The Institution of Structural Engineers

Exam Preparation Guidance

Incorporated-Membership Examination

Version: 1 - 2024

Document date: 26 March 2024

The Institution of Structural Engineers

Contents

Disclaimer

This document has been produced by the Institution's Examinations Panel and is designed to aid you in your preparation. It contains vital hints and tips for each section of the exam but does not constitute a complete 'how-to' guide to answer the questions. This guidance should be used in conjunction with your other chosen methods of preparation and can be taken into the Examination as a handy reminder of the basics.

Key Contributors:

Anne Fuller MIStructE – Chair, Examinations Panel

Gordon Harris FIStructE – Examinations Panel member and Chief Examiner

Introduction to the exam, general tips, and time management

Introduction to the Exam

The Institution of Structural Engineers' Incorporated-Membership Examination forms one half of the Professional Review process required for election to Incorporated-Membership (IMIstructE).

The Examination tasks you with demonstrating the validity of your training and experience. Examiners must be satisfied that you have conveyed an understanding of structural engineering principles, an ability to initiate and communicate structural design and provide an effective solution to a structural design problem.

The Examination is seven hours in duration. Candidates must answer one question from a choice of four. All questions have two sections and BOTH parts of the question must be satisfactorily answered to achieve a pass:

Section 1 (30% of total mark) covers design concept, presentation, identification of various structural forms (including stability and loading transfer aspects) and a selection of the most appropriate materials. Candidates are required to propose a viable, sustainable solution to a complex brief. This must be reviewed and critically appraised to justify taking forward the recommended solution while using sustainability as a key criterion. A design change will also need to be addressed in a letter to the client.

Section 2 (70% of total mark) requires you to provide relevant design calculations with approximate A1-A3 carbon footprints, general arrangement drawings and defined details, together with a method statement commenting on possible construction methods, choice of materials, specifications, estimates, management procedures, site control and safety and supervision of works in progress.

The Examination presents three main challenges which will be covered throughout this guidance:

- Ensuring that all aspects of the brief are fully understood
- Being able to propose a viable and sustainable scheme that satisfies the brief
- Producing detailed answers to all five elements of the Examination in the time available

General Tips

Past papers are added to the website to enable candidates to practise questions and familiarise themselves with the demands of the Examination.

The Examination is open book, but candidates should note that this can lead to a false sense of security. There is a lot to cover in the Examination and candidates may waste valuable time searching through reference books. To save time, candidates should prepare a folder with key reference documents and a contents page or index to help them locate information quickly.

Any design code or standard may be used to answer the questions in the paper, so long as reference to that code is consistent throughout and any assumptions made, or design data adopted (including loadings other than those specified in the question) are stated at the beginning of the answer.

When practising questions and during the Examination, candidates should be mindful of the following examples of what can be found in a poor solution, and will result in candidates losing marks:

- Unsafe structural scheme (this will result in automatic failure of the Examination)

- The structure must include all elements of the building; the roof and ground slab are an integral part and should be considered
- Where a question defines the external finish as curtain walling or full height glazing, avoid the use of obtrusive diagonal bracing, unless the question clearly permits, or can be justified.
- Lack of understanding of the geotechnical information provided in assessing foundation requirements
- The unnecessary use of piling where pads or raft foundations would be quicker and more economical
- Rambling essays that provide no clear picture of the structural integrity or viability of the scheme
- Design statements which are then contradicted by the calculations and/or details
- Unnecessary re-writing of the question or extracts from the codes of practice and standards
- No justification of scheme choice or reasons for selection
- Too much time spent on non-critical or unrealistic loading cases
- Too many repetitive calculations, or calculations of a simple nature and not of the principal elements
- Poor general arrangement layout and details with insufficient information for estimating purposes
- Answers to the final sections of Sections 1 and/or 2 which are composed of generalities and do not relate specifically to the problem stated

The Institution asked candidates who passed the exam for their “top-tips”. Tips relating to the Examination in general are shown below and should be helpful to candidates who are about to embark on their own exam preparation:

- ‘Start collating your design notes in a paper file early in your career. The temptation these days is to rely on digital copies, but you won't have access to these in the exam.’
- ‘As you prepare for the exam, keep a note pad of things you need to research etc. I found this an invaluable tool. As I did questions, I constantly wrote notes of things I needed to read up on, then tried to spend one evening a week researching them. Lots of things repeat themselves in questions so patterns do emerge.’
- ‘Ask someone to review your practice attempts and give you feedback. It’s important to know that you are expressing your ideas and knowledge in an understandable way. It’s no use knowing good solutions if you can't present them well under the time pressure.’
- ‘Practise different methods/ styles of sketching and drawing schemes, plans and details under time pressure. Certain sized buildings/scales of drawing require different techniques to present your ideas in a clear fashion and within the time available. Get some coloured pens and practice with them.’

Time Management

Creating a timetable for the Examination will help candidates ensure sufficient time is allocated to each section of the Examination.

As candidates need to play to their own strengths, timetables need to be personalised and reviewed after “mock exams” to provide a bespoke guide on the day of the Examination. Table 1 shows an indicative timetable which candidates may find a helpful starting point when preparing their own timetable.

Table 1: Indicative timetable

Question Section	Activity	Mark allocation (%)	Time allocation – based on marks (minutes)	Rationalised time allocation (minutes)
	Option investigations			20
1a	Option appraisal	16	67.2	65
	Recommendation	4	16.8	15
1b	Letter	10	42	40
2c	Calculations	30	126	105
2d	Drawings	30	126	105
2e	Method Statement	10	42	40
	Checking			30
Total		100	420	420

Several candidates who have passed the Examination provided their tips for time management:

- 'Take a watch to the exam - you can't always see the clock depending on where you sit in the exam room.'
- 'Sit full mocks in exam conditions – no phone, bring a lunch and everything you need. Select several years and do not look at them before you sit down, so you can recreate the environment of opening a new exam paper on the day. I think I did four of these. Not fun, but it made the actual day run like clockwork - I didn't have a problem sticking to my time and had 15 mins to review at the end as planned.'
- 'Rule of thumb, simple equations and design charts are very handy, as you will have very limited time to prepare your calculations. Condense and compile them in an orderly manner for easy access.'
- 'In the exam, if you think you're running behind and won't finish, don't panic! Just get the essential points down and keep going. Make sure you have a stab at all parts even if it's just a few notes.'
- 'Timing is crucial. Plan out your day, write this down and take it into the exam with you. Allow for 15 to 20 minutes to think through your solution. You don't want to decide part way through your answer you have picked the wrong solution. Allow some time for checking.'

