



**Level 3 Advanced Technical  
Extended Diploma in  
Constructing the Built  
Environment (Construction)  
(1080) (6720-37)**

**6720-053 Level 3 Constructing the  
Built Environment - Synoptic  
assignment  
Recording forms**

**Version 1.0 – January 2018**



## Candidate Record Form

### Technical qualifications

**Level 3 Advanced Technical Extended Diploma in Constructing the Built Environment (Construction) (1080) (6720-37)**

**Level 3 Constructing the Built Environment - Synoptic assignment (6720-053)**

Candidate name	Candidate number	Can
Jacob	8887	
Centre name	Centre number	Cent
College		

**Marker Notes** – Please always refer to the relevant marking grid for guidance on allocating marks and make notes that describe the quality of the evidence and justification of marks. Expand boxes as required.

AO1 – Recall - Breadth, depth, accuracy																					
20%	1	2	3	4	5	6	7	8	9	10	11	12									
AO1 Mark Centre: 11 PM: 10	<p>The candidate has demonstrated a solid approach to applying the knowledge gained over the qualification, he has endeavoured to grasp the importance of the range of knowledge to apply. The document presented includes clear drawings diagrams and sketches to support his reasoning</p> <p><i>Julian's Comments</i></p> <p>There is very good breadth of coverage of the subjects raised in the assignment although coverage is not full and extensive there is certainly good evidence that the candidate has completed wider reading and has been able to demonstrate accurate and confident recall over most of the expected learning outcomes.</p>																				
AO2 – Understanding - Security of concepts, causal links																					
35%	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
AO2 Mark Centre: 16 PM: 14	<p>The explanations he has given a clear and link to theories, he makes comparisons and endeavours to present conclusions that are valid. His approach to sustainability has been explored looking for alternatives.</p> <p>There is some good reasoning with explanations and examples of understanding shown in several aspects of the learners work for example the bending moments, use of grey water and making concrete test cubes. There are also a number of areas where there are missed opportunities to demonstrate understanding for example making comparisons between different types and thicknesses of insulating materials through simple heat loss calculations and through explaining where waste saving could be made. Also in terms of generally understanding materials there are questions to be asked where quite generic assumptions are made for example that slates are fit</p>																				

**Commented [JW1]:**  
Marks for sketches will be seen in practical skills, reasoning presumably means showing knowledge and should be marked below

	for re-use and flashings can be re-used and therefor the candidate does not quite make the bottom of band 3											
<b>AO3 - Practical skill</b> - Dexterity, fluidity, confidence, ease of application												
10%	1	2	3	4	5	6						
AO3 Mark Centre: 5 PM: 5	<p>The candidate has taken time to produce workable drawings that represent his findings. He has presented his skills in the production of CAD drawings, the presentation was well presented with confidence</p> <p><b>Julian Comments</b></p> <p>The candidate has shown some high level skills in producing good CAD sketches, calculations are coherent though some could have been presented better in terms of making a report for a client on a realistic project</p>											
<b>AO4 – Bringing it together</b> - use of knowledge to apply skills in new context												
20%	1	2	3	4	5	6	7	8	9	10	11	12
AO4 Mark Centre 7 PM: 7	<p>The work presented demonstrates the candidates ability to apply knowledge to problem solving. Solutions to problems are demonstrated in a sympathetic manner representing a compromise between the requirements and what can be achieved</p> <p><b>Julian's comments</b></p> <p>The candidate has made a good attempt to link theory and practice and most aspects of the report are fit for purpose. Spelling and grammatical errors as well as the areas where full understanding is not demonstrated let down the report if this was to be presented to a client</p>											
<b>AO5 - Attending to detail / perfecting</b> - Repeated checking, perfecting, noticing, engaged												
15%	1	2	3	4	5	6	7	8	9			
AO5 Mark Centre: 5 PM:5	<p>There is evidence of the attempt to constantly improve, the candidate has shown a desire to submit high quality material.</p> <p><b>Julian's Comments</b></p> <p>There is evidence of the candidate attempting to attend to detail in sections of the work but there are many missed opportunities including the sense checking of the report in terms of a quality presentation to a client and also in some of the sketches that do not demonstrate the expected levels of competency of skills for say .... giving a tool box talk on site.</p>											

