

ARCHITECTURAL & STRUCTURAL DRAWINGS OF
PROPOSED 03 STOREY BUILDING

R Hulhudhuffaaru school 3 Storey Building
12 classrooms

For Ministry of Education, Maldives

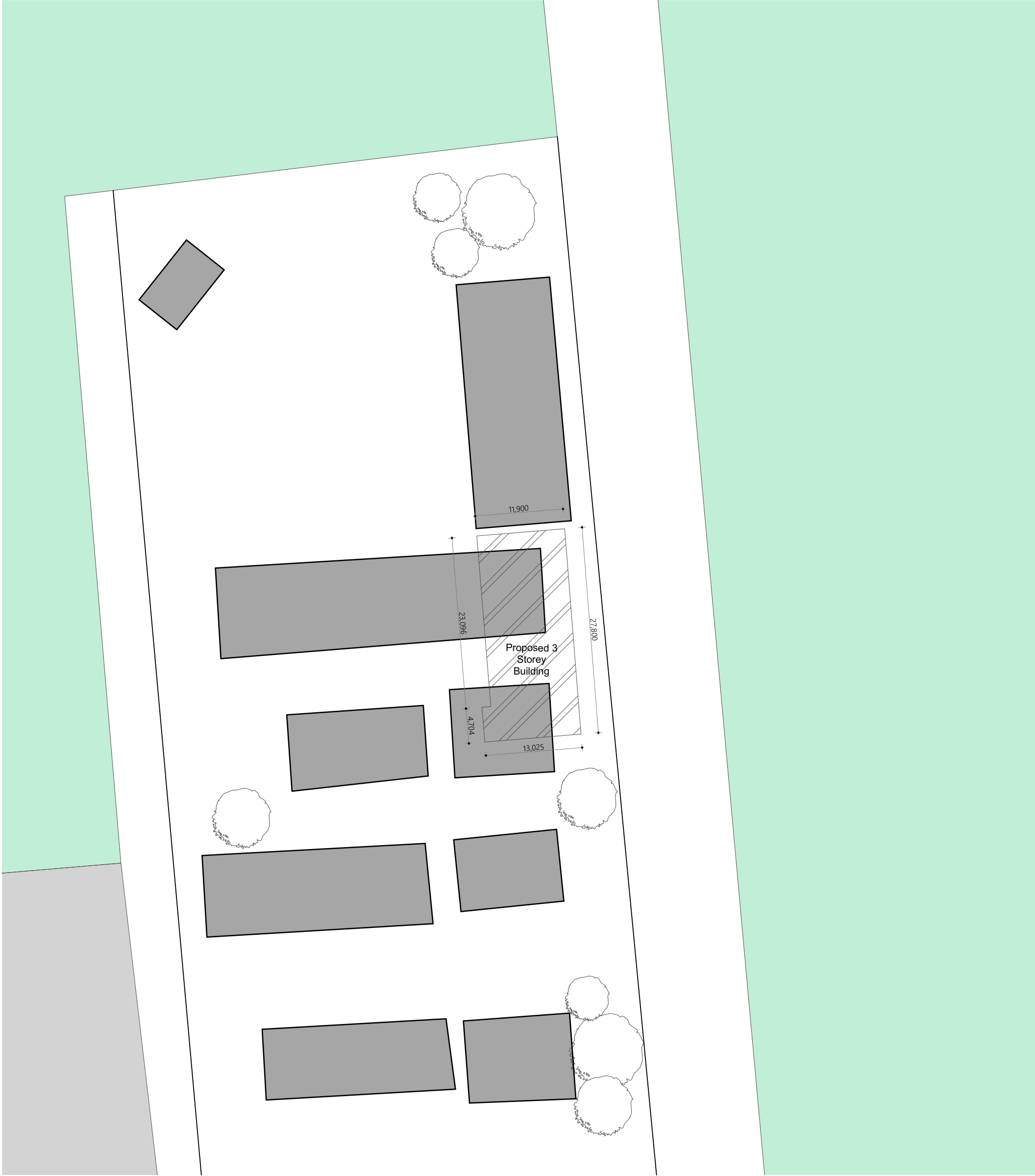


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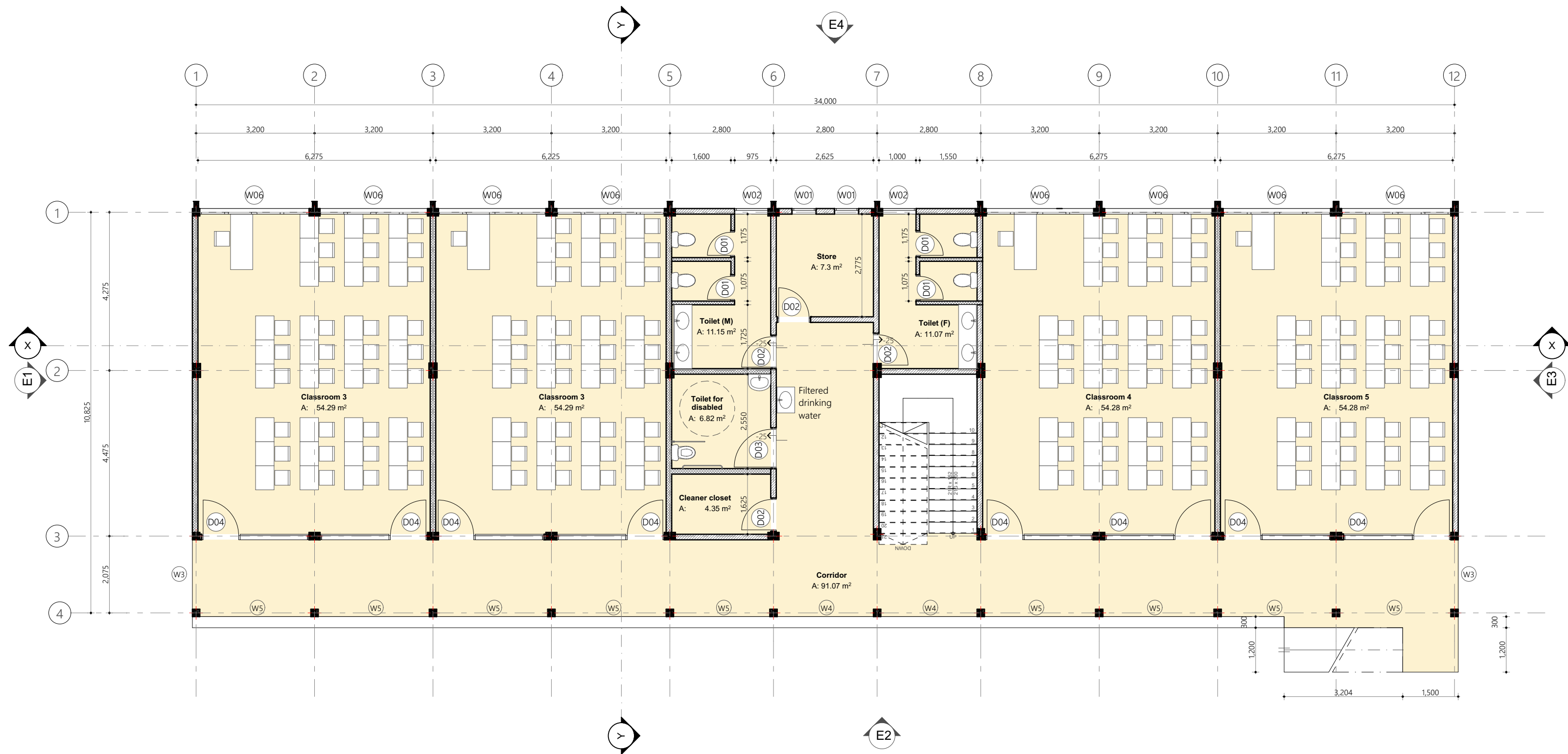


R HULHUDHUFFAARU SCHOOL
R HULHUDHUFFAARU

Location Plan



Site Plan (source: google map)
1:500



Ground Floor
1:100

Wall Legend	
2D Plan Preview	Description
	100mm thick reinforced concrete wall per engineers detail, waterproofed with waterproofing agent
	100mm thick solid masonry block exterior wall with 25mm plaster on exterior and 16mm plaster on interior finished with smoothed putty and semi gloss white paint
	100mm thick solid masonry block interior wall with 16mm plaster on both sides finished with smoothed putty and semi gloss white paint
	150mm thick interior masonry wall with 16mm plaster on both sides finished with semi gloss white paint
	75mm thick solid masonry block interior wall with 16mm plaster on both sides finished with smoothed putty and semi gloss white paint

Zone schedule							
Home Story	Zone Name	Area (sqm)	Floor Level	Floor Finishes	Ceiling Level	Ceiling Finishes	Wall Finishes
Ground Floor	Classroom 3	108.58	+350	600mm X 600mm Homogenous non-skid tiles on 50mm screed	+3350	Exposed slab soffit to be ground smooth in select paint finish	16mm plaster, applied with ground smooth finished with selected paint
Ground Floor	Classroom 4	54.28	+350	600mm X 600mm Homogenous non-skid tiles on 50mm screed	+3350	Exposed slab soffit to be ground smooth in select paint finish	16mm plaster, applied with ground smooth finished with selected paint
Ground Floor	Classroom 5	54.28	+350	600mm X 600mm Homogenous non-skid tiles on 50mm screed	+3350	Exposed slab soffit to be ground smooth in select paint finish	16mm plaster, applied with ground smooth finished with selected paint
Ground Floor	Cleaner closet	4.35	+350	600mm X 600mm Homogenous non-skid tiles on 50mm screed	+3350	Exposed slab soffit to be ground smooth in select paint finish	16mm plaster, applied with ground smooth finished with selected paint
Ground Floor	Corridor	91.07	+335	300mm X 300mm Ceramic non-skid tiles on 35mm screed	+3350	Exposed slab soffit to be ground smooth in select paint finish	16mm Plastering, ground smooth in selected paint finish
Ground Floor	Store	7.30	+350	600mm X 600mm Homogenous non-skid tiles on 50mm screed	+3350	Exposed slab soffit to be ground smooth in select paint finish	16mm plaster, applied with ground smooth finished with selected paint
Ground Floor	Toilet (F)	11.07	+325	300mm X 300mm Homogenous non-slip tiles over 50mm screeding	+2900	Cement board ceiling to be ground smooth in select paint finish	300mm X 300mm Homogenous wall tiles
Ground Floor	Toilet (M)	11.15	+325	300mm X 300mm Homogenous non-slip tiles over 50mm screeding	+2900	Cement board ceiling to be ground smooth in select paint finish	300mm X 300mm Homogenous wall tiles
Ground Floor	Toilet for disabled	6.82	+325	300mm X 300mm Homogenous non-slip tiles over 50mm screeding	+2900	Cement board ceiling to be ground smooth in select paint finish	300mm X 300mm Homogenous wall tiles

Note: All heights are taken from Natural Ground Level +00

PROPOSED 03 STOREY BUILDING AT
R Hulhudhuffaar
3 Storey Building 12
classrooms

Client
Ministry of Education,
Maldives

4/19/2021

Architect: Fathmath Ithudha Amir
Engineer: Ihsaan Waheed
Drawn By: Fathmath Ithudha Amir

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First Floor
1:100

Wall Legend	
2D Plan Preview	Description
	100mm thick reinforced concrete wall per engineers detail, waterproofed with waterproofing agent
	100mm thick solid masonry block exterior wall with 25mm plaster on exterior and 16mm plaster on interior finished with smoothed putty and semi gloss white paint
	100mm thick solid masonry block interior wall with 16mm plaster on both sides finished with smoothed putty and semi gloss white paint
	150mm thick interior masonry wall with 16mm plaster on both sides finished with semi gloss white paint
	75mm thick solid masonry block interior wall with 16mm plaster on both sides finished with smoothed putty and semi gloss white paint

Zone schedule							
Home Story	Zone Name	Area (sqm)	Floor Level	Floor Finishes	Ceiling Level	Ceiling Finishes	Wall Finishes
First Floor	Classroom 10	54.28	+3550	600mm X 600mm Homogenous non-skid tiles on 50mm screed	+6600	Exposed slab soffit to be ground smooth in select paint finish	16mm plaster, applied with ground smooth finished with selected paint
First Floor	Classroom 8	108.56	+350	600mm X 600mm Homogenous non-skid tiles on 50mm screed	+3350	Exposed slab soffit to be ground smooth in select paint finish	16mm plaster, applied with ground smooth finished with selected paint
First Floor	Classroom 9	54.28	+3550	600mm X 600mm Homogenous non-skid tiles on 50mm screed	+6600	Exposed slab soffit to be ground smooth in select paint finish	16mm plaster, applied with ground smooth finished with selected paint
First Floor	Cleaner closet	11.57	+3525	600mm X 600mm Homogenous non-skid tiles on 50mm screed	+6600	Exposed slab soffit to be ground smooth in select paint finish	16mm plaster, applied with ground smooth finished with selected paint
First Floor	Corridor	89.69	+3535	300mm X 300mm Ceramic non-skid tiles on 35mm screed	+6600	Exposed slab soffit to be ground smooth in select paint finish	16mm Plastering, ground smooth in selected paint finish
First Floor	Store	7.30	+3550	600mm X 600mm Homogenous non-skid tiles on 50mm screed	+6600	Exposed slab soffit to be ground smooth in select paint finish	16mm plaster, applied with ground smooth finished with selected paint
First Floor	Toilet (F)	11.07	+3525	300mm X 300mm Homogenous non-slip tiles over 50mm screeding	+6100	Cement board ceiling to be ground smooth in select paint finish	300mm X 300mm Homogenous wall tiles
First Floor	Toilet (M)	11.15	+3525	300mm X 300mm Homogenous non-slip tiles over 50mm screeding	+6100	Cement board ceiling to be ground smooth in select paint finish	300mm X 300mm Homogenous wall tiles

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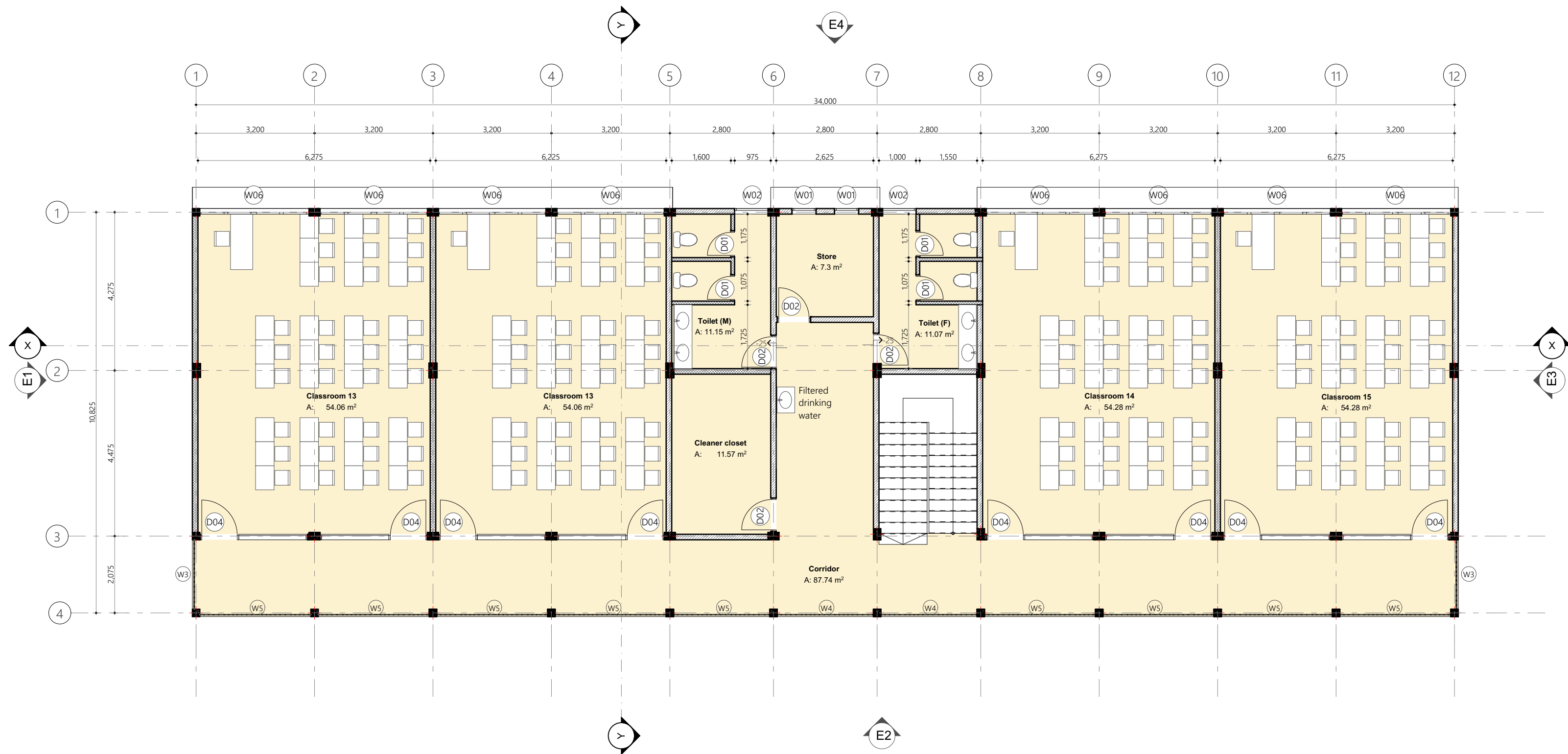
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Second Floor
1:100

Wall Legend	
2D Plan Preview	Description
	100mm thick reinforced concrete wall per engineers detail, waterproofed with waterproofing agent
	100mm thick solid masonry block exterior wall with 25mm plaster on exterior and 16mm plaster on interior finished with smoothed putty and semi gloss white paint
	100mm thick solid masonry block interior wall with 16mm plaster on both sides finished with smoothed putty and semi gloss white paint
	150mm thick interior masonry wall with 16mm plaster on both sides finished with semi gloss white paint
	75mm thick solid masonry block interior wall with 16mm plaster on both sides finished with smoothed putty and semi gloss white paint

Zone schedule							
Home Story	Zone Name	Area (sqm)	Floor Level	Floor Finishes	Ceiling Level	Ceiling Finishes	Wall Finishes
Second Floor	Classroom 13	108.12	+6700	600mm X 600mm Homogenous non-skid tiles on 50mm screed	+10006	Cement board ceiling to be ground smooth in select paint finish	16mm plaster, applied with ground smooth finished with selected paint
Second Floor	Classroom 14	54.28	+6700	600mm X 600mm Homogenous non-skid tiles on 50mm screed	+10006	Cement board ceiling to be ground smooth in select paint finish	16mm plaster, applied with ground smooth finished with selected paint
Second Floor	Classroom 15	54.28	+6700	600mm X 600mm Homogenous non-skid tiles on 50mm screed	+10006	Cement board ceiling to be ground smooth in select paint finish	16mm plaster, applied with ground smooth finished with selected paint
Second Floor	Cleaner closet	11.57	+6675	600mm X 600mm Homogenous non-skid tiles on 50mm screed	+10006	Cement board ceiling to be ground smooth in select paint finish	16mm plaster, applied with ground smooth finished with selected paint
Second Floor	Corridor	87.74	+6685	300mm X 300mm Ceramic non-skid tiles on 35mm screed	+9600	Cement board ceiling to be ground smooth in select paint finish	16mm Plastering, ground smooth in selected paint finish
Second Floor	Store	7.30	+6700	600mm X 600mm Homogenous non-skid tiles on 50mm screed	+10006	Cement board ceiling to be ground smooth in select paint finish	16mm plaster, applied with ground smooth finished with selected paint
Second Floor	Toilet (F)	11.07	+6675	300mm X 300mm Homogenous non-slip tiles over 50mm screeding	+10006	Cement board ceiling to be ground smooth in select paint finish	300mm X 300mm Homogenous wall tiles
Second Floor	Toilet (M)	11.15	+6675	300mm X 300mm Homogenous non-slip tiles over 50mm screeding	+10006	Cement board ceiling to be ground smooth in select paint finish	300mm X 300mm Homogenous wall tiles

