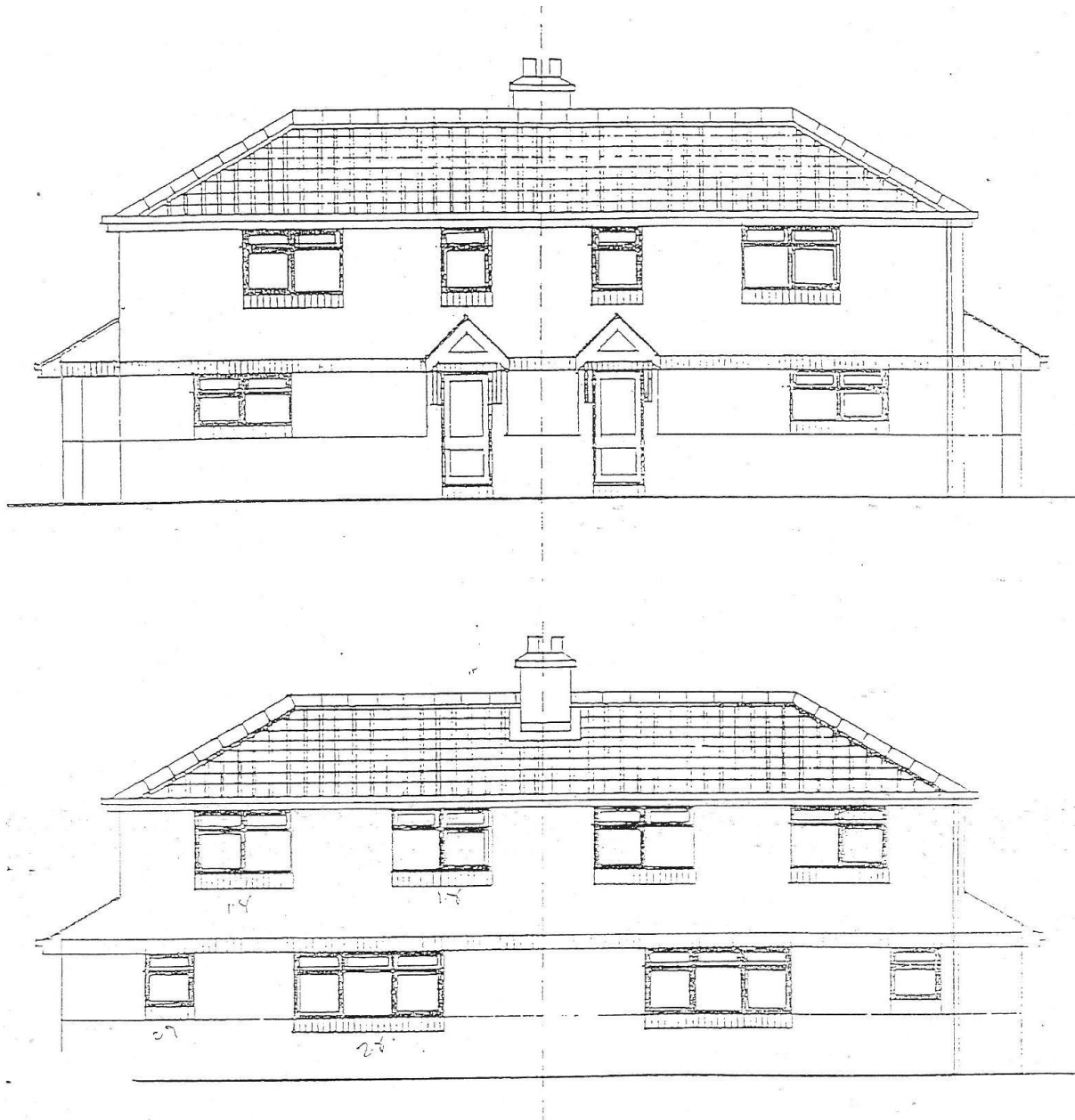


Swansea SA1 Housing Development (Option 2)



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Construction Activities Required

I have created a phase plan to help identify the activities that the development will require. The phases are in place to identify what needs to be completed in order to move on to the next phase of tasks, for example, I can only erect the frame of the structure in phase two when the foundations are in place in phase 1. This method is often used by construction firms to establish important tasks and prioritise work. The activities required in this project were established using the SPON's book (AECON, 2017) as well as by conducting personal interviews with a construction project manager (Humphreys, J 2018) and a civil engineer (Powell, T 2018). All activities are listed below through to the completion of the development.

