

## THE HKR METHODOLOGY

### Value by Design

#### Introduction to HKR

It is no coincidence that the vast majority of HKR Projects have been built, occupied and continue to deliver wealth for our clients. The foundation stone of the Practice is our ability to deliver robust commercial solutions that exceed the expectation of our clients both commercially and aesthetically. We have always regarded the function of the Architect to not only produce a fully integrated and quality design within budget but to manage the entire delivery process for the Client.

Historically HKR have provided not only Architectural but Engineering Design and Cost Consultancy services in-house. Our duty is and always has been to deliver a quality design at the correct cost point and in compliance with the program. We regularly engage main contractors and modular contractors at an early design stage ensuring our design is fully aligned with best practice and the clients designated supply chain. In the case of modular delivery, we engage with modular contractors early ensuring our design is both comprehensive and yet agnostic to guarantee competition at tendering stage. Neither is it a coincidence that over time HKR have inherited failing projects, initially on foot of a request to execute value engineering initiatives and invariably culminating in our appointment for the complete project. **An example of such a V.E. exercise is in the Appendices to our PQQ Submission.**

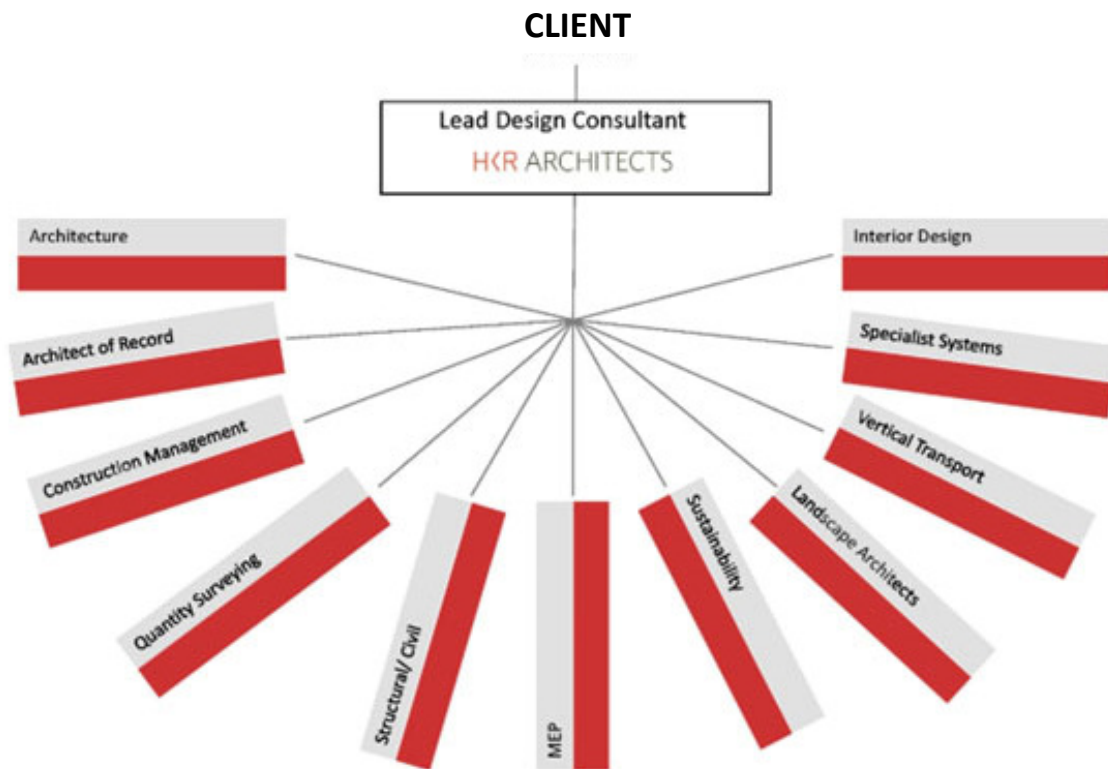
The largest project we have delivered through all project stages is Abu Dhabi Plaza, Astana, a 15 billion SAR project which was the subject of inter-government agreement between the Emirate of Abu Dhabi and the Republic of Kazakhstan. Two earlier incumbent practices, including Foster and Partners had failed to produce a design that met the program and the budget. From a standing start we established new businesses in both Abu Dhabi and Astana, relocated key personnel including the Founder of the practice and delivered the project. We were advised by Aldar it was the first Aldar project where each of 15 Client Stakeholders signed off the design at every Gateway.

HKR also were appointed as the Lead Design Consultant on the largest Hotel Complex in the World, an 11,000 bedroom, 711,000m<sup>2</sup> Hotel Complex in Kaki, Mecca in the Kingdom of Saudi Arabia for the Yousef Al Latif Jameel Group (YALJ Group). HKR delivered a fully Coordinated Technical Design and the Projects construction is imminent. On foot of this YALJ appointed HKR on a second hotel project at Medina Road in Mecca.

