

DUTIES OF THE STRUCTURAL ENGINEER

GC/WORKS/5 GENERAL CONDITIONS FOR THE APPOINTMENT OF CONSULTANTS (1998)

- All duties indicated with a '*' below are additional services over and above the standard GC Works 5 consultant services.
- All duties in blue text with double underline indicate amendments to the standard GC Works 5 consultant services.
- All duties with a ~~strike through~~ indicate standard GC Works 5 consultant services not applicable to this Appointment.

GENERAL DUTIES (ALL STAGES):

1. Together with the Lead Consultant, draw up and comply with common standards and procedures for the production and format of drawings and documents, the use of CAD, BIM and electronic data transfer and similar arrangements for document management.
2. Together with the Employer and other Consultants, develop, implement and maintain a project extranet website for the sharing of drawings, specification and key project information. At the end of RIBA stage 2 the IPR and all data collated will become the property of the Employer.
3. Co-operate and collaborate with the Lead Consultant so as to assist them in their role of design team leader with responsibility to give direction to the design process and to co-ordinate and integrate overall design.
4. Provide services in connection with any necessary demolition or enabling works.
5. If necessary, revise designs to obtain planning permission or other necessary statutory consents.
6. Comply with the Construction (Design and Management) Regulations 2015 for the duration of the project.

Building Regulations

7. With the other consultants, prepare and make submissions under the Building Regulations and other applicable statutory provisions.
8. Conduct any negotiations required under the Building Regulations, and if necessary, revise production information in order to obtain approvals.
9. In consultation with the Employer and other consultants, prepare and implement a strategy for ensuring that the design and construction of the Project complies with Part L of the Building Regulations with particular regard to thermal and air-tightness requirements, and for ensuring that such compliance can be demonstrated to the building control authorities for the purpose of obtaining a Completion Certificate (or, if applicable, a Final Certificate).

Drainage

10. Design and detail the foul and surface water drainage systems externally until and including their connection to the publicly maintained services, and below the upper surface of the ground floor or basement slab.

Changes in Legislations

11. So far as is reasonably practicable, take account of any proposals for legislation published by government or the European Union or legislation which is enacted but not yet brought into force, insofar as it is likely to affect the engineering design of the Project or the cost in use of the Project. Consult with the Project Manager as to whether and if so how such prospective legislative change should be taken into account in the civil and/or structural design of the works.

Services in connection with design by sub-Contractors

12. Advise on the need for specialist sub-Contractors or suppliers to design and execute parts of the civil and/or structural works. You are not to pass down any elements of civil or structural

design to any such specialists without written instructions or approval from the Project Manager.

13. Prepare outline, descriptive or performance specifications for use where, with the Employer's agreement, civil and/or structural elements of the Works are to be designed by specialists; assist in obtaining quotations and other information in connection with specialist work.
14. Advise and assist in the selection of any specialist sub-Contractors or suppliers to be appointed, nominated or specified by the Employer.
15. Where required, with the other consultants, appraise and report upon tenders received from specialist sub-Contractors or suppliers.
16. Review, conduct checks on and comment on designs, drawings, specifications, calculations and loading assumptions provided by specialist sub-Contractors or suppliers, and co-ordinate and integrate their input.

Roads and Hard Standings

17. Prepare structural specifications for any roads, parking areas and hard standing included in the project.

Environmental Remediation

18. If environmental remediation is required on the site, provide a suitably qualified and experienced engineer or chemist to attend site daily to monitor the remediation work and to see that it is carried out appropriately and in accordance with any applicable specification or methodology and to the reasonable satisfaction of the Environment Agency.
19. Provide a formal and detailed report on the environmental remediation work after it is completed for record purposes.

