



# Home Building Guide

Teyaseer

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## Table of Contents

<b>GLOSSARY .....</b>	<b>0</b>
<b>INTRODUCTION .....</b>	<b>1</b>
<b>CONSULTANT PROCUREMENT .....</b>	<b>3</b>
CHOOSING THE RIGHT CONSULTANT .....	3
<b>DESIGN DEVELOPMENT .....</b>	<b>4</b>
INITIAL DISCUSSION (KICK-OFF MEETING) .....	4
CONCEPT DESIGN .....	5
SCHEMATIC DESIGN PHASE.....	6
DETAILED DESIGN PHASE.....	7
TENDERING PACKAGE .....	7
<b>CONTRACTOR PROCUREMENT .....</b>	<b>9</b>
CHOOSING THE RIGHT CONTRACTOR.....	9
<b>CONSTRUCTION .....</b>	<b>11</b>
MOBILISATION & ENABLING WORKS .....	11
SUBCONTRACTOR & SUPPLIER APPOINTMENT .....	12
EXCAVATION .....	12
FOUNDATION PREPARATION .....	13
FOUNDATION .....	13
SLABS .....	14
COLUMNS .....	15
NON-LOAD BEARING WALLS (EXTERIOR AND INTERIOR) .....	15
ELECTRICAL WORKS .....	15
AIR CONDITIONING .....	16
PLUMBING WORKS.....	16
ALUMINIUM AND GLASS (GLAZING).....	17
PLASTERING.....	18
THERMAL INSULATION AND WATERPROOFING .....	18
SUSPENDED CEILINGS .....	19
KITCHEN & BATHROOM FINISHING .....	19
JOINERY (WOOD) .....	19
INTERIOR PAINTING .....	20
BOUNDARY WALLS .....	20
LANDSCAPING .....	21

SNAGGING AND DE-SNAGGING .....	21
TESTING AND COMMISSIONING.....	21
AUTHORITY INSPECTIONS .....	21
HANDOVER.....	23
DEFECTS LIABILITY PERIOD (DLP) .....	26
FINAL ACCOUNT .....	27
APPENDIX A – CONSTRUCTION PROGRAMME OVERVIEW .....	1

## GLOSSARY

We will use these terms frequently in this guide. If you are unsure about what a word means throughout this document, please refer to this section.

**Block work** = Blocks of concrete, cement or comparable material stacked up in a wall or other structure.

**Building Completion Certificate** = A certificate that the Contractor receives from the Department of Urban Planning and Municipalities that indicates substantial completion of the project, typically over 90%. The building completion certificate shows that the relevant authorities are satisfied with the (near) end-result.

**Building Permit** = A permit issued to the Consultant and Contractor early in the project so that work on site can commence.

**Commissioning** = the process of performing tests that the system is operating as intended in the design and specifications.

**Concrete** = A composite material used for most buildings. It is a composite material containing sand, stone (Portland) cement, and water.

**Consultant** = The company contracted to complete your villa designs and supervise its construction.

**Contractor** = The company contracted to complete the construction activities associated with your villa.

**Curing** = A process where recently poured concrete is supplemented with water so that the moisture content in the concrete doesn't decrease due to evaporation. This is important to have the desired moisture content of the concrete so that the final product has enough strength and durability.

**Formwork** = Sometimes referred to as 'Shuttering', formwork is a process of creating a temporary mould that the Concrete will be poured into.

**Foundation** = The lowest part of the building that is in direct contact with the soil, which transfers loads from the structure to the soil safely.

**Method Statement** = A document that details the way a work task or process is to be completed.

**Non-Conformance Report** = A report that is raised by the Consultant during Construction to indicate where the Contractor has deviated from contract documents (drawings, specs) or a component of the build that is below an acceptable level of quality.

**Pile cap** = a thick concrete mat that sits on one or more piles.

**Piles** = a foundation type that is considered a 'deep foundation', the piles transfer the load of the villa deep into the ground where the surface soil is too weak for a shallow foundation.

**Plaster** = a mixture of cement, sand, water and lime that is typically used to spread on walls to create a smooth surface.

**Reinforced Concrete** = Concrete that is strengthened with steel reinforcement bars is called reinforced concrete.

**Reinforcement cage** = a system of reinforcement bars bent and tied together to form a cage-like structure and are used to add tensile strength to concrete.

**Renderers** = or 'renderings' are depictions of your project in a way that looks real. They are essentially high-resolution 2D images that are realistic in the way that they show the villa, it's materials, and how light interacts with it.

**Shop Drawings** = Drawings produced by the Contractor which show details of connections and demonstrates the method of construction.

**Snag** = A component of the villa that has been identified as in need of rectification.

**Snagging** = The process by which the Consultant, Contractor and Client identify minor works that need to be rectified. (e.g. plastering in the wall was damaged from storage material).

**Stakeholder** = a person or entity who has an interest or concern in your project. Examples of these include, yourself, the Consultants, Contractors, Authorities (DPM, ADDC), the bank, etc.

**Steel reinforcement bars** = sometimes referred to as 'Rebar' is a material (steel rods) used to strengthen concrete slabs, walls, columns, etc.

**Super Structure** = All building components that are at or above ground level.

**Testing** = these are performed to test the quality and workmanship of the installation.

**Value Engineering** = Value engineering is an analysis of value by examining function. Value Engineering is essentially a way of identifying how to cut costs while maintaining function; this ultimately increases value.

**Workability** = A property of concrete that describes how easy the concrete can be poured into the formwork. The higher the water content, the less viscous the concrete is and the easier the concrete will take shape of the mould and subsequently reduce voids.

## INTRODUCTION

Teyaseer's wide array of services is offered free to all UAE Citizens who are in possession of a plot of land and received approval of their loan with the National Housing Scheme (NHS). Whether or not you are registered with Teyaseer, we would still like to assist you by providing you with advice as you embark on this fruitful journey.

It is important to understand each step along the journey and plan in advance to facilitate the process. Your review and/or approval will be required at several stages.

The home building journey can be summarised into the following 9 stages, this document outlines steps 3 through 9 in further detail:

1. Decide that you are ready to start the journey
2. Think about your dream villa
3. **Consultant Procurement:** Appoint your Consultant via a tender process
4. **Design Development:** Articulate your design requirements, review the designs your Consultant produces, and approve to move onto the next stage
5. **Contractor Procurement:** Appoint your Contractor via a tender process
6. **Construction:** See your dream home come to life
7. **Handover:** Receive the keys to your villa and invite the family
8. **Defects Liability Period:** Report any concerns you may have about your villa to your Consultant
9. **Final Account:** Ensure your Consultants and Contractors have completed their contractual obligations

Your involvement during this process will be to:

- **Approve documents** that require your attention; these documents will typically change the course of your project and subsequently, the end-result (e.g. design drawings and change requests).
- **Provide documents** that your Consultant or Contractor would need to progress on your project; these will most likely be crucial near the beginning of the appointment of your Consultant and Contractor (e.g. Affection Plan, No-Objection Certificate).
- **Verify payments** that your Consultant and/or Contractor put forward; these will be occur either monthly or every time a major milestone is met (e.g. substructure complete).
- **Coordinate with stakeholders\*** to facilitate the stage being completed; this will most likely be needed throughout the project lifecycle, but your Consultant will do a lot of this for you.
- **Keep records** of all communication with project stakeholders. In the unlikely event of a dispute, it is always recommended you maintain written proof of any decisions made by you or your stakeholders (i.e. meeting minutes, memos, emails, letters, etc.) – verbal actions and decisions are hard to defend.
- **Communicate with your Consultant** on all project matters. Your Consultant should act as the interface between you, and the team delivering the project (Contractors, Subcontractors, Suppliers, etc.).

