared By:

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Engineering & Consulting
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Table of Contents

Elevators Dentistry Pharmacy Building Redevelopment New Elevator Report

1. SUMMARY

The purpose of this report is to provide details of the proposed elevator design and options for the new elevators proposed for the Dentistry Pharmacy Building Redevelopment project at the U of A North Campus. The report provides preliminary information on the proposed type and size of elevator and provides comments on the configuration of the elevators and dispatching options available.

2. EQUIPMENT REQUIREMENTS

Based on plans provided and information discussed we understand that portions of the building would be demolished and a new central atrium would be constructed to connect the floor levels of the various existing building wings. A central grouping of elevators is proposed comprised of four elevators. One car would be arranged as a service elevator to serve a dual purpose as both a passenger elevator that operates with the group and also as a service elevator when needed for dedicated service purposes.

The building would be comprised mainly of offices and administration functions on the upper floors with the exception of the 1st and 2nd floor levels where there would be some assembly uses, lecture theatre, council chambers, etc. The 1st floor level would have exterior access and be the main atrium level and the 2nd floor level would also be accessed directly from the exterior at the formal front (heritage entry). It is assumed that the higher occupant floors at the lowest levels would be connected and provided with large open stairs and that the majority of the traffic in and out of the building and to the lower floor levels would occur via the stairs and that the elevators would be used primarily by the users and occupants of the upper floor offices and administration areas on the lower floors and not by the general student populations or persons accessing the assembly areas.

Current plans show a group of four (4) elevators arranged as two (2) separate atrium elevators and two (2) additional elevators located in the areas of the existing elevator core. The service elevator would also be arranged to stop at the Basement and Penthouse mechanical level whereas the other three (3) passenger elevators would only serve floors 1 through 6. We understand that the U of A have confirmed that freight elevators would no longer be required in the building and that dual use passenger / service elevator with a capacity rating of approx. 5000 lb. would satisfy the buildings service requirements.

The elevator grouping is non-standard and the elevators are separated from each other which poses challenges and may result in confusion when using the elevators. Due to the separation it would be difficult for waiting passengers to identify which elevator is arriving in response to their up or down hall call and because the elevators are separated by corridors it may be difficult for passengers to access the elevator that does arrive as it may be some distance away from where they entered their call and were waiting. Hall lanterns with visual and audible indicators to indicate the arrival of an elevator would be provided to help identify which elevator is arriving but this would still be somewhat inadequate and longer door dwell times would also be needed to allow passengers time to reach the elevator that has arrived. It is likely that persons would “miss” the elevator at times if they do not notice that one of the separated elevators had arrived and this would result in longer waiting times and could lead to frustration with users. Special controls would also be necessary to allow users to call the service elevator if their destination was either the basement or penthouse level otherwise they may need to first travel to either level 1 or 6 in one of the other elevators and then place a call for the service elevator using the down button at Level 1 or the up button at Level 6 to access the service elevator specifically.

The use of destination dispatching technology to direct passengers to the appropriate elevator when they enter their destination could alleviate much of the confusion and would make the separated elevator configuration more viable and functional. The destination dispatching technology itself may be new and different and the associated operational methods themselves may also cause some confusion to users unfamiliar with the operation.

Elevator ID numbers should be assigned by the U of A as the project moves forward to reality and for the time being the numbers #1,2,3 & 4 are being used until the project proceeds and official elevator numbers are assigned to suit the U of A Elevator Inventory.

The following is a vertical representation of the elevators showing the floors served and elevations.

Floor Level	Elevation	Atrium Passenger Elevator #1	Atrium Passenger Elevator #2	Passenger Elevator #3 and Passenger / Service Elevator #4
Elevator Machine/Control Room	TBD			
Level 7 Mechanical	125602			■
Level 6	121335	■	■	■ ■
Level 5	117068	■	■	■ ■
Level 4	112801	■	■	■ ■
Level 3	108534	■	■	■ ■
Level 2	104267	■	■	■ ■
Level 1	100000	■	■	■ ■
Basement	96647			■
Total Rise				

■ - Front Opening,

The proposed new elevators will need to satisfy the Alberta Building Code requirements for accommodating a mobile stretcher and the elevator sizes proposed would satisfy these requirements.

3. ELEVATOR PERFORMANCE ANALYSIS

We have examined the theoretical elevator performance using generally accepted elevatoring principles and based on the information provided. For elevatoring purposes the population of persons in the building for the elevator analysis was provided as follows:

Floor Level	Floor Use	Population / Occupancy Provided	% of persons requiring elevator use	Population for Elevator Analysis
PH (7)	Mechanical – No Occupancy	0	100%	0
6	Offices	141	100%	141
5	Offices	155	100%	155
4	Offices	355	90%	320
3	Offices, Council Chamber & Theatre	551	50%	275
2	Offices, Council Chamber & Theatre	759	5%	38
1	Offices, Loading, Assembly & Exhibition, Welcome Centre	635 *	5%	32
B	Storage, Slowpoke Lab, Mechanical & Electrical	123	5%	6
Totals		2719		967

Note * - Population/occupancy at Level 1 does not include standing space/occupants who would not be expected to need elevator service.

Like most campus environments it is expected that much of the movement in the lower portion of the building would be via the stairs and elevator use would be primarily for persons travelling to upper floors in the building and for Barrier Free Access or for those persons moving with equipment or otherwise unable to use the stairs.

By concentrating the higher demand and higher population densities on the lower floors this results in a lower demand on elevators for the building.

Analysis of the proposed elevator configuration was performed for both incoming (up peak) and two way traffic periods and also for both conventional and destination dispatching systems and the results are shown as follows:

A targeted demand of 12% of the population requiring elevator service was used as the criteria which is representative of a typical office building environment. Longer door times and inefficiency was factored into the analysis to account for the separated elevator arrangement as this would be necessary in real life to make the proposed arrangement functional.

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Theoretical Elevator Analysis Results:

Type of Traffic Period	Type of Dispatching	Elevator Speed	Average Wait Time (AWT)	Average Time to Destination
Up Peak	Conventional ETA	350 fpm	26.7	81.2
Up Peak	Destination Control	350 fpm	28.5	68.6
Two Way	Conventional ETA	350 fpm	23.6	71.8
Two Way	Destination Control	350 fpm	35.9	78.2

The results show that a destination dispatching system will perform better during peak incoming traffic periods where passengers will experience a significantly faster time to destination. Destination dispatching systems are well known to provide improvements during two way traffic periods, however, their ability to improve performance during two way traffic periods is more debatable. The model we used suggests that Destination Dispatching may not be as advantageous during two way traffic periods, however, some manufacturers claim that their proprietary systems will also provide performance improvements during peak two way traffic periods. We are unable to model any proprietary dispatching systems.

As previously indicated the separated elevator arrangement may be confusing and destination dispatching would have the added benefit of making this type of arrangement more functional. Likewise the #4 passenger/service elevator serves additional floor levels that are not served by the other passenger elevator sin the group and destination dispatching would also handle this arrangement much better that conventional systems. We would therefore recommend a destination dispatching system for these separated elevators not just for performance reasons but also to make the use of the separated elevator arrangement for effective and functional. Without destination dispatching the separated elevator group arrangement would likely be ineffective and potentially unsuitable for the building.

Based on the analysis an elevator rated speed of 350 fpm should suffice for the elevators in this building.

4. NEW ELEVATOR OPTIONS

The primary code considerations would be meeting the Barrier Free Access requirements of the building code as well as meeting the building code requirement for accommodating a mobile stretcher. In addition to these minimum code requirements the proposed elevators should be adequately sized to allow for the movement of mobility impaired persons, public, staff, equipment, furniture and other equipment or materials in the building periodically.

A service type elevator that can also accommodate passengers is proposed for one of the new elevators and the other passenger elevators are proposed as

Elevators Dentistry Pharmacy Building Redevelopment New Elevator Report

standard sized passenger type elevators to satisfy the code requirements stated above as a minimum. The service elevator would satisfy the building code stretcher access requirements and therefore the other elevators would not have to comply with those requirements.

A passenger rated elevator does not have any restrictions on its use other than it cannot be used for moving heavy concentrated loads and it cannot be loaded using a forklift or other industrial truck type equipment. The proposed service elevator would have a larger capacity but would still have the same restrictions on how it is loaded and the weight of any single item or concentrated load should not exceed 25% of the capacity rating of the elevator. The service elevator design would be based on these loading criteria and restrictions and if this is not adequate then a different type of elevator or one with a higher class of loading would need to be considered at additional cost to the project.

The following sections and options deal with the various options and types of passenger and service elevators and sizes available.

4.1. Passenger/Service Elevator Types

The rise and speed requirements are too great for the use of hydraulic type elevators and therefore traction type elevators would be required. The area above the atrium elevators is intended to be as open as possible and therefore an arrangement with an overhead machine room is not ideal. Although having the equipment in a machine room is recommended the current Architectural design is based on using machine-room-less type elevators for all four of the new elevators. As part of the design review an arrangement where some or all of the elevators have a conventional overhead machine room should be considered for better access to machinery for maintenance, service and repair.

The service elevator is proposed to have an additional stop at the uppermost mechanical penthouse level and therefore the hoistway for that elevator would need to extend up further into the building. For the service elevator the equipment would best be arranged in a machine-room-less (MRL) arrangement to eliminate the need for a separate machine room above the service elevator hoistway.

The current arrangement includes a common control room for the elevator equipment on the penthouse (7^{th}) floor level adjacent to the atrium elevator hoistway overhead and this room could house the control systems for all of the elevators.

All elevators should serve all upper office floors and main landings with the exception of the upper mechanical space on level 7 and the basement floor which could be served only by the passenger/service elevator. This arrangement would be acceptable provided the use to the basement and mechanical floor would be light and occasional only. A feature to call the passenger/service elevator at selected floors could be provided for calling that elevator when it is necessary to access the basement or mechanical levels if conventional dispatching was used. If a destination dispatching control system was used then no additional features would be needed to provide seamless access to the #4 elevator for access to either the Penthouse or basement floor levels.

Regardless of the arrangement of the traction elevators (MRL or in a machine room) the equipment should be specified as high efficiency traction elevator products with gearless machines, regenerative drives and permanent magnet AC hoist motors to ensure an environmentally friendly design.

The recommended speed of the elevators based on the traffic analysis is 350 fpm including the service elevator.

4.2. Passenger & Service Elevator Size

Passenger & service elevators come in a number of “standard” sizes but can also be custom made if necessary. A standard size is recommended, if possible, to keep the equipment costs down and delivery as short as possible.

Standard Passenger & Service Elevator Sizes and Dimensions		
Capacity	Clear Cab Inside Dimensions	Door Opening Size
2500 lb. (1135 kg)Pass.	2030 x 1295	1070 x 2135
3000 lb. (1365 kg) Pass.	2030 x 1450	1070 x 2135
3500 lb. (1590 kg) Pass.	2030 x 1650	1070 x 2135
4500 lb. (2045 kg) Service	1740 x 2415	1220 x 2135 (2440 high optional)
5000 lb. (2270 kg) Service	1740 x 2590	1370 x 2135 (2440 high optional)

- All capacities shown meet the building code stretcher requirement with a side opening door.
- Highlighted rows show the recommended sizes for this project.

The Passenger/service elevator would satisfy the building code stretcher requirements therefore the other elevators do not have to meet these requirements. Portions of the existing elevator hoistway is intended to be reused to accommodate two of the new elevators and we understand that the building/structure could be modified to provide the dimensions required for the new elevator hoistways.

As a minimum we recommend that the new elevators have the following capacity ratings:

New Elevator Numbers	Minimum Capacity Rating
Atrium Passenger Elevators #1 & 2 and Passenger Elevator #3	3500 lb.
Passenger/Service Elevator #4	5000 lb.

5. ELEVATOR MACHINE ROOM, HOISTWAY, PIT & OVERHEAD REQUIREMENTS

To accommodate a standard sized passenger/service elevator a suitable hoistway will need to be provided.

The following approximate dimensions would be required to accommodate new “standard” sized new equipment from various common suppliers. The approximate sizes would accommodate high efficiency gearless traction elevators in a machine room configuration from various manufacturers. The dimensions provided for the passenger/service elevator are based on a machine-room-less (MRL) arrangement to allow the elevator to serve the additional floor at the top of the building.

Standard Passenger/Service Elevator Requirements			
Capacity / Type	Approximate Hoistway Size	Pit Depth	Overhead Clearance (measured to underside of machine room floor slab for passenger elevators and to underside of hoist beam at the top of the shaft for the MRL service elevator)
Passenger Elevator - 3500 lb. Front Only with Rear Counterweight	2540 x 2390	1805	5080
5000 lb. (Service) Front Doors Only	2565 x 3100	1805	5325

Note – overhead clearance for the passenger elevators is based on a 9’-0” cab height and a 10’-0” cab height for the service elevator to meet the U of A Design Guidelines. This higher than normal cab would be appropriate for moving equipment, materials & furniture periodically over the life of the building.

The foregoing table shows the hoistway size requirements for the various elevator classification/sizes with front openings only.

For the MRL type elevators the main structural loading is transmitted down to the pit floor with the exception of the rail attachments and forces on the side walls. A hoist beam is also required at the top of the hoistway for installation and future maintenance, servicing and repair. Some MRL traction designs may require additional structural support at the top of the elevator hoistway in the form of pockets for supporting beams or structure and this will not be known until vendor and product selection is determined.

Rail bracketing support is required in the pit, at floor levels and in the overhead. A concrete hoistway is typically preferred, however, other construction is possible if preferred for various reasons. In this case two (2) of the hoistways would be open to the atrium and some special coordination would be required to ensure that there was adequate support for rail bracketing and other structure necessary to support the elevator and its guide rails, etc. A side counterweight design would likely be more suited to the atrium elevators and some revision to the current design should be considered for this preferred arrangement. The use of glass back cab enclosures could be considered for the atrium elevators.

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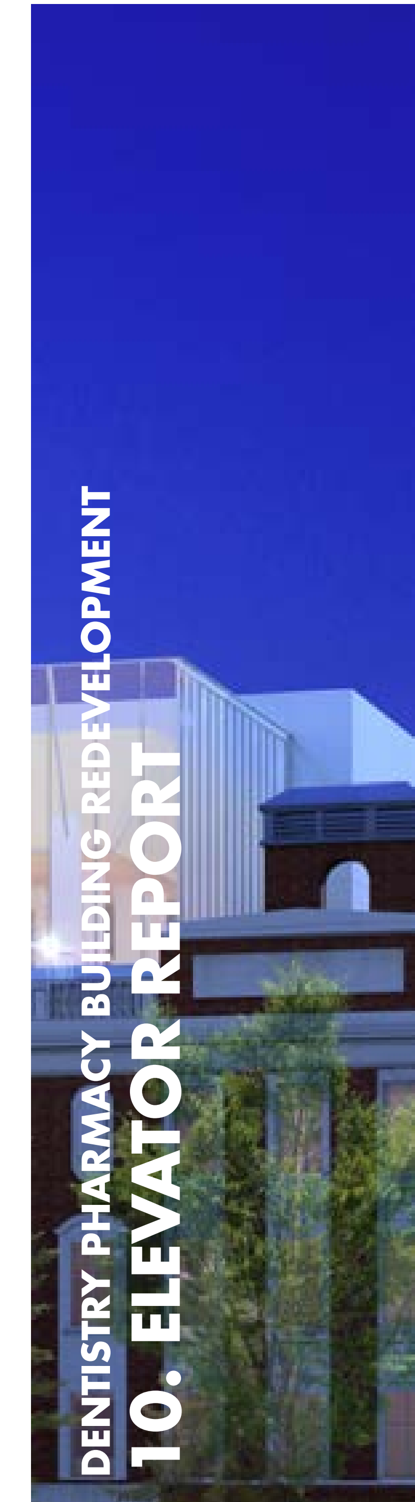

For all elevators rough openings are required in the front hoistway wall and the entire front wall of the hoistway should be left open its full width where elevator doors are to be located. The height of these rough openings should be minimum 2390 – 2440 mm for 2135 high doors. Masonry infill would need to be installed around and above the door frames once they are placed in the rough opening.

New hoistways for additional elevators may be of steel construction in which case the placement and design of the steel would need to consider the elevator support and rail attachment requirements. Drywall or other approved methods would be required to complete the steel hoistway enclosure and to provide the required fire rating if required by the Building Code. If no fire rating is required then the hoistway construction could be unrated, open work or partially unenclosed.

The elevator pit should be constructed of concrete and needs to extend below the bottom floor level to a minimum depth as indicated above depending on the supplier selected. If possible the pits for the passenger elevators that do not serve the basement floor could be placed at the basement floor elevation with walk-in access doors at that level to avoid having to access the pits from the bottom elevator floor landing.

The U of A Elevator Design Guidelines and latest elevator safety codes require that all elevators be equipped with fire recall operation (firefighter's emergency operation) and the elevator safety code will therefore also require each elevator to be provided with a pit drain to meet the elevator safety code requirements. Any sumps or sump pumps that may be required from the drain should be located outside of the elevator pit and should not be accessed from the elevator pit if possible.

The fire alarm system in the building will have to be interfaced with the elevator controls to satisfy the latest code requirements and to initiate automatic recall of the elevators under the various circumstances required by the elevator safety code. Smoke detectors for initiating recall must be installed at each elevator landing, in the top of hoistway & machinery space and in the elevator machine/control room. It may also be acceptable for an atrium smoke sensing system such as VESDA to initiate recall of the elevators from atrium spaces if applicable but this may require approval from the elevator regulatory authority (AEDARSA).

An unobstructed overhead clearance is required in the elevator hoistway as shown in the table and this is measured from the top floor level to the underside of the hoist beam that would be required in the top of the shaft for the MRL passenger/service elevator and to the underside of the structural machine room floor slab for the passenger elevators in a machine room configuration.

The traction elevator equipment will produce some heat and the machine room would need to be provided with HVAC to maintain the environment at a suitable temperature at all times. For the MRL elevator there is also some heat

Elevators Dentistry Pharmacy Building Redevelopment New Elevator Report

produced in the top of the hoistway and some ventilation for the top of hoistway machinery space is also required for the passenger/service elevator (this can likely be connected via a vent to the adjacent machine room space for the passenger elevators).

Three phase power would be required for the elevators and an appropriate electrical service would need to be provided to suit the needs of the new elevator equipment. The power would be required in the combined machine/control room at the top of the building for all four (4) of the elevators.

The approximate motor horsepower size would be as follows:

Elevator #/Description	Capacity/Speed	Approx. Motor HP Rating
Passenger Elevator	3500 lb. @ 350 fpm	25 hp each
Passenger/Service Elevator	5000 lb. @ 350 fpm	35 hp

The machine/control room needs to be fire separated from the remainder of the building.

6. RELATED WORK BY OTHER TRADES

The following work will have to be performed to accommodate the new elevator equipment and to complete the installation. The elevator contractor does not normally perform this work and the following items will need to be coordinated and completed by other trades.