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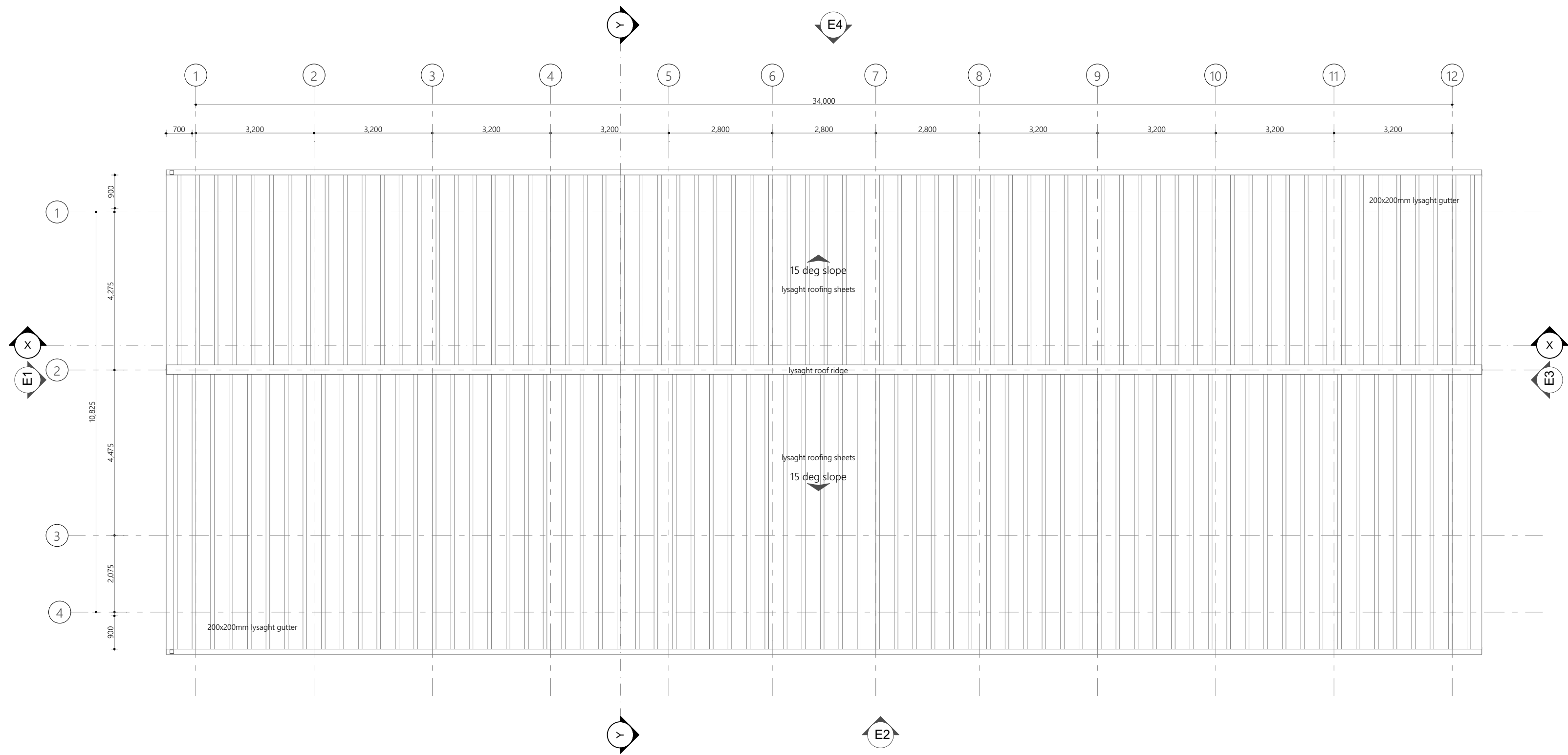
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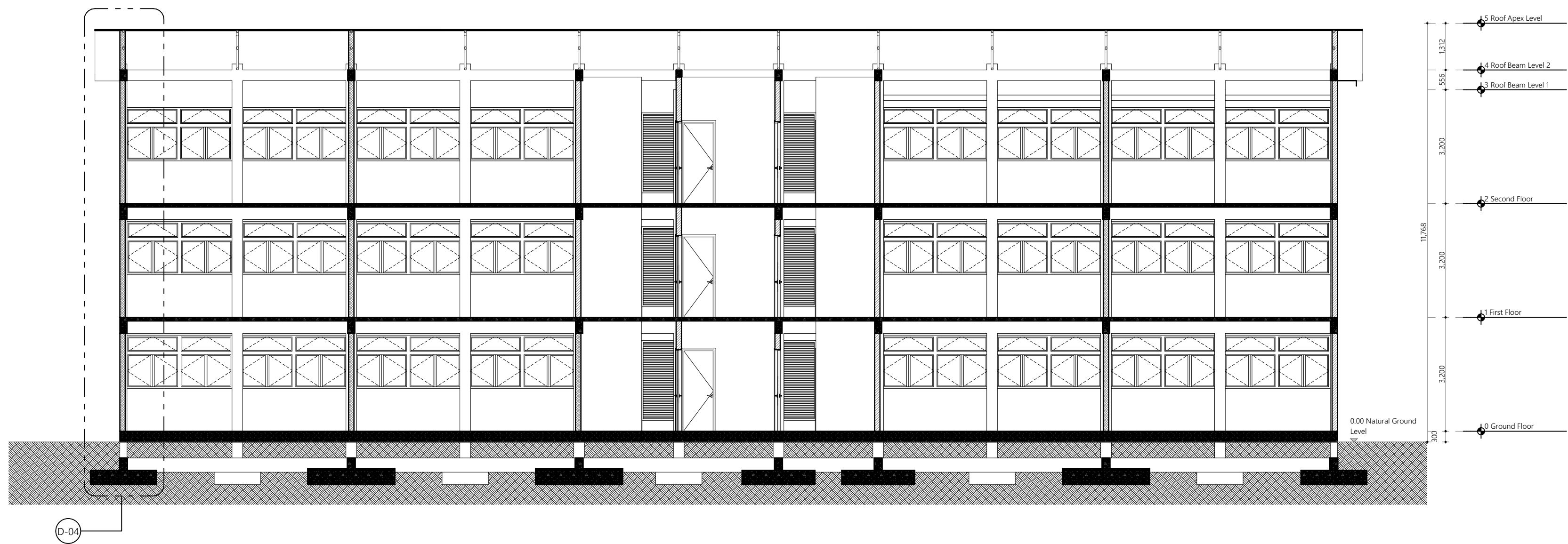
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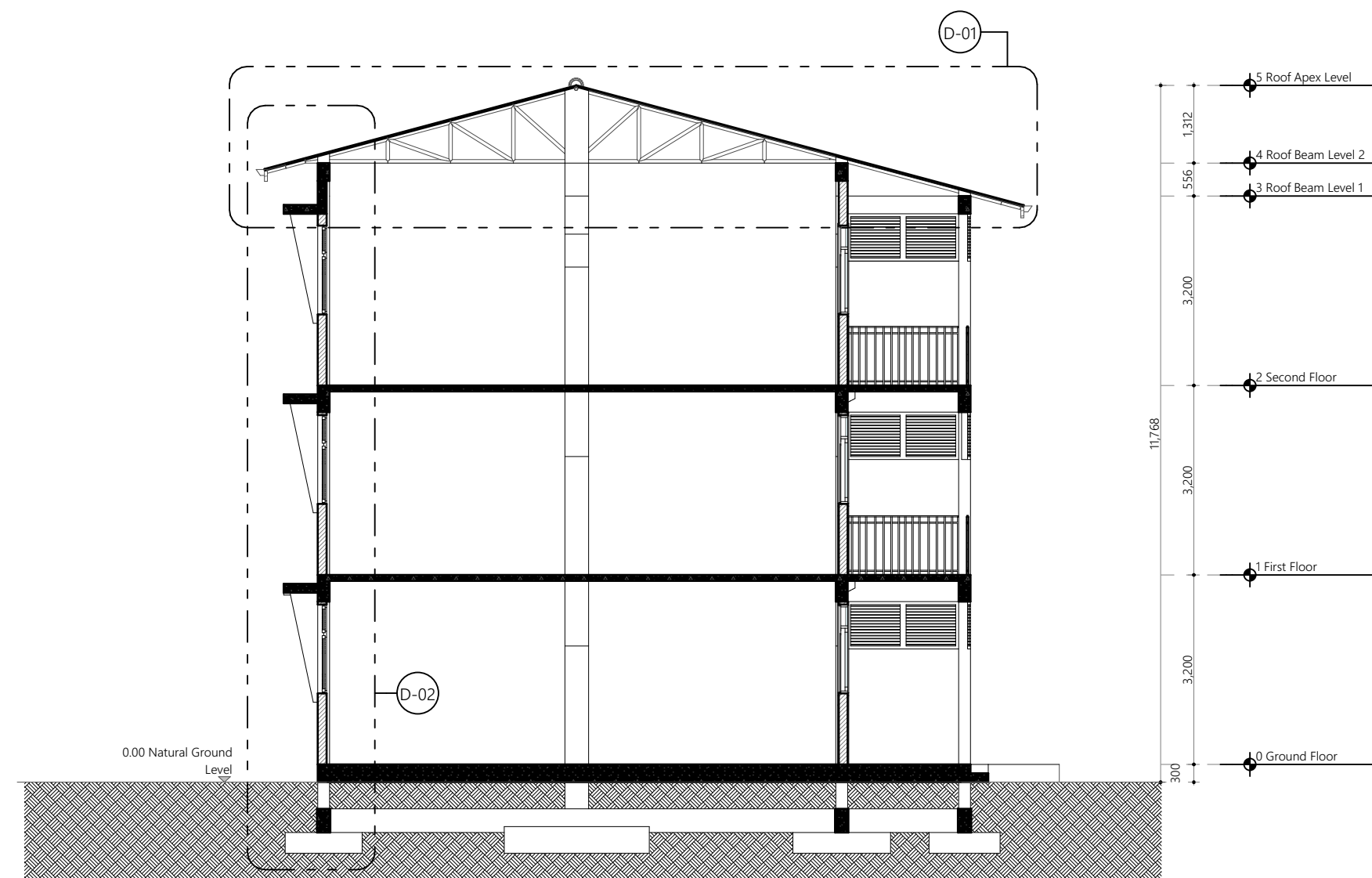
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Roof Plan
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Building Section X-X
1:100



Building Section Y-Y
1:100

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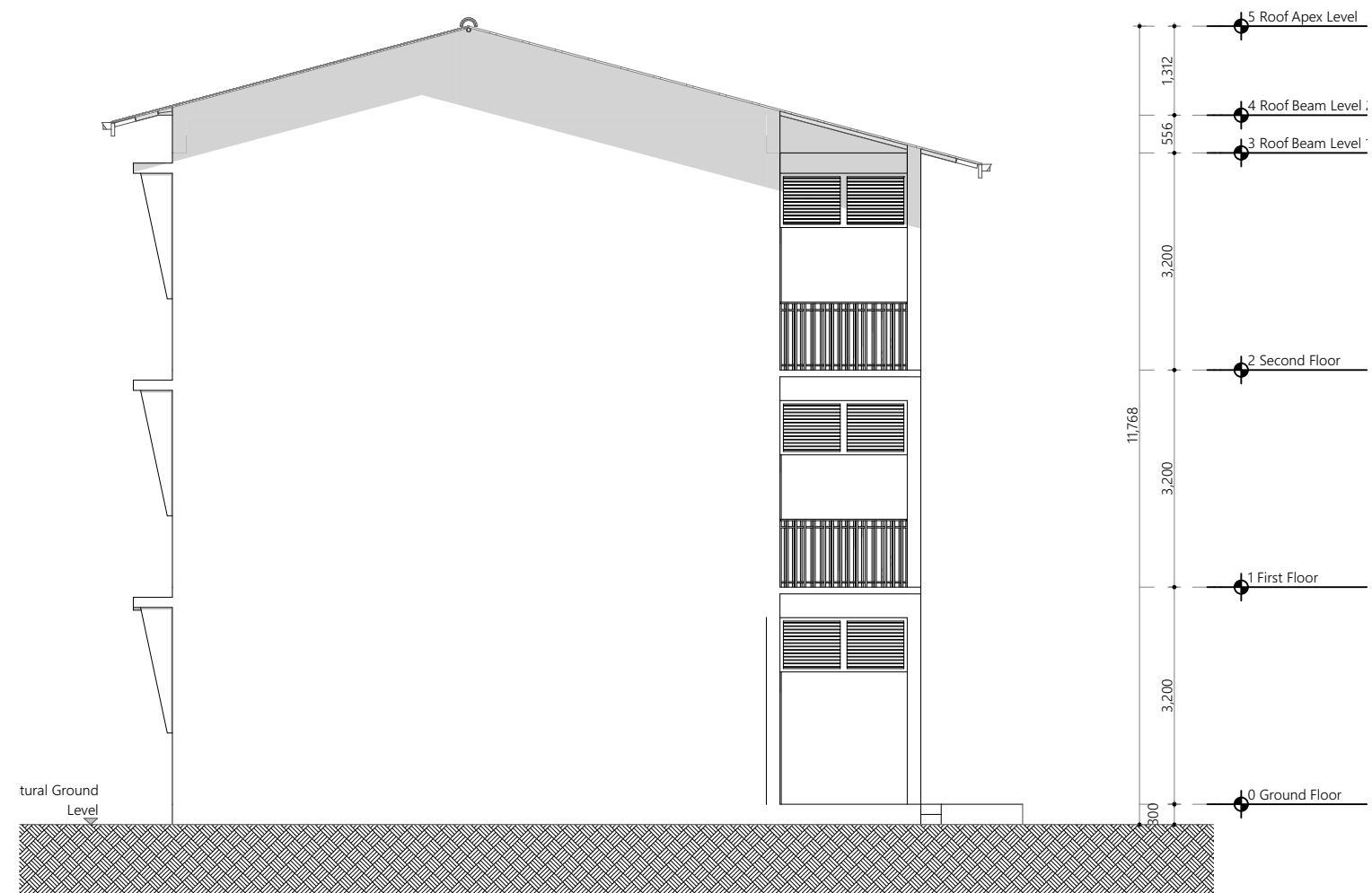
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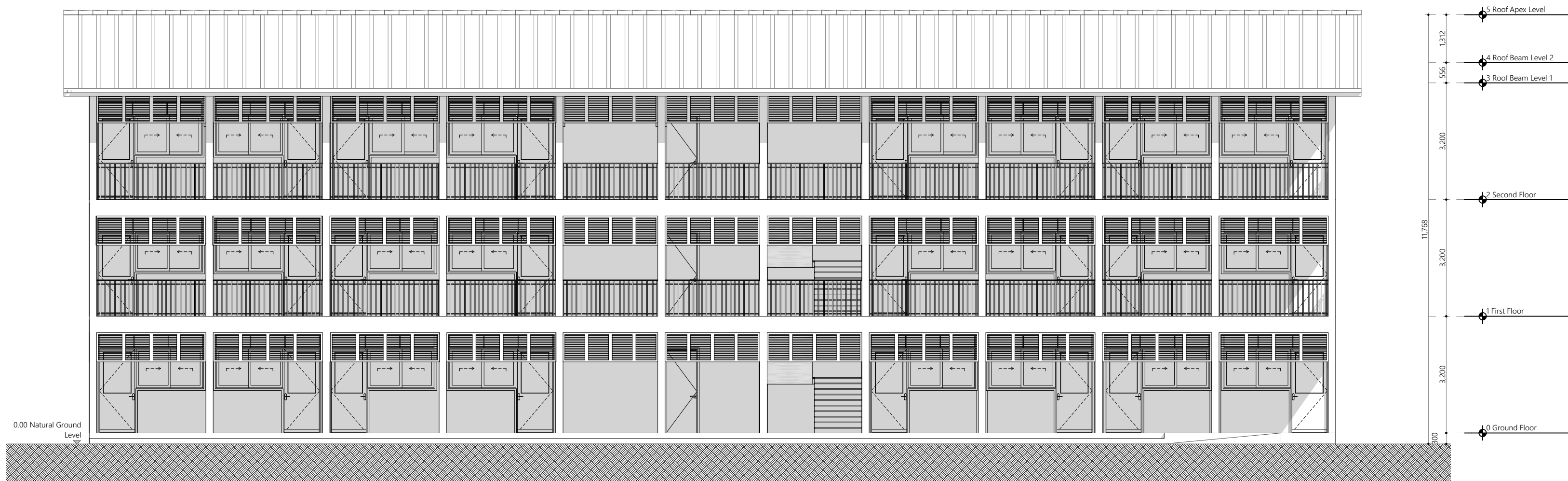
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Elevation E1
1:100



