

Governance, Set-up & Commercial



- Plan early the strategy and sequencing of external works
- Avoid chasing milestones to the detriment of the long-term goal, and remember to deal with the communal areas and building envelopes as well as apartments
- Ensure change control process is understood by whole team
- Ensure there is a clear strategy to take the project from development / design stage to construction
- Hold monthly project site team meetings to help clarify site-wide and individual building design / scope interfaces, and focus on key issues
- Make clear 'contract status' scopes available to all team members to avoid confusion
- Agree frame type and crane strategy early to inform design programme
- Reduce hoist periods to minimise costs

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- Use precast columns and walls and use pan system (saving time)
- Form podium slab early as it allows early M&E installation and provides covered storage and work areas
- Start roofing works as early as possible, avoiding temporary waterproofing – buy multiple visits to enable this and involve M&E early so that penetrations are done in time
- Post-fix cladding instead of using cast-in channels as they are never 100% right
- Maximise window pre-fabrication and installation in cladding panels
- Buy a temporary façade wall with the frame contractor to double up edge protection and get watertight to enable fit-out to commence
- Incorporate a temporary waterproof detail at façade joints
- **Recruitment and retention of suitably skilled managers (with residential experience) at the appropriate time is critical**

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- Use incentives to retain key personnel until completion
- Clearly set-out roles and responsibilities, review regularly and update to address changing roles and changes in teams – maintain clear organograms
- Infrastructure connections to buildings must be coordinated with plot programmes to ensure main services (including security and district heating) are available when required and that external works do not clash with façade works (i.e. service trenches not in way of or delayed by scaffolding)
- Have the right resources at the right time to adjust Cost Planning and check design evolution internally, ensuring all interface issues are identified – consider aligning commercial close-out strategy with building handover processes
- Consider sliding scale of risk / reward from incentivisation through to damages

- Finalised design assists with procurement – however there are also considerable advantages in getting subcontractor involvement early to inform design decisions, so this needs to be carefully considered and a **suitable balance agreed between design finalisation for cost certainty and design flexibility for cost and buildability improvements**
- Ensure procurement process is fully incorporated into an overall design, procurement, construction and handover programme
- **Insist on a detailed design programme from relevant subcontractors (and make condition of first payment)**
- Consider combining sub and superstructure packages, to avoid costs associated with interfaces and handover from one to the other
- Procure windows and other interfacing cladding systems at the same time
- Separate installer from manufacturer of pods to increase number of possible companies – consider positioning by drylining subcontractor

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- Get each subcontractor to undertake a buildability review and issue a confirmation statement, as part of their contract
- Ensure any additional visits for items affected by interfaces with other subcontractors are bought with the package initially, assisted by an interface matrix
- Use milestone payments instead of monthly ones for consultants as well as subcontractors
- Check design, manufacturing and installation capacity of each supplier (possibly on multiple buildings / site-wide) and effect it could have on lead-in periods, and have a strategy to deal with any delays
- Only let items of work that are within a subcontractors' expertise
- Coordinate site-wide and individual building procurement to eliminate scope gaps and ensure clarity on delivery requirements for all areas

Design



Design



- **Give design teams a high level design programme and get them to produce their own detailed programme to fit it** – they will have buy-in to meet their own programme, and should resource accordingly (include allowance for reviewing design team and subcontractor drawings)
- **Issue fullest possible design brief before design commences** to incorporate all requirements including those for temporary Games use (both Olympics and Paralympics) and sustainability issues, and then freeze the design as early as possible
- **Changes, including variations to the design brief and any Value Engineering, must consider the effect on the design team, subcontractor and construction resources and programmes as well as cost before being incorporated** (thoroughly review all issues including effect on interfaces and building services) – consider the potentially very large number of apartments and therefore drawings that might be affected

- The Change Control process needs to be streamlined and to have authority for sign-off of contingency release delegated to an identified appropriate level, but with central control to ensure coordinated responses to DIs with consideration of brief, programme and priorities
- Ensure appropriate lessons learnt from relevant buildings / projects are captured by the project team at the earliest and appropriate times to effect useful learning
- Appoint consultants competent to carry out the design and coordination
- Lead design coordination role to be clear and enforced, including coordination in other disciplines, especially MEP
- Ensure adequate level of Design Manager and Package Manager resource to check drawings
- Use different design practices to give design diversity
- Clarify the role, authority and specific requirements of the Client Monitoring Team (CMT), and have a clear recorded communication process