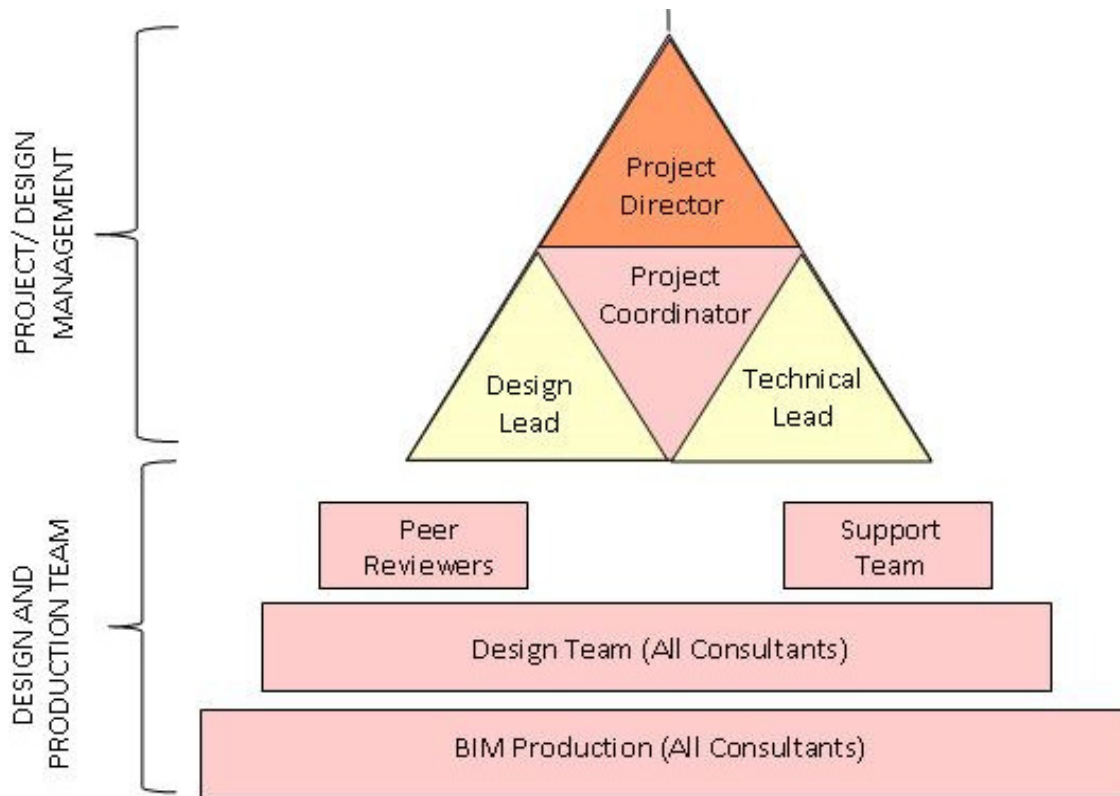
Meraas were struggling with their project at City Walk Phase 2. We were selected to take over and deliver the project. We inherited a design that included 39 different façade typologies which was not only impractical but unaffordable. We value engineered the complete design while managing to keep the contractor on program and enhancing the Design Intent.

HKR are a client friendly adaptable Commercial Practice.

## HKR Lead Design Consultants



Executing the role of Lead Design Consultant requires HKR to put in place an experienced management team and systems to organize and direct the Design process. The function of the LDC is to manage the direction of travel of the Design through all stages in close collaboration with all client stakeholders. The LDC is an extension of the Client body, charged with responsibility to correctly interpret the client stakeholders' requirements and drive the myriad of sub-consultants to deliver the desired outcome at each stage of the project. Over the years HKR has developed a unique team structure to facilitate effective collaborative design of large complex projects that involve cross office working with stakeholders, agents and subconsultants alike. this structure is reflected in the Typical project organogram in the PQQ submission.



The Project Director has an overarching role of responsibility and is the primary point of contact with the Client body. As with ADP Astana (Nursultan), a company director will dedicate himself to the role of Project Leadership for the duration of the design process. Thereafter, while the Construction team lead will be charged with responsibility for supervision of the construction process, he/she will report to a company director for the duration of the construction period. Our directors are 'hands on' and have a reputation for delivering projects through personal leadership and have extensive previous experience of working in the MENA region.

From Concept through to Construction Documentation there will be two further directors allocated to the project full time, the Design Director and the Technical Director. From our experience projects benefit greatly with the involvement of a Technical Director at Concept Stage. Some of the early decision making and engagement with Contractors must be fully appraised from a perspective of deliverability and constructability. Equally at Detail Design Stage the involvement of the design director in component or element design is critical to ensure the continuity and delivery of the early design intent. How often has a great design been 'lost in translation' in the execution of details! HKR Design Directors have a proven track record of delivering mixed use schemes for both public and private sector client bodies. Our HKR Technical Directors have extensive experience of working in multi-disciplinary design environments and focus on efficient delivery of detail design and construction packages. They're very knowledgeable in BIM and advocates for HKR protocols and procedures.

The Fourth leadership role is the Project Coordinator. The Project Coordinators key role is to design and implement, with the Project Director, a Project Execution Plan (PEP) or Design Management Plan (DMP). **A sample of project delivery plan is included in the PQQ submission.**

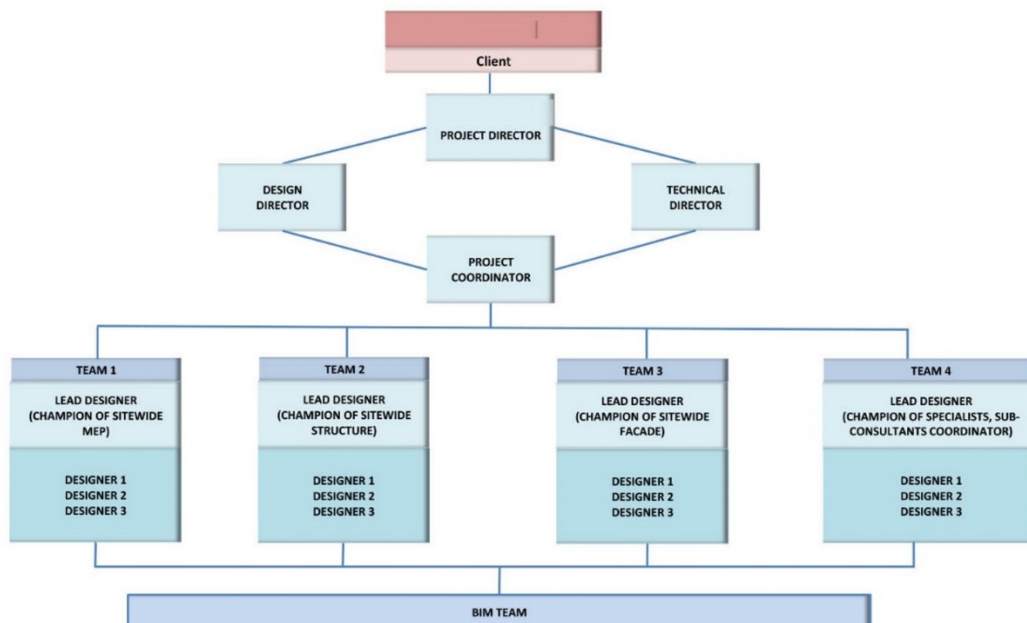
The Project Coordinator together with the Project Director lead the implementation of the integrated planning systems and administrative protocols. The Project Coordinator is supported by an Assistant Project Coordinator who in turn is supported by a Programmer, Document Controller and Administrative Support were deemed necessary.