There is no simple complete guide that can prepare you for all scenarios that you would face during this cycle. Unless you have experience in the construction industry, the journey will mostly be a learning process where you may face some issues. Luckily, you will likely have your Design & Supervision Consultant by your side who can answer any questions or concerns.

## CONSULTANT PROCUREMENT

Choosing the right Consultant will go a long way in ensuring your project is successful. Depending on the contract conditions, the Consultant will perform several tasks for you:

- Design Development (including budget refinement);
- Procurement of a Contractor;
- Apply for all permits on your behalf and for the Contractor;
- Supervise the Contractor during the construction phase, which includes:
  - General Quality Assurance,
  - Approval of shop drawings, material submittals, etc.,
  - Visiting the site frequently and inspecting of the works when necessary,
  - Progress reporting,
  - Commercial Management & Payment Certification;
- Facilitate the handover process;
- Manage the Defects Liability Period; and
- Manage the Final Account.

### Choosing the right Consultant

The best way to understand the level of expertise of a potential Consultant is to have look at previous works completed and, if possible, contact the client representative on that project to ask about their performance. There may be a conflict of interest between the Client and the Consultant (family member, close friend, etc.), so make sure to ask several of their listed Clients.

Obtaining references from your friends is always recommended. If you know someone who has built their home in the UAE, you can ask about their Consultant and if they were satisfied with the service they bought. Also, go and have a look at their villa to see if you like the build quality and design.

#### Common issues to consider during Consultant Procurement:

- **Ensure that the Consultant has sufficient experience in designing and supervising construction of villa projects.** Not only should the Consultant have experience in designing villas, but you should also appreciate the designs that they have completed – for example, if the Consultant only has a track record of traditional villas, but you are looking for a very minimalist and modern design, then they may not be the best choice for you.
- **Customers feel the need to engage Consulting firms belonging to family members.** This can cause the project to have disputes and issues later down the line because there can never be a proper Consultant-Client relationship.



## DESIGN DEVELOPMENT

Once your Consultant has been appointed you be requested to start providing more thought to the design of your home. The Consultant will develop the design of your villa according to your requirements and manage the cost estimate in line with your budget. The more guidance you give the consultant about the requirements the faster the design deliverables can be produced.

Typically, there are three design stages that you should be aware of, they are listed below and are described in more detail later in the section:

- Concept Design
- Schematic Design
- Detailed Design

### Initial discussion (Kick-off meeting)

The first official discussion after the Consultant is awarded, often referred to as a 'Kick-off meeting' which you will attend with your consultant will be extremely important in getting the project off to good start. In this Kick-off meeting, you will give your design consultant additional information that will contribute to the design.

Here are some suggested topics to think about when conceptualising your villa design:

- Family size: current and aspirations;
- Room for visitors;
- Number of floors;
- Number of bathrooms as compared to total number of rooms;
- The feel of the villa: modern, contemporary, traditional, Andalusian, etc.;
- The villa features: external majlis, garage, maid's room(s), pool, gym, etc.; and
- Landscaping opportunities (what to do with the plot area that isn't consumed by the villa building footprint).

The key benefit of describing your ideal villa at this stage is to get a good grasp of what is possible and what is not. You may not be able to build a 7-bedroom villa with a pool within the price range that you expect; so, it is important to list your dream villa requirements and then test how viable it is.

It is very crucial to let the Consultant know what your maximum budget is so that they can match the design specifications to avoid budget overruns later down the line. The Consultant can notify you when they think your decision will be too expensive, or if even you have available budget to add more components to your villa.

If the Consultant notifies you that the cost of the villa is exceeding your budget, then you can seek their advice on how to reduce the cost while still maintain functionality; this can include 'Value Engineering'\* along with other cost reduction methods. If you incorporate your consultant's advice on reductions of cost in the design development

\* = Refer to Glossary for definitions

phase, it will be much simpler and much more cost efficient than applying that same change once construction has started.

## Concept Design

The Concept Design phase is the first out of 3 standard design phases (Concept, Schematic, Detailed). Each design phase has more information and detail than the last. During this design phase, the Consultant will:

- Evaluate how viable the project is given the any site restrictions, for example:
  - environmental impact,
  - soil conditions,
  - site access,
  - masterplan control regulations (setback, villa heights, utility limitations).
- How the space in the villa will be used;
- Develop a high-level cost plan that aligns with the budget set out in the preliminary stages (i.e. during and after kick-off);
- Identify all the authority approvals required and develop an approval plan; and
- prepare and submit all documents required by authorities.

The Consultant will give you a concept design package that consists of, at a minimum:



Figure 1: An example of what you would see in a Concept Design package. this drawing shows a basic floor plan to show how the space is being used (i.e. horizontal relationship).

- Plans, sketches, and renders\* that display and describe the design concept and the direction of all elements sufficiently;
- Drawings that detail building sections and floor plans to demonstrate the horizontal relationship between all project elements;
- Sections and Elevations required to show important components of the project; and

\* = Refer to Glossary for definitions

- A preliminary cost-estimate that incorporates all costs for your project.

## Schematic Design Phase

The Schematic Design phase is the second design phase that commences once you approve the Concept Design. During this design phase, the Consultant will:

- Build upon the concept design plans, sketches, and renders to formulate a set of drawing documents that relate to all necessary engineering and design components of the villa.
- Develop the villa specifications by which the Contractor will have to abide. It will act as a document that ensures the Contractor delivers the villa to a certain standard, it will include:
  - any products that the Consultant requires the Contractor to use, or equivalent (subject to your approval); and
  - any workmanship that is required for each task: this will call out to manufacture requirements; references to codes of practice or standards (mandated by the Abu Dhabi Department of Urban Planning and Municipalities or otherwise); and standards and methodology of testing, inspections and samples.
- Refine the cost estimate plan and update with any design choice changes, if necessary.