Providing a viable and sustainable solution

Part 1a asks candidates to prepare *'a viable and sustainable solution for the proposed structure'* and then to justify the reasons for the scheme using sustainability as a key criterion. This section has a total allocation of 20 marks, which is divided into 16 marks for the solution, and 4 marks for the justification.

This is the most important part of the examination and should be considered as such as it sets the scene for the remainder of the answers required in the paper. Use the time allocated wisely and sensibly. Candidates must be competent in concept design and experienced in using a variety of materials; concrete, steel, timber, and load bearing masonry. Experience in differing construction techniques, such as prefabricated or insitu, is required. Stability options must be considered, such as braced or unbraced structures, and varying types of foundations; raft, pads, strip footings, or piling, both load bearing and retaining.

The following briefly outlines the philosophy behind this section, as contained in the Exam Guidance and Instructions document:

'For the building structure questions, the chosen scheme should include the functional framing, basic grid layout, load paths, foundations, and stability provision etc. For the bridge question, the chosen scheme should include the bridge structure with proposed spans, abutments, load path to the foundations, and the foundations. Sketches may be used alongside text to describe the proposed scheme. These may be free-hand and are not required to be to scale but they must clearly convey the design principles being proposed. Calculations of a detailed nature are not required in this part of the question; member sizing to indicate the principal elements for the proposed scheme may be sized using engineering judgement. or rule of thumb, e.g., span to depth ratio'.

Structural stability is a fundamental aspect of the scheme design, and an unsafe structure, or instances where stability is ignored, will result in automatic failure.

Candidates should demonstrate approaches in their design which minimises the use of material through structural efficiency. Candidates should consider which materials are most likely to be appropriate for the brief, however this would not need to extend to undertaking carbon comparisons at this stage. Where a reuse opportunity is provided in the question it is expected that candidates will take advantage of this in their scheme and include the benefits in identifying the most suitable solution.

The examiners are looking for candidates to clearly identify and address the main structural challenges contained within the question and marks will not be awarded for generic answers to any part of this section.

The following gives a brief, but not exhaustive, indication of what could be considered in developing the proposed scheme.

- For a long span question such as a warehouse, factory etc., depending on the span, the material alternatives could be steel, timber, or precast concrete, with the design being either a portal frame, column and truss, a two or three pinned arch, or cable stayed. The stability provision could be braced or unbraced, with foundation alternatives of pad or piled foundations. The grid centres will depend on the external finishes and the economic span of the supporting members, usually purlins and sheeting rails. Consideration must also be given to the centres of material expansion joints, such as blockwork, which may dictate a non-variable grid. If the building is long and requires a vertical expansion joint, then both parts of the structure must be stable.
- A multi-storey building structure has many material alternatives and varying construction techniques that can be considered. These include insitu concrete, one-way or two-way spanning slabs, post-tension slabs, a steel frame with composite or precast concrete floors, timber frame post and floors, and load bearing masonry with insitu or precast concrete floors. An alternative may be the use of a combination of these materials such as part concrete, part steel superstructure, particularly where a penthouse or dormer roof is required. Stability options for any of the above could be braced or unbraced. Often the grid may be predefined by the geometry of the building, or the end use such as a hotel or apartment building with defined bedroom locations. Proposing a grid such that a column falls in the middle of an internal or external wall of a bedroom etc., where a window or door would be located, is an automatic mark down. The same applies for any diagonal bracing. The grid centres again may be dictated by the external finishes. If cavity wall construction is defined, the expansion joints for blockwork and masonry/stonework are normally at 6.0m and 12.0m centres, which defines a grid, whereas curtainwall has secondary support mullions so the grids could vary. The foundations, depending on the geotechnical information, could be pads, raft or piles. The combinations of distinct and variable options are endless, and candidates must be flexible and consider the above and any other alternatives.
- Where the building is of a low rise and conventional construction, such as masonry external elevations, then domestic type construction could be considered. This would include load bearing masonry with timber or precast concrete floors, total timber construction, or a light steel frame. Usually, this form of building is a

braced structure using internal and external walls as bracing, diaphragms, or buttressing. If the building is low rise and fully glazed externally then an unbraced structure could be considered. Foundations could be either strip footings, pads, or raft foundations.

- The ground slabs for any development are an integral part of the building and must be considered as part of the design. The geotechnical information will give clear indication of the types of construction that could be considered, such as site strip and ground bearing slab with edge beams, site strip, ground improvement and ground bearing slab with edge beams, or a suspended slab with internal ground and edge beams. If piled foundations are proposed, with individual pile caps, then balancing beams must be considered to take out the moment due to construction tolerances permitted for piling.
- Similar considerations are required for the bridge question, again depending on the form of the question. Construction techniques, along with erection and installation considerations, are important for each scheme, plus health and safety considerations. The material considerations are usually precast or insitu concrete decking, with precast prestressed concrete beams, reinforced precast concrete beams, or insitu concrete beams and steel beams. Stability can be provided by bracing, diaphragm action or post tensioning.

How to justify the proposed solution

There are four marks allocated to this task and it is worth some consideration. Remember, you are aiming to impress the examiners with your knowledge of construction economics and techniques with their benefits and disadvantages.

The question requires you to '*justify the reasons for your solution using sustainability as a key criterion'*. This implies a degree of discussion around the relative merits of the proposed solution and requires more than a simple list of the various scheme elements with a tick or cross against each. Sustainability must also be a key criterion in your scheme selection.