<b>Tutor signature</b>	<b>Date</b>
<b>Tutor</b>	<b>15/05/2018</b>
<b>PM</b>	

<b>Total</b>
<b>44</b>
<b>41</b>



## Declaration of authenticity

### Technical qualifications

<b>Assessment ID</b>	<b>Qualification number</b>
6720-053	6720
<b>Candidate name</b>	<b>Candidate number</b>
Jacob	8887
<b>Centre name</b>	<b>Centre number</b>
College	777

### Candidate:

*I confirm that all work submitted is my own, and that I have acknowledged all sources I have used.*

<b>Candidate signature</b>	<b>Date</b>

### Tutor:

*I confirm that all work was conducted under conditions designed to assure the authenticity of the candidate's work, and am satisfied that, to the best of my knowledge, the work produced is solely that of the candidate.*

<b>Tutor signature</b>	<b>Date</b>
Tutor	17/05/2018

### Additional Support

Has the candidate received any additional support in the production of this work?

No  Yes  (Please tick appropriate)

If yes, give details below (and on a separate sheet if necessary).

--

**Note:** Where the candidate and/or tutor is unable to, or does not confirm authenticity through signing this declaration form, the work will not be accepted at moderation and a mark of zero will be given. If any question of authenticity arises, the tutor may be contacted for justification of authentication.

**Task 1- Produce a pre-construction report for the planning authority that emphasises sustainability aspects of the new hotel development project.**



## Cover page

This report is being written to address the construction work that a company are planning to do. This is to design and redevelop the site into a new three storey budget hotel. The first is to produce a report for the planning authority that emphasises the sustainability credentials of the new hotel development project. This is to include the materials that may be reused from the existing building.

## Executive summary

The construction company would like to do numerous things to the land is 1.5 hectares (15,000 m<sup>2</sup>). The new hotel build will cover 60 x 34.4m (2064m<sup>2</sup>). The site the building is proposed to be built on is a brownfield site which will make it easier for the proposed building project to go through the planning authority. The ground floor of the new build hotel will include a reception area, a bar/restaurant and a kitchen and other catering facilities. The two upper floors will have bedrooms (20 on each floor). Lifts, stairwells and circulation areas will connect each of the floors. There will also be rooms for heating and water services provided by two boilers. One that used gas and the other that uses woodchips.

Reuse of the existing materials is important to the company to both lower the carbon footprint and to lower costs. Possible materials that could be recycled are bricks from the original building to form an archway to the main entrance. Slates to form the new hotel roof. Softwood floorboards to be laid down in the new hotel reception area after having nails and other metal fittings removed and sanded. They then may potentially be painted or varnished.

## Heating and insulation

### **Biomass boiler**

The **200kw biomass boiler** would have many benefits then using traditional methods of heating the building. Even though the biomass boiler will cost more than traditional methods to install over time the boiler will have significantly less cost to run and the company will also gain money back on the RHI (renewable heat incentive) as well as reducing the emissions the hotel will produce which is very important to the client. The boiler will operate 3000 hours per year with roughly equates to 4 months which means it can be used in the cold winter months and still have 30 more days to help during colder times of the year.

### **Super insulations**

**Commented [JW2]:** Lots of sense issues in writing detracting from the overall mark for bringing it all together and for attending to detail

Super insulation is an approach to insulating a building that will dramatically reduce heat loss by the use of much higher levels of insulation that will be used in this project. It is the same principles as basic insulation but uses materials such as rigid urethane and rigid phenolic boards with reflective facing instead as they have better insulation properties; these materials are tightly packed into buildings to achieve good thermal values. Super insulation also includes the use of triple glazing windows as they provide great energy efficacy. Window are normally the weakest point of a build in regards to thermal insulation, so these windows should combat that in the project.

**Commented [JW3]:** Show examples of the differences to demonstrate understanding.

### Alternatives and possible add-ons

#### Solar panels

The estimated cost of 4kw solar panel will be between £6000 - £8000, these take up 28 meter squared of roof space. As the roof space of the new build is proposed to be 2064 meters squared a total of 73 solar panels could be used. As this would be used alongside the boiler mass boiler it could result in a £700 return in the first year, then a profit of £6750 after 20 years. If the client doesn't think the solar panels are aesthetically pleasing smaller or fewer ones could be used but the returns vary. A different way of tackling this problem could be a recent technology which is solar panelled tiles designed by Tesla. Which work as the same as solar panels but would then replace the used of the recycled slates from the roof.

