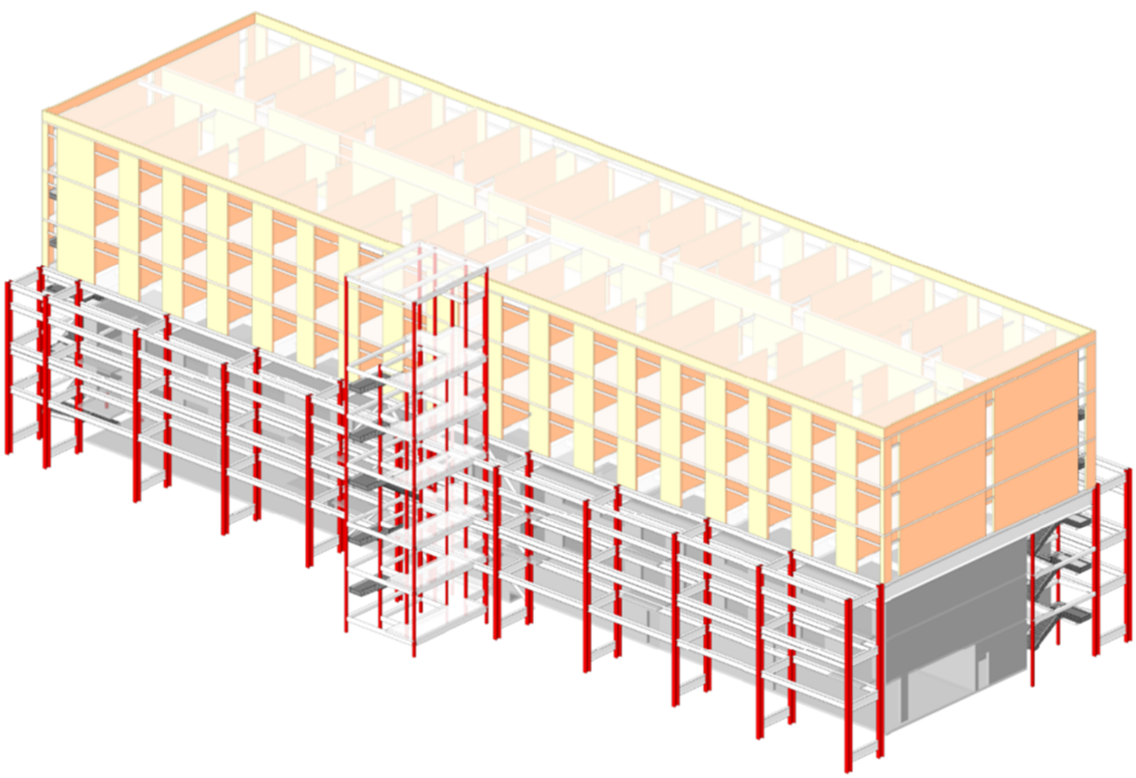
BCNPHA

THREE OVER THREE

CHIMO TERRACE STRUCTURAL REPORT

SEPTEMBER 11, 2024



THREE OVER THREE

CHIMO TERRACE STRUCTURAL REPORT

BCNPHA

PROJECT NO.: CA0026659.6220
DATE: DECEMBER 13, 2024

WSP

WSP.COM

REVISION HISTORY

2024-12-13	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 several sites managed by BC Housing where the maximum permitted number of storeys has increased 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 determine 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 in Vancouver (Chimo Terrace) to fully support the additional stories whilst minimising impacts on the existing units. 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.

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 knock-down/rebuild options.

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

3 EXISTING BUILDING

3.1 SITE LOCATION

Chimo Terrace comprises two separate, but structurally similar buildings located at 2080 and 2140 Wall Street, Vancouver.

The site slopes approximately 6m across its width, falling towards Wall Street. Undercroft carparking is currently provided for both buildings, accessed from the laneway at the rear.

Figure 1 Chimo Terrace Site Location

3.2 CURRENT BUILDING CONSTRUCTION

Chimo Terrace was constructed originally in 1969, and comprises a three-storey timber stick-built construction with 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 shear walls bracing.

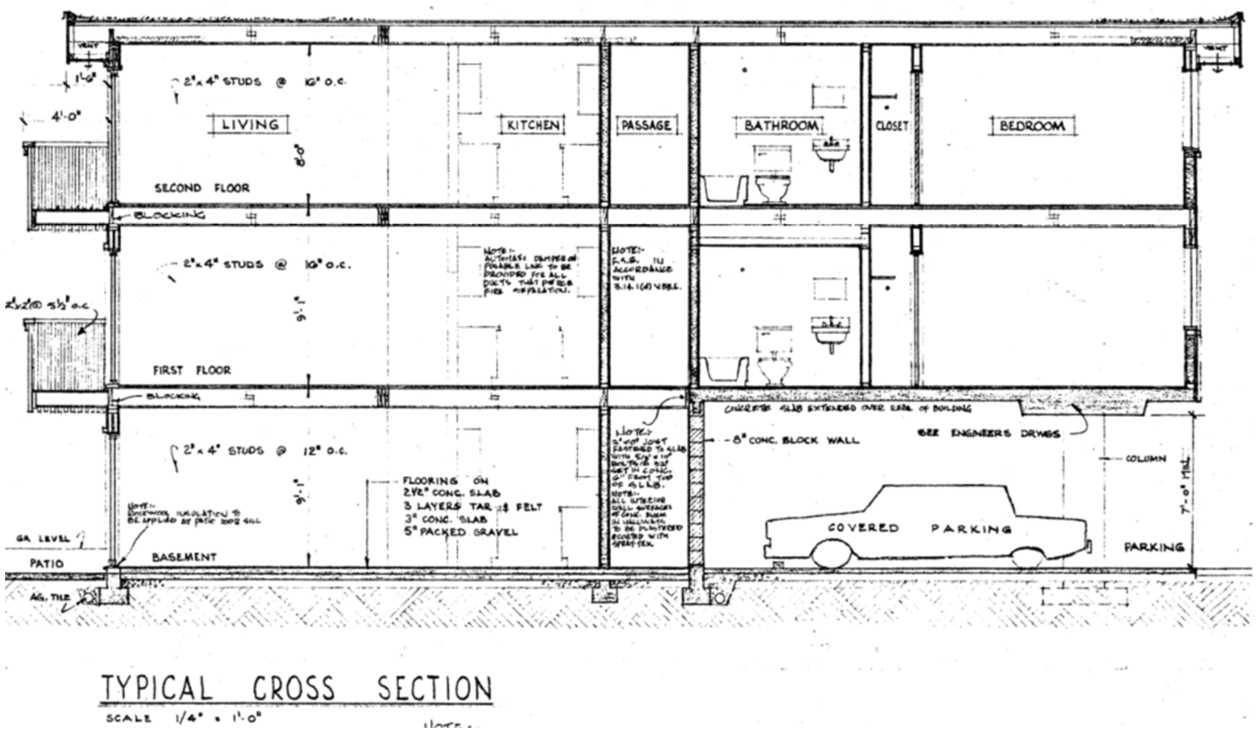


Figure 2 Chimo Terrace Typical Section

3.3 PREVIOUS UPGRADE WORKS

A minor structural upgrade was designed by WSP in 2019 to address local deflection and sagging of a balcony and carpark beam. No other structural items were upgraded at this time.

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 BUILDING IMPORTANCE

The proposed building importance level 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 new foundations.

In this concept, structural loads from the upper new three stores are transferred directly to the new foundations via the transfer structure, which removes any requirement to upgrade the original building foundations.

Seismic forces for the upper three storeys are resisted by dedicated timber shear walls in the new construction, which then transfers to steel conventionally-constructed moment frame system below. The three storeys of the lower building are laterally tied to the new portal frame through a series of belt-beams coincident with the current floor diaphragms, providing lateral seismic resistance to the original building sufficient to comply with current NBC2020 seismic loads. Refer to section 5.5 of this report for specific commentary on this.

Capacity of the current seismic force system for the original construction is ignored in our current analysis, with the new portal frame being designed to brace the complete 6 storey building. Allowing for some capacity for the existing building would reduce overall demands on the new structure, but has been ignored in this analysis for conservatism.

This arrangement is simplified and presented below in Figure 3 below;

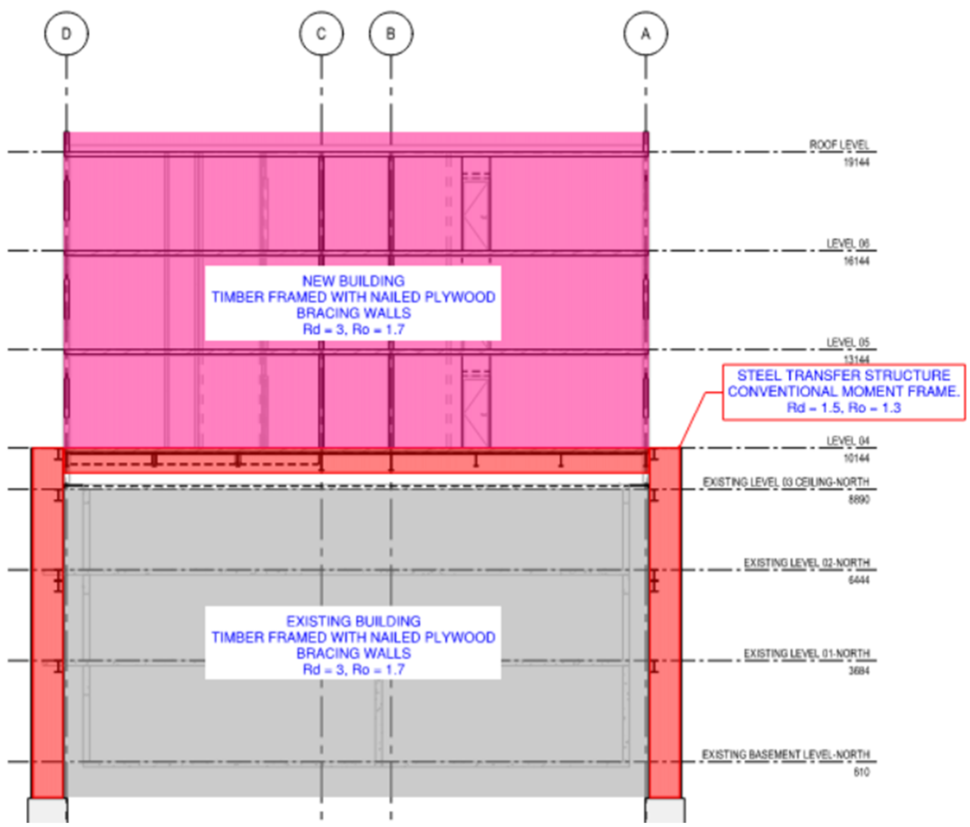


Figure 3 Structural arrangement of the new construction

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

The current structure is founded on high-level pad and strip foundations, which are appropriate for lightly loaded structures on good ground conditions.

However, as the proposed overbuild structure concentrates the entire upper levels of building and seismic forces into discrete foundations, the size of high-level foundations becomes a constraint to construction, requiring significant demolition and excavation works adjacent to an occupied structure.

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.

Should this concept be developed further in the future, the assumptions and constraints of foundation design can be reviewed again, and the viability of high level foundations reviewed at that time.

5.4 GRAVITY STRUCTURAL FRAMING

Gravity framing for the new three storey overbuild is designed to be load bearing stick-built timber walls, supported on the steel transfer deck at Level 4. Steel transfer beams then transfer the weight of the new structure to new steel portal columns outside of the original three storey building below.

The selection of timber materials for the new construction above the transfer deck is to reduce the overall structural mass of the new stories, and minimise loads on the transfer frame and foundations.

This concept allows the new structure and foundations to be independent of the original building envelope, minimising disruption to the occupants and allowing continuity of occupation throughout the construction.

5.5 LATERAL STABILITY CONCEPT

The current lateral stability system for Chimo Terrace is assumed to be nailed plywood shear walls.

For the proposed overbuild, the transfer frame is designed as a conventional constructed moment frame in the short dimension, and a concentrically braced frame in the long direction. The additional three stories of new building supported on the transfer structure are supported by the steel transfer deck.

The three upper stories are constructed as conventional timber frames with CLT floor diaphragms and nailed plywood bracing walls. The upper three stories have been designed for Rd.Ro = 3x1.7, supported on a conventional steel transfer structure designed for Rd.Ro = 1.5x1.3.

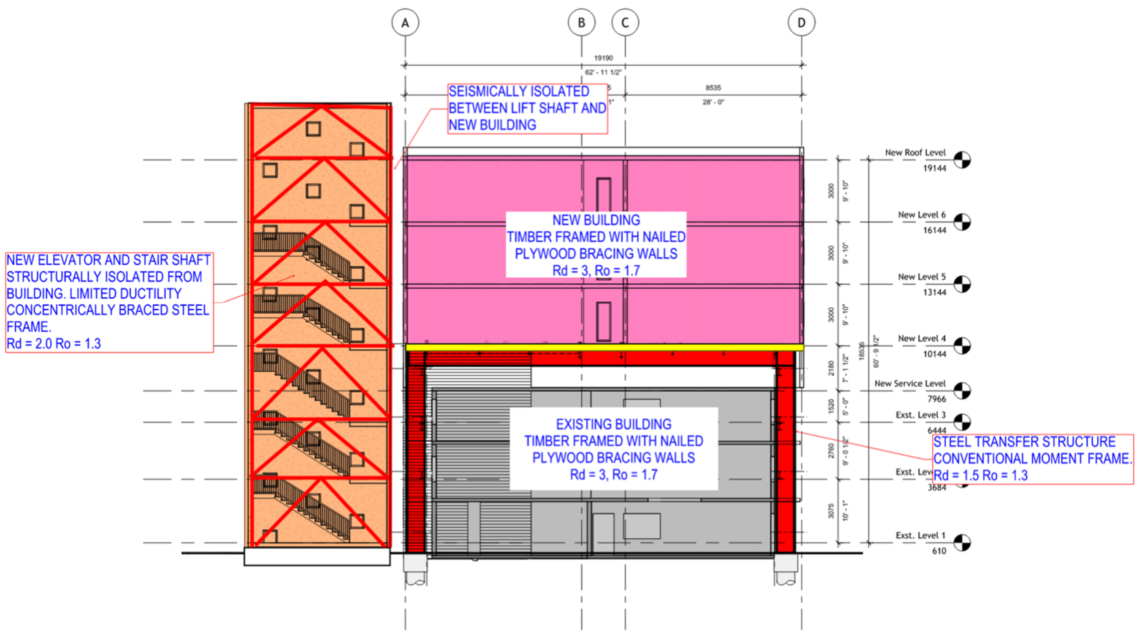


Figure 4 Chimo Terrace SFRS Concept

Structural analysis in this study has been based upon linear 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 COMPLIANCE WITH BCBC2024:

Seismic Force Category: SC4

SFRS Lower: Conventional Moment Frame designed to CSA S16;

Rd = 1.5, Ro = 1.3, Max height = 40m,

SFRS Upper 3 Storeys: Timber Frames with Nailed Plywood Bracing Walls designed to CSA O36

Rd = 3.0 Ro = 1.7, Max height = 20m

Building Height = 19m to Roof

The proposed overbuild and transfer structure both comply with the maximum height limits of BCBC2024 BCBC2024 Table 4.1.8.9, however, the proposed transfer structure results in several seismic irregularities per the which are summarised in Table 3 below.

Although the proposed scheme imposes some seismic irregularities, the application of linear-dynamic seismic analysis satisfies the requirements for these and the proposed scheme meets the requirement of BCBC2024 in respect to seismic design.