Civil, Structural, Miscellaneous Work

I. A hoistway enclosure will need to be constructed for the elevators with support for rail brackets as required by the elevator contractor. Rough openings will be required for the installation of the elevator door frames and the rough openings will need to be filled in once the door frames are set.
II. The pit and pit floor should be constructed of cast in place concrete.
III. A hoist beam would be needed in the hoistway overhead to suit the elevator contractor's requirements.
IV. Block in and grouting of the new elevator entrance frames and sills will need to be completed at each floor opening and finished flooring will be required to the elevator landing door sills.
V. A suitable control room will need to be provided to suit the elevator supplier's requirements preferably located adjacent to the top of the elevator hoistway overhead area. One common control room would be preferred for all four (4) elevators.
VI. Small openings are required in the hoistway wall between the elevator hoistways and the adjacent control room as a minimum for the passage of electrical conduit and wire.

VII. Cutouts in the hoistway walls may be required for the mounting of elevator operating fixtures, push buttons, etc.
VIII. Finished flooring is required to be installed in the new elevator cabs.
IX. A metal pit ladder is required with handholds that extend at least 48" above the lowest floor in each pit.
X. Cab finishes would be per the U of A Elevator guidelines unless otherwise specified by the Architect/University.

Electrical Work

I. A 3 phase power supply would be required for each elevator including a fused disconnect in the elevator control room to suit the elevator motor and power characteristics. Emergency power for the elevator is requested by the U of A Guidelines and should be provided. As a minimum adequate emergency power will need to be provided to operate one (1) or more elevator at a time subject to the University's desires.
II. Feeder wiring from the disconnect switch to each elevator controller is required.
III. A 110 V power supply and fused disconnect is required in the elevator machine/control room for the elevator cab lighting power supply. Feeder wiring to each elevator controller is also required.
IV. The machine room and pit needs to be provided with adequate lighting and a light switch. Fluorescent lighting is preferred and the pit fixture needs to be guarded against breakage.
V. Lighting and an associated light switch, etc. is also required at the top of the shaft for each elevator.
VI. 110 V power outlets are required in the pit and the elevator control room. Outlets are required to be of the GFCI type or the circuits equipped with GFI breakers.
VII. Fire alarm interface signals are required to activate the firefighter's emergency operation of the elevator if provided/required. As many as four (4) separate signals may be required per elevator depending on the presence of water sprinklers in the various areas. Smoke detectors are required as part of the fire alarm system in the elevator lobbies, elevator control room, top of hoistway and pit (if required by the applicable codes). The provision of these signals is required whether the building is classified as a "high" building or not as these features are now required by the elevator safety code for all elevators regardless of building height.
VIII. Telecommunications will be required in the elevator control room for use with the elevator communication equipment. The elevator communication equipment will likely be part of the U of A's "commend" intercom system.
IX. Any security equipment, readers, etc. that may be required for restricting access to the elevator or various floors served by the elevator.
X. Signals from the emergency power automatic transfer switch are required to each elevator controller for signaling the status of the elevator power supply source and for pre/post transfer operation of the ATS.

Elevators Dentistry Pharmacy Building Redevelopment New Elevator Report

Mechanical Work

I. The control room at the Penthouse level will need to be adequately ventilated or cooled to remove heat generated by the equipment or other sources to maintain a reasonable operating temperature in the room.
II. The machinery space at the top of each elevator hoistway will also need to be ventilated or cooled to remove heat generated by the equipment in the top of the hoistway to maintain a reasonable operating temperature in this area.
III. The elevator pit must be equipped with a pit drain and back flow valve per the B44 Elevator Safety Code requirements. A flow rate of 50 gpm per elevator is required.

7. RECOMMENDATIONS

The following is a list of recommendations to facilitate the design development and procurement of elevators for this building:

1. Standard sized passenger traction elevators are recommended for all elevators and to meet the U of A design guidelines.
2. For the passenger/service elevator a machine-room-less (MRL) traction elevator is recommended to allow the elevator to serve one additional floor at the top of the hoistway.
3. The passenger elevators could also be arranged as machine-room-less (MRL) elevators, however, a machine room should be considered for better access to machinery for maintenance, service and repair.
4. The hoistway, pit and overhead dimensions provided in the report are meant to be the maximum required to accommodate most suppliers and it may be possible to adjust (decrease) the dimensions somewhat prior to construction to suit the successful elevator supplier.

Report Prepared By: [redacted]

Raymond P. DeMeyer, P. Eng. (BC, AB, MB)

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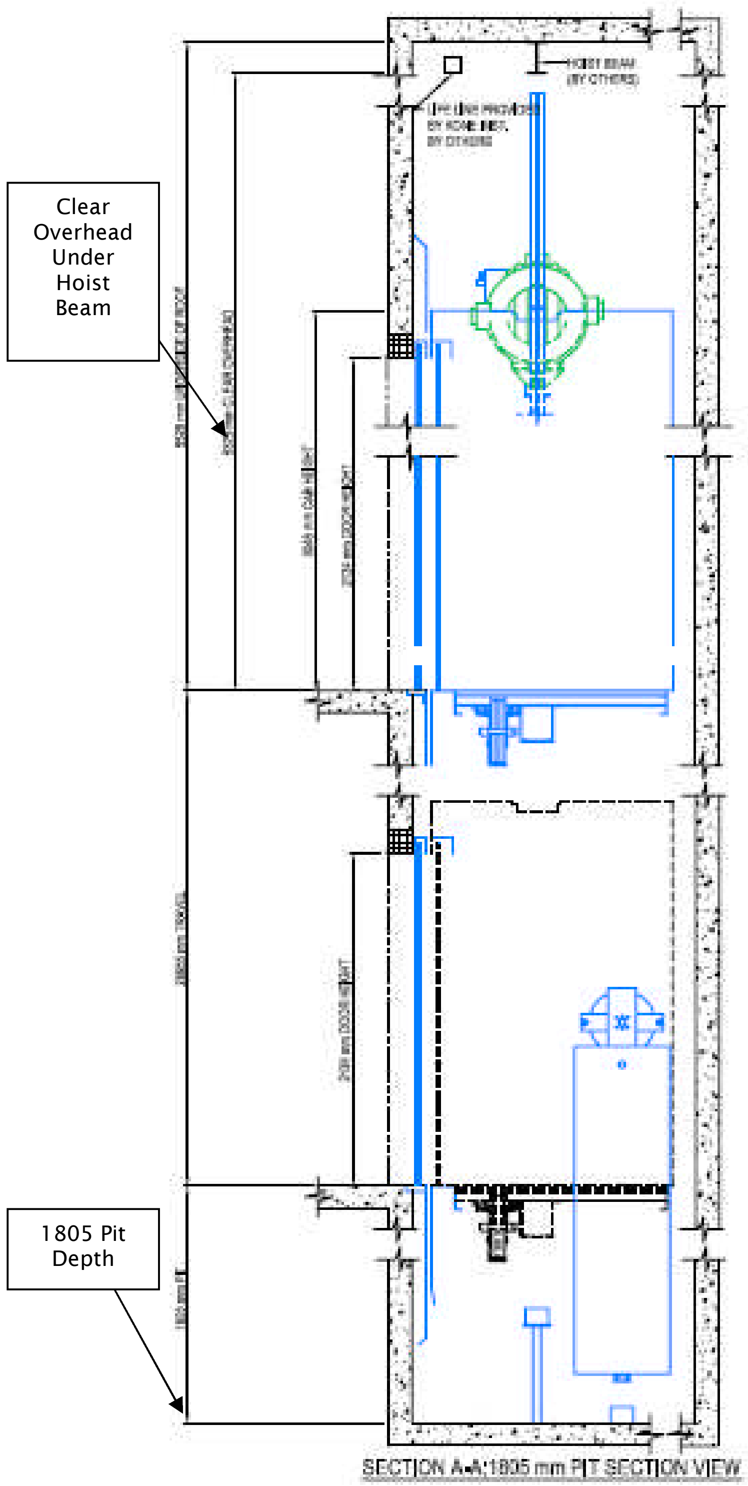
DENTISTRY PHARMACY BUILDING REDEVELOPMENT
10. ELEVATOR REPORT

8. Attachments:

8.1. Attachment 1– Sectional Elevation Through MRL Elevator Hoistway, Pit and Machine Room



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DENTISTRY PHARMACY BUILDING REDEVELOPMENT

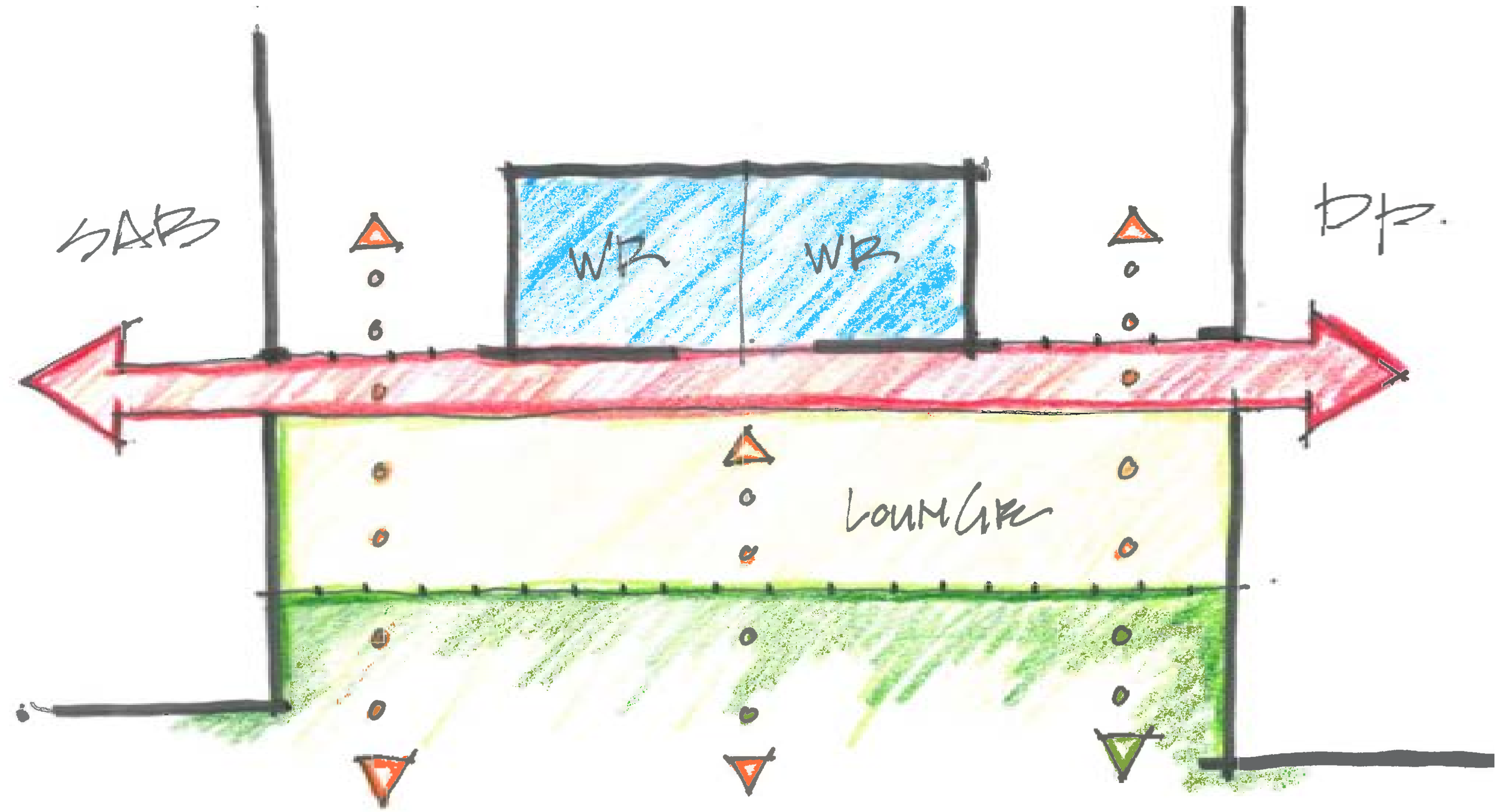
11. SAB Link

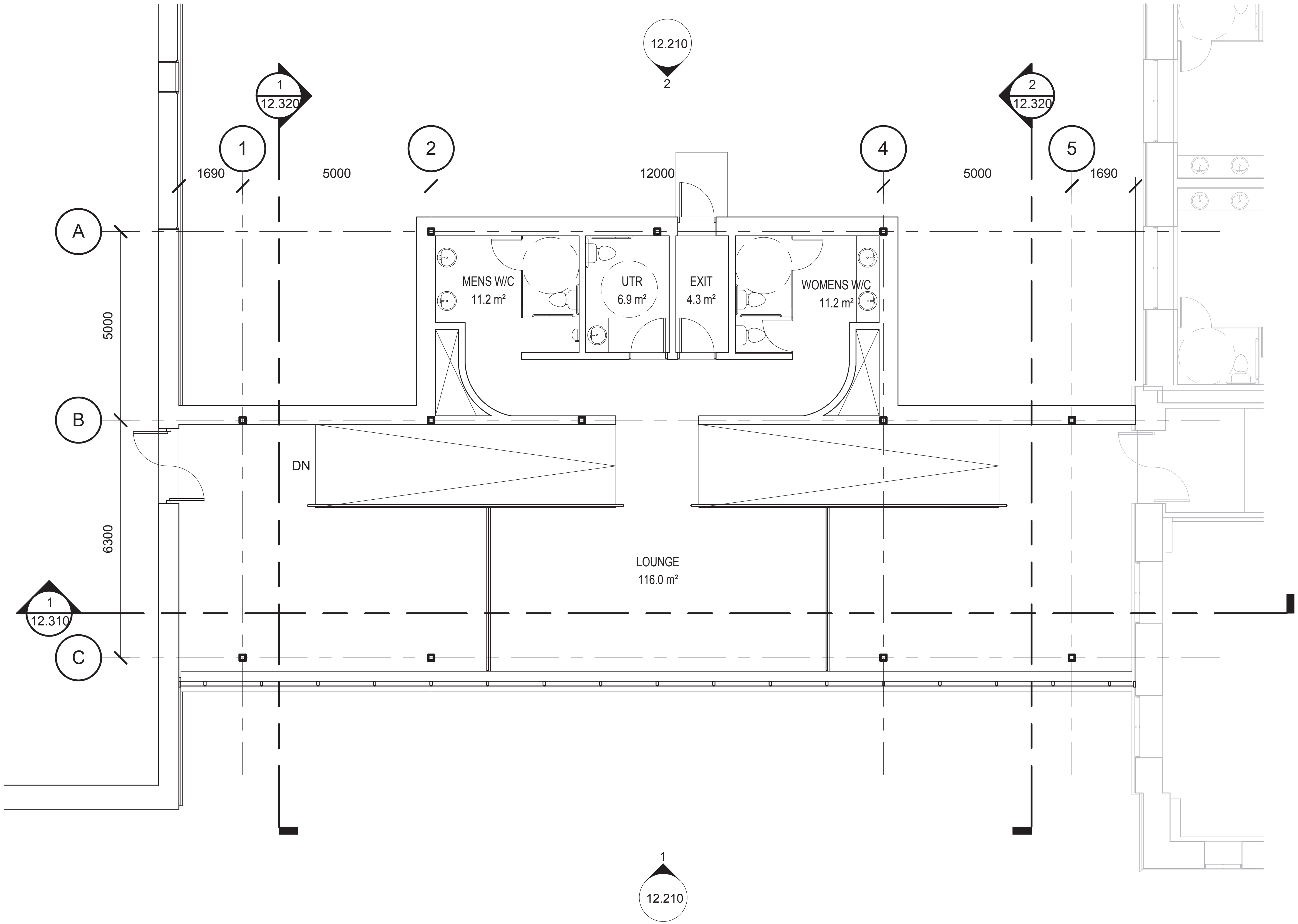
11

12.1 Architectural Concept

As the design work for the Dentistry Pharmacy Building was progressing, the University of Alberta asked Stantec to look at improving the link connecting the historic building with the South Academic Building (SAB).

While the proposed one-storey link still acts as a connection between the Dentistry Pharmacy Building and the SAB, it also creates a spacious lounge that opens up visually to the south plaza to connect users with the exterior environment, contrasting with the opaque walls of its direct neighbours. From the exterior, the glazed façade remains subtle and respectful of its surrounding buildings, while providing natural light into the space. Public washrooms complete the design along the opaque north wall facing the SAB courtyard and loading dock. The new link significantly improves accessibility for people with limitations or disabilities while providing a place where students and university staff can meet, talk, read or simply appreciate the natural beauty of the south plaza.