The Project Coordinator and Assistant Project Coordinator are not integrated into the Design process which allows them to focus on the management of the project. They will capture daily, from Stakeholder Meetings, workshops, design reviews, cost reviews the key strategic actions communicating with the relevant consultants, pursuing information, drawings or reports to ensure momentum is maintained. 'Hot topics' are identified and processed quickly without impacting the program. While monthly reports are important in terms of recording past or projecting future activities, the daily interaction of the Project Coordination team with the Designers is crucial. It will be focused demanding immediate actions of Designers or Stakeholders. All comments received through minutes of meetings, email or formal correspondence are recorded, responsibility for actioning is assigned and the central action tracker circulated for information / action. On occasions on ADP Astana, it was updated and circulated twice daily at 1pm and 7pm.

## Design Team

While the Design Director has responsibility to advance the design process, the matrix of Project Director / Design Director / Technical Director and Project Coordinator work as one to ensure that the design energies are focused and productive.

We refer you to our typical project organogram.



The Design Director will manage several teams of designers depending on the number of project assets. While leading a team each team design leader will also perform the role of champion in certain aspects of the project on a project-wide basis. (for example, façade design). All design teams are supported by a singular Project BIM team, ensuring the output of all assets is fully coordinated. The BIM team will work closely with the QA/QC lead picking up any design inconsistencies and reporting back to the Project Coordination team.

The Design Director will have a sitewide coordination role working closely with our subconsultant engineers, National Engineering Bureau.

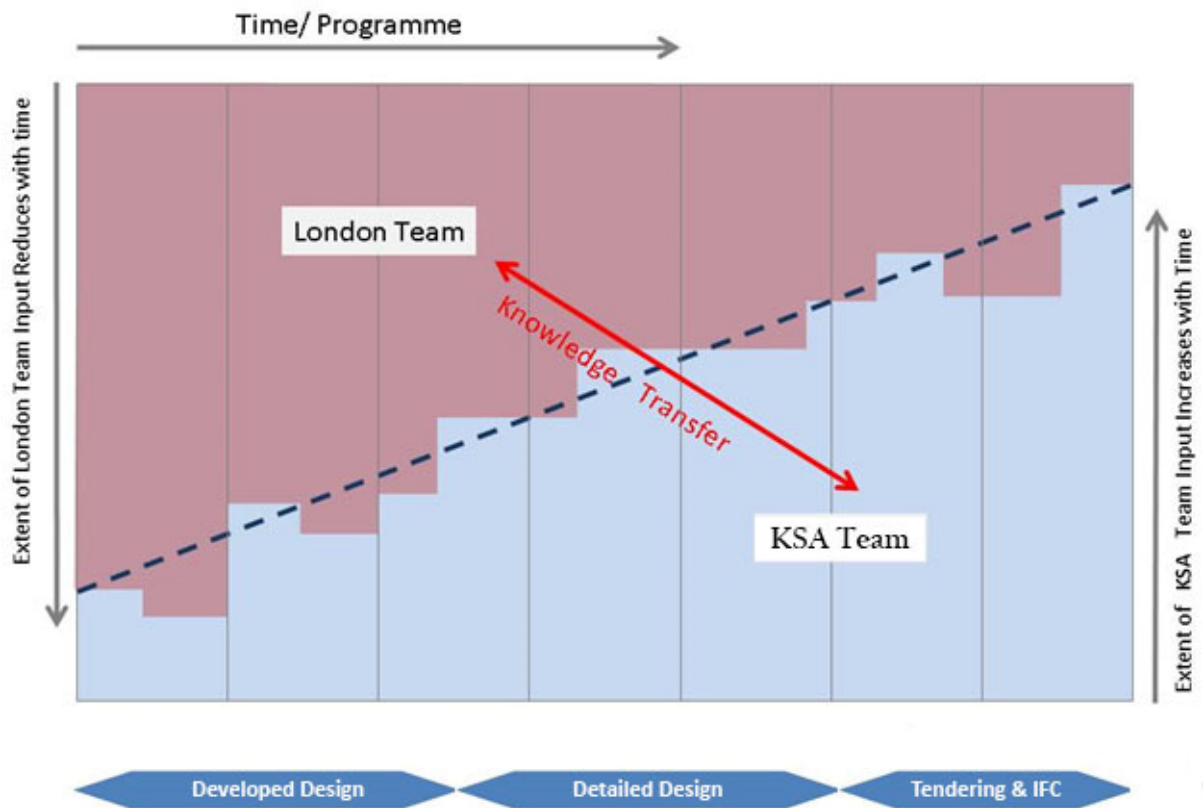
AESG will be a significant sub-consultant providing Sustainability, Energy Modelling, Acoustics, Fire and Life Safety and Security services. In such circumstances an internal AESG Project Manager, will coordinate AESG combined input working closely with the HKR Project Coordinator and the Coordination Team. Each sub-consultant has one primary Project Director with responsibility for the project and a structure similar to HKR teams' structure.

