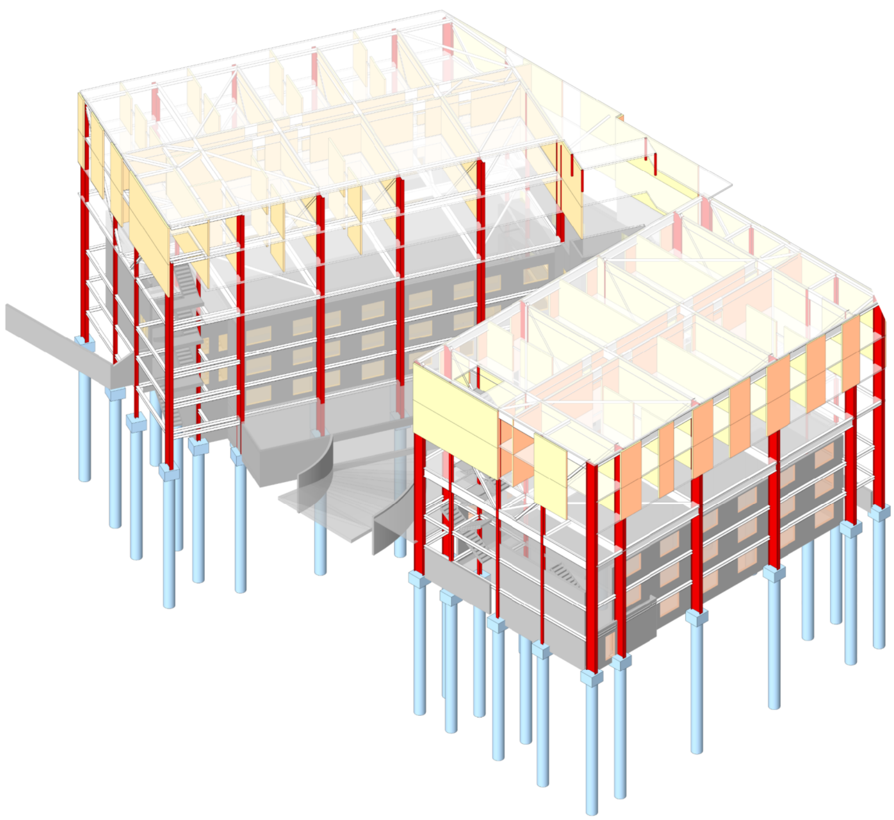
BCNPHA

THREE OVER THREE

CHELSEA MANOR STRUCTURAL REPORT

SEPTEMBER 11, 2024



wsp

THREE OVER THREE

CHELSEA MANOR
STRUCTURAL REPORT

BCNPHA

PROJECT NO.: CA0026659.6220
DATE: SEPTEMBER 16, 2024

WSP

WSP.COM

REVISION HISTORY

2024-09-11	Issued for Review			
Prepared by	Reviewed by	Approved By		
Robert West/Kevin Li	Chris Jacques	William Johnston		
2024-09-16	Updated with Comments and Reissued for Review			
Prepared by	Reviewed by	Approved By		
Robert West/Kevin Li	Chris Jacques	William Johnston		

TABLE OF CONTENTS

1 EXECUTIVE SUMMARY

This report details the findings of a study into the feasibility of constructing three additional stories of permanent housing over the top of existing three storey buildings in the greater Vancouver area. This is in response to recent City of Vancouver rezoning of current sites managed by BC Housing that are now permitted to house buildings up to six stories. This study proposes a design concept to allow construction of the additional housing units over the same footprint of the original building, whilst maintaining continuity of occupancy for the existing housing units.

This study also considered the viability of mass timber as a structural material to achieve this outcome, and determined the most effective use of structural materials to achieve affordable and rapidly deployable housing

The concept tested in this study proposes a methodology of a transfer structure above an existing three storey timber framed building to fully support the additional stories whilst minimising impacts on the existing units below.

Additional options considered using this same transfer structure to upgrade the seismic capacity of the existing building, which otherwise would impose significant disruption to current occupants of the buildings.

Preliminary costing undertaken by Altus estimates that the proposed overbuild is 25% more than an equivalent greenfield construction.

The study confirms that constructing the transfer structure above the current building is feasible from an engineering concept, and offers some unique advantages over more conventional structural renovation or known-down/rebuild options, but does come at a cost premium.

2 SCOPE

The scope of this study was to test to feasibility of constructing an additional three stories of housing on the same footprint of current three-storey developments currently managed by BC Housing, and to explore the application of mass timber to achieve this.

The following were the primary outcomes proposed for this study;

- Determine a method to extend the current buildings by three stories, and maintain compliance with current structural design codes and requirements.
- Devise a system where the occupants of the current buildings could remain in place during the works, minimising disturbance and relocation costs.
- Assessment of the feasibility of achieving seismic, fire, accessibility, and energy efficiency upgrades to the existing building.
- Maximise the use and application of mass timber to achieve these outcomes.

2.1 ASSUMPTIONS AND LIMITATIONS

This study has been undertaken on an existing building, but is intended to be adaptable to other sites with similar building typologies. For this, several assumptions have been made in the design of this study;

- Seismic site classification of Site C, based in Vancouver, BC
    - This is representative of a typical ground condition in Vancouver, BC, however site locations other than those in Vancouver would result in significant changes in seismic design loads. Should a site be located in Victoria, BC for example, the seismic design forces will increase significantly from the current assumption. Similarly, if a site was located in a region of lower seismicity, there would be a significant reduction in design actions. The principal impact of site condition and ground condition will affect the size of the transfer structure and foundations.
- No additional carparking to be provided as part of the proposed scheme
    - The scheme does not consider the potential for additional carparking requirements on site due to the increase in apartments from the new overbuilds. Should this be required, a separate study would be required.
- Structural steel for the primary framing has been tested due to its strength to mass ratio and high performance for seismic design. The substitution of this with mass timber could be considered in future studies.

3 EXISTING BUILDING

3.1 SITE LOCATION

Chelsea Manor comprises two wings, namely the south and the north wing. The two wings are connected by a common corridor on the Main Level. They are located at 3640 Victoria Drive, Vancouver.

The site slopes gently towards the north-east, and comprises an underground basement parkade on the southern building.

Figure 1 Chelsea Manor Site Location

3.2 CURRENT BUILDING CONSTRUCTION

Chelsea Manor was constructed originally in 1967, and comprises a three-storey timber stick-built construction with a flat roof founded on high level strip foundations. A section of the 1st floor directly above the current undercroft carpark is reinforced concrete construction.

The current primary structural frame and seismic force resisting system is timber stud walls with nailed plywood shearwalls bracing.

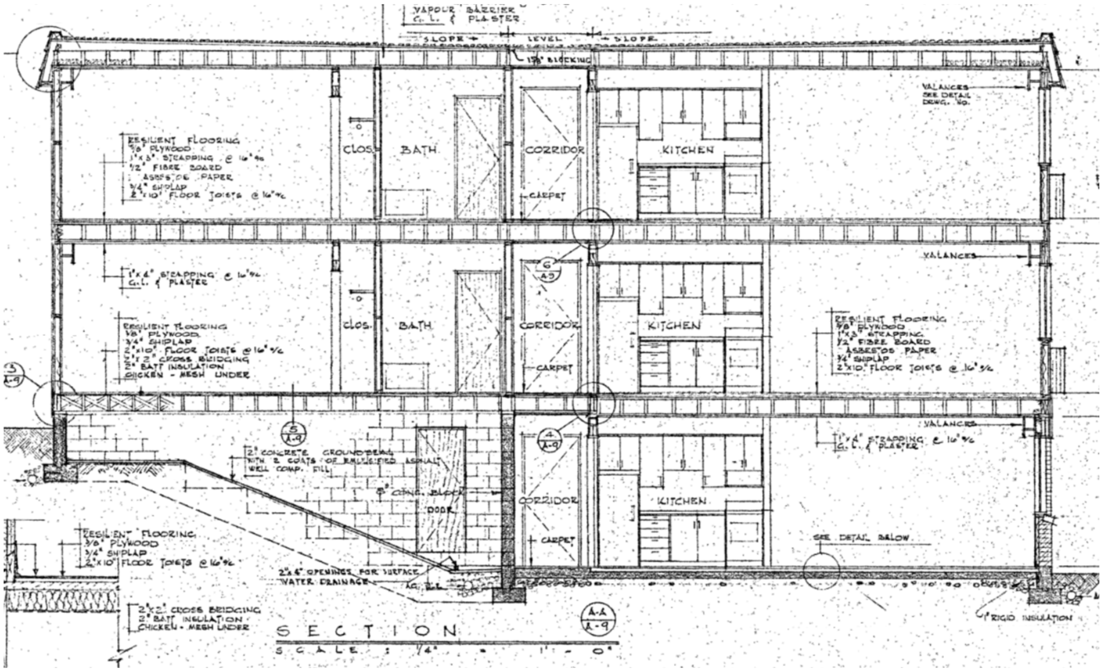


Figure 2 Chelsea Manor Typical Section

Figure 3 Chelsea Manor Current Site

3.3 PREVIOUS UPGRADE WORKS

No record of previous seismic or major upgrades to the current buildings were found, and it is assumed they remain unchanged from their original construction.

4 DESIGN CRITERIA

4.1 GENERAL

This section outlines the proposed structural requirements and considerations that will form the basis of design for the project. Work in this section includes proposed building framing layout considering building code requirements, spatial requirements, and construction limitation given site restrictions.

4.2 DESIGN REFERENCES

The preliminary design of the structures has been undertaken in accordance with the BC Building Code 2024 (BCBC 2024) supplemented by the NBC 2015 Commentary or National Building Code 2020 (NBC 2020).

4.3 IMPORTANCE FACTOR

The proposed building importance factor for the combined overbuild is “normal” importance.

4.4 GRAVITY LOADS

Table 4.1 Dead Loads

LOAD	DESIGN LOAD ALLOWANCE
Typical Floor SDL	1.5kPa
External Terrace SDL	5kPa
Roof SDL	1kPa
Façade Loading	1kPa per m vertical

Table 4.2 Live Loads

LOAD	DESIGN LOAD ALLOWANCE
Typical Apartment Floor	1.9kPa
External Podiums	4.8kPa
Stairs and Hallways	4.8kPa
Parking Areas – Accessible at Street Level	12.0kPa or 54kN applied over an area 250x600mm
Parking Areas – On suspended Structures	2.4kPa and 18kN applied over an area 120x120mm

4.4.1 DEFLECTION LIMITS

Deflection limits for gravity loading has been designed to limit deflections to less than Span/360 for dead loads and Span/500 for live loads.

4.5 WIND LOADS

Wind loads have been calculated based upon NBC2020, and are summarised below;

q50: 0.45kPa, q10: 0.34kPa

Iw (ULS) = 1.0, Iw (SLS) = 1.0

Terrain Type: Open Internal Pressure Category: 1

4.5.1 WIND DRIFT LIMITS

Interstorey drift from 1:50 year wind loading has been limited to H/500. Note that wind loads are not a critical case in the current design scheme.

4.6 SEISMIC LOADS

Seismic loads have been calculated based upon NBC2020, and are summarised below;

Site classification = C (assumed)

Importance Factor Ie = 1.0 (Normal Classification)

Seismic Design Criteria – NBC 2020 Adopted*

	2.5%/50 YEARS	**5%/50 YEARS**
Sa (0.2)	1.05	0.738
Sa (0.5)	0.842	0.578
Sa (1.0)	0.489	0.327
Sa (2.0)	0.297	0.183
Sa (5.0)	0.0853	0.0464
Sa (10)	0.0363	0.0178
PGA	**0.457**	**0.32**
PGV	**0.510**	**0.334**

**Although currently BC codes permit the use of lower NBC2015 seismic design values, in March 2025 all structures will be required to be designed to the higher seismic forces specified in NBC2020. As the approval of any overbuild design would likely be submitted after this date, the higher values have been adopted for this study.*

4.6.1 SEISMIC CLASSIFICATION

Per NBC 2020, the combined 6 storey building is classified as a SC4 seismic design category.

4.6.2 DRIFT LIMITS

Seismic interstorey drift has been limited to a maximum of H/40 (2.5%) for the purposes of design.

5 STRUCTURAL CONCEPT DESIGN

5.1 STRUCTURAL FRAMING CONCEPT

To minimize structural alterations to the existing building, the overbuild uses a structural steel framework above the existing roof. This framework acts as a transfer truss, directing the loads to the new steel columns along the building's envelope, and then the foundation.

