

The HKIE Structural Examination – Written Examination 2024

Section 2: Design Questions

Date: 20 November 2024 (Wednesday)

Time: 12:00 pm – 6:30 pm

(Duration: 6.5 hours)

Question Paper

Seat number:	
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Answer ONE question only

NOTE

All rights are reserved on the examination questions by the HKIE and candidates are prohibited to record the examination paper in any form or remove any pages from the examination paper.

Question 1 Workshop and office

Client's Requirements

The following client's requirements must be met:

1. A workshop for vehicle examination and repair is to be constructed in an open area. An office building is to be built abutting the workshop as shown in Figures Q1-1 and Q1-2.
2. The workshop and office building shall be constructed in light weight structure. The main roof level is limited at 13m above ground. 1.1m parapet wall is to be provided along the building edge above the main roof. Site boundaries are to be 3m from the building edge.
3. 4 doors at Northern entrance and 2 doors at Western exit near the office building are required. Minimum clear dimensions of each door are to be 6m wide by 8m tall. Minimum 1m clear distance to be provided between adjacent doors.
4. 6 examination-repair lanes, each of minimum clear operational dimensions of 6m width by 30m long, are to be provided at the "EXAMINATION – REPAIR" zone. Overhead runway crane with 5m operation range in two perpendicular directions is to be installed midway of each examination-repair lane. Minimum 12m clear headroom from Ground to soffit of crane girder is to be maintained. Minimum 10m clear headroom to be maintained at both "ENTRANCE" and "EXIT" zones.
5. Pedestrian walkway of 2m clear width and minimum 2.5m clear headroom is to be allowed along the parameter of workshop, shown as "PARAMETER" in Figure Q1-1.
6. The roof of workshop is to be covered by solar panels. Flat roof at a minimum inclination of 1 in 100 from office building towards northern edge of workshop is required.
7. The office building is to be 3 stories with minimum 3m clear headroom from finished floor level to soffit of false ceiling. All general plant rooms are located at Ground floor except the lift machine room to be above the lift and stair core. Minimum headroom requirements for lift overrun and lift machine room are shown in Figure Q1-2. No finishes nor E&M services is required within the lift overrun and lift machine room.
8. The following provisions at office buildings are to be allowed:

For Plant Rooms

50mm floor finishes | 500mm building services with no false ceiling

For General office

150mm raised floor | 400mm building services including false ceiling

9. The office building is surrounded by curtain wall.
10. Lawn of minimum 600mm soil depth (depth of drainage layout included) is to cover the main office roof. Lawn above roof of lift machine room is not required.

11. Minimum clear column spacings within each zone as shown in Figure Q1-1 are:

Perimeter	-	6m along building edge
Exit and Entrance	-	20m all directions
Examination-Repair Office	-	6m East-West 15m North-South
	-	13m all directions

12. The following imposed loads should be provided:

For workshop (FRP = 1.0 hr)

Roof:

600mm wide Solar Panel @ 3m c/c supports	-	0.5kPa
800mm wide maintenance access	-	2.5kPa
Screeding/ water proofing	-	To be proposed
E&M services	-	3.0 kPa

Overhead runway crane:

Static vertical operation loads	-	20 tons
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Ground:

Finishes	-	1.0 kPa
Vehicle	-	Class 6D
Others	-	5.0 kPa

For Office Building (FRP = 1.0 hr):

Finishes including raise floor	-	1.2 kPa
E&M (with or without false ceiling)	-	2.5 kPa
Partition	-	2.0 kPa
Lift machine room	-	15.0 kPa
General office	-	3.0 kPa
General plant room	-	7.5 kPa
Lawn	-	600mm deep soil

Wind Loads

13. The wind loads shall be in accordance with the Code of Practice of Wind Effects in Hong Kong 2019. For simplicity, the solar panel is assumed to be horizontally installed within the 300mm finishes zone above the main roof. Any wind effect induced by the solar panel can be ignored. It can be assumed that all doors are weather sealed and to be closed during typhoon signal 8 or above.

Site Conditions

14. 5mPD to 0mPD	Loose fill, SPT N-value from <10
0m to -5mPD	Medium Dense sand with SPT N-value from 10 to 50
5mPD to -20mPD	Completely decomposed granite, SPT N-value > 200
Below -20mPD	Slightly to moderately decomposed strong rock of material weathering grade III or better, with total core recovery greater than 85%

Ground water is encountered at 2m below existing ground level at +5.0mPD

Omit from Consideration

15. Detail design of lift and stair core
16. Detail design of grass lawn
17. Dynamic effects of workshop roof
18. Details design of crane girder and overhead runway crane
19. Details design of structural elements other than the main building structure, such as planter/ solar panel supports/ curtain wall/ etc.

Section A

- a. Prepare a design appraisal with appropriate sketches indicating two distinct and viable solutions for the proposed workshop and office building. Clearly indicate the function framing, load transfer and stability aspects of each scheme to meet all client's requirements. Identify the solution you recommend and give reasons for your choice.

For the recommend scheme, propose two viable foundation solutions for the workshop structure only. Identify the foundation solution you recommend and give reasons for your choice.

(30 marks)

- b. Explain how the structure will resist wind load including detailed description of the structural wind loads and design assumptions. Prepare detailed wind load calculations for the proposed workshop and office building.

For estimating Along Wind Force W_z , Z_e can be taken as Z (effective height = actual height above ground level at +5.0mPD) and topographic adjustment not required. For the preliminary assessment of major direction wind induced deflection and/ or stability check, W_z could be multiplied by an overload factor of 1.4 to take into the account of the combination of the two orthogonal directions and torsional loads. Individual Torsional Force and Across Wind Base Moment of the workshop and office building could be ignored.

(10 marks)

Section B

For the solution recommended in Section A:

- c. Prepare sufficient design calculations to establish the form and size of the principal structural elements including the foundation. In calculation of wind load, considerations on torsional wind forces and cross-wind base moment and dynamic effect are not required. Design calculation of crane girders and their supports is required.

(20 marks)

- d. Prepare foundation plan and framing plans for Ground floor and main roof of both office building and workshop with sufficient sections and elevations to show the key dimensions, layout and disposition of the structural elements and critical connections details for cost estimation purposes.

For workshop, framing plan and supporting details of the overhead runway crane is required. Provide the corrosion protection and fire protection scheme for the main structural elements.

(25 marks)

- e. Prepare a detailed method statement covering all essential construction activities with maximum dimension of each delivery to be not larger than 3m in width by 3.5m in height by 12m in length.

(10 marks)

- f. Prepare a detailed construction programme covering all essential activities from commencement of foundation to completion of structural works.

(5 marks)

Figure Q1-1 Indicative Ground Floor Plan with Minimum Column Spacings

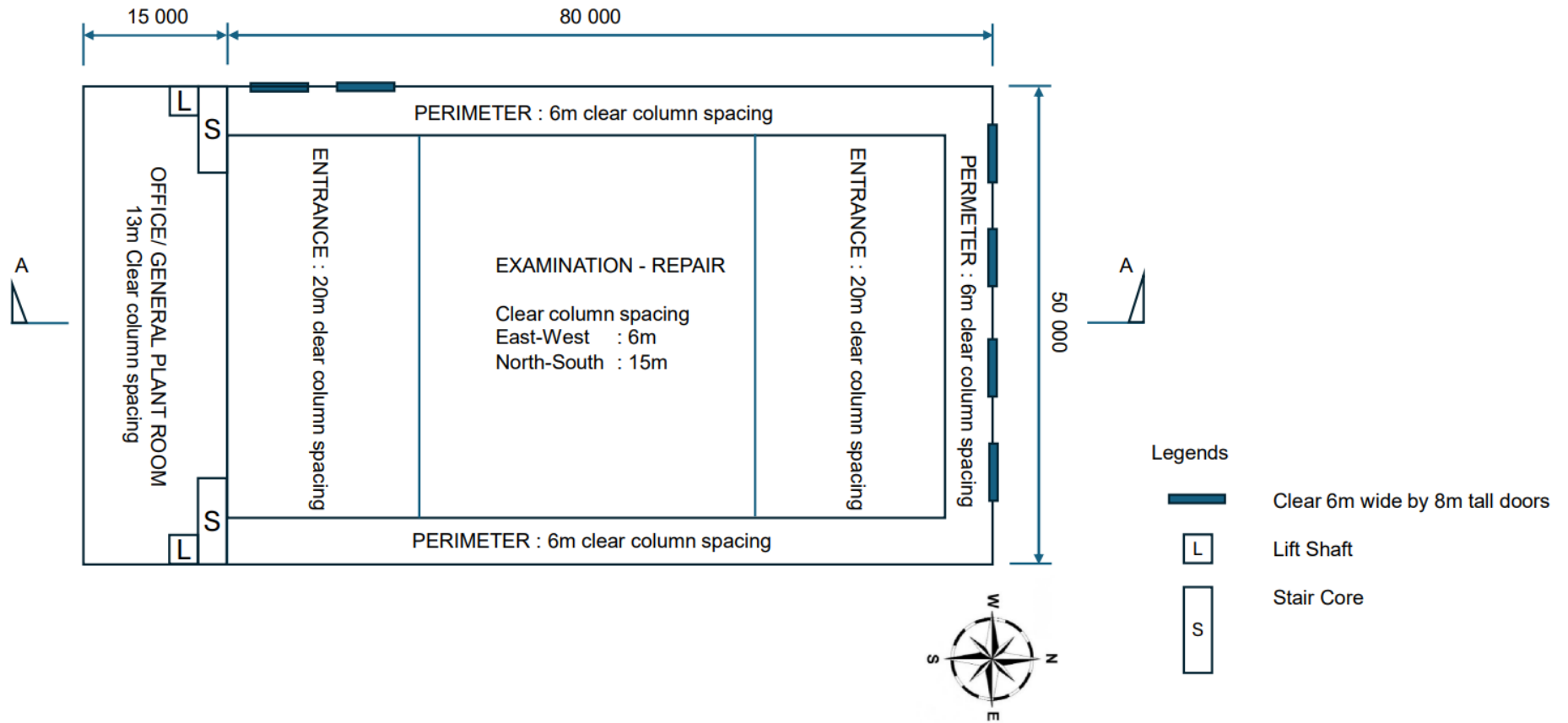
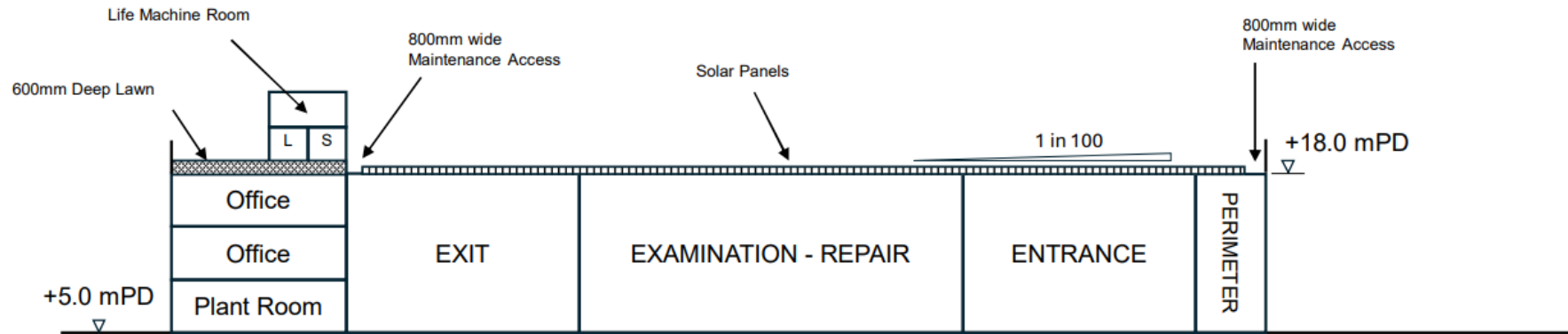