**Commented [JW4]:** Some good understanding shown, could have been better laid out in terms of presenting to a client.

Not only will the solar panels be able to provide heat it will also be an energy efficient way of generating electricity for appliances and major electrical systems in the hotels such as the lifts.

Roof Space (square meter)	System Size (kW)	Estimated Cost (£)	First Year Return (£)	Profit After 20 Years (£)
8	1	2,500-3,000	185	640
14	2	3,000-4,000	369	3,800
21	3	4,000-6,000	534	5,630
28	4	6,000-8,000	700	6,750

(Table taken from- "<https://www.greenmatch.co.uk/blog/2014/08/what-is-the-installation-cost-for-solar-panels>")

**Commented [JW5]:** Good practice to show referencing.

#### Water turbine

A water turbine was considered for the drainage was considered for the drainage system from the car park to the suds pond. This was then determined as unviable as the amount of water needed to be able to turn the turbine would have been too much.

**Commented [JW6]:** sense

**Commented [JW7]:** missed opportunities to demonstrate understanding and show through calculation what would be needed. What is going to be used instead,

### Carpark

The carpark will be at the back of the hotel and will have to accommodate for 40 car spaces. 4 of these will be disabled used and 2 will need to be for electrical vehicles. The area will have to be excavated and a substructure will need to be put in; this will most likely be a strip foundation will MOT type one stone filled inside. The car park will be tarmac and have a small edged perimeter in stone blocks. Drainage will be installed so water can run off the surface into a SUDS pound situated below the carpark. Each space should be 2.4m by 4.8 m.

Commented [JW8]: sense

### SUDS Pond

The suds pond will contribute to sustainable development on the site. Firstly this is because they are considered environmentally beneficial by causing no long term detrimental damage. They will be more sustainable than traditional methods because, manage runoff volumes and flow rates from hard surfaces, reducing the impact of urbanization on flooding, provide opportunities for using runoff where it falls and Provide an attractive habitat for wildlife in urban watercourses.

### Boundary wall

A boundary wall will be erected, it will be made out of reclaimed brick taken from the old building. Path ways will also be added around the grounds made out of reclaimed brick crushed down into MOT type 1 stone. This will help reduce costs and reduce waste.

Commented [JW9]: how, give examples

### Recycled materials

On the site the old build the local authority building is run down but still has useful materials that could be used in the construction of the new three story budget hotel. These materials should be used to both lower the cost of the build and to lower the company's environmental impact.

The useful materials and there possible uses are as followed;

The original building **brick** could have a number of different uses on the new site, the first is for brick on the new build to construct new walls floors and ceilings the other use for the re-cycled brick is to build a low rise boundary wall.

The **slates** on the original building will mainly be used for the new builds roof on the hotel, they may also be used on the boiler house.

Commented [JW10]: understanding, what about checking condition, insulation etc

The **softwood floorboards** can be taken out and reused in the new build. The floor bored will need all the fixings removed, sanded down and then varnished before being relayed.

**Metals** could be reused from the original building like copper, lead, cast iron pipework, lead flashing. These could be used for various jobs including

Commented [JW11]: not so sure about this and there is a lack of understanding here

The site the building is proposed to be built on is a brownfield site which will make it easier for the proposed building project to go through the planning authority.

### Other environmental plans

Recycling storage will be set up on site to gather materials that are salvageable. A waste management plan will be in place to reduce the waste coming off the site.

Commented [JW12]: great, what might one of them look like

### References

*sustainable drainage*. (n.d.). Retrieved from susdrin: <https://www.susdrain.org/delivering-suds/using-suds/background/sustainable-drainage.html>

### **Task 1- Explanatory statement for the planning authority explaining why the local authority building is to be demolished, and rebuilt as a hotel, rather than refurbished and converted into a hotel.**

Commented [JW13]: good to see

There are numerous reasons why the authority building should be demolished.

Firstly there could be dangerous materials that could cause serious health issues including asbestos. Asbestos could have been in the building as it only got outlawed in the UK in 1985, just 38 years ago. But as in the assignment brief it does not specify how long ago the building was being used this must be taken into consideration.

Commented [JW14]: sense

The next reason is the financial benefit to the company taking on the project. As the building is 50 years old to refurbishing it would hinder the profit margins of the company if they would consider selling the hotel in the future. As building the hotel as a new building may cost similar to the refurbishment but the hotel cost will be less. Whereas rebuilding it may cost a slight bit more but the hotel will then be worth more.