There are many aspects which can be considered in the appraisal. Try to identify any key features or requirements in the brief of the question you are answering and make sure that you address these in your justification. For example, if your structure is in a remote or inaccessible location, availability of materials and skilled labour may influence your choice more than construction cost, whilst aesthetics is likely to be a more important consideration in an art gallery than in an industrial building. Some typical examples of things you might discuss in your answer are listed below; however not all of these will be applicable to every question and the list is by no means exhaustive:

- Economics - Consider the structural efficiency; for example, what are the most economic materials/construction methods for the spans you need to achieve? Also consider the impact choice of structural frame can have on overall cost. For example, flat slab construction may not provide the least expensive structural frame but could simplify service routing and thus reduce servicing costs in a heavily serviced building such as a hospital or could reduce the height of a tall building thus saving on cladding costs.
- Programme - Think not only of speed and overall timescale, but also of construction sequence.
- Construction and demolition - How do your proposals affect safety during construction? Does the scheme require specialist skills or equipment? Does it require extensive temporary works? Similarly, does your scheme present challenges for demolition or dismantling, for example post-tensioned structures?
- Location - Does the setting of your structure preclude the use of certain materials or construction techniques? Is transportation of materials difficult?
- Maintenance - Can your solution be maintained easily and safely?

Other considerations could include robustness, construction quality, aesthetics, flexibility for adaptation or extension, environmental impact etc. The list is almost endless, but please make your justification relevant to your chosen question's brief and avoid generic discussions.

Finally, don't forget that you are going to have to prepare a scheme design for the chosen solution using nothing more than a calculator. It is therefore clearly best to avoid recommending anything which would require complex software to design, or indeed anything you are not confident you can easily develop a design for in the time available.

Writing a professional communication to the client

The professional communication requested in Section 1b is an important part of the Examination as it constitutes the candidate's direct formal contact with the client. It offers the opportunity for the candidate to demonstrate their understanding of sustainable design alongside their engineering ability, vision, and skill to propose in a clear and concise manner possible beneficial amendments to the brief.

The communication is personal to the client and as such needs to be addressed in a professional manner, therefore it should begin 'Dear Client' and finish with 'Yours sincerely.' It is acceptable for candidates to answer this part of the question in an email format. However, this must still be written in a professional way.

The letter/email and its content is in response to a request from the client to suggest changes to the brief and design in order to reduce the amount of material used. Attention should be paid to any structural design features that cannot be altered. These will be made clear in the question text.

Candidates are expected to critically evaluate the brief and propose amendments to the layout rather than fundamentally changing the function of the structure. The candidate should be capable of explaining the impact of their proposals on its operation and on the rest of the design.

Often the candidate may need to express quite complicated concepts relating to the answer which should not be covered superficially or in a patronising way. Many concepts and options will be understood more easily if sketches or diagrams are incorporated in the answer.

Comments regarding delays to the programme, costs, professional fees etc. should be included as these are important to the client. However, these are secondary to the question being asked and should not contain excessive remarks about them. The focus of the communication should be on the structure and the proposed changes. 'Text speak' should also be avoided along with abbreviations unless they are recognised terms.

Below is an example of a typical part 1b question and how it may be answered. This has been taken from Q1 of the July 2019 Incorporated-Member Exam paper.

For the purpose of the example, it has been assumed that the question has stated that there are no structural design constraints that need to remain unchanged as per the original brief.

Example communication

To: client@company.com

Re: Project Material Reduction

Dear Client,

Thank you for your recent email in which you asked me to review the structural design in order to reduce project costs. My understanding is that to achieve more structural efficiency and reduced material usage, you would be willing to look at alternatives to the brief and that you are not considering applying any constraints at this time.

I have listed some options below, with a brief description and potential implications.

1) Integrate the core areas

By integrating the core areas into the main structure the layout of the stairs and lift core could possibly be rationalised on plan to reduce its width and therefore cause minimal obstruction to the concourse. This will save on the additional external cladding material, the piles caps and pile foundations beneath, and reduced the steel work necessary for the independent structure as currently proposed.

2) Increase internal column allowance

By introducing mid span columns under the raking beams to the terraces it will reduce the span of the beams, and hence their depth and size, saving on material, and also negate the potential problem with deflection and vibration from the terraces which has to be considered with the longer span.

3) Introduce external columns at the end of the terraces

If there could be a relaxation of the requirement to allow a vertical structure at both ends of the terraces, a goal post structure could be introduced to support the roof on the line of the lower terrace. This will eliminate the need for the cantilever roof structure currently proposed and reduce the loading on the main structure to the stand. The structural elements to the roof will become simple beams supported at both ends eliminating deflection problems and permit a significant amount for material saving.

I would be more than happy to discuss these options in more detail with you and the design team. The added benefit of these options would greatly reduce the embodied carbon for the structural frame design.

Yours sincerely

Engineer

NB. A sketch outlining the proposal would be a benefit.

Calculations

Part 2c is the first section in part 2 of the exam and is where you start to develop in more detail the scheme you prepared in Part 1a.

This part of the exam attracts 30 marks and so, assuming you have prepared an examination timetable that allocates time generally in proportion to marks available, and with an allowance for checking, you are going to have around an hour and forty-five minutes to spend on this section. Use this time wisely! The question asks the candidate to *'prepare sufficient design calculations to establish the form, size and approximate A1-A3 carbon footprints of all the principal structural elements including the foundations'*; therefore, the first task is to decide which are the principal structural elements. Do not waste time designing non-critical members or carrying out repetitive and simple calculations.

For the building structures questions the principal structural elements will be different for any scheme proposed, but the following gives an indication of the likely elements:

- Main members in trusses, portal frames, arches etc.
- Transition members / transfer structures, members with high point loads
- Cantilever members
- Vertical structures where there is a high concentration of load and/or significant out of balance moments
- Members of stability systems
- Foundations including piles and pile caps, reinforced rafts and pads, balancing beams within the foundation system. Ground slab if appropriate
- Retaining walls
- Any special structural elements unique to the scheme

For the bridge structure question the principal structural elements will again be different for each scheme proposed, but the following gives an indication of the likely elements:

- Bridge deck
- Main deck support structure
- Vertical structure
- Stability system
- Foundations including piles and pile caps, reinforced pads, retaining walls, etc.