To finalise the Schematic Design phase and move onto the next stage, the Consultant will submit a Schematic Design Package for your approval which will include, at a minimum:

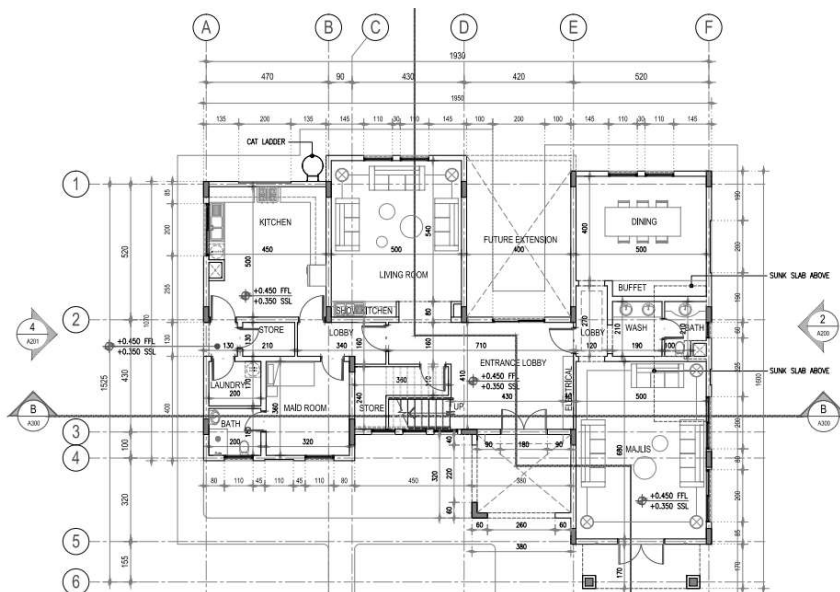


Figure 2: An example of what you would expect to see in a Schematic Design Package. This drawing shows the floor plan for the first floor of a villa.

- a schematic design report;
- site plans, floor plans, sections, elevations, schematic details;

- design specifications; and
- a refined cost estimate plan.

## Detailed Design Phase

The Detailed Design phase is the last of the three typical design phases associated with a project. It will commence after you approve of the Schematic Design submissions. During this design phase, the Consultant will:

- build upon, refine, and update the Schematic design documents and specifications to a state where it is considered finalised and ready for issue to the Contractor Bidders during the Contractor procurement phase; and
- develop a pre-tender estimate that estimates the cost of the project compared to the budget and provides a benchmark for the assessment of the Contractors' tender responses.

The consultant will submit a detailed design package for your approval, this will include:

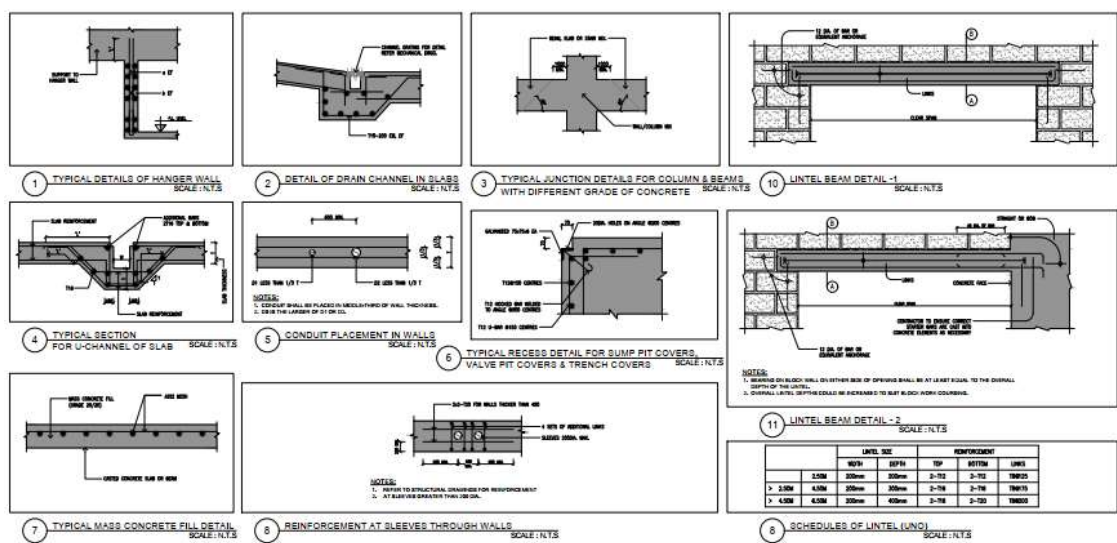


Figure 3: An example of what you would see in a Detailed Design package. This figure shows general details that will be used throughout the villa.

- a detailed design report;
- site plans, floor plans, sections, elevations, details, schedules (all disciplines);
- design specifications; and
- Pre-tender estimate (final cost estimate prior to awarding Contractor).

## Tendering Package

Following approval of the Detailed Design Package, the Consultant will develop your tendering package that will be provided to all Contractors who are bidding to build your home.

The Tendering Package will include, at a minimum,

- Instructions to Bidders (i.e. how to submit the bid);
- Scope of Works (what services/deliverables they will provide);
- Contract Conditions (the contract that they will be required to sign); and
- Drawings, Specifications, Bill of Quantities (the most up to date approved design package – i.e. Detailed Design Package).

**Common issues to consider during Design Development:**

- **You need to make sure that the Consultant clearly understands your project goals early.** They need to fully understand what you expect in your dream home, when you want it completed, and how much you want it to cost. It is the Consultant’s job to then tell you if it is unattainable. The earlier you communicate all the information to them the higher the chance your project will succeed with minimal issues.
- **Trust your Consultant’s judgement;** if the Consultant tells you it is not possible then you should probably listen. If you force them to “find a way” it will likely result in a villa build that is lower quality than you intended.
- **Major changes during the later design stages (schematic and detailed design) could cause significant delays in the programme.** You should have a clear vision for your villa before you start the design process. If your vision changes significantly during design, this will cause delays in finalising the design and cost you money from your budget.
- **Be clear on your budget,** communicate this to your Consultant, and ensure the estimate at each design stage does not exceed it. Customers sometimes will not communicate their budgetary requirements to their designers enough and they will design a villa that they cannot possibly finance.
- **You need to have the time to meet with your Consultant whenever they need your input or approval.** If you are expecting a design stage deliverable to be issued to you for approval within a week then you should make it a point to be available. Some customers will disregard the milestone dates and take a vacation, for example, and be unreachable. This can have an impact on your project’s timely completion.

## CONTRACTOR PROCUREMENT

Once you have your designs and have the tendering package ready, you can start thinking about procuring a Contractor to construct your approved design. The Contractor will have the following responsibilities:

- Develop shop drawings\*;
- Develop method statements\*;
- Deliver the construction in a series of stages;
- Monitor progress, expenditure and report to the Supervision Consultant;
- Coordinate with authorities for all required approvals;
- Coordinate with Consultant to ensure the work is as per design;
- Developing a Quality Management Plan and executing the works according to it;
- Ensuring proper HSE regulation is followed; and
- Rectifying any issues that you or the Consultant may find.
- Attend to defects and respond to warranty issues after construction is completed.

### Choosing the right Contractor

Your Consultant may voice support for the Contractors they would prefer to use, but it is ultimately up to you. You should ensure that the Contractors have the correct skillset and experience to build your villa; to do this, you can search through the Contractors' websites to see their previous work and even visit their offices to see some of their previous projects. Where there has been a Government prequalification exercise completed, this should be relied on as the primary source of which companies you should consider signing up with.