Supported by the transfer trusses is consisting of timber framing. Since the existing building's seismic provisions do not meet current design standards, the steel framework also enhances the building's lateral load resistance. The arrangement is simplified and presented below in Figure 4.

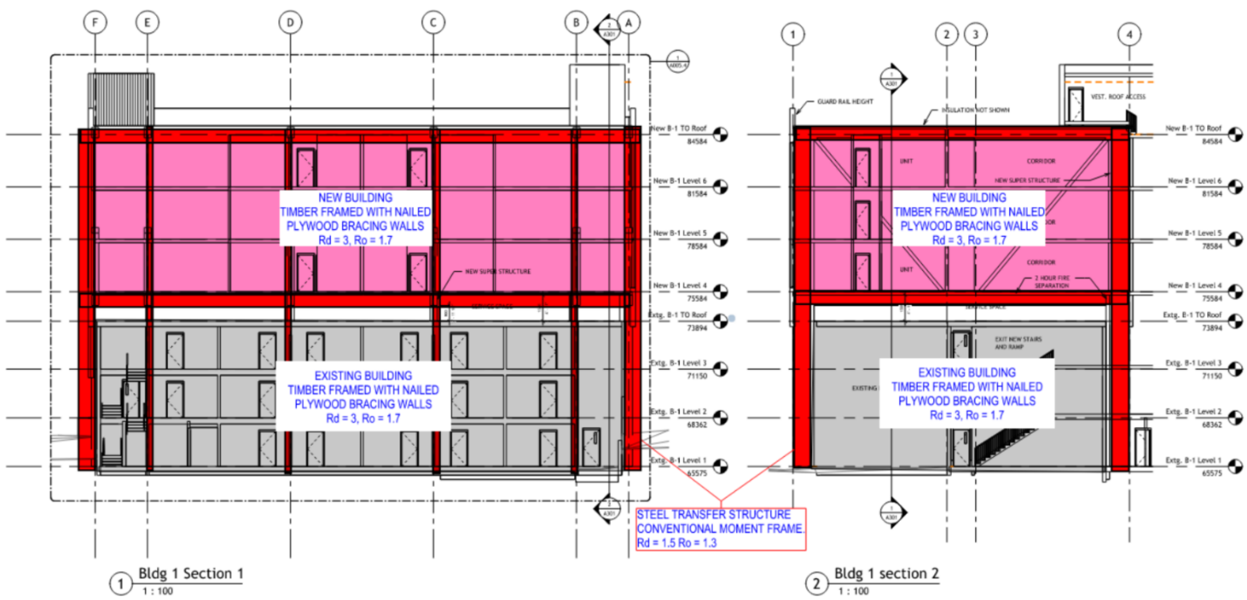


Figure 4 Structural arrangement of the new construction

5.2 MATERIAL CHOICE

The proposed overbuild features a steel frame with columns along the building envelope and a composite steel decking serving as the transfer slab over structural steel framing. The three new storeys are constructed with timber stud walls, beams and CLT (Cross-Laminated Timber) panels for the floors. This arrangement offers several benefits.

5.2.1 LIGHTWEIGHT

Since the three new storeys are constructed on a transfer framework, the weight of it dictates the size of the transfer structure. Timber is significantly lighter than many other construction materials, which reduces the overall load on the existing structure and the new steel frame. In addition, the seismic load is proportional to the mass of the structure. Minimizing the weight is particularly beneficial for increasing seismic performance.

5.2.2 EASE OF CONSTRUCTION

Timber construction can be faster and more straightforward, especially with prefabricated components. This can reduce construction time and labor costs. On the other hand, it causes minimal disturbance to the existing residents.

5.2.3 SUSTAINABILITY

Timber is a renewable resource and has a lower carbon footprint compared to steel and concrete. Using timber can contribute to more sustainable building practices.

5.3 FOUNDATIONS

Structural drawings for the current Chelsea Manor were not available at the time of this study.

From site inspections, the southern building is founded above a single level underground parkade , whilst the northern building is founded directly on the ground with no basement. Both buildings have been assumed to be founded on high level foundations for the purposes of this study.

To minimise these impacts, piled foundations have been proposed currently for the new overbuild structure, as these allow a high-capacity foundation to be located close to the existing structure, with minimal effects on the existing structure.

Coordination with the existing basement parkade structure needs to be completed as part of future works, including modifications to the parkade to allow for installation of new piled footings for the overbuild structure.

5.4 GRAVITY STRUCTURAL FRAMING

The gravity load system features timber stud walls along the building envelope, the corridor, and where they align with the architectural partitions. The floor is designed as a one-way spanning Cross Laminated Timber (CLT) deck across the walls to minimize the overall height of the overbuild. Beams are assigned between the walls and are installed where there are door or window openings.

5.5 LATERAL STABILITY CONCEPT

The current lateral stability system for Chelsea Manor is assumed to be nailed plywood shearwalls.

For the proposed overbuild, the transfer frame is designed as a two-way moment-sway frame. The additional three stories of new building supported on the transfer structure are supported by the trussed upper frame.

The provision of tension/compression ties for the upper transfer structure allows for thinner overall structural depths for the main transfer beams whilst providing lateral support to the additional three stories. This means that the upper three stories are not required to provide independent seismic bracing, as the steel framing is providing this capacity. This is an advantage to this system, and conceivably could allow for standardised modular building components to be used across multiple sites or seismic regions.

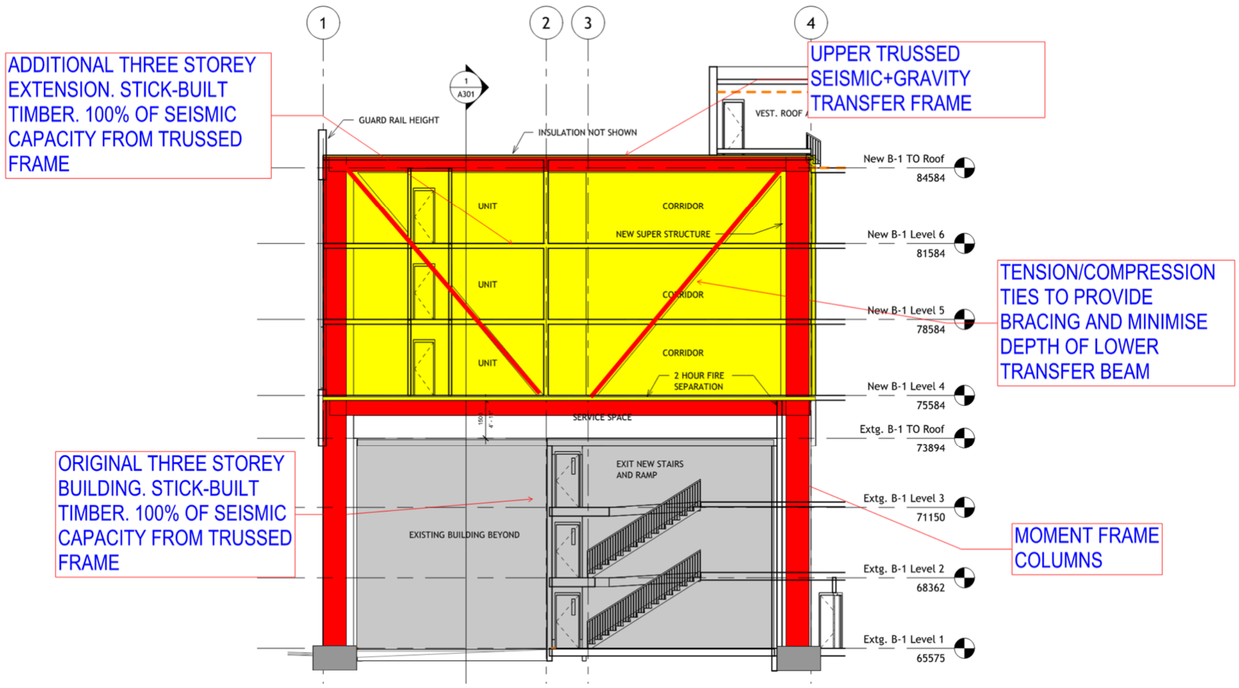


Figure 5 Assumed Seismic Force Systems

Structural analysis in this study has been based upon dynamic analysis, however, higher-order 3D non-linear analysis of the combined structure may result in further reductions in overall seismic design criteria and should be considered in future studies.

The bracing capacity of the existing building has been neglected in our current analysis. Allowing for capacity of the current bracing walls for the existing building would reduce overall seismic loads on the new structure, but would also require a more complicated seismic analysis.

5.5.1 SEISMIC UPGRADING TO EXISTING BUILDING

The proposed construction of the new overbuild has been assessed in accordance with NBC 2015 Commentary L, and comprises a major addition to the existing three storey building. Per the requirements of table L-1, the existing building would be required to be seismically upgraded to comply with 100% of current code criteria.

Seismic upgrades to buildings usually require significant intrusive structural works internally to upgrade shear walls, floor diaphragms and foundations. As part of the proposed overbuild construction, two options have been considered currently;

- Option 1: Seismic isolation of the new overbuild and original building, with no load sharing
  - Based upon the current BCBC and by-laws in the Vancouver region, this would require that the existing three storey building be upgraded to a “Level 3” seismic upgrade per NBC 2015 Commentary L. These works would need to occur within the current building envelope, and would require temporary relocation of the residents.
- Option 2: Seismically connect overbuild structure and original building, with 100% load sharing between components.
  - If the new transfer structure and original building envelopes are seismically tied, then it is possible to achieve a significant upgrade to the current seismic capacity of the original building, meeting at least the requirements for the Level 3 upgrade per Commentary L. This would result in a code-compliant design approach, and is the current basis of the structure documented in this study.

Not upgrading the seismic capacity of the original building during these works would not satisfy the requirements of current building codes and would result in a disparity of capacity between the new overbuild and original building.

In the worst case this could potentially result in a situation where the original building collapses in a seismic event, but the overbuild structure does not, presenting an unacceptable structural risk to the overbuild structure in the event of a major seismic event.

The additional forces applied to the overbuild transfer structure represent approximately 20% of the total seismic demand, and for the purposes of this study, it has been assumed that the new overbuild structure is designed to provide 100% of current code earthquake design capacity to the original building. This exceeds the minimum standards required by Commentary L, and essentially brings the combined complete building up to current code capacity.

Table 5.1 Seismic Force Distribution Per Grid – Whole Building System

	SHEAR BELOW (KN)	STOREY SHEAR (KN)	RD.RO
Roof - New	376	376	1.5 x 1.3
Level 6 - New	629	253	1.5 x 1.3
Level 5 - New	834	205	1.5 x 1.3
Level 4 – New/Transfer Floor	1009	175	1.5 x 1.3
Level 3 - Original	1117	108	1.5 x 1.3
Level 2 – Original	1194	77	1.5 x 1.3
Level 1 - Original	1231	37	1.5 x 1.3
Base	1231		

5.5.2 ACCESS AND EGRESS

Vertical access to the proposed three stories is provided through the vertical continuation of the existing central elevator core and elevator lobby space. This elevator lobby space will not only connect the two wings of the new building but will also allow access to both the existing and new building.

The elevator lobby area will be structurally connected to the South wing, following the same CLT floor and beam system, and to ensure structural separation between the two wings, an isolation joint will need to be included along gridline 4, as seen in the figure below.

In addition to the central elevator core, new vertical access is proposed on the end of each wing. This area is designed to interact with the SFRS of the new overbuild, through the use of the steel framing.