- **Standardise site-wide detailing where possible** (e.g. balconies, dry-lining), but must be prepared properly and enable flexibility to suit each project including allowing for different suppliers (e.g. BG and Lafarge) – make the project architect responsible, with detailed subcontract design where appropriate
- **Standardise MEP design and equipment site-wide as far as possible**
- Issue a tough brief at the beginning and integrate balconies into the façade to avoid / reduce water / fire / thermal issues at connections
- Toilet and bathroom pods good with maximisation of repetition – ability to freeze design (including finishes) early is essential
- Back-to-back pods are significantly slower to sequence and test than single pods – access to stacks and other plumbing is the key issue, so do not overlook it or use inappropriate materials for access panels, and ensure stacks, valves and rodding points are easily accessible
- Consider locating cooling units above the bathroom pods instead of in bulkheads, but ensure access and condensation issues are resolved

- Coordinate building and external streetscape / public realm levels and details early
- Use a Lead Consultant for all landscaping / infrastructure / public realm areas to ensure full coordination
- Incorporate sufficiently large tolerances from the frame onwards, with a design tolerance matrix to identify issues if design changes affect them – ensure all zones take account of the full build-up of the related building and installation tolerances
- Increase tolerances to give flexibility to meet the numerous critical design constraint dimensions imposed by LTH, HQIs, WCH etc (increased GEA justified by increased buildability)
- Design structure to enable flexibility to precast and stitch together on site
- **Involve subcontractors early to steer design based on preferred construction methods (and adjust design release programme)**

- **Site-wide design guides to be in place at briefing stage**, and all requirements fully detailed and communicated to the whole team (including for SVP access and maintenance access that have different solutions on different buildings – see note under Commissioning & Testing also)
- Apex cabling – bigger cable than originally, value for money with reduced labour on site but increased design labour as less flexible – clear advantage?
- Incorporate concrete upstands to parapets as they are fully protected and easier to weatherproof early than alternatives
- Use of precast cladding de-risked site operations but created a risk of subcontractor failure – single storey would have shortened programme as double storey panels had to be double-handled
- Use basic chassis (courtyard) design as it provides control of design development given the time constraints on master planning and tenure modelling

- Forming access through wintergardens at every floor level between blocks for the Games satisfied the requirement for athletes to access two lifts without any additional provision
- Arrange floor layouts to make SVPs in-line vertically and enable fire collars and insulation to be installed, and ensure rodging points are accessible (consider locating hatches in corridors where possible)

Quality Process



Quality Process



- Engage project team, subcontractors and external stakeholders early in the process, including attendance at quality workshops – early identification of issues with NHBC and Triathlon worked well
- Deliver benchmarks (including accelerated apartments) early, and get input from all parties (including NHBC & JLAB) – use off-site as well as on-site where possible (e.g. balconies) – allow for out-of-sequence working and additional resources required
- Carry out quality inductions to drive key messages and demonstrate expectations early – would have assisted progressing benchmarks earlier
- Implement a simple effective samples and benchmarks process, and use an electronic system for sign-offs
- QA tracker with identified stages was a successful tool and should be developed to include commissioning – commercial team could use it more to control payments – don't let focus on Milestone 5 detrimentally affect the rest of the project – focus on Milestone 9 as this is the key hold point

Quality Process



- Put M&E testing and fire stopping in Hold Point QA3 of QA tracker instead of QA4
- **Use site-wide standards for benchmarks and samples to give consistency, and make signed-off physical benchmarks and samples of an agreed fixed list accessible for reference**
- **Arrange for sufficient personnel (e.g. from ODA and JLAB) to deal with numerous handovers very close together, and from JLAB at earlier stages in construction to reduce pressure at final inspections**
- Apply second coat of paint initially to meet ODA expectations, with a third 'touch-up' coat post games
- **Issue robust quality procedures, including requirements for samples and benchmarks, at tender stage to ensure requirements fully allowed for, and ensure subcontractors are able to maintain the required quality on possible large numbers over multiple buildings**
- Use pods as they were finished to a good quality generally and benefitted the programme