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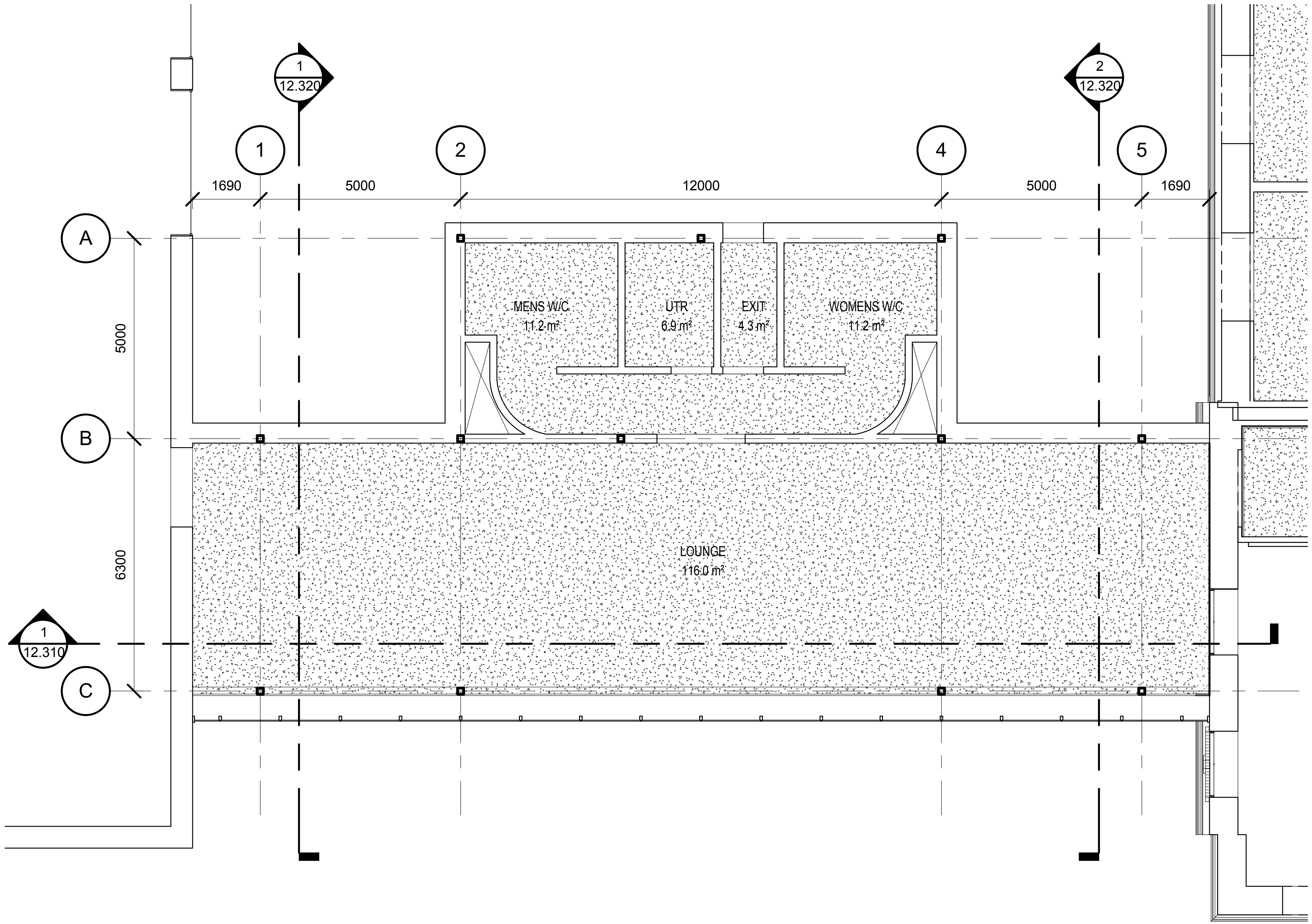
DENTISTRY PHARMACY BUILDING REDEVELOPMENT

11. SAB Link

Floor Plan 11.110



11.120 Reflected Ceiling Plan

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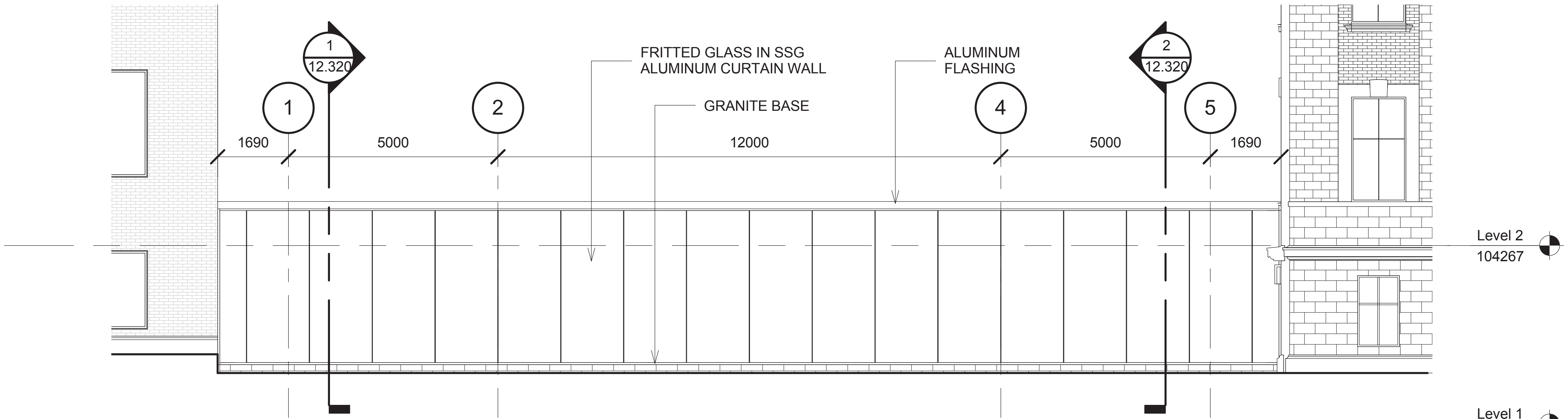
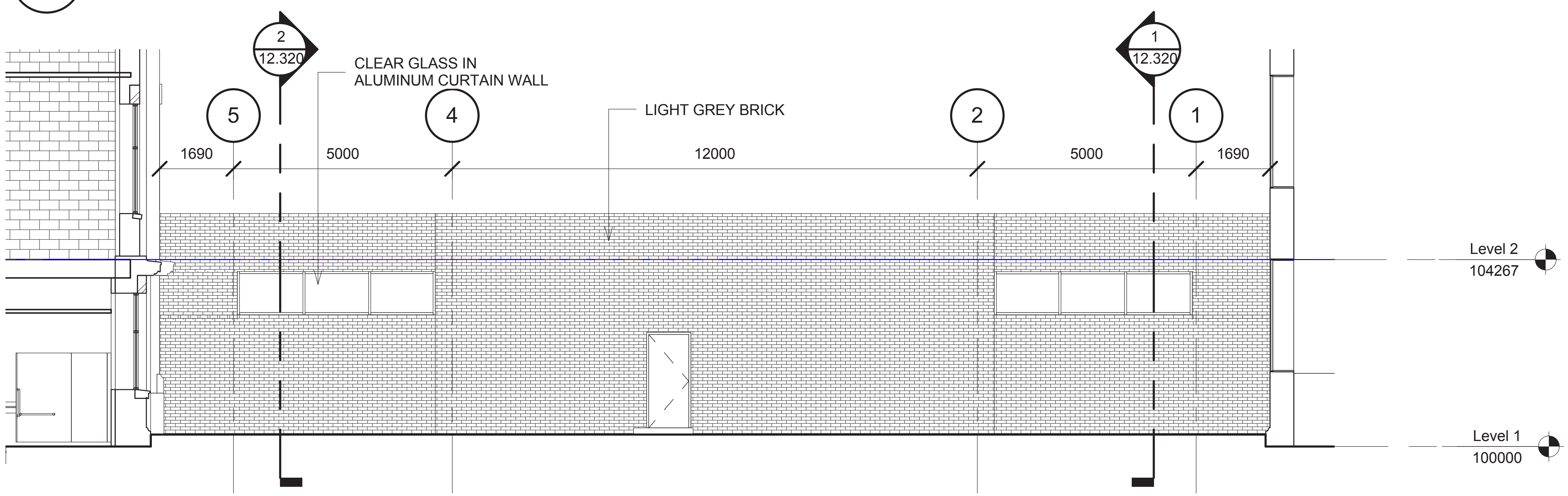


1
12.210
SOUTH ELEVATION



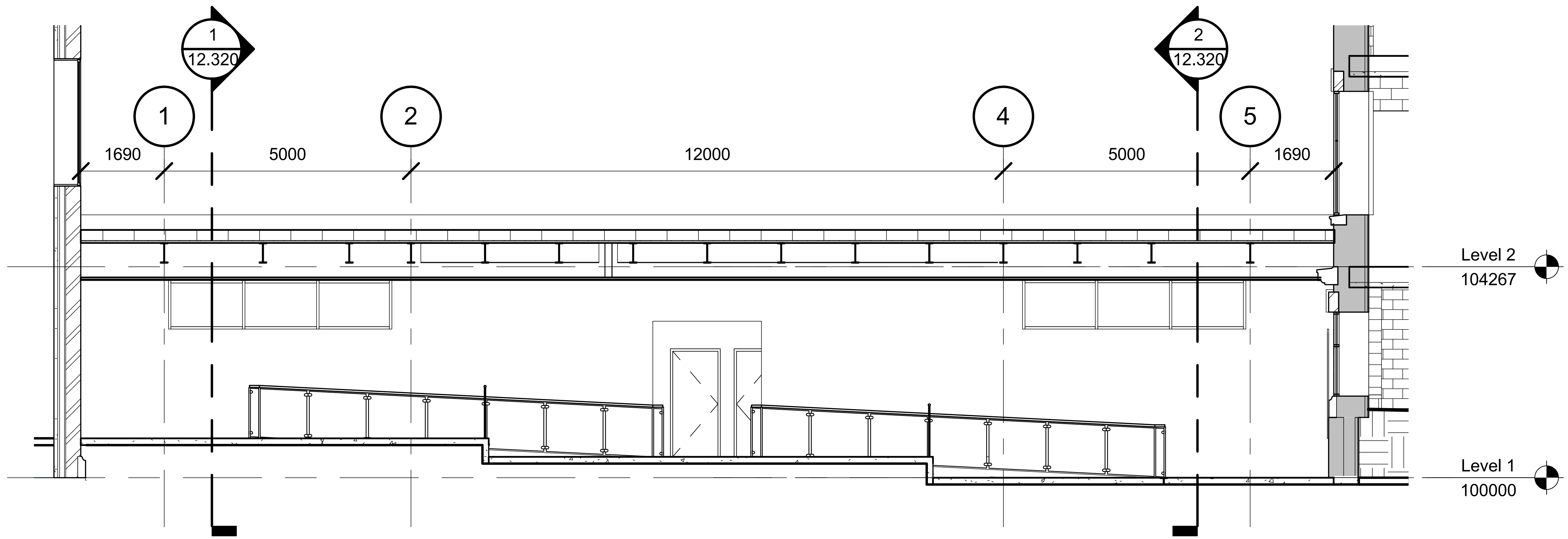
2
12.210
NORTH ELEVATION

DENTISTRY PHARMACY BUILDING REDEVELOPMENT

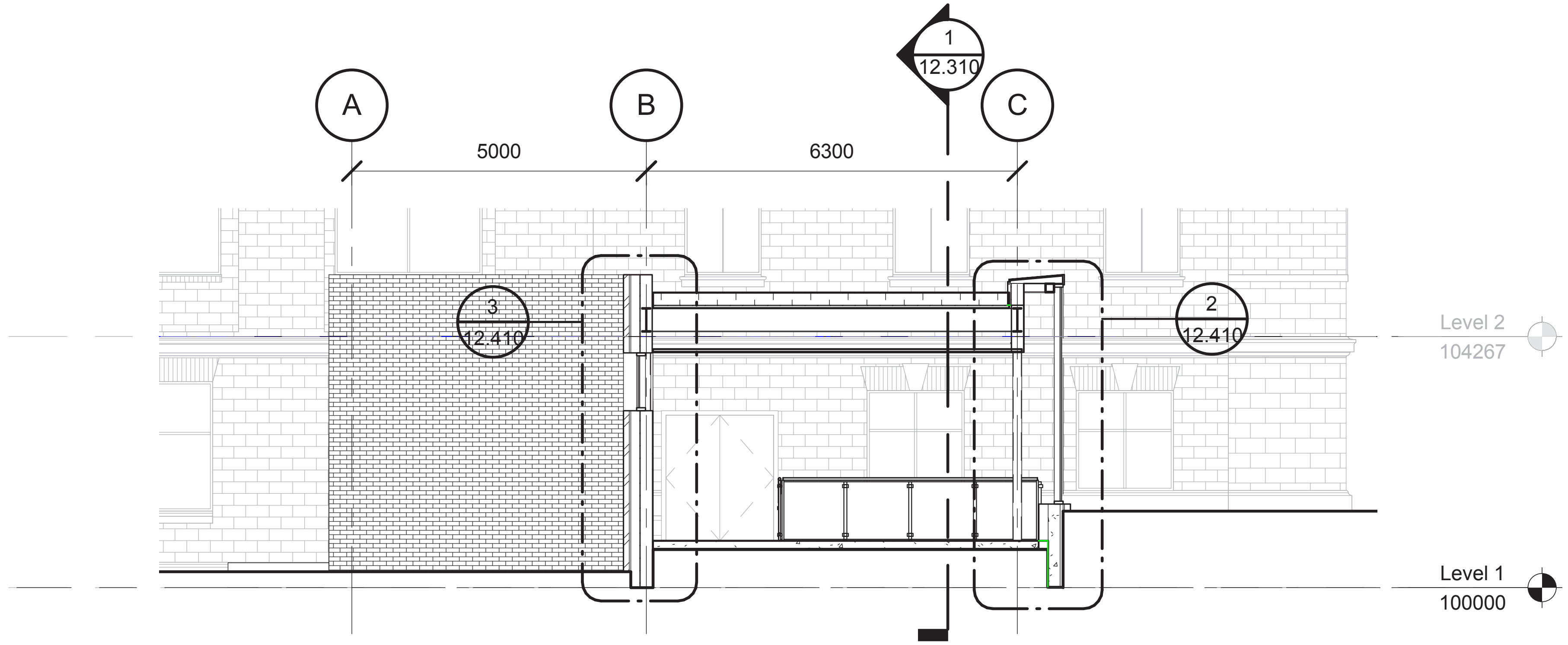
11. SAB Link

Building Elevations

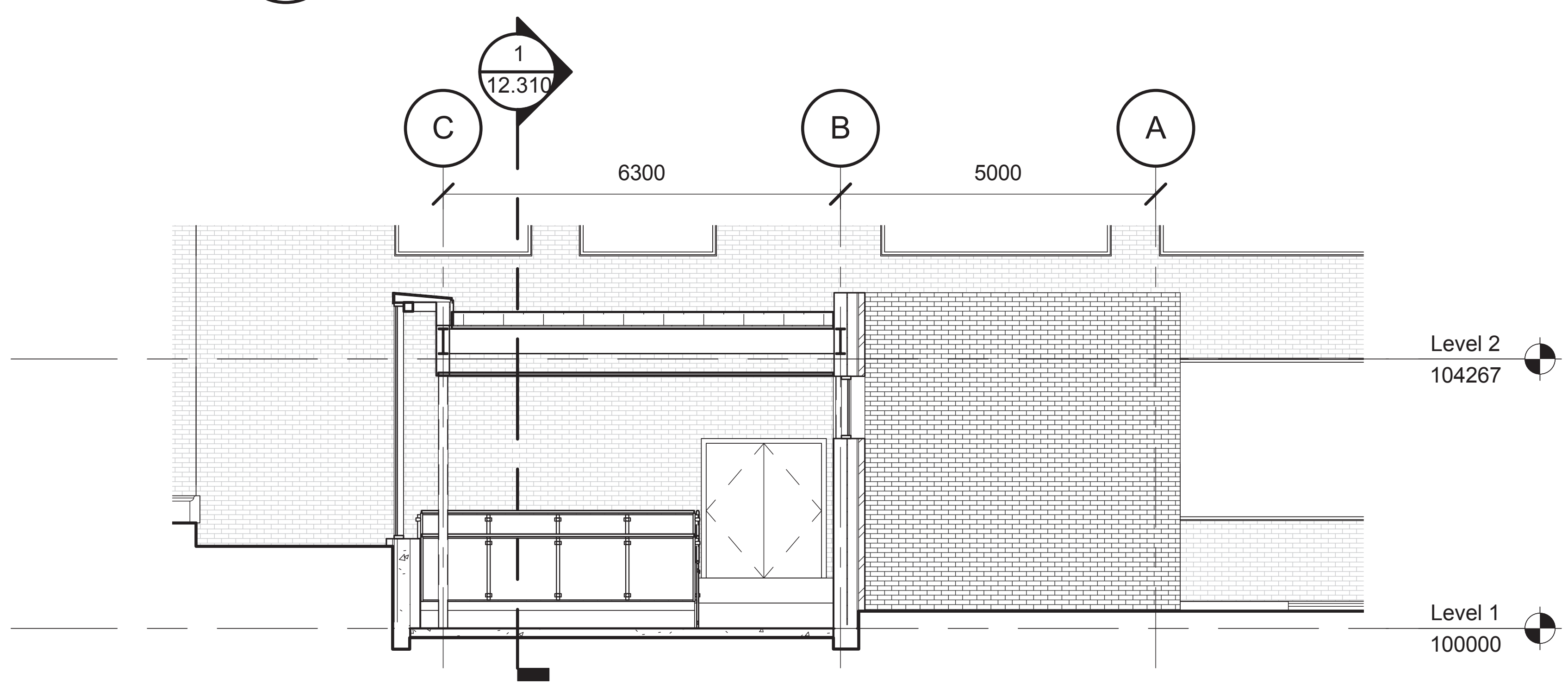
11.210



11.310 Longitudinal Section



1
12.320
CROSS SECTION LOOKING EAST



2
12.320
CROSS SECTION LOOKING WEST

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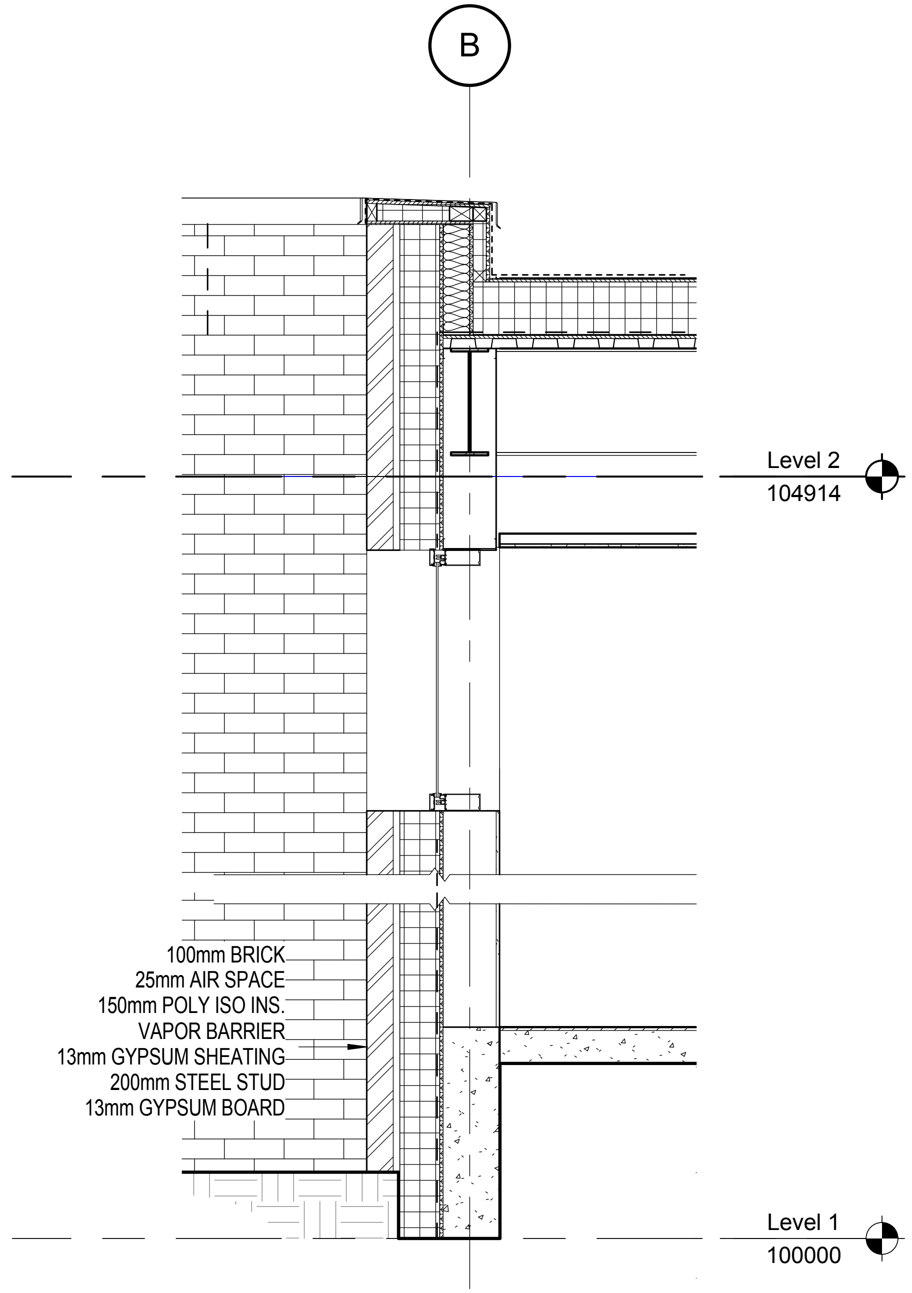
DENTISTRY PHARMACY BUILDING REDEVELOPMENT