STAGE 1: Inception [RIBA Plan of Work Stages 0 - 2]

- ~~A4.1.1 The Consultant shall carry out a structural survey and submit a report to the Employer. The report to include:~~
- ~~• a description and address of the property;~~
 - ~~• the dates during which the survey was undertaken;~~
 - ~~• the name and qualification of the person who carried out the survey;~~
 - ~~• advice on matters relating to Statutory and legal requirements including rights of support and the like;~~
 - ~~• details of its present condition of the property disclosed by the survey;~~
 - ~~• whether further investigation is advised including a geotechnical investigation;~~
 - ~~• supporting drawings and/or photographs;~~
 - ~~• recommendations (and estimated costs if applicable);~~
 - ~~• an anticipated programme for completion of the Works;~~
 - ~~• the name and qualification of the person signing the report who should be a Partner or Director of the Consultant.~~
- A4.1.2 Obtain an outline brief from the Project Manager including an anticipated completion date for the Project and the financial limits and programme constraints. Provide general advice on how to proceed.
- A4.1.3 Contact the other members of the Project Team and ensure that the Services listed hereunder are fully co-ordinated with the Services provided by other Consultants.
- A4.1.4 Consult as necessary with any local or other authority on matters relating to the proposed structural design of the Works.
- A4.1.5 Visit the site, evaluate structural implications and in liaison with the other members of the Project Team, undertake such further studies as may be necessary in order to submit proposals and options to the Employer including an anticipated programme and costs and undertake all work necessary to obtain the Project Manager's approval to proceed on the basis of the agreed proposals. Provide to the Cost Manager sufficient information to enable the production of an approximate costing of the design options.
- A4.1.6 Review all existing site survey and investigation information, recommend any additional surveys or investigations required and arrange for the carrying out of any structural, topographical, geotechnical or other investigations authorised by the ~~Employer~~ Project Manager, interpret the results and, if necessary, make recommendations to the Employer. Provide to the Cost Manager sufficient information to enable the production of an approximate costing of the design options.
- A4.1.7 Undertake risk assessments.
- A4.1.8 Undertake value management exercises.
- A4.1.9 Obtain the Project Manager's approval to proceed to Stage 2 which will include the preparation of detailed designs up to tender stage, including the preparation of a detailed programme for the delivery of further services.
- A4.1.10* Obtain from the Employer and/or statutory undertakers information on any existing buildings on the Site, boundaries, any known easements, underground services, rights of way, rights of support and other relevant matters.
- A4.1.11* The Norwich Research Park has an existing masterplan consent with outline planning permission. This is supported by transport assessments and a masterplanned services infrastructure. The Consultant will develop a mini-masterplan including overall design and

transport assessment to coordinate the relationship between proposed and existing developments to enable wider masterplan activity.

A4.1.12* Provide the technical drawings, reports and advice in support of a Planning Application and Environmental Impact Assessment which will be collated and submitted by the Planning Consultant and amend the strategic design proposals as directed by the Planning Consultant in order to minimise the environmental impact of the whole site development. Reference the attached Initial Scoping Brief and additional services as applicable.

A4.1.13* Relevant design codes, guidelines, standards and regulatory requirements: Contribute to the report provided by the Lead Consultant identifying the codes, guidelines, British and European standards, regulatory requirements, industry best practice guides and all other relevant published documents which contain information relevant to the design requirements for the proposed facility.

The report should include all aspects of the design but should be structured to enable the requirements affecting operational health and safety, biological containment, security and other matters affecting the licensing of the facility by the Health and Safety Executive to be clearly understood by all parties involved in the briefing, management, design, construction, operation and licensing of the proposed facility.

The report should clearly state the categorisation of each element of the proposed facility and should confirm how this categorisation affects the application of these requirements.

Where these documents require a level of interpretation or other assumption these considerations should be explicitly stated.

The report should make reference to all known and anticipated changes in the documents or to other changes in law which may come into effect during the period before the proposed HCLAF facility becomes operational.

A4.1.14* Employer's Operational Requirements: Assist the Lead Consultant and Employer in developing the operational requirements for the proposed facility.