Figure Q1-2 Section A-A



Question 2 Proposed Trunk Road above existing Roadway

Client's Requirements

The following client's requirements must be met:

1. A new vehicular bridge is proposed to run above an existing Roadway to provide a trunk road connecting two towns at South and North. See Figure Q2.
2. The bridge is straight and will connect to existing piers with allowance for supporting at the south side. In order not to affect the slope stability at the north side, no loading is allowed to transfer from the bridge to the existing rock slope. Expansion joints are required at the interface at each side.
3. Allowance for future loading at each existing Pier support (P1 & P2) (Cannot be exceeded):
 - a. Dead and SDL load 2,300 kN
 - b. Live Load 1,650 kN
 - c. Omit wind load effects
4. No supports are allowed at pedestrian areas.
5. The design of the structure should have a minimum and maximum longitudinal gradient of 1.0% and 1.5% fall respectively to allow for drainage.
6. No columns should be located within 0.6m adjacent to the existing Roadway and anywhere within pedestrian areas. The clearance of any new structure to the existing pier at South side shall be 3m while to the slope at North side shall be 2m.
7. Closure of one lane of Roadway at each direction for construction of foundation is allowed only with proper temporary traffic management. Closure of full direction can be arranged only at night for erection of the new vehicular bridge.
8. The minimum requirements on clear headroom over proposed playground, footpaths, and amenity area are as follows:

<u>Location</u>	<u>Minimum Clear Headroom (m)</u>
Pedestrian/Amenity/Landscape Area	3.5
Roadway	5.1

9. The construction is planned to complete in 2.5 years.

Design Requirements

10. The structural design shall be in accordance with the latest version of the Structures Design Manual for Highways and Railways published by the Highways Department of the HKSAR Government.

Imposed Loads

11. The imposed loads shall be in accordance with the latest version of the Structures Design Manual for Highways and Railways published by the Highways Department of the HKSAR Government.

Wind Loads

12. The imposed loads shall be in accordance with the latest version of the Structures Design Manual for Highways and Railways published by the Highways Department of the HKSAR Government.

Site Conditions

13. The site is located at open area with Degree 3 of exposure to wind.
14. Ground conditions as revealed by the Ground investigation boreholes are:

From 0m to 1m	Loose Fill, SPT N-value = 0 – 10 [Category 4(d)] ^{Note 1}
From 1m to 2m	Medium dense soil, SPT N-value = 10 – 40 [Category 4(c)] ^{Note 1}
From 2m to 20m	Very dense soil, SPT N-value > 50 [Category 4(a)] ^{Note 1}
20m and below	Moderately decomposed granite with total core recovery >85% [Category 1(c)] ^{Note 1}

Groundwater is encountered at 3.5m below Roadway ground level.

Note 1: Categories of soil/rock refer to Table 2.1 of Code of Practice for Foundation 2017.

Omit from Consideration

15. Design calculation of parapet and barrier.
16. EQ, Collision, and Fatigue effects.

Section A

- a. Prepare a design appraisal with appropriate sketches indicating two distinct and viable solutions for the span of the proposed vehicular bridge over the existing Roadway including two viable foundation schemes. Clearly indicate the function framing, load transfer and stability aspects of each scheme to meet all client's requirements. Identify the solution you recommend and give reasons for your choice.

(30 Marks)

- b. Explain how the structural will resist wind loading including detailed description of the structural wind loads and design assumptions. Prepare detailed wind load calculations for the proposed bridge including longitudinal, transverse and vertical combination. In addition, numerical verification of the loading effects to existing pier at the south side is required.

(10 Marks)

Section B

For the solution recommended in Section A:

- c. Prepare sufficient design calculations to establish the form and size of all the principal structural elements including the foundation. [Traffic load – LM1 and LM3 with SV196]

(20 Marks)

- d. Prepare foundation plans and details, framing plans (including articulation of bearings), sections, and elevations to show the dimensions, layout and disposition of the structural elements and critical details for cost estimating purposes. Please also include the connection detail at the North side.

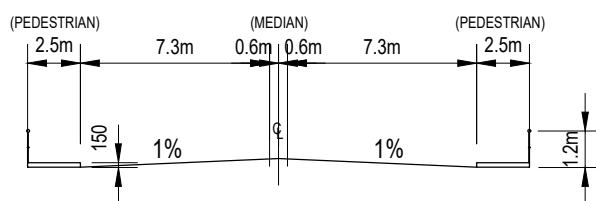
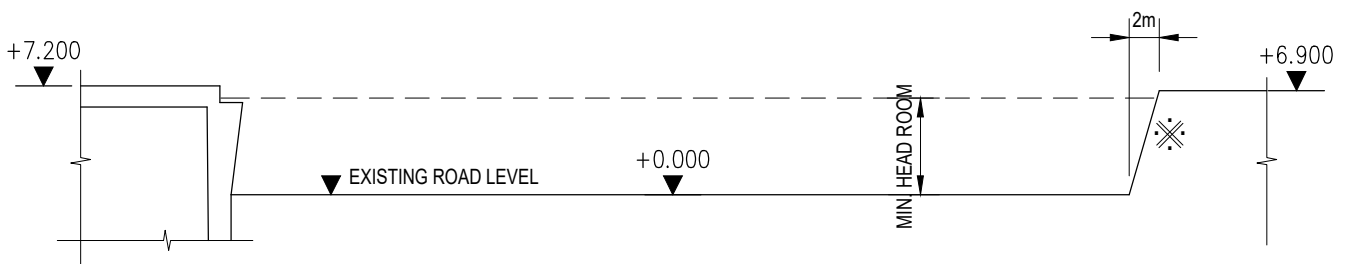
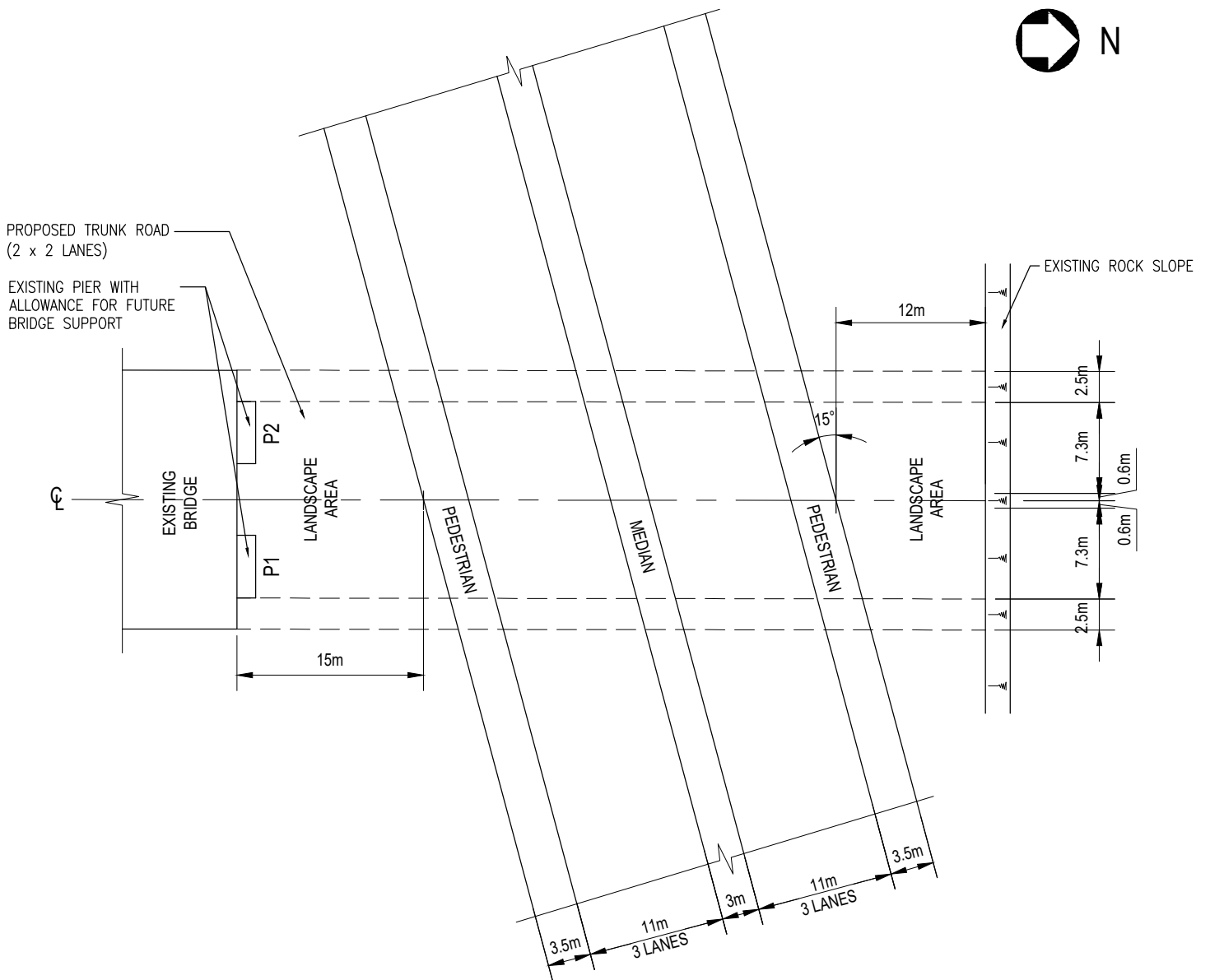
(20 Marks)

- e. Prepare a detailed method statement covering essential activities for the construction of the superstructure and sub-structures of the bridge including foundation works. Please also elaborate the proposed temporary traffic management scheme to allow for successful construction of the proposed vehicular bridge.

(10 Marks)

- f. Prepare a detailed construction programme covering essential activities from commencement of foundation to completion of structural works.

(10 Marks)



CROSS SECTION PROFILE OF THE PROPOSED TRUNK ROAD

SKETCH Q2

Question 3 Proposed Laboratory cum Supercomputing Centre

Client's Requirements

The following client's requirements must be met:

1. A laboratory cum supercomputing centre is to be constructed at the northern New Territories of Hong Kong, in the close proximity of wetland area.
2. The proposed centre consists of 9 storey plus 2-level basement and is in trapezoidal shape as proposed by the architect. A separate car ramp structure is to be provided for access to the basement carpark. See Figure 1 to 2.
3. Part of the lowest 5 floors above basement, between G.L. 5 and 9, shall be designated for supercomputing use.
4. For proposed laboratory use, all columns shall be offset by a minimum 2m along the western and northern elevation of the building, and the other restrictions on vertical elements are as follows:-

Floor Mark	Area	Restrictions*
B2	Chiller Plant Room	No internal column is allowed
B2	Carpark	Minimum clear distance between internal columns should be 5m
B1	Lecture Hall	Minimum clear distance between internal columns should be 10m in North/South direction and 20m in East/West direction respectively
G/F	Transformer Room	Minimum clear distance between internal columns should be 10m
G/F – 8/F	Laboratory	Minimum clear distance between internal columns should be 5m in North/South direction and 10m in East/West direction respectively
G/F – 4/F	Supercomputing	Minimum clear distance between internal columns should be 5m in North/South direction and 10m in East/West direction respectively

* No restriction on spacing between column/wall and service core.