Albeit the vertical hierarchy of the team is essential HKR also advocate horizontal management or management from the bottom up. The QA/QC lead in HKR, NEB, BMCE and AESG engineers and other significant consultants will hold independent reviews of the design from time to time and will report upwards to the Project Coordinator / Project Director. This communication is encouraged. Equally the NEB, BMCE engineers and HKR BIM teams and BIM leads will be in constant communication and will be encourage through workshops and reviews to act as one Team. Horizontal as well as vertical alignment of teams is essential to the success of the project.

A further layer of Design Management developed by HKR is the peer review team led by a senior HKR Associate. This team includes independent HKR Civil Structural and MEP Consultants, none of whom have day to day involvement in the project. This peer review group will actively review the Design progress through all stages and report their findings measuring against established benchmarks and issue recommendations to the Project Coordinator / Project Director.

### **Cross Office Working**

The HKR consortium operate as one office with four principal design hubs located in London, Istanbul Dubai and Riyadh. This protocol is designed to ensure all the requisite International sectoral skillsets are available to the project together with local knowledge.



Knowledge transfer is not just about systems but more importantly people. HKR envisage that Stage 3B will be executed principally from our London office. HKR together with our structural and MEP consortium members will create a project-based office, where the whole team will be assigned to work on Mukaab District. However, the team will be supported as deemed necessary by our KSA office. After the first two months as we move into Stage 3C when the level of coordination with sub-consultants and Stakeholders intensifies, more of the work will be produced in our KSA Consortium office and key team members from the London office will move to work in the KSA office. New Mukaab as described earlier will have a local Liaison Director in your office throughout the Design process. We will also be employing local talent whom we will train during the work on the project. (Saudization)

During site stage HKR will ensure key designers are involved in the Supervision team where they will review shop drawings and ensure the design integrity of the construction works.

We use our cloud server infrastructure for sharing / transferring information between HKR offices and inter alia with all offices of the consortium. This system not only permits sharing of information but maintains control over remotely located members of the project team.



### HKR Co-ordination Plan

The importance of efficient design co-ordination is reflected in our project team organization. Breaking the project down into each asset type, which simplifies interfaces and clearly allocates responsibility for management, and employing experienced senior managers in all key positions, will provide a solid basis for design. From our experience in successfully managing large, multi-disciplinary projects we recognize the importance of good planning and control to achieve high quality design.

Because of the number of parties involved and the resulting numbers of interfaces, great care will be taken in establishing scopes and boundaries in the very early stages of the design; avoiding any scope gaps. This aspect will require frequent monitoring and review as well as foresight and planning to resolve problems before they occur.

Meetings will be held weekly and prior to strategic milestones, chaired by the Project Director / Project Coordinator as necessary. Within each discipline, design meetings will be held when necessary chaired by the Design champions.

Regular coordination meetings and workshops will be held within and between different disciplines. The project team will undertake a workshop at the outset of each design stage to establish a series of design parameters around which the work stage will be developed. They will also be involved in this workshop to obtain endorsement of the design parameters prior to proceeding further. This method ensures that everyone is aware of the issues, constraints, and opportunities, and therefore facilitates a smooth and efficient agreement among the key stakeholders.

Interface points will be established at the inception stage, and an Interface Activity Schedule will be prepared. The schedule will define all interface points between different design disciplines both within and between sections which will be 'signed off' by relevant personnel when interfaces have been reviewed and resolved.

### **Identification of Key Multi-Disciplinary Issues**

It is recognised that project programming software is not ideal in identifying areas where there is considerable interaction between disciplines. This can result in several iterations to reach an acceptable solution. The key to minimizing the number of iterations is early identification of these multi-disciplinary issues. We will then hold 'brainstorming' meetings in the 'war room' with the relevant Team members. This ensures that the solution reached is optimal and accepted by all parties.

Design Freeze Points will be established as milestones within the Programme to co-ordinate the activities of the Multidisciplinary design team. These freeze points will be identified following discussions with key team members who will be responsible for the preparation of the developed design. As a minimum they will be placed prior to milestone submission dates with sufficient time allowed to fully co-ordinate the designs to be submitted for review by the Client.

As referred to above, Quality Control including coordination of the design output produced by the various disciplines will be achieved by implementing quality management procedures.

Included in our Project Quality Plan will be the following key procedures:

- Programme planning to cover monthly reporting, detailed daily programming for the following month, and working programs. Led by the Project Director and Project Coordinator.
- Monthly planning ensures that every person on the project knows: what work they should be doing; why they should be doing it; how work fits into the project team; and when they must finish the work.
- Co-ordination Procedure, to ensure that adequate co-ordination takes place between disciplines prior to the issue of drawings.
- Design Reviews to confirm that key issues relevant to each element of the design have been properly addressed.
- Peer Reviews to confirm that key issues relevant to each element of the design have been properly addressed.
- Constructability Reviews led by the Technical Director.
- Design Quality Checks to ensure that design complies with all relevant standards and is properly co-ordinated across interfacing disciplines.
- Document Control.

**A template of HKR's Project Quality Plan is in the appendices PQQ Submission.**

**HKR Overall Project Execution Plan (PEP) or Design Management Plan (DMP)**



It is the Project Co-ordinator's responsibility within the HKR structure to establish and implement an execution plan for the project. HKR shall establish a project execution plan which shall be contingent on the specific challenges of the project. The core documents of the delivery plan for this project will be:

- A Project Charter – documenting pragmatic Project-Specific Management Systems, made up of an integrated set of Policies, Protocols and Procedures.
- A Master Delivery Programme / Schedule.
- Network Diagrams (establish at the outset of each design stage) to map the split of scope and responsibilities between different HKR individuals, Teams and (where applicable) Offices – accommodating project uncertainty and effectively managing works with Sub Consultants.
- Scope and Deliverables Schedules and Tracker – for the methodical identification, delegation and management of activities and deliverables.
- Identification of key design submissions and approval gateways.
- Definition of Clients quality management objectives.
- Definition of Clients technical and budget approval objectives.
- Integrated Risk Management.
- An agreed schedule of Codes and Regulations taken from SBC, NFPA, ADA, IBC and CDD to form a comprehensive list of applicable statutory requirements.
- Statutory consents and project close out.
- Change Management.
- Communications Procedure.
- Document Management.