Clearly most schemes will not include all the above and, as a guide, candidates would be expected to design between five and seven elements depending on the question.

Having established which elements you are going to design, you are then expected to use your judgement and experience to decide the extent of the design checks required. Note that these are NOT supposed to be detailed design calculations; they are only required to *'establish form and size'* of the elements under consideration. Remember also that you only have on average between fifteen and twenty minutes to spend on each element. For most members, checks of bending and shear alongside a span/depth deflection check will be adequate; however, candidates will gain extra marks for recognizing when additional checks are appropriate;

for example, web buckling of a steel beam under a concentrated load. Use your judgement to assess and check worst-case load combinations rather than including multiple load cases. These will eat up valuable time without gaining you extra marks.

The design calculations can be prepared in accordance with any current recognized national code of practice. The use of design guides shall not be used as the primary source of member sizing, but can be used to justify the actual sizing once the calculated design parameters are established for each principal element. Reference to such design guides or manufacturers literature should be noted where used. Please state clearly which design codes you are using and any reasonable assumptions you have made, such as loadings other than those specified in the question.

The approximate A1-A3 carbon footprints for key elements can be assessed using a straightforward calculation of the element mass multiplied by the embodied carbon factor (ECF) of the material. Candidates can refer to the Institution's 'How to Calculate Embodied Carbon' document for suitable methodology and ECF values. Industry average ECF values are recommended, but other suitable values can be used. Candidates are encouraged to take advantage of the Institution's free on-line embodied carbon basics course in preparation. You will need to state clearly which ECF values you are using when preparing your calculations.

Embodied carbon ($kgCO_2e$) = Mass (kg) x Embodied Carbon Factor ($kgCO_2e/kg$)

A carbon calculation for a pile cap may be presented as follows (using recommended default value of material from the 'How to Calculate Embodied Carbon' guidance):

Material	Type	Specification/details	Recommended default value
Concrete	*In situ* concrete (unreinforced)[a]	UK C40/50	**0.138** **25% GGBS**[b]
Steel	Reinforcement bars	UK CARES sector average (EAF production)	**0.760**

2100x900x1400 C40/50 concrete – reinforcement 115kg/m3

ECF for C40/50 concrete = 0.138

ECF for Steel reinforcement bars = 0.760

Concrete: 2.1x0.9x1.4x2400x0.138 = 876 kgCO2e per pile cap
+
Reinforcement: 2.1x0.9x1.4x115x0.760 = 231 kgCO2e per pile cap.

Total A1-A3 upfront embodied carbon = 1107 kgCO2e per pile cap.

Finally, make sure that your calculations are clear, legible, and set out in a logical manner so that they can be easily followed and understood by a marking examiner. They should be of a standard that they could be sent for checking by an external third party without that party having to raise any questions. Add explanatory text where appropriate and don't skip steps. Remember, it is your job to demonstrate your design knowledge; it is not the examiner's job to try to interpret what you have done and if it is not clear to an examiner how you have arrived at your answer you will not get marks for it.

Preparation of Proposed Scheme General Arrangement Drawings and Defined Details

Part 2d, one of the most important aspects of the Examination, is the diagrammatic presentation of the proposed chosen structural scheme. This is the candidate's opportunity to convey their knowledge and experience in concept design and the preparation of schematic information from a brief. As for the calculations in Section 2c, there are 30 marks allocated to this section which again gives you around an hour and forty-five minutes in which to produce such general arrangements as appropriate and defined details.

So why is it an important part of the question? There are various reasons which include the following:

- Demonstrates that the client's brief has been correctly interpreted
- Helps to ensure that the proposed concept design is structurally safe and practical
- Shows that the candidate has considered any critical details that may need design consideration
- Communicates the candidate's chosen scheme to other members of the design team
- Enables a budget cost estimate to be prepared for the overall project

In each of the questions in the Examination paper, Section 2d states:

*'Prepare general arrangement drawings, **which may include** plans, sections and elevations, to show the dimensions, layout and disposition of the structural elements for estimating purpose. Prepare clearly annotated sketches to illustrate details of two defined critical details'.*

The requirement as outlined leaves the exact extent of the arrangement drawings that need to be produced up to the candidate and permits them to use their own discretion. This also includes the way they present that information; the question simply steers them as to what information may be appropriate for them to convey the outline structural scheme that they propose. The details required are defined and should contain a clear specification of the requirements.