The hotel energy rating will be significantly less if refurbished, as the building has brick external wall and no insulation then the energy used will be considerably more. If the hotel is a new build it will allow the build to be super insulated resulting in less emissions used, which is very important to the company.

Commented [JW15]: demonstrate the differences

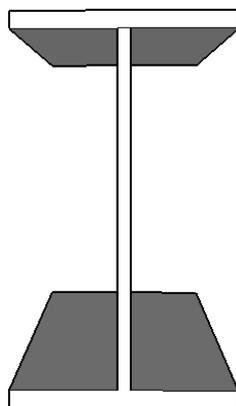
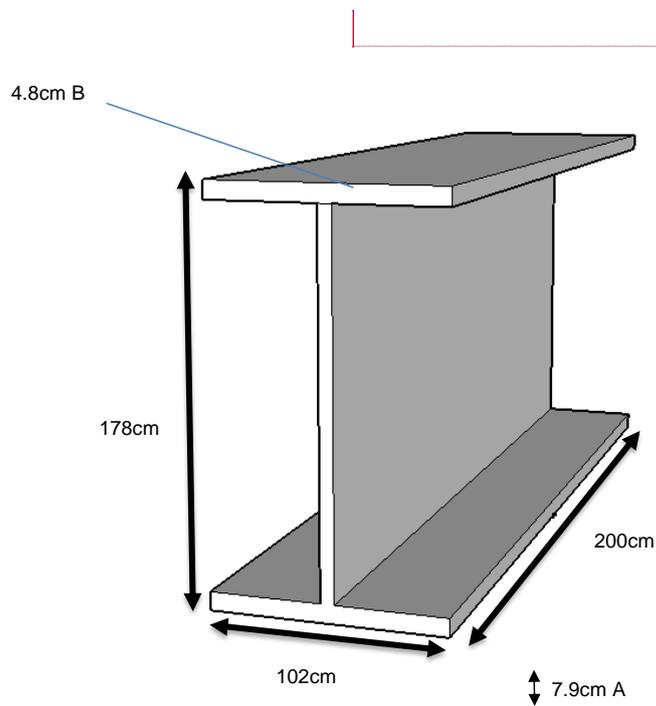
If the building was to be refurbished the maintenance of the building would cost considerably more for the company; this may mean that in the future it may end up costing the company a considerable amount to maintain the property also increasing the carbon footprint. This is because the building is already 50 years old so the natural lifespan of the build is encroaching as for the residential property's it is between 50 to 60 years.

As the plans for the hotel are to use recycled materials from the authority building there won't be a lot of waste from the demolition. As it is important for the company to keep both low costs and waste this is very important for the company to recycle as much material from the existing build as possible.

In conclusion if the company destroys the existing building it allow them to have more freedom with the build which will then cause lower emissions as the building will be will have a better specification of more efficient materials. This will then be more cost effective as it will have lower energy costs; as well as keeping costs down this way the company will recycle every possible material to have reduced waste.

**Task 2- Specify the size of a steel I-Beam to support the concrete block work wall above the door to the external terrace and include the supporting structural calculations or the bean and produce a cross section CAD drawing of the specified beam.**

Commented [JW16]: Skills used in producing the CAD drawings.

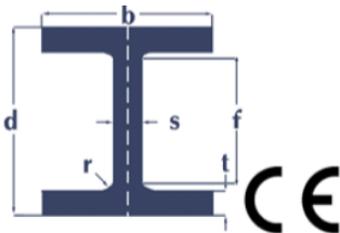


## Report on the steel I-beam

The steel I-beam will be made to so I can support all of the brick work above the door. The size of the I-beam will need to be constructed and installed carefully in accordance to building regulations part A. If it is not the beam could break as it will not be able to take the load of the block work above.

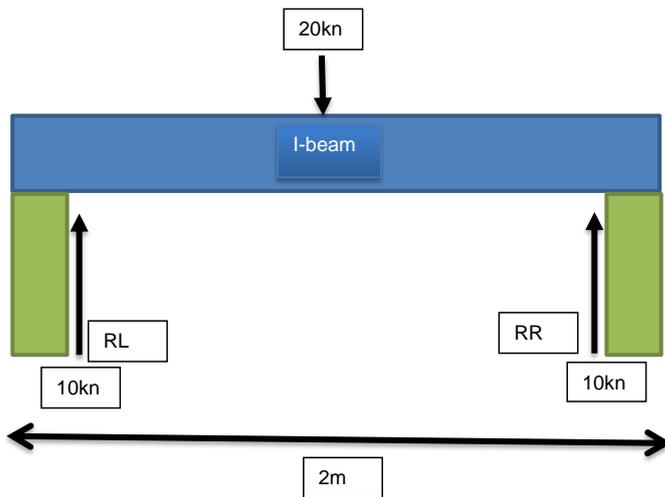
Commented [JW17]: recall

The diagram below shows the measurements for the steel I-beam being used in the hotel. The calculations would be carried out by a fully qualified structural engineer.