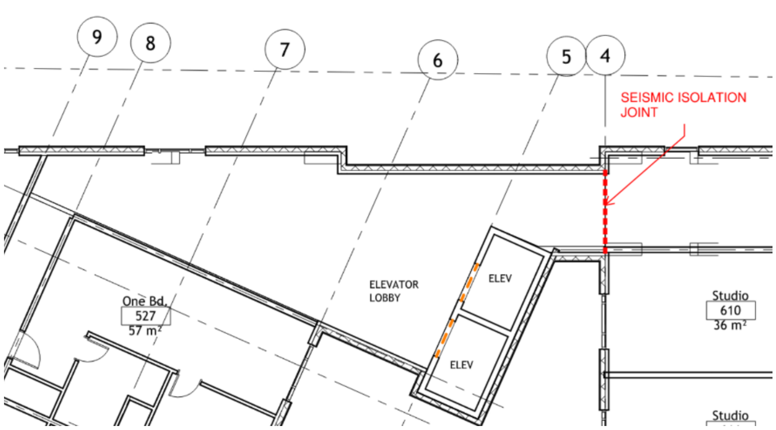


Figure 6 - Elevator Lobby

5.6 CONSTRUCTABILITY

5.6.1 STAGING AND ERECTION SEQUENCE

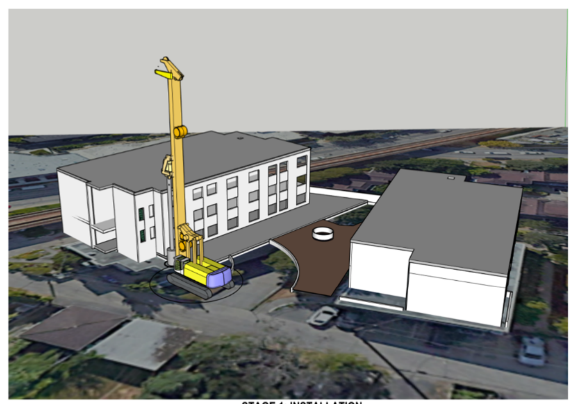
The proposed erection sequence for the transfer structure is indicated below. The design minimises disruption to the occupants of the existing building, and allows for continuity of occupation.

Temporary evacuation of the building is expected to be required during overhead erection of the main transfer deck, but this could be limited to apartments under the affected area only, and to relatively short periods (a few hours to a day potentially).

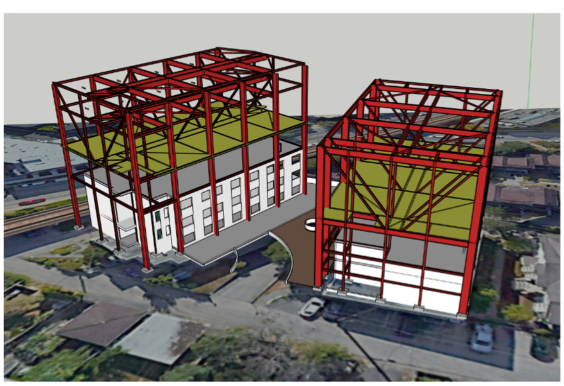
Once the transfer deck is erected, the construction of the new overbuild can progress without disruption to the existing occupants.

The proposed transfer deck does facilitate the design of either conventional built-on-site construction, or off-site prefabricated modular construction techniques. One interesting option that this concept allows is the potential to reuse existing BC housing modular buildings on a site, re-using of current building stock from other sites in BC or elsewhere. This could allow for very rapid rollout of new accommodation once the transfer structure is constructed.

CURRENT BUILDING



STAGE 1: INSTALLATION
OF NEW FOUNDATIONS



STAGE 2: INSTALLATION
OF TRANSFER STRUCTURE

STAGE 3: INSTALLATION
OF APARTMENT INFILL

Figure 7 Proposed Erection Sequence

5.7 COSTS

Preliminary costings for the proposed scheme have been undertaken by Altus and included in their separate report.

The Class D cost for the proposed scheme was calculated to be approximately $571psf, including allowances.

For comparison, the construction of new apartments of similar specification is estimated to be approximately $430/sf - $485/sf of above-grade floor area, including a single level of underground parking.

The proposed overbuild option is approximately 25% more than standard construction, but does provide savings in relocation and demolition costs when compared to redevelopment of brownfield sites.

6 CHALLENGES / LIMITATIONS WITH CONCEPT

6.1 STRUCTURAL IRREGULARITIES

Structural irregularities in the BC Building Code refer to specific configurations or characteristics of a building that can affect its seismic performance. These irregularities can make a building more susceptible to damage during an earthquake. Two of them may be related to the current structural arrangement for Chelsea Manor.

6.1.1 WEIGHT (MASS) IRREGULARITY

Weight irregularity occurs when the seismic weight of any storey exceeds 150% of that of its adjacent storeys. In other words, if one storey is significantly heavier than the adjacent storey, the design is considered irregular. The building code allows for this irregularity, provided the Dynamic Analysis Procedure outlined in the code is followed.

Additionally, proposing the overbuild as a timber construction can help manage the weight of the new construction, potentially making it comparable to the existing structure. It is crucial to revisit this code requirement during the design phase of the project.

6.1.2 DISCONTINUITY IN CAPACITY – WEAK STOREY

Discontinuity in Capacity – Weak Storey in the BC Building Code refers to a situation where the shear strength of a storey is significantly less than that of the storey above it. The shear strength of a storey is the total strength of all seismic-resisting elements (like shear walls and braced frames) that share the storey shear for the direction under consideration. This irregularity can make a building more vulnerable during an earthquake, as the weaker storey may not be able to adequately transfer seismic forces, leading to potential structural failure.

The code prohibits this irregularity in structural designs if the project site is in Seismic Category SC2, SC3, or SC4. Most of the Greater Vancouver area falls into SC4, meaning the structural design for Chelsea Manor cannot include this irregularity, as it would not comply with the code.

In our current design, the overbuild is supported by a steel transfer floor on Level 4. Although this transfer floor is much stronger than any other floor in the existing building, we believe the design does not fall into this irregularity category. The transfer floor functions as a "table" to ensure that both vertical gravity loads and horizontal wind and seismic loads are directed into the new steel columns, bypassing the existing structure. This means the overbuild is structurally independent from the existing building.

This setup is similar to introducing a horizontal joint at the top of the existing roof, allowing the combined building to be viewed as a single structure architecturally, while structurally, the two parts do not interact. The concept of building expansion joints is common, especially in larger structures, where they are typically arranged vertically.

With this assumption, the transfer floor is considered the "lowest floor" in the current design, and it complies with the code requirements. However, it is essential to confirm this assumption with the relevant authorities to secure their approval, as it is crucial for the feasibility of this approach. A relaxation of the code requirements may be necessary to ensure that, while the overall building is considered a single entity architecturally, the structures remain independent from a structural perspective.

7 EMBODIED CARBON ESTIMATE

A simplified calculation of embodied carbon emissions has been conducted to compare two scenarios: building a three-story addition on top of an existing structure versus demolishing the existing building and constructing a new six-story structure. The summary is as follows:

Table 7.1 Simplified Embodied Carbon Calculations

	Embodied Carbon (kg eCO_2)	
CO_2 Contributors	Scheme 1 - retain existing timber structure - construct a three-storey timber overbuild on a steel transfer frame	Scheme 2 - demolish existing structure - construct a six-storey timber structure
Steel	453,000	N/A
Timber	145,500	258,500
Reinforced concrete	140,300	280,500
Removal of existing structure	N/A	85,740
Total	738,800	624,740

The following assumptions were made in the calculations:

1. The embodied carbon of the existing structure in Scheme 1 is excluded, as it is not resulted from any new construction activities.
2. In Scheme 2, 30% of the carbon is released into the atmosphere if the existing structure is demolished and sent to landfill.
3. Certain secondary structural elements, such as beams along the building envelope on the existing floors and the stairwells, are not included in the calculations.

From the calculations, it is observed that Scheme 1 has more embodied carbon emission (18.3%) than Scheme 2 even though the volume of steel used is much lower than that of timber. It is because the production of steel relies heavily on fossil fuels, resulting in substantial CO_2 emissions. From an embodied carbon emission perspective, the new construction may be a more environmentally friendly scheme.

In summary, the demolishing and rebuilding approach (Scheme 2) is generally more sustainable in terms of embodied carbon emissions compared to the overbuild. However, it’s important to conduct a detailed Life Cycle Assessment to quantify the exact benefits and ensure compliance with sustainability goals.

8 SUMMARY

This study has reviewed a proposed overbuild option to facilitate construct an additional three stories of accommodation over the existing buildings at Chelsea Manor, providing additional housing without having to relocate the existing residents.

The proposed overbuild design is also utilised to provide supplementary seismic resistance to the original building in order to upgrade the capacity of that structure to current seismic design loads, resulting in a combined six storey building that is designed to perform as complete building.

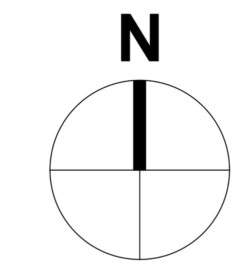
The proposed overbuild structure also provide additional vertical circulation capacity and elevator access to all floors of the building as required for a six storey building.

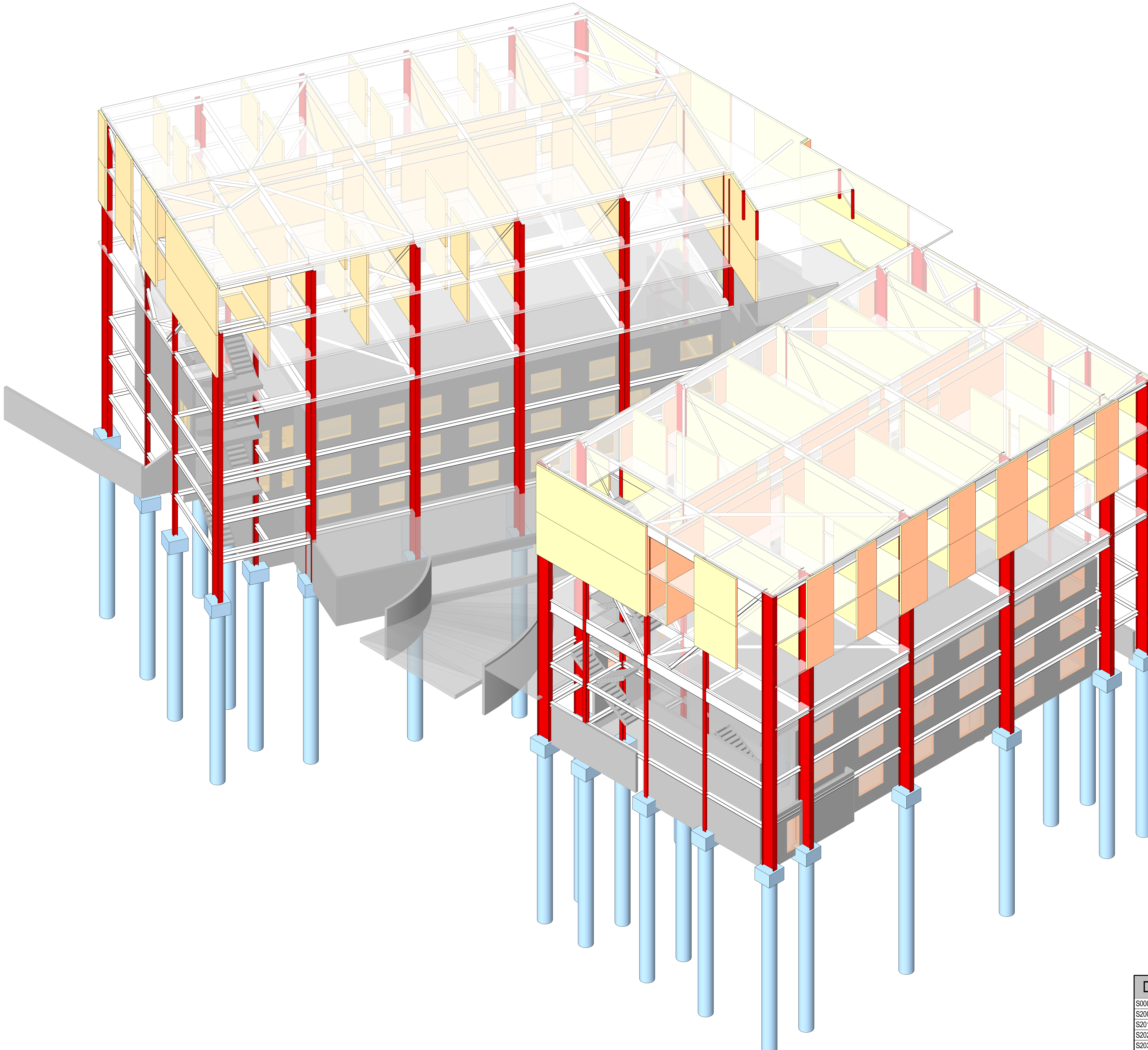
The construction staging presented demonstrates the overall processes required, but further development and coordination with a contractor is required to determine the optimal construction staging and final design of the structure.

Preliminary costings have been undertaken on the proposed design, and are estimated to be approximately 25% more than similar construction on green field sites.

APPENDIX

APPENDIX A: PROPOSED OVERBUILD DRAWINGS





3D VIEW

NTS.