5. The proposed use of the laboratory cum supercomputing centre with the minimum headroom requirements and fire resistance rating is listed as follows:

Floor Mark	Usage	Minimum Clear Headroom* (m)	Fire Resistance Rating	Finishes & E/M Services Zone (m)
B2	Chiller Plant Room	7.5	4 hours	1.0
B2	Carpark	2.5	4 hours	0.3
B1	Lecture Hall	4.0	4 hours	0.5
G/F	Transformer Room	4.0	2 hours	0.5
G/F – 8/F	Laboratory	4.0	2 hours	0.5
G/F – 4/F	Supercomputing	4.0	2 hours	0.8

* The minimum clear headroom is the floor height clear of all structures, finishes and building services.

Imposed Loads

6. The imposed loads shall be in accordance with the latest version of the Hong Kong Code of Practice for Dead and Imposed Loads while minimum live load for laboratory and supercomputing use shall be 7.5kPa and 25kPa respectively.

Wind Loads

7. The wind loads shall be in accordance with the Code of Practice on Wind Effects in Hong Kong 2019.

Site Conditions

8. Ground conditions:

Fill	0-2.5m below ground
Estuarine Deposit (ED)	2.5-13m below ground
Alluvium Sand	13-65m below ground ($c'=0$, $\phi=32$)
Grade III Rockhead	65m below ground

9. The highest possible groundwater level is at existing ground surface.

Omit from Consideration

10. Detailed layout and design of the car ramp structure.
11. Detailed settlement assessment for the Excavation and Lateral Support (ELS) works.

Section A

- a. Prepare a design appraisal with appropriate sketches for the below:
- Two distinct and viable schemes for the proposed laboratory cum supercomputing centre;
 - One viable foundation scheme.

Indicate clearly the functional framing, load transfer and stability aspects of each scheme to meet all client's requirements. Identify the solution you recommend and give reasons for your choice.

(30 marks)

- b. Explain how the structure will resist i) soil load and ii) wind load including detailed description of the structural wind loads and design assumptions. Prepare a detailed soil and wind load calculation and stability checking for the proposed building.

For the purpose of estimating Along Wind Force W_z , Z_e can be taken as Z (effective height = actual height above ground level) and topographic adjustment not required. For the preliminary assessment of major direction wind induced deflection and/or stability check, the Along Wind Force could be multiplied by an overload factor of 1.4 to take into account of the combination of the two orthogonal directions and torsional loads. Torsional Force and Across Wind Base Moment could be ignored.

(10 marks)

Section B

For the solution recommended in Section A:

- c. Prepare design calculations to establish the form and size of all principal structural elements including transfer structures and critical structures (if any).

(15 marks)

- d. Prepare full dimensional framing plans for B1, G/F, 2/F and 5/F.

(20 marks)

- e. Prepare structural details for the principal structural elements including transfer and critical structures (if any), for cost estimation purpose.

(10 marks)

- f. Prepare the design calculation for the building foundation.

(5 marks)

- g. Prepare a preliminary foundation layout plan.

(5 marks)

- h. Prepare an outline construction program covering essential activities from commencement of foundation to ELS to the completion of structural works.

(5 marks)

PROPOSED LABORATORY CUM SUPER COMPUTING CENTRE

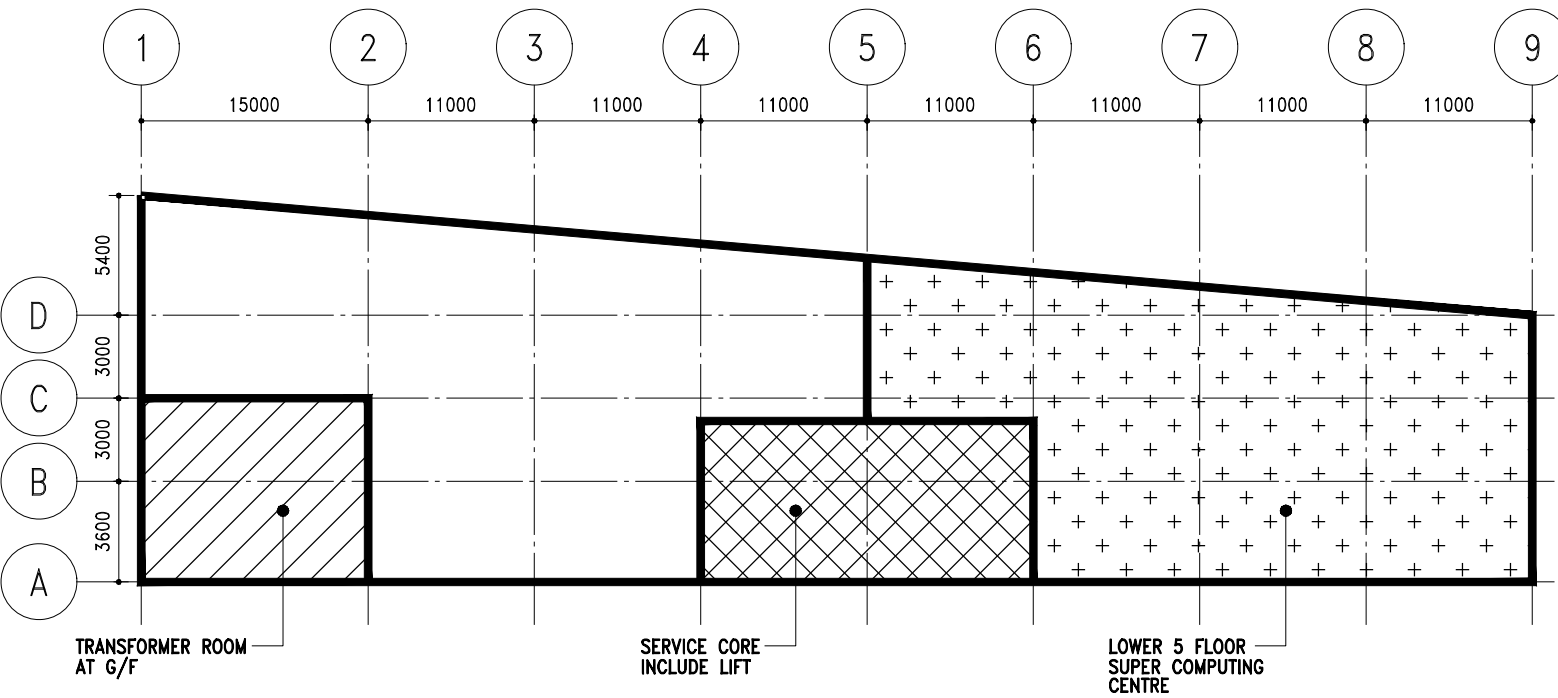


FIGURE 1 – TYPICAL FLOOR PLAN

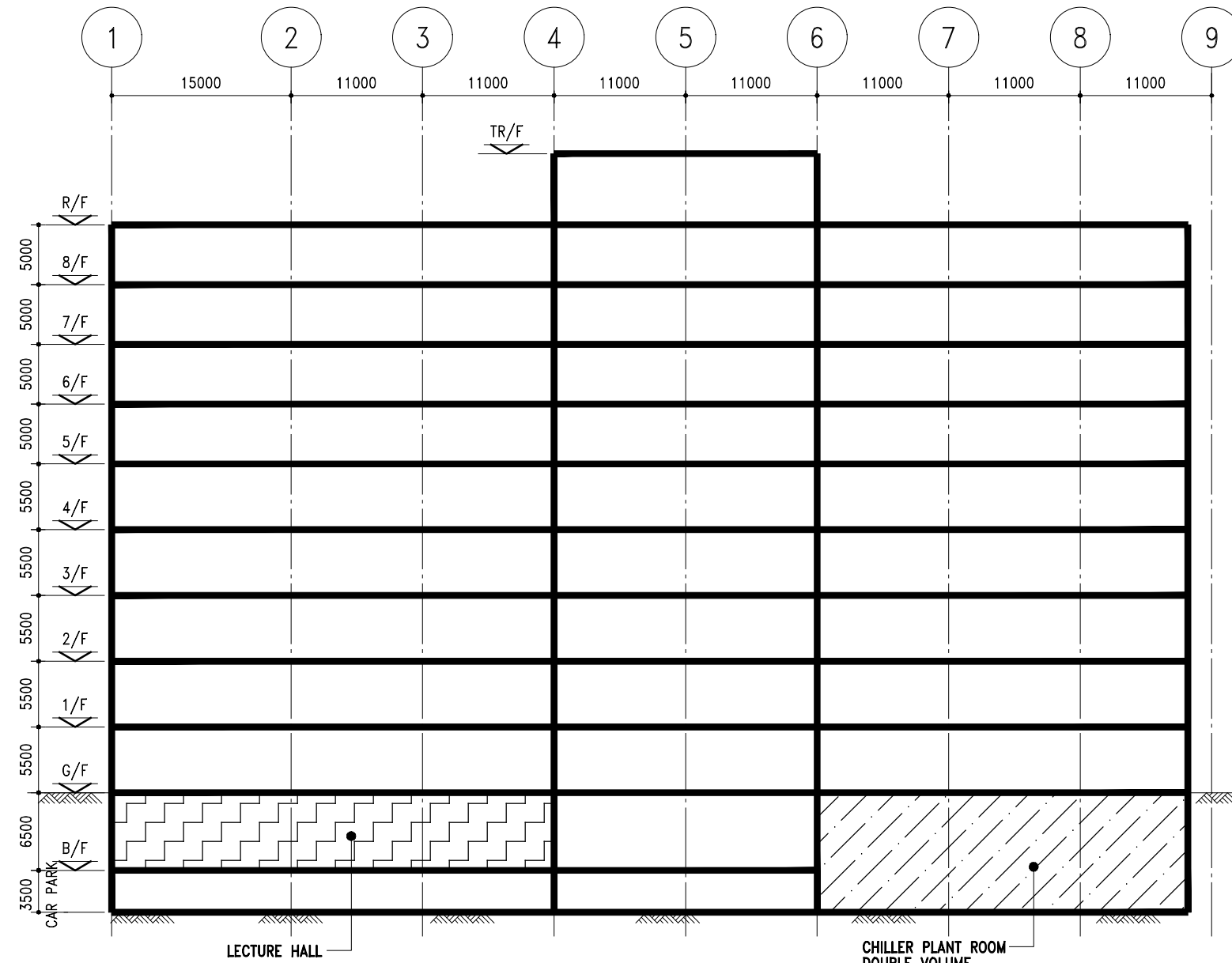


FIGURE 2 – TYPICAL SECTION

Question 4 Resort Hotel

Client's Requirements

The following client's requirements must be met:

1. A resort style hotel building with a large pool deck is to be constructed at the outlying Island of Hong Kong. See Figure 1 to 3.
2. The hotel building has 6 storey and overall plan dimension of 24m x 64m. All hotel bedrooms to have open balcony facing the sea.
3. There is an external pool deck consisting of a 15m wide x 46m long x 1.4m water depth infinity pool to be built over an existing rock slope.
4. The proposed use of the hotel building with the minimum headroom requirements and fire resistance rating is listed as follows:

Floor Mark	Usage	Minimum Clear Headroom* (m)	Fire Resistance Rating	Finishes & E/M Services Zone (m)
Main Roof & Flat Roof at 1/F	Inaccessible	N/A	N/A	N/A
1/F – 6/F	Bedroom and Balcony/Terrace	3.3	2 hours	0.3
1/F – 6/F	Corridor	3.0	2 hours	0.5
G/F	Lobby/ Lounge	4.2	2 hours	0.5
G/F	Restaurant	4.2	2 hours	0.5

*The minimum clear headroom is the floor height clear of all structures, finishes and building services.