Measurements from diagram			
<b>d</b>	177.8	Depth d mm	<b>b</b> 101.6 Width b mm
<b>s</b>	4.7	Web s mm	<b>t</b> 7.9 Flange t mm
<b>r</b>	7.6	Root Radius r mm	<b>f</b> 146.8 Depth Between Fillets f mm
	19	kg/m	53 Approx. Metres per Tonne
	24.3	Area of Section cm <sup>2</sup>	0.738 Surface Area per Metre m <sup>2</sup>
	38.8	Surface Area per Tonne m <sup>2</sup>	0.004 Surface Area Two End Faces m <sup>2</sup>

## Bending moment diagram



The bending moment is the reaction of a structural element (Steel I-beam) when a external force (the weight of the building above) is applied causing the I-beam to bend. There will be a larger bend in the middle of the beam as this is where the beam is at its least supported.

The **maximum bending moment** is the amount of the weight it will take to snap the I-beam.

### Calculations

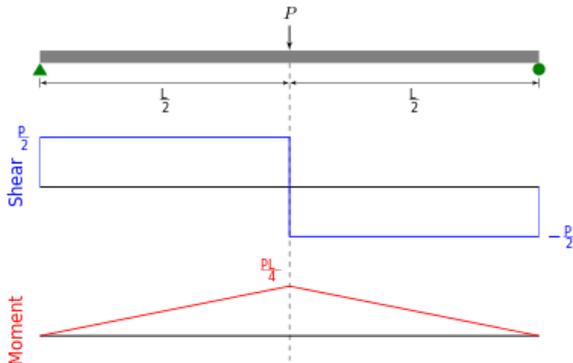
$$RR \times 2m = (20KN/m \times 2m) \times 1m$$

$$RR \times 2m = 20KN \times 1m$$

$$RR = 20 \div 2 = 20KN$$

**Commented [JW18]:** knowledge & understanding demonstrated here

Diagram for shear force and the bending moment of a simple supported beam:



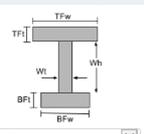
(picture taken from ' [https://en.wikipedia.org/wiki/Shear\\_and\\_moment](https://en.wikipedia.org/wiki/Shear_and_moment_diagram) diagram')

**Commented [JW19]:** opportunity missed her to fully demonstrate understanding by using SF & BM diagrams from the calculations completed.

### Selection modulus

The section modulus is the geometric property of the cross section area of the I-beam. Using a section modulus calculator the I-beam dimensions were imputed and the values are calculated on the right of the diagram.

please fill in all dimensions as per diagram.



I-Beam

TFW:

TFI:

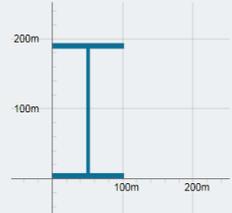
BFW:

BFI:

Wh:

Wt:

r:

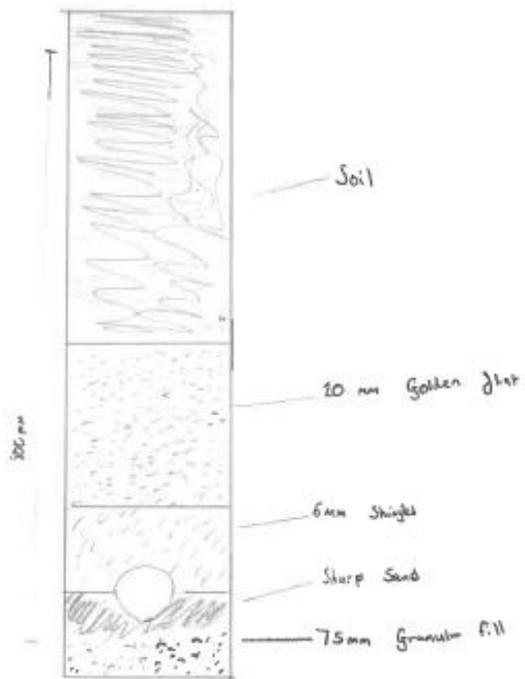


Units:

Notation	Value	Unit
A	2522	mm <sup>2</sup>
I <sub>z</sub>	16473768.666666666	mm <sup>4</sup>
I <sub>y</sub>	1416798.1666666665	mm <sup>4</sup>
C <sub>z</sub>	51	mm
C <sub>y</sub>	97	mm
Q <sub>z</sub>	95690.5	mm <sup>3</sup>
Q <sub>y</sub>	21364.25	mm <sup>3</sup>
Z <sub>z</sub>	169832.6666666667	mm <sup>3</sup>
Z <sub>y</sub>	27780.3562091503	mm <sup>3</sup>
J	42232.6666666667	mm <sup>4</sup>

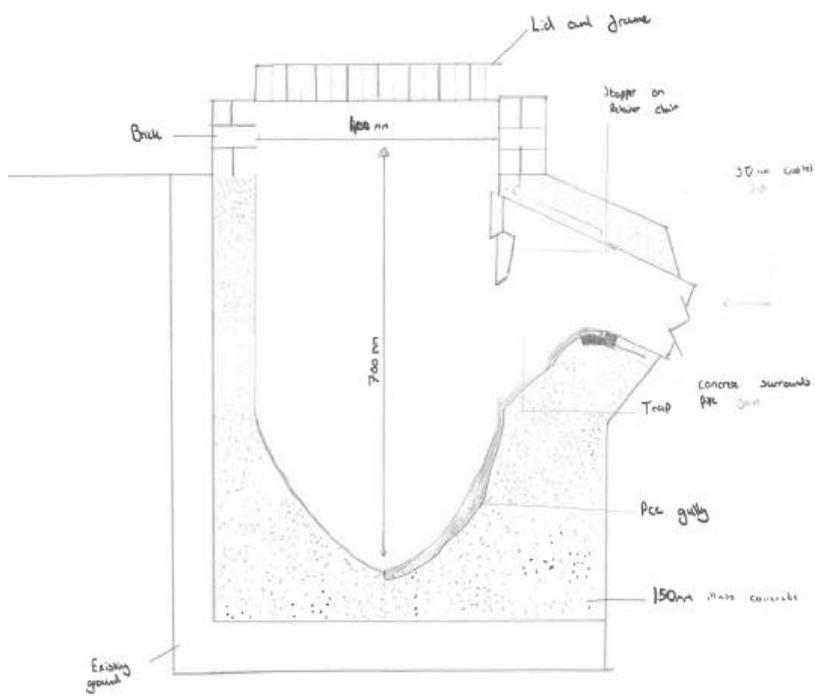
  
CLOUD ENGINEERING SOFTWARE

end cross section/ pipe fill

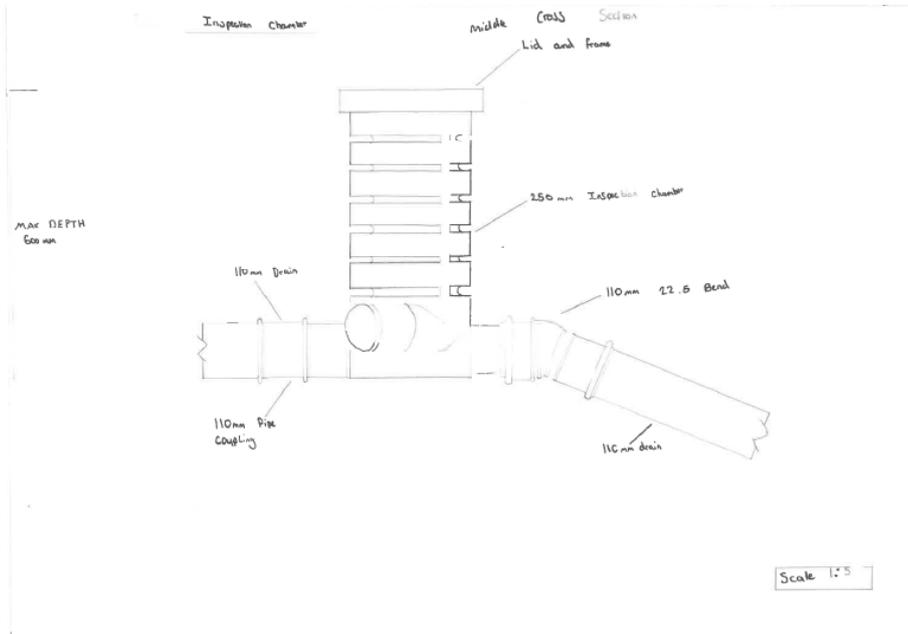


**Commented [JW20]:** missed opportunity to score higher marks for practical skills and certainly bringing it all together with poor sketching, a key skill that should be developed on this programme.