Elevation E2
1:100

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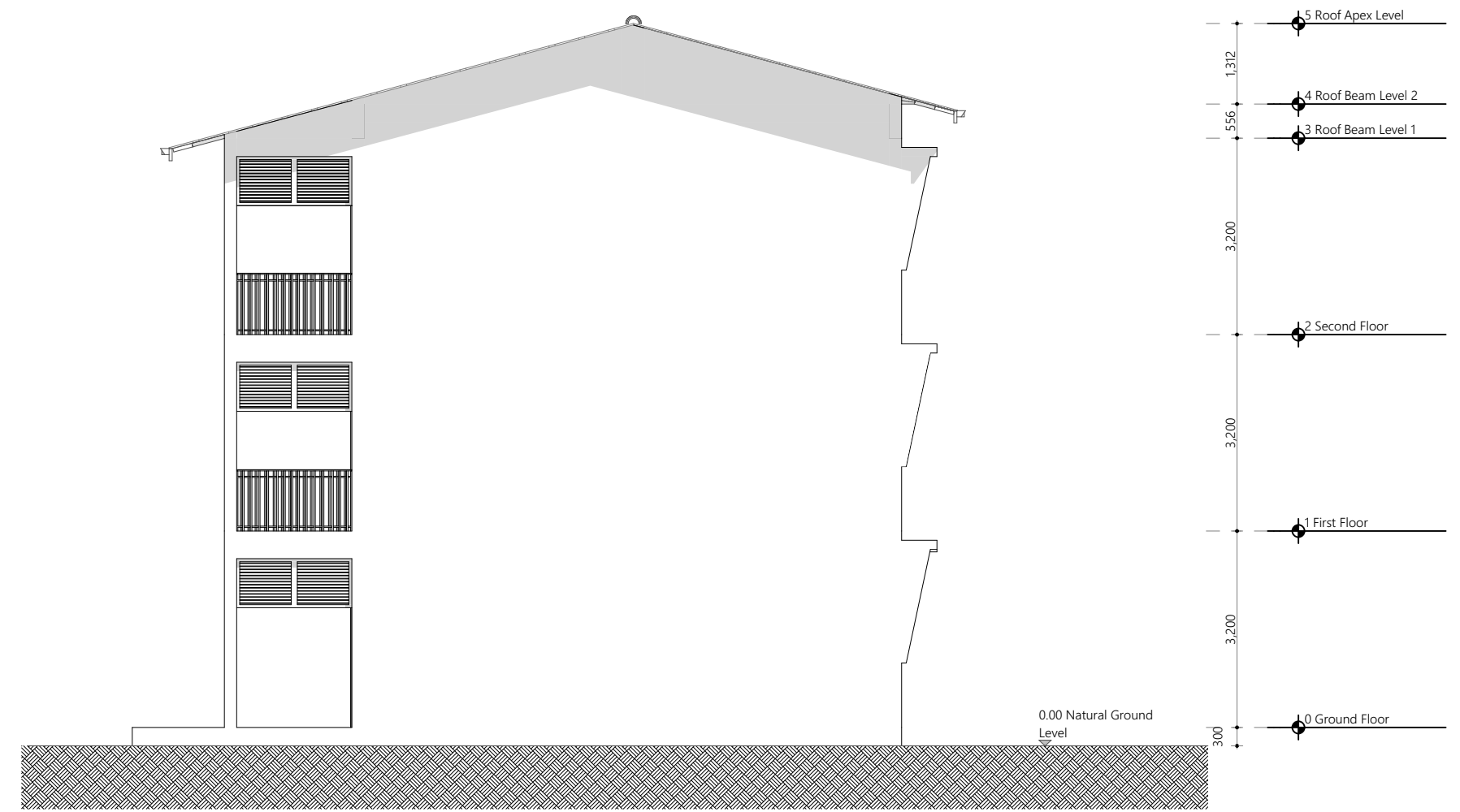
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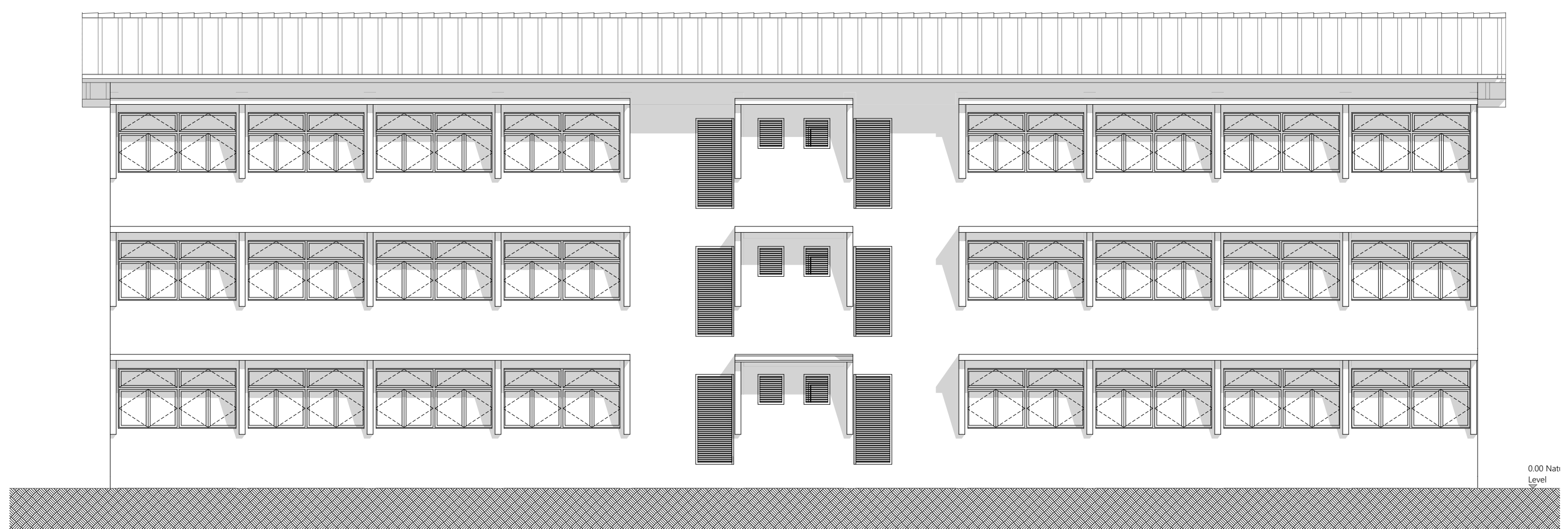
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Elevation E3
1:100



Elevation E4
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All Openings Schedule								
Element ID	D01	D02	D03	D04	W01	W02	W03	W04
Quantity	12	12	1	24	6	6	6	9
W x H Size	700×2,300	900×2,300	1,100×2,300	2,900×2,700	650×750	950×2,250	1,875×800	2,600×800
2D Symbol								
View from Side Opposite to Opening Side								
Frame Outside	50mm Thick powder coated (60 microns) Aluminum frame of selected colour	50mm Thick powder coated (60 microns) Aluminum frame of selected colour	50mm Thick powder coated (60 microns) Aluminum frame of selected colour	50mm Thick powder coated (60 microns) Aluminum frame of selected colour	50mm Thick powder coated (60 microns) Aluminum frame of selected colour	50mm Thick powder coated (60 microns) Aluminum frame of selected colour	50mm Thick powder coated (60 microns) Aluminum frame of selected colour	50mm Thick powder coated (60 microns) Aluminum frame of selected colour
Leaf Outside	50mm Thick powder coated (60 microns) Aluminum panel of selected colour	50mm Thick powder coated (60 microns) Aluminum panel of selected colour	50mm Thick powder coated (60 microns) Aluminum panel of selected colour	50mm Thick powder coated (60 microns) Aluminum panel of selected colour	---	---	---	---
Glass	(No Glazing)	(No Glazing)	(No Glazing)	Clear Glass	---	---	---	---
Sash Outside	---	---	---	---	50mm Thick powder coated (60 microns) Aluminum louvers of selected colour	50mm Thick powder coated (60 microns) Aluminum louvers of selected colour	50mm Thick powder coated (60 microns) Aluminum louvers of selected colour	50mm Thick powder coated (60 microns) Aluminum louvers of selected colour

All Openings Schedule		
Element ID	W05	W06
Quantity	24	24
W x H Size	3,000×800	3,000×1,500
2D Symbol		
View from Side Opposite to Opening Side		
Frame Outside	50mm Thick powder coated (60 microns) Aluminum frame of selected colour	50mm Thick powder coated (60 microns) Aluminum frame of selected colour
Leaf Outside	---	---
Glass	---	---
Sash Outside	50mm Thick powder coated (60 microns) Aluminum louvers of selected colour	50mm Thick powder coated (60 microns) Aluminum panel of selected colour

Ventilation Schedule						
Home Story	Zone Name	Area (sqm)	Opening	Required Opening	Designed Opening	Opening %
Ground Floor	Classroom 1	54.28	D04 X 2, W06 X 2	5.428	15.68	28.89
	Cleaner closet	4.35	Mechanical			
	Corridor	104.35	Open			
	Classroom 2	54.28	D04 X 2, W06 X 2	5.428	15.68	28.89
	Classroom 3	54.28	D04 X 2, W06 X 2	5.428	15.68	28.89
	Classroom 4	54.28	D04 X 4, W06 X 8	5.428	15.68	28.89
	Classroom 5	54.28	D04 X 4, W06 X 8	5.428	15.68	28.89
	Store	7.3	Mechanical			
	Toilet (F)	11.07	W02	1.107	1.84	16.62
	Toilet (M)	11.15	W02	1.115	1.84	16.50
	Toilet for disabled	6.82	Mechanical			
	Classroom 5	54.28	D04 X 2, W06 X 2	5.428	15.68	28.89
	Classroom 7	54.28	D04 X 2, W06 X 2	5.428	15.68	28.89
	Classroom 7	54.28	D04 X 2, W06 X 2	5.428	15.68	28.89
First Floor	Cleaner closet	11.57	Mechanical			
	Classroom 9	54.11	D04 X 2, W06 X 2	5.411	15.68	28.98
	Corridor	102.97	Open			
	Classroom 10	53.84	D04 X 2, W06 X 2	5.384	15.68	29.12
	Store	7.3	Mechanical			
	Toilet (F)	11.07	W02	1.107	1.84	16.62
	Toilet (M)	11.15	W02	1.115	1.84	16.50
	Classroom 11	54.28	D04 X 2, W06 X 2	5.428	15.68	28.89
	Classroom 12	54.11	D04 X 2, W06 X 2	5.411	15.68	28.98
	Classroom 13	53.84	D04 X 2, W06 X 2	5.384	15.68	29.12
	Classroom 14	54.28	D04 X 2, W06 X 2	5.428	15.68	28.89
	Classroom 15	54.28	D04 X 2, W06 X 2	5.428	15.68	28.89
	Cleaner closet	11.57	Mechanical			
	Corridor	102.97	Open			
Second Floor	Store	7.3	Mechanical			
	Toilet (F)	11.07	W02	1.107	1.84	16.62
	Toilet (M)	11.15	W02	1.115	1.84	16.50

Ventilation Schedule
1:47.57

Door and Window Notes

Dimensions shown on DWG indicate effective openings of frame
All measurements to be verified by manufacturer

All aluminium Doors / Windows

Aluminium frame profiles shall be 35-50mm x 100mm (minimum 1.6mm thick)

Aluminium panels should be a minimum 6mm thick single sheet within an aluminium profile of 35-50mm x 100mm (minimum 1.6mm thick)

All Timber Doors / Windows

Timber Door frame shall be 50mm x 100mm hardwood.

All door panel thicknesses are 40mm thick solid core.

All frame edges shall be trimmed 3mm

All wooden components should be wood stained finish

All glazing should be of 6mm unless specified

External units must comply the following weather conditions:-
Wind pressure: 200 kg/sqm
Water tightness: 25 kg/sqm

All external frames / wall joints must be sealed with silicon sealant and the wedges trimmed with 12 X 12mm hardwood beading fixed to frames by brass nails

All hardware should be provided for the performance of all functions of the units

Hinges shall conform to

- Door size more than 700X900mm
WD: 125mm X 2 sets
SD: 150mm X 3 sets
- Door size less than 700 X 1900mm
WD: 100mm X 2 sets
SD: 125mm X 2 sets

Locks shall be cylindrical with master key sets

Door knobs shall be 1000mm above FFL

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1. General notes

1.1.Do not scale the drawingsAll dimensions shall be read from the drawing or computed.Elevations are in millimeters distances and reinforcement bar sizes are in millimeters

1.2. In the interpretation of these drawings, indicated dimensions shall govern and distances or sizes shall not be scaled for construction purposes

1.3. The contractor shall coordinate with the arse, ee and other utility and equipment plans for the exact size number and locations of all sleeves or openings through floor slabs, beams and walls. Any discrepancies or conflict in the setting out lines levels, details, locations,sizes, reinforcement etc. Of the structural member shall be brought to the attention of the engineer prior to commencement of work.

1.4. All reinforced concrete work shall be done in accordance with the british structural code bs 8110 or ec-en2 building code

1.5. All structural steel work shall be done in accordance with the british structural code bs 5950 parts 1to 9 and ec-en3 in so far as they do not conflict with the local building code requirements

1.6. All slabs, beams and other structural elements which are not indicated, detailed, designated or inadvertently omitted but are necessary to be coordinated with architectural and other allied engineering plans as well as to complete the structural works in accordance with the intent of the plans and specifications shall be brought up during pre-bids/meetings/negotiations.It is understood that the contractor has provided and included all these items in his bid.

1.7. The contractor shall produce shop drawings and schedules as required for completion of the works and record drawings of the as-built and builder works for the consultant's approval.

1.8. Contractor shall do full coordination between structuralarchitectural and mep drawings in wet areas to allow for drainage pipes

1.9. All discrepancies shall be brought to the attention of the consultant engineer proceeding with the work on site

1.10. All materials to be used in conjunctions shall comply with the requirements of the specified codes, standards and ordinance of relevant building authorities unless noted otherwise in the project specification and /or drawings.

1.11. All dimensions and levels shown on the drawings shall be verified by the contractor . Any discrepancies shall be brought to consultants attention prior to construction

1.12. The contractor shall ensure that during constructionmo part of the structure is overstressed by excessive construction loads until their completion. Temporary bracing and propping to be provided were required

1.13. Once the excavation is done to a specified depththe bearing capacity of the soil shall be confirmed by relevant test, if the value is less than the design bearing capacity the engineer is to be informed immediately

1.14. The contractor shall submit a method statement for all elements of work and shall not proceed until consultant's written approval is given The method statement shall provide the contractor's preferable options where such options are available.

1.15. The contractor shall comply with all requirements of the local regulations and requirements of all concerned authorities

1.16. Quality of concrete finish for all nonplastered columns and beams is to be in accordance with fair faced concrete as reflected on the architectural drawings and specifications.

1.17. Any structural requirements specified by relevant authorities, which are not covered in notes and specifications are assumed to be duly considered by the contractor.

1.18. All typical details and notes shown on drawings shall apply unless noted otherwise. Typical detail may not necessary be indicated on the plans but shall still apply as shown or described in the details where particular details are noted on the drawings the specified details shall be used.

1.19. The design life of the structure of this project shall maintain a minimum of 50 years life period The primary structural components are to be designed and detailed to satisfy this requirement. Concrete mix supplier shall submit a life cycle analysis which reflect a 50 years design life without maintenanceinspection and repair requirement during this period.

2. Concrete

2.1. All concrete works shall conform to the bs8110 or ec-en, a grade of c25/30 indicates that concrete shall have a fcu compressive strength of 30n/mm2 established from test cubes at 28 days equivalent to a compressive strength of 25n/mm2 established from cylinder tests at 28 days.
concrete mix design shall comply with bs8500-1:2006 as follows:

Miz Number	1	2	3	4
Grade	C30/37	C25/30	C25/30	C16/20
Min cement content (kg/m³)	380	340	340	300
Cement Type	SRC	SRC / OPC	OPC	SRC/OPC
Max free W/C ratio	0.4	0.45	0.45	0.55
Slump	75 ± 25	75 ± 25	75 ± 25	100 ± 25
Aggregate	20	20	20	20

mix 1 - used in reinforced concrete works for structures at sea/exposed to sea, water retaining structures and tank structures.

mix 2 - used in reinforced concrete works for ground level and below (sub-structutre) or any reinforced concrete works in contact with soil or water.

mix 3 - used in reinforced concrete works above ground flr lvl (superstructure) for horizontal members (beams/slabs) and vertical members (columns/walls).

mix 4 - used for plain concrete blinding and mass fill.

2.2. Contractor shall implement a trial mix in accordance with the project specifications & authority requirements. Trial mix results shall be submitted for engineer's review & approval prior to commencing concreting.

2.3. Contractor shall submit the details of additives, plasticizers, micro silica, curing compounds, waterproofing agents, etc. Application should follow strictly the manufacturer recommendation. It is contractors responsibility to ensure that all constituents of concrete are compatible to each other.

2.4. Maximum percentage (by weight) of salt contents permissible in aggregates used for concrete, hollow blocks & hourdi blocks, etc, shall be as follows:
a) acid soluble chlorides in aggregate - (fine 0.03%, coarse 0.02%)
b) acid soluble sulphate in aggregate - (fine 0.3%, coarse 0.2%)

2.5. Concrete shall be cured by an approved means in accordance with the specifications.

2.6. Aggregates shall be from approved source and in accordance with the specifications.

2.7. Openings, sleeves:
a) no holes, sleeves or penetrations be placed vertically or horizontally through beams unless approved by the engineer.
b) no holes to be made in slabs unless approved by the engineer.

2.8. Construction joints:
a) the contractor shall submit to the engineer for approval a plan marked up showing the location of all construction joints
b) horizontal construction joints shall not be made in beams, unless approved by the consultant or engineers.
c) vertical construction joints may be located at midspan of slabs or beams after reviewed and approved by the engineers.
d) contractor shall submit shear friction and the additional required reinforcement calculation of construction joint
at any location) for engineers review and approval.

3. Reinforcement

3.1. The reinforcement used in the reinforced concrete shall be round, deformed type 2 bars marked as (t) to indicate high yield strength of 460n/mm2 to bs4449 or type 500b to ec-en. The carbon equivalent of rebars should not exceed 0.51 for grade 460.

3.2. Reinforcement details shown are indicative. The contractor shall prepare detailed shop drawings & full bar schedules in accordance with the design drawings and shall be cut and bent in accordance with bs 8666 and aci 315-09 for the engineer's approval at least four weeks prior to commencement of reinforced concrete work and after coordinating with all concerned parties.

3.3. Lap lengths and anchorage lengths of reinforcement shall be as per bs 8110 and ec en. Additional lapping if required to be provided with engineer's approval. The minimum lap length of reinforcement shall be the maximum of (45 bar dia in general and 50 dia for tension) or the values of the table a.

Table a : schedule of lap splices

Bar dia	lap splices length (mm)
10	500
12	600
16	800
20	1000
25	1250

3.4. Spacer bars in beams shall be a minimum t25 or the size of bar if greater at 1000mm c/c; chairs in slabs shall be a minimum t12@1000mm c/c; and minimum ties in walls shall be t8@1000mm c/c.

3.5. Clear cover to reinforcement including links, stirrups, and ties shall be as follows:

- A) structure in contact with ground
- Footings = 60mm
- Wall and column = 50mm
- Ground beam = 50mm
- Slab at ground level = 50mm
- B) super structure
- Columns = 40mm
- Beams = 35mm
- Slabs = 30mm
- Walls = 40mm
- All concrete elements in contact with water/splash zone = 50mm

3.6. Reinforcement bars to be cut, bent or adjusted to clear all openings and interfering structures to suit at site to the approval of the consultant or engineer.

3.7. For holes in slabs up to 300x300 sq., reinforcement is to be cut and replacement bars fixed adjacent to the hole extending 50x bar diameter beyond the hole.

4. Fire resistance

4.1. All structural concrete members between units on boundaries are designed to maintain fire resistance of 2 hours.

PROPOSED 03 STOREY BUILDING AT
Hulhudhuffaar
3 Storey Building
12 classrooms

Client:
Ministry of Education,
Maldives

4/19/2021

Architect: Fathmath Ihudha Amir
Engineer: Ihsaan Waheed
Drawn By: Fathmath Ihudha Amir



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5. Cracking

5.1. The cracking of the structural concrete in general is restricted to 0.30mm.

6. Earthwork & foundations

6.1. Foundation detail design is based on the assumed safe allowable bearing capacity has been taken as 150kpa. The actual requirement for the foundation design is to be verified based on final geotechnical report for the project.

6.2. Excavations for foundations down to formation level shall be carried out by mechanical means, except for the last 100mm of excavation which is to be carried out by manual methods and recommended by geotechnical consultant.

6.3. The formation level of foundation is to be inspected and approved by the geotechnical engineer before commencement of the work.

6.4. Engineering fill (unless specified otherwise as a higher quality material) shall be selected well graded granular material approved by the engineer with a minimum soaked cbr of 15% compacted not exceeding 250mm in layers to 95% maximum dry density as per geotechnical investigation report recommendations in accordance with the specification. However, a minimum cover of 250mm back fill material shall be provided at the top of foundations below the blinding to cast against.

6.5. Efficient site drainage during and after construction of the project should be provided by the contractor.

6.6. Site inspection by a qualified engineer should be carried out after completion of the excavation works and after preparation of the proposed foundation level to ensure that the contact surface is free from any loose/soft layer and properly prepared for the foundation.

7. Concrete workmanship

7.1. All concrete without plaster shall be fair finish unless noted otherwise.

7.2. All concrete surface to have plaster are to be hacked to have an adequate surface key.

7.3. All concrete is to be cured by an approved method-water pounding or curing compound.

7.4. All types of construction joints in concrete shall be at a specified locations and approved by the engineers.

7.5. All substructure concrete works shall be protected with water proofing as per standard details & specifications.

7.6. All concrete shall be compacted using a mechanical vibration process.

7.7. 25x25mm chamfers to external corners and edges shall be provided in accordance with specifications and directed by the engineer.