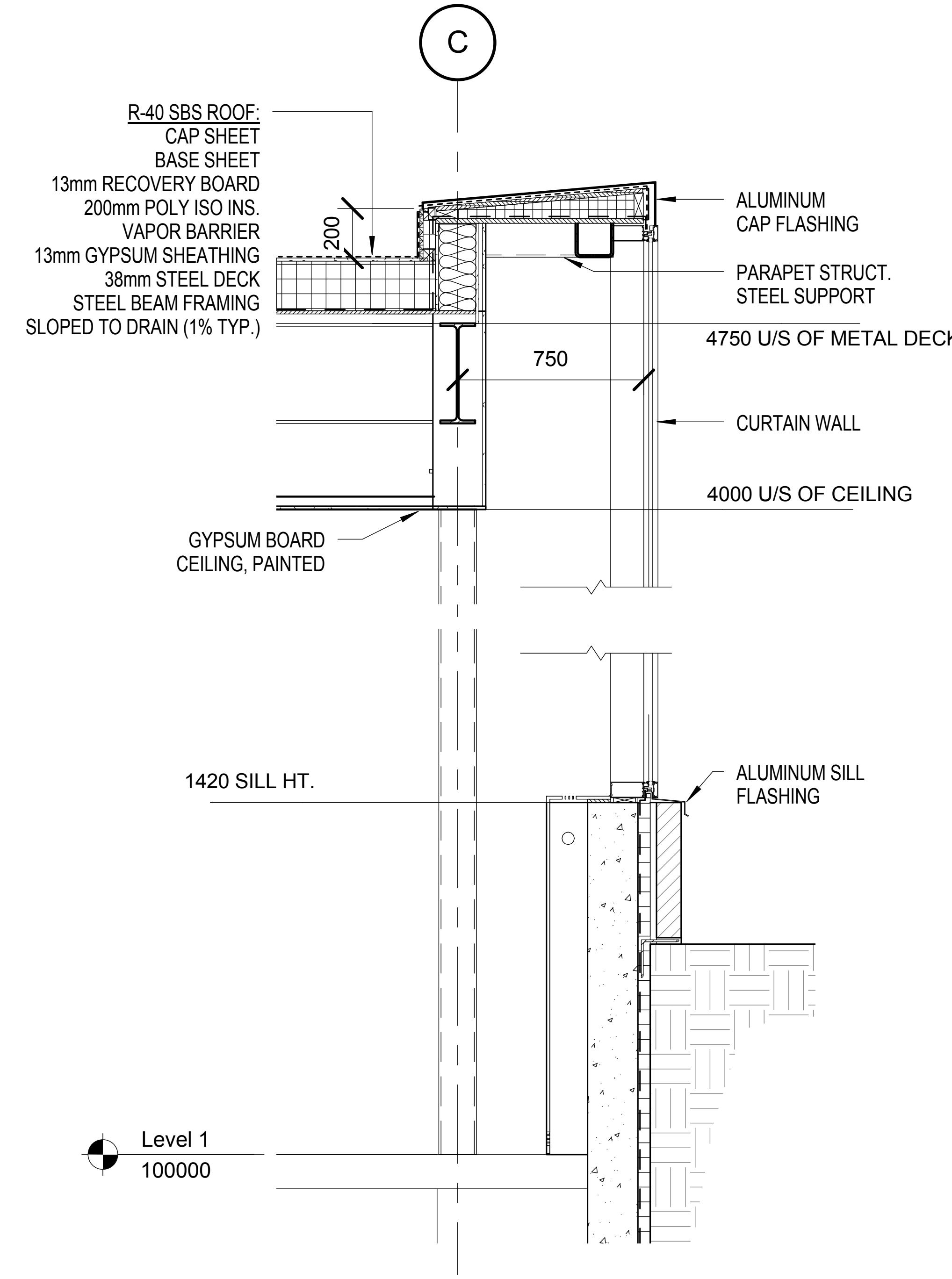
11. SAB Link

Cross Sections

11.320



3
12.410
NORTH WALL SECTION

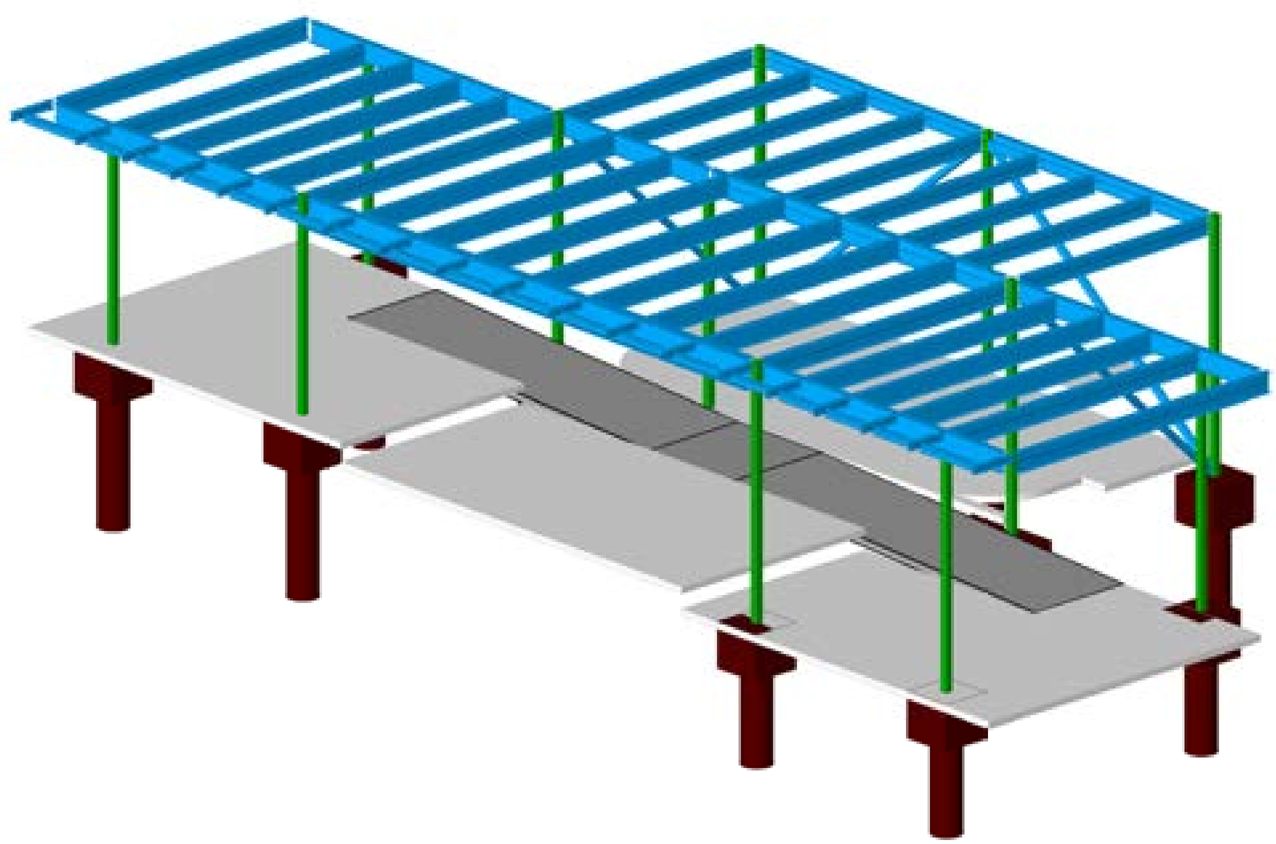


2
12.410
SOUTH WALL SECTION

11.410 Wall Sections

12.510 Structural Concept

The new SAB link provides a single storey connection between the Dentistry Pharmacy Building and the SAB. The building has been framed independently of the existing buildings and consists of a steel frame supporting a metal deck roof. The roof has been designed as a stiff diaphragm to transfer loads to the braced steel core that provides stability in two orthogonal directions. The building is supported on bored piles.



SAB Link Structural Rendering

12.520 Mechanical Concept

The new mechanical systems to serve the SAB Link will consist of fancoil ventilation heating and cooling, similar to what is in the SAB. The fan coils will provide zone-level air circulation, heating, and mechanical cooling (where required) for each zone. The anticipated install location for the fancoils is proposed to be over the washroom spaces providing significant ceiling space for access to equipment for maintenance. Perimeter hydronic heating along the south exposure will consist of baseboard heating enclosed in an architectural enclosure; ceiling mounted radiant panel will be used along the north perimeter exposure.

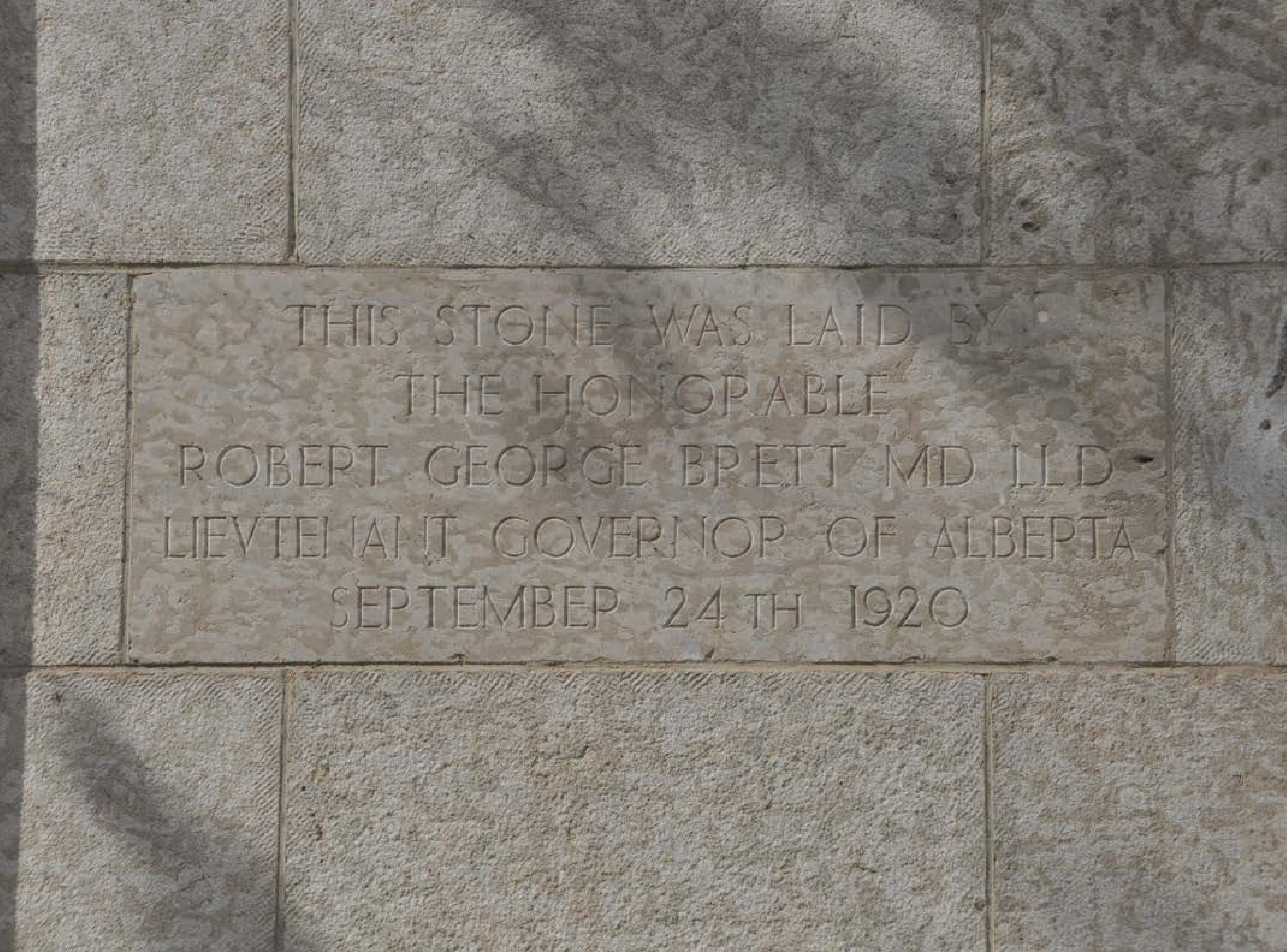
Utilities serving the SAB Link will be interconnected to the SAB through the existing adjacent mechanical room. Required utilities to support the building are hot water supply and return, chilled water supply and return, domestic cold and hot water, sanitary and storm. A sprinkler system will be required for the SAB Link, however both the SAB and Dentistry Pharmacy Building do not currently have sprinkler systems. Sprinkler piping will be installed in the SAB Link and will be connected in the future to the Dentistry Pharmacy Building with a separate flow switch for monitoring. Outside air ventilation will be connected to the re-purposed existing exterior air handling unit AHU-4.

12.530 Electrical Concept

The new SAB link is anticipated to be a single floor transition space between the SAB and the Dentistry Pharmacy Building. There will be a dedicated 120V panelboard located within the link to supply power to the electrical loads. The space will require minimal convenience power receptacles throughout. A University of Alberta wireless access point shall be provided to connect to the network. The SAB Link will require coordination with both the SAB and Dentistry Pharmacy Building fire alarms system. Fire alarm devices shall be provided to meet code. The fire alarm devices shall connect to the SAB to accommodate the phasing of construction of the Dentistry Pharmacy Building.

The lighting strategies for the space are intended to provide a higher level of lighting of 20 foot-candles on the ramp area. The lounge defines itself to a soft seating area for students and staff to congregate. The lighting for this area shall be decorative and subtle to provide a warm and aesthetically pleasing environment. There is a potential to utilize decorative pendants in the lounge to create a high contrast in the evening hours from the south plaza looking in.

Due to the daylight available from the south windows there will be a day lighting control system deployed to control the lighting during peak daylight hours. Should the purpose of the space require higher lighting levels of 40 to 50 foot-candles for evening events, a supplementary higher output lighting system using recessed pot lights shall be provided in the lounge on a dedicated control switch to adjust the light level for presentations or other events requiring more luminosity. The washrooms shall have a similar lighting design to the one deployed in the Dentistry Pharmacy Building for continuity.



DENTISTRY PHARMACY BUILDING REDEVELOPMENT

12. COST PLAN

COST PLAN

The Dentistry Pharmacy Building Redevelopment had a hard construction budget of $171,000,000 (2011 dollar value) plus a 20% premium for phased construction ($205,200,000) described in the RFP documentation. Through the predesign and design process the project and its schedule have been developed with the expectation that construction funding for the entire project would not be available and that phased construction is still expected that could extend construction until fall 2019.

The cost plan following has a hard construction cost of $202,770,600 in current 2013 dollars. This includes a budget increase of nearly $7,500,000 related to the scope addition of the SAB Link and LRT and also allows for phasing.

The removal of the SLOWPOKE faiclity prior to commencement of this project would provide possible cost reduction of $7,000,000.00.

Dentistry Pharmacy Building Redevelopment
University of Alberta
Design Development Report - Cost Plan 4

Summary				Subtotal	Total
1 Phase 1					35,648,500
2 Phase 2					71,737,460
3 Phase 3					23,182,640
4 Phase 4					45,754,000
Subtotal					**176,322,600**
5 Contingencies					26,448,000
5.1 Design Contingency	5%			8,816,000	
5.2 Construction Contingency	10%			17,632,000	
Total Construction Cost	**34,500**	**m2**	**5,877.41**		**202,770,600**
6 Soft Cost					38,400,000
Total Project Cost	**34,500**	**m2**	**6,990.45**		**241,170,600**

Dentistry Pharmacy Building Redevelopment University of Alberta Design Development Report - Cost Plan 4					
	Description	**Quantity**	**Unit**	**Unit Rate**	**Amount**
1.0	**Phase One**				
	➢ Dentistry Pharmacy Building final decant				
	➢ Initial demolition				
	➢ SLOWPOKE isolation				
	➢ SAB Link reconstruction				
	➢ Selective Demolition including Haz Mat removal				
	➢ Decommissioning of Dentistry Pharmacy Building				
	➢ Temporary Servicing of Dentistry Pharmacy Building				
	➢ Council Chamber construction and finishes				
	➢ Loading dock				
	➢ Civil				
	➢ Landscaping, LRT Pavilion and North Canopy				
1.1	Isolation for Slowpoke				
	Temporary Access	1	ls	250,000.00	250,000
	Mechanical and Electrical Services				
	Mechanical	1	ls	800,000.00	800,000
	Electrical	1	ls	845,000.00	845,000
	Electrical Duct Bank	1	ls	335,000.00	335,000
1.2	Temporary Offices and Storage	116	m2	1,500.00	174,000
1.3	Temporary Electrical Room	100	m2	2,500.00	250,000
1.4	HAZMAT Removals				
	Asbestos, Mercury, Lead, PCB	31,100	m2	110.00	3,421,000
1.5	Selective Interior Demolition				
	Finishes, Mechanical and Electrical	31,100	m2	150.00	4,665,000
	Disconnect M and E services to remainder building	1	ls	100,000.00	100,000
1.6	Temporary Services				
	Heating and Ventilation	36	mos	25,000.00	900,000
	Power and Lighting	36	mos	10,000.00	360,000
	Temporary Fire Alarm System for the Building	1	ls	200,000.00	200,000
1.7	Re-construct Entrances and New Entrances	1	ls	1,000,000.00	1,000,000

	Description	Quantity	Unit	Unit Rate	Amount
1.8	Council Chamber - Architectural	400	m2	5,500.00	2,200,000
	Temporary Mechanical	400	m2	1,500.00	600,000
	Temporary Electrical	400	m2	1,000.00	400,000
1.9	New Loading Dock	100	m2	1,100.00	110,000
1.10	Site Works				
	South Plaza				
	Repair existing entrance stonework	1	ls	100,000.00	100,000
	Remove Trees	1	ls	50,000.00	50,000
	New Hydrant	1	ls	125,000.00	125,000
	Regrading and Storm Drainage	3,000	m2	200.00	600,000
	Granite pavers and Steps	400	m2	550.00	220,000
	Granite pavers and heated slab	1,100	m2	800.00	880,000
	Finish to Wall exposed by Grading	500	m2	1,100.00	550,000
	Retaining Walls, Railings and Planter Boxes	1	ls	2,000,000.00	2,000,000
	Soft Landscaping	1,400	m2	150.00	210,000
	Site Finshes North, East and West Sides	1	ls	500,000.00	500,000
	Site Furniture	1	ls	250,000.00	250,000
	Site Lighting and Feature Lighting	1	ls	750,000.00	750,000
	North Side Canopy	500	m2	1,500.00	750,000
	New LRT Pavilion incl demolition and capping existing	1	ls	5,000,000.00	5,000,000
1.11	SAB Link Re-construction				
	Demolition and HAZMAT	1	ls	100,000.00	100,000
	Structure	250	m2	1,100.00	275,000
	Curtain Wall	160	m2	1,650.00	264,000
	Interior Core Finishes	250	m2	2,200.00	550,000
	Mechanical Core Systems	250	m2	750.00	187,500
	Electrical Core Systems	250	m2	500.00	125,000
	Subtotal Direct Construction Costs				30,096,500
1.12	Indirect Costs				
	General Expenses	15%			4,514,000
	Fee	3%			1,038,000
1.0	**Total for Phase 1**				**35,648,500**