5. The restrictions on the location of vertical structural elements are as follows:

Floor Mark	Area	Restrictions*
1/F – 6/F	Bedroom and Balcony	No internal column or wall within each bedroom. Column or wall at edge allowed. No column or wall at external edge of the balcony.
1/F – 6/F	Corridor	3.0m clear width.
1/F	Terrace	No restriction.
G/F	Lobby/ Lounge	Minimum Column/Wall Clear Space 10m.
G/F	Restaurant	Minimum Column/Wall Clear Space 6m.
G/F	Below Pool Deck	No restriction.

*No restriction on spacing between column/wall and service core.

6. The main roof structure shall not be inverted.
7. The building is to be constructed with reinforced concrete.

Imposed Loads

8. The imposed loads shall be in accordance with the latest version of the Hong Kong Code of Practice for Dead and Imposed Loads.

Wind Loads

9. The wind loads shall be in accordance with the Code of Practice on Wind Effects in Hong Kong 2019.

Site Conditions

10. Existing 30-degree rock slope at the south part of the site extending towards the sea.
11. Ground conditions:

From +30mPD to +29mPD	Lose Sand, SPT average N-value = 10 [Category 4(d)] ^{Note 1}
From +29mPD to +27mPD	Medium dense sand, SPT average N-value = 30 [Category 4(c)] ^{Note 1}
Below +27mPD	Moderately decomposed granite with total core recovery greater than 85% [Category 1(c) rock] ^{Note 1}

Note 1: Categories of soil/rock refer to Table 2.1 of Code of Practice for Foundation 2017.

12. The highest possible groundwater level is at existing ground surface.

Omit from Consideration

13. Detailed layout and design of the structure of the service core.
14. External Glass Wall.
15. Stability of the rock slope.

Section A

- a. Prepare a design appraisal with appropriate sketches for the below:
- i) Two distinct and viable schemes for the proposed hotel building;
 - ii) One viable scheme for the external pool deck including support above the rock slope; and
 - iii) One viable foundation scheme for the building and pool deck.

Indicate clearly the functional framing, section, load transfer and stability aspects of each scheme to meet all clients' requirements. Identify the solution you recommend and give reasons for your choice.

(30 marks)

- b. Explain how the structure will resist wind load including detailed description of the structural wind loads and design assumptions. Prepare a detailed wind load calculation and stability checking for the proposed hotel building in both X and Y direction.

For the purpose of estimating Along Wind Force W_z , Z_e can be taken as Z (effective height = actual height above ground level) and topographic adjustment not required. For the preliminary assessment of major direction wind induced deflection and/or stability check, the Along Wind Force could be multiplied by an overload factor of 1.4 to take into account of the combination of the two orthogonal directions and torsional loads. Torsional Force and Across Wind Base Moment could be ignored.

(10 marks)

Section B

For the solution recommended in Section A:

- c. Prepare design calculations to establish the form and size of all principal structural elements for superstructure from G/F (including pool deck) to 6/F including transfer structures, and critical structures (if any).

(15 marks)

- d. Prepare full dimensional framing plans for each G/F (including the pool deck), 1/F and Typical floor.

(20 marks)

- e. Prepare structural details for the principal structural elements from G/F (including the pool deck) to 6/F including transfer and critical structures (if any), for cost estimation purpose.

(10 marks)

- f. Prepare the design calculation for the building foundation.

(5 marks)

- g. Prepare a preliminary foundation layout plan.

(5 marks)

- h. Prepare an outline construction program covering essential activities from commencement of foundation to the completion of structural works.

(5 marks)

RESORT HOTEL

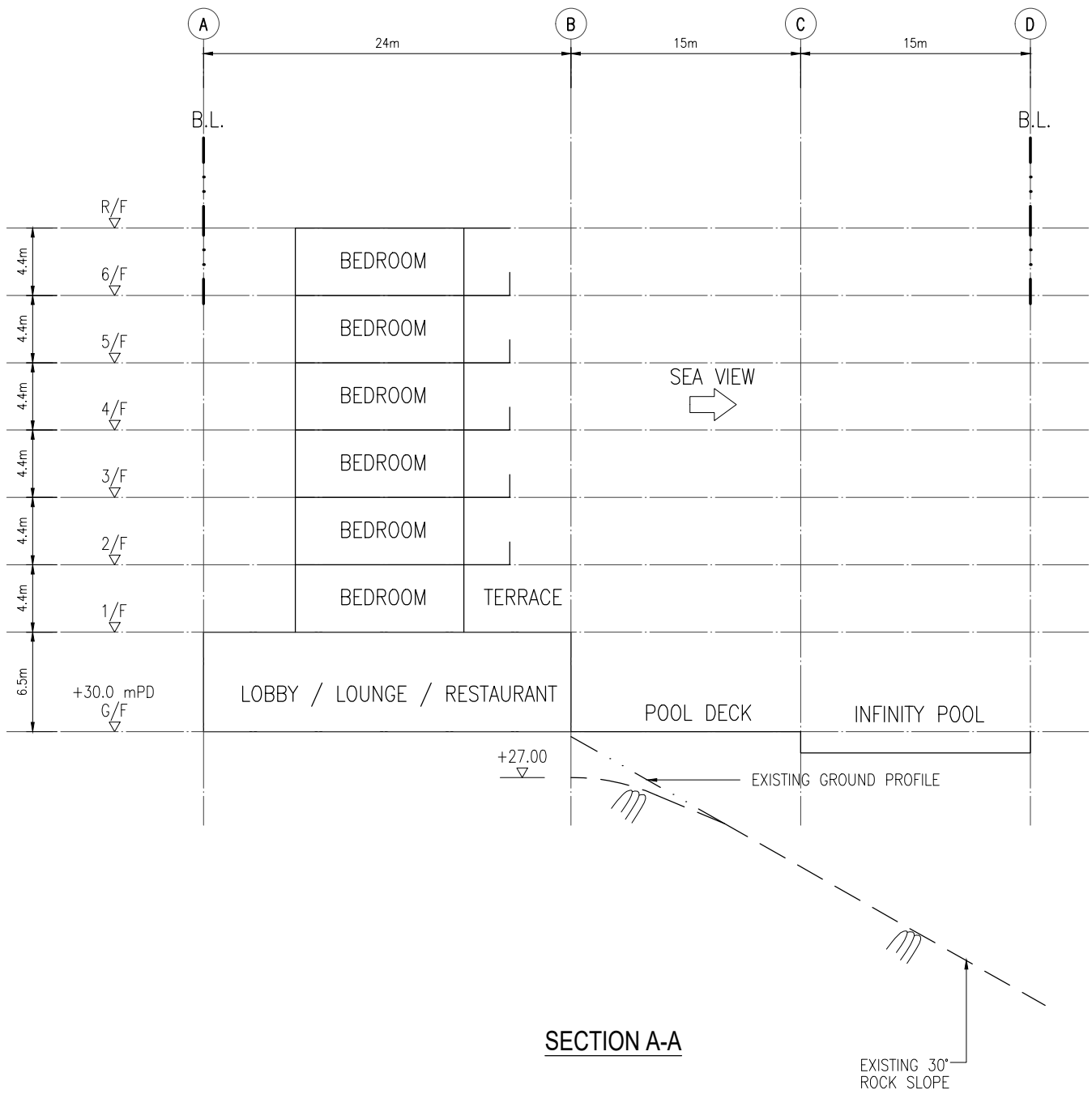
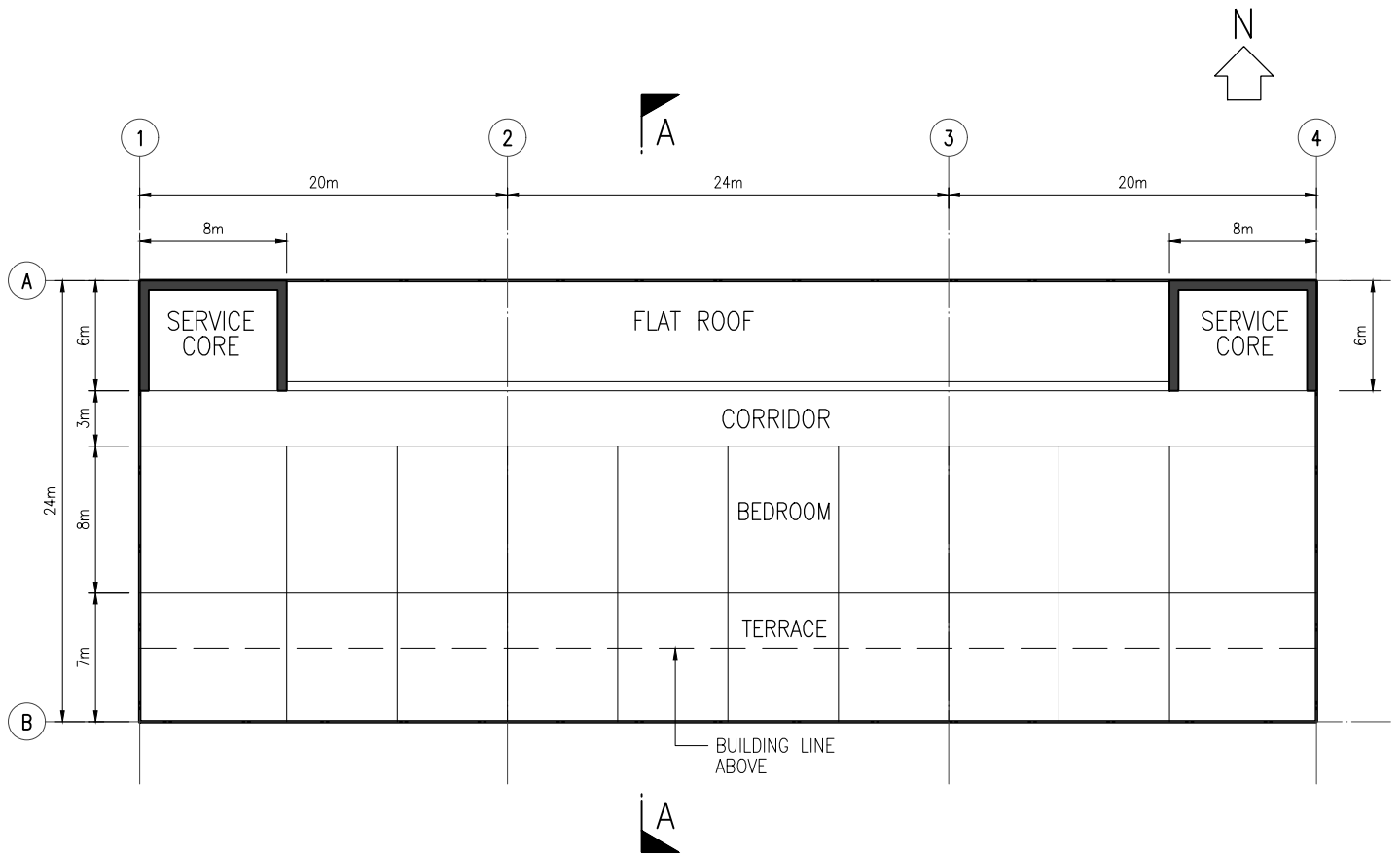
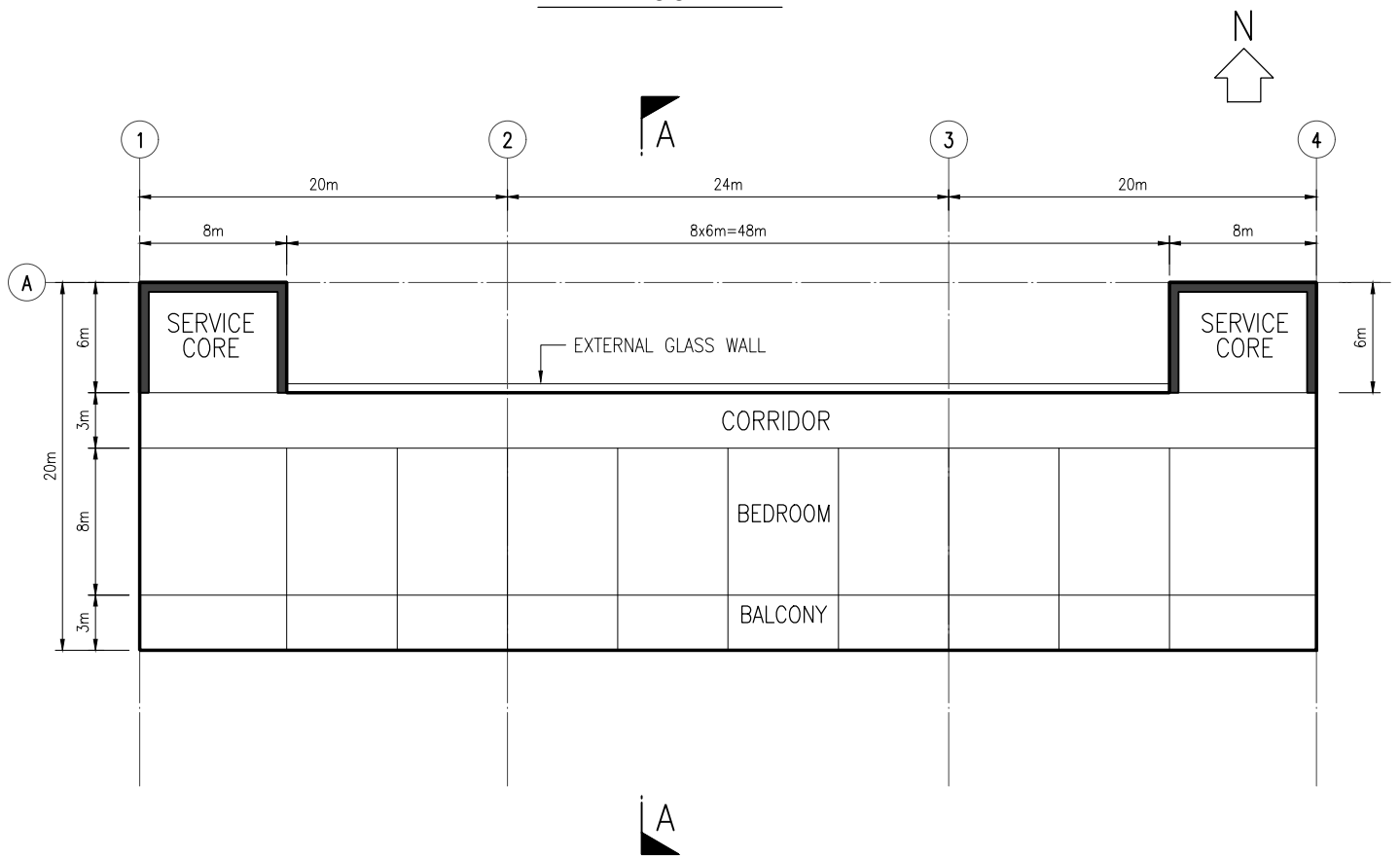