8. Structural steel

8.1. All structural steel works shall be in accordance with bs 5950 parts 1 to 9 or ec-en3.

8.2. Maximum dimension of holes shall be in accordance with bs 5950 : part 1 : 2000 table 35, unless indicated otherwise.

8.3. The contractor shall provide whatever temporary ties or bracing necessary for a safe and proper erection of the steel structures.

8.4. Welding shall comply with bs en 1011-1: 2009, bs en 1011-2 : 2001 and bs bs en 1011-8 : 2004.

8.5. Contractor shall do a detailed design for aluminum shades and to submit full design calculations and detailed shop drawings for all steel sections and connections to the engineer for approval prior to commencement of fabrication.

8.6. All rolled products and plates shall conform to bs en 10025-2. Cold form welded structural hollow sections shall conform to bs en 10219-1. Hot finish hollow sections shall conform to bs 10210-1 unless noted otherwise on drawings.

8.7. All connections shall be made with minimum 2nos. Galvanized grade 8.8 to bs 3692 with a minimum diameter of 20mm and minimum yield strength of 627mpa and minimum ultimate strength of 765mpa and electrodes to bsd 639, unless noted otherwise.

8.8. Unless noted otherwise on the drawings, all connections shall be in accordance with the following minimum requirements:

- A) all welds shall be at least 6mm continuous fillet welds all around.
- B) all structural bolted connections should be galvanized minimum 85 micron and with a minimum of 2 bolts per connection. Purlin bolts shall be in accordance with the suppliers recommendations.
- C) all gusset plates shall be at least 4mm thick.
- D) all cap plates shall be at least 4mm thick.
- E) all base plates shall be at least 4mm thick.

8.9. As minimum all structural steel members shall be shot blasted to sa 2.5, galvanized, primed & painted as below unless noted otherwise:

- A) hot galvanization (dft 200micron)
- B) primer coat to contain 2 coats of zinc rich epoxy primer (dft 75 micron)
- C) top coat to contain 2 coats of polyurethane enamel paint (dft 125 micron)

8.10. All structural steel work shall be corrosion protected in accordance with the structural specifications.

8.11. All steel should conform to the following:

- A) shs, rhs and chs sections bsen 10210 s275 fy=275mpa
- B) all angles and channels u.n.o bsen 10025 s275 fy=275mpa

8.12. All steel columns to be central on grids or equally spaced between grids unless noted otherwise.

8.13. All steel beams to be central on grids or equally spaced between grids unless noted otherwise.

8.14. All steel dimensions are to center line of section unless noted otherwise.

8.15. All bracing is to be set out on the centroids of bracing members and on the center line of beams and columns unless noted otherwise.

8.16. Where bracing is shown offset from center of members the contractor shall design and provide all necessary stiffeners.

8.17. Contractor to provide all leader railing as required to support free edges not trimmed with cold formed or mild steel work. To be provided in accordance with architect’s drawings.

8.18. Location of any connections, splices not shown in the drawings shall be submitted with design for engineer’s approval. No splices shall be made unless shown in the drawings and as approved by the engineers.

8.19. Contractor shall do a full coordination between architecture and structural drawings for the steel support for shade elements, locations and sizing connections with structural concrete elements and sections. Care shall be taken to prevent dissimilar metal corrosion.

9. Masonry blocks

9.1. Design and construction of all blocks shall comply with bs 5628 : parts 1.2 & 3 : 1992 or en-ec6. The contractor shall submit a construction method statement prior to commencing the works.

9.2. Wall ties in accordance with bs 1248 - cp 121 part 1.73.

9.3. All block wall joints to manufacturers specifications.

9.4. All block work walls are to be considered as non-load bearing partitions unless noted otherwise in drawings

9.5. Block walls shall be reinforced horizontally and vertically as per manufacturers requirements.

9.6. Masonry wall mechanical properties

- young’s modulus = 3.5e+006 kn/m²
- poisson’s ratio = 0.25
- density = 20kn/m³
- min.compressive strength = 3.5 mpa

10. Design & loading

10.1. Consultant design design and construction of reinforced concrete structural members, shall be in accordance with bs8110 & ec-en2 and the structural steel members to bs 5950 & ec-en3.

10.2. Contractor design the contractor is responsible for the design of all temporary works. (shoring for excavation, signage... Etc) and the following items of permanent secondary works. (subjected to engineers review and approval)

- a) precast concrete elements
- b) architectural facade and support steelwork
- c) non load bearing feature columns
- d) all secondary steel works
- e) structural steelwork connections
- f) structural support for mep services
- g) shade structures
- h) balustrade and crash barrier
- i) structural glass
- j) interior signage

the design of the primary structure is considering the interfaces with these structures loading reactions, opening...etc.) And were detailed to accommodate these elements into the design.

the contractor shall submit a full detail design for the wall and boundary wall foundation, also the contractor to do

full coordination between the structural foundation for villas (including the water tanks, and the boundary wall for clashes, the contractor shall produce shop drawings for the boundary walls for engineer’s approval.

10.3. Loading

- a) superimposed (dead loads & live loads) as per bs 6399 or en-ec1.
- b) self-weight & densities as per bs 648 or en-ec1.
- c) wind loads as per bs 6399 or en-ec1 (mean wind speed = 25m/s).

11. Timber

11.1. All timbers shall be in accordance with bs 5268 or ec-en5

11.2. All timber members sizes are indicative. Contractor shall coordinate with supplier and submit detail designs for all prefab timber structure for approval.

PROPOSED 03 STOREY BUILDING AT

Hulhudhuffaar
3 Storey Building
12 classrooms

Client:
Ministry of Education,
Maldives

4/19/2021

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Engineer: Ihsaan Waheed
Drawn By: Fathmath Ihudha Amir



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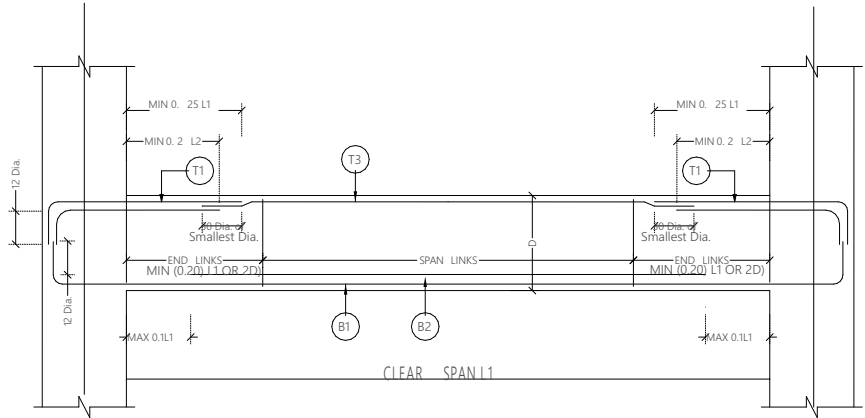
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Notes:

1. First stirrups location shall be $s/2$ from the face of the column/ support.
2. Place one b bar in each bottom corner and one t bar in each top corner of the stirrup cage.
3. Condition shown is at columns. Where beams and girder intersect, use typical interior girder section.
4. All bottom bars and top bars shall be placed in one layer unless two layers are noted in the beam schedule. Where to layers are noted provide 25 mm clear between layers. If two layers are noted place bar b1 above bar b and bar t above t1.
5. Length of exterior top bars are given only when straight bar occurs otherwise hooked bars are required.
6. Where a member is supported by a column, but has another member running perpendicular to it at the same column, the first stirrup spacing shall start from the face of the column and not from the face of the transverse beam.
7. Top & bottom reinforcement lapping of both main rebars can be ignored if the main rebars at left and right side of lapping location are identical.
8. For 'column width less or equal 2m $l^* = \text{column width}/2$. For 'column width' greater than 2m, $l^* = 1\text{m}$

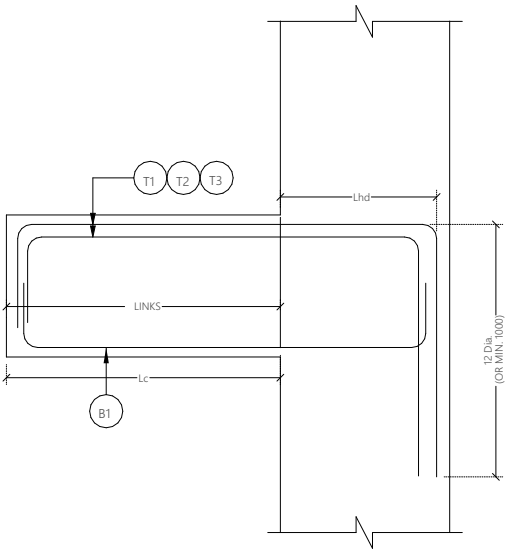
Supplementary abbreviations:

- B1 - continuous bottom bars.
B2 - additional bottom bars
CE - cantilevered end
D - depth of member, mm
EE - each end
EF - each face
FL - full length
EW - each way
H - aci standard hook
ITB - interior top bar
LE - left end
LG - length
P - paired stirrups
RE - right end
REM - remainder
S - side bars
T1 - top bars at internal supports
T2 - top bars at mid-span
T3 - top bars at end support
W - width of member, mm



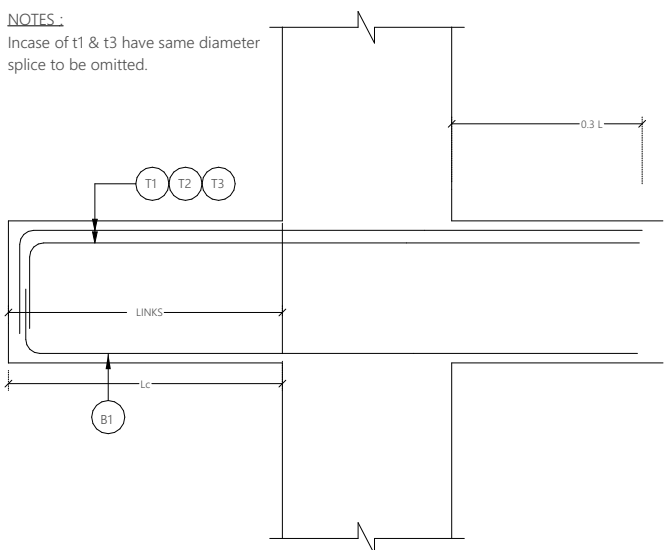
SIMPLE BEAM DETAILS

NTS



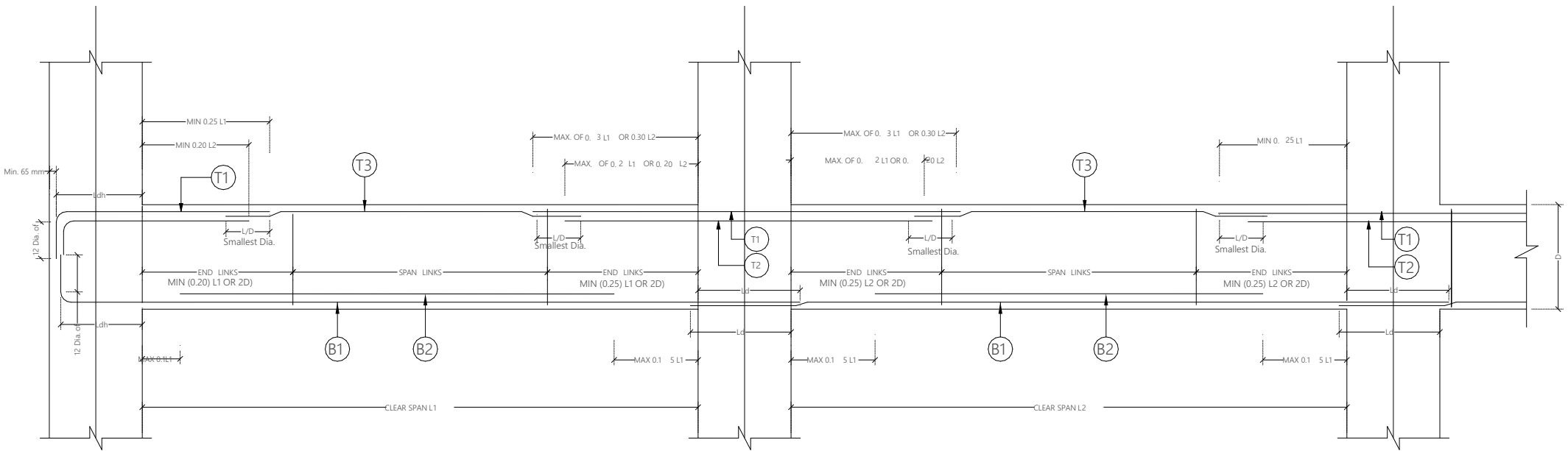
TYPICAL CANTELEVER BEAM FROM COLUMN

NTS



TYPICAL CANTELEVER BEAM CONTINUOUS

NTS



CONTINUOUS BEAM DETAILS

NTS

General Notes 3

1:100

PROPOSED 03 STOREY BUILDING AT
Hulhudhuffaar
3 Storey Building
12 classrooms

Client:
Ministry of Education,
Maldives

4/19/2021

Architect: Fathmath Ihudha Amir
Engineer: Ihsaan Waheed
Drawn By: Fathmath Ihudha Amir



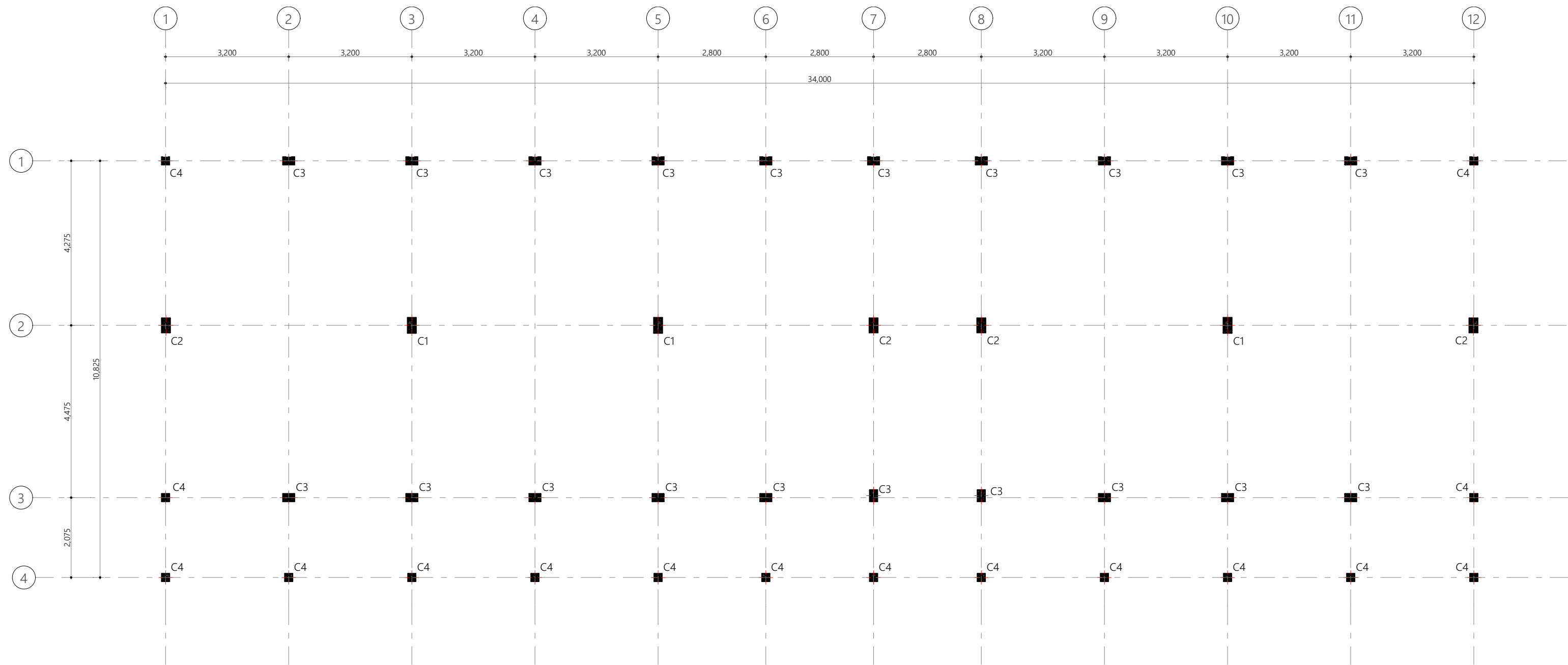
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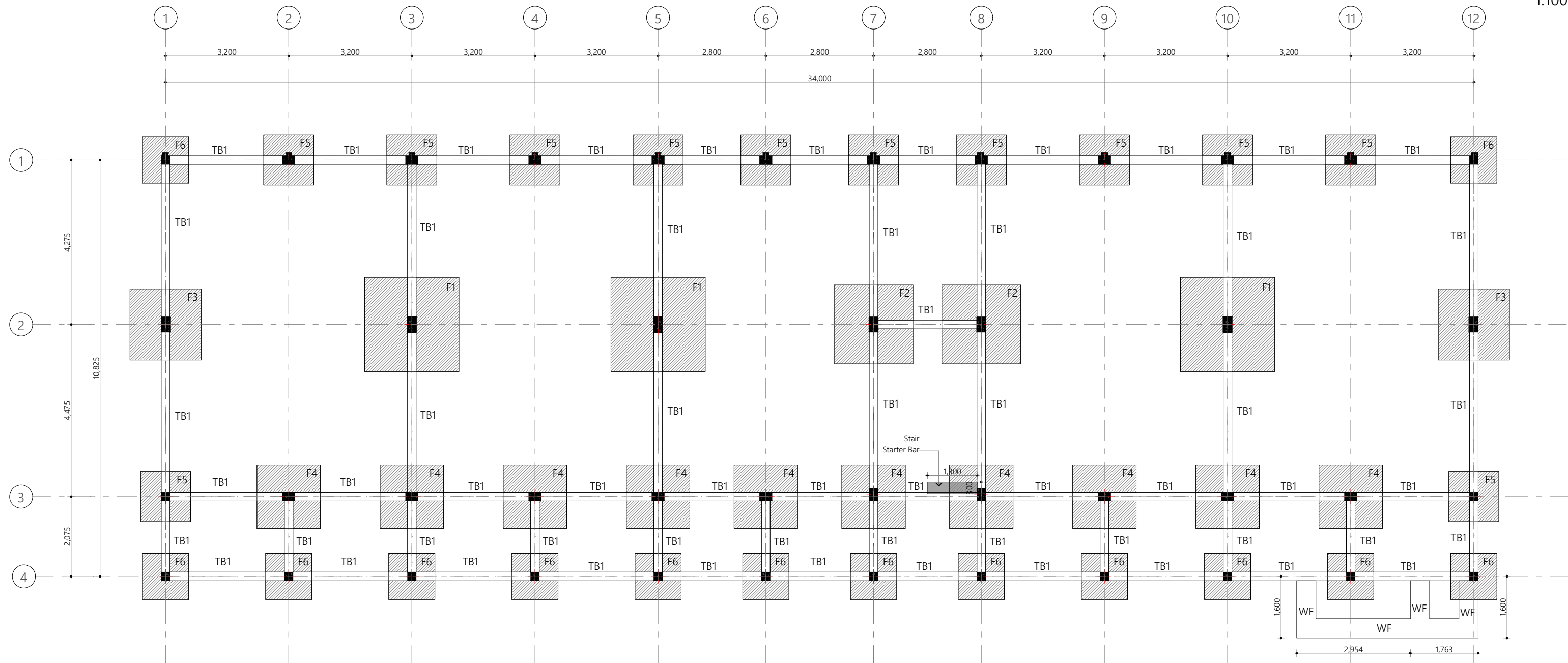
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Column Layout
1:100