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UNIVERSITY OF ALBERTA

DENTISTRY PHARMACY BUILDING REDEVELOPMENT

12. COST PLAN

Cost Plan - Phase I

Dentistry Pharmacy Building Redevelopment
University of Alberta
Design Development Report - Cost Plan 4

	Description	Quantity	Unit	Unit Rate	Amount
2.0	**Phase Two**				
	➢ Demolition of central wing				
	➢ Basement deepening				
	➢ Foundations				
	➢ Atrium structure				
	➢ Penthouse roof structure				
	➢ Roof structure 22/46/47 Buildings				
	➢ Atrium glazing				
	➢ Penthouse construction				
	➢ Roofing: new and existing roof areas				
	➢ Stairs				
	➢ Elevators				
	➢ Mechanical major equipment				
	➢ Mechanical main distribution				
	➢ Electrical major equipment including Generator				
	➢ Electrical main distribution				
	➢ Basement main service rooms				
	➢ Service spaces: washrooms, electrical and communication rooms.				
2.1	Demolition of Central Wing to Ground Level	1,957	m2	750.00	1,467,750
2.2	Remove Roof and Wall for New Mechanical Room	1,320	m2	330.00	435,600
2.3	Pre-order major Mechanical Equipment	1	ls	3,000,000.00	3,000,000
2.4	Pre-order major Electrical Equipment	1	ls	5,500,000.00	5,500,000
2.5	Pre-order Elevators	1	ls	3,000,000.00	3,000,000
2.6	Atrium				
	Foundations				
	Demolition and Grading	1,900	m2	200.00	380,000
	Piles	73	ea	7,500.00	547,500
	Pile Caps	125	m3	3,000.00	375,000
	Slowpoke Protection	1	ls	100,000.00	100,000
	Main Floor slab	1,426	m2	250.00	356,500
	Structural Steel Roof, Floor and Bridge Structure	850	tones	5,000.00	4,250,000
	Catwalk Service Platform	334	m2	1,100.00	367,400
	Fireproofing Walkway and Floor Structures	1,576	m2	110.00	173,360
	Roofing including sloped Insulation	1,330	m2	375.00	498,750
	Curtain Wall	1,350	m2	1,650.00	2,228,000
	Interior Window Washing System	1	ls	250,000.00	250,000

	Description	Quantity	Unit	Unit Rate	Amount
2.7	Modifications to Existing Building				
	Basement modifications	900	m2	1,000.00	900,000
	Structural Upgrading	1	ls	1,000,000.00	1,000,000
	New Mechanical Room				
	Structure	80	tones	5,000.00	400,000
	Roof Deck and Roofing	1,500	m2	330.00	495,000
	Cladding	1,756	m2	650.00	1,141,400
	Finishes	1,500	m2	550.00	825,000
	New Elevator Shafts	1,200	m2	550.00	660,000
	Floor leveling and patching	3,100	m2	150.00	465,000
	In-fill and make new openings	1	ls	500,000.00	500,000
	Fireproofing	19,281	m2	75.00	1,446,000
	Fireproofing Attic Structure	4,000	m2	75.00	300,000
	New Corridor to future Lab Space	1	ls	250,000.00	250,000
2.8	Roofing				
	Re-roof existing Building				
	Flat Roof with sloped Isulation and new Parapets	3,443	m2	400.00	1,377,200
	Sloped Metal Roofing	436	m2	750.00	327,000
	Fall Arrest System				
	Wall Anchors	20	ea	1,000.00	20,000
	Roof Anchors	123	ea	2,000.00	246,000
	Ladders and Roof Access	1	ls	50,000.00	50,000
2.9	Vertical Transportation				
	Elevators - installation	26	stops	35,000.00	910,000
	Re-finish Stairwells	24	levels	100,000.00	2,400,000
	New Stairs	331	risers	2,000.00	662,000
2.10	Service rooms				
	Washrooms	1,060	m2	2,700.00	2,862,000
	Electrical and Communication Rooms	700	m2	1,100.00	770,000
	Duct shafts	1	ls	500,000.00	500,000
2.11	Base Building Mechanical Systems	31,100	m2	490.00	15,239,000
2.12	Base Building Electrical Systems	31,100	m2	125.00	3,888,000
	Subtotal Direct Construction Costs				60,563,460
2.13	Indirect Costs				
	General Expenses	15%			9,085,000
	Fee	3%			2,089,000
2.0	**Total for Phase 2**				**71,737,460**

12.103 Cost Plan - Phase II

Dentistry Pharmacy Building Redevelopment
University of Alberta
Design Development Report - Cost Plan 4

	Description	Quantity	Unit	Unit Rate	Amount
3.0	**Phase Three**				
	➢ Exterior wall glazing replacement 22/46/47 Buildings				
	➢ Repair and repointing 22/46/47 Buildings				
	➢ Exterior wall glazing, repair, and entrances 58 Building				
	➢ Atrium finishes				
3.1	Exterior Wall Modifications				
	Remove Windows	519	ea	1,500.00	779,000
3.2	Atrium Finishes				
	Atrium Finishes				
	Partitions including Wall finshes	3,600	m2	500.00	1,800,000
	Concrete Wall	360	m2	750.00	270,000
	Glazed Wall	1,335	m2	1,100.00	1,468,500
	Floor Finish at Main Level	1,426	m2	440.00	627,440
	Ceiling Finishes	1,426	m2	550.00	784,300
	Floor Finish at Bridges	100	m2	400.00	40,000
	Glazed Soffits at Bridges	100	m2	1,650.00	165,000
	Glazed Railings	423	m	1,000.00	423,000
	Winter Garden	109	m2	5,500.00	599,500
	Welcome Centre	138	m2	5,500.00	759,000
	Shared Spaces	1,329	m2	1,100.00	1,461,900
	Acoustics	1	ls	500,000.00	500,000
	Mechanical System	2,600	m2	350.00	910,000
	Electrical System	2,600	m2	350.00	910,000
3.3	Exterior Wall				
	New Windows (non-opening) and Sills	2,338	m2	1,650.00	3,858,000
	Finish Openings without Windows	23	ea	5,000.00	115,000
	Re-point and clean existing Wall	13,100	m2	110.00	1,441,000
	Repair existing Brick	2,000	m2	500.00	1,000,000
	Plaster Repairs at Exterior Wall	3,000	m2	300.00	900,000
	Foam Insulation and Drywall	11,000	m2	150.00	1,650,000
	Subtotal Direct Construction Costs				20,461,640
3.4	Indirect Costs				
	General Expenses	10%			2,046,000
	Fee	3%			675,000
3.0	**Total for Phase 3**				**23,182,640**

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	Description	Quantity	Unit	Unit Rate	Amount
4.0	**Phase Four**				
	➢ Mechanical TI fit out				
	➢ Electrical TI fit out				
	➢ SLOWPOKE final installation				
	➢ User Fit Ups				
4.1	Architectural Finishes				
	Acoustics	1	ls	500,000.00	500,000
	Partitions	31,100	m2	200.00	6,220,000
	Circulation	6,700	m2	440.00	2,948,000
	Office Areas	19,000	m2	660.00	12,540,000
	Historical Retrofit	1,600	m2	2,200.00	3,520,000
	Slowpoke final installation	509	m2	1,650.00	840,000
4.2	Mechanical Finishes	30,700	m2	300.00	9,210,000
4.3	Electrical Finishes	30,700	m2	150.00	4,605,000
	Subtotal Direct Construction Costs				40,383,000
4.4	Indirect Costs				
	General Expenses	10%			4,038,000
	Fee	3%			1,333,000
4.0	**Total for Phase 4**				**45,754,000**

Clarifications and Assumptions

1 This Cost Plan has been prepared based on Design information provided by Stantec upto March 2013
2 This Cost Plan is based on current dollars. Escalation contingency is not included
3 Phasing of construction has been included in this Cost Plan.
4 Except for the Slowpoke, this Cost Plan assumes that the entire building will be vacant
5 Storage costs of pre-ordered Mechanical and Electrical Equipment are not included
6 Extended Warranties on pre-ordered Mechanical and Electrical Equipment are not included
7 The University will provide Natural Gas and Power consumed during construction at no cost
8 The following items have not been included in this Cost Plan:
GST

Cost Plan - Phase III and IV

Clarifications

13. RISK MANAGEMENT UPDATE

As this project moved from Schematic Design to Design Development the ASU Best Value Process continued to be used. The identification of risk and mitigation of those risks was ongoing. As more investigation and design took place the level of risks that had been identified were being reduced.

Introduction of the removal and replacement of the SAB Link impacted the completion of the design development phase but now forms a chapter of this report.

Those risks that were being monitored at the conclusion of Schematic Design are identified below;

- atrium structure (structure and support of building envelope has been resolved and risks and impacts minimized).

- budget and phasing (through design development costs have been stabilized and unknowns reduced).

- over subscription of user space needs (programming will need to confirm which users will be accommodated).

- introduction of additional scope related to the South Academic Building Link and LRT improvements (scope has been defined and budget reflects increased scope).

Utilization of the Best Value Process has supported the design process and has allowed a successful completion of the design development phase.

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UNIVERSITY OF ALBERTA

DENTISTRY PHARMACY BUILDING REDEVELOPMENT

14. SUSTAINABLE STRATEGIES

14

0. Table of Contents

15.1 GREEN GLOBES Project Analysis

15.1.1 Green Globes status update

The Dentistry and Pharmacy Building Redevelopment (DPBR) project located in Edmonton, Alberta is targeting a 4 Globe Certification (70%) using the Green Globes Environmental Assessment for New Buildings rating system.

Percentage of points achieved in the Concept Design Stage Assessment by Dentistry Pharmacy Building Redevelopment for each module:

- Project Management – 88%
- Site – 65%
- Energy – 79%
- Water – 68%
- Resources – 44%
- Emissions – 71%
- Indoor Environment – 69%

The Dentistry Pharmacy Building Redevelopment achieved an overall rating of 71% in the Concept Design Stage Assessment. The Concept Design Stage Assessment was conducted using the design features addressed in the Schematic Design Report. The sustainable features included in the Concept Design Stage Assessment will be reviewed through the working drawing stage and finalized within the Construction Documents (Plans and Specifications) Green Globes Assessment. The Concept Design Stage Assessment score of 71% shows that the project is on track to achieving its targeted 4 Globe Certification and reflects the University of Alberta's commitment to implementing sustainable design features.

15.2 Credit sumary

15.2.1 Project management policies and practices

This section evaluates the extent to which an integrated design process and a team approach are being used to generate design solutions that will meet the needs identified in previous stages, as well as the purchasing policy and the commissioning plan.

Dentistry Pharmacy Building Redevelopment achieved a score of 88% on the Green Globes™ rating scale for its integrated design process, integration of environmental purchasing and commissioning plan.

15.2.1.1 Integrated Design Process

An integrated design process is being used for site selection and the building design concept.

The design process uses a team approach.

Green design facilitation is being used to support green integration.

15.2.1.2 Integration of Environmental Purchasing

Environmental purchasing, including the procurement of energy-efficient equipment is being addressed.

15.2.1.3 Commissioning Plan - Documentation

The Design Team produced a Design Concept Report which includes Design Intents, Basis of Design, Design criteria, an O&M Report and budget, and a description of the service contracts that will be needed.

The Design Team has established design criteria to meet the functional and operational requirements of the building.

<u>Opportunities for Improvement</u>:

Prepare Basis of Design documentation in the Design Concept Report. Document the primary assumptions to guide design decisions and provide a narrative description of the building systems. Explain how the design intent goals will be achieved.

15.2.2 Site

This section evaluates design strategies for optimal use of the site based on information gathered during the Site Analysis Stage, and in response to the requirements set out at the Project Initiation Stage and further outlined in the Programming Stage.

Dentistry Pharmacy Building Redevelopment achieved a score of 65% on the Green Globes™ rating scale for site design and measures to minimize the impact of the building on the site and/or the site enhancement.

15.2.2.1 Analysis of Development Area

The site analysis data for topography, geology, soils, water features, drainage, vegetation as well as previous land use, are being applied to the development of the site plan.

The site is an existing serviced site.

The site has been verified as not being a wetland or a wildlife corridor.

15.2.2.2 Development of Strategies to Minimize Ecological Impact

The design recommends that undeveloped areas on the site, that is areas which will not be built upon or used for parking or access roads, remain undisturbed.

There are strategies to avoid creating heat islands.

Opportunities for Improvement:

If land must be cleared, specify that native plants should be salvaged for later planting on the site as part of the landscaping. Limit the amount of lawn to functional purposes, such as a picnic area. Aim for natural biodiversity.

15.2.2.3 Integration and Enhancement of Watershed Features

Site grading will be used to increase infiltration, reduce run-off and divert water from the building.

The design proposes that pervious material and vegetated areas be maximized on the site.

Opportunities for Improvement:

Maintain existing water courses and use plants and trees to anchor the soil along drainage courses, to retain and/or treat stormwater on-site as needed.

Design a strategy to capture rainwater from the building and/or impervious areas of the site for groundwater recharge or for reuse in the building.

15.2.2.4 Strategies to Enhance Site Ecology

Opportunities for Improvement:

Consult with the University's Landscape Architect for advice on ways to improve the native habitat based on slope, soil type, and local regulations, and incorporate this into the Design Concept.

15.2.3 Energy

This section evaluates strategies that are being considered to reduce the energy consumption of the building. The proposed solutions should be developed using an integrated design process that considers a wide range of factors such as the site's microclimate, space optimization, the integration of energy- efficient systems and transportation.

Dentistry Pharmacy Building Redevelopment achieved a score of 79% on the Green Globes™ rating scale for energy efficiency. This represents the weighted integration of the sub-scores for: modeling and simulation of the building energy performance, energy demand minimization strategies, integration of energy-efficient systems, integration of renewable energy sources, and planning energy-efficient transportation.

15.2.3.1 Modelling and Simulation of Building Energy Performance; establishing an energy target.

Dentistry Pharmacy Building Redevelopment achieved a sub-score of 100% for its energy consumption, based on the inputted projected energy performance of 2.200 ekWh per gross square meter per year.

A preliminary building energy simulation has been carried out on the concept options.

15.2.3.2 Energy Demand Minimization Strategies

The Model National Energy Code for buildings sets out the design requirements for improving the energy performance of buildings, focusing on both the building envelope and the building systems and equipment.

Dentistry Pharmacy Building Redevelopment achieved a sub-score of 81% based on a review of space optimization, response to microclimate and topography, daylighting and design features of the building envelope that would be expected to affect the building's energy use and hence its carbon dioxide emissions.

Space optimization:

The design proposes the optimization of space use to maximize energy efficiency.

The design concept accommodates the potential to phase construction.

Response to microclimate and topography:

The design proposes that spaces and openings be configured to optimize passive solar gains.

The design recommends that the building form, occupied spaces and fenestration be coordinated to allow natural or hybrid ventilation.

Daylighting:

The building will be located and oriented to maximize opportunities for daylighting.

The window sizing and placement are being designed to optimize energy-savings and maximize daylighting.

Design strategies are being implemented to maximize daylight for upper floors.

Design strategies are being implemented to bring light deeper into occupied spaces, provide uniform lighting and prevent glare.

The design proposes that window glazing be used to optimize energy-savings and daylighting.

The design proposes that shading devices are to be integrated to minimize overheating and glare.

Integration of lighting controls is proposed in the design.

Optimization of building envelope:

The design proposes the use of building form and thermal massing to minimize heat loss through the building envelope.

The design proposes that glazing with a low U-factor be used.

Measures are being proposed to prevent groundwater or driven rain from penetrating into the building.

Energy metering:

The design provides for interval metering or sub-metering of major energy uses.

Opportunities for Improvement:

Explore material selection strategies to respond to ambient conditions, including wind, precipitation and other environmental forces. Meet or exceed the performance requirements of the Model National Energy Code for Buildings

15.2.3.3 Integration of Energy-Efficient Systems

Building systems such as HVAC, lighting and heating of water use large amounts of energy. The Model National Energy Code for buildings sets out the design requirements for improving the energy performance of buildings, focusing on both the building envelope and the building systems and equipment.

Dentistry Pharmacy Building Redevelopment achieved a sub-score of 52% based on a review of individual design features of the building services that would be expected to affect the building's energy use and hence its carbon dioxide emissions.

The design proposes the integration of the following lighting features:

- High efficiency lamps
- Luminaires with electronic ballasts
- Appropriate personal lighting controls

The design proposes the integration of the following:

- Variable speed drives on variable air volume distribution systems
- Energy-efficient motors

The integration of building automation systems (BAS) is proposed.

Other energy-saving systems or measures are proposed, described thus:

- Control strategies include occupancy sensors to reduce air supplies to spaces by 80% if the space is not occupied.
- Occupancy sensors will setback space temperature controls during periods of no occupancy.
- Spaces will be zoned so that no more than three offices are controlled by a space thermostat.
- The volume of air supply will be controlled by both CO2 sensing strategies and temperature.
- Lighting will be turned off during unoccupied periods.
- Central systems will utilize variable frequency speed control on all pump and fan motors, relating to demand for ventilation and heating/cooling.
- All motors are premium efficiency motors, suitable for VFD application.
- Space occupancy sensors will be provided by electrical for lighting control; mechanical will utilize the sensors for ventilation air supply and space tempera ture setback during unoccupied periods.
- Heat generated in electrical rooms and communication rooms will be recov ered and utilized to preheat outside air flows. The fluid flow will be cooled in the air systems, thereby eliminating the need for chilled water consumption to offset interior zone cooling requirements during winter months.
- High performance glazing will be utilized to reduce perimeter heat transfer, allowing the use of perimeter radiant panel for heating and cooling. Chilled water will be circulated through the panels during summer months.

<u>Opportunities for Improvement</u>:

Consider integrating task lighting in combination with overall ambient lighting at the implementation stage.

Explore opportunities to include hot water savings devices, and assess the economics of the proposed installations.

Explore measures for reducing the dependence on elevators, either through building morphology or circulation patterns that promote the use of ramps and stairs.

15.2.3.4 Integration of Renewable Energy Sources

Renewable energy sources are those that produce electricity or thermal energy without depleting resources or producing greenhouse gas. They include solar, wind, water, earth and biomass power, and energy from waste.