You must focus on choosing a Contractor with a healthy track record. If the Company is new and hasn't worked on a villa, they may underestimate what it takes to build a villa and overpromise in their proposal. This may lead to a tempting contract value in their proposal, but there is a chance of them not delivering on time or on budget, or even exhausting all their resources and going bankrupt, leaving you with a half-built villa.

#### Common issues to consider during Contractor Procurement:

- **Customers feel the need to engage Contractors belonging to family members;** this includes contractors that do not have either the capacity or the experience to carry out the project. This can sometimes leave the Consultant out of important decisions and cause the project to have disputes later down the line.
- **Contractor may not be technically or financially capable.** During the tender, your Consultant will likely evaluate the bids of each of the Contractors. Be wary of contractors where financial strength is a concern. Do not proceed with a Contractor if all their capital is locked up in other projects, even if they claim that a certain project will pay out soon and fund the materials and resources for your project. An unstable financial cashflow is a sign that the Contractors finances may be mismanaged.

- **The Contractor's bid can be too low.** Use the "Pretender estimate" developed by your Consultant as a benchmark when reviewing the Contractor's bid prices. Get your Consultant's advice if anything seems out of place or it seems too low? Has the Contractor completely missed out a component of the contract? If so, they should not be considered for award.

## CONSTRUCTION

The most exciting phase of the process, but often also the most stressful. During this phase you will get to see your home come to life. If everything runs smoothly, it will require a lot less input from you compared to the design phase.

To help you visualise the sequencing of the Construction phase, refer to *Appendix A* before reading each section.

### Mobilisation & Enabling Works

*The activities in this section relate to items #3 and #4 in Appendix A.*

Mobilisation is a term used to describe the period after a Contractor is awarded a project, but before any work commences on the site. During this period the Contractor will:

- Invite you and your Consultant to a Kick-off meeting;
- Prepare a master programme;
- Develop shop drawings;
- Discuss how the construction methodology (method statements) will meet the Consultant's expectations;
- Develop QA/QC (Quality Assurance / Quality Control) procedures;
- Obtain all authority approvals;
- Secure the Building Permit; and
- Secure the Performance Bond, in the agreed amount.

A stage known as "Enabling Works" comes after the Contractor mobilises but before any work commences. You can expect the following activities to occur during this period:

- Demolition (if applicable);
- Clearing of the site;
- Diversion and/or disconnection existing site services (e.g. ADDC electrical boxes);
- Soil Conditions testing (Geotechnical report, if not done so already);
- Decontamination (if applicable);
- Ground Improvement/Compaction;
- Survey work of the site (measuring out elevation, coordinates and lengths of building footprint, boundary walls);
- Creation of access routes;
- Installation of temporary site fence (also known as "hoarding") – for security and safety purposes;
- Installation of signage (showing your details as well as that of the Bank, Consultant and Contractor); and
- Installation of utilities needed for construction.



The site fence should surround the area beyond the building footprint (which will likely align with the boundary wall) to allow for extra space when excavating and so that extra space beyond the excavated pit can be used for access routes, laydown areas, etc.

## Subcontractor & Supplier Appointment

*The activities in this section relate to items #5 and #6 in Appendix A.*

The Contractor would have included all the prices of procuring materials and outsourcing jobs to subcontractors into the contract price at the tender stage. It would not be possible to buy all the materials needed for the entire villa at the beginning and only use it when needed; this would cost too much to store in a warehouse. There would likely not be enough space on site, and even if there were, it would leave little space for construction equipment, vehicles, and labour to manoeuvre.

So, the Contractor will develop a procurement plan and embed this into his programme. The contractor will engage subcontractors and suppliers only when needed (while accounting for a short lead time to negotiate and mobilise). This means that the construction phase will be more agile, but it also means that there is always the chance that a subcontractor or supplier may delay the project due to late onboarding or delivery.

The contractor should also identify long lead items that may take longer than the other to procure so that they can get an appropriate head start. An example of this would be doors and doorframes procured and imported from Europe.

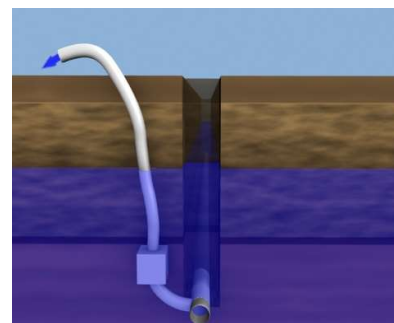
## Excavation

*The activities in this section relate to item #8 in Appendix A.*

Excavation is removal of the soil on the plot. In this case, it is to make space for the foundation and all the activities involved in laying the foundation.

If the design or construction methodology requires a deep excavation pit, then the Contractor may be required to install temporary supports (known as “shoring”), to avoid the soil caving in; this is an extremely crucial safety measure that the contractor must take. Make sure to ask your Consultant if the Contractor’s shoring is installed and approved before you enter any excavation pit.

If the plot of land is close to sea level, or near an aquifer or large body of water, then the water table may be an issue during excavation and construction. During excavation, and up until the foundation (and sometimes level 1) is finished, the Contractor will need to undertake an activity called dewatering which is pumping water so that the soil stays strong and compact, and so that it does not affect the casting of concrete. Water can also cause a lot of upward pressure on a building, so the Consultant may decide to dewater long after the foundation has finished.



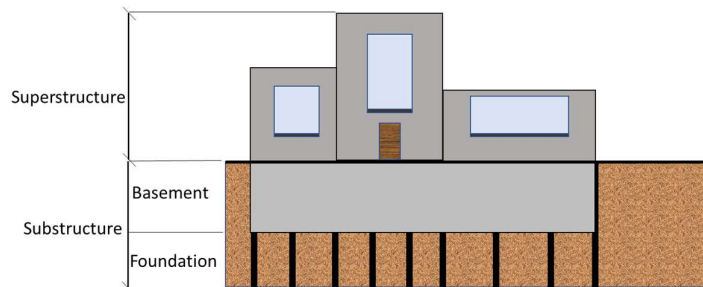
*Figure 4: A figure showing what a dewatering system aims to do, it pulls water from under the soil.*

## Foundation Preparation

*The activities in this section relate to item #8 in Appendix A.*

The load (or weight) of the building is transferred to the columns in the ground floor (or basement if applicable) and from there it is transferred to the soil via the foundation.

The foundation must extend deep into the soil layer below the villa to provide enough support and strength to withstand the weight of the villa. Since surface soil in the UAE does not offer enough support to a building; the most common type of foundation you will see is pile foundations which run deep and are either



*Figure 5: This figure shows the major components of a villa.*

supported via friction against the surrounding soil or by resting on bedrock. In addition, the design may require a level of strength from the soil that you cannot get naturally in your plot, so the Contractor may need to procure soil that meet the specifications outlined in the contract.

During the foundation preparation stage, you will see a lot of rods in the ground, strings tying them together and markings around the site to indicate coordinates of the components of your home: these are plot boundaries and pile/ pile cap locations. The Contractor will be cutting and filling (removing soil and adding soil, respectively) the soil to give the ground stability and consistency throughout the building footprint.