Foundation Plan
1:100

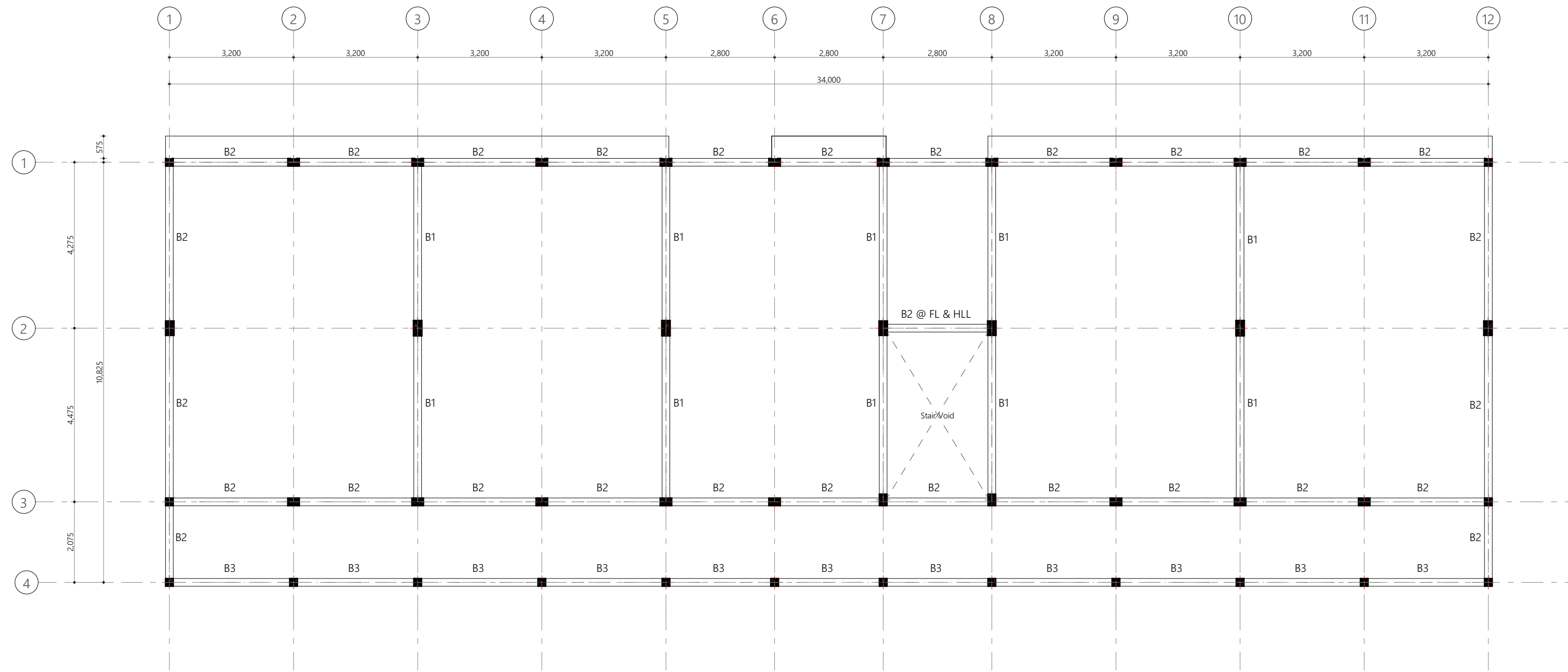
Foundation Details:

	Dimensions	Reinforcement	Foundation depth
F1	2450X2450X450	T12@100C/C B/W (B)	1300mm
F2	2050X2050X400	T12@125C/C B/W (B)	1250mm
F3	1850X1850X400	T12@150C/C B/W (B)	1250mm
F4	1650X1650X350	T12@150C/C B/W (B)	1200mm
F5	1300X1300X350	T12@150C/C B/W (B)	1200mm
F6	1200X1200X350	T12@150C/C B/W (B)	1200mm

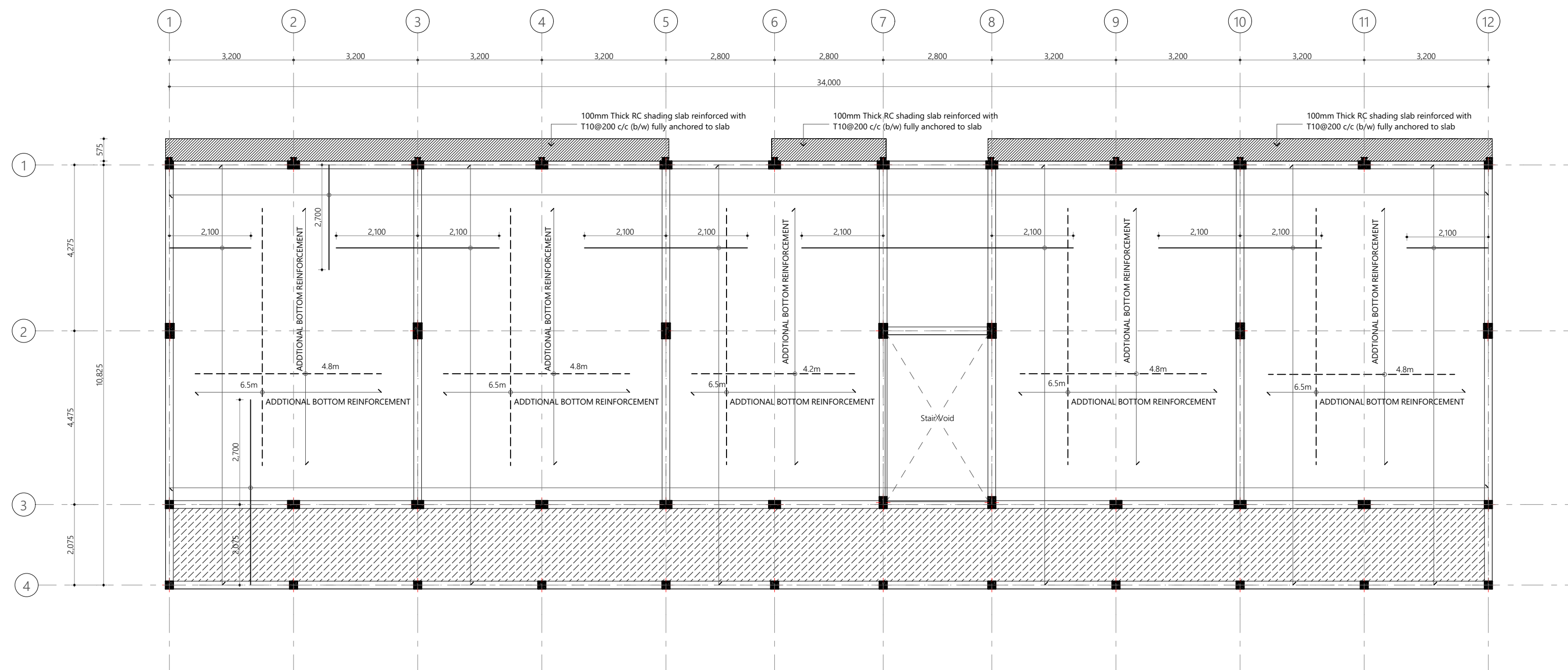
Ground Slab = 100mm thick RC slab on fill reinforced with T10@200C/C (B/W)

All Footings are to be laid on top of 50mm thick lean concrete

Add waterproofing admixture and apply waterproofing to all substructure (below ground elements)



First and Second Floor Beam Plan
1:100



First and Second Floor Slab Reinforcement Plan
1:100

175 mm
 155 mm
 Bottom Reinforcement:
 Bottom Additional Reinforcement:
 Top Reinforcement:
 Top Distribution steel:

T12@150c/c B/W (Not Shown)
 T12@150c/c B/W (As shown)
 T12@150c/c (As shown, unless stated)
 T12@150c/c (Unless stated)

PROPOSED 03 STOREY BUILDING AT
R Hulhuthfaaru
 3 Storey Building 12 classrooms

Client
 Ministry of Education,
 Maldives

4/19/2021

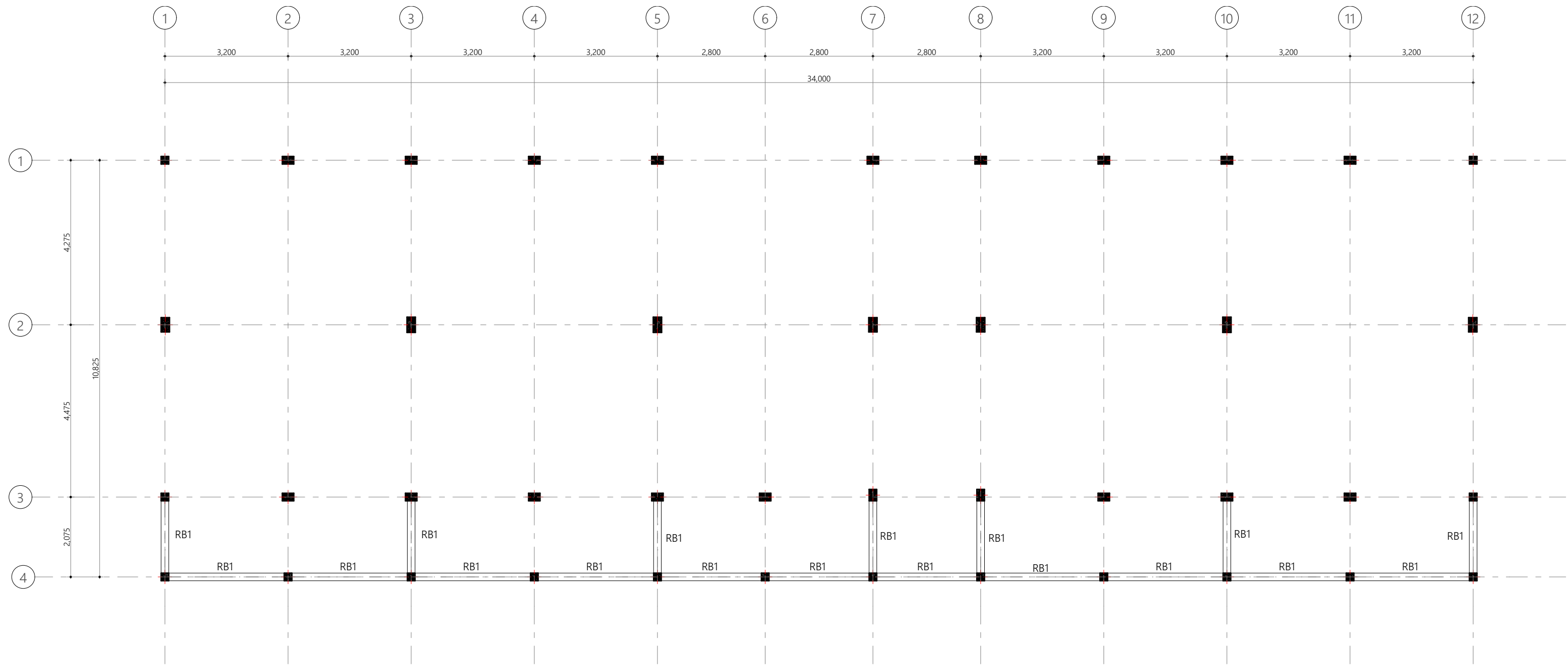
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 Engineer: Ihsaan Waheed
 Drawn By: Fathmath Ithudha Amir



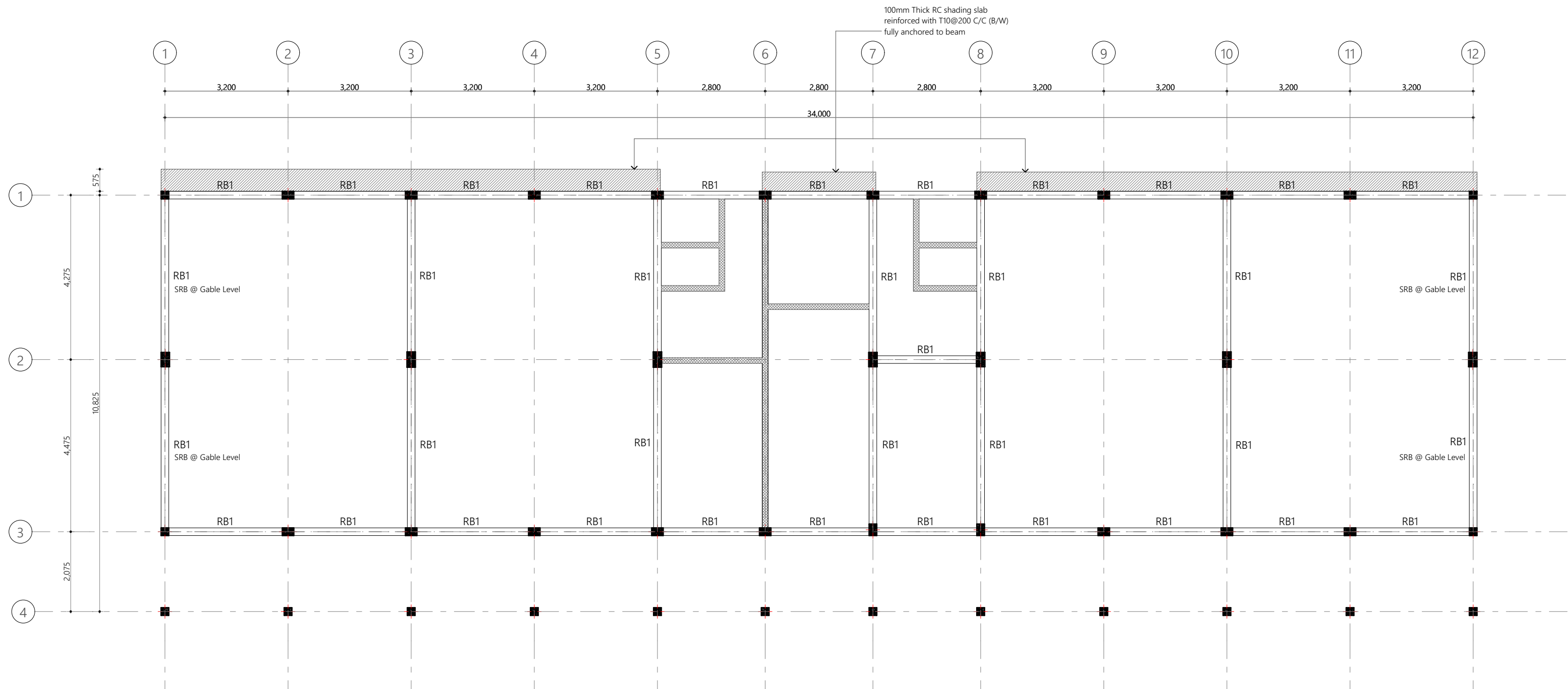
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Roof Beam Level 1
1:100



Notes:

WCB (Wall cast beam cast on top of wall)

Roof Beam Level 2
1:100

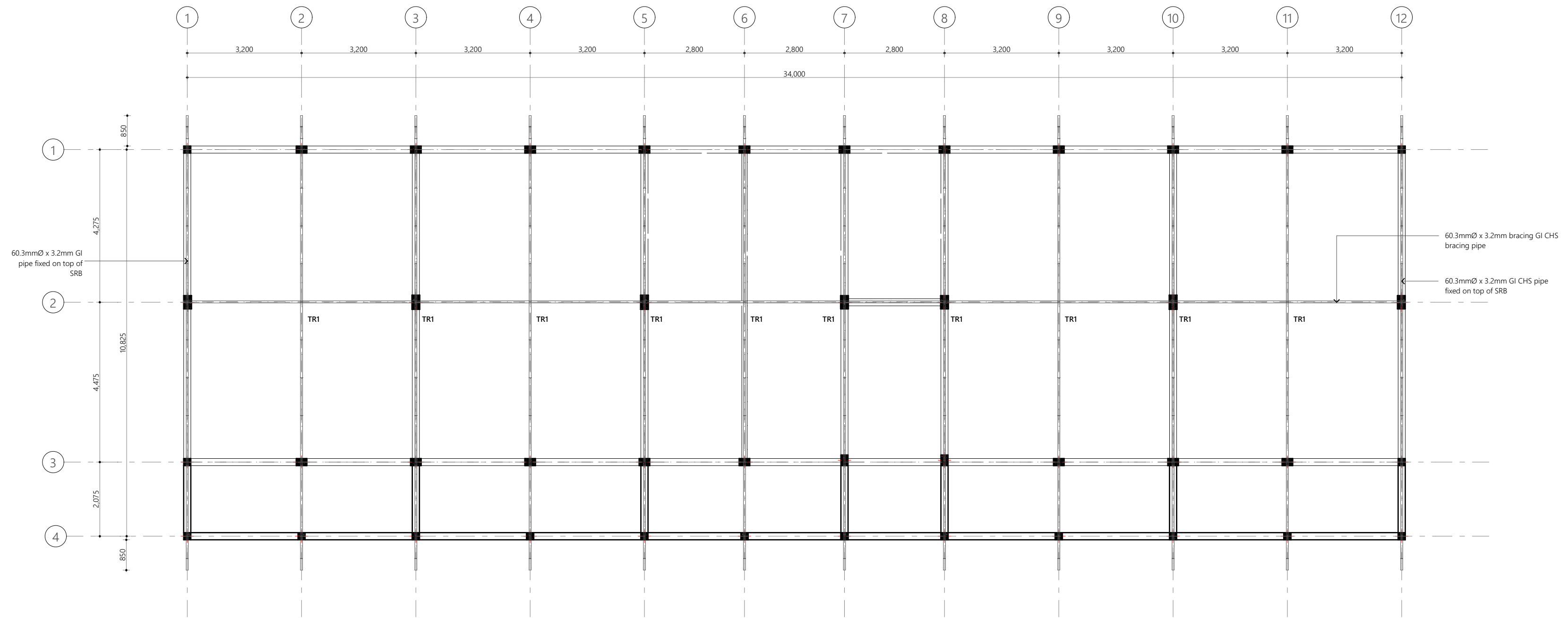
PROPOSED 03 STOREY BUILDING AT
R Hulhudhuffaar
3 Storey Building 12
classrooms