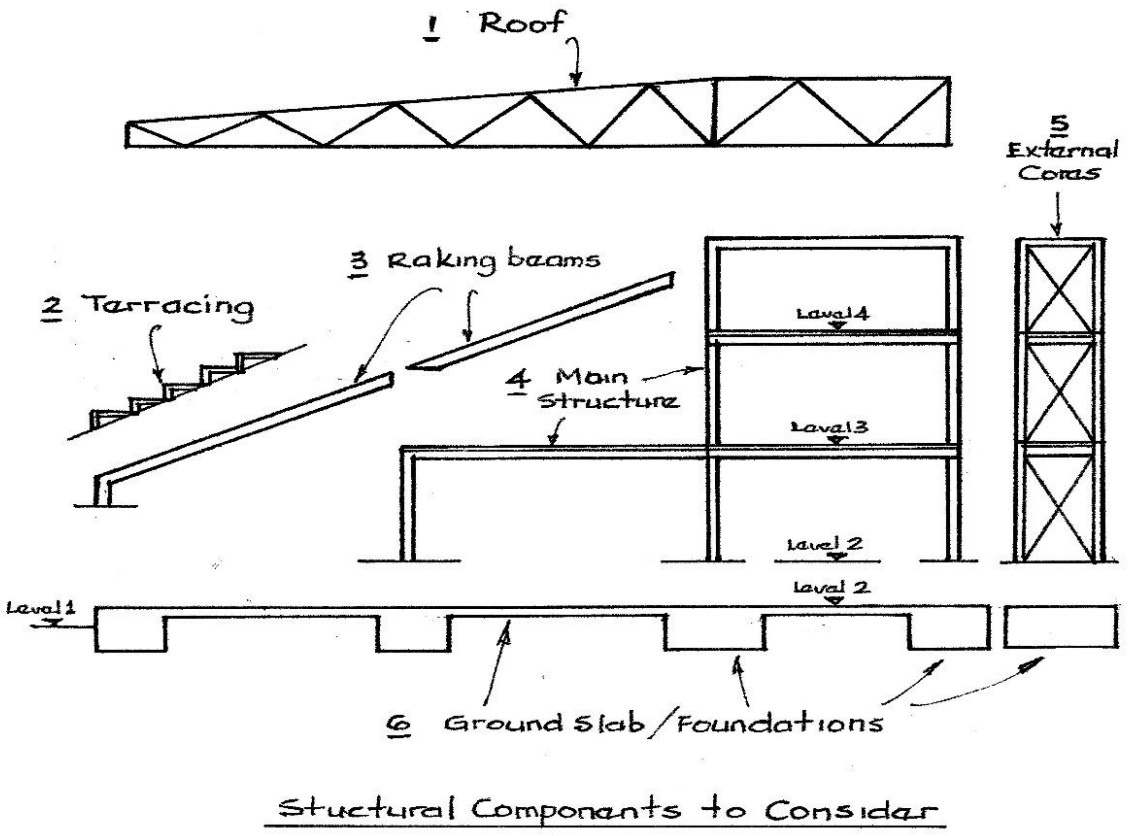
The drawings and details do not need to be to scale but should generally be in proportion and should be dimensioned. In the Examination, graph paper is provided with clear horizontal and vertical lines to a set dimensional grid. Candidates should practise before the examination preparing scheme outlines from past papers using such graph paper and become familiar with the preparation of arrangements and details using freehand techniques.

In general, the arrangement drawings should include all appropriate plans including the foundations, and a typical section and elevation if it is felt they are beneficial in conveying essential information pertinent to the proposed scheme. It may be appropriate to draw part plans where the structure is symmetrical, or to draw a single plan to represent several identical floors in a building structure. Obviously, economy of time in preparing the information is essential. Two defined critical details will be specified in the brief. Their actual content and detail will be specific to the chosen scheme.

The plans and details should include all relevant dimensions and member sizes. The member sizing can be in tabular form with coding on the plans and details.

As an example of the type of response that would be expected to this part of the question, the following has been prepared as an indication only of the type of answer anticipated.

Example - IM Question 1 July 2019



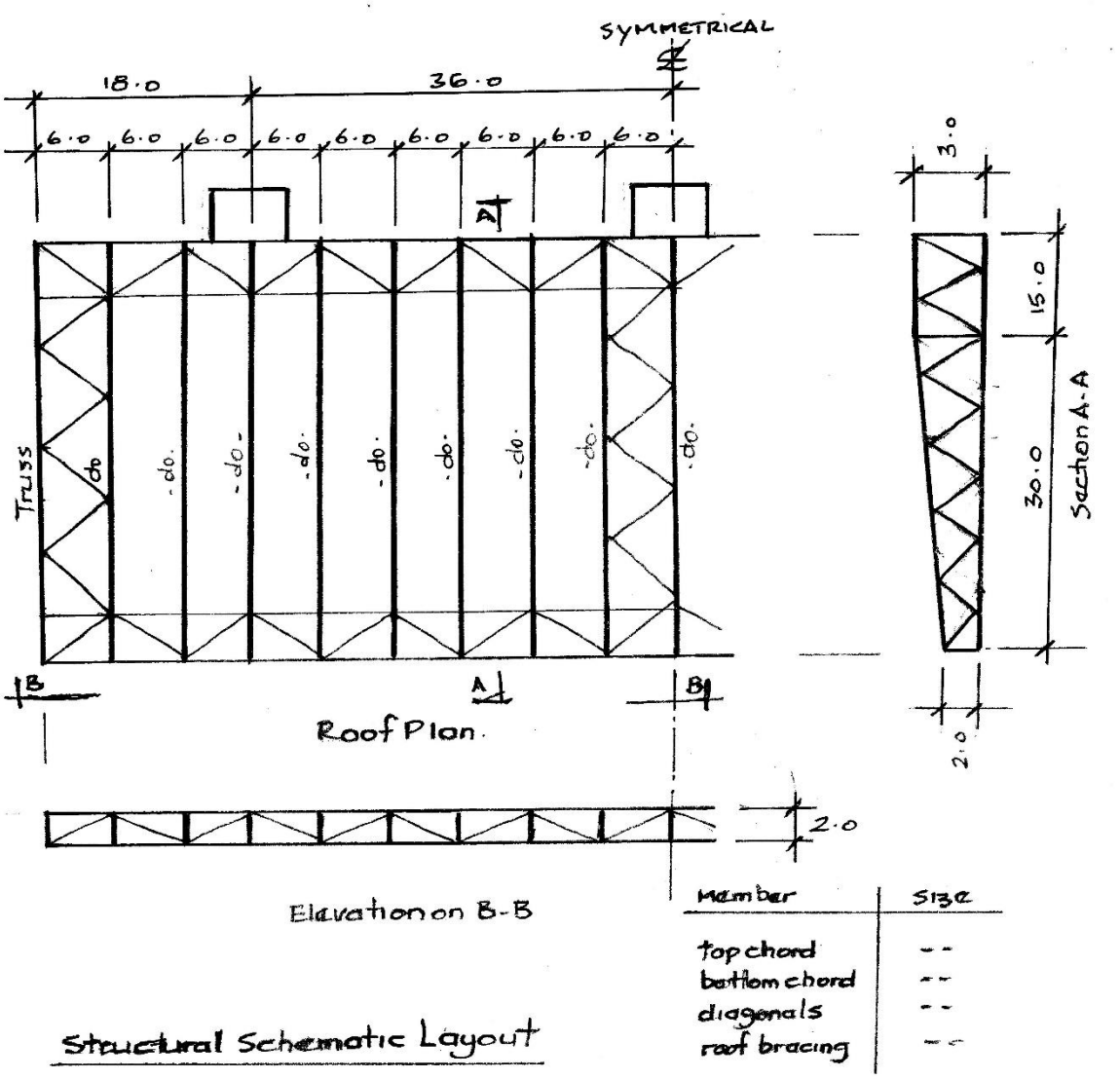
Stuctural Components to Consider

Structural Components for Arrangement and Details Consideration:

1) Roof Arrangement
2) Terracing
3) Raking Terrace Beams
4) Main Structure and Floors
5) External Cores (Stability Braced Structure)
6) Ground Slab and Foundations

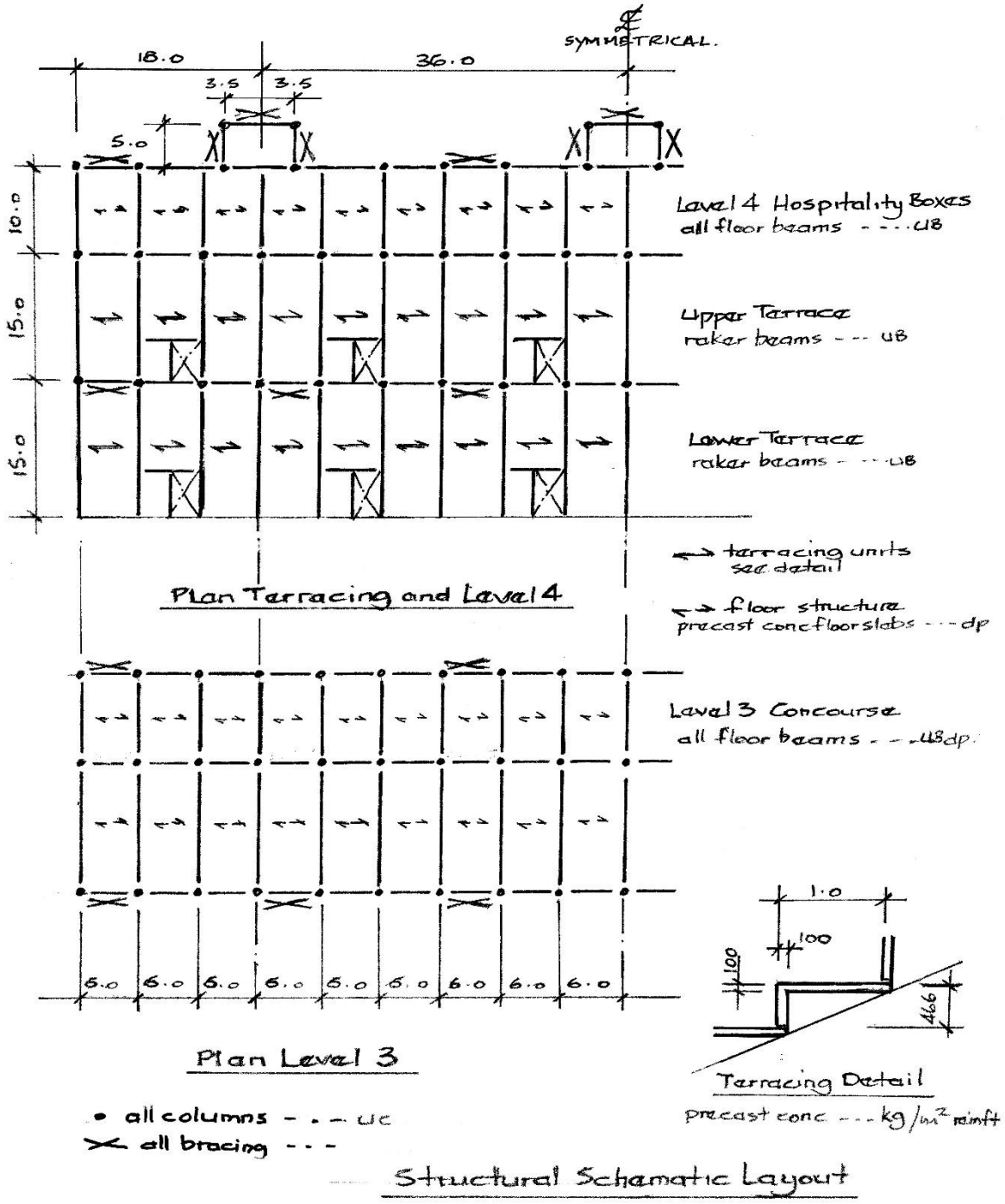
The above sketch breaks down the outline structure into individual component parts that need to be considered when preparing the respective plans, sections, and details. There are many structural scheme outlines that will satisfy the client's requirements, but for this exercise only one is being considered and the outline sketches are included below.

As outlined, all sketch layouts can be freehand using the graph paper provided at the time of the examination and should be in proportion, which means that for a rectangular building the ratio of the building's length to its breadth should be approximately correct. The plans should be dimensioned with some form of grid system.