Phase 1 – Site Setup (8 Days)

- Site Perimeter Security – Hoarding.
- Site Cabins – Offices, Toilets, Canteen.
- Water, Drainage, Electricity – Site Cabins
- Top Soil Removal

Phase 2 – Substructure (10 Days)

- Foundation Excavation
- Foundation Reinforcement
- Foundation Concrete Pour
- Substructure Blockwork
- Brickwork to DPC
- Buried Services (Water, Electricity, Gas, etc.)
- Drainage System

Phase 3 – Slab and Skeleton (39 Days)

- Slab Preparation (DPM, Mesh).
- Concrete Slab
- Timber Frame Erection
- Timber Roof and Truss Erection
- Roof Completion (Waterproofing, Insulation, Tile)
- Superstructure Brickwork
- Window Installations
- External Door Installations

Phase 4 – Internal Works (21 Days)

First Fix (22 Days)

- Staircase Erection
- Softwood Flooring (Intermediate Floor, Attic)
- Timber Stud Internal Walls & Plasterboard
- M&E Installation
 - Electricity
 - Waste Disposal
 - Gas
 - Water (Hot and Cold)
 - Telephone and Data Points

Second Fix – (28 Days)

- Plasterboard Ceilings
- Wall & Ceiling Paint
- Ground Floor Insulation and Screed
- Internal Door Installations

Third Fix – (13 Days)

- Flooring
 - Tile
 - Laminated Softwood
 - Carpet
- Furniture Fitting
 - Kitchen
 - Bathroom

Site Clearance – (2 Days)

Project and Task Costs

I have taken my list of activities produced in the 'Construction Activities Required' section and used SPON's Architects' and Builders' Price Book 2018 (AECOM, 2017) to put together an approximate costing for the development. I used the drawings to produce measurements using a scale ruler and worked out total cubic meterage, linear meterage and square meterage for the relevant construction activities. SPON's (AECOM, 2017) uses dimensions, primarily square meterage, and puts a cost per meter squared for different activities, therefore using the dimensions I had calculated from the drawing, I was able to estimate the cost for each section of work within my phase plan. The information I was not able to find in the SPON's book (AECOM, 2017), I gathered from a professional quantity surveyor by use of interview (Payne, D 2018). The table below shows how I achieved this:

Task	Size	Cost
Site Setup and Topsoil Excavation	29 m ³	£4660
Foundation Excavation	22.76 m ³	53 lin.mtrs x £150/Lin.mtr =£7950
Mesh Reinforcement (2 Layers A393)	62.4 m ²	
Concrete Foundation Pour	9.46 m ³	
Substructure Brickwork	27.9 m ²	
Substructure Blockwork (Inside Skin)	24.72 m ³	
Slab Mesh (1 Layer A393)	80.5 m ²	80.5m2 x £100/m2 =£8005
DPM	80.5 m ²	
Concrete Slab	12.1 m ³	
Timber Frame	184.5 m ²	184.5m2 x £130/m2 =23985
Roof and Truss Erection	95.2 m ²	95.2m2 x £182.5/m2 =£17374
Roofing (Waterproofing, Insulation, Clay Tile, Ceiling, Skim)	95.2 m ²	
Superstructure Brickwork Skin (Facing Brick)	188.38 m ²	188.38m2 x £58/m2 =£10926
uPVC Windows	32.5 m ²	32.5m2 X £240/m2 =£7800
uPVC External Doors	4 No	4No x £680 =£2720