Client
Ministry of Education,
Maldives

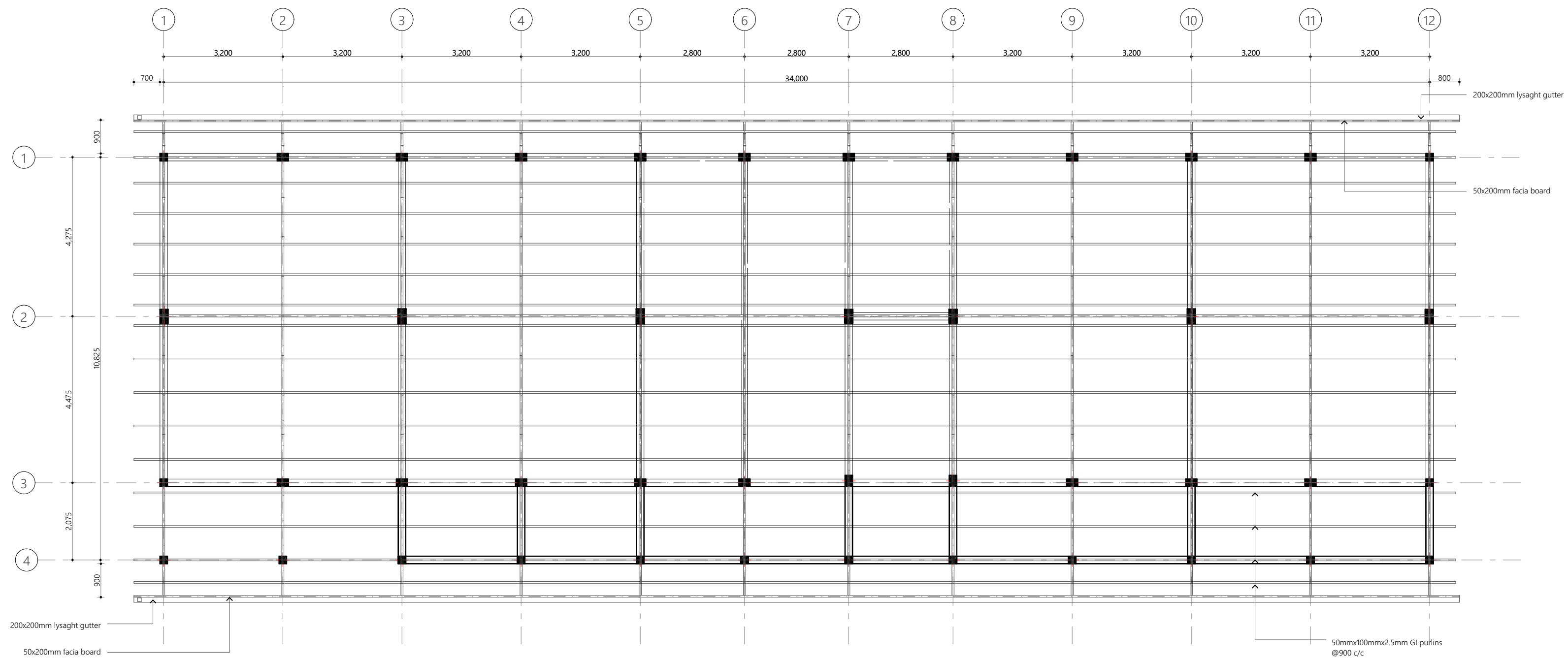
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Roof Truss Plan
1:100



Roof Framing Plan
1:100

PROPOSED 03 STOREY BUILDING AT
R Hulhudhuffaar
3 Storey Building 12
classrooms

Client
Ministry of Education,
Maldives

4/19/2021

Architect: Fathmath Ihudha Amir
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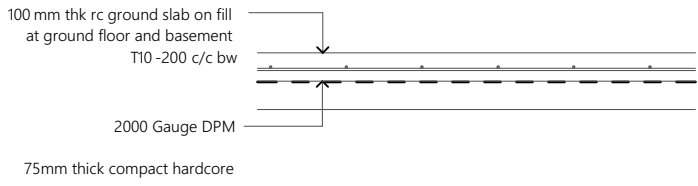
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B.02.3

Foundation Details:

	Dimensions	Reinforcement	Foundation depth
F1	2450X2450X450	T12@100C/C B/W (8)	1300mm
F2	2050X2050X400	T12@125C/C B/W (8)	1250mm
F3	1850X1850X400	T12@150C/C B/W (8)	1250mm
F4	1650X1650X350	T12@150C/C B/W (8)	1200mm
F5	1300X1300X350	T12@150C/C B/W (8)	1200mm
F6	1200X1200X350	T12@150C/C B/W (8)	1200mm

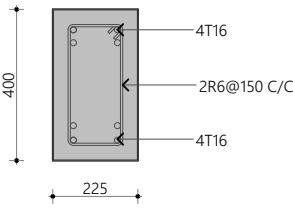
Ground Slab = 100mm thick RC slab on fill reinforced with T10@200C/C (B/W)

All Footings are to be laid on top of 50mm thick lean concrete
Add waterproofing admixture and apply waterproofing to all substructure (below ground elements)



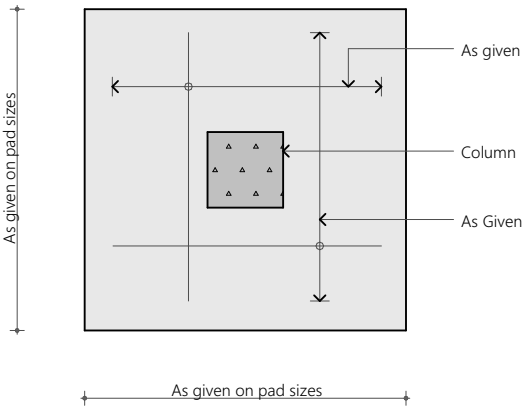
NOTE:
All cover blocks shall be casted using grade C 25 / 30 concrete with 5-10 mm aggregates

For slab, rebar spacer chairs spacing shall be minimum 1m spacing or 1 no. per 1 sqm

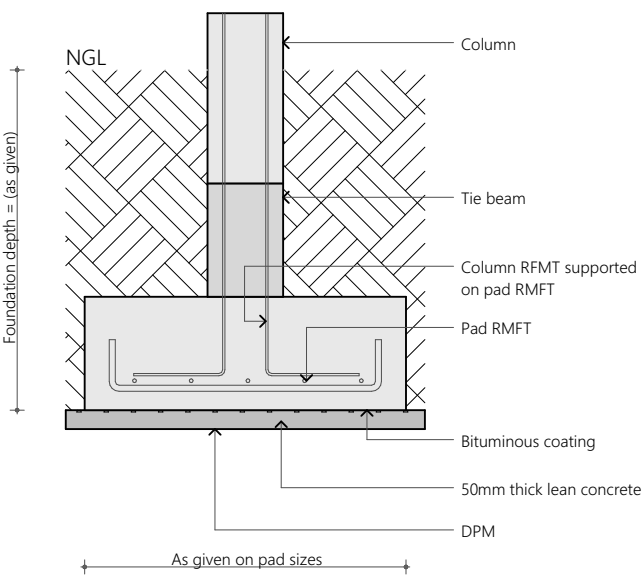


TB1

Foundation Details
1:100



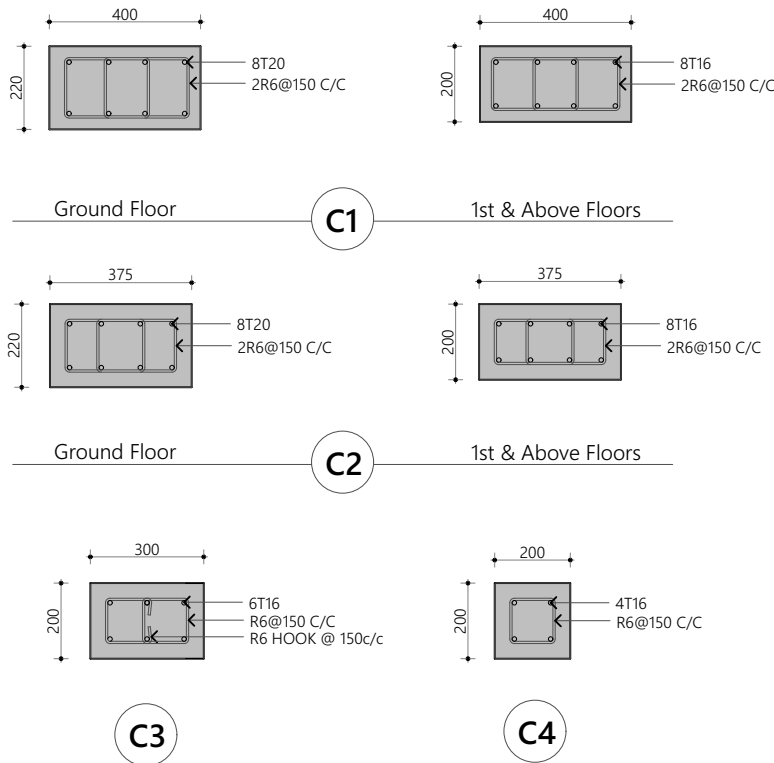
Plan View



Sectional View

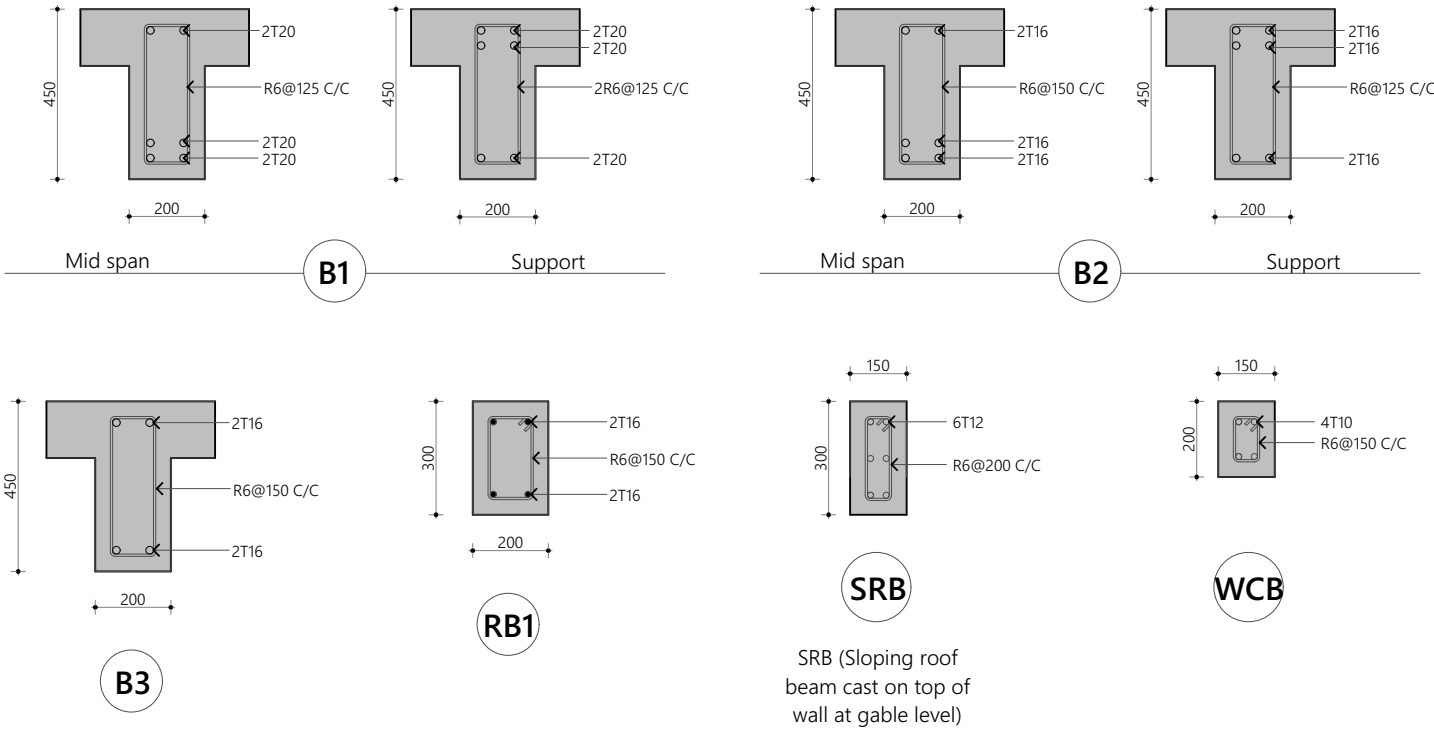
Typical Pad Footing Detail
1:20

Ground Slab Detail
1:20

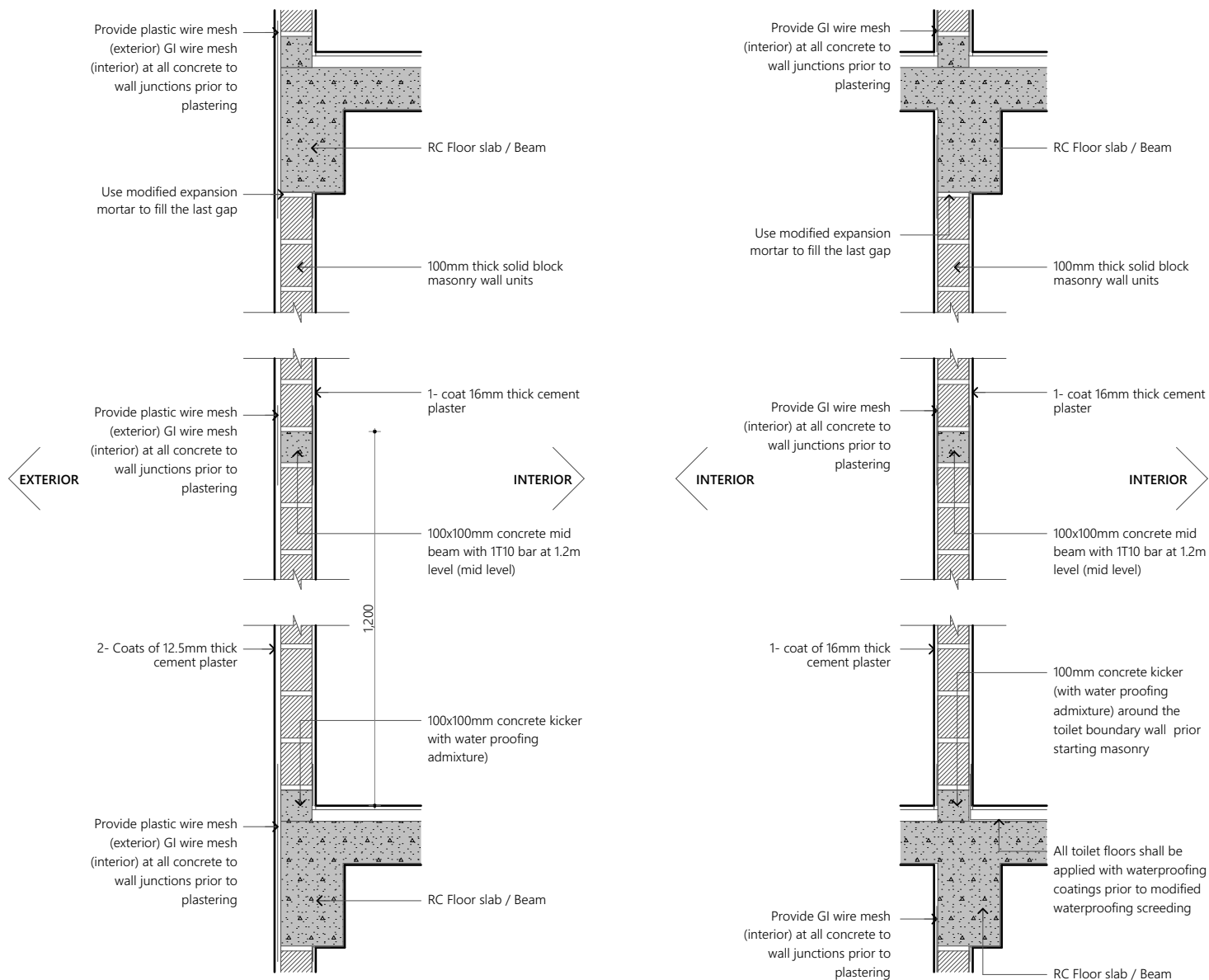


Column Details
1:20

Tie Beam Details
1:20



Beam Details
1:20



Note:

- * Concrete surfaces shall be thoroughly cleaned with water & applied with mastercast 141 or equivalent bonding mortar prior to plastering.
- * Plastering mortar mix shall be 1:4 (cement: sand) ratio.
- * Plaster mix shall be modified using fibre wool & mastercast 141 or equivalent plasticisers as per manufacturer's specification.
- * Height of placing blocks shall be maximum 1.2m per day.
- * After initial coat of plastering, water curing shall be provided for minimum 3 days & after final coat water curing shall be provided for 7 days.

Typical Wall Construction Detail
1:20

PROPOSED 03 STOREY BUILDING AT
R Hulhudhuffaar
3 Storey Building 12
classrooms

Client
Ministry of Education,
Maldives

4/19/2021

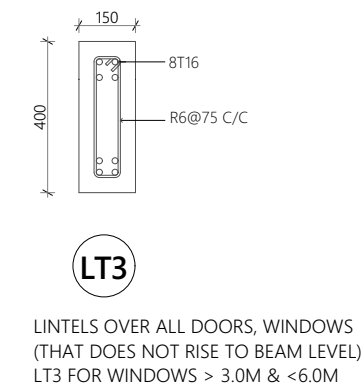
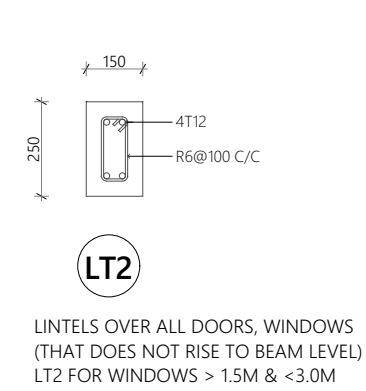
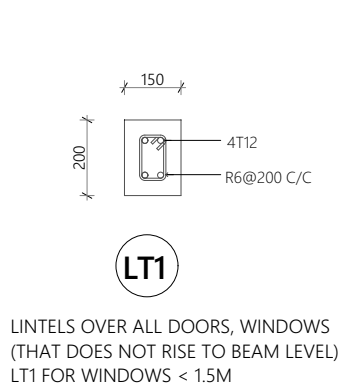
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Engineer: Ihsaan Waheed
Drawn By: Fathmath Ithudha Amir