ALL RENDERINGS ARE FOR ILLUSTRATION PURPOSES ONLY.
THEY DO NOT INCLUDE ALL STRUCTURAL ELEMENTS AND
STRUCTION

CONCEPT DESIGN ONLY

DRAWING LIST

S000	COVER SHEET
S200	FOUNDATION PLANS
S201	LEVEL - 2 PLAN
S202	LEVEL - 3 PLAN
S203	LEVEL - 4 PLAN
S204	B2 LEVEL 4 FRAMMING AND B1 LEVEL 5 WALL LAYOUT
S205	LEVEL - 6 PLAN
S206	B-1 ROOF FRAMMING PLAN & B2 LEVEL 6 WALL LAYOUT
S207	B2 ROOF FRAMMING PLAN
S300	COLUMN SCHEDULE
S301	SCHEDULES
S400	SECTIONS
S500	ELEVATIONS
S501	ELEVATIONS
S502	ELEVATIONS

REVISIONS:

REV	DATE	DESCRIPTION	BY
1	2024-09-11	ISSUED FOR DRAFT REPORT	RW

SEAL:

ORIGINAL SCALE:

DATE: 2024-09-11

APPROVED BY: RW — "APPROVED BY" is the person siging/sealing the drawing (e.g. Engineer, Architect, Land Surveyor or qualified professional) and is thereby assuming responsibility. This person will be called to answer any questions that arise on this drawing. (For OIQ: "Prepeared By") format is First initial, Last Name

CHECKED BY: CJ — "CHECKED BY" is the person who checks the accuracy of the information and formating (max. 2 people). Format is First initial, Last Name

DRAWN BY: DR — "DRAWN BY" (optional) is the Drafter/Modeler who input the information from the design into the drafting platform. If more than one, this is the draftperson/Modeler who did the majority ofthe work. Format is First initial, Last Name

(Optional)

(Optional)

IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.

25mm

DISCIPLINE: STRUCTURAL

WSP Canada Inc.
3300 - 237 - 4th Avenue SW
Calgary, AB, Canada, T2P 4K3
T 403-243-8380 | www.wsp.com

PROJECT NUMBER: CA0026659.6220

CLIENT:

BCNPHA
BC Non-Profit Housing Association

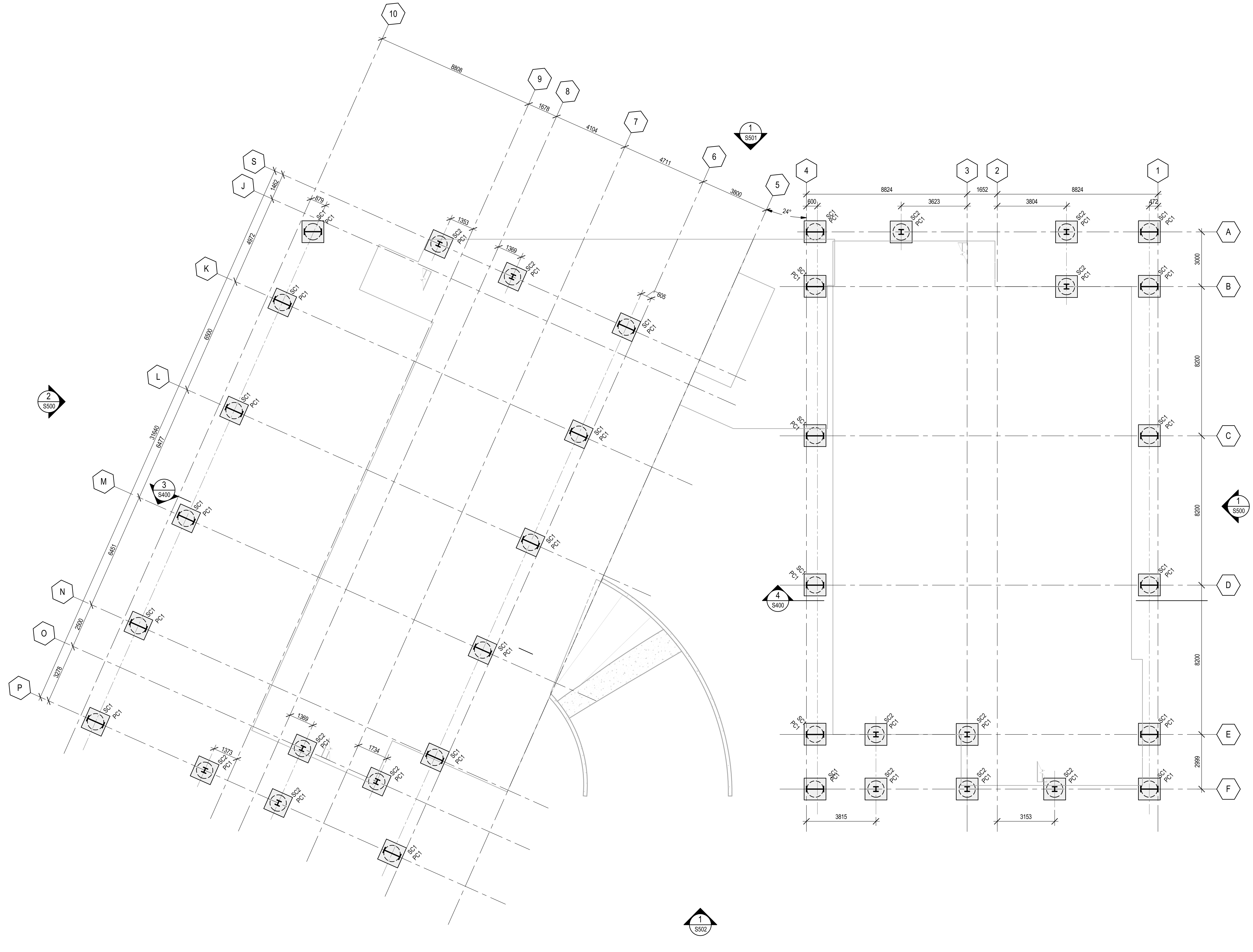
CLIENT REF. #:

PROJECT: CHELSEA MANOR

TITLE: COVER SHEET

DRAWING NUMBER: S000

REV.: 1



FOUNDATION PLAN

1 : 100

CONCEPT DESIGN ONLY

REVISIONS:

REV	DATE	DESCRIPTION	BY
1	2024-09-11	ISSUED FOR DRAFT REPORT	RW

SEAL:

ORIGINAL SCALE: 1 : 100

DATE: 2024-09-11

APPROVED BY: RW — "APPROVED BY" is the person siging/sealing the drawing (e.g. Engineer, Architect, Land Surveyor or qualified professional) and is thereby assuming responsibility. This person will be called to answer any questions that arise on this drawing. (For OIQ: "Prepeared By") format is First initial, Last Name

CHECKED BY: CJ — "CHECKED BY" is the person who checks the accuracy of the information and formating (max. 2 people). Format is First initial, Last Name

DRAWN BY: DR — "DRAWN BY" (optional) is the Drafter/Modeler who input the information from the design into the drafting platform. If more than one, this is the draftperson/Modeler who did the majority ofthe work. Format is First initial, Last Name

(Optional)

(Optional)

IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.

25mm

DISCIPLINE: STRUCTURAL

WSP Canada Inc.
3300 - 237 - 4th Avenue SW
Calgary, AB, Canada, T2P 4K3
T 403-243-8380 | www.wsp.com

PROJECT NUMBER: CA0026659.6220

CLIENT: BCNPHA — BC Non-Profit Housing Association

CLIENT REF. #:

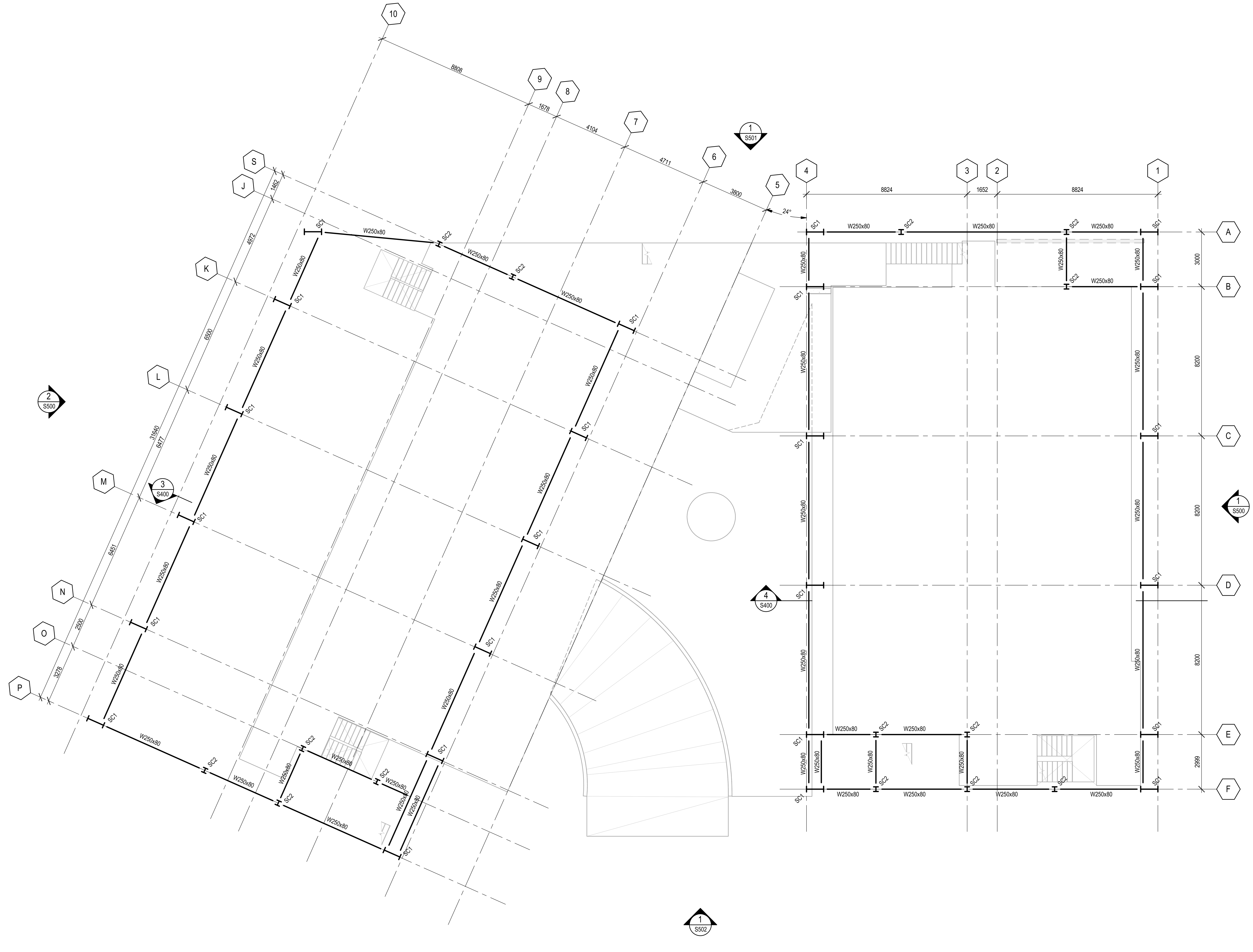
PROJECT: CHELSEA MANOR

TITLE: FOUNDATION PLANS

DRAWING NUMBER: S200

REV.: 1

Autodesk Docs://000-00000-00 - BC-Misc Projects - R24/CA0026659.6220 3 - Chelsea Manor_R24.rvt
2024-09-10 2:40:31 PM



LEVEL 2 FRAMMING PLAN

1 : 100

CONCEPT DESIGN ONLY

0 1 2 5 8m
SCALE 1:100

REVISIONS:

REV	DATE	DESCRIPTION	BY
1	2024-09-11	ISSUED FOR DRAFT REPORT	RW

SEAL:

DISCLAIMER: COPYRIGHT:

ORIGINAL SCALE: 1 : 100

DATE: 2024-09-11

APPROVED BY: RW — "APPROVED BY" is the person siging/sealing the drawing (e.g. Engineer, Architect, Land Surveyor or qualified professional) and is thereby assuming responsibility. This person will be called to answer any questions that arise on this drawing. (For OIQ: "Prepeared By") format is First initial, Last Name

CHECKED BY: CJ — "CHECKED BY" is the person who checks the accuracy of the information and formating (max. 2 people). Format is First initial, Last Name

DRAWN BY: DR — "DRAWN BY" (optional) is the Drafter/Modeler who input the information from the design into the drafting platform. If more than one, this is the draftperson/Modeler who did the majority ofthe work. Format is First initial, Last Name

(Optional)

(Optional)

IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.