Staircase Erection (Softwood)	2 No	Flat Rate =£2200
Softwood Flooring – Attic & Int. Floor	154 m ²	157.5m ² x £72/m ² £11340
Plasterboard Ceilings (Fix 2)	157.5 m ²	
Internal Walls – Frame and Panel Partitions. Timber Stud, Plasterboard, Tape and Fill.	354.15 m ²	354.15m ² £56/m ² =£19833
Mains Electricity Installation	157.5 m ²	157.5m ² x £42/m ² =£6615
Gas Installation	2 No	2No x £490 =£980
Waste Disposal.	157.5 m ²	157.5m ² x £10/m ² =£1575
Hot and Cold-Water Installation	2 No	2no x £970 =£1940
Telephone Points, TV, Data, Wiring.	157.5 m ²	157.5m ² x £8/m ² =£1260
Paint Walls (2 Coats)	474.3 m ²	474.3m ² x £4.20/m ² =£1992
Plasterboard Ceilings	157.5 m ²	Specified in Fix 1
Paint Ceilings (2 Coats)	157.5 m ²	157.5m ² x £4.2p/m ² =£661.5
Ground Floor Insulation	80.5 m ²	80.5m ² x £22.5/m ² =£1812
Ground Floor Screed (Cement and Sand 1:3)	80.5 m ³	80.5m ² x £24.50/m ² =£1973
Veneer Internal Doors	18 No	18No x £420 =£7560
Tile Flooring (Slate Tiles)	36 m ²	36m ² x £65/m ² =£2340
Softwood Laminate Flooring	11.6 m ²	11.6m ² x £31/m ² =£360
Carpet Flooring	91.30 m ²	91.3m ² x £30 =£2739
Kitchen Furniture Fitting	2 No	2No x £2450 =£4900
Toilet Furniture Fitting	2 No	2No x £2150 =£4300

Construction Programme

Appendix 1 is a Gantt Chart I have put together, which represents the total duration of each works as well as the order of works. I have estimated the project will last a duration of twenty-two weeks (5 Months). This seems to have come out accurately, as after questioning a previous Persimmon Homes civil engineer, I discovered that they would aim to complete detached houses in 3-4 months and semi-detached homes in between 4 and 6 months depending on the size (Powell, T 2018). In some areas it is possible for delays to the project, such as when the crane lifts the timber frame in place, the wind could become too strong and the crane would be unable to operate in high winds. There may also be the potential for works to be completed quicker than expected, for example, ground works can be made easier or more difficult depending on the existing ground conditions, therefore if the ground is relatively easy to dig through, the process of foundation excavation and buried service installation could be completed quicker than expected.

Cost Forecast

I have worked out that the total cost for the site setup and construction of the two-storey dwelling is to be in the region of £153,140.50. This does not take into account the twenty-two week's worth of site facilities. Using the SPON's (AECOM, 2017) book, I was also able to accumulate a total cost of £5,317 for twenty-two weeks' worth of the following equipment:

- Office Cabins (15m²) - £22.50/Week (22 Weeks)
- Container with Padlock (15m²) - £10.50/Week (22 Weeks)
- Toilets (13ft x 9ft) - £45/Week (22 Weeks)
- Fire Extinguishers - £8.50/Week (22 Weeks)
- Power and Lighting - £20/Week (22 Weeks)
- Timber Perimeter Hoarding (72 linear meters) - £117/Week (22 Weeks)
- Mixer, 7-5 Diesel - £50/Week (8 Weeks)

When divided between the length of the project gives a value of £241.68/week. Adding these costs onto the costs for the construction of the project itself, gives a total job construction value of £158,457.50, making the average monthly spend £31,691.50, and the average weekly cost £7,202.61.

Though the total cost may seem excessive, it is purely a draft cost and will likely end up completing the project a lot cheaper than projected. The costs I allowed for, using SPON's (AECOM, 2017), were often somewhere in the middle of the upper and lower boundary of task costings, so where some money could be saved on some tasks, it could also end up being spent more in others.