Once the soil layer is finished, the Contractor will begin constructing the piles. You will start seeing the Contractor assembling a steel frame in the shape of an elongated cylinder; this is the reinforcement cage for the piles. Concrete is very strong when you try compress it, but if you start applying a force that causes tension (a pulling or bending motion) the concrete may crack or break, so it is crucial that the concrete is made stronger and more durable by reinforcing it with steel (reinforcement bars); this structural composite material is called reinforced concrete.

During this time, any Mechanical, Electrical, or Plumbing (MEP) services required are installed. The foundation also requires to be treated for termites, termites can typically damage the foundation and soil under a home.

## Foundation

*The activities in this section relate to item #9 in Appendix A.*

A device called a pile-driver should be arriving on site to drive in large metal tubes called 'pile casings' into the ground. The pile casing is hollow and acts to keep away surrounding soil so that a concrete pile (the main component of the foundation) can be cast into the ground. The Contractor will then attach an excavator onto the pile-driver to remove all the soil that the pile-casing contains. Both the pile case driving, and the excavation are very loud and intrusive processes that may result in complaints from any nearby neighbours.

Once the pile casing is hollow, it is ready for concrete pouring. The Contractor will pour concrete into these pile casings and then push the cylindrical reinforcement bar frames that have been prepared earlier into the concrete. The pile casings will be removed to leave a completed pile that needs to be cured.

The soil contains moisture and salts, which can have a negative effect on the reinforced concrete; it can cause the reinforcement bars to rust and erode; this can compromise the structural integrity of the villa. Your Contractor will apply waterproofing measures to all the substructure and ground floor slabs to mitigate this effect. Your Consultant would have dictated the type of waterproofing needed in the detailed design – typically an additive is used to supplement piles, while a bitumen membrane is added to the pile caps since it is more accessible.

The foundation is also connected with reinforced concrete beams called grade beams that distribute the load of the villa to the pile caps according to the design. Once these are cast, the Contractor can then compact soil around the foundation and begin working on the superstructure.

You will notice that there are steel reinforcement bars protruding vertically from the pile caps, this is so that the reinforcement bars can be linked to the reinforcement bars in the ground level slab and the columns that sit on it. These vertical bars are referred to as 'Starter Bars'.

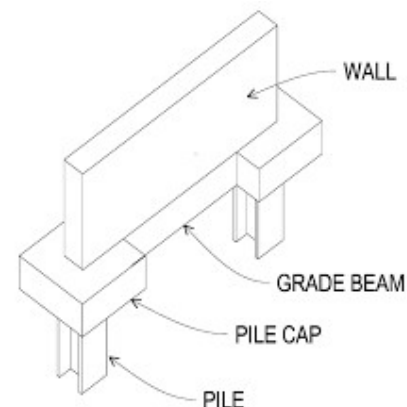
## Slabs

*The activities in this section relate to items #10, #12, and #14 in Appendix A.*

Once the foundation (piles and pile caps) is cast and has had enough time to cure (typically 7 days at least), the Contractor will begin setting out and tying the steel reinforcement into a system that is called a reinforcement cage that will support the first slab – your ground-level slab (or grade slab).

The Contractor will also leave starter bars protruding from this slab – all the starter bars will be turned into columns later. Tying in the reinforcement bars is a time and labour-intensive task, as can be seen in your schedule.

Once the reinforcement is tied, the Contractor will then begin setting out the formwork\* for the ground floor of your villa. You can expect the Concrete to be poured soon after the formwork is assembled and after the reinforcement cage has been inspected. The concrete for a slab will likely be supplied by a concrete mixer truck since it will be a large volume of concrete that needs to be poured.



*Figure 6: This is the typical relationship between piles, pile caps, grade beams and the structure it is supporting (in this case, a wall). However, it is important to note that your contractor will use reinforced concrete piles as described in this section, and not H-piles which are shown in this figure.*

### Concrete Testing

*For all concrete pours, there needs to be a series of inspections and tests before the concrete is poured; the most important of which is the 'slump test', which is done on-site prior to pouring the concrete.*

*Another test called a cube test involves taking two concrete samples that fit a 15x15x15 cm cube, and then testing the compression strength after 7 days for the first one and 28 days for the second.*

\* = Refer to Glossary for definitions

If the concrete has low workability\*, then there may need to be manual pouring of the concrete to ensure all areas of the formwork are filled with the mixture. The Contractor will be required to vibrate the concrete as the concrete is being poured and after the required volume is reached using a mechanical concrete vibrator; this minimises the chances of voids in the finished product. Afterwards, the Contractor will be required to cure the concrete for 7 to 28 days. This slab can then be called the 'structural slab level' (or Structural floor level), you will see this on your construction drawings abbreviated as 'SSL'; this level may not look aesthetically pleasing to you, but there are layers of insulation and finishing (marble, carpet, plaster, etc.) that will be added to the floor that will result in what is called the 'finish floor level', which is the end-result.

## Columns

*The activities in this section relate to items #11, #13, and #15 in Appendix A.*

The columns will follow a similar procedure to the slabs, but just on a smaller scale. The reinforcement bars will be installed<sup>1</sup>, the formwork be assembled. Then the concrete will be poured and cured for 7 to 28 days.

## Non-Load Bearing Walls (Exterior and Interior)

*The activities in this section relate to items #11, #13, and #15 in Appendix A.*

The structural system (Slabs, Columns, Beams and load-bearing walls) that is designed to withstand the forces associated with your villa will often be entirely made of reinforced concrete. However, this does not mean that the entire villa will be reinforced steel – only the structural system. If a villa is made entirely out of reinforced concrete then it has been overdesigned, i.e. designed for much larger loads than it would need to handle and would therefore result in a villa that is far too expensive. So, the Consultant would likely have decided to use block work\* (or masonry) walls which are cement blocks that are typically hollow to complete the wall system (exterior and possibly interior).

In most situations, the Contractor will be able to start the blockwork if the reinforced slabs below and above an area are complete. The Contractor will leave out areas where door frames and hallways are indicated on the design.

## Electrical Works

*The activities in this section relate to items #17, #21, and #24 in Appendix A.*

Electrical works will have commenced before the structural system is fully constructed. The Contractor would have used the electrical drawings produced by your Consultant to map out the connection from the utility service to your distribution box, then from your distribution box to each room, and then distributed to every socket and output (including lights, switches, and any mechanical equipment) that requires power. The Contractor will also typically install fibre optical cables (for Internet, TV, Landline). Since the Electricity provided to your home will be supplied

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<sup>1</sup> The steel reinforcement cage will extend to beyond the height of the column so that the steel can be tied to the slab above the column, creating a uniform structural system.

by Abu Dhabi Distribution Company (ADDC), they will need to approve the shop drawings that your Contractor produces.

The wiring will not disturb the structural system (reinforced concrete) of the villa, it will instead run along it in an organised fashion and cut through non-load bearing walls where necessary. However, it is important to note that the wall cut outs should be kept to a minimum to maximise their durability.

## Air Conditioning

*The activities in this section relate to items #17, #21, and #24 in Appendix A.*

Typically, tenants only really interact with the Thermostat and the Air Handling Unit, two of the main indoor units. However, all units are equally important. The outdoor components are either installed right outside your villa or on the roof. They need to be outside because they keep you cool by expelling heat outside of your villa.