25mm

DISCIPLINE: STRUCTURAL

WSP Canada Inc.
3300 - 237 - 4th Avenue SW
Calgary, AB, Canada, T2P 4K3
T 403-243-8380 | www.wsp.com

PROJECT NUMBER: CA0026659.6220

CLIENT:

BCNPHA
BC Non-Profit Housing Association

CLIENT REF. #:

PROJECT:

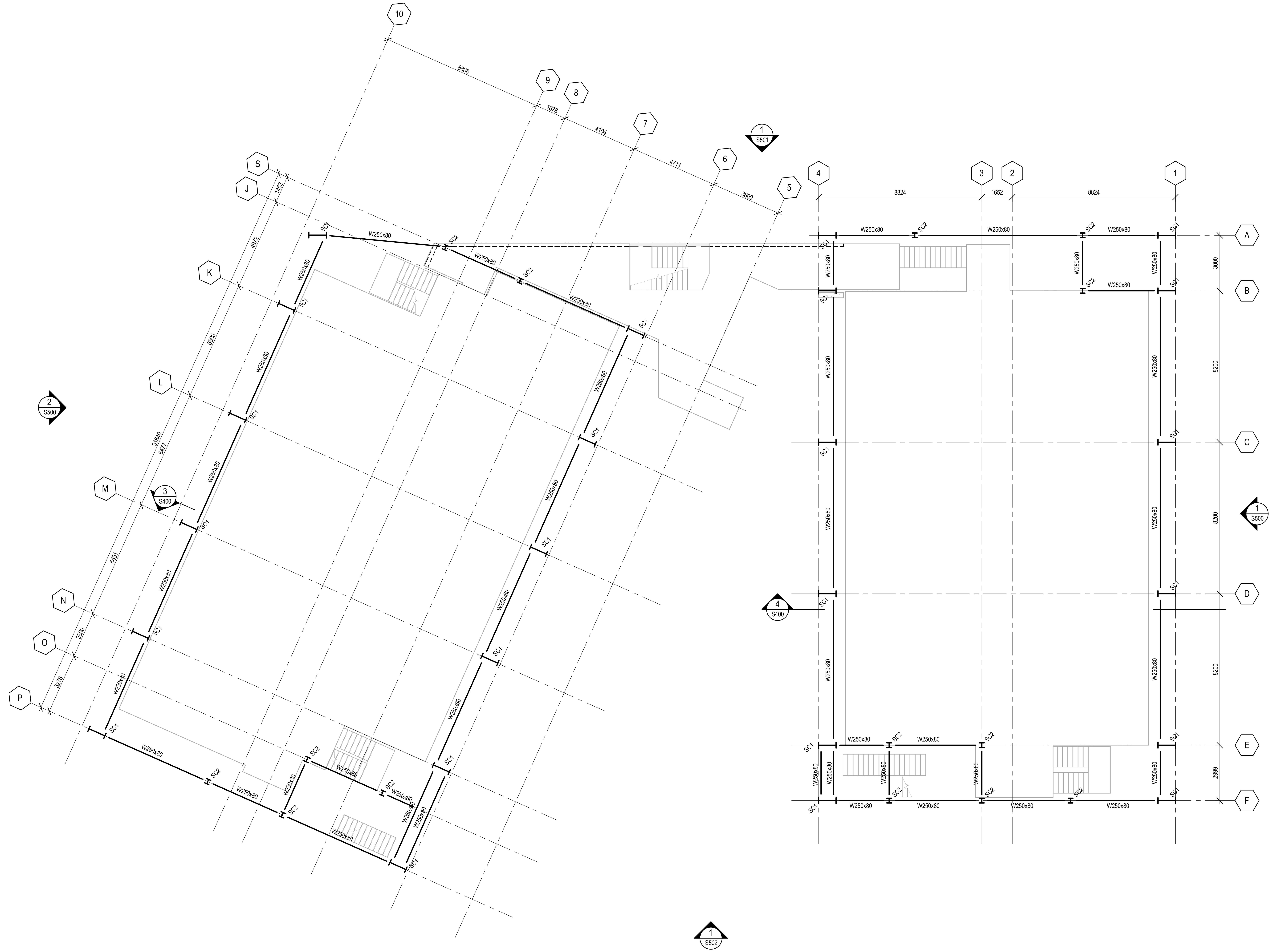
CHELSEA MANOR

TITLE:

LEVEL - 2 PLAN

DRAWING NUMBER: S201

REV. 1



LEVEL 3 FRAMMING PLAN

1 : 100

CONCEPT DESIGN ONLY

0 1 2 5 8m

SCALE 1:100

REVISIONS:

REV	DATE	DESCRIPTION	BY
1	2024-09-11	ISSUED FOR DRAFT REPORT	RW

SEAL:

ORIGINAL SCALE: 1 : 100

DATE: 2024-09-11

APPROVED BY: RW — "APPROVED BY" is the person siging/sealing the drawing (e.g. Engineer, Architect, Land Surveyor or qualified professional) and is thereby assuming responsibility. This person will be called to answer any questions that arise on this drawing. (For OIQ: "Prepeared By") format is First initial, Last Name

CHECKED BY: CJ — "CHECKED BY" is the person who checks the accuracy of the information and formating (max. 2 people). Format is First initial, Last Name

DRAWN BY: DR — "DRAWN BY" (optional) is the Drafter/Modeler who input the information from the design into the drafting platform. If more than one, this is the draftperson/Modeler who did the majority ofthe work. Format is First initial, Last Name

(Optional)

(Optional)

IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.

25mm

DISCIPLINE: STRUCTURAL

WSP Canada Inc.
3300 - 237 - 4th Avenue SW
Calgary, AB, Canada, T2P 4K3
T 403-243-8380 | www.wsp.com

PROJECT NUMBER: CA0026659.6220

CLIENT: BCNPHA BC Non-Profit Housing Association

CLIENT REF. #:

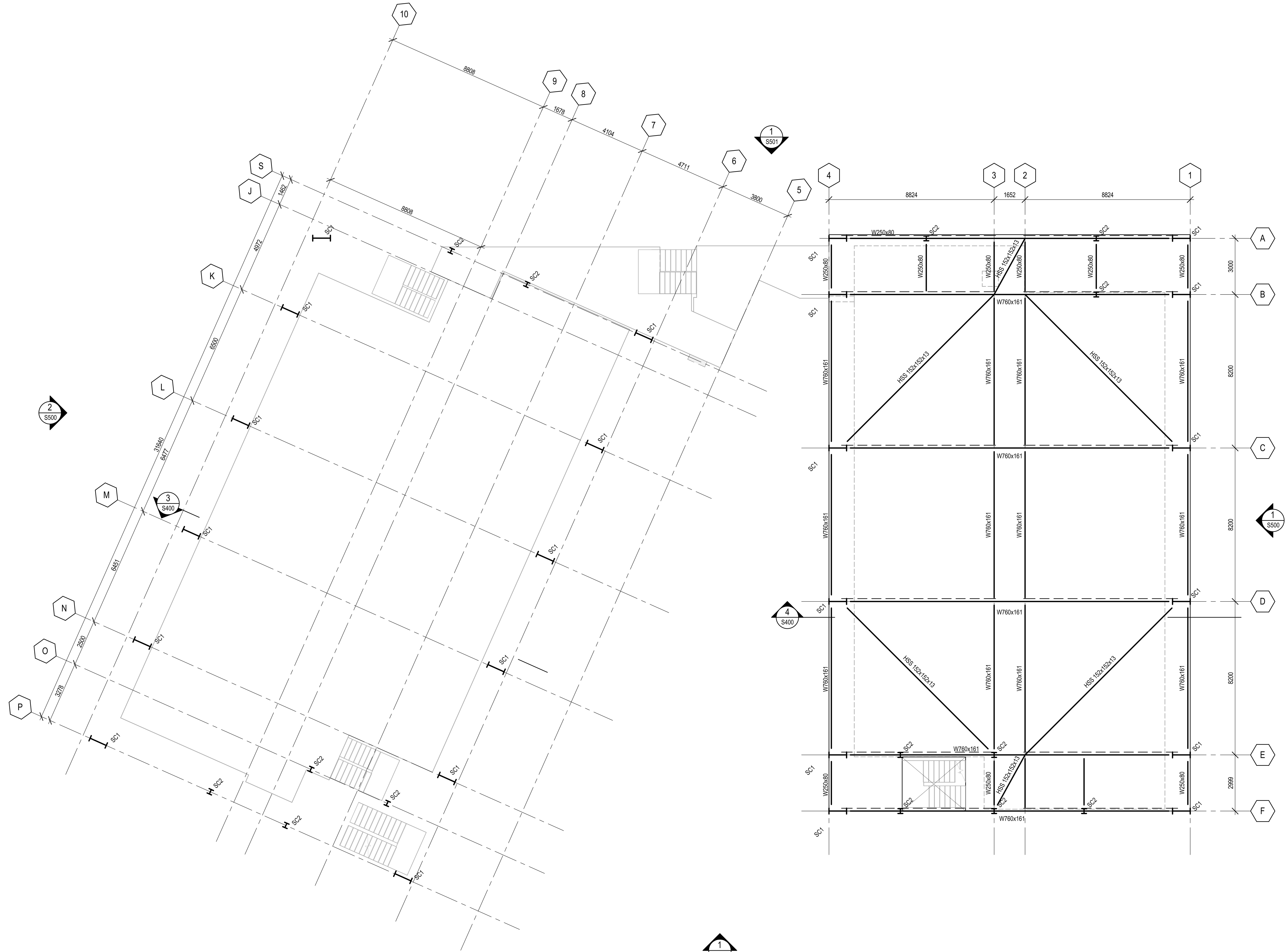
PROJECT: CHELSEA MANOR

TITLE: LEVEL - 3 PLAN

DRAWING NUMBER: S202

REV. 1

Autodesk Docs://000-00000-00 - BC-Misc Projects - R24/CA0026659.6220 3 - Chelsea Manor_R24.rvt
2024-09-10 2:40:33 PM



B1 LEVEL 4 FRAMMING PLAN

1 : 100

CONCEPT DESIGN ONLY

0 1 2 5 8m

SCALE 1:100

REVISIONS:

REV	DATE	DESCRIPTION	BY
1	2024-09-11	ISSUED FOR DRAFT REPORT	RW

SEAL:

ORIGINAL SCALE: 1 : 100

DATE: 2024-09-11

APPROVED BY: RW

CHECKED BY: CJ

DRAWN BY: DR

IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.