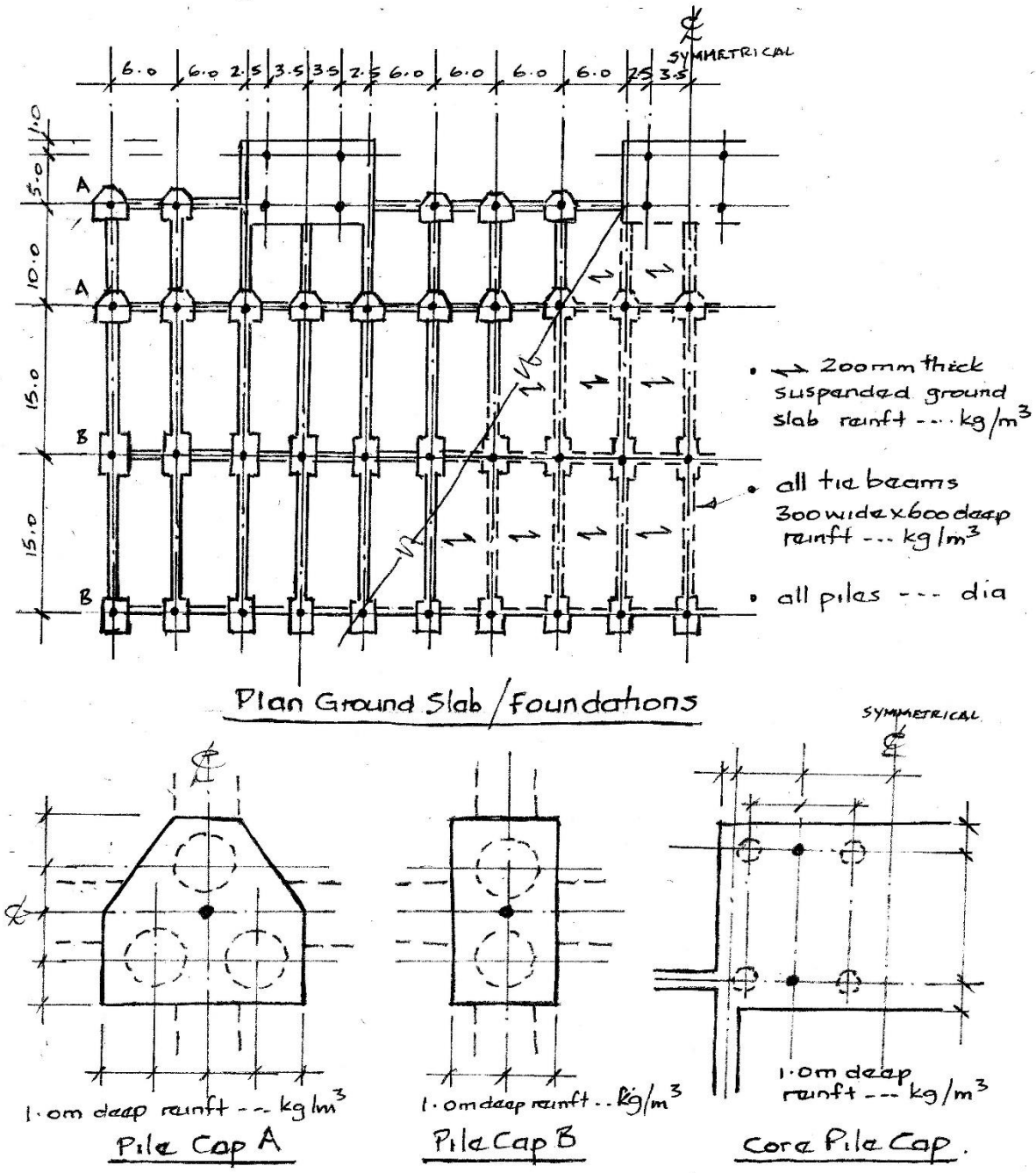
ROOF

The above schematic roof arrangement shows a system of simple cantilever trusses at regular centres to suit the overall grid dimensions and bracing for stability. For estimating purposes, a simple table could be included to indicate the respective member sizes. For this exercise each individual member does not have to be designed, only the critical elements such as the top and bottom chords and worst-case diagonal members for the truss, and rule of thumb sizing for the bracing not included in the stability calculations.