There are two main types of air handling units that changes the system quite a lot: ducted and ductless. Ductless air handling units are localised, so it only supplies a single room with cool air. Ducted air handling units are centralised and involve installing a network of ducts that distribute the air throughout the home and will be installed on the ceiling of your home, these can be concealed with a false (or suspended) ceiling.

Ducted Air Conditioning Systems are cheaper because they require less components and are easier/cheaper to maintain. Ductless air conditioning systems have air handlers in each room that require service and more components are needed. Overall, if you are looking for comfort in your new home then ductless air handling units are your best bet, they are more efficient (so they are more cost-efficient long term) and can allow the occupant of each room to choose their own air conditioning settings.

## Plumbing Works

*The activities in this section relate to items #17, #21, #24, #28 and #30 in Appendix A.*

Another component of the villa that needs to be installed as the structure is being built, is the Plumbing system. The Contractors need to route the water supplied by ADDC into your building for your use throughout your tenancy. The water mains supply, that runs through your neighbourhood will be eventually be connected to your villa's water distribution network once construction is complete and it has been inspected and approved by the authorities. The design that your Consultant submitted would have been approved, but your Contractor's execution of the drawing also needs to be inspected by the authorities (Abu Dhabi Municipality).

The main components of a water distribution system are:

- Pipes
- Valves (Gate, Ball, Pressure)
- Tank
- Water Heater

- Pump
- Water Meter

The connection to the water supply mains will have a gate valve (or stop tap), which is used to shut off the supply in case of flooding that will typically be near your boundary wall (make sure you know where this is), and a water meter that measures your consumption. The water supply mains will be routed from the ground (or basement) floor upwards; it will provide direct water supply along the way (i.e. to your kitchen, bathrooms, etc.), and convey water to your roof tank system. The overflow outlet should be in a visible location so that you are aware if something has gone wrong and can contact the authorities.

The tank will store water that can be used to provide extra pressure to the system, it will allow the villa to use its own supply during potential fluctuations in supply from the water supply mains, and depending on the specifications of the tank, it may be an option for firefighters to use during emergencies.

Prior to casting concrete (slabs, walls, columns, etc.) the Contractor will install short sections of pipes in the wall (around the reinforcement bar, with protection) that will eventually be connected to the entire system; the installation of these short pipes are referred to as the 'first fix'. Once the structure (Slabs, Walls, Columns) is complete, the Contractor will likely connect most of the pipes in the walls to create the distribution system.

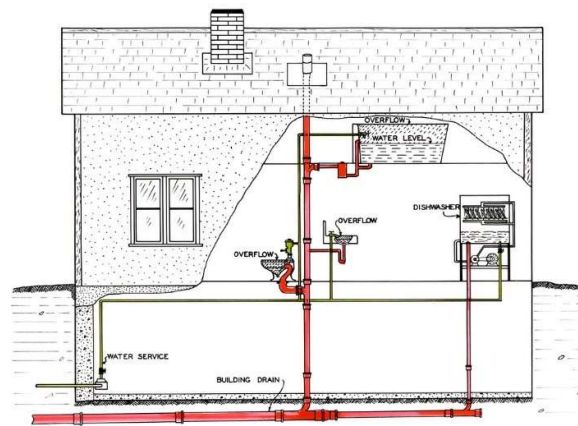


Figure 7: A water distribution system (simplified) for a house.

Once the distribution system is complete (including tanks, pumps, pipes, etc.) and approved by the authorities, the system can be connected (not turned on) by either the authorities or a contractor who has been approved to do so (depending on the municipality jurisdiction); this will likely be a separate contractor.

## Aluminium and Glass (Glazing)

*The activities in this section relate to items #19 and #23 in Appendix A.*

Windows are a very important component of the structure to maximise comfort in your home. The window placement, type, system and should be carefully selected by your Consultant, along with your efforts, to ensure you have enough light (size/placement), privacy (type: e.g. Tinted glass), and insulation from heat (system – double-glazing, sealing, etc.).

The windows, and their aluminium frames, are the next component that will be added to your villa. Your Consultant should be ensuring that your Contractor takes necessary precaution in protecting your windows for the remainder of Construction.

First, the Contractor will install the aluminium frame of the window with consideration to how you want the window to open: will it slide, or open inwards/outwards? The Contractor will ensure the frame is sufficiently sealed to block airflow, water leakage, and to promote insulation. Next, the window will be placed and sealed against the sash, which holds the glass together and is connected (via fixed connection or otherwise) to the aluminium frame. Using Adhesive and sealant where necessary, the Contractor will complete the installation of the window according to the specifications dictated by your consultant.

## Plastering

*The activities in this section relate to items #16, #20, and #24 in Appendix A.*

As the Contractor is finishing up the walls on the ground floor, you may realise that the walls are quite rough and have markings on it from when the formwork was removed. The Contractor will fix this by using a substance called plaster\*. The plaster will be spread across the walls to create a smooth surface that can then be painted or finished with other materials.

To be more efficient, the Contractor may have included in his project schedule that the plastering on the walls at the ground floor will be done while the floor above is still being constructed. This is a great way to deliver the villa quickly but can result in some defects and damages in the finishing; this will be fixed once you 'snag'\* the villa.

### Interior Finishing

*Before completing any of the interior finishing (plastering, ceramics, joinery, suspended ceilings interior painting, etc.) and installing any sensitive materials the Contractor needs to ensure that the environment inside the villa is regulated to an acceptable level so it will not damage, the interior finishes which can be quite expensive.*

*To Contractor can avoid moisture and temperature related damage by using turning on Wild Air. This is done by blowing cool air through the air conditioning.*

## Thermal Insulation and Waterproofing

*The activities in this section relate to items #16, #20, and #24 in Appendix A.*

Areas where water will be present (kitchen and bathroom) will require waterproofing on the concrete slab so that water cannot penetrate to the concrete and cause corrosion and mould. The roof should also be waterproofed to protect against penetration of rain and moisture. Even though the roof will have a drainage system to handle the water accumulation, it can still seep through to your home if not careful. Bitumen waterproofing is typically used for roofing; this is a black substance that can either be spread as a liquid or rolled out as a membrane.

The villa must also have thermal insulation so that your villa can remain cool in the summer and retain heat in the winter. The insulation will be built into the ground and external walls; some common insulation material foams used are Polystyrene, fibreglass, and mineral wool. The thickness of the insulation can vary depending on the design, but you will typically find that 5cm insulation foam boards are installed.

\* = Refer to Glossary for definitions

## Suspended Ceilings

*The activities in this section relate to items #16, #20, and #24 in Appendix A.*

There are a lot of utilities that need to be distributed throughout your home. You will probably notice that a lot of these utilities sit directly under a floor slab. Suspended ceilings are used to hide conduits and pipes from view. The Consultant, when designing your home, would have allowed extra space between the slab and the floor below to add the utilities and hide it from sight using a suspended ceiling.

## Kitchen & Bathroom finishing

*The activities in this section relate to items #18 and #22 in Appendix A.*

The kitchen and bathroom need fixtures and fittings to make them functional (i.e. toilet, sink, bidet, bathtub, etc.).

