

**PROPERTY DEVELOPMENT
SERIES 5
DETAILED DESIGN, DOC-
UMENTATION AND VALUE
ENGINEERING**

A PERSPECTIVE

Property Development Series 5

Detailed Design, Documentation and Value Engineering

You have now obtained your town planning permit and approval. Congratulations on clearing this major milestone! Council out of the way, and now the ball is really in your court and the real fun begins. At the conclusion of the planning approval stage and having spent a year obtaining the permit, you will have the following deliverables – site detailed survey plan, architectural layouts, elevation design and material specifications, section drawings, shadow diagrams, sometimes a landscape plan and perhaps some basic 3D renderings and images. In some larger scale projects, there may also be a traffic report, a wind report and other supporting technical engineering reports. Not a lot for a whole year's work!

There is a lot more information necessary before a builder can proceed to price and build. Such information includes material specifications, detailed finishes and details, setout, fully dimensioned plans, a building permit, geotechnical reports, environmental sustainability assessment and accompanying structural, civil and services design drawings. This next stage of the development process takes us to the design and documentation of the project in full.

There are a number of considerations and questions to be made at this stage:

1. Who is best to drive and manage the design and documentation process? The builder or the developer, or a combination? The underlying question is one of procurement method selection – design and build or fully documented lump sum, or a hybrid?
2. How can a developer manage and control the design process to ensure a design fit for purposes, within budget, integrated with the sales and marketing process and is conducted in an efficient manner with minimum re-design?
3. How do we ensure the designs produced from multiple consultants are well co-ordinated and free from errors or omissions?
4. What is value engineering, and what is a structured process to go about VE?

We look at these questions one by one:

Procurement Method

There are many procurement methods in construction, but typically the two extremes of the spectrum are design & build, or fully documented lump sum. Full D&C arrangements typically involve engaging a builder at the completion of town planning approval on basic town planning drawings and outline specifications and the builder is responsible for completing the detailed design and carrying out the physical construction works. A lump sum arrangement is where the developer completes the full detailed design to a construction level of detail and appoints a third party builder on a fixed price build-only contract.

Either method can be tendered to a select group of builders, although one will argue that for a D&C approach, there is no fair way of comparing different tender prices, as the ultimate material selection can vary greatly based solely on a set of outline specifications. For example, the outline specifications may specify engineering timber flooring, but there are many different grades, quality and specifications of such flooring on the market. How would you compare flooring type A with another flooring type B? Also, it limits the ability for the builder to source more innovative alternative but most cost effective solutions. A builder may have access to hardwood flooring at a much better price than engineered flooring because the builder also happens to own a flooring supplier, or there may be excess stock from another project completed a few months ago. Furthermore, there is likely to be no structural design at this stage, hence, it would be very difficult for any builder to place a firm structural cost, apart from very conservative rates based on other completed projects. Naturally, the price will be conservative with a lot of contingency.

On the other hand, a fully documented approach provides complete full control over the design and all builders will be pricing on the exact same set of drawings and design, allowing for better comparability and competition in sourcing the best prices. But the risk of co-ordination errors, design faults or documentation quality rests with you the developer. There are hybrid arrangements in between the two spectrums but each approach needs to be considered uniquely for each project type.

We will go into more detail on the pros, cons and features of each procurement method in a subsequent series paper.

If you were to ask us what method I prefer for a typical medium scale apartment or mixed use project, I would have no hesitation in recommending a fully documented lump sum approach, or somewhere close to that end of the spectrum. Our past experience in Asia and Australia reveals one very stark difference between the two cultures. Asian developers value full and direct control and best value for money, much more than Australian developers, who tend to adopt a more collaborative approach, single point of contact and ease of mind. Being Chinese in blood, I naturally take a more controlling approach to my style, and enjoy the thrills and challenges of leading and delivering the full design and documentation process. After all, why would you hand away the most fun part of the project to a third party?

We do believe there is room for adopting the D&C approach, but only for very technically complex projects or building elements, where there is a strong need to integrate design with buildability, and where there is strong evidence the builder has unique expertise that no other consultant has. One type that immediately comes to mind may include theme parks with intricate structures and one-of-its-kind designs. There are such limited contractors or suppliers in the world that can successfully complete this project that the procurement does warrant full integration with design and construction. For more conventional buildings, there may be certain elements of the building that warrant a D&C approach, such as special roof spines, tri-generation mechanical plants or specialist long span glass structures or special façade systems. In this case, one would specify the performance requirements of these elements in order to control the final designed and built outcome, and established contractual mechanisms such as provisional sums, prime cost items or re-measurement can be deployed to maintain a control of costs.