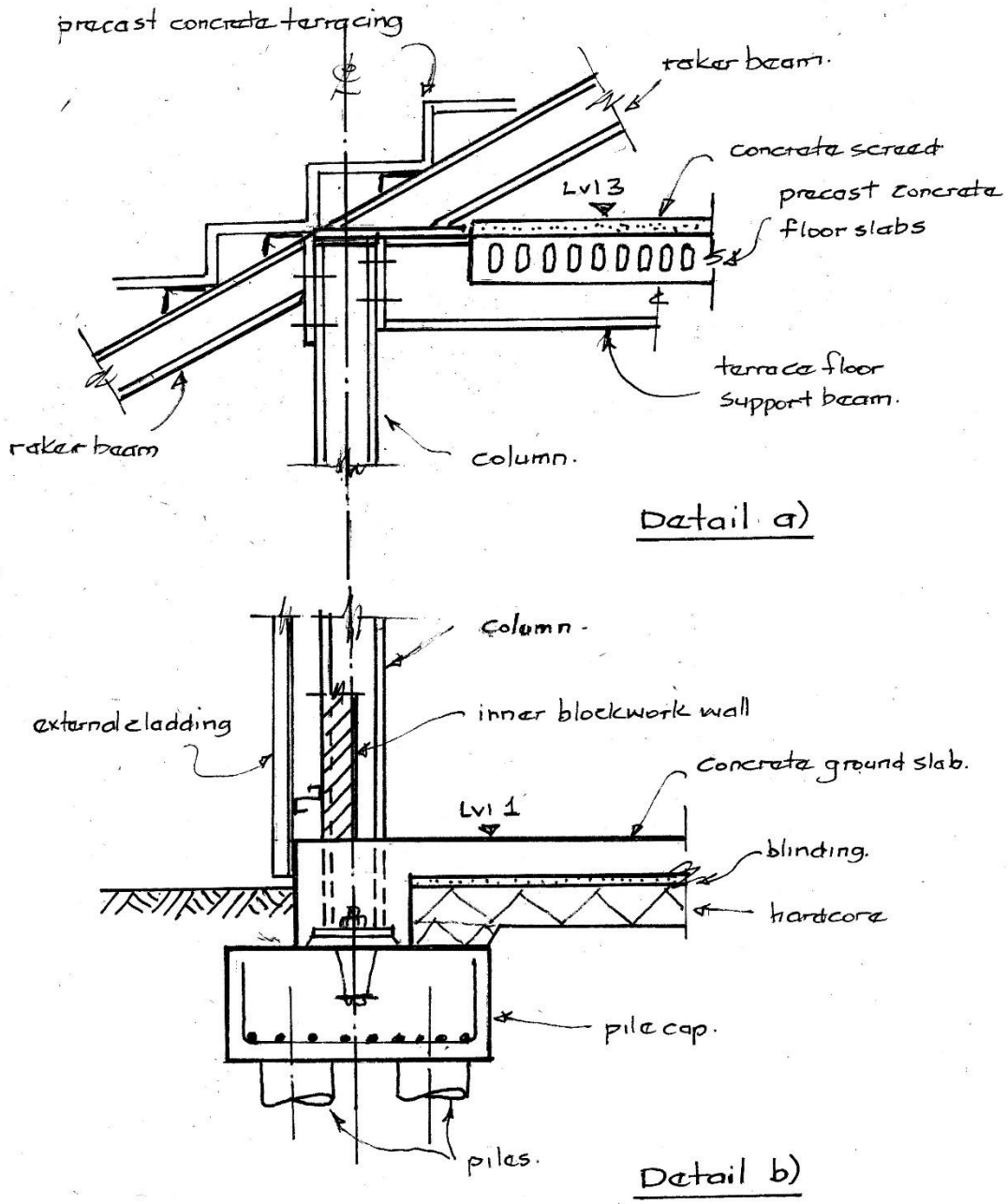
FLOORS AND TERRACING

As for the roof structure, a simple plan, or plans, outlining the schematic structural layout, with dimensions and indicative member sizes for the respective elements is required. Floor slabs and concrete elements thicknesses should be included with a notional weight of reinforcement per m^3.



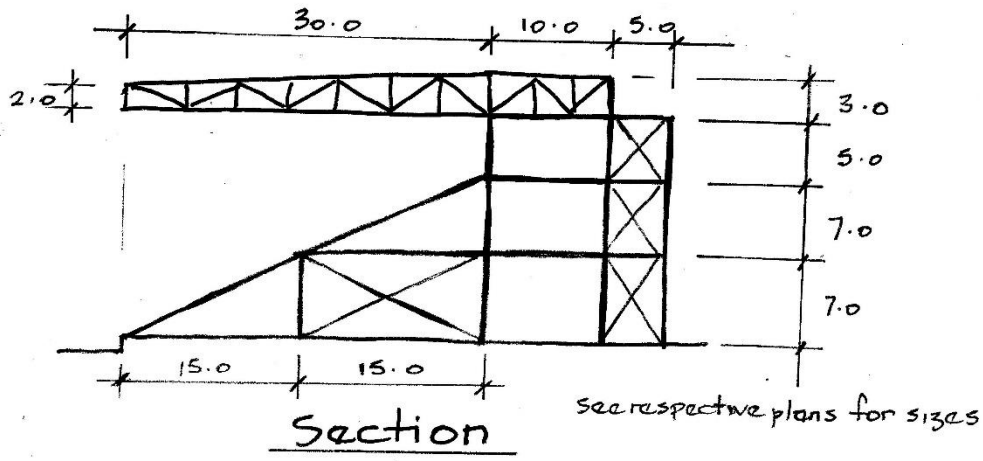
FOUNDATIONS and GROUND SLAB

One of the most important aspects of any scheme design is the foundations and ground slab, and all too often this is overlooked by candidates in the examination. The above shows an outline indicating what would normally be expected. The foundation plan could be simplified by showing typically two bays and then coding the pile caps and ground beam from the outline details. Simplicity and efficiency of information is the key.



CRITICAL DETAILS

The critical details are subjective and unique to each individual scheme, and it is up to the candidate to identify such details appropriate to their scheme. The above outlines the type of detail expected and usually three would be required. They can be sketched and do not have to be to scale, but again should be in proportion and should indicate sizes and thicknesses with notes for clarification.



SECTIONS and ELEVATIONS

Sections and elevation are not always required, and it is up to each individual candidate to decide whether they are necessary to clarify and enhance the proposed scheme information. They can again be simple and drawn freehand. Above is a simple section which outlines the vertical height and horizontal dimensions.

Method Statement

The final part of the examination Section 2e is the Method Statement which has 10 marks allocated and a time allocation of around 40 minutes. The aim of the method statement is to consider the proposed construction sequence to enable the works to be carried out in a safe and controlled manner. The sequence assumes that notices to the Local Authority and H&S etc. have been given. The following considerations could be included, if applicable, to your selected scheme proposal. The list is not exhaustive, and candidates are expected to include activities unique to their chosen scheme:

Site Set Up

- Clear the site and erect perimeter hoarding to secure the site
- Carry out a site survey and provide survey stations
- Provide H&S signs and notices
- Prepare an area and erect the Site Compound Facilities
- Provide hard standing around the compound, including the access road and storage areas
- Install temporary service to the site facilities

Site Investigation

- Check for existing above and below ground service, cap or divert as necessary
- Check site investigation for any special requirements or existing below ground obstructions
- Carry out any special pre-construction requirements

Foundations

- Level the site and set out the building
- Provide oversite for movement of plant and machinery
- Excavate foundations in a predefined sequence, trim the sides and base to the required profile and blind the bottom
- Provide temporary support to the excavations
- Construct reinforcement cages and place in excavations
- Locate and place the holding down bolts for casting in the foundations
- Place and vibrate the concrete foundations

Superstructure

The method of construction for the superstructure will again be unique to the scheme chosen and would follow in a similar style and pattern as for the foundations with careful consideration given to the sequencing of construction. Any special requirements that have a time implication in the programme should be included. The roof may be of a separate form of construction from the floors and therefore must be treated as an individual programme item.

The external finishes can be consolidated depending on the client's requirements. Curtain walling could be considered as a single installation item, whereas cavity wall construction requires external scaffolding and access platforms for material storage and placement.

This is to show that you have a safe method to construct the structure.

Windspeed Conversion Chart

The following chart is to be used for IStructE exams only and is intended as a guide for candidates who are using codes which provide a 10-minute averaging period.