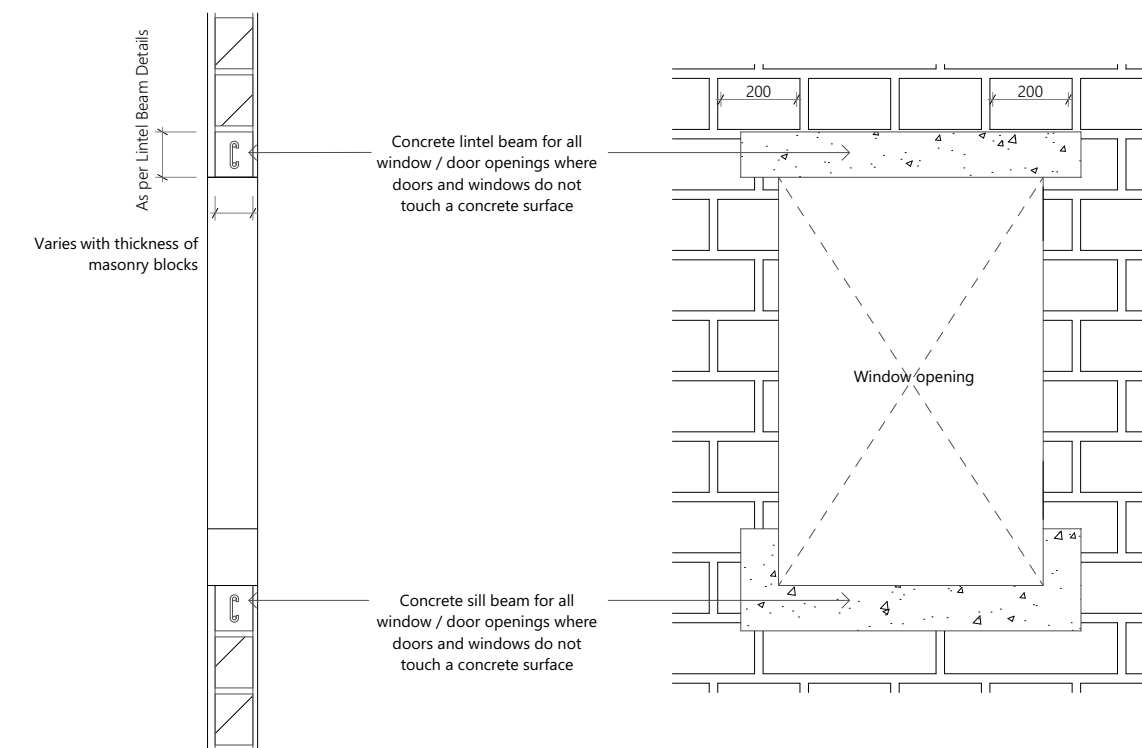
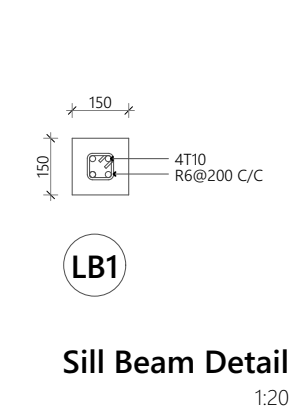
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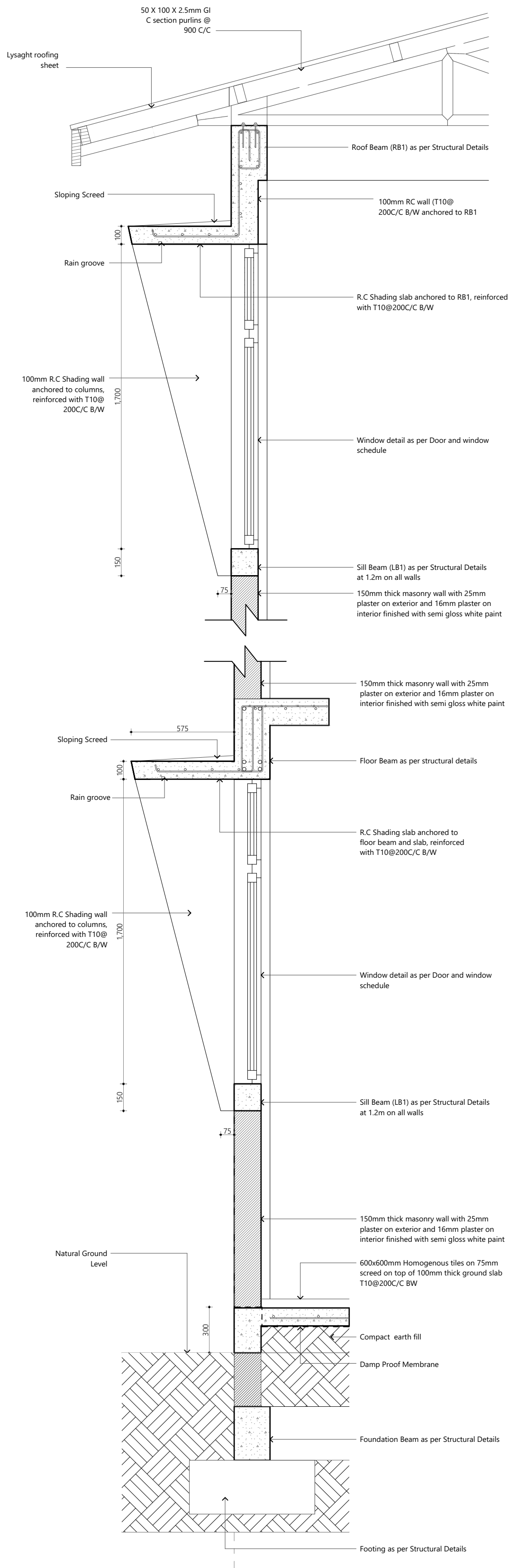


Lintel Beam Detail
1:20



Typical Window
Construction Detail

Window Construction Detail
1:20



Detail D-02
1:20

PROPOSED 03 STOREY BUILDING AT
R Hulhudhuffaar
3 Storey Building 12
classrooms
Client
Ministry of Education,
Maldives

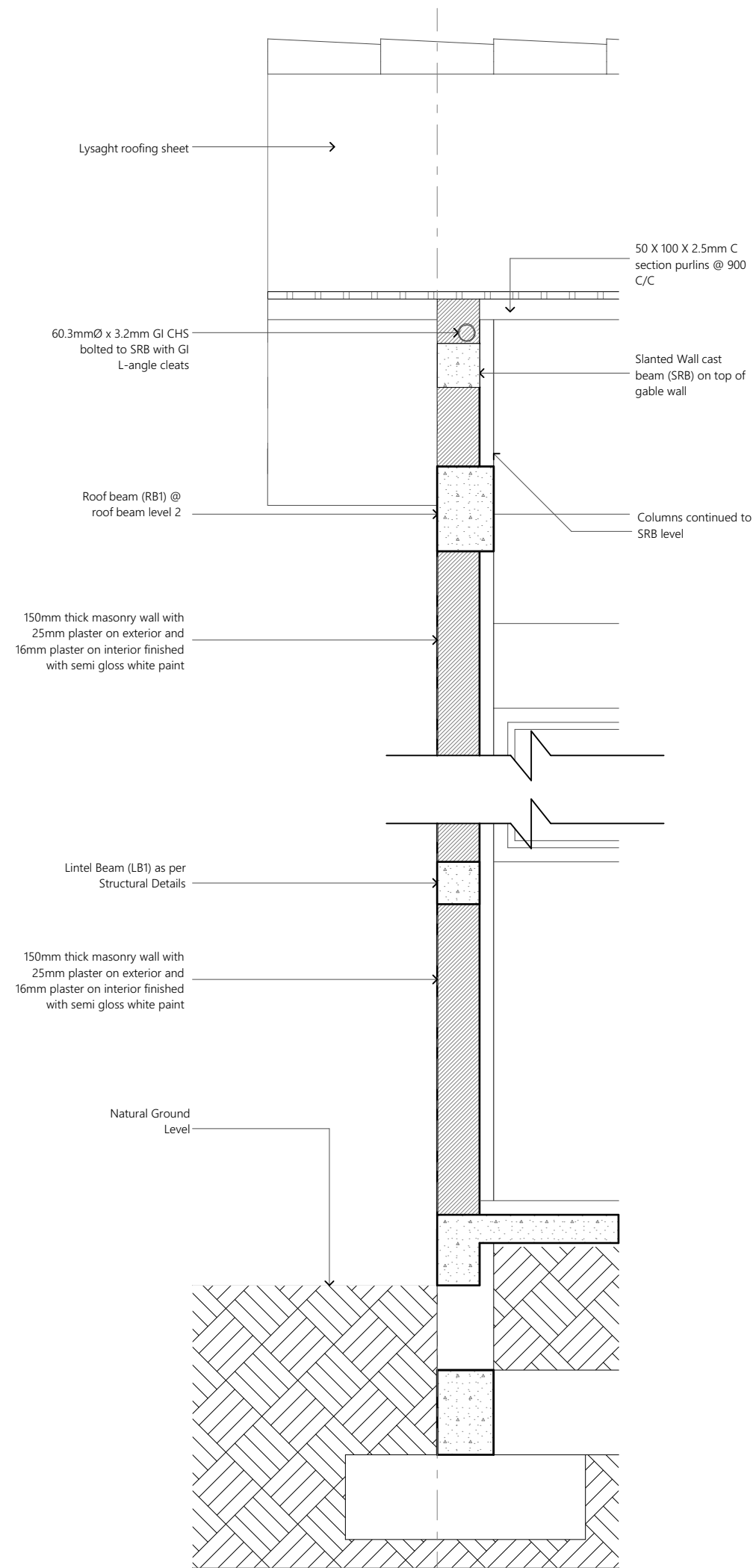
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Detail D-04
1:20

PROPOSED 03 STOREY BUILDING AT
R Hulhudhuffaar
3 Storey Building 12
classrooms

Client
Ministry of Education,
Maldives

4/7/2021

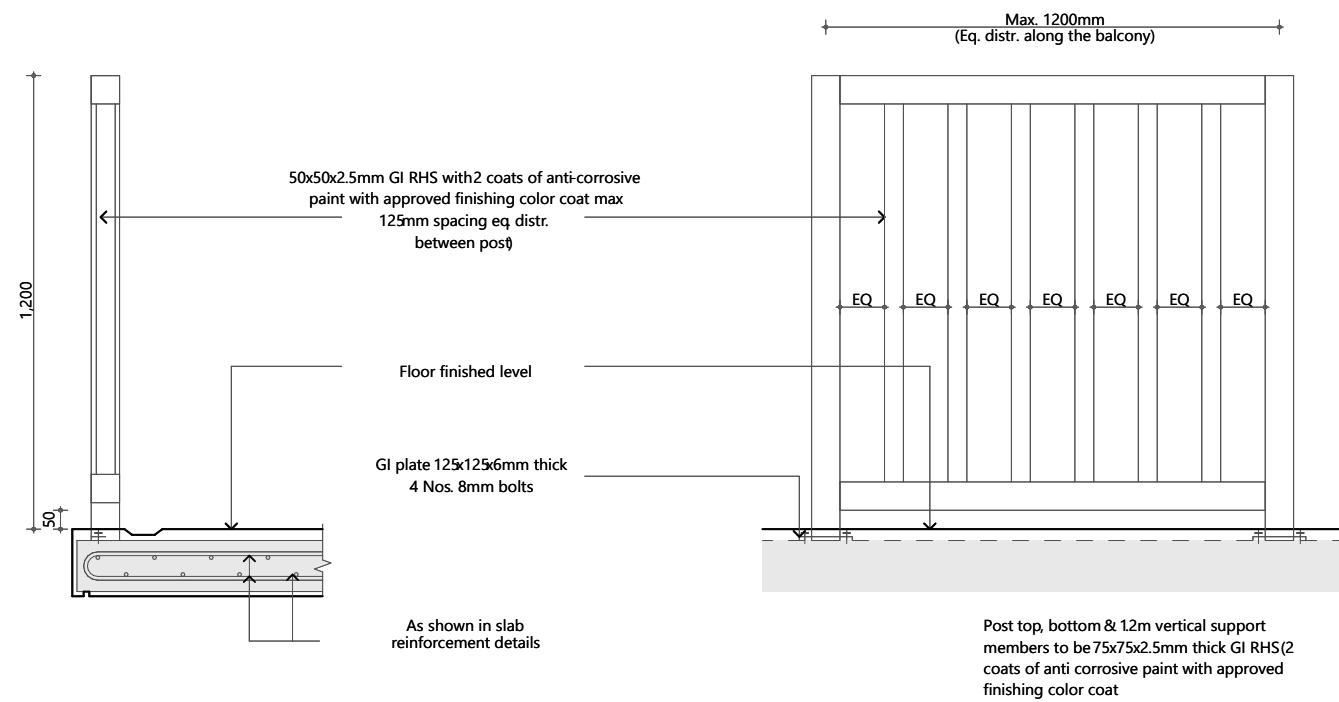
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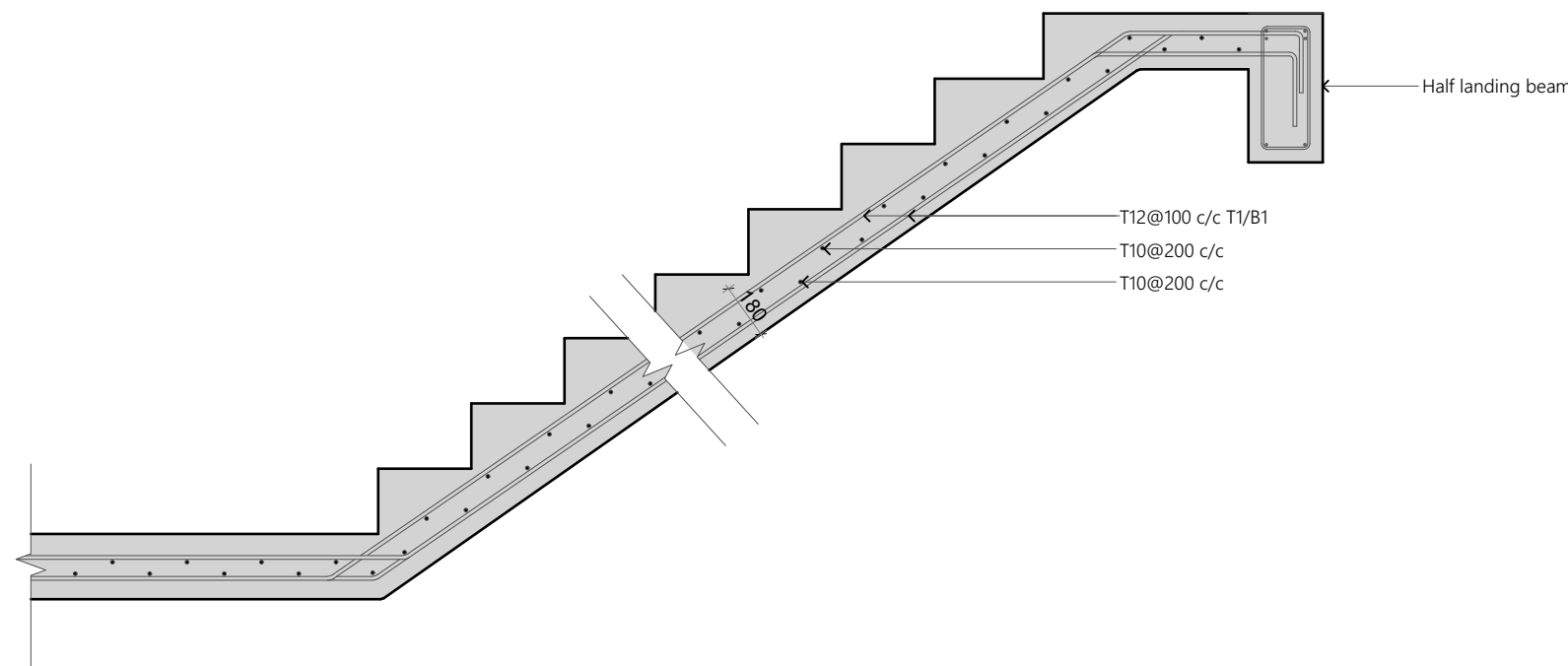
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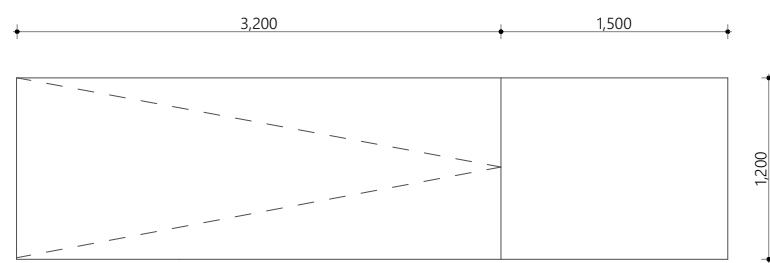
Sectional View

Elevation View

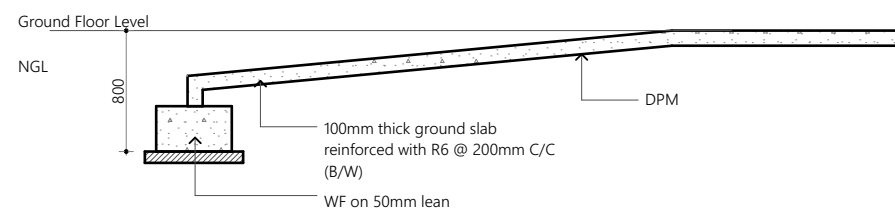
Balcony Detail
1:20



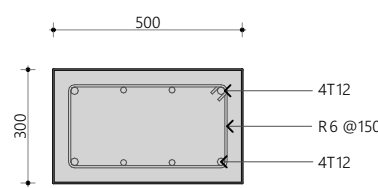
Stair Reinforcement Detail
1:20



Ground Floor Ramp Plan View

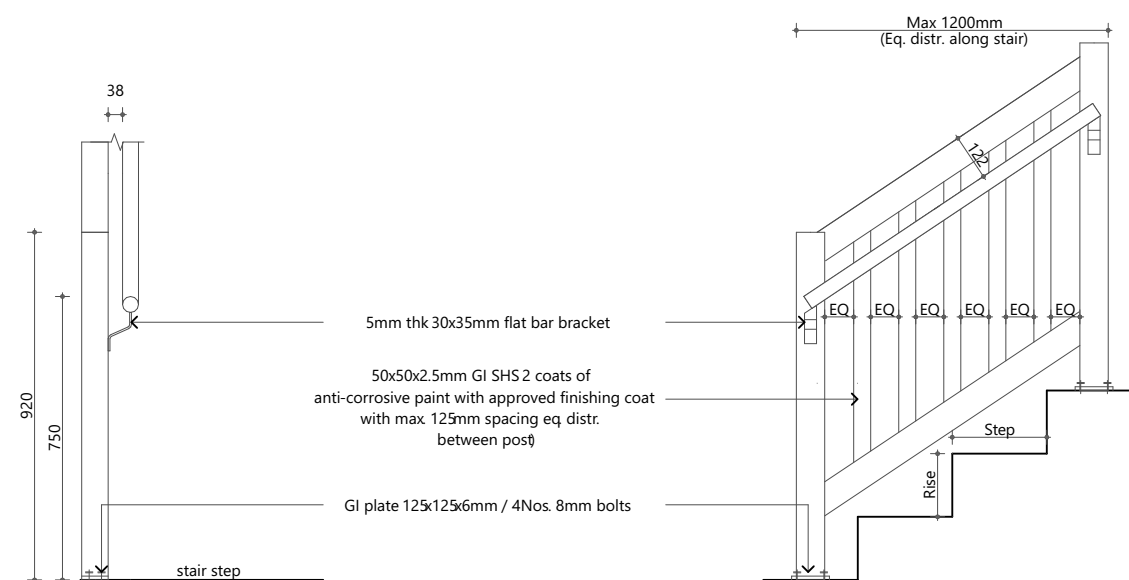


Ground Floor Ramp Elevation View



Wall Footing (WF) Detail
Scale = 1:20

Ramp Detail
1:50



1. Post top, bottom & 12m vertical support members to be 75x75x2.5mm thick GI SHS (2 coats of anti corrosive paint with approved finishing color coat)
2. Handrail material to be 50mm Ø 2.5mm thick GI CHS with 2 coats of anti-corrosive paint and approved finishing coat
3. Step: 300mm
4. Raise: 152mm

Stair Railing Detail
1:20

PROPOSED 03 STOREY BUILDING AT
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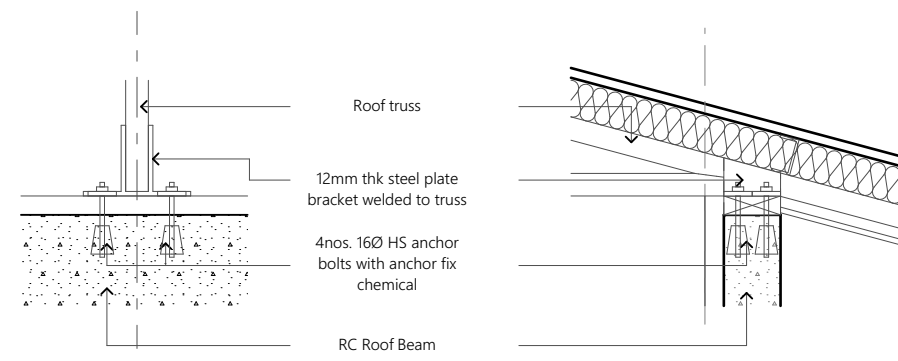
4/7/2021

Architect: Fathmath Ihudha Amir
Engineer: Ihsaan Waheed
Drawn By: Fathmath Ihudha Amir