25mm

DISCIPLINE: STRUCTURAL

wsp

WSP Canada Inc.
3300 - 237 - 4th Avenue SW
Calgary, AB, Canada, T2P 4K3
T 403-243-8380 | www.wsp.com

PROJECT NUMBER: CA0026659.6220

CLIENT:

BCNPHA
BC Non-Profit Housing Association

CLIENT REF. #:

PROJECT:

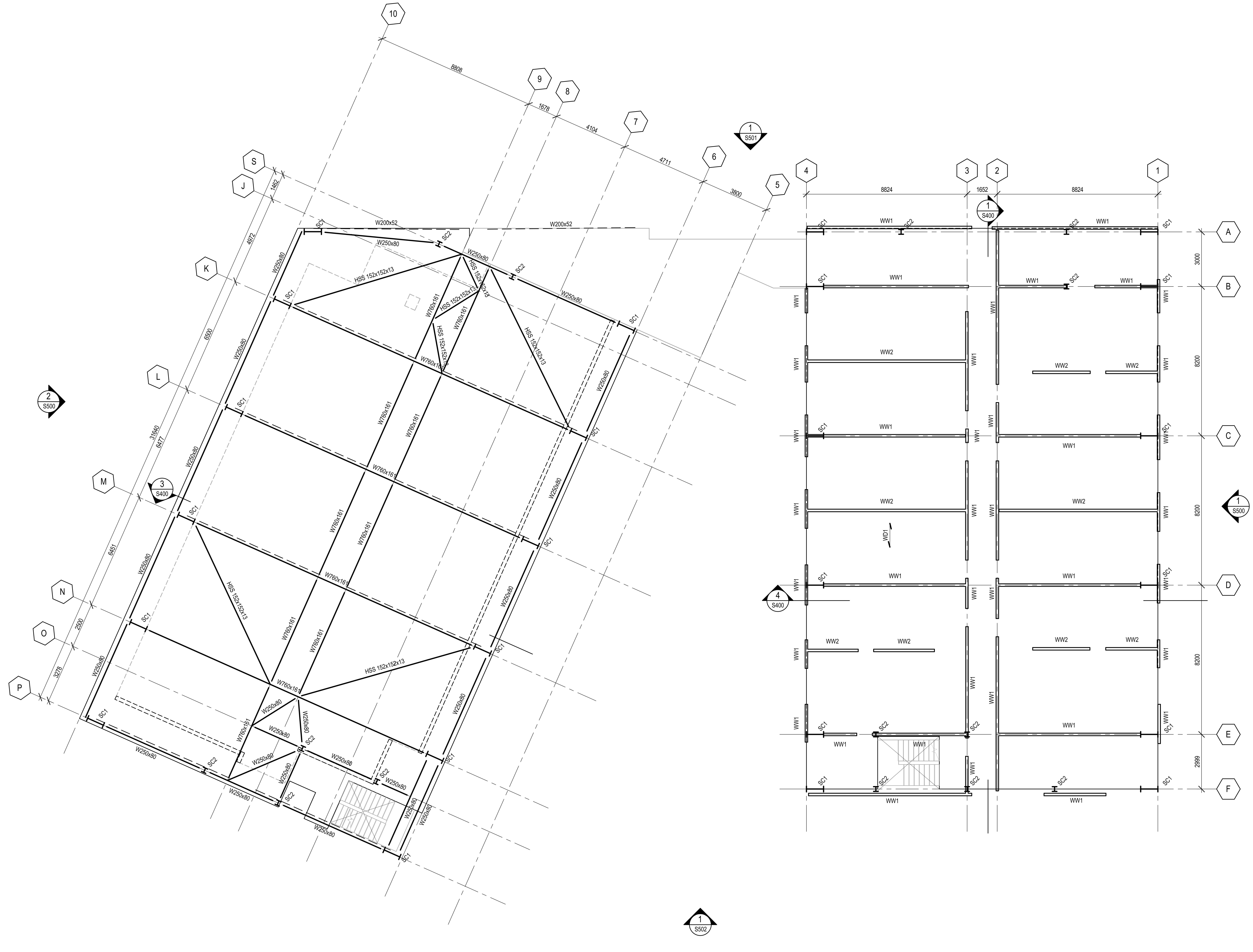
CHELSEA MANOR

TITLE:

LEVEL - 4 PLAN

DRAWING NUMBER: S203

REV. 1



B2 LEVEL 4 FRAMING AND B1 LEVEL 5 WALL LAYOUT

1 : 100

CONCEPT DESIGN ONLY

SCALE 1:100 (0, 1, 2, 5, 8m)

REVISIONS:

REV	DATE	DESCRIPTION	BY
1	2024-09-11	ISSUED FOR DRAFT REPORT	RW

SEAL:

ORIGINAL SCALE: 1 : 100

DATE: 2024-09-11

APPROVED BY: RW — "APPROVED BY" is the person siging/sealing the drawing (e.g. Engineer, Architect, Land Surveyor or qualified professional) and is thereby assuming responsibility. This person will be called to answer any questions that arise on this drawing. (For OIQ: "Prepeared By") format is First initial, Last Name

CHECKED BY: CJ — "CHECKED BY" is the person who checks the accuracy of the information and formating (max. 2 people). Format is First initial, Last Name

DRAWN BY: DR — "DRAWN BY" (optional) is the Drafter/Modeler who input the information from the design into the drafting platform. If more than one, this is the draftperson/Modeler who did the majority ofthe work. Format is First initial, Last Name

(Optional)

(Optional)

IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.

25mm

DISCIPLINE: STRUCTURAL

WSP Canada Inc.
3300 - 237 - 4th Avenue SW
Calgary, AB, Canada, T2P 4K3
T 403-243-8380 | www.wsp.com

PROJECT NUMBER: CA0026659.6220

CLIENT: BCNPHA
BC Non-Profit Housing Association

CLIENT REF. #:

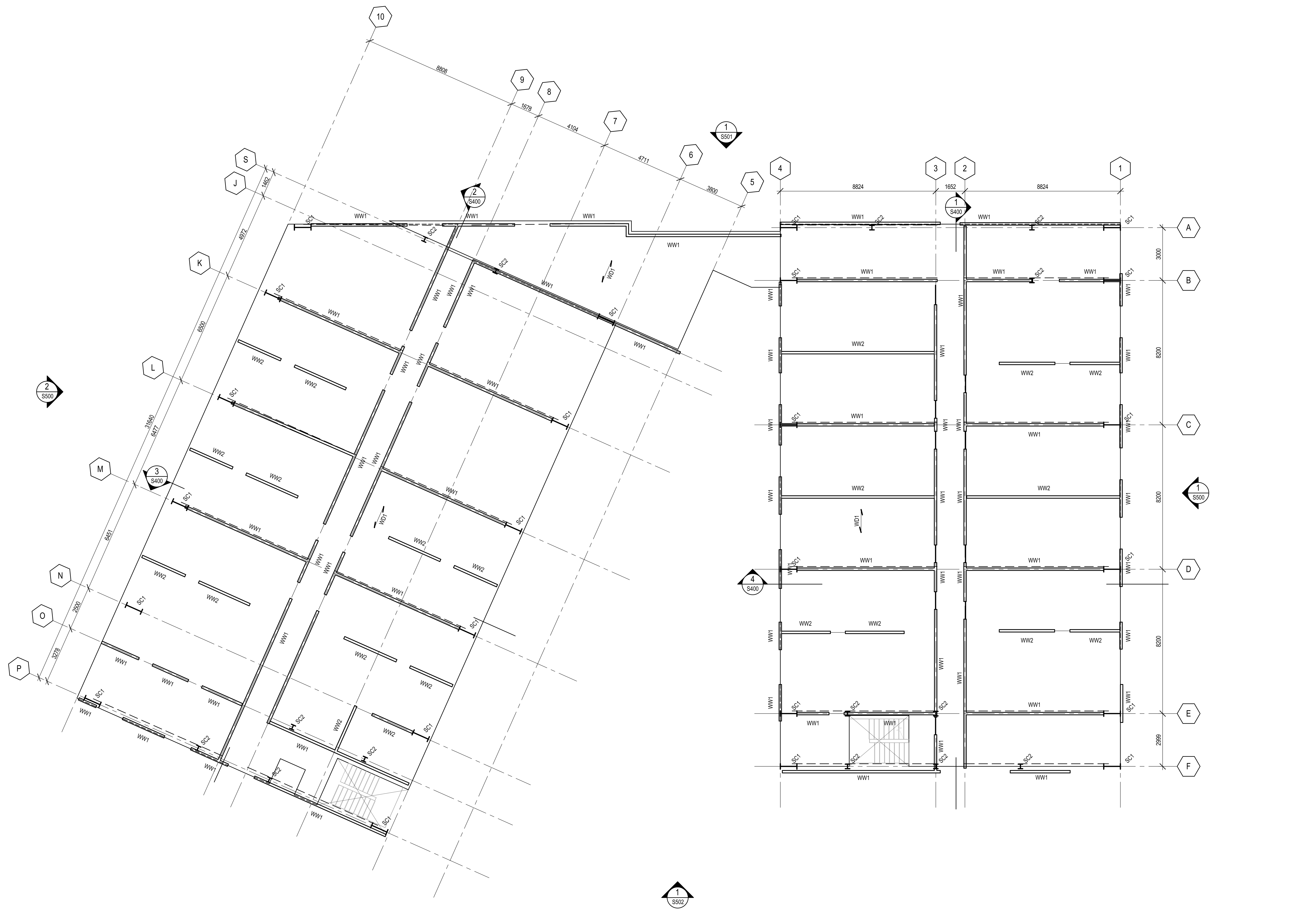
PROJECT: CHELSEA MANOR

TITLE: B2 LEVEL 4 FRAMING AND B1 LEVEL 5 WALL LAYOUT

DRAWING NUMBER: S204

REV. 1

Autodesk Docs://000-00000-00 - BC-Misc Projects - R24/CA0026659.6220 3 - Chelsea Manor_R24.rvt
2024-09-10 2:40:34 PM



LEVEL 6 WALL LAYOUT

1 : 100

CONCEPT DESIGN ONLY

0 1 2 5 8m

SCALE 1:100

REVISIONS:

REV	DATE	DESCRIPTION	BY
1	2024-09-11	ISSUED FOR DRAFT REPORT	RW

SEAL:

ORIGINAL SCALE: 1 : 100

DATE: 2024-09-11

APPROVED BY: RW
"APPROVED BY" is the person siging/sealing the drawing (e.g. Engineer, Architect, Land Surveyor or qualified professional) and is thereby assuming responsibility. This person will be called to answer any questions that arise on this drawing. (For OIQ: "Prepeared By") format is First initial, Last Name

CHECKED BY: CJ
"CHECKED BY" is the person who checks the accuracy of the information and formating (max. 2 people). Format is First initial, Last Name

DRAWN BY: DR
"DRAWN BY" (optional) is the Drafter/Modeler who input the information from the design into the drafting platform. If more than one, this is the draftperson/Modeler who did the majority ofthe work. Format is First initial, Last Name

(Optional)

(Optional)

IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.

25mm

DISCIPLINE: STRUCTURAL

WSP Canada Inc.
3300 - 237 - 4th Avenue SW
Calgary, AB, Canada, T2P 4K3
T 403-243-8380 | www.wsp.com

PROJECT NUMBER: CA0026659.6220

CLIENT:
BCNPHA
BC Non-Profit Housing Association

CLIENT REF. #:

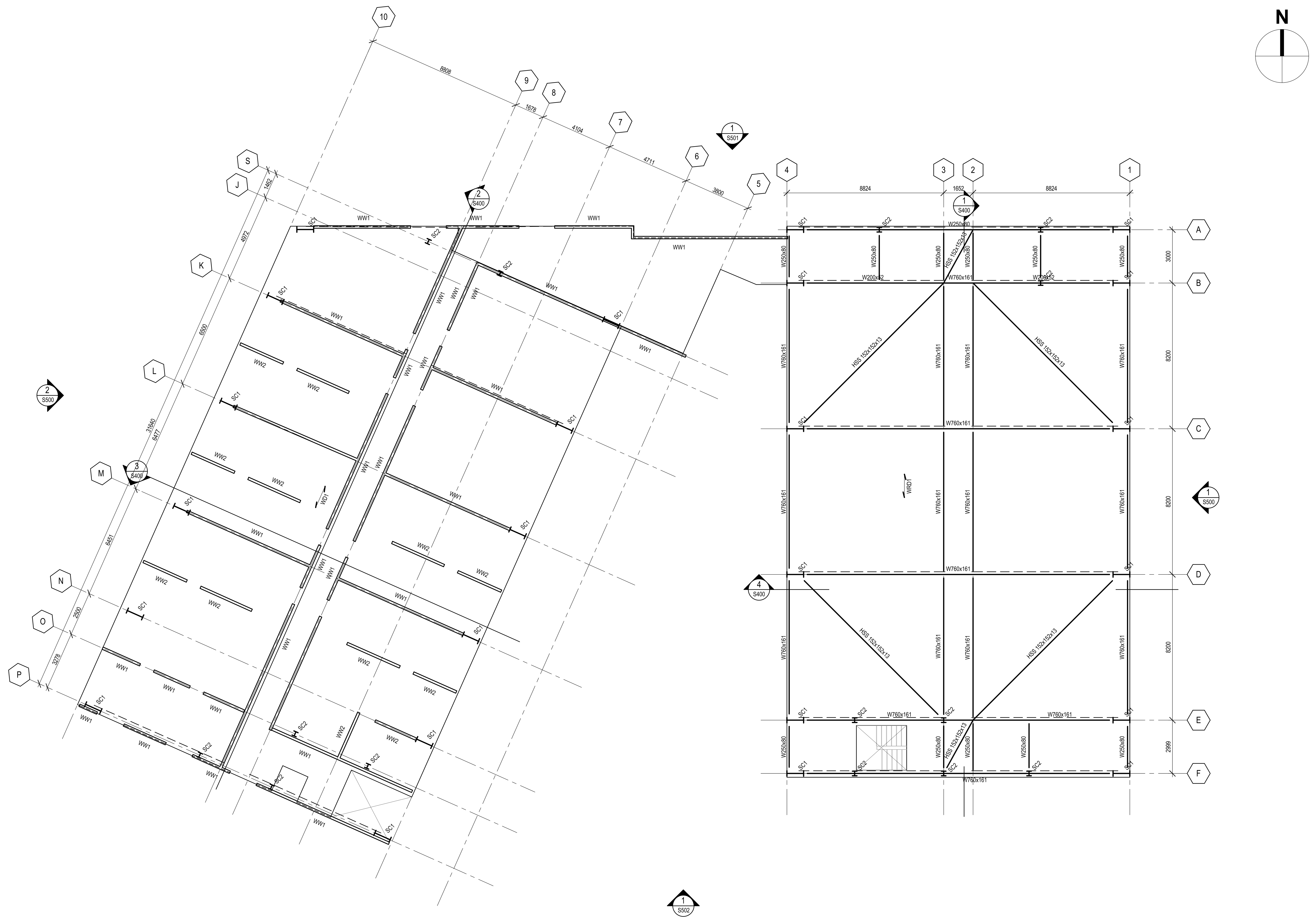
PROJECT:
CHELSEA MANOR

TITLE:
LEVEL - 6 PLAN

DRAWING NUMBER: S205

REV. 1

Autodesk Docs://000-00000-00 - BC-Misc Projects - R24/CA0026659.6220 3 - Chelsea Manor_R24.rvt
2024-09-10 2:40:35 PM