There is a lot of published literature comparing lump sum with D&C methods, each with varying conclusions. For more conventional built form projects, such as apartments, or high rise towers, our preference for full documentation can be reasoned as follows:

- Control and Ownership - A developer ultimately owns the project and delivers on its brand. Detailed design is what end users ultimately see, feel and touch. Refining the detailed design has a direct impact on the end product and your brand, and having direct control over the design process is the only sure way to guarantee what the end product is what you are after. A hands-on approach will always yield a better outcome than a hands-off approach. Also, once your consultants are novated to the builder in a D&C contract, you are at your own mercy to drive the project and hope the builder will progress the project in an efficient manner. You will have no further external technical support to advise you on the design details. At this stage, the developer will feel like a toothless tiger, a lone wolf.

- Value for Money - Having worked in different parts of Asia and Australia with a broad range of builders ranging from the top-tier commercial international contractors to suburban domestic home builders, we can say with a fair amount of confidence that a D&C approach will typically result in a higher cost outcome and a lower than expected performance result. The higher the quality the buildings, the higher the deviation from expectations. As with any service or product in the world, luxury and convenience always come at a price. One must bear in mind that the costs of managing and delivering the project does not vanish just because you have a D&C contractor – in D&C, you are paying for the “convenience” and “ease” of dealing with one party, the builder, as opposed to numerous design consultants and sub-contractors. Builders typically charge a project management fee and a design management fee in any case, so a shrewd developer with good project management experience should save this fee and manage the project themselves and also achieve exactly what they have in mind in terms of budget and design. This is the reason why you see a lot of developer/builder firms, who are able to deliver projects more effectively.

However, from an investor’s point of view, working with developer/builder firms will mean you are paying even more for the ultimate convenience of dealing with one party and also dealing with potential conflict of interest (developer/builder specifying expensive materials and finishes, hence achieve a higher overall margin). This is why we recommend investors to work with a professional developer and outsource the construction works through competitive tendering to achieve the best value for money.

- Relative cost certainty – At the time of signing a lump

sum contract, assuming a complete and well co-ordinated set of documentation, the final cost is more or less locked in. Scope changes should not occur at this stage. Obviously there still will be a client contingency to cater for unexpected events such as unknown ground conditions, or design documentation or co-ordination errors. However, at the time of signing a D&C contract, there will still be a lot of uncertainty in the final contract value, as there is still no detailed design, finishes selection and details, lots of provisional sums and lot of scope for client initiated changes and design development refinements. All these add uncertainty to the final contract value. Although there are many mechanisms to put a cap on the contract value, such as the use of staged GMPs, cost sharing/saving etc, this adds added administrative and contractual complexity and more room for argument and delays. The time one save in quickly signing up a builder may quickly exceed the procedural and administrative timing involved in negotiating and finalizing a locked-in price. Finally, any financier will not be willing to approve construction finance based on a moving uncertain target.

Design Management

Our view on design management is that it is a separate professional discipline from conventional project management. On larger projects, the developer normally employs a design manager whose sole responsibility is to drive the design documentation, undertake value for money reviews, lead the design co-ordination efforts and produce a set of complete and well co-ordinated drawings and specifications. Typically, the design manager will come from an architectural or construction management background with strong experience in reviewing drawings, an eye for detail and strong understanding of design and co-ordination processes. For smaller projects, the project manager will perform the role of design manager during the detailed design phase.

Our past experience both as a design consultant and also as a client project manager suggests there are typically a number of recurring pain points experienced by the developer during the design process

- Cost overrun – when the ultimate design exceeds budget
- Scope Creep – additional incremental scope or small design elements creeping into the final documentation, resulting in over design
- Final Design not marketable – when the proposed design does not meet market requirements, or has no niche to enable it to sell or lease successfully

- Numerous rounds of re-design and re-documentation
- Endlessly investigating different design options and alternatives with no objective or target in mind
- Design not buildable

The above pain points can be skillfully managed through a system of defined processes, checkpoints, interval design reviews and past experience. We highlight some of the ways that a developer can adopt to minimize these pain points:

1. Enforce a structured staged documentation deliverable schedule with the whole design team and undertake design and cost reviews at these checkpoints. Conventional stages are 50% design development, 100% design development, 50% contract documentation, 100% contract documentation and pre-tender issue.