A template of HKR's Design Management Plan is in the appendices.

## **Time**

The objective is to complete the project in a timely manner in accordance with the Client's master programme and milestone dates.

## **Cost**

It is essential that the development of the design is continuously monitored and not simply the subject of a review at each stage in the process. Notwithstanding the fact that the client will appoint an independent Project Manager / Cost Consultant, HKR have their own independent Cost Consultant, to work within the Design Team providing regular concise and timely advice on the design and delivery strategies. While the Cost Consultant reports direct to the Project Director, he/she will also have a direct line of communication to the PM/QS thereby ensure the design stages remain within budget and avoiding the delay of unnecessary redesign to align construction budgets. Cost Control is therefore embedded in the Design process.

Cost Control of the project is of paramount importance. The objective is to carefully plan out every aspect to minimize the unknowns during the design development and construction phases to

maintain expenditure within the budget. Cost Control advice is a critical and important part of the design process.

The establishment of a financial framework at the very first stages of the project with the aid of the Cost Consultant is essential. HKR will work closely with them to achieve this.

Continuous monitoring of the scheme ensures that the costs of the project are known at each stage, allowing the design team to control the scheme development within the cost budgets. If the design should exceed the Project Budget at any stage in the design and construction process HKR will by use of a structured Value Management process bring the design back in line with the budget. We refer you to the 'Project Methodology and Approach' within the cost consultants Technical Submission in the PQQ submission.

This team will provide accurate, bench marked, market tested and up to date cost advice as we move through the design stages. They will instil processes in the design function to mitigate the financial risks to the project, reduce abortive design costs and strive for value. The Cost Consultant operates continuous 'live' cost tracking as the design progresses providing the client with continuous reassurance that the design is being carefully cost monitored as it progresses through the stages.

## **Quality**

The quality of the completed project is fully dependent on the quality of the design and construction process. The objective is to achieve the highest possible standard compatible with the Client's requirements, while recognizing the time and cost parameters. The Integrated Management System (IMS) adopted by HKR has proven to be a good mechanism for performing high quality services and this is described further below. Proper coordination of the multi-disciplinary design documentation is of great importance in achieving a high quality and our systems are tailored to ensuring this. HKR will assign a dedicated team, composed of staff from each main discipline and led by our Quality Manager based in London and later KSA, to the management and monitoring of quality assurance for the delivery of the project.

Our Quality Manager will be responsible for preparing a project specific QA/QC Plan and Procedures Manual, "Project Quality Plan" (PQP). The plan will cover such items as technical reviews and checks and will be updated, revised and reissued at the end of each design stage and/or every three months during the term of the contract. It is the intention of the design team that the QA/QC function shall operate under the umbrella of the HKR Quality Management System which is accredited to ISO 9001:2015. The Quality Manager Team will also work closely with our Senior Project Manager and the Design Team Leaders and Managers to ensure that all tasks carried out on the project are performed in accordance with the requirements of the PQP. Included in the Project Quality Plan.

- Programming and planning covering monthly reporting, detailed daily programs for the following month, and working programs.
- Monthly planning to ensure that every person on the project knows what work they should be doing, why they should be doing it, how work fits into the project team and when work is to be completed by.
- Coordination procedure to ensure that adequate coordination takes place between disciplines.

- Design reviews.
- Individual asset reviews
- Site wide reviews of services.
- Peer reviews including design quality checks to ensure the design complies with all relevant standards.
- Constructability reviews
- Ongoing cost reviews.

### **Environmentally Sustainable Design**

Our team shares the understanding of the importance of Sustainability within a responsible and ethical approach to real world development and has put into position the building blocks to make sustainable design a central part of our consortium's design ethos. In setting key sustainable KPI's we aim to match our clients' aspirations by designing buildings that reduce environmental impact, optimize the social benefits, balance financial returns and exceed current legislative standards.

We set sustainability targets for every project and offer solutions through innovative research and practice that deliver advantages for our clients.

We will seek to tailor the general ethos of Sustainability to the particular local Environment, placing special emphasis on the need to conserve water and reduce CO2 emissions, whilst also recognizing the importance of quality internal environments, respect for the local habitat, a responsible approach to transport, the need to eliminate any form of pollution and waste, appropriate selection of materials and even the role of the management team itself in the process.

Together with AESG Energy Management Services, Emirates LLC a Specialist Sustainability and Energy Efficiency Advisory Company, and energy specialist who will act as a catalyst whereby project team members spearhead the efforts to deliver the agreed sustainability strategy. Their Project Director will finalize the strategy through a series of workshops / Charettes with the client and design team and will then monitor their implementation through the Stages 3C and 3D.

### **The Process**

#### **Benchmarks and Target-setting**

The design team sets Sustainability and emissions targets at the inception of the project. These targets recognize industry benchmarks and standards, project goals and constraints.

#### **Online Emissions-Tracking Tool:**

Q&A sheets on KMS are used to inform project environmental design. By filling in the sheets stage by stage, project teams record sustainable project features in an online database. Our database records typical and exemplar projects for future benchmarking.

### **Reviewing:**

Tracked data informs project reviews, design workshops and other project teams through a searchable database. Progress is documented at key project stages by the project Sustainability Champions.

### **Reporting:**

Sustainability Reports are generated at the end of each project phase via the online emissions-tracking tool and so require minimal editing by project champions.