B-1 ROOF FRAMMING PLAN & B2 LEVEL 6 WALL LAYOUT

1 : 100

CONCEPT DESIGN ONLY

0 1 2 5 8m

SCALE 1:100

Autodesk Docs://800-00000-00 - BC-Misc Projects - R24/CA0026659.6220 3 - Chelsea Manor_R24.rvt
2024-09-10 2:40:36 PM

REVISIONS:

REV	DATE	DESCRIPTION	BY
1	2024-09-11	ISSUED FOR DRAFT REPORT	RW

SEAL:

DISCLAIMER: COPYRIGHT:

ORIGINAL SCALE: 1 : 100

DATE: 2024-09-11

APPROVED BY: RW — "APPROVED BY" is the person siging/sealing the drawing (e.g. Engineer, Architect, Land Surveyor or qualified professional) and is thereby assuming responsibility. This person will be called to answer any questions that arise on this drawing. (For OIQ: "Prepeared By") format is First initial, Last Name

CHECKED BY: CJ — "CHECKED BY" is the person who checks the accuracy of the information and formating (max. 2 people). Format is First initial, Last Name

DRAWN BY: DR — "DRAWN BY" (optional) is the Drafter/Modeler who input the information from the design into the drafting platform. If more than one, this is the draftperson/Modeler who did the majority ofthe work. Format is First initial, Last Name

(Optional)

(Optional)

IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.

25mm

DISCIPLINE: STRUCTURAL

WSP Canada Inc.
3300 - 237 - 4th Avenue SW
Calgary, AB, Canada, T2P 4K3
T 403-243-8380 | www.wsp.com

PROJECT NUMBER: CA0026659.6220

CLIENT:

BCNPHA
BC Non-Profit Housing Association

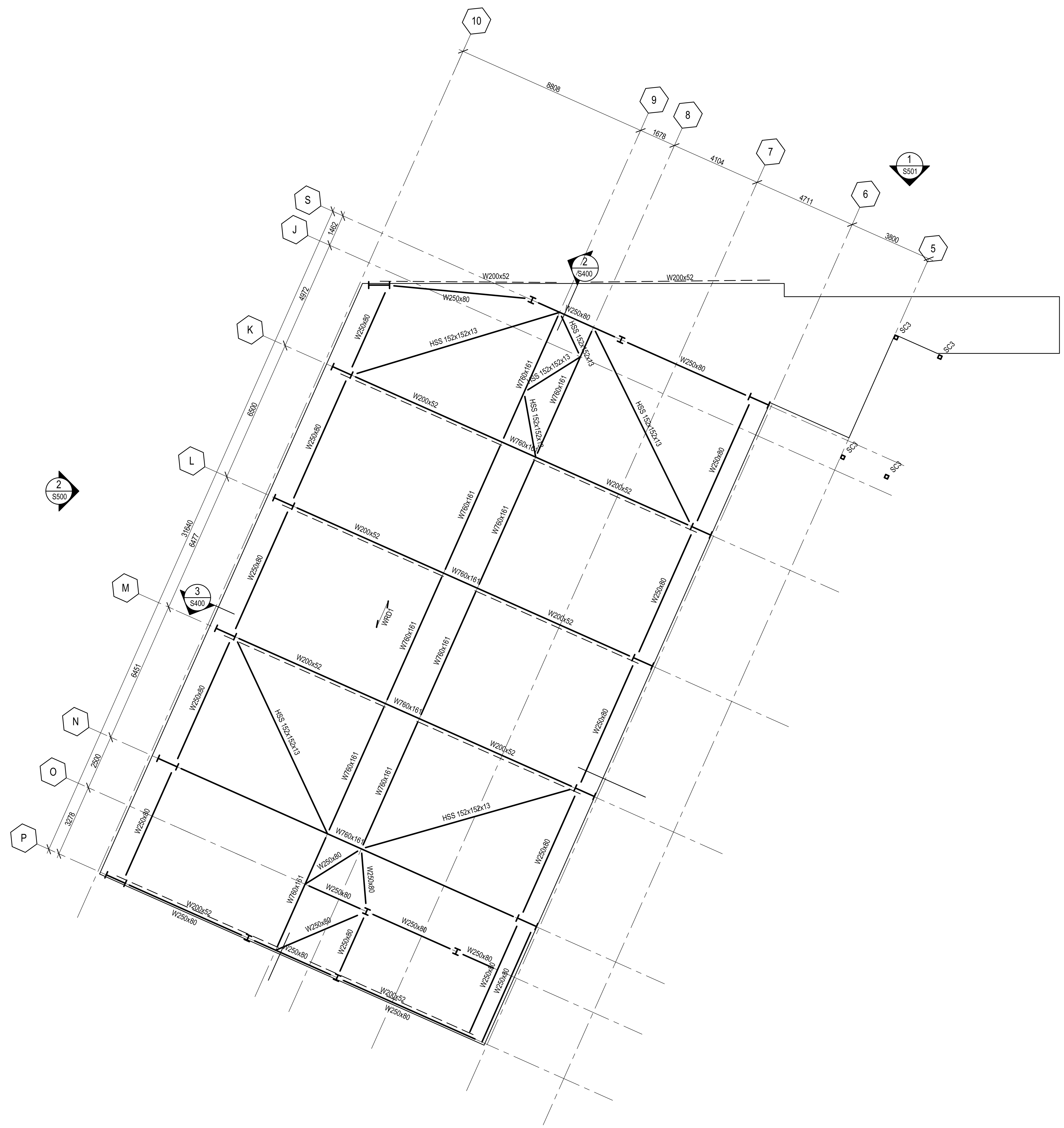
CLIENT REF. #:

PROJECT: CHELSEA MANOR

TITLE: B-1 ROOF FRAMMING PLAN & B2 LEVEL 6 WALL LAYOUT

DRAWING NUMBER: S206

REV. 1



B2 ROOF FRAMMING PLAN

1 : 100

CONCEPT DESIGN ONLY

SCALE 1:100

REVISIONS:

REV	DATE	DESCRIPTION	BY
1	2024-09-11	ISSUED FOR DRAFT REPORT	RW

SEAL:

DISCLAIMER: COPYRIGHT:

ORIGINAL SCALE: 1 : 100

DATE: 2024-09-11

APPROVED BY: RW

CHECKED BY: CJ

DRAWN BY: DR

IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.

25mm

DISCIPLINE: STRUCTURAL

WSP Canada Inc.
3300 - 237 - 4th Avenue SW
Calgary, AB, Canada, T2P 4K3
T 403-243-8380 | www.wsp.com

PROJECT NUMBER: CA0026659.6220

CLIENT: BCNPHA BC Non-Profit Housing Association

CLIENT REF. #:

PROJECT: CHELSEA MANOR

TITLE: B2 ROOF FRAMMING PLAN

DRAWING NUMBER: S207

REV. 1

STEEL COLUMN SCHEDULE

MARK	SIZE	BASE PLATE	ANCHORAGE	REMARKS
SC1	W920x345			
SC2	W250x80			
SC3	HSS 152x152x9.5			

PILE CAP SCHEDULE

MARK	WIDTH	LENGTH	DEPTH	REINFORCEMENT	REMARKS
PC1	1200	1200	900		

WOOD WALL SCHEDULE

MARK	STUDS	REMARKS
WW1	38x140 SPF No. 1/No. 2 @600 O/C	-
WW2	38x140 SPF No. 1/No. 2 @400 O/C	-

WOOD LINTEL BEAM SCHEDULE

MARK	DESCRIPTION	REMARKS
LB1	38x140 SPF No. 1/2, 2-PLY	-

WOOD FLOOR AND ROOF DECK SCHEDULE

MARK	DESCRIPTION	REMARKS
WD1	139 THK CLT FLOOR PANEL (5 LAYERS), SPF E1	-
WRD1	139 THK CLT FLOOR PANEL (5 LAYERS), SPF E1	-

CONCEPT DESIGN ONLY

REVISIONS:

REV	DATE	DESCRIPTION	BY
1	2024-09-11	ISSUED FOR DRAFT REPORT	RW

SEAL:

ORIGINAL SCALE:

APPROVED BY: Approver — "APPROVED BY" is the person siging/sealing the drawing (e.g. Engineer, Architect, Land Surveyor or qualified professional) and is thereby assuming responsibility. This person will be called to answer any questions that arise on this drawing. (For OIQ: "Prepeared By") format is First initial, Last Name

CHECKED BY: Checker — "CHECKED BY" is the person who checks the accuracy of the information and formating (max. 2 people). Format is First initial, Last Name

DRAWN BY: Author — "DRAWN BY" (optional) is the Drafter/Modeler who input the information from the design into the drafting platform. If more than one, this is the draftperson/Modeler who did the majority ofthe work. Format is First initial, Last Name

(Optional)

(Optional)

DATE: 2024-09-11

IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.

25mm

DISCIPLINE: STRUCTURAL

WSP Canada Inc.
3300 - 237 - 4th Avenue SW
Calgary, AB, Canada, T2P 4K3
T 403-243-8380 | www.wsp.com

PROJECT NUMBER: CA0026659.6220

CLIENT:

BCNPHA
BC Non-Profit Housing Association

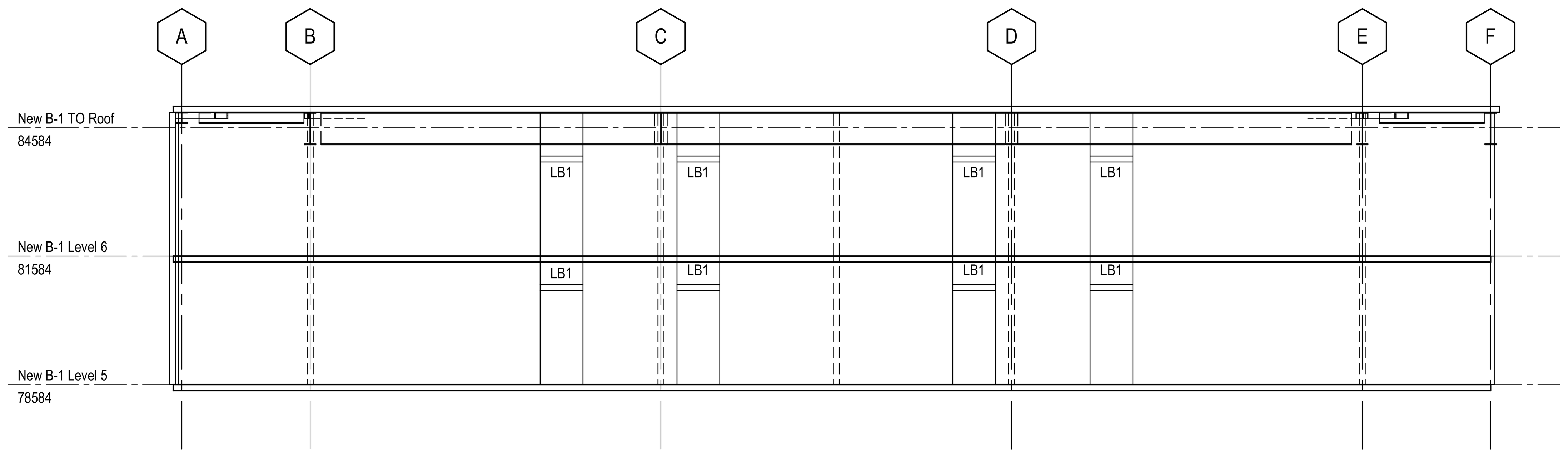
CLIENT REF. #:

PROJECT: CHELSEA MANOR

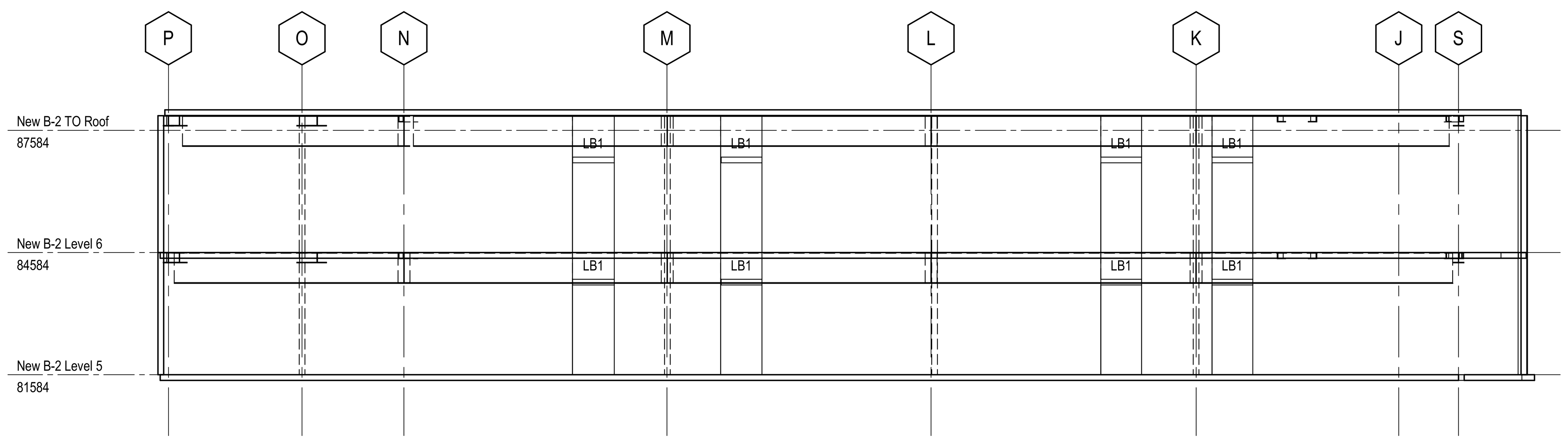
TITLE: SCHEDULES

DRAWING NUMBER: S301

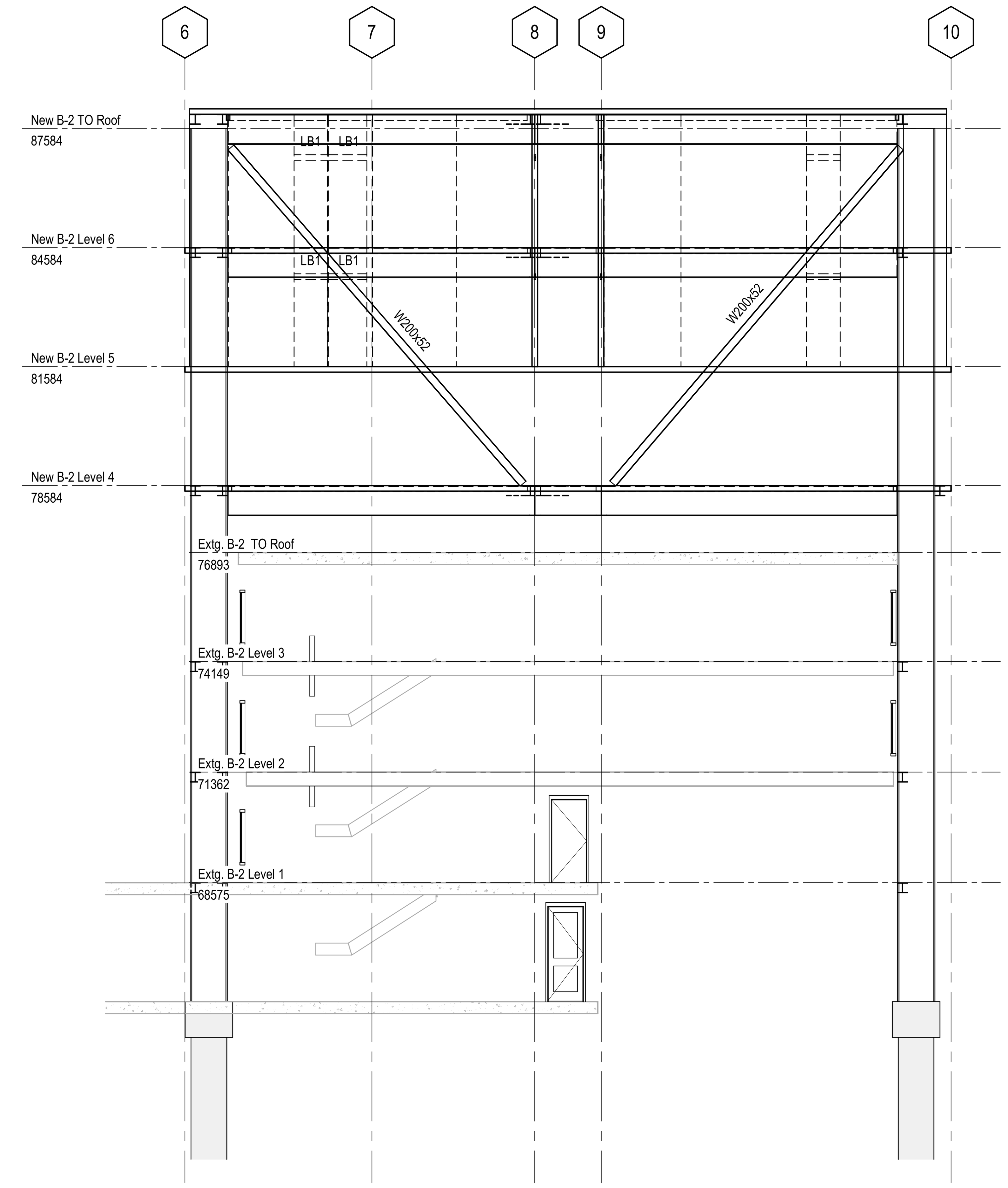
REV.: 1



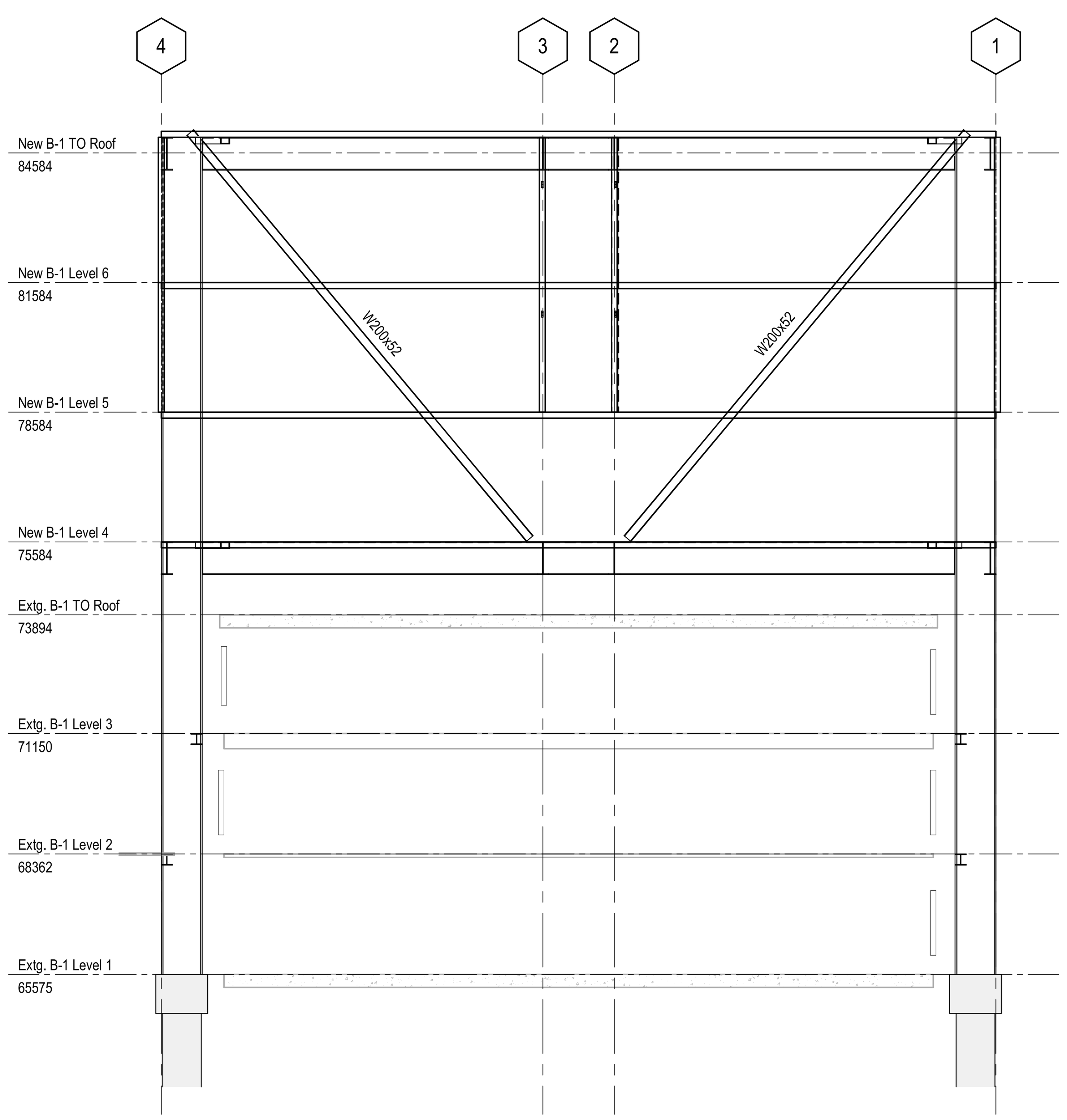
1
S204
1 : 100



2
S205
1 : 100

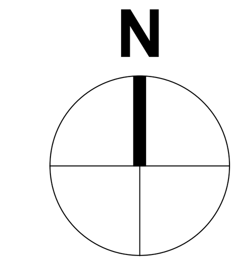


3
S200
1 : 100



4
S200
1 : 100

CONCEPT DESIGN ONLY



REVISIONS:

REV	DATE	DESCRIPTION	BY
1	2024-09-11	ISSUED FOR DRAFT REPORT	RW

SEAL:

ORIGINAL SCALE: 1 : 100

DATE: 2024-09-11

APPROVED BY: RW
"APPROVED BY" is the person siging/sealing the drawing (e.g. Engineer, Architect, Land Surveyor or qualified professional) and is thereby assuming responsibility. This person will be called to answer any questions that arise on this drawing. (For OIQ: "Prepeared By") format is First initial, Last Name

CHECKED BY: CJ
"CHECKED BY" is the person who checks the accuracy of the information and formating (max. 2 people). Format is First initial, Last Name

DRAWN BY: DR
"DRAWN BY" (optional) is the Drafter/Modeler who input the information from the design into the drafting platform. If more than one, this is the draftperson/Modeler who did the majority ofthe work. Format is First initial, Last Name

(Optional)

(Optional)

IF THIS BAR IS NOT 25mm LONG, ADJUST YOUR PLOTTING SCALE.

25mm

DISCIPLINE: STRUCTURAL

WSP Canada Inc.
3300 - 237 - 4th Avenue SW
Calgary, AB, Canada, T2P 4K3
T 403-243-8380 | www.wsp.com

PROJECT NUMBER: CA0026659.6220

CLIENT:

BCNPHA
BC Non-Profit Housing Association

CLIENT REF. #:

PROJECT: CHELSEA MANOR

TITLE: SECTIONS

DRAWING NUMBER: S400

REV. 1

Autodesk Docs://000-00000-00 - BC-Misc Projects - R24/CA0026659.6220 3 - Chelsea Manor_R24.rvt
2024-09-10 2:40:37 PM