Apart from the fixtures and fittings required, the walls and floor of the kitchen and bathroom need will be in contact with a lot of water and substances that may stain and damage a concrete floor. So, tiles (usually ceramic) are installed to enable the kitchen and bathroom to be cleaned properly and remain durable.



*Figure 8: Ceramic tiles in a bathroom.*

The Consultant will dictate the specifications of the bathroom based on your preferences: size, layout, type, etc.

All the finishing in the kitchen and bathroom must only be completed after the plumbing installations are completed and approved by the Consultant. You may see some pipes that are exposed, these will likely be covered by the cupboards or other bathroom fixtures.

## Joinery (Wood)

*The activities in this section relate to items #18 and #22 in Appendix A.*

In the UAE, it's typical that the only wood used in the construction in a home (other than formwork) is for doors, cupboards/cabinets, and skirting; but it brings a sense of warmth to a home that cannot be possible with only concrete and ceramic tiles.

The door frames are installed as part of the interior fitout and drilled to the concrete wall. The hinge and door hinge are then installed using screws.



The connection between the wall and floor can sometimes look unfinished, especially if installing hardwood floors. Floor skirting<sup>2</sup> is usually installed to make the joint at the wall and floor look a little cleaner. It also protects the wall finish and flooring edge from kicks, abrasion and the movement of furniture.

## Interior Painting

*The activities in this section relate to items #18 and #22 in Appendix A.*

The first coat of paint on the interior walls (and ceiling) is usually applied prior to installing the door frames and skirting; the final coat of paint is applied once the joinery works have concluded. Paint, wood stains, or varnish can also be applied to the joinery.

Interior walls are typically painted with emulsion paint; a water-based paint that is usually supplemented with acrylic or vinyl for durability. However, for areas that can get humid, it is best to use an oil-based paint, as they are more durable and resistant to temperature and humidity.

The typical procedure for painting is as follows:

- Sanding down: You may be required to sand down any areas that have protrusions or large sediments near the surface.
- Plastering: Covering up the imperfections in the concrete (see the section on plastering, above) by applying the plaster and evening it out across the surface.
- Priming: Primer is a preparatory paint applied on the wall prior to adding the paint to ensure better adhesion to the paint layer that comes next.
- Paint: The final paint in the colour that you prefer, you should ensure that the Consultant if you were to change your mind on the type or colour of paint.

## Boundary walls

*The activities in this section relate to item #26 in Appendix A.*

Boundary walls are an important part of homes in the UAE and provide a sense of security and privacy to a family. They require a foundation, which is like the villa foundation, but on a much smaller scale. The larger the boundary wall the deeper and wider the foundation will have to go.

Depending on the type of the boundary wall, the construction method can be quite different. Some are pre-cast and others are cast-in-place.

Construction of the boundary wall limits the amount of laydown space to work with, it also limits the site access routes and vehicle movement paths; for this reason, it is usually constructed once the villa is complete. However,

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<sup>2</sup> Panels, usually wood, that is installed at the joint between the wall and floor.

the boundary wall requires excavation and backfilling along the perimeter of the land, so it is usually done right before any landscaping work takes place.

## Landscaping

*The activities in this section relate to item #27 in Appendix A.*

Landscaping is sometimes split into “soft-scaping” and “hard-scaping”. Soft-scaping refers to all the of the soft elements of your garden/backyard; flowers, grass, bushes, trees. Hard-scaping refers to all the hard elements; rocks, cobblestone, paths, wooden decks, etc. While designing your garden, you may want to consider using a mix of both soft and hard landscaping.

Since landscaping is a very delicate aspect of your home that takes up a lot of space, it usually one of the last steps of your journey. That way, the contractor can use as much space as possible during construction without the worry of damaging anything with the stock material, large construction vehicles, and equipment.

## Snagging and De-snagging

*The activities in this section relate to item #29 in Appendix A.*

Once most, if not all, works have been completed, the Consultant and Contractor will go through a process called ‘snagging’\* (which you are encouraged to attend). Snagging is the process of inspecting every component of the building to identify minor issues that need fixing. Any issue that you identify is called a “snag” and goes onto a “snag list”. The Contractor will then be required to fix all the snags before they handover the Villa to you.

## Testing and Commissioning

*The activities in this section relate to item #31 in Appendix A.*

Since this activity is so close to the handover of the villa, Customers tend to try to speed this up. You need to resist the urge to speed this up to ensure that the systems work as intended. Identifying any issues now will save you a lot of inconvenience in the future.

Testing and commissioning are performed throughout the project. However, there is a checkpoint at the end for the Consultant to approve the systems before it is handed over to you.

## Authority Inspections

*The activities in this section relate to item #32 in Appendix A.*

Prior to the work commencing, the Consultant will need to apply for and obtain the building permit\*, so that work can commence.

Once the works are substantially completed, the Contractor can apply for the Building Completion Certificate\*, which is required for handover and for occupancy. Once the Defects Liability Period is finished and the final account is settled (see page 26 & 27) the Contractor and Consultant will be applying for a Final Completion Certificate.

\* = Refer to Glossary for definitions

After completion of the works, and the connection of utilities to the mains supply, the Contractor will request a Department of Urban Planning & Municipalities (DPM) inspector to visit the site to complete an inspection and issue the Building Completion Certificate. This certificate is simply between the Contractor and the authorities; it does not mean that the contractor has filled his obligation to you according to the contract. The villa may contain open snags or non-conformances\*, but the inspector may still award the contractor with a Building Completion Certificate, provided there is a commitment in place to rectify the snags in a timely manner.

**Common issues to consider during regarding Construction:**

- **Claims and extensions of time (EOT) not being managed;** Contractors will often look for areas to make up some money or time during the project (especially since it is a lump sum contract amount). You should avoid giving the contractor the opportunity to do so.

An example of this would be if you delayed the Contractor from procuring a material because you took a long time to approve it, then the Contractor will be able to ask for an extension of time based on the extra time you required. They can ask for an extension of time even if they were not ready to use that material, they can use this EOT to catch up on time elsewhere.

- **Change orders not following proper procedure;** naturally, as you see your villa come to life you may start to change your mind about a few things or want to add components. It is advisable not to instruct your Contractor to make the change without following procedure. Talk to your Consultant about the potential for this change, your Consultant should come back with a time and cost impact for your approval. Typically, the later you make a change in the project, the more expensive it is to incorporate that change.
- **Large number of subcontractors and suppliers;** the greater the number of subcontractors, the less control the main contractor has over them. HSSE (Health, Safety, Security, Environment) and quality standards reduce drastically.
- **Late mobilisation and site set-up;** pay attention to the early months of the project, if the Contractor is late in the first step of the process (without good reason) or is underperforming early on, it should raise red flags.

## HANDOVER

*The activities in this section relate to item #34 in Appendix A.*



*Figure 9: A family who have been successful in the handover process. At this point they would have received the handover documents, signed their takeover certificate (TOC), and then received their keys.*

The time to receive the keys to your home has arrived. But first you need to take ownership of the villa; this involves a document called a Takeover Certificate (TOC). The TOC is a document produced by the Consultant and Contractor that outlines the status of the villa at handover.