Figure 1



FIRST FLOOR PLAN



TYPICAL FLOOR PLAN

Figure 2

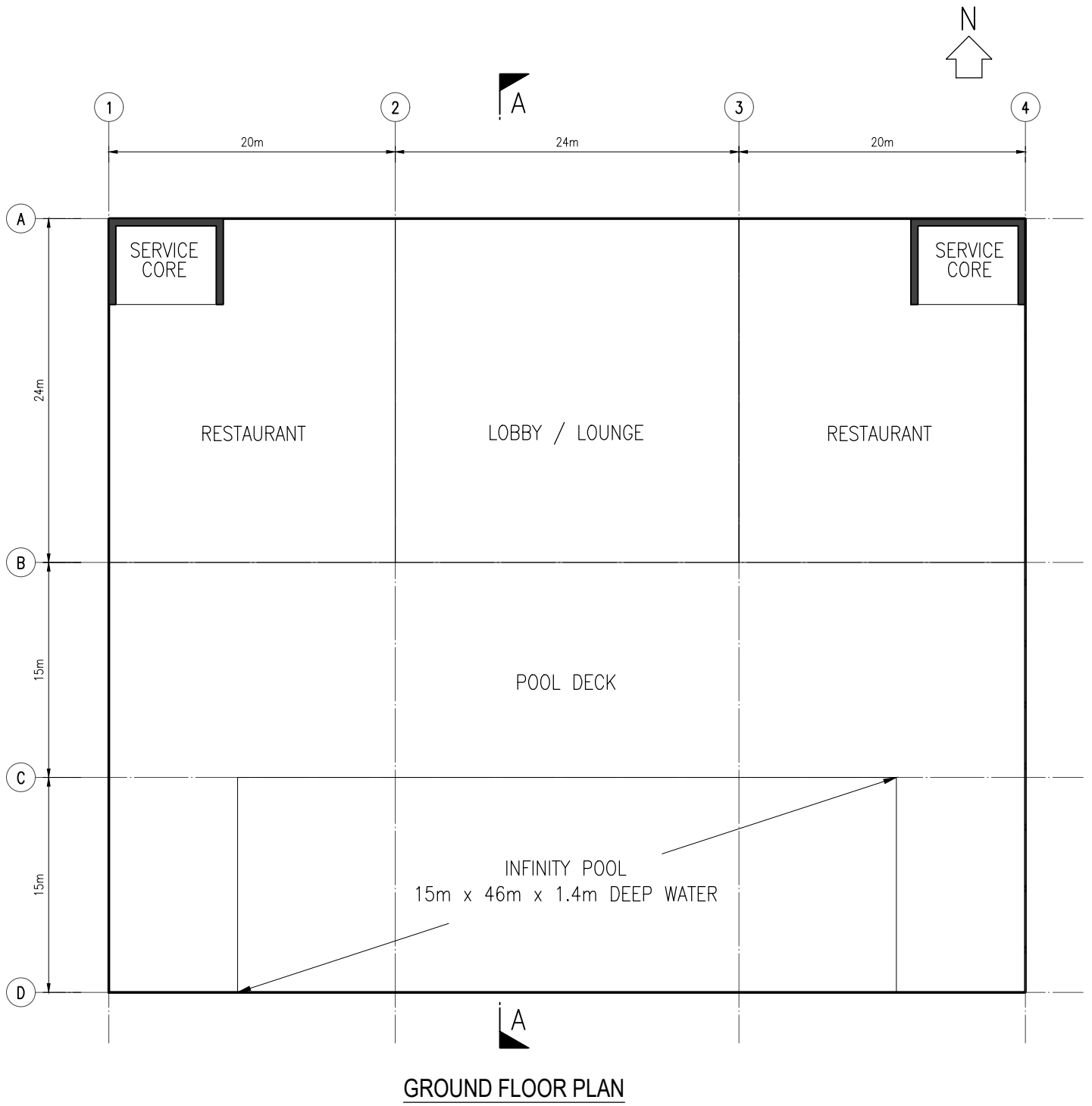


Figure 3

Question 5 Cultural Performance Building

Client's Requirements

The following client's requirements must be met:

1. A cultural performance building located above the existing MTR facility building is to be constructed within the urban area of Hong Kong. See Figures 1 to 8.
2. The building has 12 storey and overall plan dimension of 67m x 29m. It is to be built above the existing MTR facility building. The MTR protection zone of 3m from the building edge of the MTR facility building shall be maintained. No structure, pile or drilling of bored holes shall be carried out inside the MTR protection zone. The structure of the development, E/M services and temporary works shall not occupy the 3m no structure zone above the MTR facility building. No loading from the development can be applied on the MTR facility building.
3. The proposed use of the building with the minimum headroom requirements and fire resistance rating is listed as follows:

Floor Mark	Usage	Minimum Clear Headroom (m)	Fire Resistance Rating	Finishes & E/M Services Zone (m)
G/F	Public Entrance Area	3.5	2 hours	0.5
1/F to 4/F	Classroom/Studio	3.5	2 hours	0.5
2/F	Plant Room [#]	3.5	2 hours	0.5
3/F	Reception	3.5	2 hours	0.5
3/F	Concert Hall	5	2 hours	0.5
5/F to 12/F	Office	3.5	2 hours	0.5
R/F	Non-accessible	NA	2 hours	NA

[#] Finishes and E/M services Zone under the plant room in 2/F is 0.5m.

4. The restrictions on the location of vertical structural elements are as follows:

Floor Mark	Area	Restrictions*
1/F – 12/F	Classroom, Studio, Office	Minimum column center to center spacing is 8.0m
G/F	Public Entrance	Minimum column center to center spacing is 8.0m
G/F	Landscape Area	No limitation on the column spacing. Wall structure is not allowed.
2/F	Plant Room	<ul style="list-style-type: none"> - Minimum column center to center in X direction is 6m. - Minimum column center to center in Y direction is 8m. (Refer to the layout plan for X and Y directions)
3/F	Reception, concert hall	<ul style="list-style-type: none"> - Internal column is not allowed in reception. - Internal column is not allowed in concert hall. - Structural wall and column are allowed between reception and concert hall area.

- * 1. No restriction on spacing between column/wall and service core.
 2. Wall structure is only allowed at the 4 sides of the service core and between the reception and concert hall.

5. The main roof structure shall not be inverted.
6. The floor levels of plant room in 2/F (From grid line 4/5 to 7) and the reception area/concert hall above the plant room can be adjusted if necessary. However, the clear headroom and the finishes and ENM zones for all floors shall be maintained.
7. For cantilever beam or structure (if any), maximum cantilever span to be less than 4.0m from face of support.

Imposed Loads

8. The imposed loads shall be in accordance with the latest version of the Hong Kong Code of Practice for Dead and Imposed Loads.