Clearly define the exact deliverables expected from each consultant at each of these milestones to avoid confusion. 50% design development may include outline architectural and interiors specifications, concept structural systems (vertical and horizontal stability system) with typical structural floor framing options and key structural element sizing, outline specifications for all building services, including proposed HVAC system, need and sizing of any electricity, water, drainage and sewer infrastructure, façade concept design and proposal. The purpose of this stage is to define all the building elements to enable an early cost figure to be determined. This early stage is when options are considered – the architect will propose different material option and the structural engineer will look at and size up different lateral and vertical stability systems.

At the end of each design stage, there will be a number of activities – cost plan review/update, project manager and marketing agent documentation review and comments, client design presentation of recommended solution. This enables smooth design delivery and minimizes re-design work as far as practicable.

2. Prior to the first design meeting, decide on and define the required option studies to be carried out for the first stage deliverable. This can be made based on past experience or in consultation with your QS. Focus only on major cost items worth reviewing. A lot will fall on your past experience. For example, consider a high rise office building with open plan office space and a central core housing lift and services. If we were the developer, we would commission the following option studies – structural floor slab options, structural perimeter column study,

façade options, mechanical ventilation options. It would consider life cycle costs – capital costs and also ongoing maintenance and energy costs.

3. Buildability is always a pain point. We have witnessed so many builders complaining a certain detail cannot be physical built or manufactured, or there is not enough repetition in the structure. Unfortunately, consultant designs may not always be an efficient build with numerous transfer structures, complex architectural and façade detailing and inefficient building services design. Engaging a good team is the first step, but how can we proactively ensure a buildable and cost effective design, especially if we are opting for a lump sum approach in lieu of a D&C approach?

One successful approach is the appointment of a construction advisor as part of the design team. This advisor is a builder and will most likely be part of the tender shortlist in the future. Their role is to provide buildability advice in the design to ensure economy in design and also accounting for practical site management, logistics and construction. They will work with the structural engineer to come up with the various structural options which is light and also easy to construct. They will advise on which elements are best suited for pre-fabrication for fast construction and shorter lead times and incorporate this into the design documentation. When it comes to tender, they will form part of the shortlist to submit a price along with other builders. Cost plans and reviews are kept separate from the builder advisor.

4. Maintain a detailed design programme outlining key actions and milestones up to completion of documentation. Define date and time for each design checkpoint deliverable. The programme will state how much time is allowed for each deliverable delivery and review. This programme will be monitored and statused at each design meeting and any acceleration actions conducted promptly.

5. Maintain a strict schedule of face to face design meetings and co-ordination. Too often, we have seen failed or very prolonged attempts at co-ordination over the phone or via emails. It never ceases to amaze me that consultants hate calling each other and resolve issues directly and prefer to resort to lengthy, poorly worded emails back and forth! Then comes the classic excuse that they did not receive the email! I do not recall how many times I have asked consultant A to call or meet with consultant B to resolve a particular design issue! An issue can be raised and resolved at a 2-hour design meeting, but emails back and forth can take more than a week! Your design meetings should comprise both a progress reporting element, where the team will go through meeting minutes and close our key actions

items, and a working session element, where the team rolls up their sleeves and resolve design issues. It will also force the team to come prepared each week and allocate time to work on this project, amongst their numerous other concurrent projects.

6. End User and Stakeholder management and consultation is probably one of the most important but understated aspects of design management. In any project, there are always numerous stakeholders to satisfy – bosses, end users, tenants, operators, property managers and clients. Set up a project governance mechanism, a Project Control Group (PCG) in Australian terminology to act as the ultimate decision maker in all project related matters. This group will meet regularly, typically monthly, to review project progress, manage risks and make decisions on design matters. It will move the project forward in a structured efficient manner and also keep all stakeholders informed and happy and reduce the chances of major designs later down the track. Communication is always the key to success of any project, whether dealing with Council, design team, end users or builder. The PCG also sets an implicit monthly milestone for the whole team to work towards delivering their part and assists in maintaining momentum and energy on the project. See the attachments for a diagrammatic representation of such a structure.