If there is still an aspect of the villa that has not yet completed, but you and the Contractor and Consultant have agreed that it will be done after handover, then it will be listed in “outstanding works” section, or equivalent.

The TOC should also mention the value of the outstanding works in case the contractor fails to complete this. The Contractor will get paid against the full contract value excluding the outstanding works at TOC – they will only be paid the remaining amount once complete.

You will be required to sign the TOC to make the handover official, but before you do so, you need to ensure the following documents are available (or as listed in the contract):

Table 1: This table shows essential documents that you need to receive before you sign your Takeover certificate.

Document	Description
As-Built Drawings*	The drawings showing exact location and placement of all components – will vary slightly from design.
Shop Drawing Register	The construction documents that your Contractor produced based on the design documents provided by your Consultant.
Material Approvals	Submissions from your Contractor to your Consultant regarding materials chosen
Material Inspection Reports	Inspection that materials procured are as per design specifications
Non-Conformance Report Log*	A list of all the Non-Conformances committed by your Contractor. <b>These MUST be closed out before you take over the home.</b>
Permits and Municipality Approvals*	All the authority approvals on drawings, documents, permits, etc.
Work Inspection Requests	All the inspections that the Contractor submitted an indication of outcome (e.g. inspection of ground floor slab reinforcement cage)
Warranties and Insurances*	A Warranty and Insurance pack for all components of the Villa.
Variations approved*	A table summary showing all variations requested/approved by you and the net change in contract value.
Dilapidations (Joint Survey, Final Measurement, Snag List) *	Results from the joint survey, all the final measurements (i.e. grade of the finished floor), and snag list showing everything has been rectified.
Final Statement (Summary) *	Final statement (Transmittal/Letter) saying that all scope has been fulfilled and indication of any outstanding works.

Note: All documents marked with a red asterisk (\*) are considered essential, the others are nice to have. However, all documents listed in the contract should be considered essential.

Common issues to consider during Handover:

- **Documents that have not been completed being developed only for this submission;** some of these documents are meant to be maintained throughout the project cycle, if they are only developed for handover then it is a reason for concern.
- **Handover process not initiated early enough;** The contractor should be developing as-built drawings and compiling warranty lists throughout the project; if they leave it until last minute the quality of the as-builts may decrease and incorrect documents may be handed over if your Consultant is not diligent enough.
- **Handover documents not communicated early enough;** the Contractor should know what handover documents are required long before they start compiling it.
- **Not closing off any open variations;** by the time of handover, all variations and claims should be resolved and agreed by all parties.

## DEFECTS LIABILITY PERIOD (DLP)

*The activities in this section relate to item #35 in Appendix A.*

Once you sign the takeover certificate you are now authorised to live in your home. For the next year (or however long specified in the contract), you are entitled to let your Contractor know of any issues you face, and they are required to fulfil it, if it is covered by the DLP.

You should ensure to keep your takeover certificate and all the handover documents. Ensure that the Contractor keeps his commitment to close out any snags or outstanding works that were listed in the takeover certificate.

During your DLP you should keep track of any issues in your villa, such as cracks, moisture damage, and equipment failure/malfunction. You should report this to your Consultant who will then get the Contractor to rectify it. In most contracts there is a clause that states that if the doesn't rectify within a certain period, you can pay a different contractor to complete the works and charge your DLP contractor the entire fee.

It is important to note that you may notice minor cracks in areas around your villa (for example, a common place is around the corners of doorframes); this can be completely normal and is due to the settling of your villa into the foundation. Nevertheless, you should contact your consultant to check the severity of any defects you notice.

### **Common issues to consider during the Defects Liability Period:**

- **Not agreeing what constitutes a defect;** it is important to define what a defect is in the DLP Certificate. The Consultant will likely have to determine whether the issues identified by the client is a defect or a maintenance issue which would be covered by the warranties and insurances.
- **Starting the DLP too early;** you may be inclined to accept the handover even though there are some outstanding snags and outstanding works. While this is possible, you will not be maximising the amount of time you have to identify defects and have your contractor fix them.

## FINAL ACCOUNT

The “Final Account” summarises the financial position of the project. Final accounts are typically produced at the end of a contract. However, a final account will likely be produced at the end of design, construction and at the end of DLP. When you receive the final account (usually produced by a cost consultant or supervision consultant) at the end of the DLP that is the last statement you will have of the project. It will show the contract value and any ups and downs due to:

- Variations
- Fluctuations in market prices, if applicable.
- Prime cost sums / Provisional sums (costs not defined or known at the time of tendering)
- Loss and expense (Client paying for loss and expense on progress of works being affected by matters for which the client is responsible)
- Liquidated damages (e.g. delay damage)
- Claims (made by the Contractor / Consultant)
- Retention deducted or paid

### Some common issues consider regarding the Final Account:

- **Not addressing or agreeing on the variations in the contract value as they arise;** if you had 3 notices of potential claims and you did not properly address them with your vendors, then you will face disputes when they issue the Final Account. You should address the claims early and document all outcomes and correspondence.
- **Not notifying the Contractor of defects throughout the DLP.** You should notify your Consultant throughout the DLP if there are any defects. Notifying the Consultant of a long list of identified defects will likely cause the Contractor (and Consultant) to rush the job in the hope of avoiding delay of obtaining the Final Completion Certificate.



## APPENDIX A – CONSTRUCTION PROGRAMME OVERVIEW

#	TYPICAL CONSTRUCTION PROGRAMME	Month #1				Month #2				Month #3				Month #4				Month #5				Month #6				Month #7				Month #8				Month #9				Month #10				Month #11				Month #12			
		1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4				
1	Issue LoA																																																
2	Design NOC & Shop Drawing production																																																
3	Mobilisation & NOC for hoarding																																																
4	Enabling Works																																																
5	Subcontractor procurement																																																
6	Material Approvals and Supplier Procurement (incl delivery)																																																
7	Start Construction																																																
<b>FOUNDATION</b>																																																	
8	Excavation & Foundation Preparation																																																
9	Foundation Casting & Backfilling																																																
<b>GRADE SLAB WORKS</b>																																																	
10	Grade Slab (Ground Floor) Rebar & Casting																																																
11	Ground Floor to First floor works (columns and walls)																																																
<b>FIRST FLOOR SLAB WORKS</b>																																																	
12	First floor slab reinforcement and casting																																																
13	First Floor to Roof Floor works (columns and walls)																																																
<b>ROOF FLOOR SLAB WORKS</b>																																																	
14	Roof Floor slab reinforcement and casting																																																
15	Parapet wall reinforcement and casting																																																
<b>GROUND FLOOR MEP, INTERIOR DESIGN, GLAZING</b>																																																	
16	Walls GF level (blockwork, insulation, waterproofing, plaster)																																																
17	MEP work GF Level																																																
18	Interior Design GF Level (Suspended Ceiling, Paint, Joinery, bathroom & Kitchen Accessories)																																																
19	Glazing (Windows) GF Level																																																