Wind Loads

9. The wind loads shall be in accordance with the Code of Practice on Wind Effects in Hong Kong 2019.

Site Conditions

10. Existing MTR facility building to be under operation during the construction.
11. Ground conditions:

From +6mPD to +1mPD	Loose Fill, average SPT average N-value = 10
From +1mPD to -22mPD	Completely decomposed granite, SPT N-value 55 to 120
From -22mPD to -25mPD	Highly decomposed granite with total core recovery greater than 85% [Category 3 rock] ^{Note 1}
Below -25mPD	Moderately decomposed granite with total core recovery greater than 85% [Category 1(c) rock] ^{Note 1}

Note 1: Categories of soil/rock refer to Table 2.1 of Code of Practice for Foundation 2017.

12. The highest possible groundwater level is at existing ground surface.
13. Level of ground floor is +6mPD.

Omit from Consideration

14. Detailed layout and design of the structure of the service core.

Section A

- a. Prepare a design appraisal with appropriate sketches including two distinct and viable solutions for the cultural performance building including one viable foundation scheme. Indicate clearly the functional framing, load transfer and stability aspects of each scheme to meet all client's requirements. Identify the solution you recommend and give reasons for your choice.

(30 marks)
- b. Explain how the structure will resist wind load including detailed description of the structural wind loads and design assumptions. Prepare a detailed wind load calculation and stability checking for the proposed building. Calculation for the deflection of the building for compliance of serviceability requirement is not required.

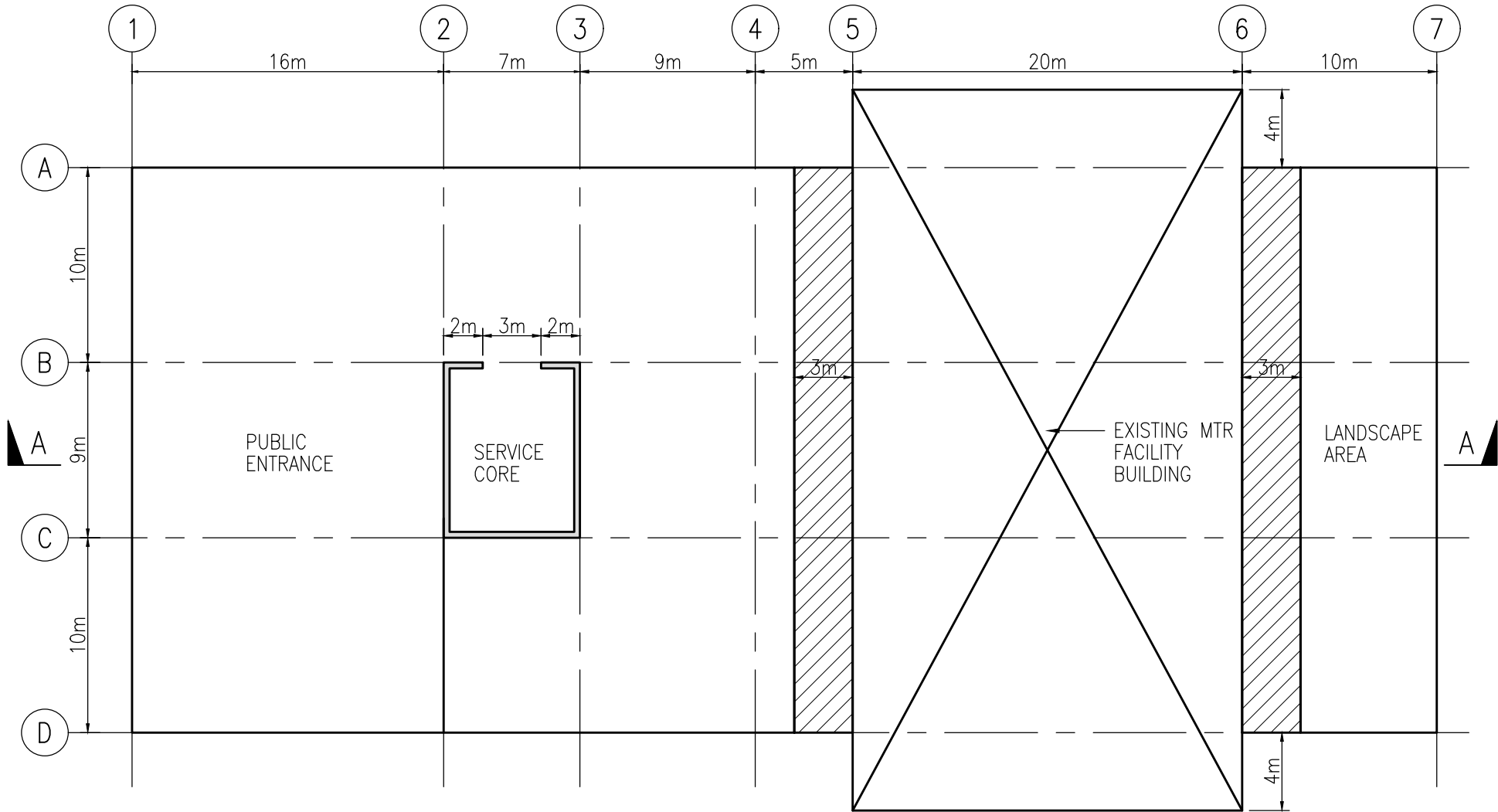
For the purpose of estimating Along Wind Force WZ , Z_e can be taken as Z (effective height = actual height above ground level) and topographic adjustment not required. For the preliminary assessment of major direction wind induced deflection and/or stability check, the Along Wind Force could be multiplied by an overload factor of 1.4 to take into account of the combination of the two orthogonal directions and torsional loads. Torsional Force and Across Wind Base Moment could be ignored.

(10 marks)

Section B

For the solution recommended in Section A:

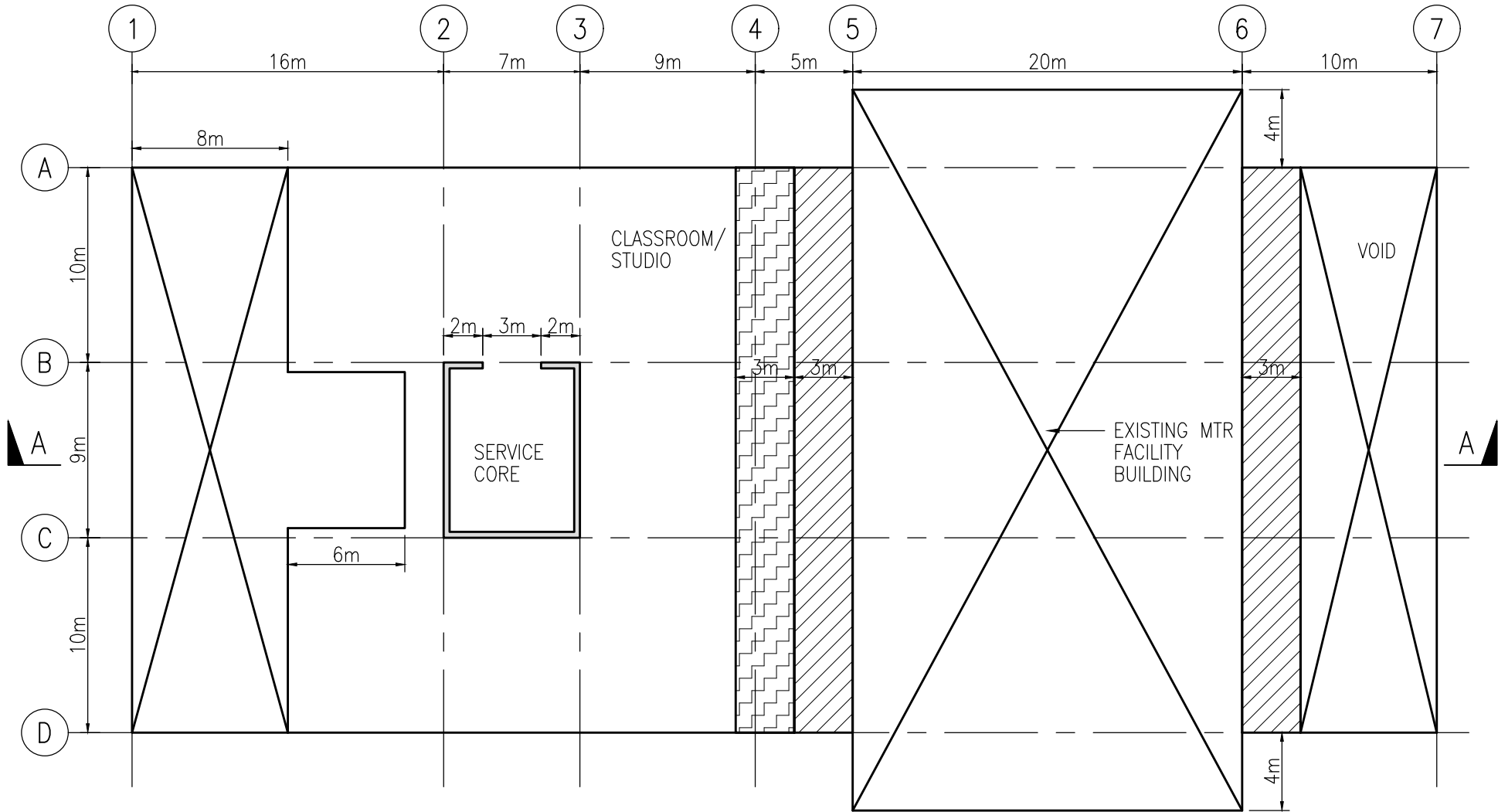
- c. Prepare design calculations to establish the form and size of all principal structural elements for superstructure from G/F to 5/F including transfer structures, and critical structures (if any).
(15 marks)
- d. Prepare full dimensional framing plans for each 2/F, 3/F, 4/F, 5/F and levels with transfer and critical structures (if any).
(20 marks)
- e. Prepare structural details for the critical structural elements including column, main beam, transfer structure and long span structure (if any)
(10 marks)
- f. Prepare the design calculation for the building foundation.
(5 marks)
- g. Prepare a preliminary foundation layout plan.
(5 marks)
- h. Prepare an outline construction program covering essential activities from commencement of foundation to the completion of structural works.
(5 marks)



LEGEND:

 MTR PROTECTION ZONE

G/F PLAN
1 : 300

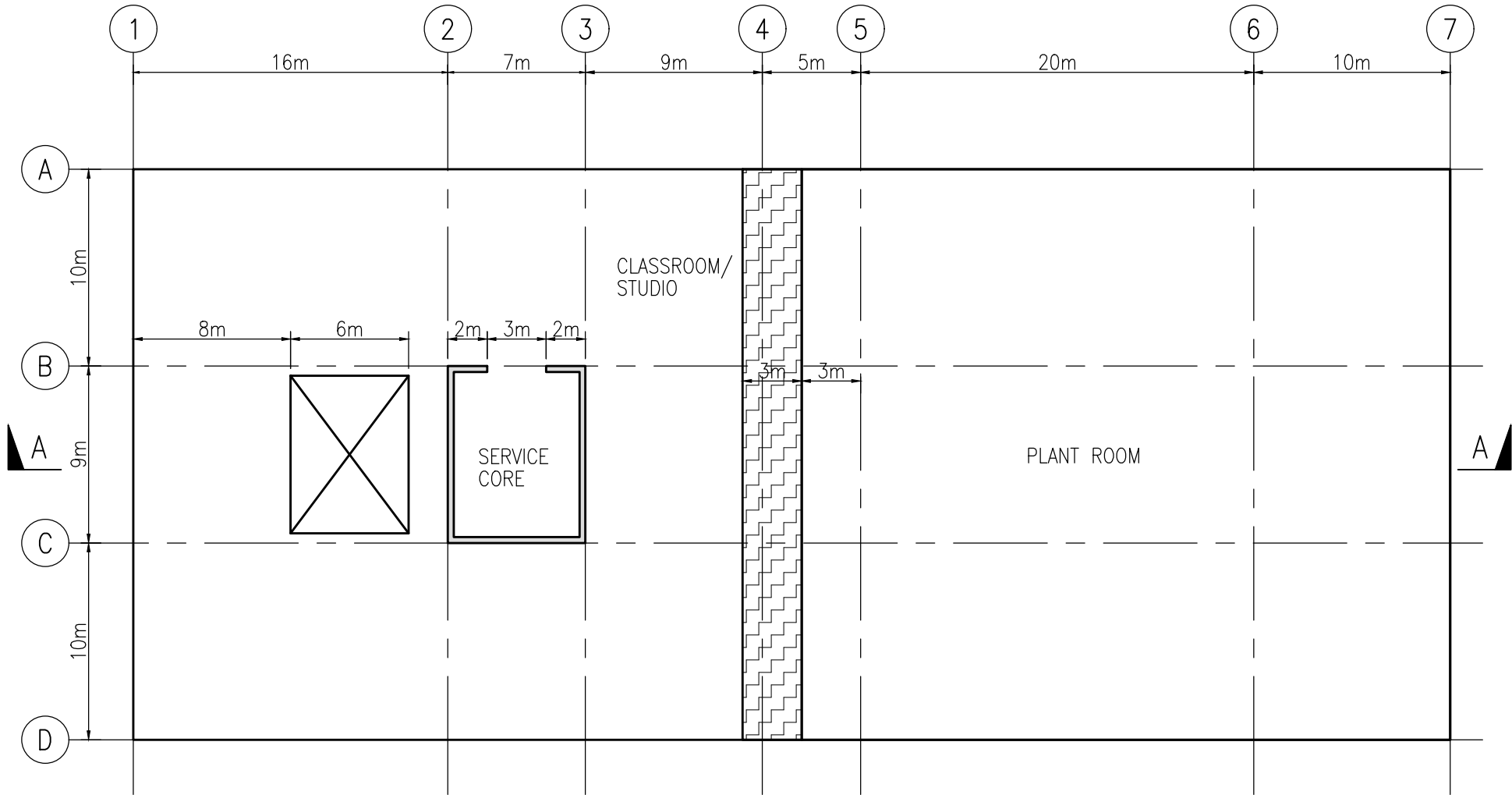


LEGEND:

-  MTR PROTECTION ZONE
-  NO HEADROOM REQUIREMENT ZONE

1/F PLAN
1 : 300

Figure 2



LEGEND:

 NO HEAD ROOM REQUIREMENT ZONE

2/F PLAN
1 : 300

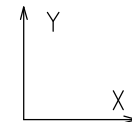
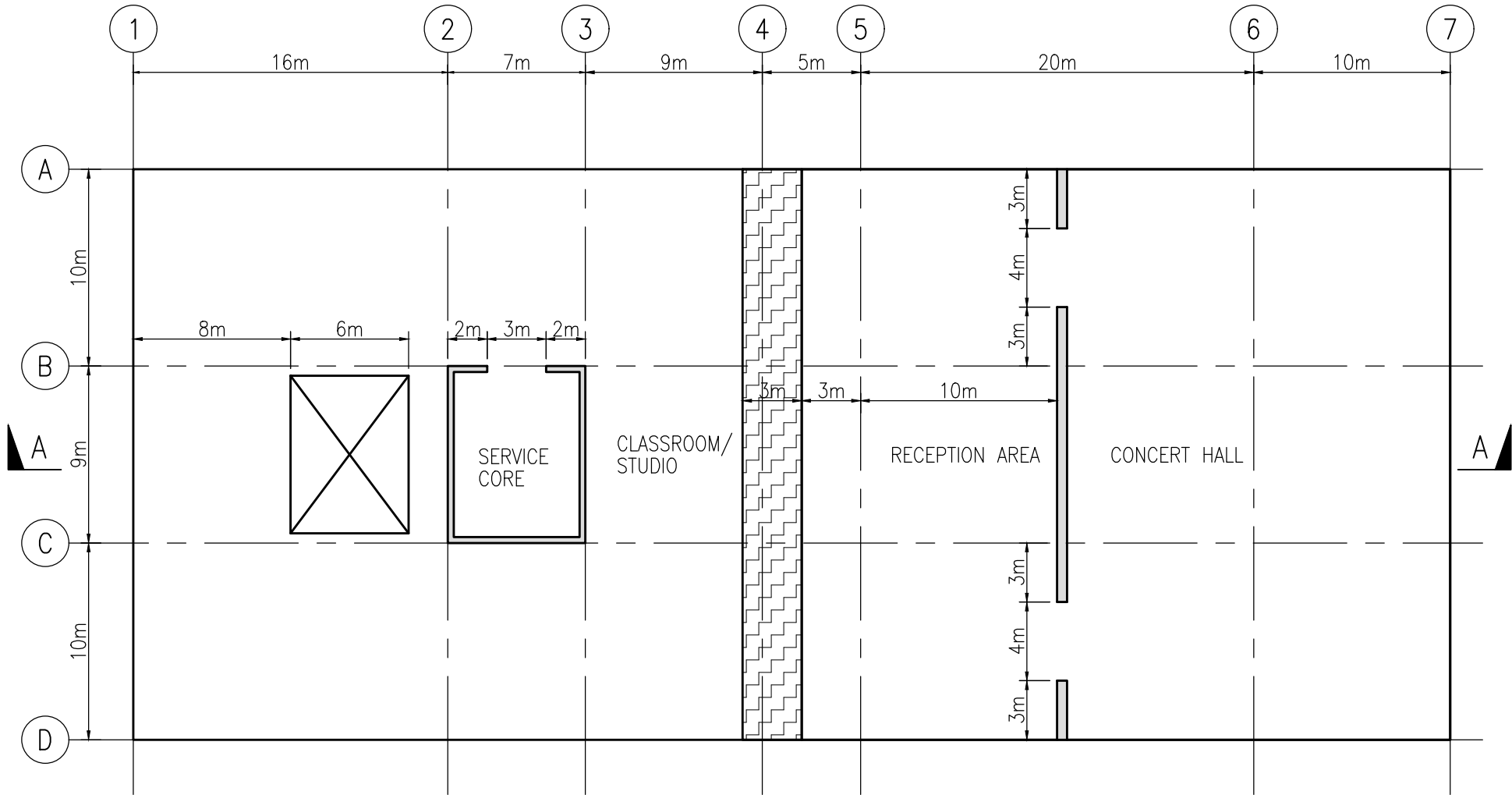


Figure 3

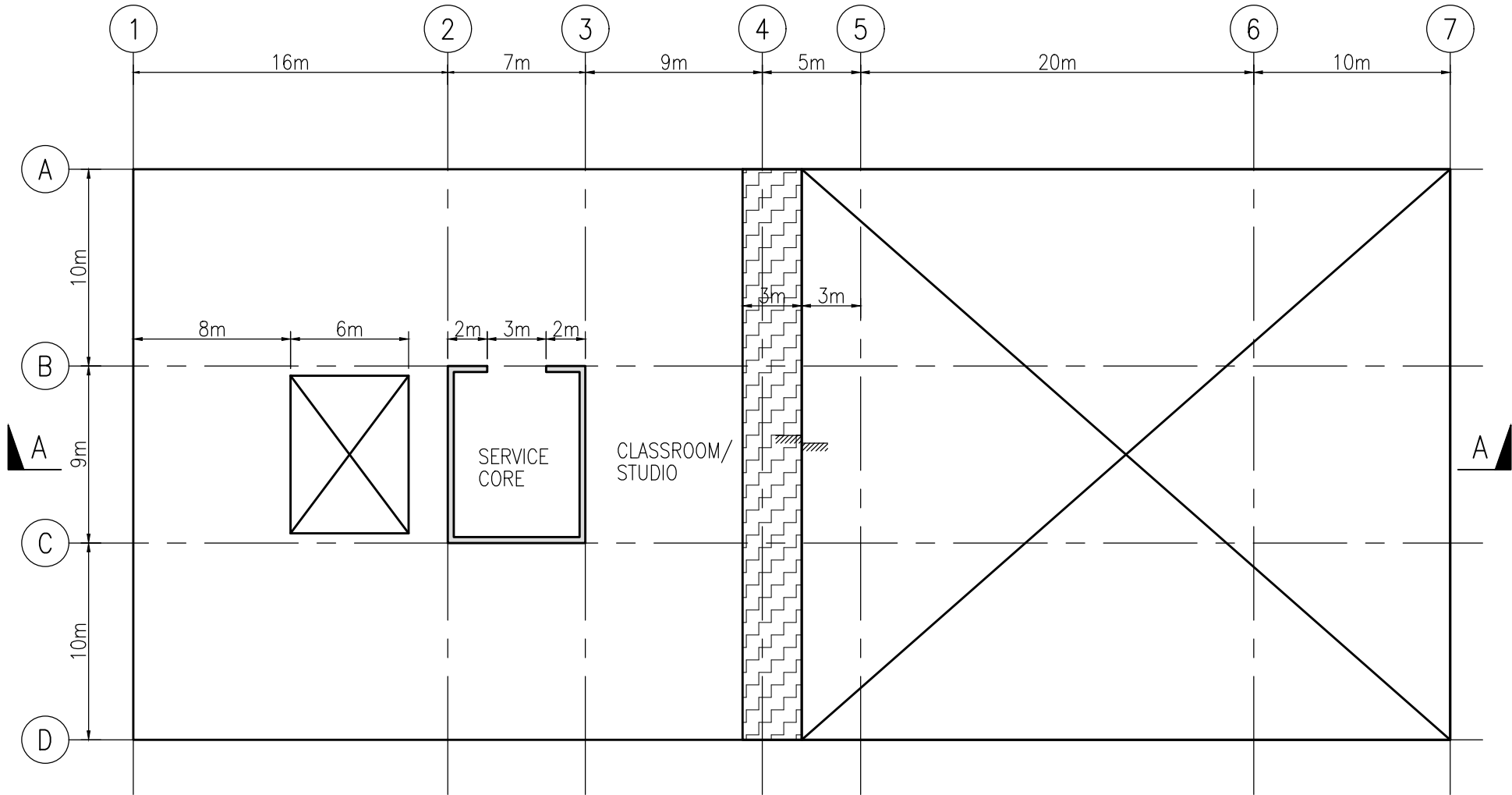


LEGEND:

 NO HEAD ROOM REQUIREMENT ZONE

3/F PLAN
1 : 300

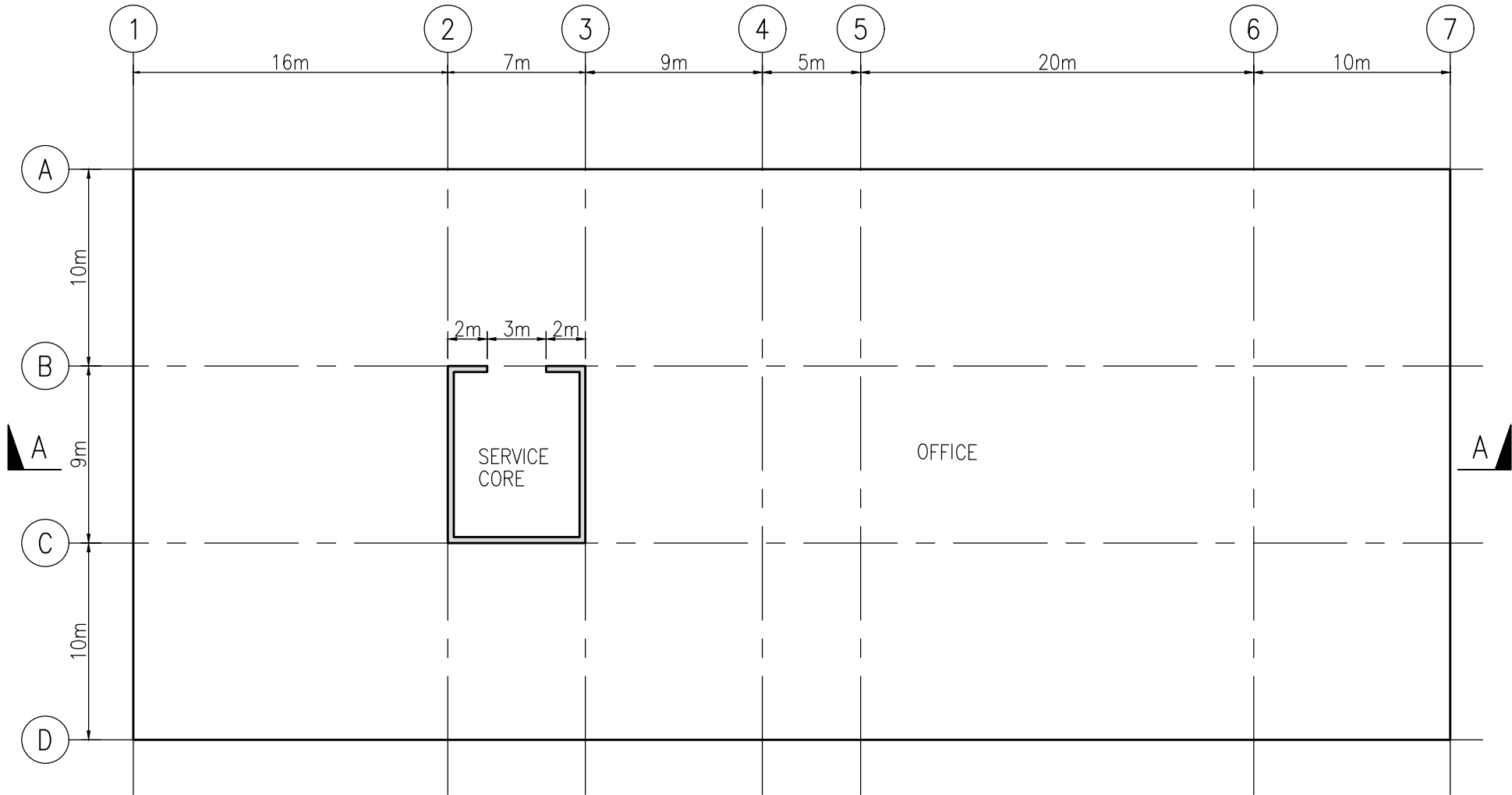
Figure 4



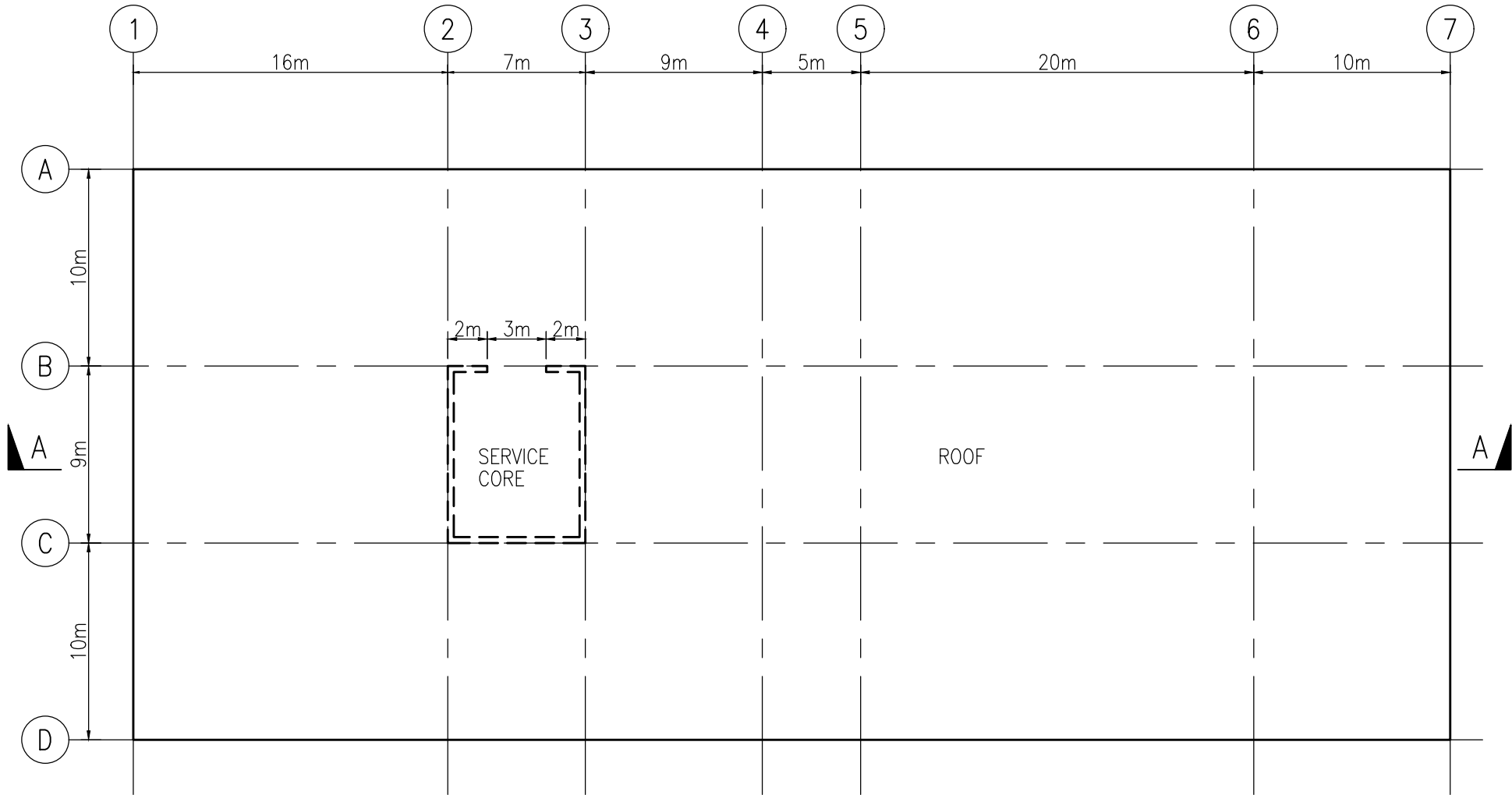
LEGEND:

 NO HEAD ROOM REQUIREMENT ZONE

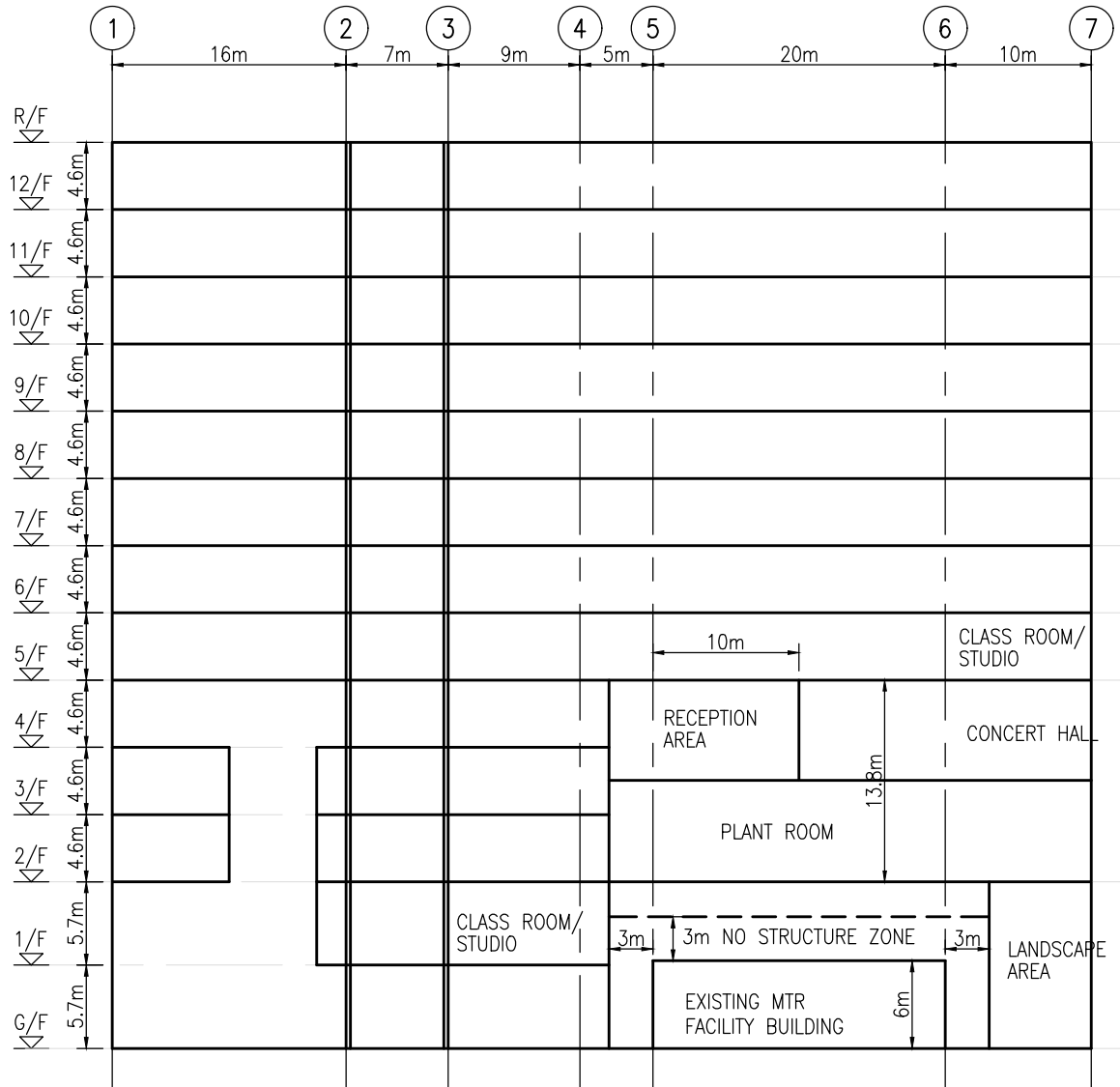
4/F PLAN
1 : 300



5/F TO 12/F PLAN
1 : 300



R/F PLAN
1 : 300



SECTION A-A
1 : 500

Figure 8