### **Research**

The aim of our research and development group is to: “Raise the quality of our projects and processes, to promote forward thinking attitudes and to foster a culture of excellence with the aim of adding value to the business”. The group explores design innovations in the field of parametric modelling and computational design in collaboration with the practice’s design teams. Through advanced modelling, the team develops and applies custom solutions for complex geometries employing the most sophisticated software to generate architectural surfaces. We also employ computational design to integrate processes (algorithms) from various fields into architectural and urban design, such as visibility analysis, routing optimization and wayfinding by creating their own prototypical software.

### **Main Contractor Engagement**

HKR engage at an early stage with key contractors and subcontractors who will be tendering the project. It’s essential the design is agnostic and capable of being delivered by multiple systems to ensure competitive bidding. In the case of Neom, they asked HKR to employ contractors for this input during the design process. We as designers hired contractors to provide that input. Such was the trust we had built with Neom. Thereafter HKR continued to deliver LOD 400 and LOD 500 documentation for the contractor minimising the need for shop drawing production and approval.

### **Modern Methods of Construction**

We refer you to the paper at Section ‘Modern Methods of Construction’ in the document [PQQ Submission](#) . HKR are very experienced in a range of prefabrication technologies that ensure zero waste and efficient cost-effective construction. As described in our paper it includes but is not limited to 4 typologies:

- Component sub-assembly.
- Non volumetric pre-assembly.
- Volumetric pre-assembly.
- Complete building.

We have delivered all four types in many projects over the last 20 years.

Based on our rich experience in Industrialized Design and Construction we will quickly established detail parameters of specialist contractors and suppliers and develop design from outset. We capture the essence of all interfaces ensuring coordination which guarantees that the construction process progresses smoothly.

### **Supply Chain Management**

As we develop the design HKR will establish which components are repeating throughout the scheme and we will always seek to standardize them to make sure that design and construction is efficient. We will do so without harm to the design intent, and we will ensure as many varieties as necessary for aesthetics while focussing on an efficient design with a minimal number of typologies throughout the development. After establishing all components, we will check them with the preferred by Client supplier and make sure they are available and designed to match their specification. This will ensure swift progress during construction and supply.

### **Value Management Plan**

HKR promotes, throughout the entire development process for any project the ability to “Design for Value” through a rigorous process of value management. This is a philosophy which is naturally engrained within the working methodologies of HKR. Through value management, our teams always strive towards the most appropriate and commercially advantageous designs which fit with our client’s brief.

Within HKR, a wealth of knowledge will be available to the client to ensure that the project will be a success. There are many facets to our management process, but it is fundamentally our ability to always challenge the design that makes our projects commercially successful. We employ the following methods to ensure that these targets are achieved.

- By collaborative working. At HKR, we listen, we design, we solve and achieve the best solutions for the client.
- We carry our rigorous peer reviews of every stage of the design process to ensure the most efficient designs area achieved. We have extensive experience in designing building for construction, having worked with and for contractors during the site phase. HKR bring the knowledge of being a ‘poacher’ and a ‘gamekeeper’.
- We will naturally always challenge conventional designs-taking nothing for granted.
- We provide optioneering studies to best inform the client of the most appropriate and cost beneficial solutions.
- We exploit creative engineering solutions to optimize potential and commercial returns for the client.
- We strive for standardization of elements in any project.
- We are experts in modular modern methods of construction. We provide agnostic design solutions, to enhance tender return ability.

- We ensure that building spaces are flexible and are adaptable to foreseen and unforeseen future use changes. This can mean for example that hotels are adaptable to serviced apartments, residential units or even commercial spaces. This is the way HKR think.
- We put a lot of energy into core planning thereby optimizing lettable areas while at the same time planning cores that allow flexibility in tenancies. We start with a good solution and always strive to improve it. Many of our completed office buildings have achieved ratios approaching 90% net to gross.
- We always strive to understand the local market and determine the most appropriate solutions with the client, contractors and consultants collaboratively.
- We use BIM design production technologies, whilst freeing our designers to design and maximize the potential of any building.

Ultimately design is a collaborative process, and we take the best facets of every consultant's input and deliver the most appropriate solutions. This is what value management means to HKR, "Design for Value".

### **Approach to Tendering**

HKR has unrivalled experience of MMC having being Architects on one of the Earliest and largest modularized projects in Europe, at Rock brook, Sandyford, Dublin 9 ( in 2002) as well as using other typologies on Housing Education and Hospitality projects.

HKR will assess all manufacture technologies and materials selected by the client. Based on its detail assessment HKR will create an agnostic design, which will be universal to all the above manufactures. This will allow for a wide tender return.

We understand the need to develop the relevant packages to a level of detail at an early stage in the programme to procure the works. We like to detail everything prior to tender to eliminate risk and ensure the tender returns are watertight. Each subconsultant will provide to HKR a report on the tender submissions to confirm the design intent of all aspects of the design Our technical evaluations always inform the client team of where there are positives or negatives in any tenderers return documentation.

We have a strong delivery team led by the Technical Director. While we are engaged in Stage 3B Development the Technical Director will be strategizing the packages required for the tender to ensure there is not time lost in preparing and issuing information in a format suitable for pricing by tenderers.

### **Stage 3A – Concept Design**

Concept design will have been completed and approved with pending comments. HKR will review the design and account for open comments in the comments review sheet. This review will identify problems and propose solutions.

### **Stage 3B – Design Development**

At this stage, the space/programme and design approach must meet all the requirements of the client. HKR will prepare a developed design including coordinated drawings, developed specifications, developed capital cost estimate and lifecycle cost, including Design Risk Assessment and Design Interface matrix between various stakeholder of the project as per the requirements in the brief.

HKR will immediately commence work in a proactive manner to assess the existing design and identify optimisation and improvements required in addition to implementation and confirmation of Code A's comments as well as all Code B's comments and responses to be segregated and declared and implemented. All will be presented in tabulated form and a continuation of the existing design CRS template.