A4.1.15* Validation, Commissioning and Testing Strategy: During the early stages of concept design, Support the CVV Consultant to provide a report describing the overall approach and methodology for commissioning and verification activities during the design, construction / installation and post-construction periods for the project. The report shall include a description of the roles and responsibilities of all parties and the deliverables to be produced. The report shall define the performance acceptance criteria for each element of the proposed facility, subject to the actual elements, products, construction materials and methods of installation chosen.

A4.1.16* Review the Employer's initial feasibility report and advise of any comments.

**STAGE 2: Development of the design and the preparation of tender documentation
[RIBA Plan of Work Stages 3 – 4 and including Procurement]**

- A4.2.1 [In co-operation with the other members of the Project Team, develop a design within the approved cost and submit to the Employer for approval giving details of proposed specification, forms of construction, construction standards and Services. In developing the design consider and advise in conjunction with the other consultants as to such issues as floor loadings, location and size of columns, fire protection, thermal performance and air-tightness, walls, foundations, bracing, stairs and other structural elements.](#)
- A4.2.2 If necessary, advise the Employer of the need to appoint specialist firms to design and execute sections of the Works and obtain the Employer's approval to approach the firms concerned or to obtain competitive tenders.
- A4.2.3 Where applicable, co-operate with the other members of the Project Team in the preparation of a cost plan for the Project based on the overall cost approved by the Employer.
- A4.2.4 Attend all design team meetings, report on matters appertaining to the structural design and provide advice thereon to other consultants as may be necessary.
- A4.2.5 Monitor the development of the scheme design against the approved cost and report any anticipated difficulty to the Employer including proposals for overcoming that difficulty and obtain the Project Manager's instructions in sufficient time to allow corrective action to be taken.
- A4.2.6 Where the Employer has indicated the possibility of a change to the agreed brief during the design phase, inform the Employer of the cost and programme implications and obtain the Employer's instructions. [Carry out any redesign work the Employer may request or as may be necessary to bring the estimated cost of the Works within an acceptable budget.](#)
- A4.2.7 Complete the structural design up to tender stage and provide all information necessary for the completion of tender documentation, [including but not limited to the preparation of Production Information, detailed specifications and any necessary room data sheets.](#)
- A4.2.8 If applicable make recommendations to the Employer on the suitability of firms who may be invited to submit tenders for the structural Works and obtain instructions.
- A4.2.9 Ensure that all drawings, specifications, schedules, or other documents necessary for the placing of the construction contract are completed and are fully co-ordinated, are in accordance with the brief approved by the Employer and are available on the programmed date.
- A4.2.10 Prepare such calculations and details relating to the Works as may be required for submission to any appropriate authority and obtain any necessary approvals.
- A4.2.11 ~~Ensure that a pre-tender cost check is prepared based on the tender documentation and inform the Employer of the result of that check.~~ [Support the Cost Manager in the production of a pre-tender estimate, based on the tender documentation.](#)
- A4.2.12 Undertake value management exercises.
- A4.2.13 Undertake risk assessments.
- A4.2.14 Obtain the Project Manager's approval to proceed to Stage 3.
- A4.2.15* Consider the Employer's requirements and recommend the most suitable civil and structural solutions with options, including comparative comment as to cost and time considerations. Agree with the Employer and the other consultants the preferred outline design solution and provide any sketch drawings or other documentation necessary to illustrate the outline design proposals.
- A4.2.16* In conjunction with the other consultants, prepare a report and cost plan in respect of the final design, illustrating the scheme in scale plans, sections and elevations and specifications in sufficient detail to enable the Employer to approve spatial arrangements, materials and appearance, and reporting as to all the above issues required to be dealt with under this work stage.