Dentistry Pharmacy Building Redevelopment received a sub-score of 0% for integration of renewable energy sources.

<u>Opportunities for Improvement</u>:

Explore strategies to integrate, where appropriate, the following renewable energy systems into the design: Solar-heating systems, high efficiency, low emissions biomass combustion systems, wind energy systems, photovoltaics.

Investigate the scope and amount of renewable energy that can be supplied either directly or indirectly to the buildings.

15.2.3.5 Planning Energy-Efficient Transportation

Dentistry Pharmacy Building Redevelopment received a sub-score of 89% for facilitating alternatives to automobile commuting.

Public transport

The site design will integrate the following features to reduce automotive commuting:

- Good access to public transport
- Features promoting shared vehicle transport (car-pooling)

Cycling facilities

- The design proposes secure, sheltered and accessible bicycle storage.
- The design includes staff changing facilities in the building at the tenant fit-up stage.

15.2.4 Water

This section calls for the development of strategies to conserve treated water and minimize the need for off-site treatment of water.

Dentistry Pharmacy Building Redevelopment achieved 68% on the Green Globes™ rating scale for water consumption and measures to minimize water use.

15.2.4.1 Meeting a Water Performance Target

Estimated water usage targets for the building based on the integration of water-conserving features and strategies is 0.96 m^3/m^2/year.

15.2.4.2 Water Conserving Strategies

Strategies to minimize consumption of potable water

The design proposes sub-metering of water consumption.

The following water fixtures are being considered:

- Water-saving devices or proximity detectors on urinals
- Low flush toilets (less than 6 L)
- Water-saving fixtures on faucets (7.5 L /min) and showerheads (9.0 L/min.)

Opportunities for Improvement:

Integrate native, drought-resistant species into the landscape.

If a rainwater catchment system is to be integrated, consider the required volume, based on regional rainfall data and plant requirements. Evaluate the availability of potential storage areas on the site (basins, cisterns, ponds, etc.)

15.2.5 Resources, building materials and solid waste

This section evaluates strategies and design approaches, material selection and construction systems that use fewer resources, or enable materials to be reused or recycled. The design of facilities for storing recyclable waste is also considered.

Dentistry Pharmacy Building Redevelopment achieved a score of 44% on the Green Globes™ rating scale for managing resources through waste reduction and site stewardship.

15.2.5.1 Integration of Systems and Materials with Low Environmental Impact

Opportunities for Improvement:

Conduct a preliminary research and evaluation of building materials generically, such as concrete, steel, and wood. Explore the environmental effects of different design options or material mixes.

15.2.5.2 Strategies to Minimize the Use of Non-Renewable Resources

The design proposes the incorporation of reused building materials and components.

The design concept recommends the incorporation of building materials that contain recycled content.

The utilization of locally manufactured materials is proposed for the project.

Opportunities for Improvement:

Investigate the sources of certified lumber and timber panel, and avoid the use of tropical hardwoods.

15.2.5.3 Strategies to Reuse Parts of the Existing Building

It is intended that at least 75% of the existing façade will be reused.

It is intended that at least 50% of the existing major structures (other than the building shell) be reused.

15.2.5.4 Design Strategies for Building Durability, Adaptability and Disassembly

The design proposes the incorporation of durable, low-maintenance building materials and components, particularly in areas likely to experience high levels of wear and tear.

Design features to facilitate building adaptability are being considered.

Opportunities for Improvement:

Explore systems that are fastened in such a way as to facilitate disassembly, thereby avoiding their destruction and allowing the components to be reused when the building is demolished.

15.2.5.5 Strategies to Reuse and Recycle Demolition Waste

A construction, demolition and renovation waste management plan is proposed.

15.2.5.6 Facilities for Recycling and Composting

The design proposes facilities for future occupants to handle and store consumer recyclables.

Opportunities for Improvement:

Investigate the feasibility of composting either on or off-site.

15.2.6 Emmissions, effluents, and other impacts

This section evaluates strategies to avoid or minimize air emissions, ozone-depleting substances, effluents, pesticides, and hazardous materials. Note that it is assumed that halon-containing materials will not be introduced into the building.

Dentistry Pharmacy Building Redevelopment achieved 71% on the Green Globes™ rating scale for emissions, effluents and other environmental impacts.

15.2.6.1 Strategies to Minimize Air Emissions

Opportunities for Improvement:

Investigate low-NOx burner technology.

15.2.6.2 Strategies to Avoid Ozone-Depleting Refrigerants

The building uses central cooling from the University's Central plant.

15.2.6.3 Strategies to Control Surface Run-Off and Prevent Sewer Contamination

Design measures will be taken to prevent sewer contamination.

There will be measures to prevent stormwater run-off from the roof from entering public utilities.

15.2.6.4 Pollution Reduction Strategies

Strategies to control other pollutants (PCBs, asbestos, radon):

Any PCBs and asbestos present in the building will be removed and/or will meet applicable regulatory requirements.

Strategies for proper storage and control of hazardous materials:

The design provides proper storage of hazardous materials.

Opportunities for Improvement:

Avoid architectural/structural perforations and openings that could allow pests to enter and plan proper storage facilities to protect garbage and kitchen waste from pests. Outdoors, select native, pest-resistant vegetation and integrate it into the landscaping.

15.2.7 Indoor environment

This section evaluates the strategies that are being used to ensure that the indoor environment is healthy and comfortable, in terms of providing a high level of indoor air quality, effective lighting, thermal comfort and suitable acoustic conditions.

Dentistry Pharmacy Building Redevelopment achieved 69% on the Green Globes™ rating scale for indoor environment and the measures to provide healthy, productive and comfortable environment.

15.2.7.1 Strategies for Effective Ventilation

The design proposes that air intakes be positioned so that they are far from sources of pollution and prevent recirculation. The openings will be protected.

The suggested ventilation system provides sufficient ventilation rates in accordance with ANSI/ASHRAE 62-1999.

A strategy for effectively delivering ventilation is being developed.

The design proposes a CO2 monitoring system to ensure that levels do not exceed 800 ppm.

The intended control systems will allow ventilation rates to be adjusted to meet varying needs throughout the building.

The design provides for easy access for cleaning and inspecting air filters.

Opportunities for Improvement:

Investigate and evaluate available technologies for personal environmental controls and integrate the selected option into the design. This can be further explored at the tenant fit-up stage.

15.2.7.2 Strategies for the Source Control of Indoor Pollutants

The air-handling units will be easily accessible for regular maintenance and drainage.
The design includes a humidification system which will pose a low risk of sick building syndrome (SBS).

Opportunities for Improvement:

Evaluate options for the design to minimize the risk of Legionella.

Consider the demand patterns for hot water and estimate bulk storage volumes and recovery rates to match. Design the domestic hot water system with features that will help minimize the risk of Legionella, including measures to ensure that water can be heated to high temperatures for pasteurization, and can be kept at a uniform temperature. Design the system so that it can be readily accessed for draining, dismantling and cleaning, and to avoid dead-legs and long runs. Consider using point-of-use heaters.

15.2.7.3 Strategies to Optimize Lighting

Daylighting: (Daylighting Study available upon request)

The lighting is being designed using an integrated, sequenced approach.

The orientation and visual access of the building are being considered in terms of daylighting potential.

The design concept indicates how much of the floor plan will receive direct daylight and the approximate value.

The design concept indicates the daylight factor of those areas that require good or moderate daylighting.

Lighting design:

The design proposes electronic ballasts fitted to luminaires.

The proposed lighting concept follows the guidelines outlined in the ISNEA Lighting Handbook for Lighting Levels with regards to the selection of lighting levels for specific tasks.

The local lighting controls will be adjustable to meet requirements relating to room occupancy, circulation space, and daylighting.

The floor plan depths and heights are fixed by the original building which was designed to optimize daylighting and views.

Opportunities for Improvement:

Consider shading options and lights which can be angled to minimize glare; particularly in the vicinity of windows orientated more southerly than NE or NW.

Explore opportunities for integrating task lighting into the lighting concept, and evaluate how these might affect the ambient lighting requirements.

15.2.7.4 Strategies for Thermal Comfort

Based on thermal evaluation for critical spaces the thermal conditions will meet ASHRAE 55.

15.2.7.5 Strategies for Acoustic Comfort

The design plan includes strategies to zone acoustically sensitive occupancies far from undesirable external noise sources.

There are design measures to achieve desired vibration control and prevent noise transmission throughout the building.

There are design measures, such as zoning or isolating certain spaces, to achieve the required acoustic privacy and minimize the potential for occupancy-related acoustic problems.

Design strategies exist to achieve reverberation control/acoustic absorbency, consistent with speech intelligibility requirements.

The design proposes measures to mitigate acoustic problems associated with noise and vibrations from mechanical equipment and plumbing systems.

Opportunities for Improvement:

Where undesirable noise originates on the site, integrate noise attenuation in the design of building envelope.

15.2 CREDIT SUMMARY

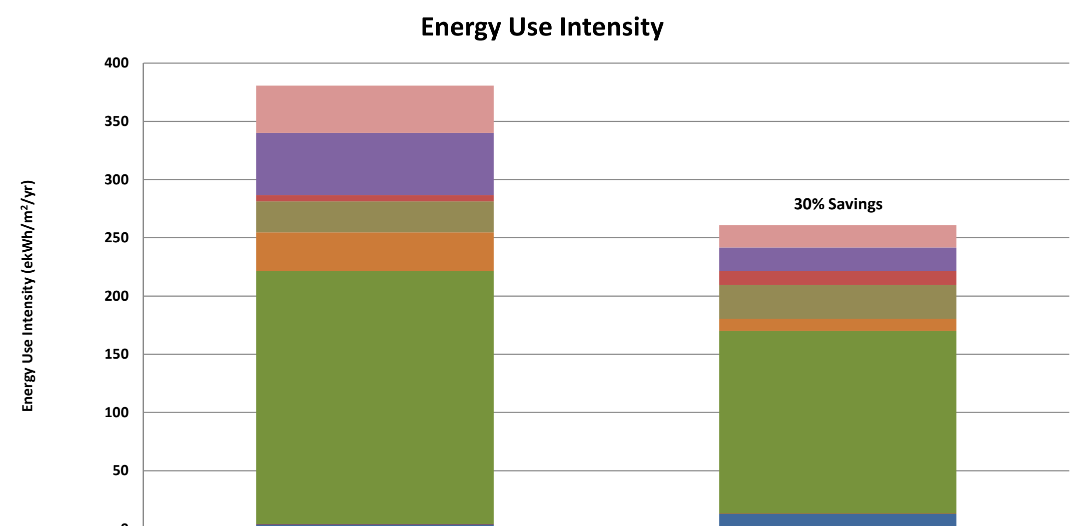
- *Energy Analysis*

Introduction

A preliminary energy model was prepared for the University of Alberta Dentistry Pharmacy building. The model is based on the schematic design data provided. Analysis was conducted using eQuest, which is an energy simulation software tool which performs hourly simulation with the DOE 2 based engine. The purpose of this energy analysis is to provide a preliminary estimate of the energy use intensity of the building, compared to typical offices in Alberta. Finally, this memorandum provides recommendations to further improve performance. Energy consumption associated with the SLOWPOKE nuclear reactor is excluded from the analysis.

Current Energy Performance

Building energy performance of the renovated Dentistry Pharmacy building is shown in Figure 1. A typical office building in Alberta is presented as a basis of comparison.



	NRCAN Energy Use Database 2009	U of A Dent/Pharm Renovated
Total	380.6	260.7
Area Lights	40.3	18.9
Misc. Equip.	53.7	20.3
Pumps & Aux.	5.3	12.0
Vent. Fans	26.6	29.0
Hot Water	33.1	10.3
Space Heat	217.3	156.9
Heat Reject.	0.4	0.4
Space Cool	3.8	12.9

Figure 1: Energy Use Intensity Comparison

Upgrades assumed in the renovated Dentistry Pharmacy building include:

- Upgrade roof insulation
- New windows
- Installation of a heat recovery ventilator
- Installation of an atrium
- Chilled beam radiant heating and cooling

Discussion of Energy Use

Typical of most commercial buildings, space heat accounts for almost 60% of the total energy use in the building. Area lighting, combined with pumps and ventilation fans account for a further 25% of the energy use, while electrical plug loads, domestic hot water and space cooling account for the balance of energy use.

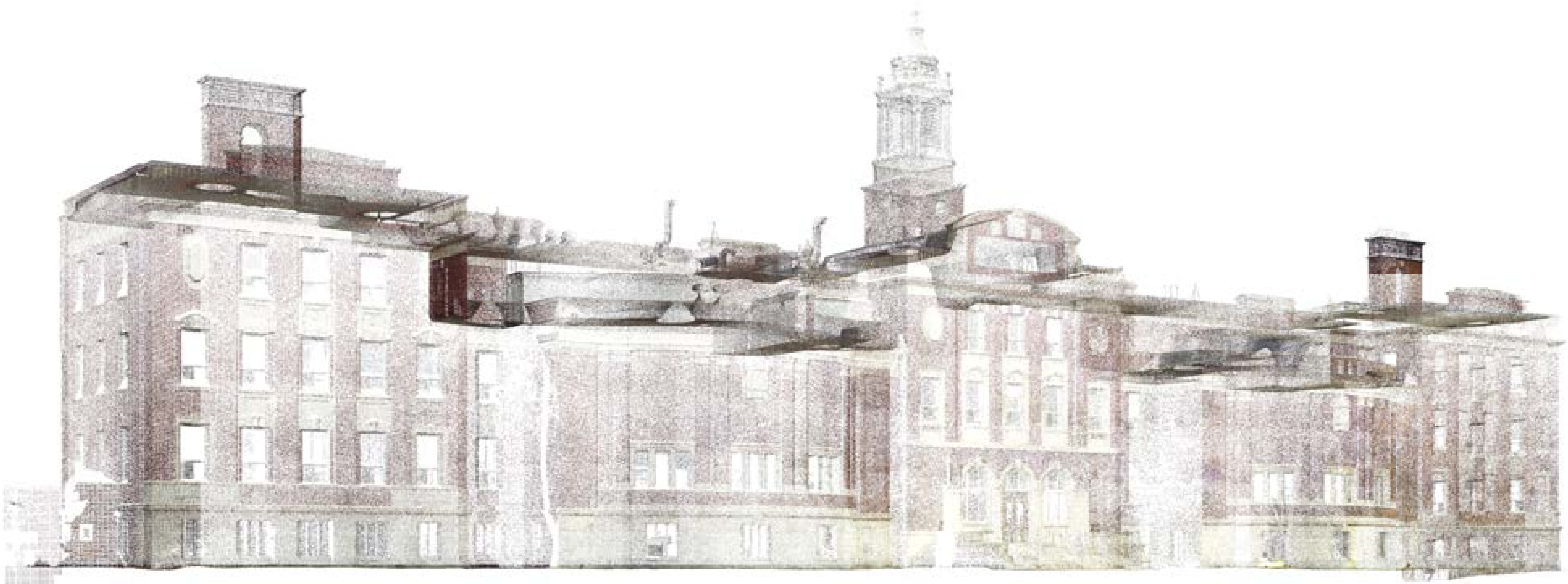
Table 1: Energy Model Input Summary Table

University of Alberta Dentistry Pharmacy Building Redevelopment	
General	
Location	Edmonton, Alberta
Climate Zone	ASHRAE Climate Zone 7
Building Type	Office Redevelopment
Floor Area Summary	**Total: 32,660 m²**
Envelope Performance	
Overall Roof R-value[1] (m²·°C/W)	**Increased Roof Insulation** Insulation Above Deck: RSI-5.30
Overall Wall R-value (m²·°C/W)	Brick – no insulation: RSI-0.5 (average)
Percentage Glazing	36%
Overall Glass U-value including frame (W/ m²·°C), and Solar Heat Gain Coefficient[2] (SHGC)	**High Performance Windows** Solarban 60 U-value$_{\text{(center of glass)}}$: 1.65 SHGC: 0.39
Shading Devices	No shading devices
Internal Loads	
Lighting Power Density (LPD)[3]	**Reduced Lighting Power Density** Office: 7 W/m² Service Spaces: 2.9 – 4.9 W/m²
Lighting Controls	None
Plug Loads	Based on MNECB 1997 Table 4.3.2.A Building Type Categories: Default Assumptions Office: 7.5 W/m²
Occupancy	Based on MNECB 1997 Table 4.3.2.A Building Type Categories: Default Assumptions 25 m²/occ
Domestic Hot Water	eQuest Defaults
Design Conditions	

[1] Based on inputs from design team
[2] Based on inputs from design team
[3] Based on inputs from design team

	University of Alberta Dentistry Pharmacy Building Redevelopment
Indoor Design Temperature	Heating: 22°C Cooling: 21°C Night Setback: Heating: 18°C Cooling: 28°C
Central Plant	
Heating Type	District Energy System: Steam from Campus utilities
Heating Efficiency	Modeled as 75% natural gas boiler
Hot Water Design Supply and Return Temperature	Supply: 82°C Return: 60°C
Cooling Type	District Energy System: Chilled water from Campus utilities
Cooling Efficiency	Modelled as centrifugal chiller w/ COP 4.0
Chilled Water Design Supply and Return Temperature	Supply: 7°C Return: 13°C
Domestic Hot Water	District Energy System: Steam from Campus utilities
Domestic Hot Water Efficiency	Modeled as 75% natural gas boiler
Pump Power	eQuest defaults
Mechanical Systems	
System Description	100% OA Ventilation Supply Chilled Beams to occupied spaces Radiant Panel in perimeter zones and atrium
Supply Air Temperature	OA Ventilation Unit 13°C Chilled Beam Units Heating: 35°C Cooling: 13°C
Fan Power	eQuest Defaults

2



LIDAR Scan of Dentistry Pharmacy Building - Image is comprised of millions of laser generated points in space creating a “cloud” of measurable data.

BUILDING INFORMATION MODELING AND DATA MANAGEMENT

Overview

This project has been and will continue to be modeled in REVIT. The modeling is being done fully for all disciplines. Specific data related to the specification of materials, components and assemblies will be developed further throughout construction documentation. These data will be used for the on-going maintenance of the building and will – through the use of the Stantec Asset Management System (SAMS) – be available for desktop and field display of all data associated with this project.