HKR will commence detail research of the selected by the client systems and prepare detailed presentation documents with comparisons, advantages – disadvantages, cost evaluations, schedule evaluations, establishing commonalities and concluding into a universal design.

HKR will work with the consortium and participate in the development of the building's systems and budget. HKR will convene regular formal Design Team Meetings as well as individual discipline workshops at the location of their core team to achieve a coordinated approach to the design.

Following the issue of preliminary drawings and the production of separate discipline drawings by sub-consultants, HKR will commence "bulk" coordination. We will work with the Structure and Services sub-consultants to develop and plan the spatial requirements, structural zones, etc. to optimize the positions and arrangements of the Structural & Service Systems with due regard to cost, operational & statutory requirements.

During this stage HKR will be responsible for coordinating the designs for MEP, Structure & Services requirements as set out by the consortium members. This work will involve a very close and proactive relationship with all sub-consultants.

HKR will work with a Cost Consultant, who will be required to develop an elemental cost plan and estimate of the design during this design stage. Any overrun of costs will be identified and a Value Engineering workshop will be convened by HKR.

A cost review will be conducted with the client along with VE Workshops. The stage 3B review will commence with a general presentation which will be followed by individual discipline reviews for the following.

- A. Architecture / Masterplanning.
- B. Landscape Architecture
- C. Interior Design
- D. Urban Planning
- E. Structural Engineering
- F. MEP Engineering

- G. Fire & Life Safety strategy drawings & reports including special features and Emergency response strategy.
- H. Civil and Infrastructure Engineering
- I. Quantity Surveying
- J. Communications & ICT
- K. Mobility & Transportation
- L. Environment & Sustainability
- M. Waste Management
- N. Acoustics
- O. Signage & Wayfinding, location types, and signage schedule
- P. Geotechnical Engineering
- Q. Pools and Water Features
- R. Retail and F&B
- S. Security
- T. Vertical Transportation
- U. Façade
- V. Audio Visual
- W. Interior Lighting
- X. Exterior Lighting including access road and street
- Y. Irrigation
- Z. BIM/GIS
- AA. Dynamic Thermal Modelling and Analysis
- BB. Preparation of LEED submission requirements
- CC. Preparation of an early works procurement package to enable the employer to proceed with procuring the manufacture mock-up module(s).

During the review sessions, the client will evaluate and comment on the design and HKR as lead consultant will assist the Project Manager in collating all comments made by Stakeholders during the review process, assigning a level of priority 1-3 to each comment:

<b>1</b>	Requires response and/or correction before acceptance
<b>2</b>	Requires response during next phase of the project (accepted as noted)
<b>3</b>	Editorial comment – does not require response (accepted)

Before starting the next phase of design and commencing during the review process, HKR will address all Level 1 comments such that the client and their Project Manager are satisfied.

The deliverables of the stage 3B will include all documents outlined in the scope of services for stage 3B.

Special attention will be given to the development of industrialized construction systems / components, where the Design and Technical Director will be working closely together to identify the best solutions in collaboration with pre-selected client contractors.



The completion of Developed Design represents a key milestone and defines the principles, systems and strategies of all aspects of the project going forward. The Developed Design Report produced at this stage is a key deliverable and will be submitted one week in advance of the client review, enabling the client to comprehend the documentation prior to the commencement of the review process.

The Consultant shall prepare a Developed Design report for presentation and delivery to the client. The Developed Design Report will include a section for all disciplines. The Report will follow the requirements and format provided by the client.

The Developed Design Report shall include a commercial report and draft tender documents for all major disciplines, including sustainability to be provided for the base building design elements to demonstrate the quality and selection of materials, basic finishes, equipment's and proposed systems to best demonstrate the design intent for the project. HKR propose that the Technical Team will work in parallel with the design team to develop draft tender documents. In our experience these two functions work together but under separate leadership.

### **Stage 3C – Detailed Design**

Following the approval of the Developed Design by the client, HKR will proceed to the Detailed Design stage 3C. By this time, we will have clearly established the Developed Design layouts and defined the appearance of the project, internal layouts with outline finishes schedules will be developed and the project Cost Plan will be established at the completion of Developed Design stage. The commencement of Detailed Design Stage is triggered by sign-off and approval of the Developed Design by the client.

During Detailed Design Stage 3C the design reaches the level of refinement and coordination necessary for the development of final detailed drawings for Construction and Tender documents.

Based upon the approved Developed Design Documents, cost plan and any adjustments to the programme, schedule or budget authorized by the client, the Lead Consultant will prepare the Detail Design Drawings such that they fix and finalize the size and character of the Project. At this stage 90% of the design deliverables are to be completed.

At the beginning of Technical Design, HKR will incorporate the selected systems, material and equipment into the frozen design and will continue to evaluate the design through VE workshops by making sure that design and eventual operation of the asset is more efficient without compromising on the asset's essential performance, quality and maintainability. The design will be developed during this stage to provide a set of documents suitable for Contractor's bids, including a full specification of the works. Early works packages will be accelerated to provide tender/bidding documents ahead of the main schedule/programme and when deemed necessary in advance of the Design Review and Approval process.

At the commencement of this phase HKR will also use the checked and collated Developed Design documents to produce a full mock-up book of all intended Architectural Construction Drawings. This will be drawn up at A3 (half scale) and will be fully cross-referenced to ensure that all areas are fully drawn at the appropriate scale without repetition.

During the Detail Design Stage, HKR will coordinate with the sub-consultants in achieving the Client's Programme; complete scheduling of all finishes and other key architectural systems and prepare a second draft of the final specifications.

Specifications will be based on the CSI's Standard Master Format which refers to the British & American Standards. The Standard Master Format has been widely used on many projects especially in the Middle East. This specification has also recently been thoroughly updated to reflect availability of materials and components with equivalence to the specified products. We will employ a materials research and specification coordination specialist, who will ensure that the materials selected comply with Sustainable KPI's and will coordinate a consistent approach across the project with the specification writer.