7. Very often, we see sales and marketing left behind as an after-thought following the design process, but in reality, good design should also be marketable. Our view is that in addition to traditional design consultants – architects, engineers etc, the appointed sales and marketing agent should also be treated as part of the consultant team, providing invaluable input into layouts, materials specifications, and aesthetics all throughout the design process. While they may not need to take part in every design meeting, it does make sense for them to review the design package at each design checkpoint. Sometimes, architects and interior designers tend to be overwhelmed by their own personal design preferences and character, and fail to observe general market acceptance. The developer and sales agent should maintain this reality check to keep the team grounded. The sales agent will also be able to conduct some select quiet marketing and create market hype and excitement well in advance of the official project sales launch.

Design Co-ordination

Co-ordinating designs from different consultants are always a painful, iterative and time-consuming task, but it is absolutely

essential to enable a building to be built and function properly. Luckily, technological advancement today has made this task a lot easier with Revit, BIM modelling and other 3D modelling software taking away a lot of the old human effort and iterations. We have experienced co-ordination of designs using primitive manual methods, where the client would engage a co-ordination consultant, whose role is to produce overlaid autocad drawings, identify clashes and issue final builders works drawings (Combined Builders Works Drawings - CBWD, and Combined Services Drawings - CSD) for set out and construction.

Whilst technology can greatly speed up the co-ordination process and reduce the amount of errors, the ultimate fallback is "rubbish-in rubbish-out". Ultimately, there is always a large human component in design and the quality, accuracy and extent of the input information will dictate whether co-ordination has been carried out fully and successfully.

As the developer or project manager, in addition to appointing a good design team, which is a given in most situations, there are a number of key control and management measures that can be adopted:

1. Prior to launching into detailed design drawings, review the proposed design brief for all building services and structure at the 50% DD design checkpoint stage. The design brief acts as the engineer's technical response to the project vision and brief and outlines (in words) the proposed technical system and engineering solution to be adopted, including explanation of the level of quality to be adopted, energy efficiency targets, sustainability ratings (Green Star, Nabers) to be achieved. This is to be costed and reviewed prior to proceeding to detailed design calculations and drafting.

2. Clarify the level of documentation that will be documented by the consultant – for building services, there will be some elements which will be left as a D&C items, such as main switchboards, distributions boards, co-generation plants. Understand which items will be left as D&C and assess whether there will be a co-ordination impact. If so, make adequate allowances, space and ceiling height for these D&C items.

3. Reinforce the need for regular face to face meetings to report on progress and also act as a working session to resolve design issues. As projects progress, there is a natural tendency to shy away from these meetings, but sometimes a design issue will impact on a number of parties, hence communication by mass emails or phone calls will not suffice. These design meetings are best chaired by the Architect or a nominated design manager (if it exists) and minuted and actioned at each meeting. Make the Architect responsible for overall design co-ordination.

Value Engineering

Almost in all projects that we have worked on in the past, we observe that construction costs from tenderers come back at well above budget, then follows a painful process of negotiating and cost cutting after appointing a builder. This is time-consuming and strategically not in the developer's favour. The developer's hands are tied and have lost all bargaining power, but just negotiating with one appointed builder. We have experienced this on numerous occasions, where despite assurances from the builder that they will act in good faith and co-operatively, the result is far from that. For example, we decided to downgrade a certain internal finish and request a revised lower price. What always comes back is indeed a lower price, but higher than what our QS would have expected. You will probably know why – there is no motivation for the appointed builder to help the developer any more. They have won the job, and our whole team is at their mercy and disposal. Some builders will attempt to delay as much as possible, so as to increase the developer's urgency to agree a price and sign the contract. Unless the builder is your son, where you can smack him around at the dinner table, never carry out value engineering after tender! Always carry out value engineering prior to tender.

One thing to bear in mind about value engineering – it is not pure cost cutting. What we are trying to achieve is an equivalent quality and performance for a lower cost, using smarter and quicker construction methods, tighter design standards and alternative materials and finishes, utilizing the experience of everyone in your design team.

Hopefully, throughout the design checkpoint process up to pre-tender estimate, costs have been kept relatively under control and the overall scope has not crept. Value engineering can take a long time to finalise if not conducted in a structured manner. Below is a 10-step method that we like to conduct VE – it avoids being too academic and is flexible enough to adapt to different circumstances:

1. The QS produces their contract documentation detailed elemental cost plan and conducts benchmark cost analysis with other recent comparable tender prices by element, use, discipline and other relevant criteria. The analysis should be cut by multiple dimensions to give a more robust three-dimensional picture of the cost situation.