- A4.2.17* Prepare and provide to the Principal Designer such information as may be required relating to general and structural and/or civil engineering matters for inclusion in the pre-construction phase plan.
- A4.2.18* Input into the scope and content of the Design Brief. Advise on information required for the Design Brief incorporating the site wide issues including but not limited to the sustainability policy and energy strategy. Provide the Lead Consultant with data required to carry out relevant design studies and support the preparation of the Design Brief for approval by the Employer.
- A4.2.19* Provide information in support of an application for detail planning consent for the proposed facility made by the Planning Consultant on behalf of the Employer.
- A4.2.20* In conjunction with other consultants provide rendered BIM data model and three-dimensional visualisations (BIM Level 2) of all internal areas of the proposed facility, include all physical features within the internal space including mechanical and electrical fitting, Employer supplied loose and fixed equipment to accurately represent all surface features visible to the Employer when the facility is occupied.
- A4.2.21* Incorporate into the structural design builder's work information provided by the other consultants or by any specialist sub-Contractors or suppliers.
- A4.2.22* Provide information in support of SWIFT and HAZOP studies undertaken by the Employer. Where required, attend workshops and actively participate in the SWIFT and HAZOP exercises. Respond to output recommendations of the SWIFT and HAZOP studies providing additional information or making amendments to the design and appropriate and as required.
- A4.2.23* With the other consultants, advise the Project Manager of the cost and programme effects of any subsequent design changes.
- A4.2.24* Provide information in support of the Design Qualification, Installation Qualification and Operational Qualification to be undertaken by the CVV Consultant.
- A4.2.25* Consider issues as to life cycle costs, including operational costs in use, maintenance and renewal requirements.

STAGE 3: Covering tender stage (including both first and second stage tenders under the two stage design and build contract) [RIBA Plan of Work Stages – Procurement]

- A4.3.1 Discuss with the Employer the need for site inspection staff and obtain instructions.
- A4.3.2 Agree final arrangement for the obtaining of tenders with the Employer.
- A4.3.3 Prepare further designs, specifications and drawings including, if necessary, bar bending schedules for the information of the Contractor executing the Works.
- ~~A4.3.4 Invite tenders from contractors included on the list approved by the Employer and arrange for tenders to be returned direct to the Employer in accordance with the Employer's tendering procedure.~~
- ~~A4.3.5 Copy all correspondence regarding the obtaining of tenders direct to the Employer.~~
- A4.3.6 Examine tenders received and, in liaison with the other members of the Project Team, make recommendations to the Employer and advise on any corrective action which may be required if the lowest tender is higher than the approved cost for the Works and obtain the Project Manager's instructions.
- A4.3.7 Obtain the Project Manager's ~~decision~~ instructions regarding the acceptance of a tender, including providing assistance to the Employer in negotiating prices and contractual matters with Contractors.
- A4.3.8 Where required, provide the Employer with drawings or other documents necessary for entering into contract (or alternatively follow the procedure for the appointment of specialist sub-Contractors). Revise any design information as may be required to adjust the tender sum.
- A4.3.9 Undertake value management exercises.
- A4.3.10 Undertake risk assessments.
- A4.3.11 Obtain the Project Manager's approval to proceed to Stage 4.
- A4.3.12* With the other consultants, negotiate an information release schedule with the Contractor prior to the award of the Building Contract.
- A4.3.13* Raise with the Project Manager for discussion the inclusion in the Building Contract of appropriate requirements for the Contractor to prevent or minimise inconvenience, danger, disturbance or nuisance to third persons who are likely to be adversely affected by the carrying-out of the Works. Take steps to see that such appropriate requirements are included in the Building Contract.
- A4.3.14* Once the Employer is ready to enter into the Building Contract, confirm to the Project Manager in writing that so far as matters within your responsibility or knowledge, a state of readiness has been achieved for construction to commence and to proceed in accordance with the proposed construction programme, or notify the Project Manager of any respects in which that is not the case.