Summary

The information gathered on the project was from various sources, meaning I managed to take practical applications and theoretical applications and apply them in a way that best reflected how a project would come together and how much it would cost. I ended up using personal practical experience, interviews by three industry professionals and a commonly used costs book to give me a diverse knowledge of project task applications, which gives my project duration, costs and activities required a thorough check.

I used these sources firstly to determine how the project would be built, from the site setup requirements to the internal finishes gaining dimensions from the drawing provided using a scaled ruler. I decided to include all basic welfare facilities, which are listed in *Cost Forecast*. I then established the foundations I would use, which I based on assuming that the existing ground conditions were good. This led me to use a basic strip foundation to be laid on the line of all load-bearing walls with brick and blockwork laid up to DPC level. I decided to opt for a concrete slab system for the ground floor, rather than block and beam as I have experience in using this construction method and know that it is a quick, easy and effective method of construction. For the frame and skin of the building, I decided to use the traditional housing method of timber frame and brickwork. This is usually a lot more cost-effective and fitting for a structure of this size in comparison to a steel frame building, as well as the brickwork giving it more of a feel in comparison to perhaps an insulated PVC cladding system. From there on out, the decision for walls, ceilings and flooring were traditional, using timber stud and plasterboard walls finished with paint, a screed ground floor finished with slate tiling in wet areas (Kitchens, Utilities, Toilets), carpets in living rooms and bedrooms and laminate softwood to the front hallway.

I am overall happy with the outcome of my proposed project plan as I feel using my personal practical knowledge I have gained through working on site as a trainee engineer for over two years to build a structure of the required works, then thoroughly scrutinising it and

adding/removing works by use of information gathered by interviewing a professional project manager and civil engineer gave me a well established construction works program with all activities and durations listed. It was this information that I then placed into the GANTT Chart which represents the start and end dates of works. A construction phase program is very important to a project manager as well as the team surrounding him/her as it should be used to identify the crucial path of activities (Tasks that must be completed on time to reach the overall completion date) as well as knowing a timeframe for tasks that can be started and will take a given time to complete, but are allowed to drag over by a few days as it falls into the float.

By having a solid construction works program in place, I was then able to establish costs for each task or package by using SPON's (AECOM, 2018) which lists the majority of core construction project works with costs for different variables of the construction methods I have adopted. I then spoke with a professional quantity surveyor about other costs that weren't available in the SPON's (AECOM, 2018) book. These costs were primarily site setup and site clearance, including topsoil excavation and welfare facility placement. I also asked whether the pricings I gathered from SPON's (AECOM, 2018) were true and accurate to the prices that are gathered by construction companies and was told that it is a good guide, however some costs are subject to change due to inflation, shortage of work, demands for trades and using package systems on a large scale.

Referencing

AECOM. (2017). *SPON's Architects' and Builders' Price Book 2018*. Taylor and Francis.

Humphreys, J (2018) Interview with Justin Humphreys (Interserve Project Manager). 21st February.

Powell, T (2018) Interview with Tomos Powell (Ex-Persimmon Homes Civil Engineer), 19th February.

Payne, D (2018) Interview with Darren Payne (Interserve Quantity Surveyor) 21st February.

Personal Experience:

- 32 Months spent on-site with Interserve Construction Ltd.
 - Gowerton Primary School (07/2015 - 10/2015)
 - Margam Biomass Plant (10/2015 - 09/2017), (01/2018 - Present)
 - Coed Eva Primary School (09/2017 - 12/2017)
 - Prince Charles Hospital (09/2017 - Present)
- Framing systems used and experienced:
 - Timber, Steel, Reinforced Concrete
- Foundation Systems used and experienced:
 - Driven Piles, Bored Piles, Raft, Strip
- Ground works & major ground works used and experienced:
 - Ducting, Drainage, External Slabs, Highway construction & Road Slabs, Tarmac, Lagoon Construction, Interceptor Tanks