Model Development and Data Sources

The data streams will include:

- Embedded REVIT data is present
- COBI compliant fields are included in the REVIT data although none of the fields are populated
- Uses as maintained in the University's Facility Centre CAFM Database
- Department allocations as maintained in the University's Facility Centre CAFM Data base
- RECAPP information as specified by the University is not currently integrated although that integration can occur when the University feels it is necessary
- GIS data remains unspecified at the end of Design Development. There are no GIS layers in ESRI (the University currently has an ESRI license used for research). The Stantec Asset management System anticipates the use of ESRI or similar data layers to fix the geospatial positioning of components that are presented. This can occur at a later date

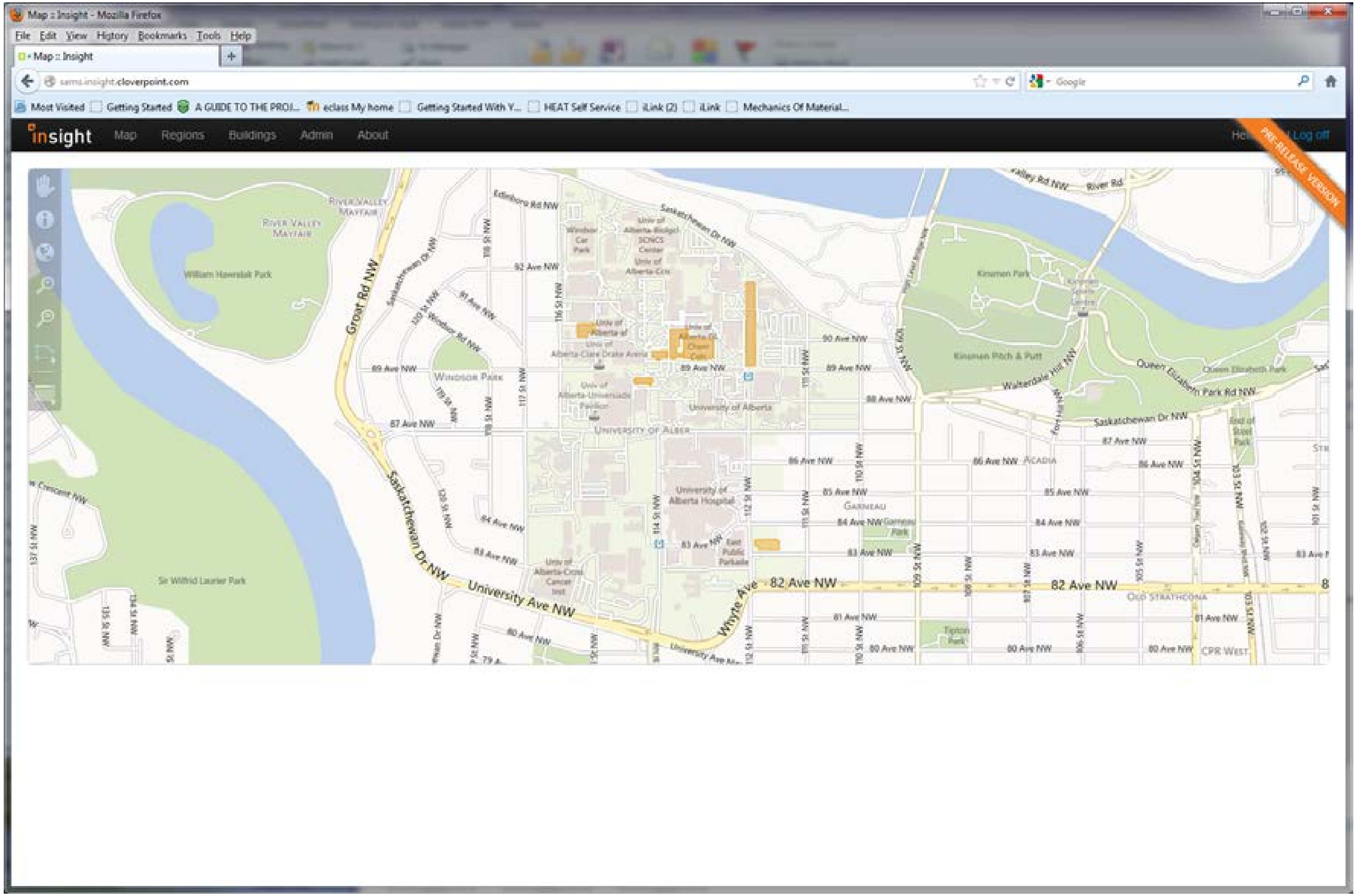
"WeatherMap"

The weather mapping function in 2D is available at http://sams.insight.cloverpoint.com/ and login information has been provided.

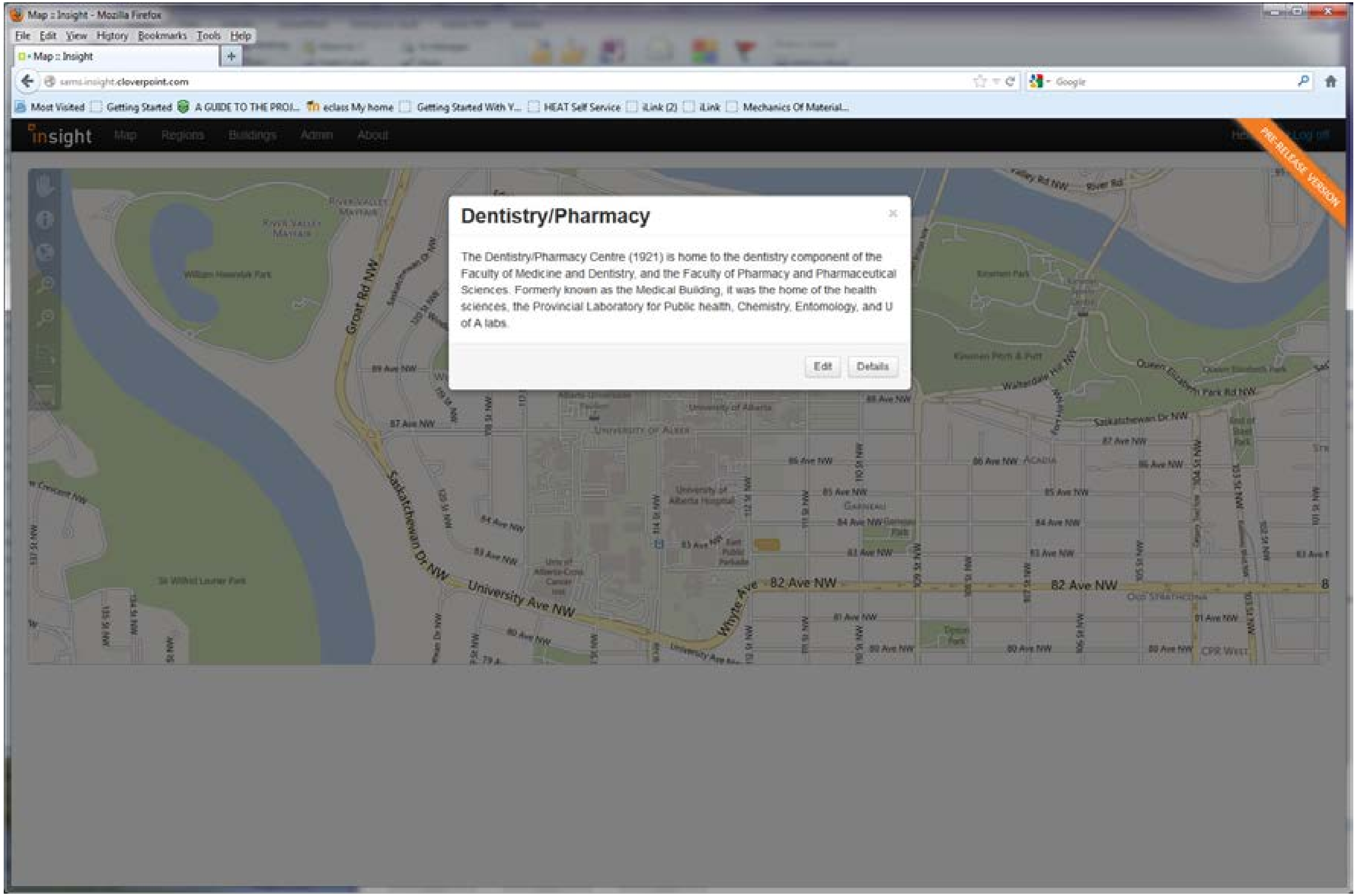
- All pull down menus reflect current data categories in Facility Centre
- Although coordinates for building location are indicated, this is not yet tied to an ESRI layer with other survey information to make the mapping geospatially accurate

MODEL SUBMISSION STANDARDS FOR UNIVERSITY OF ALBERTA INSIGHT3D

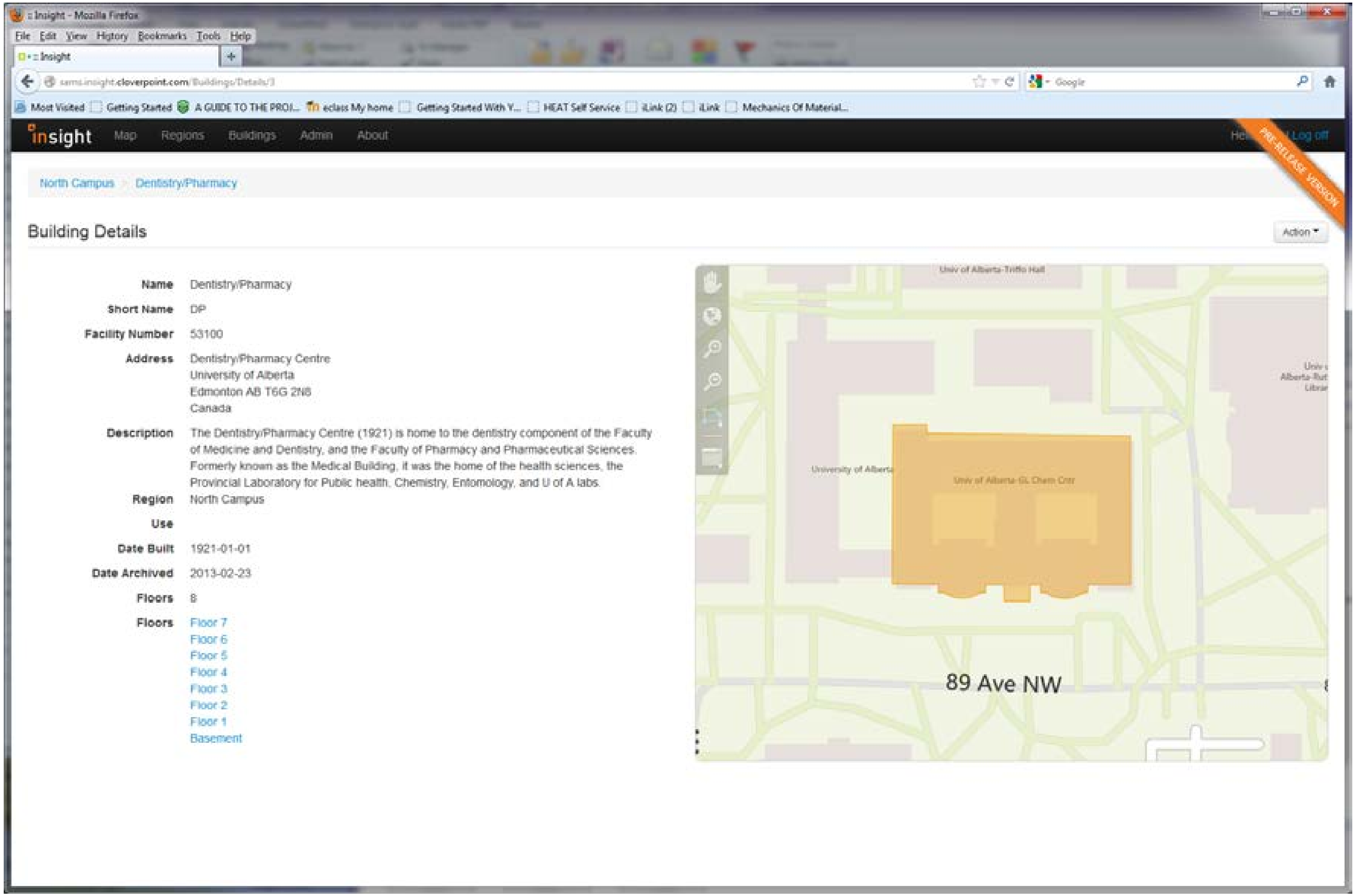
- Models must be saved in either .3DS, .FBX, or .C4D file formats. Popular 3D modeling software such as 3D Studio MAX, Maya and Cinema4D all support these formats
- The polygon count of the model must not exceed 60,000 polygons (Check your 3D software Help file for instructions on how to display polygon counts)
- The complete 3D model is a single mesh/object
- The model file size is no greater than 50Mb
- Only one .JPG or .PNG file is used as a texture map for UV mapping
- Texture sizing is divisible by 2 (E.g. 512px x 512px) at 72 dpi.
- The image pixel count cannot exceed 2048 X 2048 in size
- The texture map file size is less than 5Mb
- The 3D model's "normals" are all facing outwards i.e. all polys are visible from the viewers expected perspective
- The scale of the 3D model must be built with a ratio of 1 to 1m.
- The model has a known Origin/Axes point positioned at the center point of the model.



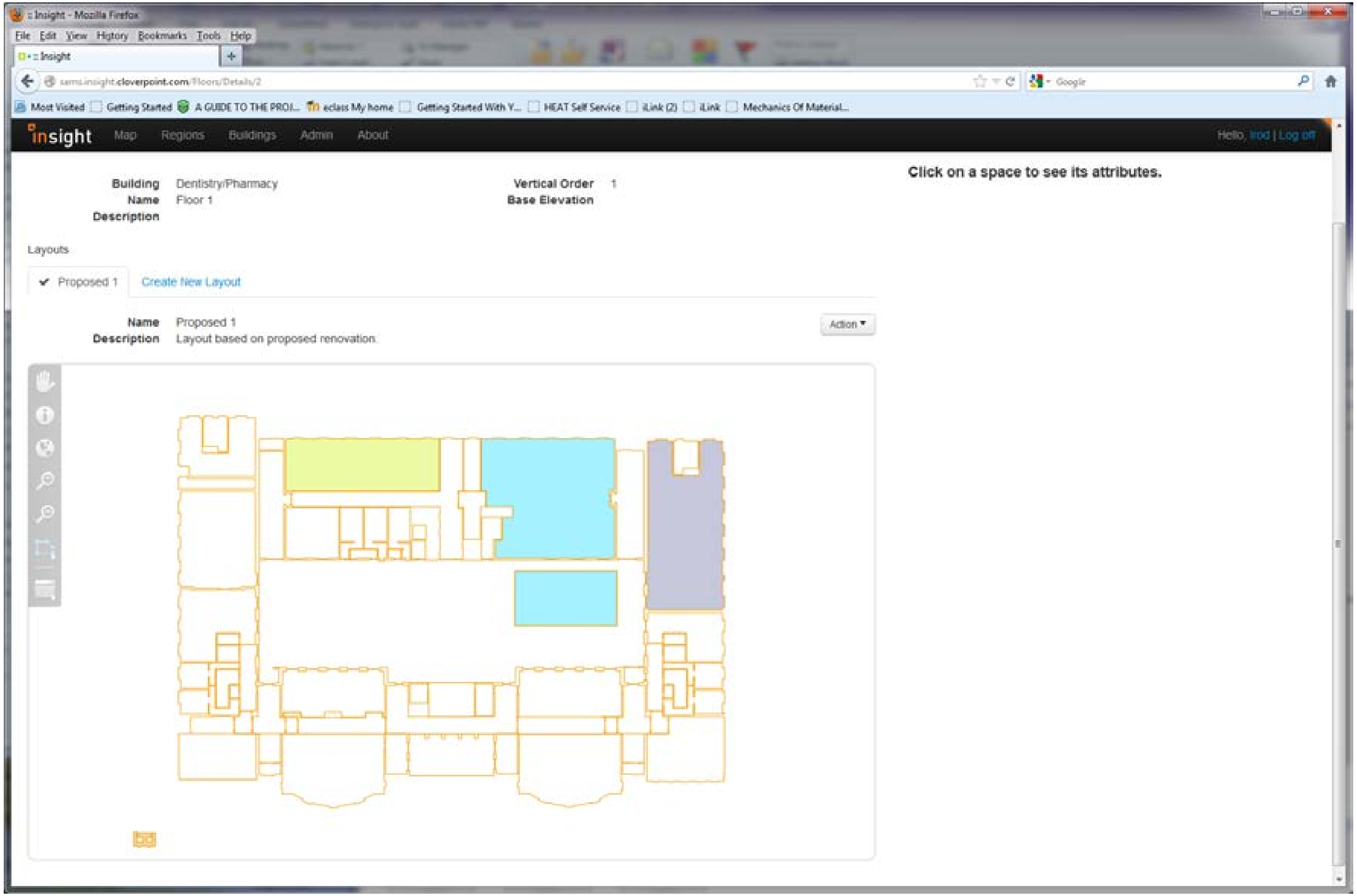
Once you have logged into SAMS, the entry screen is the map of the University of Alberta Campus. The highlighted buildings are those that are related to the program moves anticipated for the Redeveloped Dentistry Pharmacy Building.



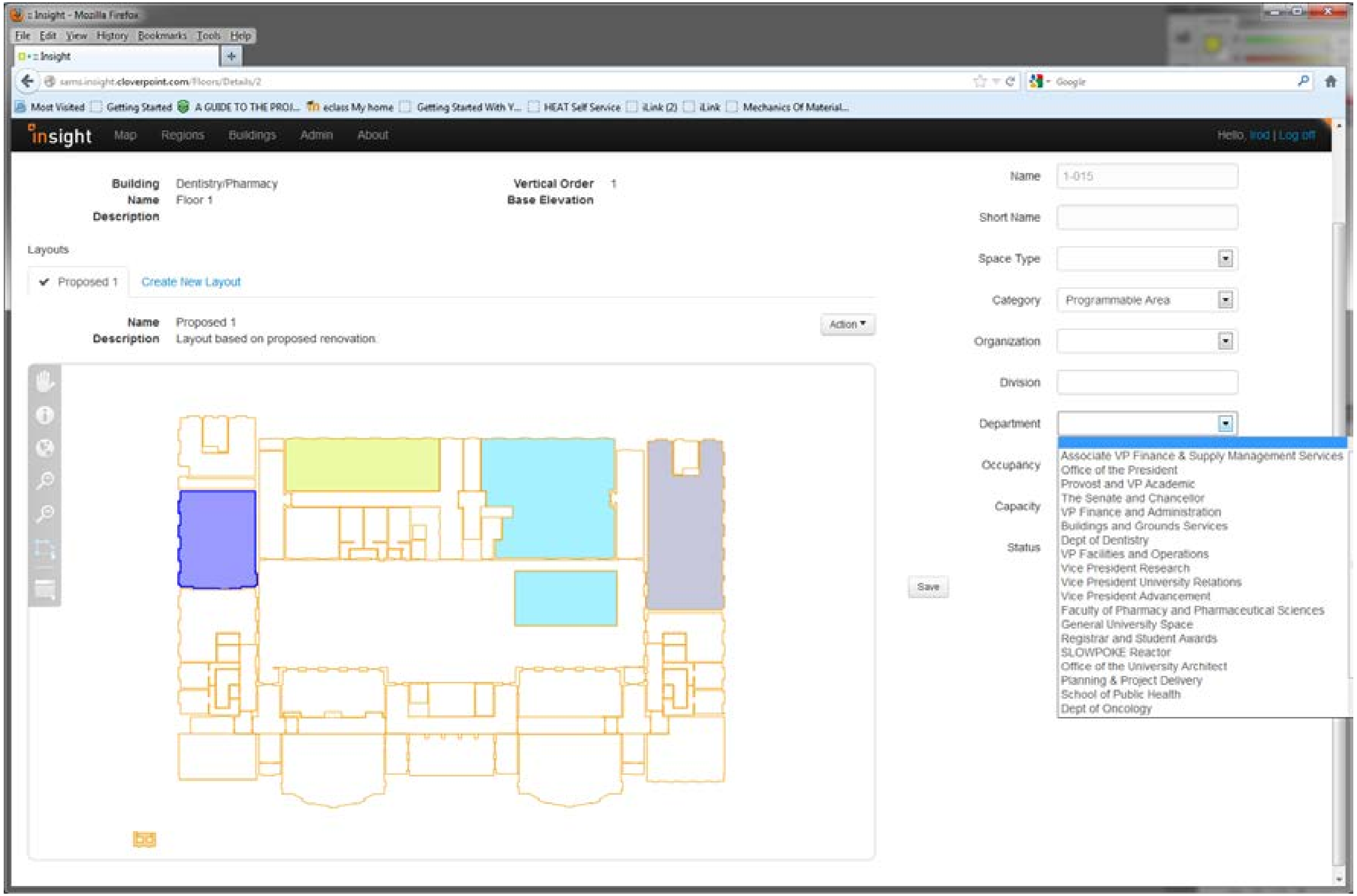
Clicking on the Dentistry Pharmacy Building will bring up this dialogue box providing general information on the building. the next step is to click on the “Details” button in the dialogue box.