STAGE 4: Covering the construction and operations on site [RIBA Plan of Work Stage 5]

- A4.4.1 In collaboration with the other members of the Project Team, assist the Project Manager in administering the terms of the Works contract during operations on site and relating to the completion of the Works including (but not limited to) all activities in connection with the adjudication of disputes between the Employer and the Contractor.
- A4.4.2 Attend the regular meetings with the Contractor and the other members of the Project Team as necessary in order to monitor the progress of the Works and the production of design information to the Contractor.
- A4.4.3 Visit the site at regular intervals during the construction of the Works in order to inspect the quality of the work and to monitor progress and ensure that the Works are executed in accordance with the Works contract and in accordance with good engineering practice.
- A4.4.4 ~~Ensure that~~ Assist the Project Manager and use all reasonable endeavours to procure that relevant legislation, standards and rigorous safety policies are in place and are implemented by the Contractor and that there is adequate protection for the public and others. Ensure that all Health and Safety Statutory Requirements or Regulations are being observed by all those responsible for either designing or constructing the Works and that adequate monitoring procedures are in place to ensure day to day compliance.
- A4.4.5 ~~Ensure that~~ Assist the Project Manager and use all reasonable endeavours to procure that relevant legislation, standards and rigorous quality management procedures are in place throughout the construction phase.
- A4.4.6 Advise the Project Manager on the need for special inspection and tests and, following approval, arrange for the inspection and tests to be undertaken.
- A4.4.7 Inform the Project Manager of any contractual difficulties which may arise during the course of the construction contract and obtain the Project Manager's instructions.
- A4.4.8 Establish post construction contract cost control procedures in order to ensure financial control covering the issue of instructions which vary the Works and the issue of cost reports to the Project Manager and ensure that the instructions are fully in accordance with Condition 27 (Variations).
- A4.4.9 Inform the Project Manager four weeks prior to the anticipated date of Practical Completion.
- A4.4.10* Provide Production Information as and at the times required under the Building Contract.
- A4.4.11* Inspect materials delivered to the Site.
- A4.4.12* As appropriate, instruct sample-taking and the carrying out of tests of materials and workmanship and examine the conduct and results of such tests whether on or off-site.
- A4.4.13* As appropriate and requested, visit the sites of fabrication and assembly of structural elements to inspect such materials and workmanship before delivery to the Site.
- A4.4.14* Monitor and report to the Project Manager upon the progress of the Works against the Contractor's programme. During Site visits, monitor compliance by the Contractor with any provisions of the Building Contract for the avoidance or minimisation of inconvenience, danger, disturbance or nuisance to third parties.
- A4.4.15* Conduct sample reviews of record drawings and O&M Manual submittals as prepared by the Contractor. Such reviews will be conducted on the basis of a benchmark set of such Record Drawings and O&M Manual submittals prepared by the Contractor and approved by the Employer prior to any O&M Manuals and Record Drawing Reviews being conducted. Review such Record Drawings and O&M Manuals for general completeness. Such reviews will not represent a full check of the documents for accuracy (assumption that any such accuracy verification will be performed by others i.e. the Clerk of Works) and the reviews are based on the assumption that it is the Contractor's responsibility to provide a complete set of information in the manner specified under the contract.
- A4.4.16* Review selected construction information for general compliance with the Employer's Requirements. Comment on any aspects of the proposals which do not or appear may not comply with the Employer's Requirements either requesting this is changed to comply or

that further information is provided demonstrating compliance. Comment on other aspects of the proposals which appear to comply with the Employer's Requirements but which you believe the Contractor may wish to modify (more clarity, alternative solution, etc.). Any actions on these comments are entirely at the Contractor's decision.