At the commencement of the project, a Common Data Environment and Electronic Document Management System will be established by the Client Team. HKR's Project Task Information Manager will lead the coordination of same once established. In the Detail Design Stage, the framework of the documentation and drawing system will be completed with relevant information. As each of the project's main components achieves detail design completion, HKR will composite the information electronically and in hard copy to verify full completion and that all necessary information to proceed to Construction Drawings is available.

### **Cost Plan**

The Cost Plan will be updated at the end of the Detail Design to verify that the cost of the project is aligned with the budget. As required, a VE workshop will be convened to align the design with the budget and HKR will carry out a stage QA/C audit, before final stage invoicing occurs, rectifying any discrepancies, errors and/or omissions prior to final issue of the Tender Documents.

### **Tender & Construction Documents**

HKR will be responsible for completion of all Tender Documents packages; to all sequencing of trades, as required by the master construction programme by the Client.

A full Materials & Products list shall be drawn up and reference numbers applied to every method and product. The reference number will be HKR's own alpha numeric system which is cross-referenced to our specification. This is particularly important to minimize mistakes due to contractor language difficulties.

HKR will assist in identifying packages where cost risks are significant and provide information for preliminary pricing e.g. cladding and curtain walking packages; accelerating these areas to tender ahead of other packages. So that costs can be established, and any VE exercises implemented before tendering, HKR will provide technical assistance in the trade package procurement process.

The Developed Design Report will be updated to reflect any further developments from this stage of work and submitted prior to the Technical Design Review.

At the conclusion of this stage HKR and key sub-consultants' disciplines will attend a review workshop with the Client and all Stakeholders to close out remaining issues; before receiving approval. The usual QA/QC internal audit will be carried out prior to billing.

### **Deliverables**

The deliverables of the stage 3C will include all documents outlined in the Client's scope of services.

HKR will develop a construction system in collaboration with the Client's Design Team and contractor input delivering LOD 300. Particular attention will be paid to ratify the interfaces between the various components potentially delivered by several manufacturers as well as the interfaces between offsite and onsite works.

HKR will further develop and review in collaboration with pre-selected Client manufacturers 3D construction sequence diagrams incorporating the IC/MMC systems if appropriate, including but not limited to consideration for Supply Chain, Manufacturing, Logistics (delivery route, crane capacity, crane position, storage) and installation.

### **Enabling Works / Advanced Works for Packages**

The tender process will allow for the advanced issue of the structural package to allow the early works packages to proceed on site.

As well as preparing drawings to enable building mock-ups to ensure quality and deliverability of the product.

### **Stage 3D – Tender Stage**

Upon Client's written approval of the Detailed Design Submittal, the Consultant shall initiate the Tender Documents Stage to support main contractor and manufacture appointment. To include Employer's information, drawings, specifications, bill of quantities, schedule of rates, approved samples where applicable.

Tender stage activities will be controlled by the Client / Project Managers and HKR will support these activities by providing Tender Support Services and prepare Contract Formation and IFC drawings and documents as required by Client.

At the beginning of this stage HKR will prepare a comprehensive list of proposed construction contract packages and will identify possible risks of programme delay or cost over-run. HKR will work with the Client's Contractors, capture all commonalities between the various engaged and finalize an optimized agnostic design and fabrication method.

HKR will assist in preparing clarifications and addendums to the bid documents, if required. HKR will revise bid documents. HKR will incorporate bidder VE exercises and/or alternative proposals if directed by the Client.

HKR will respond to bidder's enquiries within 3 days and, if necessary, amend the bid documents to reflect any clarification. All communications with bidders will be through the Project Manager, the protocol for which will be defined in the PEP prepared at the inception of the project.

The Tender Documents set shall include all the information produced in the previous Design phase and shall be further detailed/refined to show the contract the exact method of installation and construction, especially as it relates to exterior and interior visible areas and all critical components of the building and for the integrity and performance of the building.

A comprehensive list of all drawings, reports, specifications and BOQ's that form the tender documents will accompany the submission.

### **Deliverables & Approvals**

The deliverables of the stage 3D will include all documents outlined in scope of services for stage 3D.

The consultant shall, in coordination with the Cost Consultant, prepare complete Tender Documents for review and approval by the Client. The Consultant shall provide the Client's Cost Consultant with required drawings, details and other documents enabling the Cost Consultant to generate Bills of Quantities (BOQ) to an acceptable level of breakdown in order to avoid future claims to be raised by the Contractor executing the Project subject of this Contract. Tender Documents shall include specifications for site offices. Specification shall also provide for overtime for Client and Client's Consultants consistent with Client's agreements with Client's Consultants. Upon approval, HKR will deliver a complete set of tender documents in soft copy (PDF & CAD format) on the Client's network.

### **Tender Analysis and Information for Construction**

Upon Client's written approval of the Construction Documents the Consultant shall initiate the Tender Analysis Stage as outlined below.

HKR assisted by their sub-consultants will evaluate bids for technical compliance with the Construction documents and participate, as required, in a series of technical workshops after the receipt of bids. A Technical bid analysis report will be delivered at the end of this stage.

During the tender of the project the Consultant shall:

- Issue bulletins during the tender period in answer to Tenderer's questions.
- Consider and advise the Client of any alternatives proposed by the Tenderers.
- Coordinate responses to bidder inquiries.
- Conduct bid review, analysis and evaluations.
- Where necessary and as an additional service, revise Contract Document information to adjust tender sum except for the revisions where required to correct errors and omissions.
- Consultant will analyse bids and advise Client in the evaluation of Tenderers bids and other submissions.

Information for construction will be produced subject to final tender information including bid addendums, Contractor's proposals and VE exercises being agreed with the Client and incorporated

into the bidder's costs. A general update of tender information will take place prior to the Contractor signing the contract and this will be the information for construction issue. HKR will provide MMC support services in line with the scope.