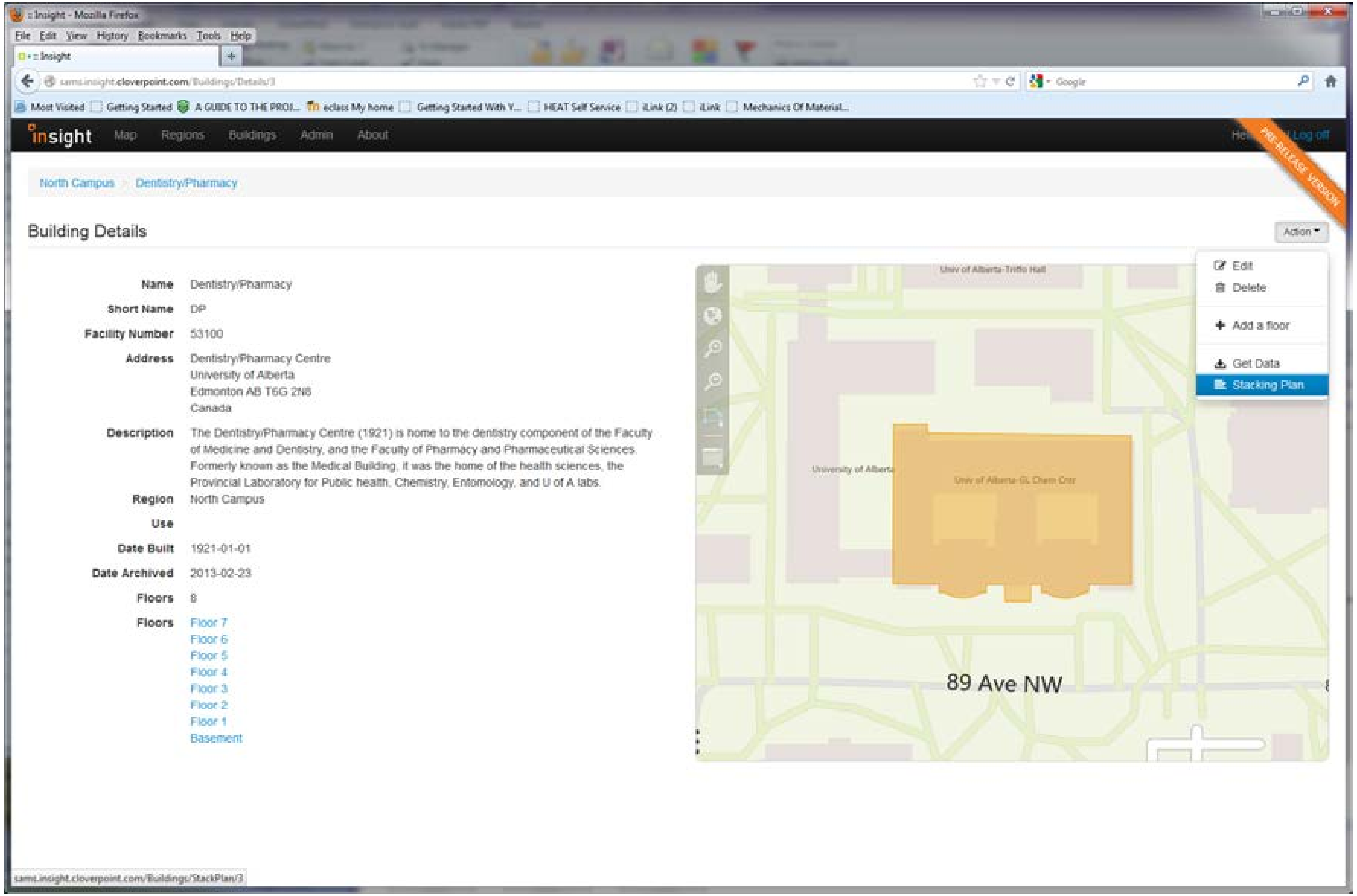
The screen shown will appear once “Details” has been clicked. This has a more complete description and shows the floors in blue - floor by floor. We will click on “Floor 1” to activate the next screen.



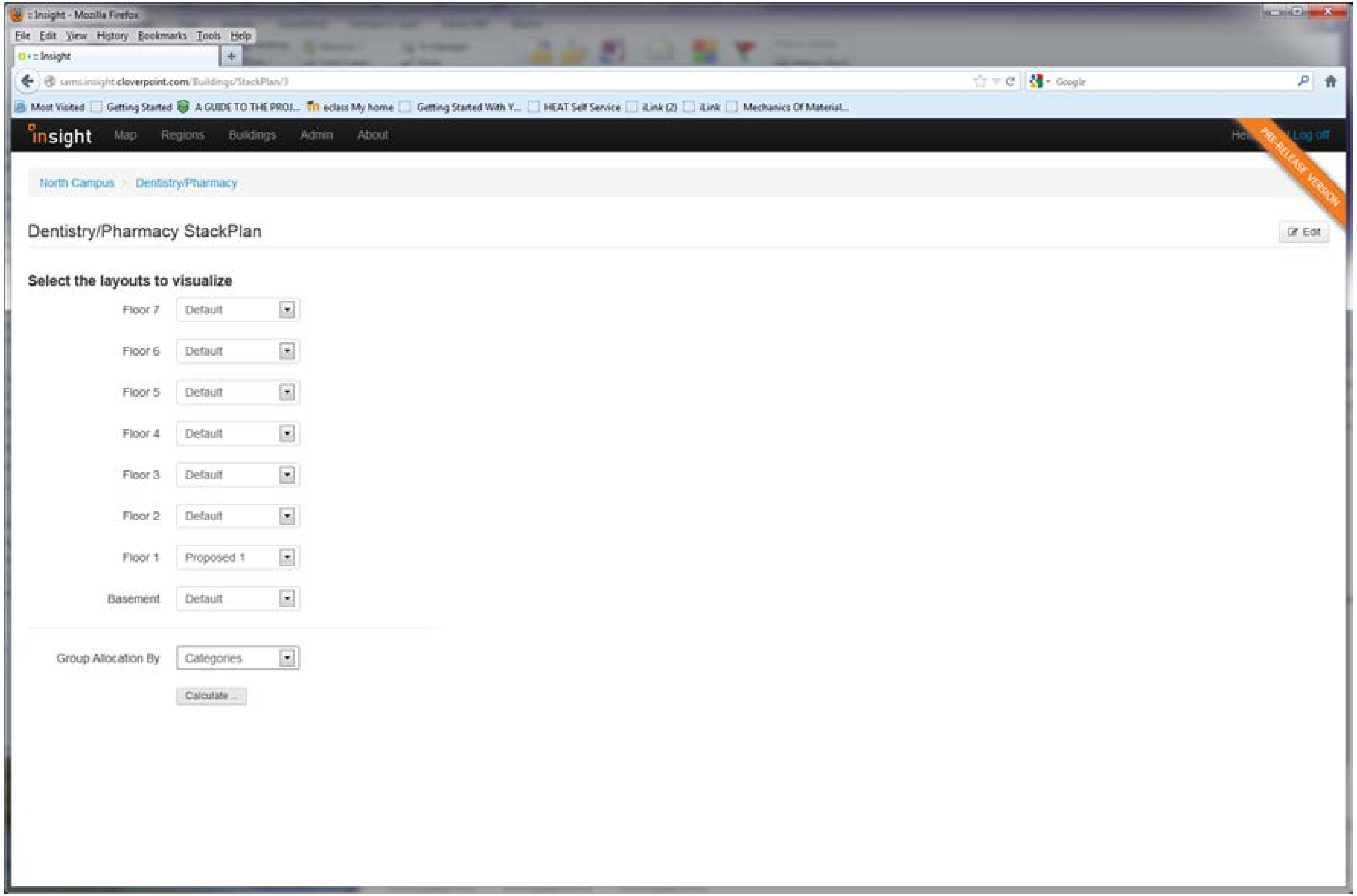
Floor 1 appears with all of its assignable space in outline. To assign a department to a space, one clicks within the space of the outline..



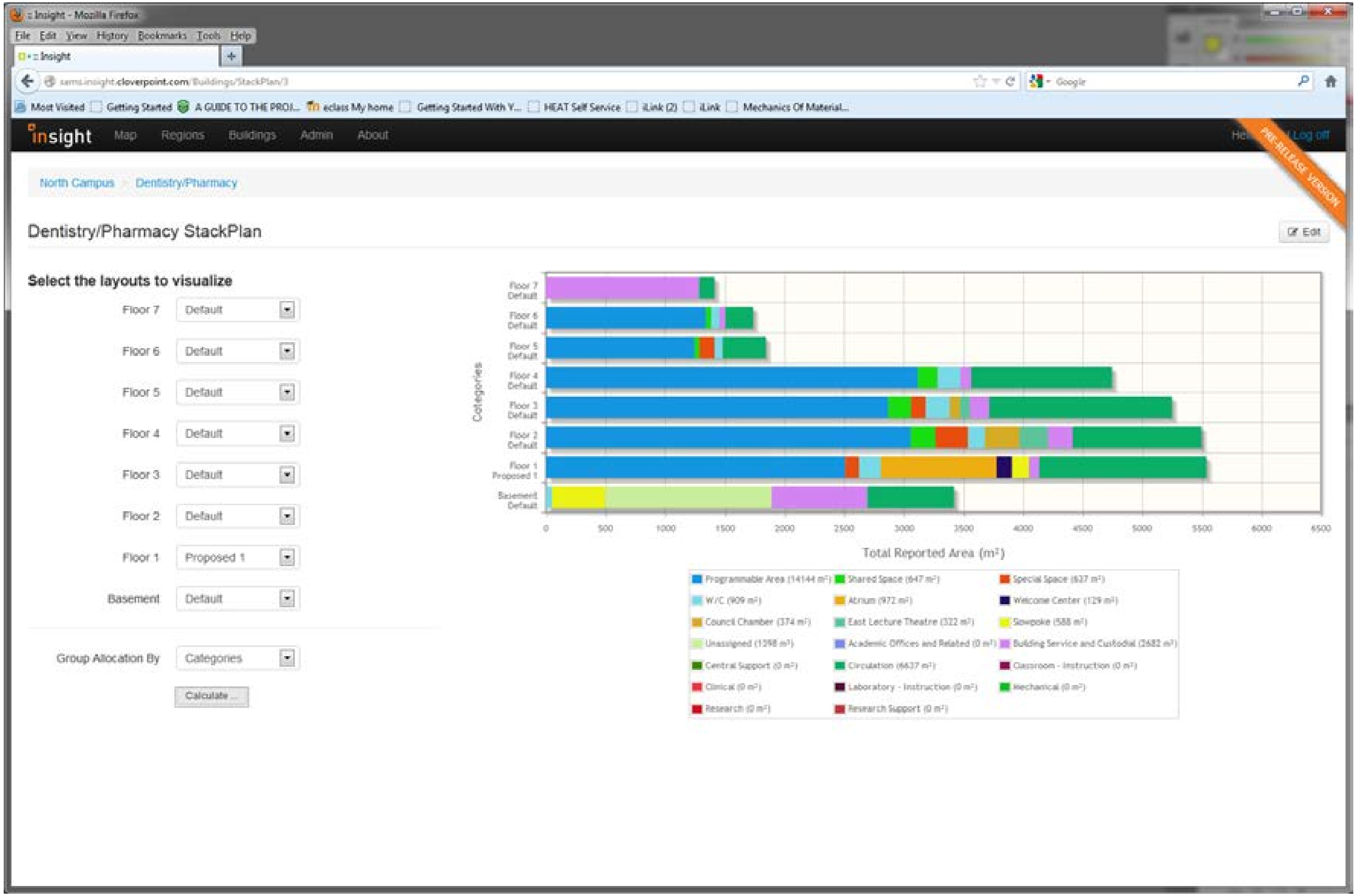
In this case we have clicked on the space in dark blue and the entry screen appears down the right side of the screen. We choose the "Department" pull down menu and will assign the space to one of these departments.



Once you have assigned departments to all of the available area, you can see the summation of the floors and their departmental cumulative areas by going back to the “Buildings Detail” screen and clicking on the “Actions” button in the upper right corner. This will show a pull down menu. Clicking on “Stacking Plan” will give you the results for the building as seen in the next screen...

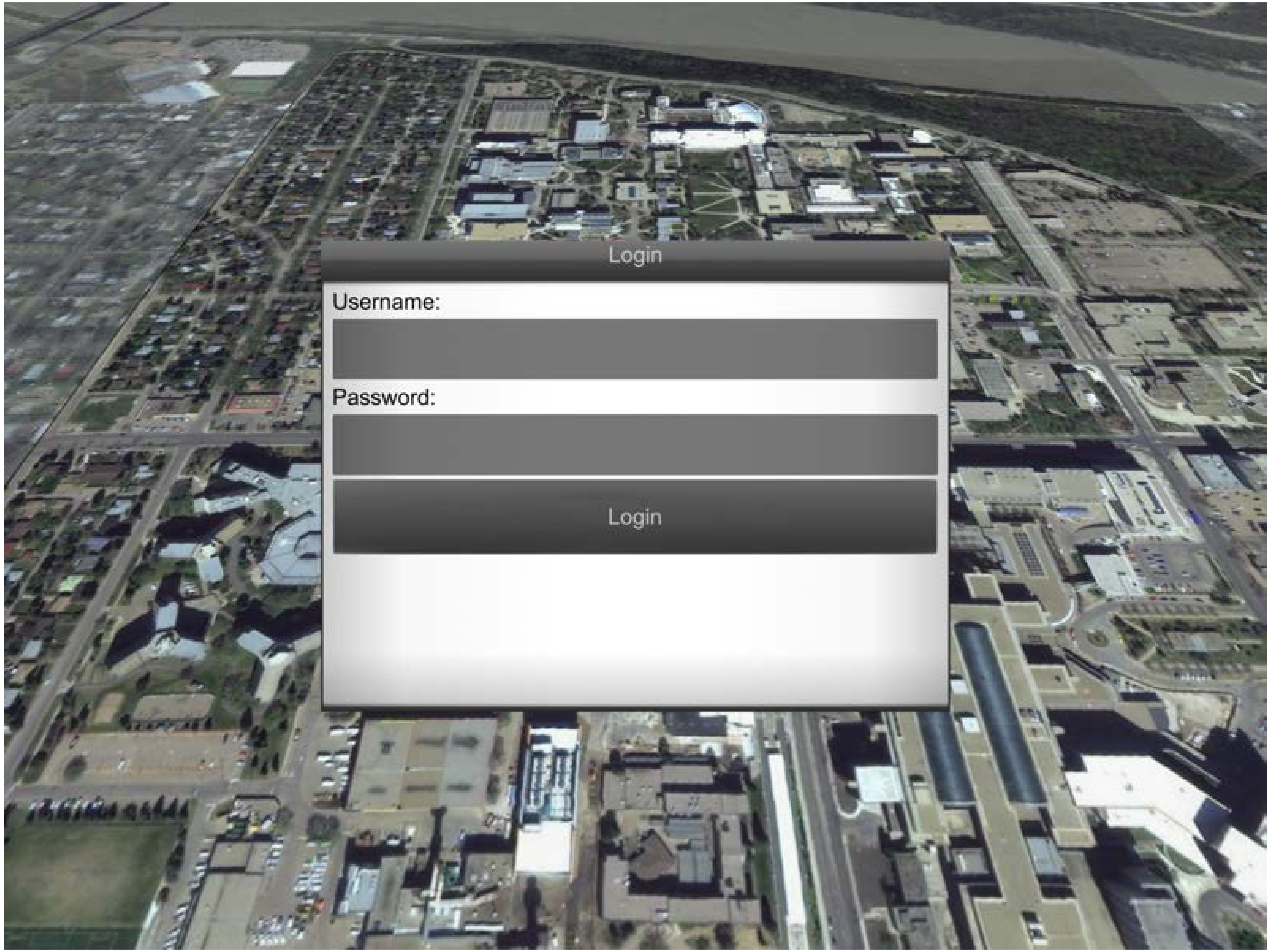


This is the Stacking Plan screen. Choose the plan you want to display from each one of the floors. You can have many potential plans that will yield differing results for the stacking plan and its associated aggregated areas. Choose "Categories" for example and then click the "Calculate" button...



The stacking plan will appear to the right with the colour legend and all associated area calculations

One the iPad has logged you in, you will see the 3D model screen. This gives you access to the data about the building and what is in it. Tapping on the building will bring up the next screen...



Once you start the App on the iPad, the following login screen appears. Enter user name and password as provided by Stantec

After tapping the building, it will change colour and display the dialogue box to the left. This information is consistent with the data on the 2D screens described earlier, but is also editable here.

Tapping the "Proposed Model" button will show the building as it is intended to be in its finished form. Tapping the "Load Interior" button will load the interior 3D perspective images.

Once the Interior is loaded, you can navigate by using your fingers: Putting your index finger on the screen and moving it up or down will move you forward and back in the perspective. Placing two fingers on the screen and turning them will turn your view of the scene in another direction.

Tapping the "AR" button will place you in "Augmented Reality" mode and will geospatially fix the position of the image. If you move the tablet. the scene will change as if you were looking through a lens at the image of the building in its final format. The "UP" and "Down" buttons will adjust your vertical elevation to match your location in the building.

Stantec
Architecture Ltd.

UNIVERSITY OF ALBERTA

DENTISTRY PHARMACY BUILDING REDEVELOPMENT

15. BUILDING INFORMATION MODELING AND DATA MANAGEMENT

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