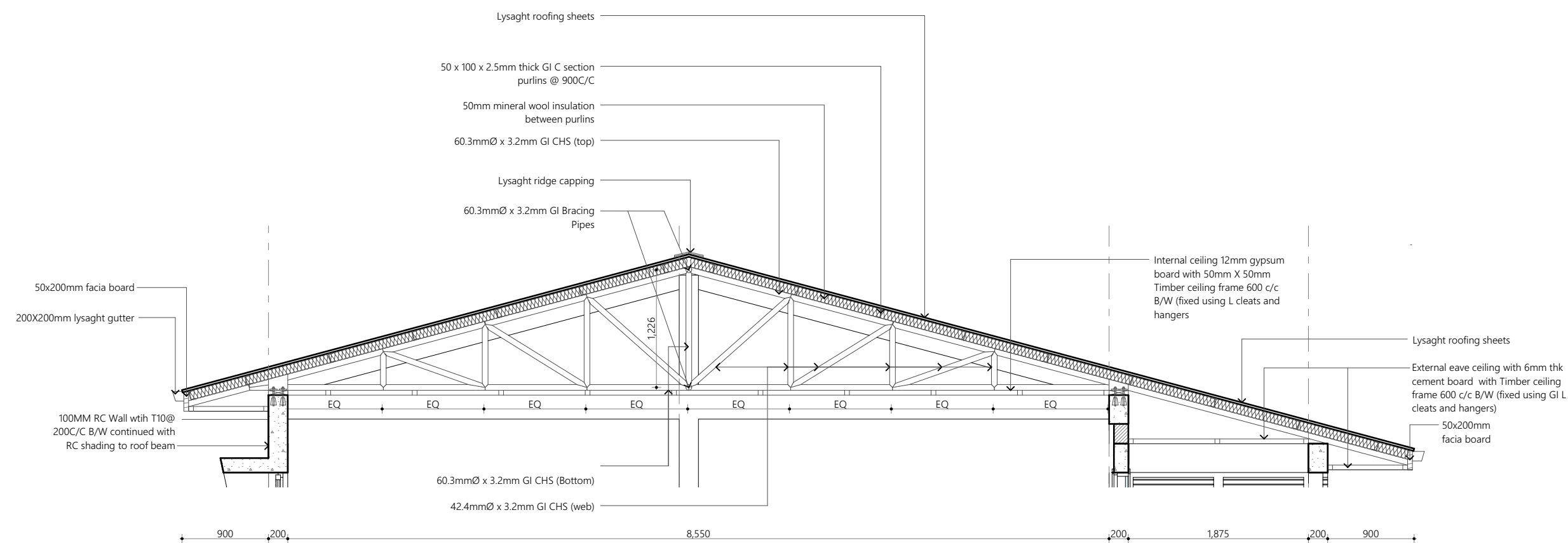


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Truss Fixing Detail
1:20



Truss Detail D-01
1:50

Notes:

All the CHS shall have minimum yield stress of 275MPa
All welds shall be 6mm thick full parameter fillet welds
All truss ends shall be capped with 6mm plates
All truss members shall be protected with anti corrosive coatings

PROPOSED 03 STOREY BUILDING AT
R Hulhudhuffaar
3 Storey Building 12
classrooms

Client
Ministry of Education,
Maldives

4/19/2021

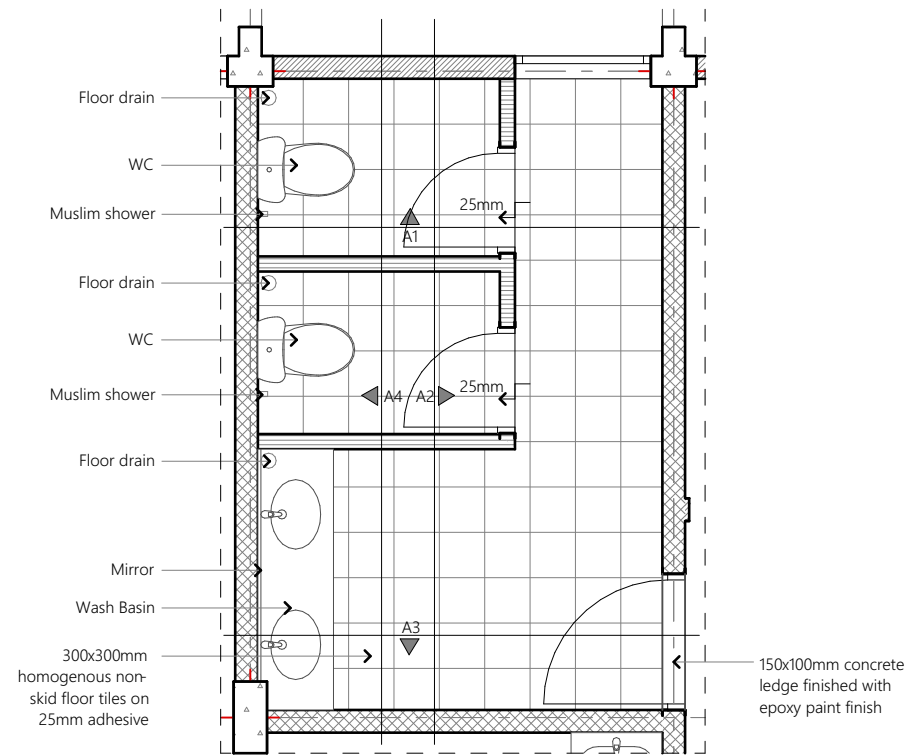
Architect: Fathmath Ihudha Amir
Engineer: Ihsaan Waheed
Drawn By: Fathmath Ihudha Amir



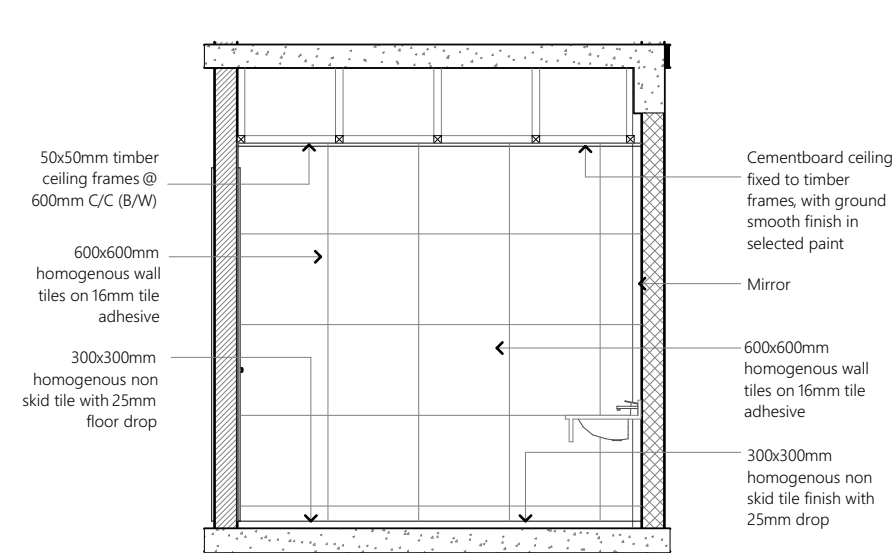
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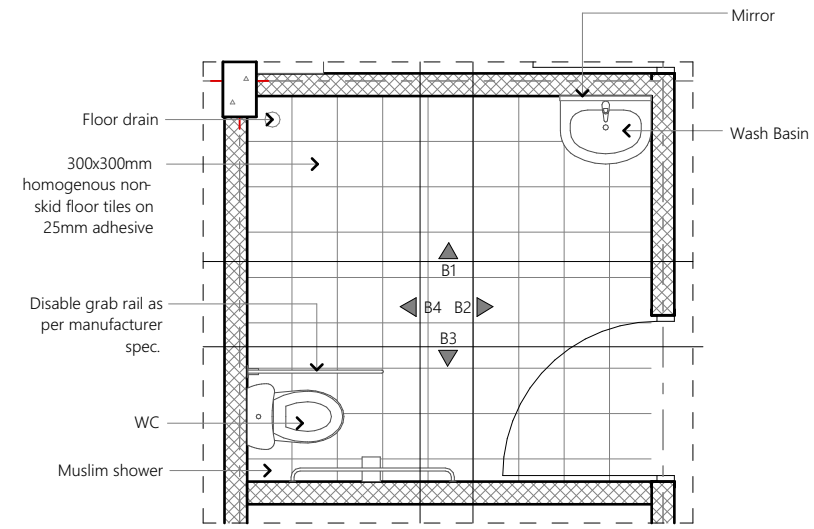
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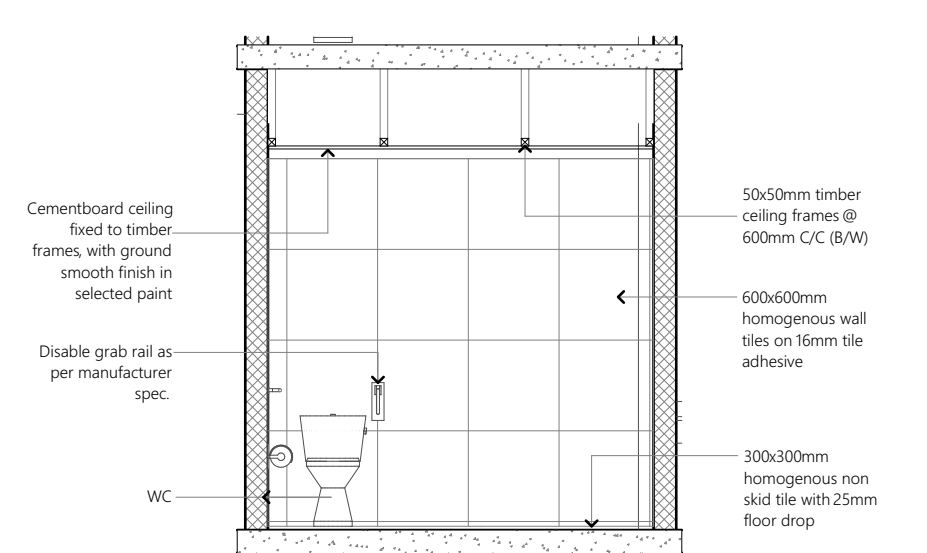
Toilet Plan (Male and Female)
1:50



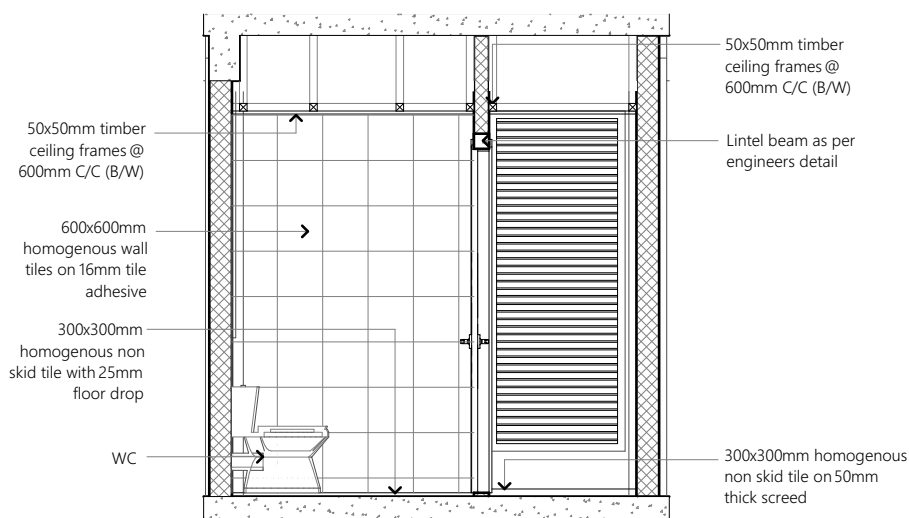
A3
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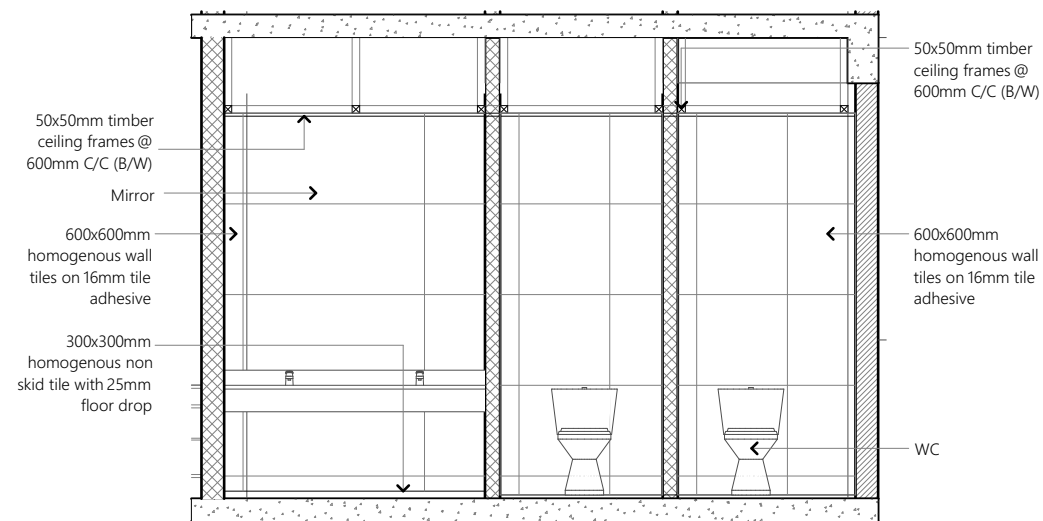
Disable Toilet Floor Plan
1:50



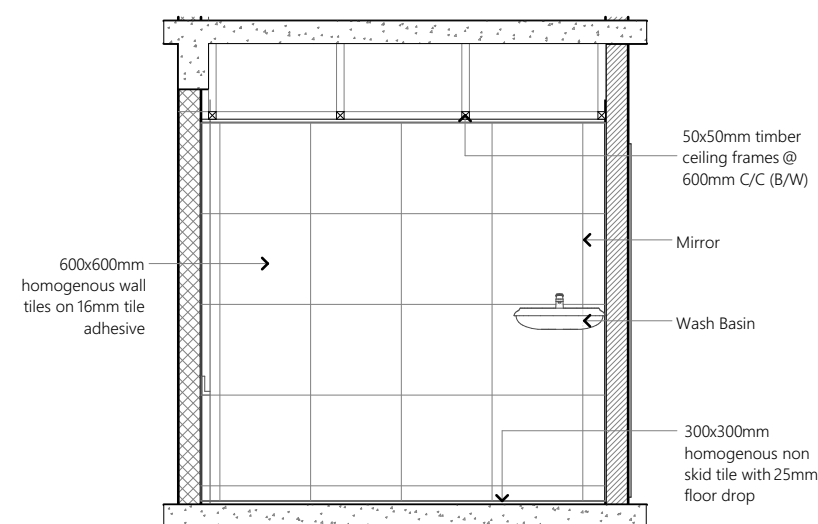
Elevation B 4
1:50



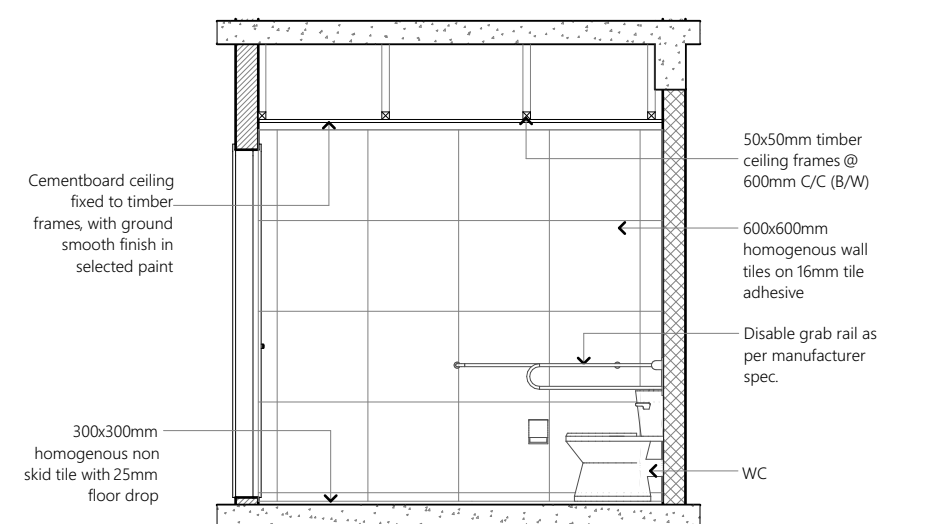
A1
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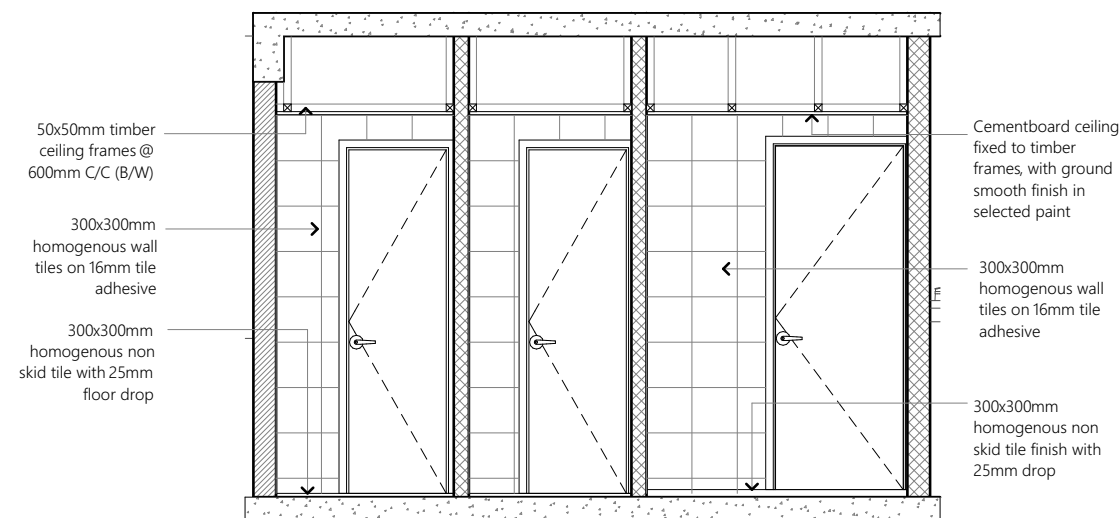
A4
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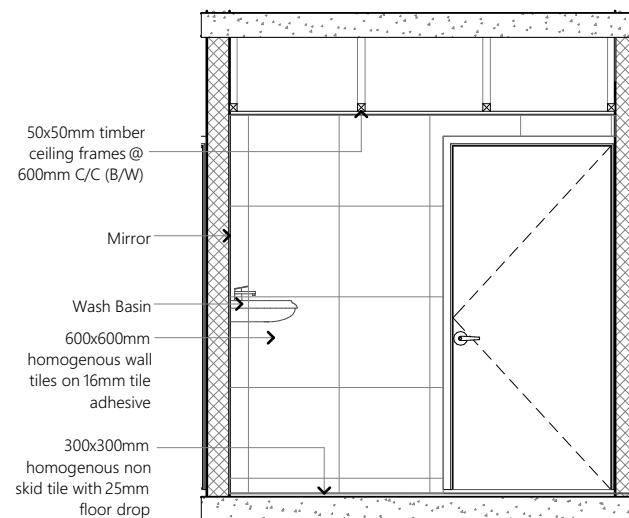
Elevation B 1
1:50



Elevation B 3
1:50



A2
1:50



Elevation B 2
1:50

PROPOSED 03 STOREY BUILDING AT
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3 Storey Building 12
classrooms

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Architect: **Fathmath Ihudha Amir**
Engineer: **Ihsaan Waheed**
Drawn By: **Fathmath Ihudha Amir**



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