- A4.4.17* Technical support and technical advice in the form of answers to Request for Information as related to civil and/or structural design during the anticipated construction period.
- A4.4.18* Support and advise the Employer with regard to regulatory compliance of the design information developed by the Contractor Team.
- A4.4.19* Provide support to reconcile comments between the Contractor Team, TPI User Team and the Employer's Project Manager on design information being prepared by the Contractor.
- A4.4.20* Support the Project Manager in the Change Control Process based on input from the Employer and the Contractor, where appropriate
- A4.4.21* Provide support to review and advise on issues related to reconciliation of design proposals and contractual requirements via the Request for Project Manager's Instruction (RFPMI) process.
- A4.4.22* Review information issued by the Contractor.
- A4.4.23* Attendance at project update meetings
- A4.4.24* Attendance as required at communication and coordination meetings with the Contractor during development of the Contractor Design. Attendance at site meetings as required during the construction activity period.
- A4.4.25* Visit site on average fortnightly during the main civil and structural construction works. Additional visits to be made before and/or during critical activities and particularly for containment structures and for the first construction of typical areas.
- A4.4.26* After each visit prepare and issue a site visit report which will highlight any aspects of the works which do not or appear may not comply with the Employer's Requirements either requesting corrective action to comply or that further information is provided demonstrating compliance.
- A4.4.27* Carry out periodic checks to see that the Contractor is operating robust quality control procedures and periodically inspect test records, such as concrete slumps and cube tests.
- A4.4.28* Attendance as required at Employer and Project Manager communication meetings to review and advise on the progress of construction and how it complies with the design intent of the Employer's Requirements during the main construction activity period.
- A4.4.29* Support to snagging activities in the form of a onetime walk-through to conduct an observation of visible defects for each of the building elements declared by the Contractor as "substantially complete". Each walk-through will be documented in a written defects report issued to the Project Manager, with a revisit to confirm defect has been rectified and closed.
- A4.4.30* Attendance at HAZOP and other containment design related meetings conducted on the project site.
- A4.4.31* Review of design information prepared by the Contractor team and related to the containment design of the project.
- A4.4.32* Review of containment related work package submittals including, but not limited to, the list below. The proposal is based on conducting one such review per work package submittal. The reviews are limited to advising the Employer that the information generally complies with the design intent documented in the Employer's Requirements.
 - a. Autoclave
 - b. Scientific gases
 - c. BMS
 - d. Cold Rooms & Freezers

**MULTI-DISCIPLINARY DESIGN TEAM
STRUCTURE**

JIC - NGI TEAM

- e. Fume Cupboards
- f. Microbiological Safety Cabinets
- g. Controlled Environment Rooms
- h. Air Handling and HEPA filtration in containment laboratories
- i. ICT fit out
- j. General laboratory fit out

STAGE 5: Covering completion [RIBA Plan of Work Stage 6-7]

- ~~A4.5.1~~ ~~Where relevant, provide the Employer with a set of record drawings.~~
- A4.5.2 Issue a list of defects to the Contractor at the appropriate time in accordance with the terms of the construction contract.
- A4.5.3 ~~Ensure~~ Use all reasonable endeavours to procure that the Contractor rectifies the defects within a reasonable time and issue a Certificate to the Contractor when all defects have been made good. Use all reasonable endeavours to procure that operational-critical defects are rectified prior to operational start to ensure the Employers deadline are not jeopardised.
- ~~A4.5.4~~ ~~Report the final cost of the Works to the Employer.~~
- ~~A4.5.5~~ ~~Where relevant, issue a Final Certificate to the Contractor.~~
- A4.5.6 In the event of any arbitration or litigation resulting from the Project prepare any necessary documentation and reports and, if required by the Employer, attend any hearing acting as witness (and subject to the payment of an additional fee) ~~in accordance with Condition 46 (Payment for changed Services and variations).~~
- A4.5.7* Assist in compiling a programme for the planned maintenance of the Project.
- A4.5.8* Assist in compiling a code of management for the running of the completed Project.
- A4.5.9* Assist the Project Manager to prepare a completion report to the Employer showing:
- A comparison between the outturn cost and the approved budget cost.
 - The actual expenditure against sums included in the contract for specialist works and provisionally measured work.
 - The costs included against any Variation or Price clause.
 - The expenditure against approved variations and additional works authorised by the Employer.
 - A comparison of programmed dates against actual dates achieved.
 - Any lessons obtained from the scheme which could be applied to future projects
 - The performance of project participants.