Table 3 BCBC2024 Table 4.1.8.9 and Commentary

Irregularity Type	Irregularity Definition	Comment
1	Vertical Stiffness Irregularity	Transfer structure is more flexible than the upper three storeys, and results in a type 1 irregularity. Linear dynamic earthquake analysis proposed.
2	Weight Irregularity	Transfer structure is lighter than the upper three storeys, and results in a type 2 irregularity. Linear dynamic earthquake analysis proposed.
3	Vertical Geometric Irregularity	Transfer structure is wider than the upper three storeys, and results in a type 3 irregularity. Linear dynamic earthquake analysis proposed.
4	In-Plane discontinuity	Shear walls for upper construction are concentric full height and transfer directly to the dedicated transfer structure beams below.
5	Out of Plane Discontinuity	Not applicable. Shear loads in upper building designed concentric with portal frames below
6	Discontinuity in Capacity	Not applicable. Transfer structure designed for lower Rd.Ro than upper storeys
7	Torsional Sensitivity	Not applicable. Current scheme does not have a torsional sensitivity
8	Non-Orthogonal Systems	Not applicable. Current scheme maintains orthogonal seismic force systems
9	Gravity-Induced Lateral Demand Irregularity	Current transfer structure designed to be sufficiently stiff to prevent gravity-induced lateral loadings
10	Sloped Column Irregularity	Not applicable. No sloped columns proposed

Additional System Restrictions per BCBC2024 4.1.8.10;

- 1) No Type 6 Discontinuity in Capacity exists.
- 2) Building is not designed for post-disaster occupancy
- 3) Building is normal importance
- 4) Shear walls are wood based and no type 4 or 5 irregularities exist
- 5) Proposed building does not have more than 4 storeys of ***continuous*** wood construction.
- 6) Does not apply. Timber shear walls are plywood construction for upper construction
- 7) Does not apply. Transfer structure designed to prevent gravity induced demands
- 8) Does not apply
- 9) Does not apply
- 10) Does not apply

5.6 EXISTING BUILDING UPGRADES

5.6.1 SEISMIC UPGRADING

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 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.

5.6.2 ACCESS AND EGRESS

New vertical access is provided by a dedicated elevator and stair shaft located adjacent to the new building. This structure is seismically isolated from the main building envelope, and is designed to allow elevator access to all six levels of the completed building.

Refer to architectural report for further details on the proposed vertical access modifications included in this study.

5.7 CONSTRUCTABILITY

5.7.1 STAGING AND ERECTION SEQUENCE

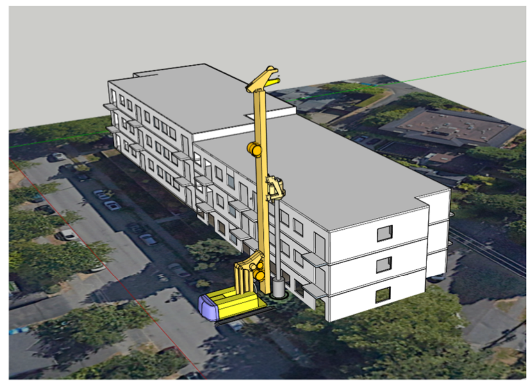
The proposed erection sequence for the transfer structure is indicated below. The design minimises disruption to the occupants of the existing building, and allows for continuity of occupation.

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).

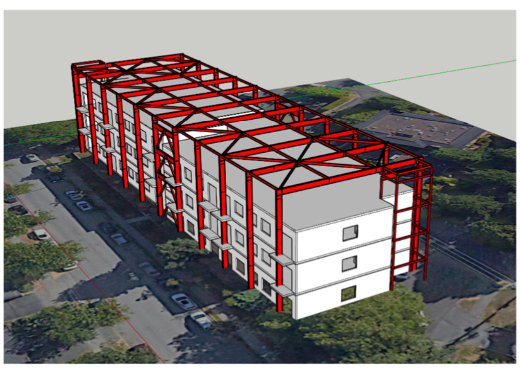
Once the transfer deck is erected, the construction of the new overbuild can progress without disruption to the existing occupants.

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.

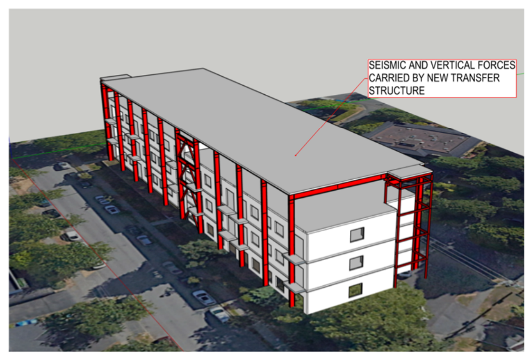
CURRENT BUILDING



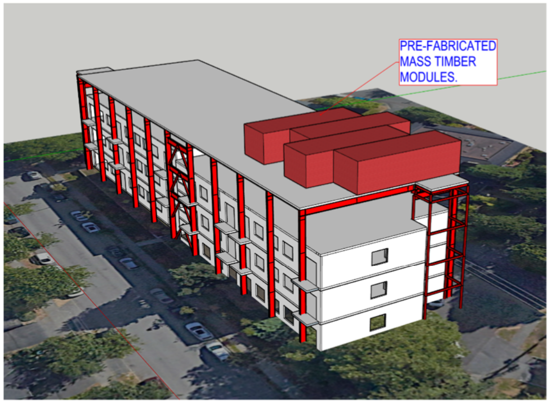
STAGE 1: INSTALLATION OF NEW FOUNDATIONS



STAGE 2: INSTALLATION OF TRANSFER STRUCTURE



STAGE 3: INSTALLATION OF TRANSFER DECK



STAGE 5: MODULES INSTALLATION COMPLETE

STAGE 6: LIFT CORE AND STAIRS CONSTRUCTED.
BUILDING COMPLETE

Figure 5 Preliminary Construction Staging Concept

5.8 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 $590psf, 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 Chimo Terrace.

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 Chimo Terrace 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	260,000	N/A
Reinforced concrete	153,000	305,100
Timber	146,400	260,000
Removal of existing structure	N/A	89,820
Total	559,400	654,920

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 2 has more embodied carbon emission (17.1%) than Scheme 1. It is because the construction of a whole new building not only consumes more new materials which has more upfront embodied carbon produced, but also release more carbon when demolishing the existing structure.

In summary, the overbuild approach (Scheme 1) is generally more sustainable in terms of embodied carbon emissions compared to the demolishing and rebuilding approach. 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 Chimo Terrace, 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

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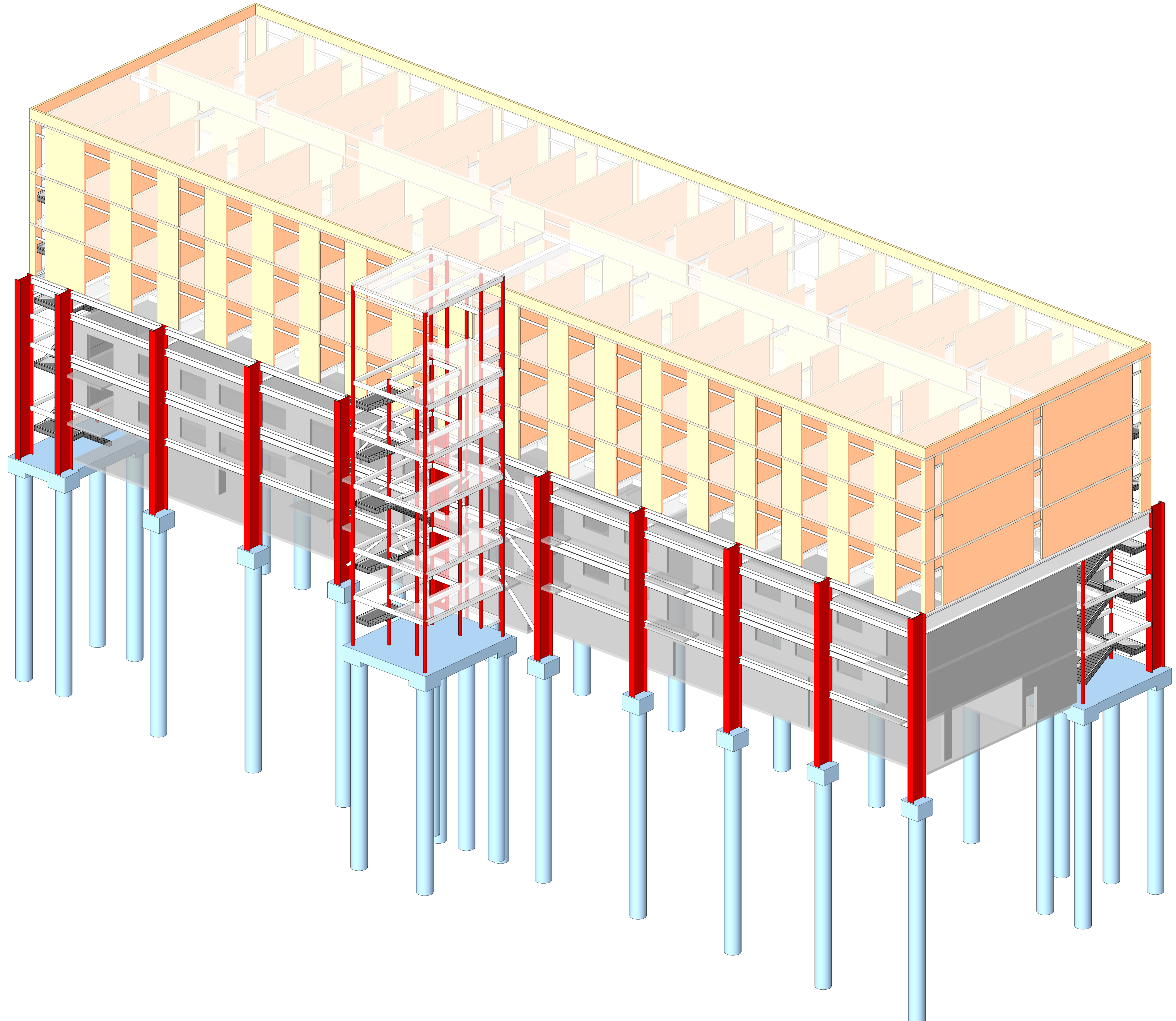

3D VIEW

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ALL RENDERINGS ARE FOR ILLUSTRATION PURPOSES ONLY. THEY DO NOT INCLUDE ALL STRUCTURAL ELEMENTS AND DETAILS, AND SHOULD NOT BE USED FOR CONSTRUCTION

CONCEPT DESIGN ONLY

DRAWING LIST

DRAWING No.	DRAWING NAME
S000	COVER SHEET
S200	FOUNDATION PLANS
S201	LEVEL 01 FRAMING PLAN
S202	LEVEL 02 FRAMING PLAN
S203	LEVEL 03 FRAMING PLAN
S204	LEVEL 04 FRAMING PLAN
S205	LEVEL 04 WALL LAYOUT
S206	LEVEL 05 FRAMING PLAN
S207	LEVEL 06 FRAMING PLAN
S208	ROOF FRAMING PLAN
S300	SCHEDULE
S400	SECTIONS
S500	ELEVATIONS
S501	ELEVATIONS & SECTION

REVISIONS:

REV	DATE	DESCRIPTION	BY
2	2024-09-11	ISSUED FOR DRAFT REPORT	RW
1	2024-08-19	ISSUED FOR COSTING	RW

SEAL:

ORIGINAL SCALE: NTS

DATE: 2024-09-11

APPROVED BY: RE

CHECKED BY: CJ

DRAWN BY: EM

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BCNPHA
BC Non-Profit Housing Association

CLIENT REF. #:

PROJECT:

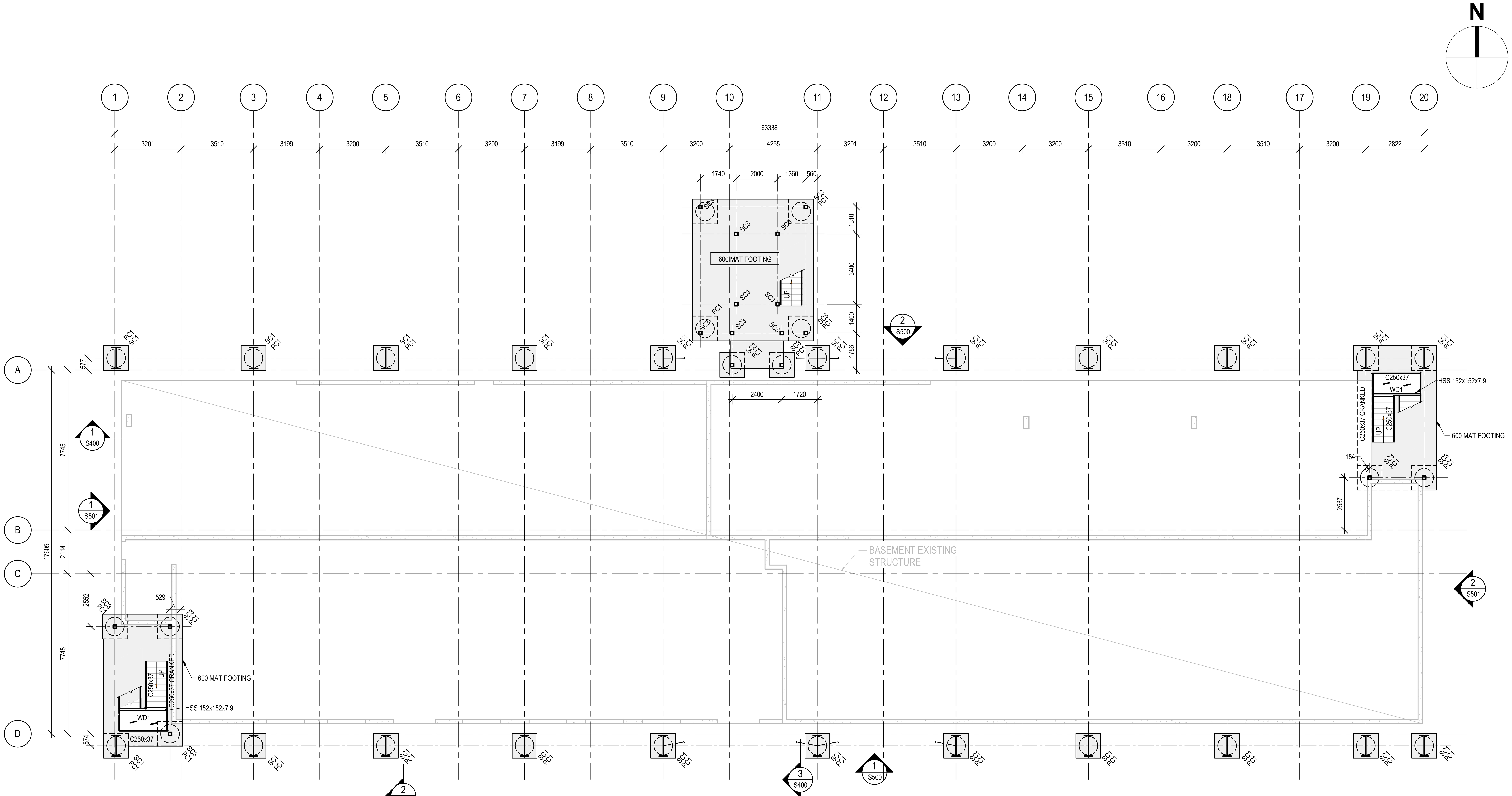
CHIMO TERRACE

TITLE:

COVER SHEET

DRAWING NUMBER: S000

REV. 2



FOUNDDATION LEVEL PLAN

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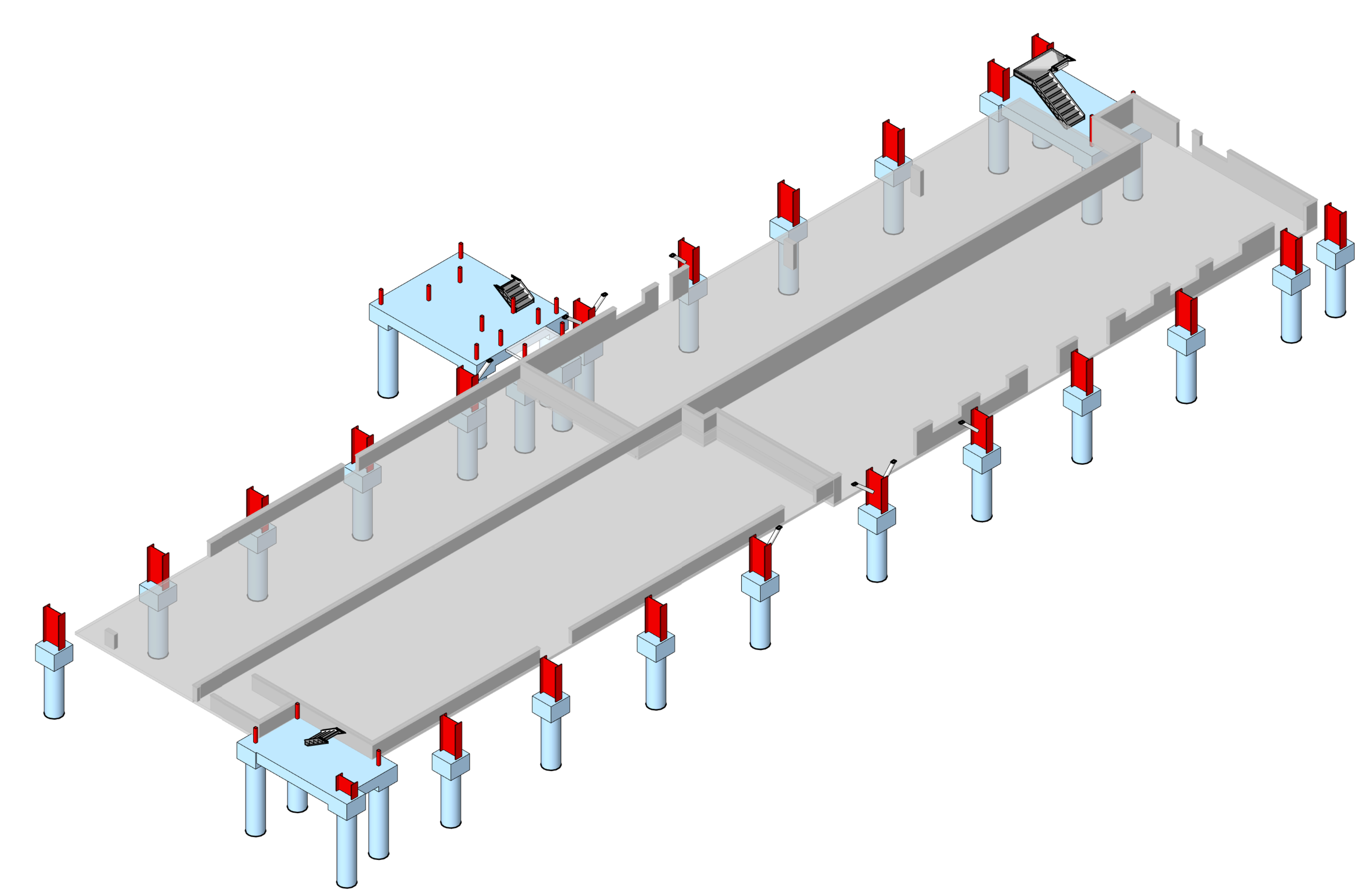

CONCEPT DESIGN ONLY

FOUNDATION LEVEL-3D VIEW

NTS

0 1 2 5 8m

SCALE 1:100

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CLIENT REF. #:

PROJECT:

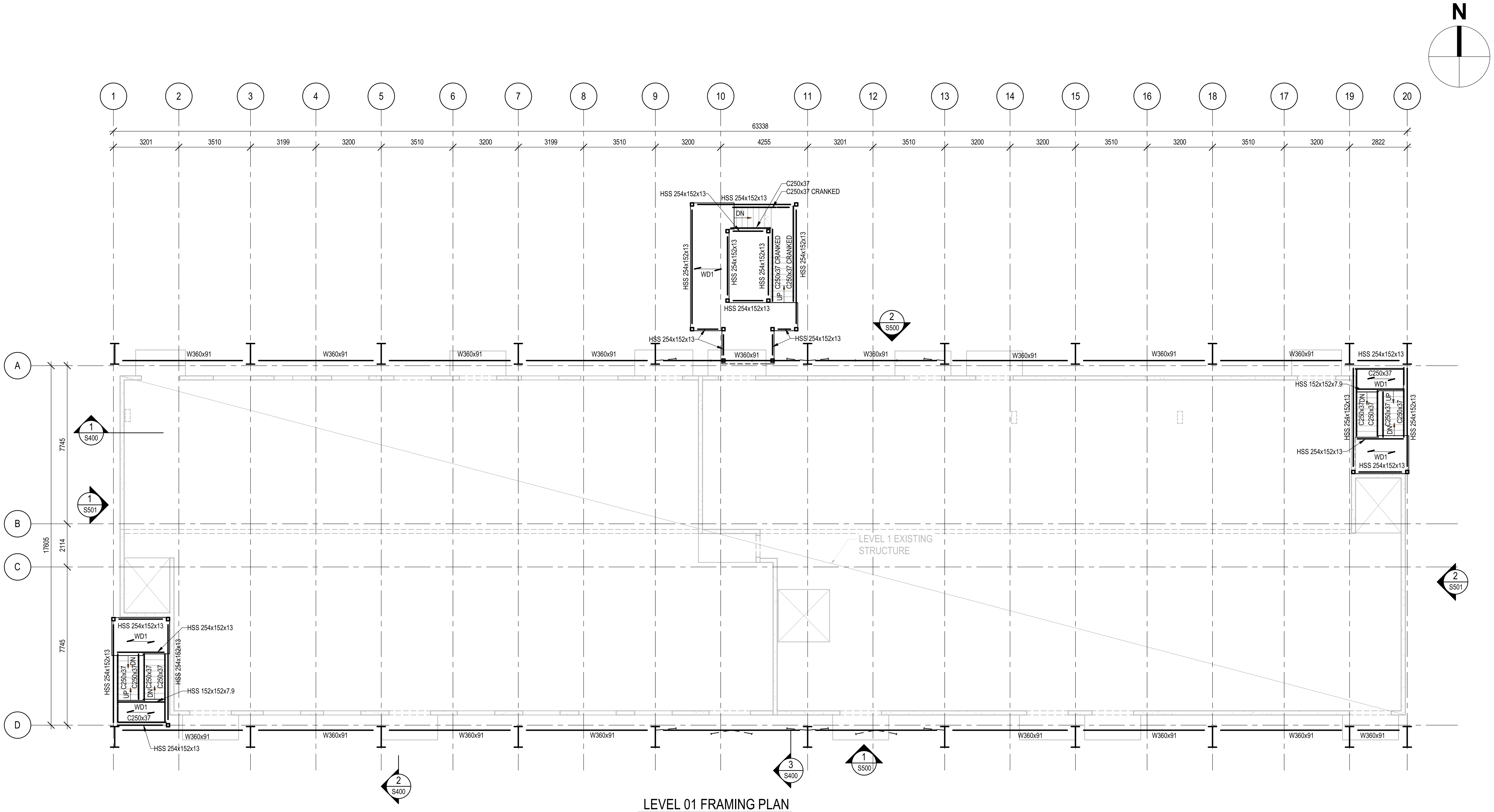
CHIMO TERRACE

TITLE:

FOUNDATION PLANS

DRAWING NUMBER: S200

REV. 2



LEVEL 01 FRAMING PLAN

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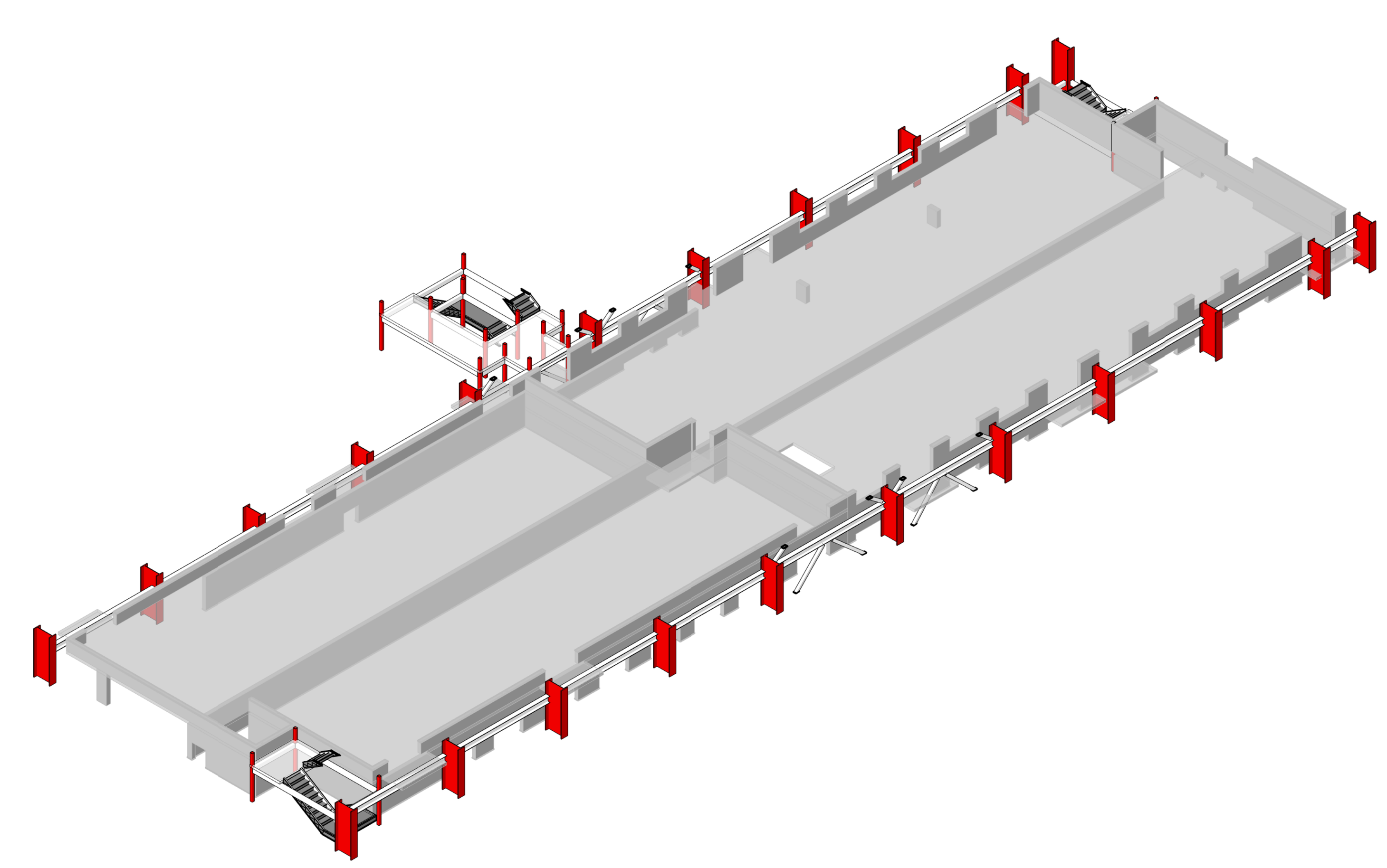

LEVEL 1 - 3D VIEW

NTS

CONCEPT DESIGN ONLY

0 1 2 5 8m

SCALE 1:100

REVISIONS:

REV	DATE	DESCRIPTION	BY
2	2024-09-11	ISSUED FOR DRAFT REPORT	RW
1	2024-08-19	ISSUED FOR COSTING	RW

SEAL:

ORIGINAL SCALE: 1 : 100

DATE: 2024-09-11

APPROVED BY: RE

CHECKED BY: CJ

DRAWN BY: EM / HM

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

25mm

DISCIPLINE: STRUCTURAL

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T 604-685-9381 | www.wsp.com

PROJECT NUMBER: CA0026659.6220

CLIENT:

BCNPHA
BC Non-Profit Housing Association

CLIENT REF. #:

PROJECT:

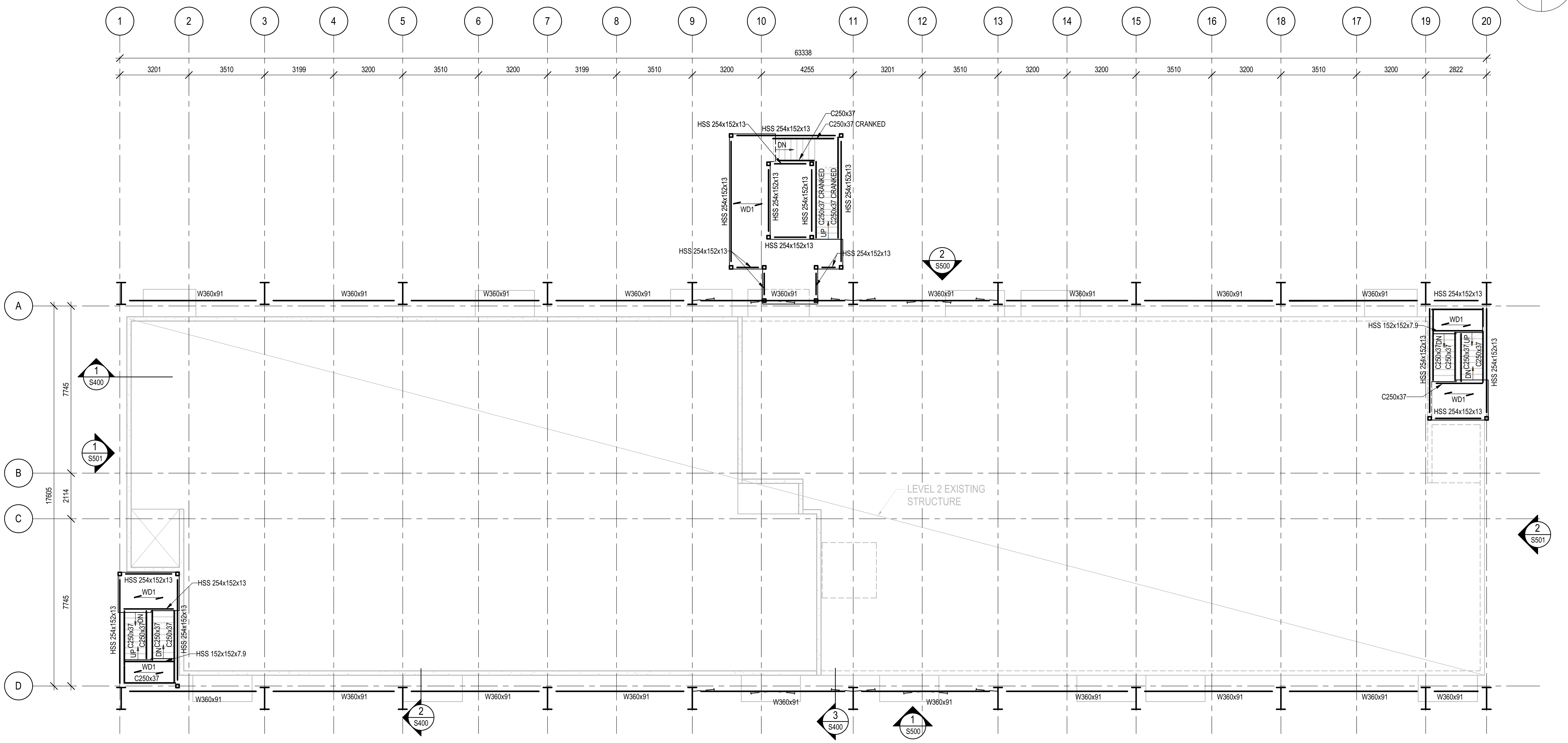
CHIMO TERRACE

TITLE:

LEVEL 01 FRAMING PLAN

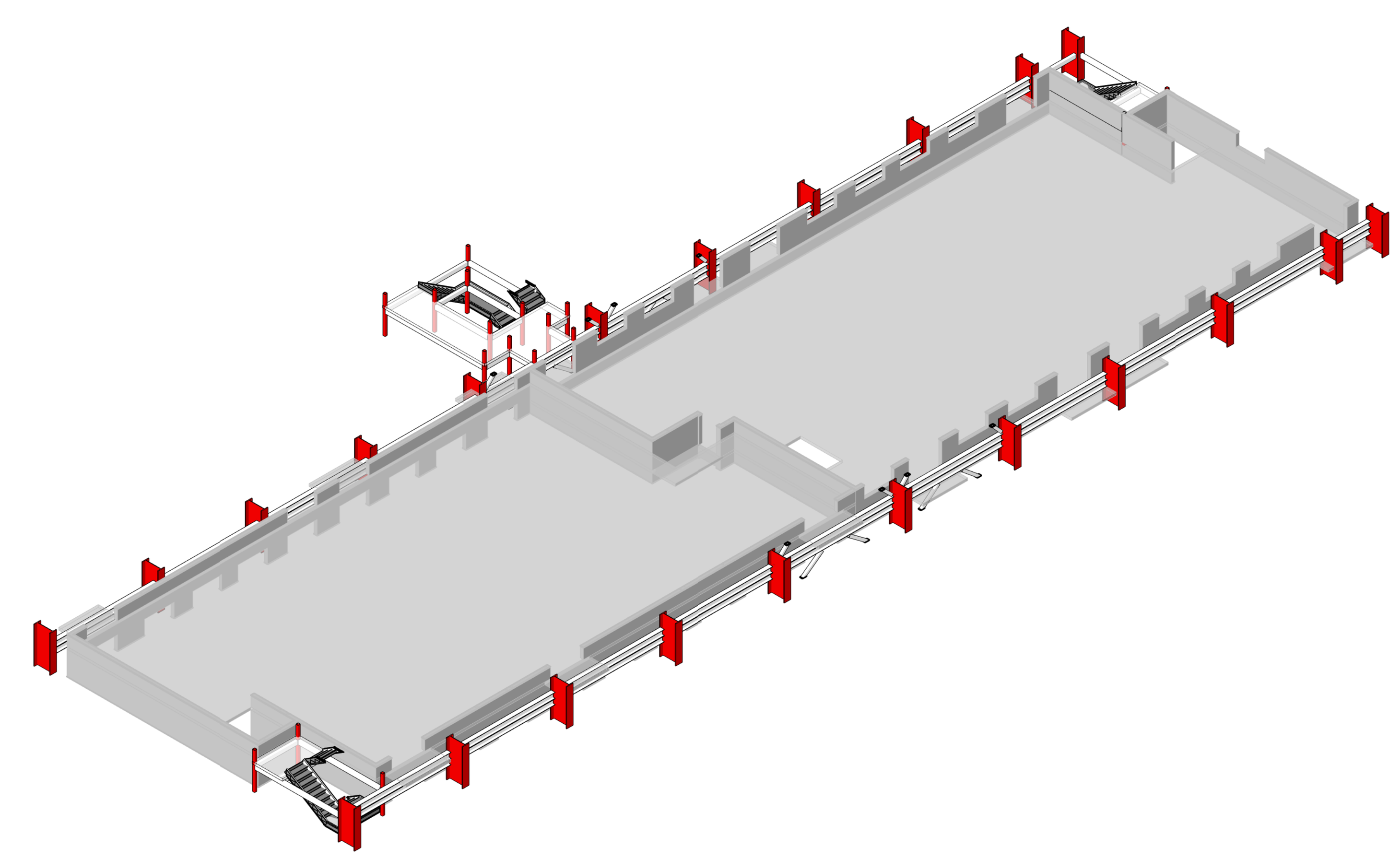
DRAWING NUMBER: S201

REV. 2



LEVEL 02 FRAMING PLAN

1 : 100



LEVEL 2 - 3D VIEW

NTS

CONCEPT DESIGN ONLY

SCALE 1:100

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2024-09-10 2:53:26 PM

REVISIONS:

REV	DATE	DESCRIPTION	BY
2	2024-09-11	ISSUED FOR DRAFT REPORT	RW
1	2024-08-19	ISSUED FOR COSTING	RW

SEAL:

ORIGINAL SCALE: 1 : 100

DATE: 2024-09-11

APPROVED BY: RE

CHECKED BY: CJ

DRAWN BY: EM / HM

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

25mm

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PROJECT NUMBER: CA0026659.6220

CLIENT: BCNPHA BC Non-Profit Housing Association

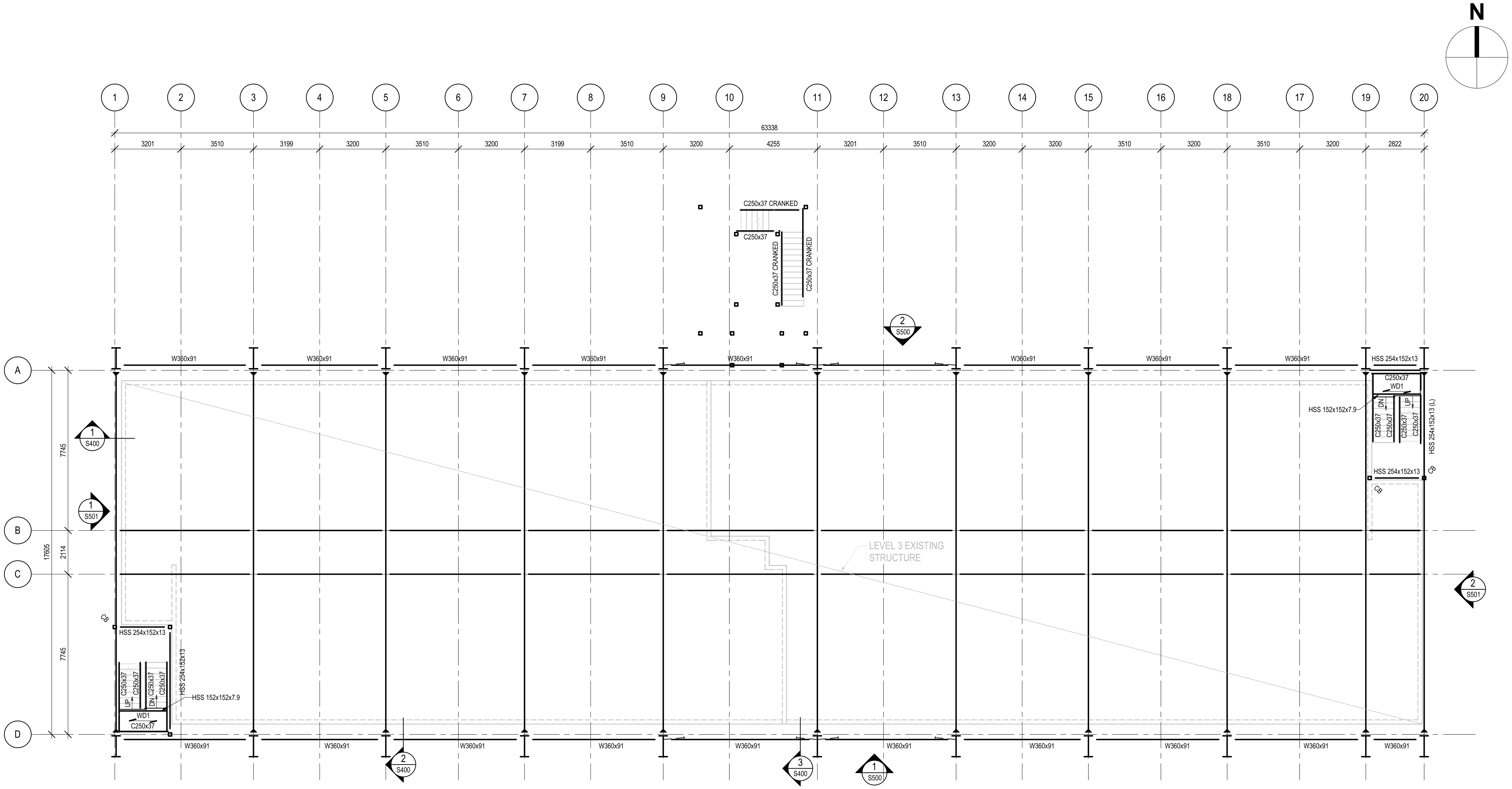
CLIENT REF. #:

PROJECT: CHIMO TERRACE

TITLE: LEVEL 02 FRAMING PLAN

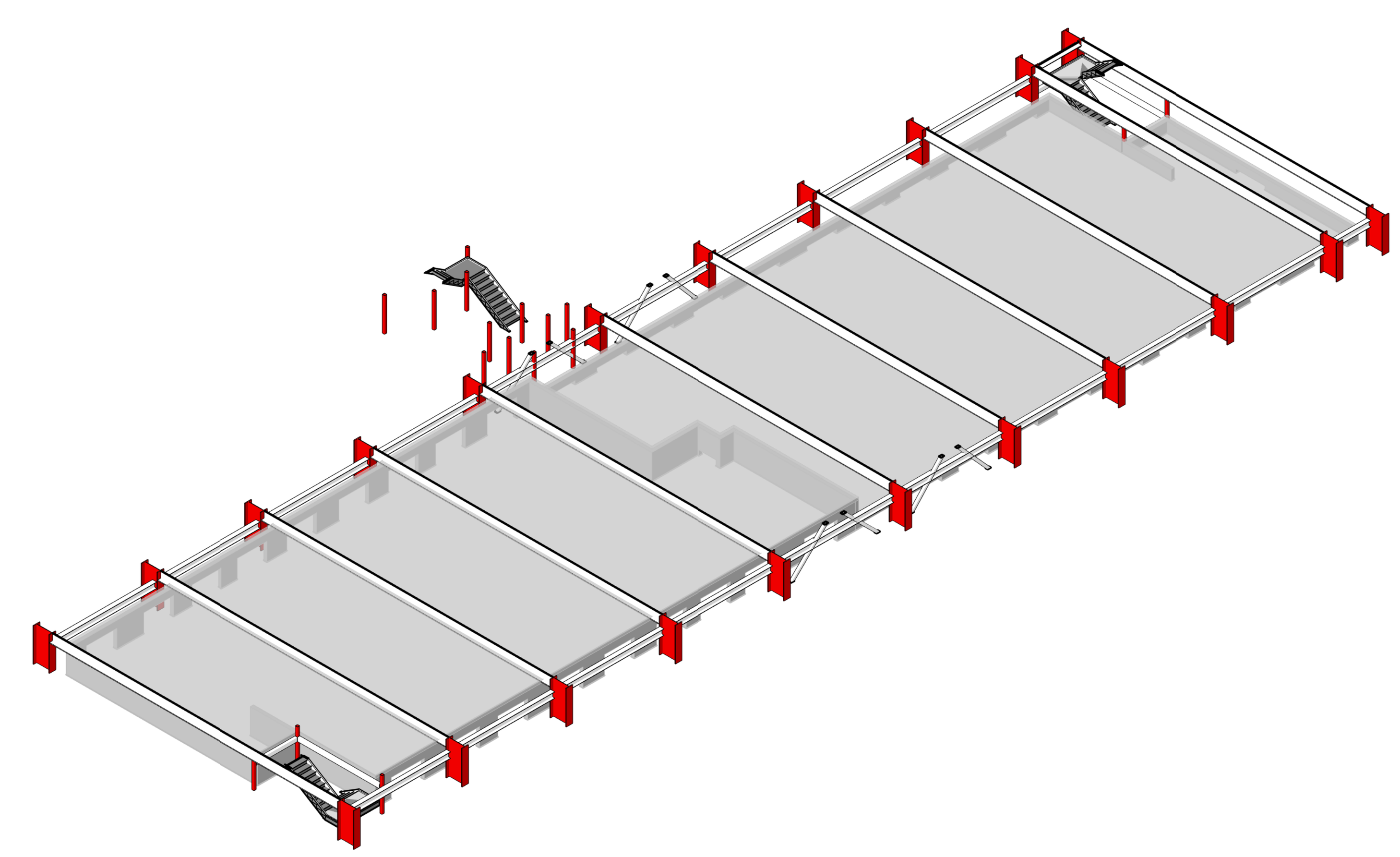
DRAWING NUMBER: S202

REV. 2



LEVEL 03 FRAMING PLAN

1 : 100



LEVEL 3 - 3D VIEW

NTS

CONCEPT DESIGN ONLY

0 1 2 5 8m

SCALE 1:100

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2024-09-10 2:53:28 PM

REVISIONS:

REV	DATE	DESCRIPTION	BY
2	2024-09-11	ISSUED FOR DRAFT REPORT	RW
1	2024-08-19	ISSUED FOR COSTING	RW

SEAL:

ORIGINAL SCALE: 1 : 100

DATE: 2024-09-11

APPROVED BY: RE

CHECKED BY: CJ

DRAWN BY: EM / HM

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

25mm

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PROJECT NUMBER: CA0026659.6220

CLIENT:

BCNPHA
BC Non-Profit Housing Association

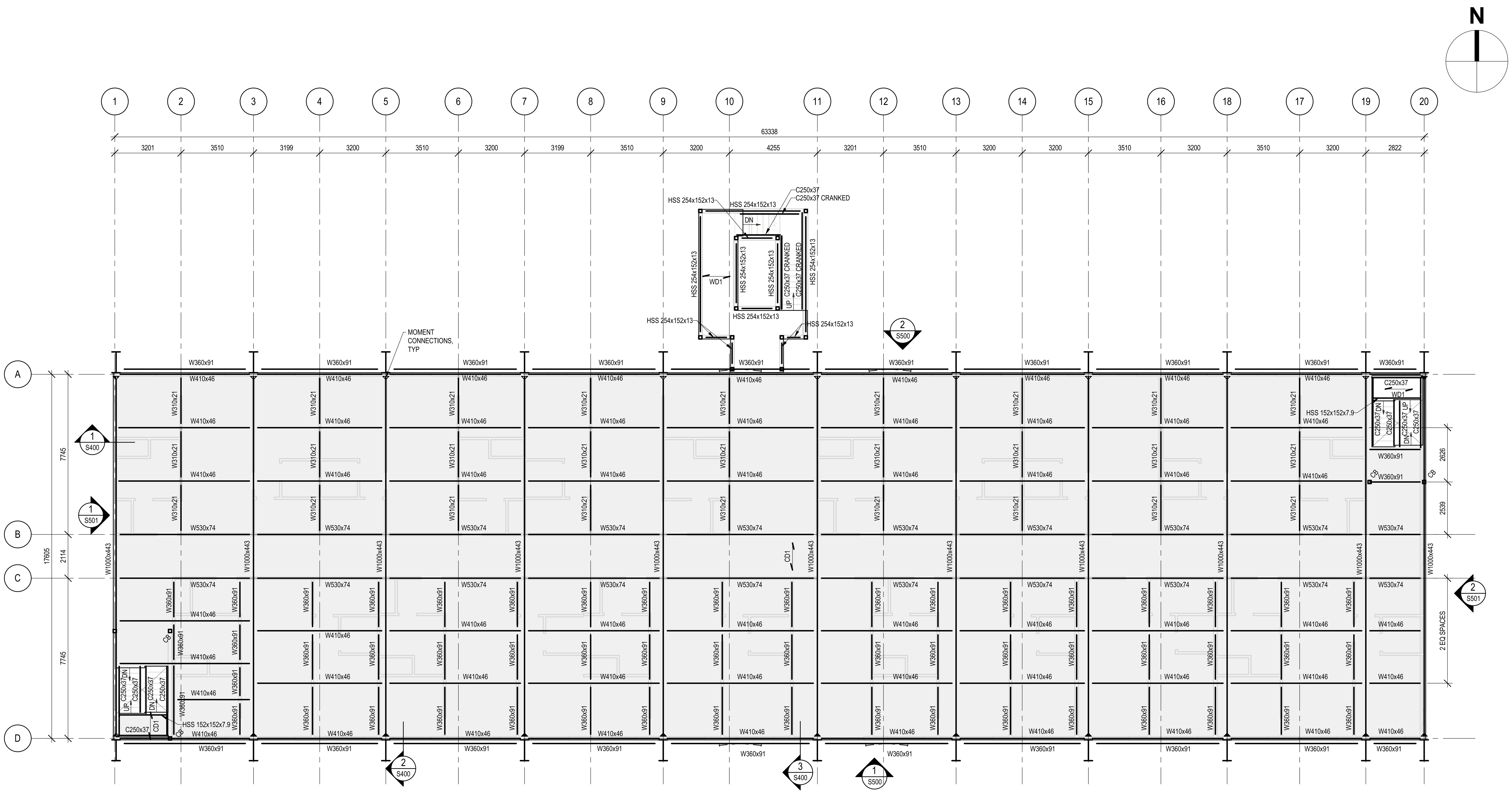
CLIENT REF. #:

PROJECT: CHIMO TERRACE

TITLE: LEVEL 03 FRAMING PLAN

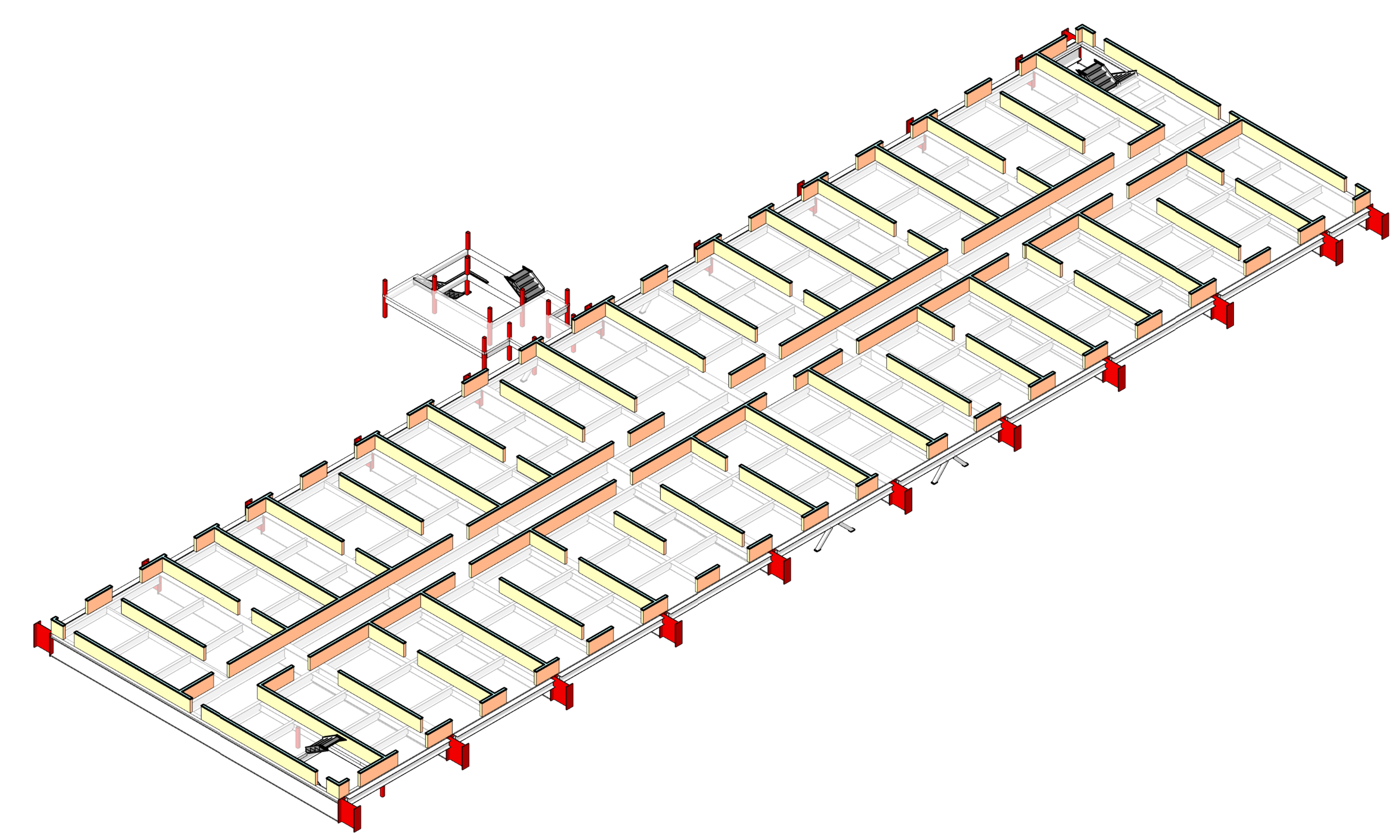
DRAWING NUMBER: S203

REV. 2



LEVEL 04 FRAMING PLAN

1 : 100



LEVEL 4 - 3D VIEW

NTS

CONCEPT DESIGN ONLY

0 1 2 5 8m

SCALE 1:100

REVISIONS:

REV	DATE	DESCRIPTION	BY
2	2024-09-11	ISSUED FOR DRAFT REPORT	RW
1	2024-08-19	ISSUED FOR COSTING	RW

SEAL:

ORIGINAL SCALE: 1 : 100

DATE: 2024-09-11

APPROVED BY: RE

CHECKED BY: CJ

DRAWN BY: EM / HM

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

25mm

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PROJECT NUMBER: CA0026659.6220

CLIENT:

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BC Non-Profit Housing Association

CLIENT REF. #:

PROJECT: CHIMO TERRACE

TITLE: LEVEL 04 FRAMING PLAN

DRAWING NUMBER: S204

REV. 2

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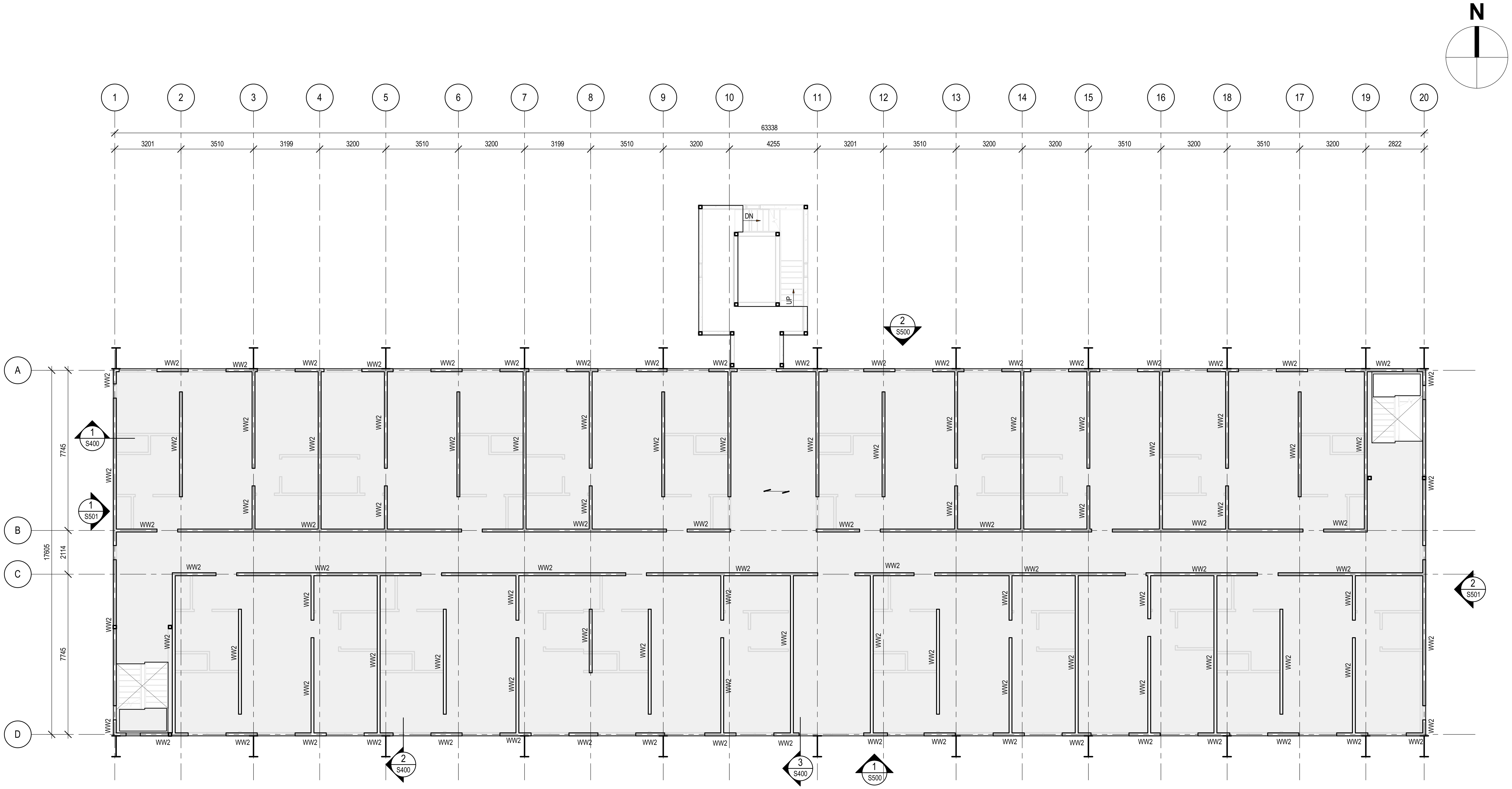
2024-09-10 2:53:31 PM



LEVEL 04 WALL LAYOUT

1 : 100

CONCEPT DESIGN ONLY

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

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2024-09-10 2:53:32 PM

REVISIONS:

REV	DATE	DESCRIPTION	BY
2	2024-09-11	ISSUED FOR DRAFT REPORT	RW
1	2024-08-19	ISSUED FOR COSTING	RW

SEAL:

ORIGINAL SCALE: 1 : 100

DATE: 2024-09-11

APPROVED BY: RE

CHECKED BY: CJ

DRAWN BY: EM / HM

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

25mm

DISCIPLINE: STRUCTURAL

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CLIENT:

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BC Non-Profit Housing Association

CLIENT REF. #:

PROJECT:

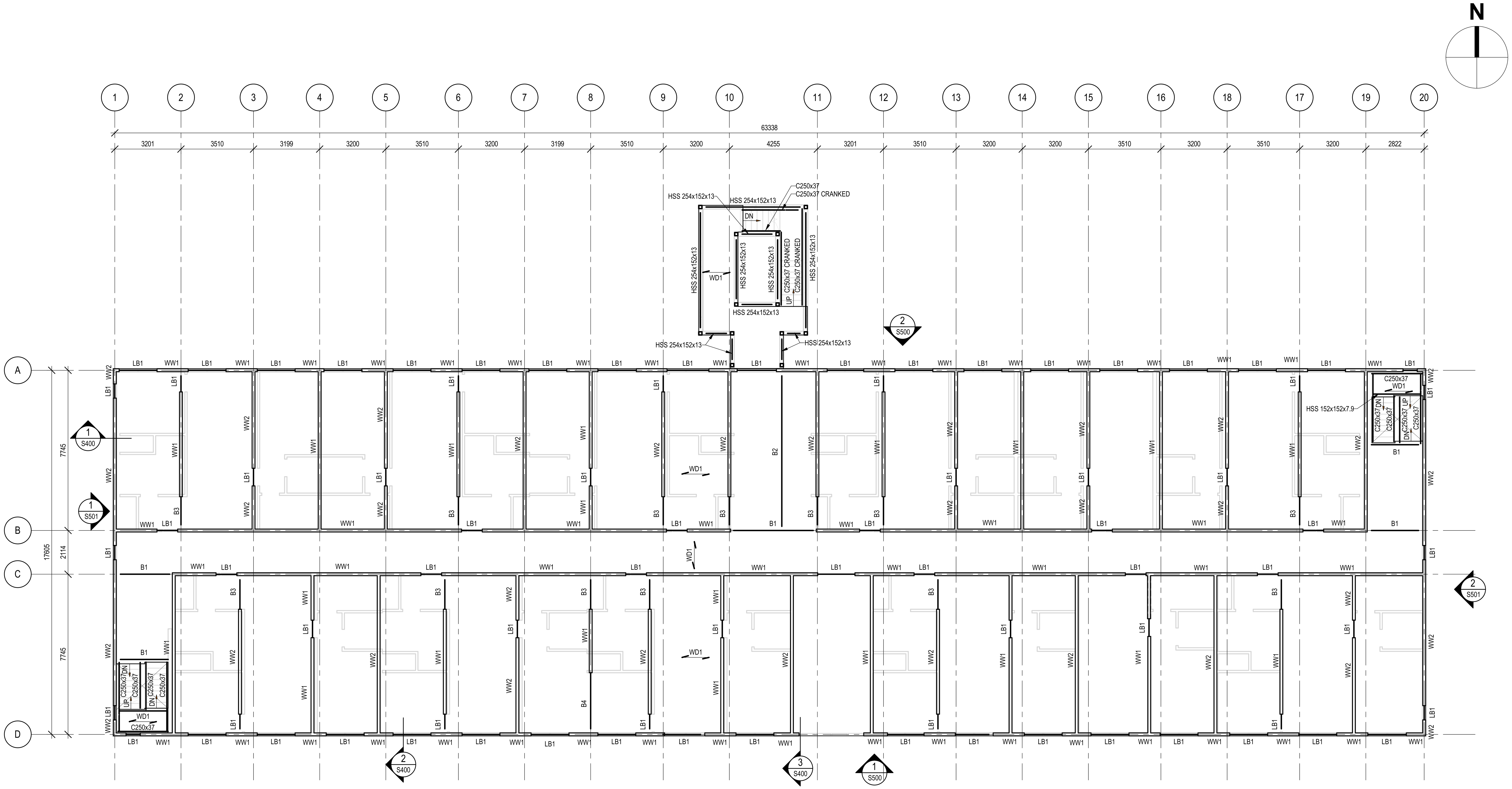
CHIMO TERRACE

TITLE:

LEVEL 04 WALL LAYOUT

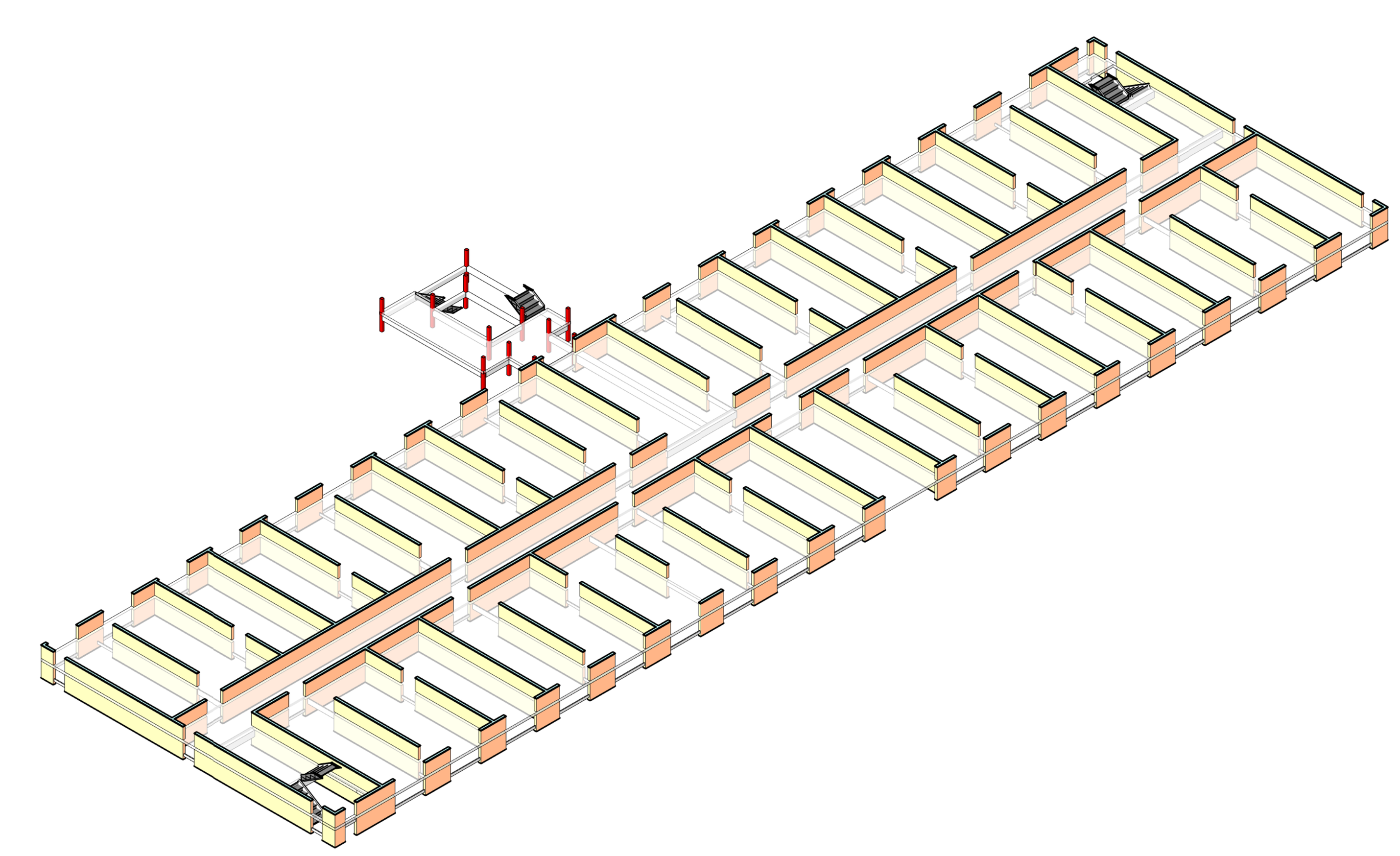
DRAWING NUMBER: S205

REV. 2



LEVEL 05 FRAMING PLAN

1 : 100



LEVEL 5 - 3D VIEW

NTS

CONCEPT DESIGN ONLY

SCALE 1:100

REVISIONS:

REV	DATE	DESCRIPTION	BY
2	2024-09-11	ISSUED FOR DRAFT REPORT	RW
1	2024-08-19	ISSUED FOR COSTING	RW

SEAL:

ORIGINAL SCALE: 1 : 100

DATE: 2024-09-11

APPROVED BY: RE

CHECKED BY: CJ

DRAWN BY: EM / HM

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25mm

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CLIENT: BCNPHA BC Non-Profit Housing Association

CLIENT REF. #:

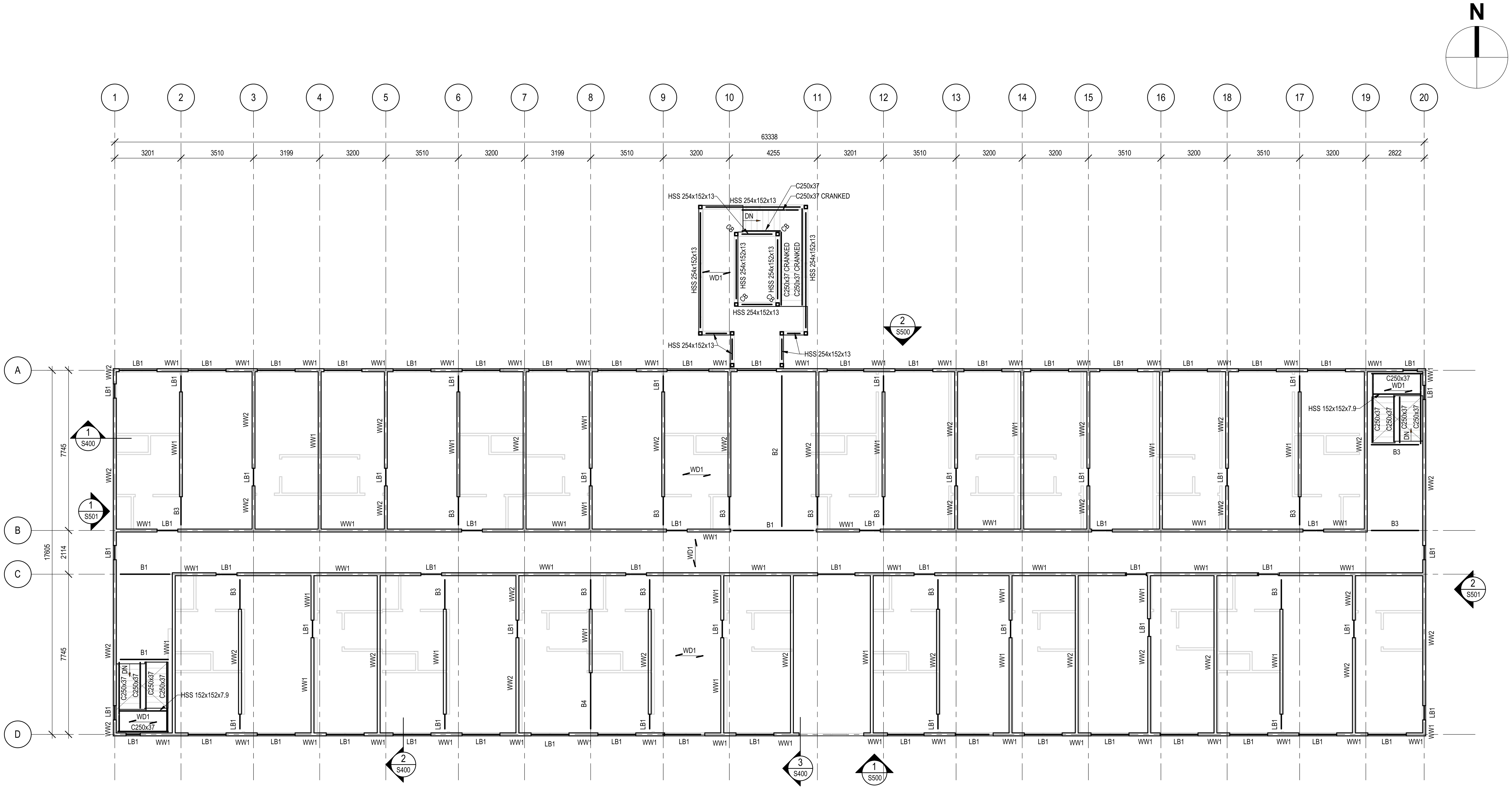
PROJECT: CHIMO TERRACE

TITLE: LEVEL 05 FRAMING PLAN

DRAWING NUMBER: S206

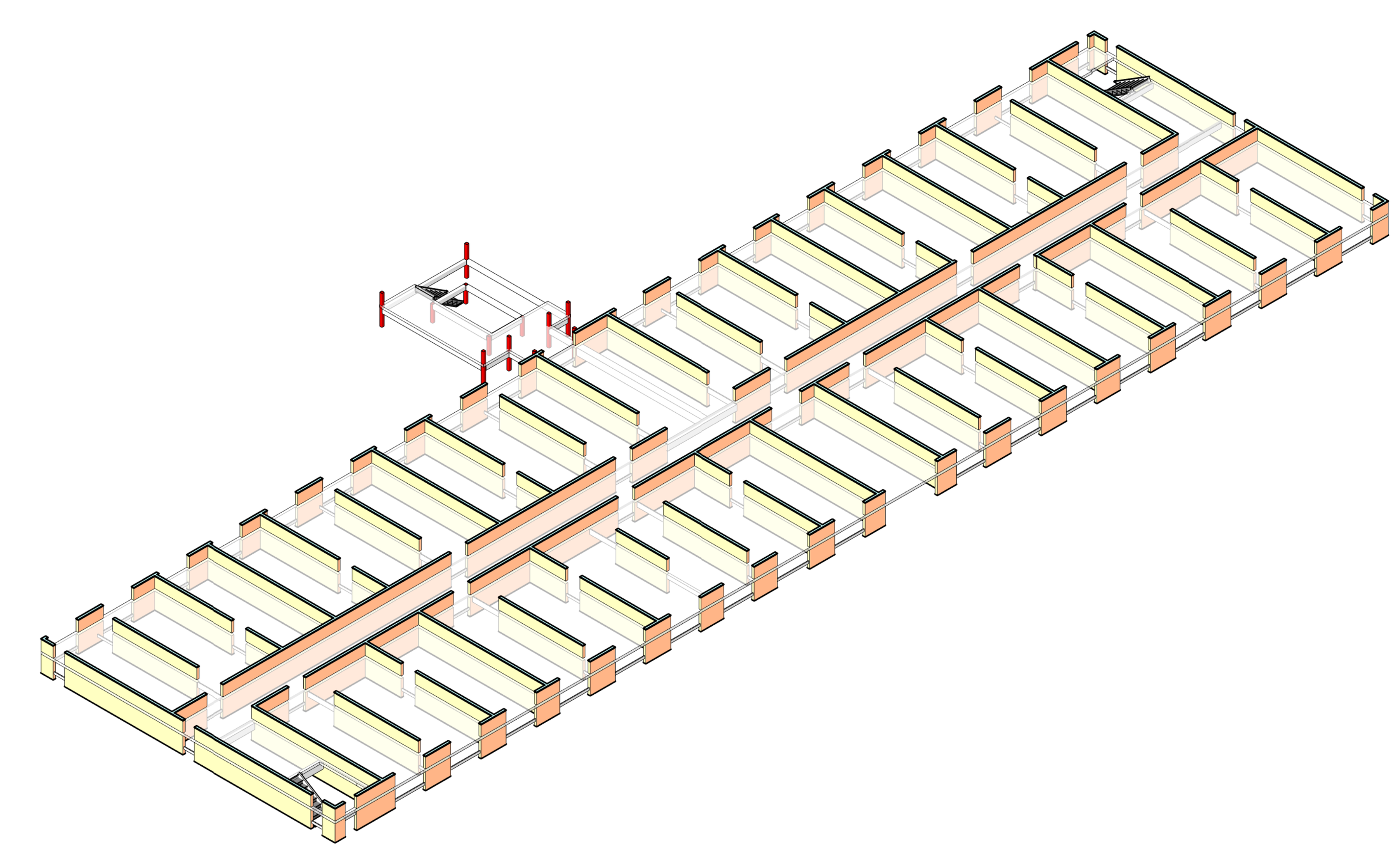
REV. 2

Autodesk Docs://000-00000-00 - BC-Misc Projects - R24/CA0026659.6220 3-Over-3 Mass Timber Residential Infill_Chimo Terrace_R24.rvt
2024-09-10 2:53:35 PM



LEVEL 06 FRAMING PLAN

1 : 100



LEVEL 6 - 3D VIEW

NTS

CONCEPT DESIGN ONLY

0 1 2 5 8m

SCALE 1:100

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2024-09-10 2:53:38 PM

REVISIONS:

REV	DATE	DESCRIPTION	BY
2	2024-09-11	ISSUED FOR DRAFT REPORT	RW
1	2024-08-19	ISSUED FOR COSTING	RW

SEAL:

ORIGINAL SCALE: 1 : 100

DATE: 2024-09-11

APPROVED BY: RE

CHECKED BY: CJ

DRAWN BY: EM / HM

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

25mm

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CLIENT:

BCNPHA
BC Non-Profit Housing Association

CLIENT REF. #:

PROJECT:

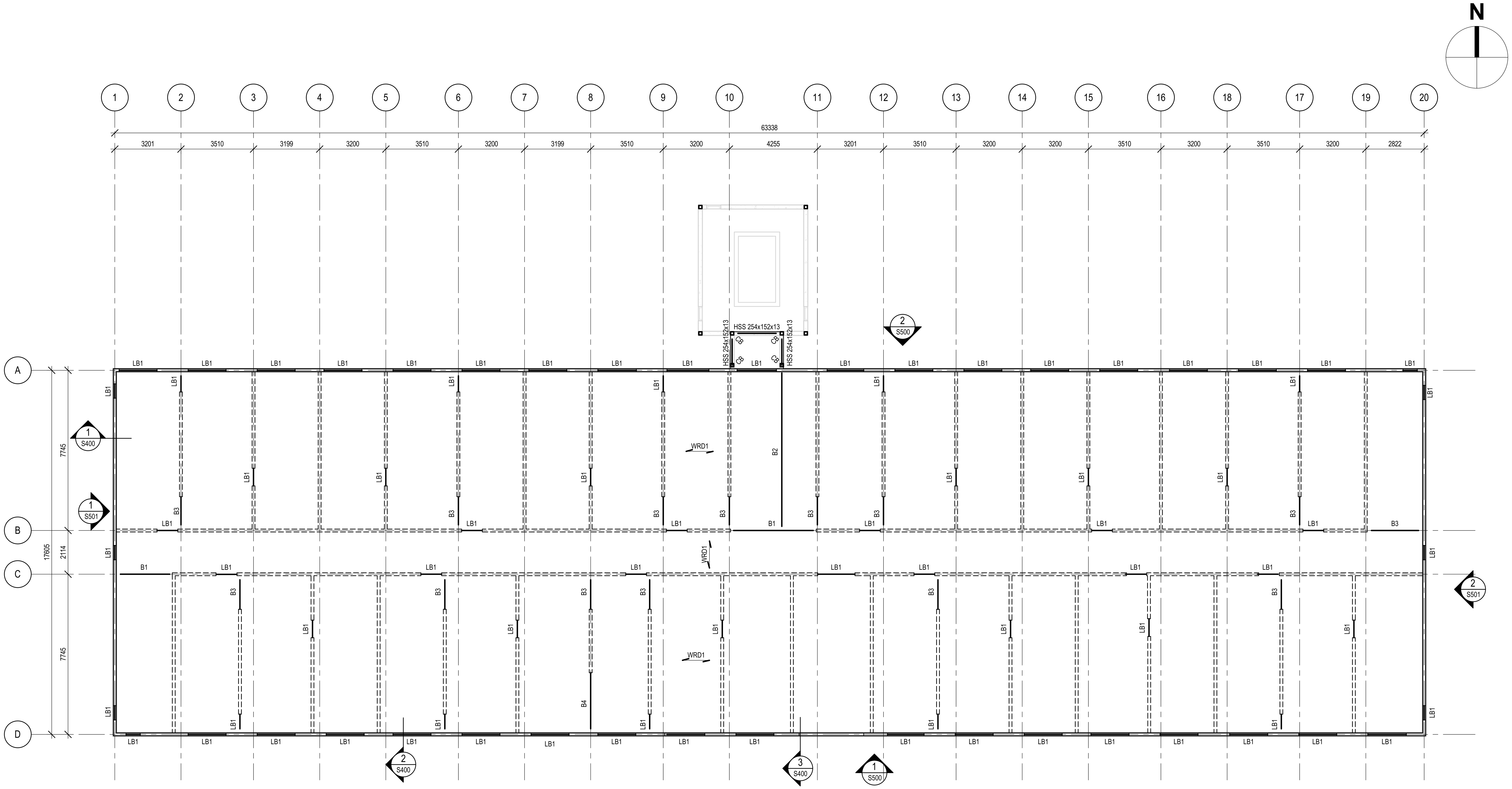
CHIMO TERRACE

TITLE:

LEVEL 06 FRAMING PLAN

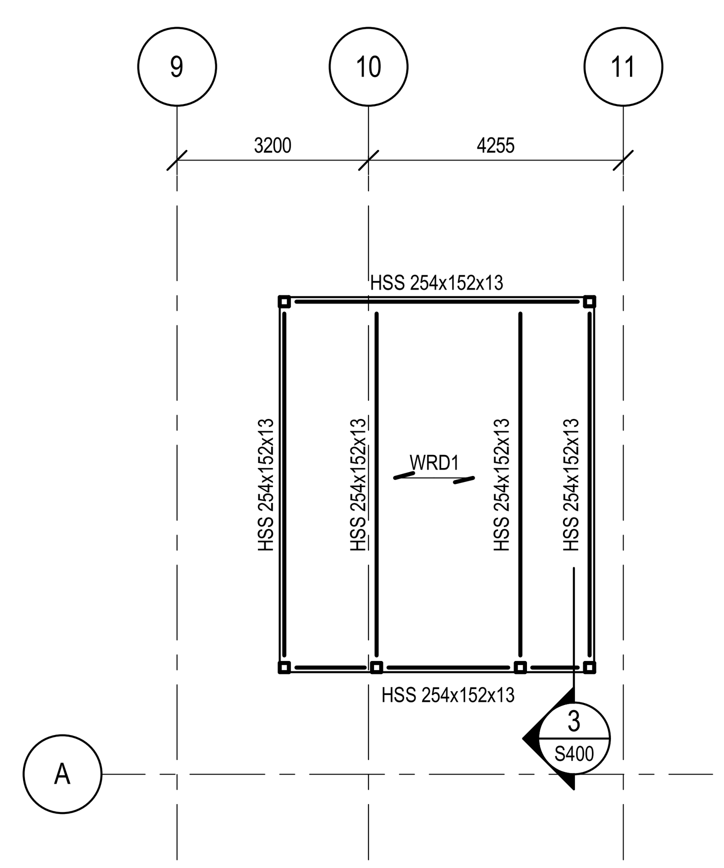
DRAWING NUMBER: S207

REV. 2



ROOF FRAMING PLAN

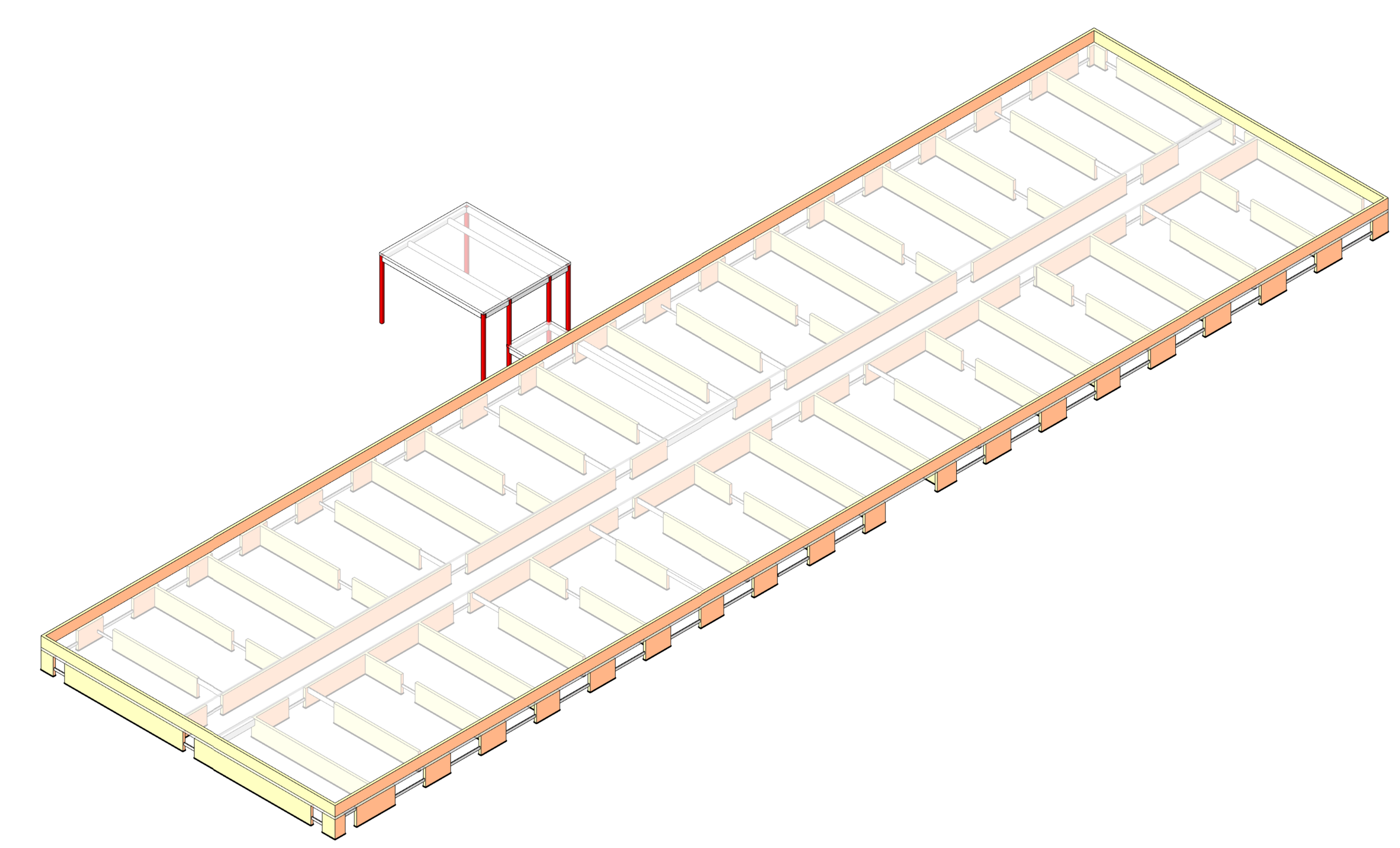
1 : 100



STAIR ROOF FRAMING PLAN

1 : 100

CONCEPT DESIGN ONLY



ROOF LEVEL - 3D VIEW

NTS

0 1 2 5 8m

SCALE 1:100

REVISIONS:

REV	DATE	DESCRIPTION	BY
2	2024-09-11	ISSUED FOR DRAFT REPORT	RW
1	2024-08-19	ISSUED FOR COSTING	RW

SEAL:

DISCLAIMER:

COPYRIGHT:

ORIGINAL SCALE: 1 : 100

DATE: 2024-09-11

APPROVED BY: RE

CHECKED BY: CJ

DRAWN BY: EM / HM

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25mm

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PROJECT NUMBER: CA0026659.6220

CLIENT:

BCNPHA
BC Non-Profit Housing Association

CLIENT REF. #:

PROJECT:

CHIMO TERRACE

TITLE:

ROOF FRAMING PLAN

DRAWING NUMBER: S208

REV. 2

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2024-09-10 2:53:40 PM

PILE CAP SCHEDULE

TYPE	PILE DIA	WIDTH	LENGTH	DEPTH	No	REMARKS
PC1	900	1200	1200	900	33	

STEEL COLUMN SCHEDULE

MARK	SIZE	BASE PLATE	ANCHORAGE	REMARKS
SC1	W1000x412			
SC3	HSS 152x152x13			-

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 HEADER BEAM SCHEDULE

MARK	DESCRIPTION	REMARKS
B1	265x432 SPRUCE PINE 20f-E GLULAM BEAM	-
B2	365x418 SPRUCE PINE 20f-E GLULAM BEAM	-
B3	38x286 SPF No. 1/2, 2-PLY	-
B4	130x228 SPRUCE PINE 20f-E GLULAM BEAM	-

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 ROOF PANEL (5 LAYERS), SPF E1	-

CONCEPT DESIGN ONLY

REVISIONS:

REV	DATE	DESCRIPTION	BY
2	2024-09-11	ISSUED FOR DRAFT REPORT	RW
1	2024-08-19	ISSUED FOR COSTING	RW

SEAL:

ORIGINAL SCALE: NTS
DATE: 2024-09-11
APPROVED BY: RW
CHECKED BY: KL
DRAWN BY: HM

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25mm

DISCIPLINE: STRUCTURAL

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PROJECT NUMBER: CA0026659.6220

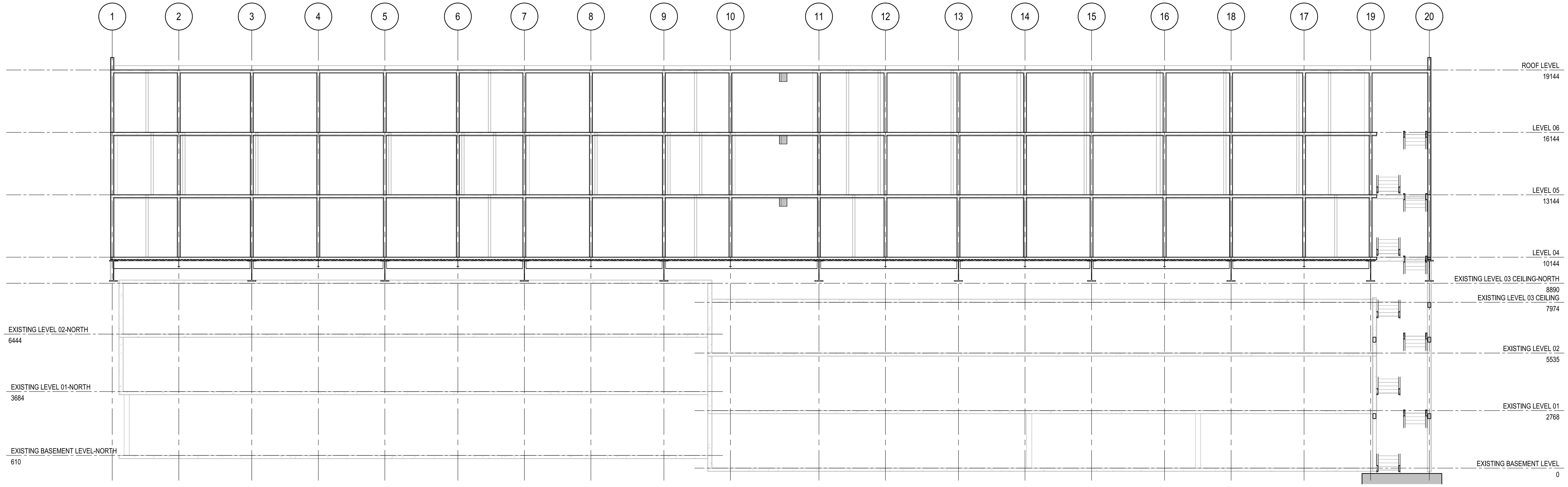
CLIENT:
BCNPHA
BC Non-Profit Housing Association

CLIENT REF. #:

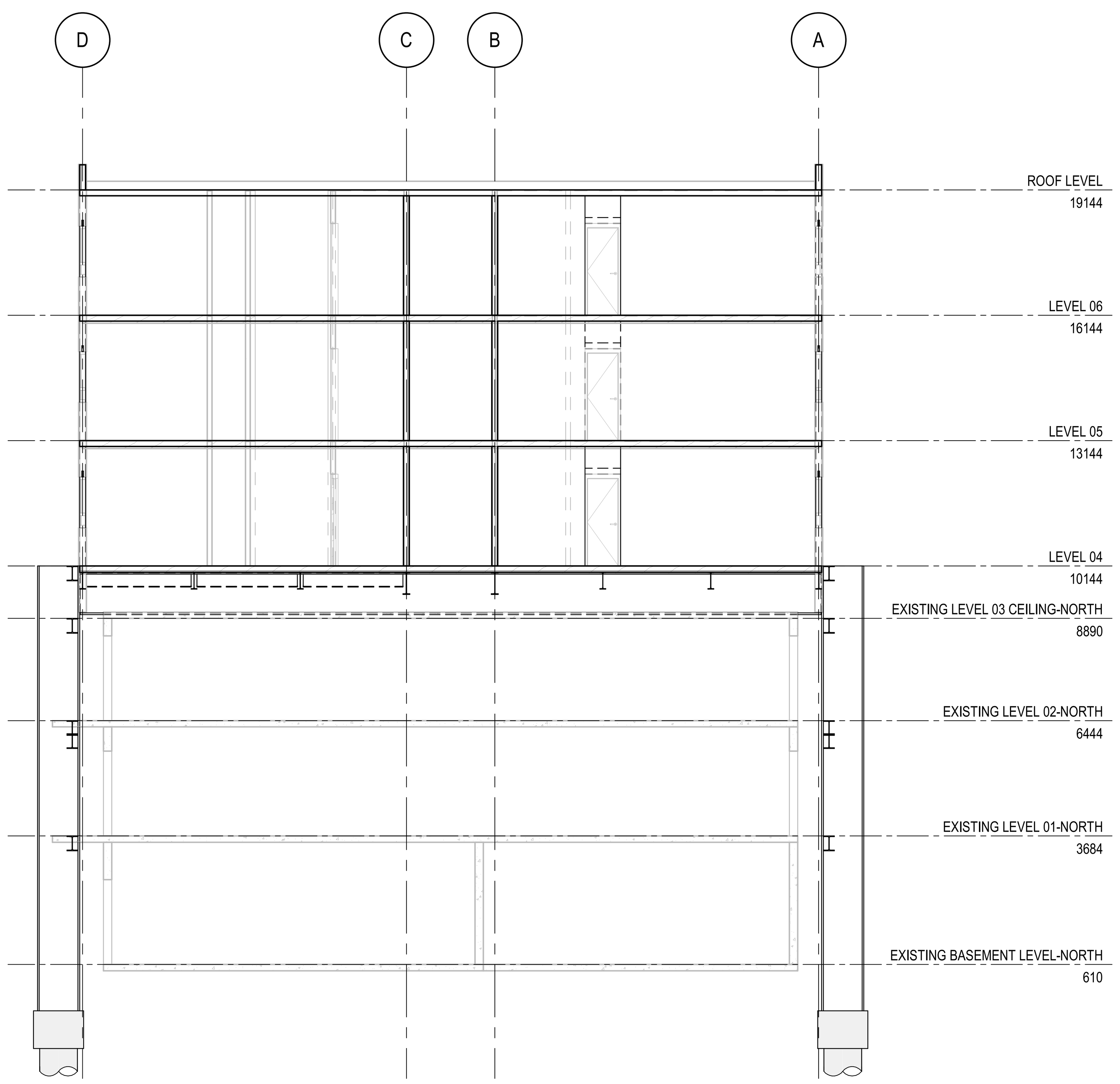
PROJECT: CHIMO TERRACE

TITLE: SCHEDULE

DRAWING NUMBER: S300
REV.: 2

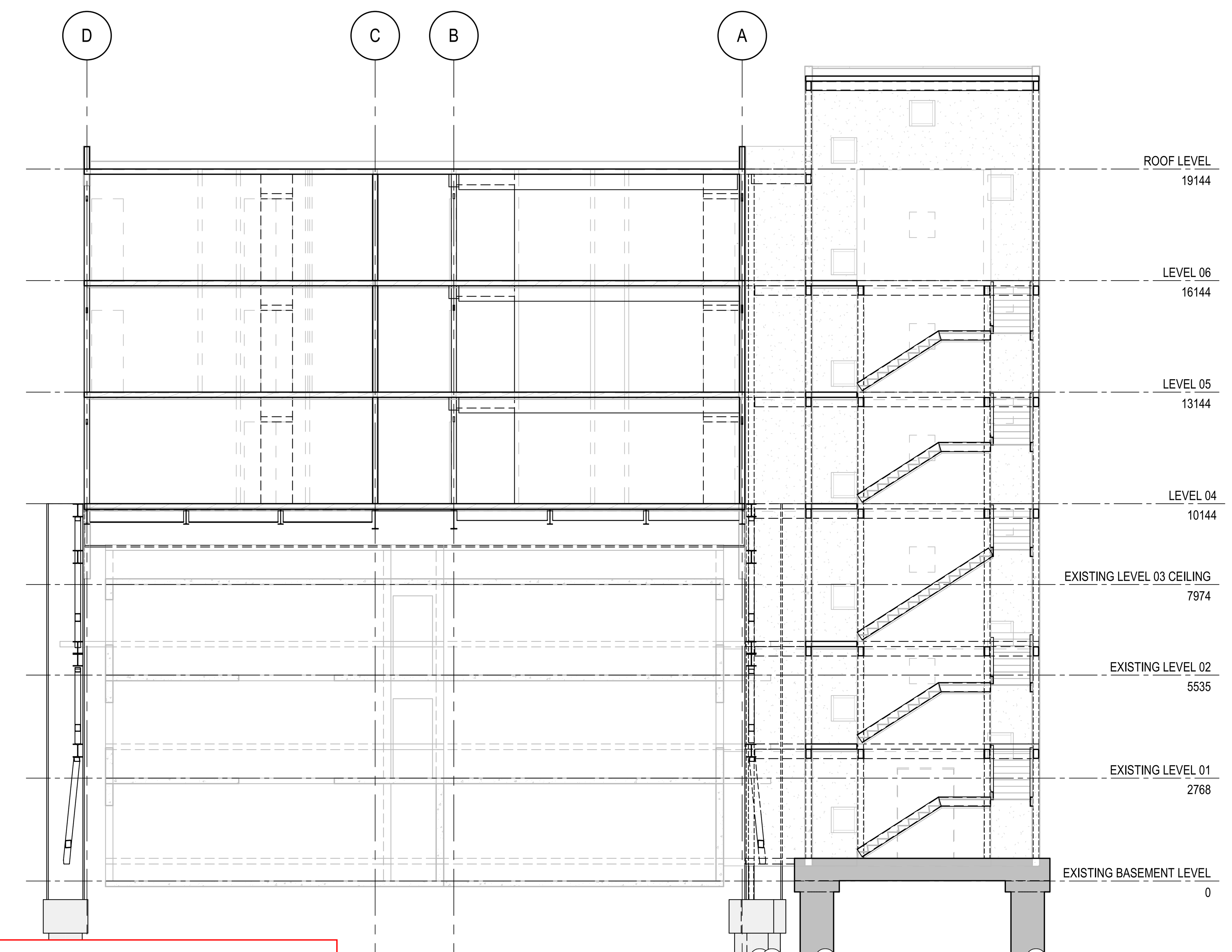


1
S400
1 : 100



2
S400
1 : 100

CONCEPT DESIGN ONLY



3
S400
1 : 100

0 1 2 5 8m
SCALE 1:100

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2024-09-10 2:53:51 PM

REVISIONS:

REV	DATE	DESCRIPTION	BY
2	2024-09-11	ISSUED FOR DRAFT REPORT	RW
1	2024-08-19	ISSUED FOR COSTING	RW

SEAL:

ORIGINAL SCALE: 1 : 100
DATE: 2024-09-11
APPROVED BY: Approver
CHECKED BY: Checker
DRAWN BY: Author

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25mm

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PROJECT NUMBER: CA0026659.6220

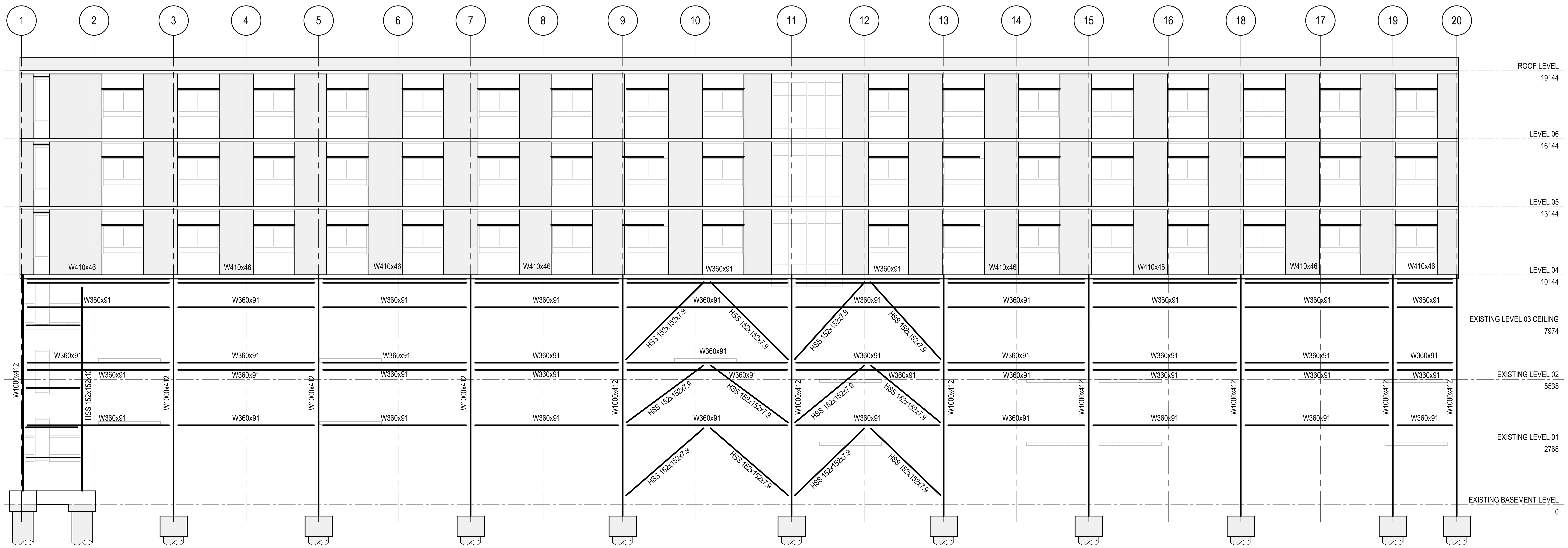
CLIENT:
BCNPHA
BC Non-Profit Housing Association

CLIENT REF. #:

PROJECT: CHIMO TERRACE

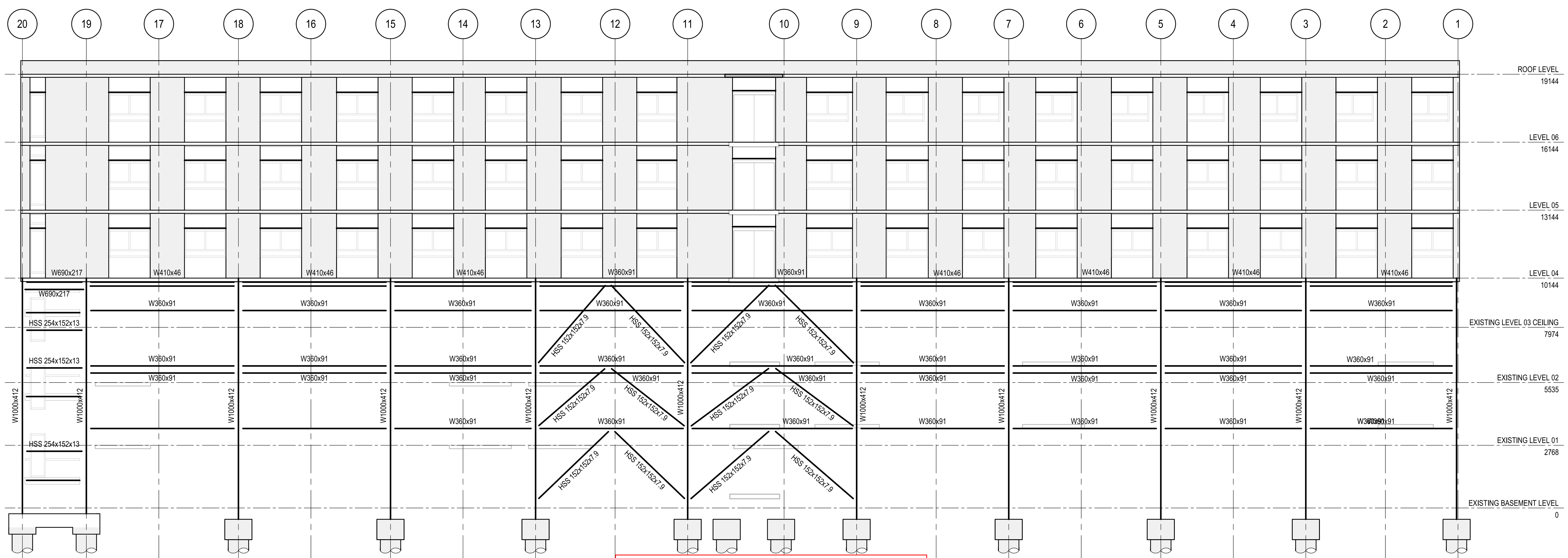
TITLE: SECTIONS

DRAWING NUMBER: S400
REV. 2



SOUTH ELEVATION LONG GL-D

1 : 100



CONCEPT DESIGN ONLY

A

0 1 2 5 8m

SCALE 1:100

REVISIONS:

REV	DATE	DESCRIPTION	BY
2	2024-09-11	ISSUED FOR DRAFT REPORT	RW
1	2024-08-19	ISSUED FOR COSTING	RW

SEAL:

ORIGINAL SCALE: 1 : 100

DATE: 2024-09-11

APPROVED BY: RW

CHECKED BY: KL

DRAWN BY: HM

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

25mm

DISCIPLINE: STRUCTURAL

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PROJECT NUMBER: CA0026659.6220

CLIENT:

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BC Non-Profit Housing Association

CLIENT REF. #:

PROJECT:

CHIMO TERRACE

TITLE:

ELEVATIONS

DRAWING NUMBER: S500

REV. 2

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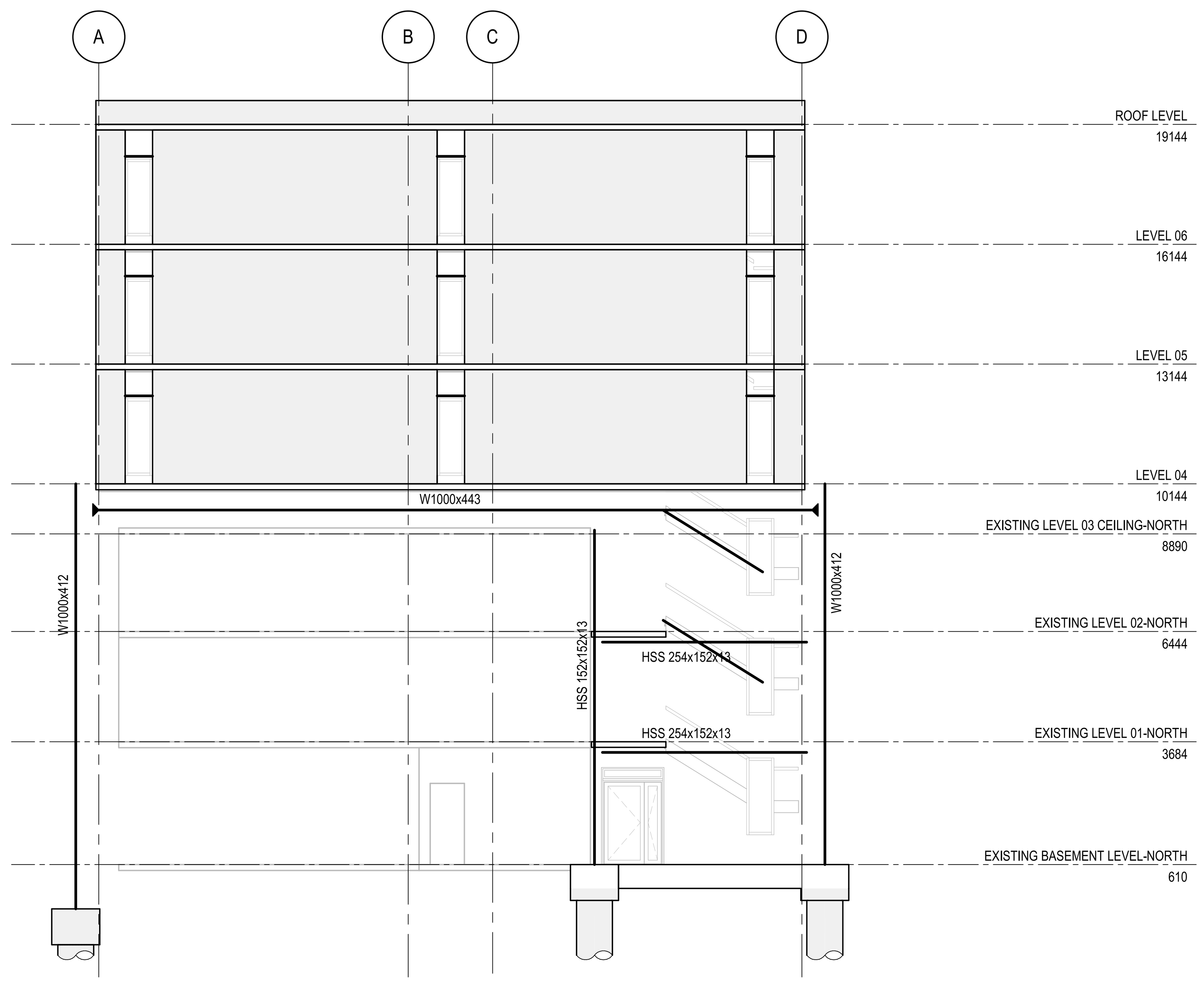
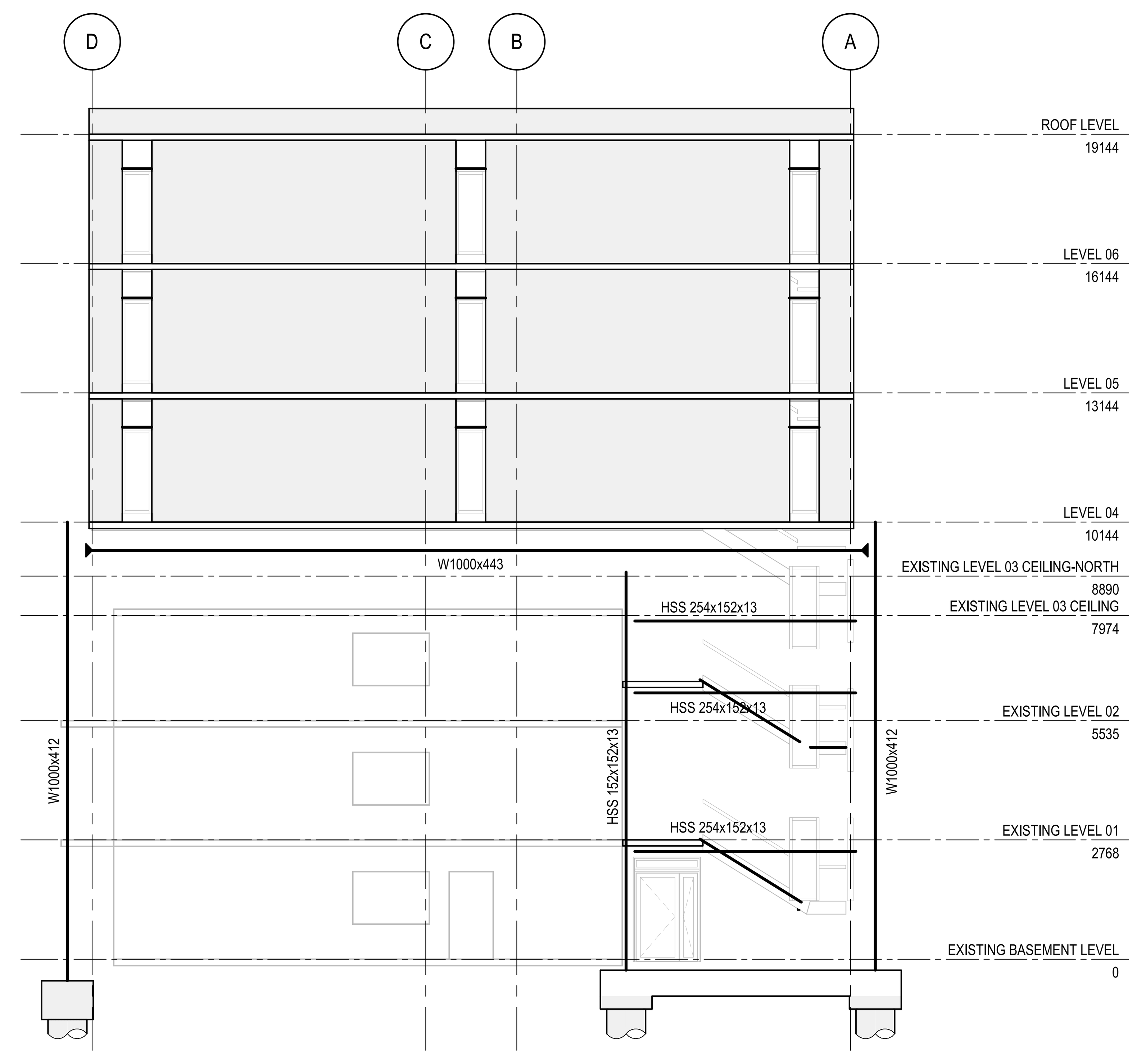
2024-09-10 2:53:53 PM



WEST ELEVATION LONG GL-1

1 : 100



EAST ELEVATION LONG GL-20

1 : 100

CONCEPT DESIGN ONLY

0 1 2 5 8m
SCALE 1:100

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2024-09-10 2:53:53 PM

REVISIONS:

REV	DATE	DESCRIPTION	BY
2	2024-09-11	ISSUED FOR DRAFT REPORT	RW
1	2024-08-19	ISSUED FOR COSTING	RW

SEAL:

ORIGINAL SCALE: 1 : 100
DATE: 2024-09-11
APPROVED BY: RW
CHECKED BY: KL
DRAWN BY: HM

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25mm

DISCIPLINE: STRUCTURAL

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PROJECT NUMBER: CA0026659.6220

CLIENT:
BCNPHA
BC Non-Profit Housing Association

CLIENT REF. #:

PROJECT: CHIMO TERRACE

TITLE: ELEVATIONS & SECTION

DRAWING NUMBER: S501
REV. 2