2. This analysis will identify which element or disciplines are considered too costly relative to comparable projects. Other elements may also be identified by the project manager at their discretion as the focus for subsequent VE. The focus of VE should be on these identified elements.

3. Clearly define a target monetary saving for each element. The target should be generous, say 20% above the actual required saving, as there will be some savings which will not be implemented or de-prioritised.

4. Set up a master schedule template (excel format will suffice) which will track and record all identified savings items. The schedule should have the following headings – item number, description, initiating party, discipline, upper and lower limit of cost saving, and implementation priority (high, medium low)

5. Send out an instruction to team clearly stating the target savings to be achieved by discipline, so that each consultant can focus their efforts on achieving the numbers.

6. Make clear to the team that each VE item must be specific and quantifiable. Also clarify that the items should achieve a roughly equivalent level of performance or quality and that the project vision and brief has not changed. Clarify which elements or design are considered important and non-negotiable and cannot be value engineered away.

7. Allow the team some time to feed VE items to the PM and QS. The PM can also provide some VE item suggestions. QS will then carry our cost analysis in consultation with the project team. This VE list can be a brainstorm list of items of ALL possible cost savings items.

8. Once all information is available, convene a full team workshop (typically at least half day) to go through each item one by one and discuss impact and assign a priority level (H, M, L) depending on the developer's preferences and cost impact.

9. At the end of the workshop, there should be firm decision on which items to implement as cost savings (all the H and most of the M priority items). The sum of all these items should be equal to or exceed the target saving identified in step 3 above. Instruct team to amend documentation to reflect cost savings within a certain time frame.

10. All the remaining priority items can be included in a specific tender return schedule as specific items to be costed by the tenderers. This schedule can also allow space for the tenderer to come back with specific cost saving items for consideration (although most tenderers will prefer not to give away their intellectual knowledge at this stage yet). The purpose is to keep all VE activities in the pre-tender return stage, so that a reasonable element of competition can still be induced. These items also act as a fallback in case the tender prices are all still higher than expected for whatever reason.

Depending on the complexity of the project, the whole VE process can normally take between 3-4 weeks to finalise and documentation revised. As such, it is not a short process, but it will potentially save precious time post tender when budgets are exceeded.

As one can see, the detailed design and documentation process is probably the most labour-intensive, time consuming and arduous stage of the whole development process, requiring immense brain power, execution capability and drive. A good developer should have resources to execute this stage with confidence and competently.

Our extensive experience on a broad range of projects of varying scale, complexity and cultures makes us ideal to manage the detailed design process on behalf of developers and investors. We provide impartial and independent advice in the best interests of the developer to achieve true value for money.

YOUR TRUSTED AUSTRALIAN DEVELOPMENT PARTNER

OUR CAPABILITIES



SITE ACQUISITION

Solid pre-acquisition due diligence and sourcing of the best on and off market development sites is the first step to a successful project.



PROJECT FEASIBILITY

Thorough market research, detailed risk assessment and a robust project feasibility analysis will provide comfort for a successful acquisition.



DEVELOPMENT MANAGEMENT

Leading and managing all project consultants and stakeholders and securing the best planning approval is a crucial first step in the development process.



PROJECT MANAGEMENT & FINANCING

Disciplined project management, design and documentation management and cost control within feasibility limits will ensure projects are completed on time and to budget.



INVESTOR REPRESENTATION

On larger scale joint ventures or projects, negotiating development agreements, undertake commercial and technical due diligence and representing investors throughout the project will ensure their interest and risks are managed.

ABOUT US

STM Developments is a property development & advisory business based in Melbourne, Australia.

We work alongside developers and investors, providing site acquisition, feasibility analysis and project management services for residential and commercial projects. We initiate and participate in property development joint ventures as project proponent. We also act as investors' independent representatives as their point of contact for their co-investment projects and joint ventures.

Founder and Managing Director Simon Lee has more than 17 years of professional experience in all major facets of the development industry in Australia. He has successfully designed, led and managed major commercial, retail, mixed use and residential projects in Hong Kong and Australia ranging in value from \$4 million to \$20 billion. Simon is also an occasional guest lecturer and tutor at the Faculty of Architecture University of Melbourne.

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