Gullie pit Start cross Section



Commented [JW21]: Ditto above but his is supporting recall and some knowledge



**Commented [JW22]:** A better quality sketch gaining some marks in all categories and showing an ability as identified by the tutor to make improvements.

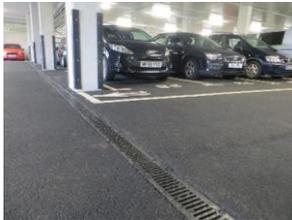
**Task 3- specify the layout and materials used for the surface water drainage system to link the rain water gullies at the edge of the car park with the SUDS pond.**

There will be 4 gullies, they will be in place once every 15 meters. This is so if there is any blockages it will be easier for jets washer to get down and clear them out. The road will be cantered to drain into the centre where the gullies will be positioned. There will be a man hole positioned closer to the outlet pipe to give access if there is a block. The pipework that will be used will be 100mm CV pipe. The pipes will start at 250mm down which is the depth of the gullies. It then drops to 1000mm (1m) at a gradient of 0.125mm over 1000mm (across the car park). The total meter of the pipework is 120 meter, the total fall equates to 1.75 meter to comply with building regulations.

**Material to be used**

Gullies

One system that could be used for the drainage systems is gullies at different intervals of the car park on the road surface. An alternative to this could be drainage holes on the curb of the car park. A benefit to this would be that it is more ascetically pleasing. Benefits of both of these systems is that the grids can lead directly into the pipes that will take the water SUDS pond.



Pipe work

The material that will be used for the pipework is **vitrified clay (VCPs)**. The reasons for using vitrified clay is because they are reliable and strong enough to hold the weight above without being crushed. They are able to repel chemical attacks and resist corrosion. They are also recycled able and economically friendly which is important to the company.

**Commented [JW23]:** Not sure this is a demonstration of understanding but knowledge of the product is clear

Inspection chamber

The Inspection chamber will be in place to check for any blockages. It will also allow for the clearing of out the blockages to take place. The inspection chamber will be made out of plastic. This is because it corrosion resistant. It is also a strong but flexible material which will allow ground movement and be able to hold the weight around it. As it is a strong material there will not be any cracks or breakages. **The plastic used will be recycled to keep up with the company's low carbon footprint.** Installation is simple reducing cost and time constraints.

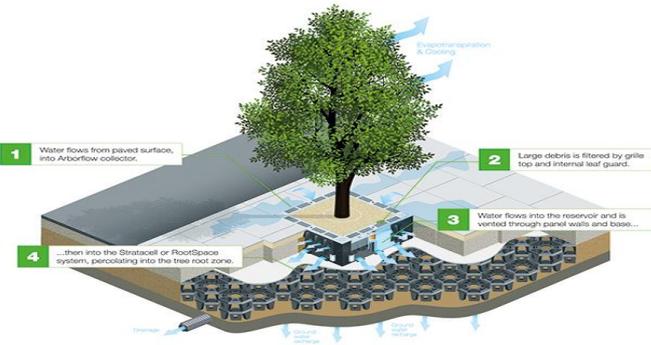
**Commented [JW24]:** Would be good to see some dimensions

**Commented [JW25]:** Really??

Alternatives or possible add-ons to the gullies

An alternative to using more common grids and drainage hole is to have the ArborFlow system in place. The ArborFlow systems uses trees to soak up water that has been collected from a surface. It works by having trees planted at different intervals of the carpark; the trees are then surrounded by grids that lead into that Arbor system which is a gridded cage that spread the water across that ground underneath the tree to allow it to soak the water up. The water that doesn't get soaked up by the roots of the tree will seep into the ground and disperse naturally. Not only will the Arborflow system look aesthetically pleasing it will also drain the water efficiently and economically by planting trees which is important to the company.

**Commented [JW26]:** Some good statements

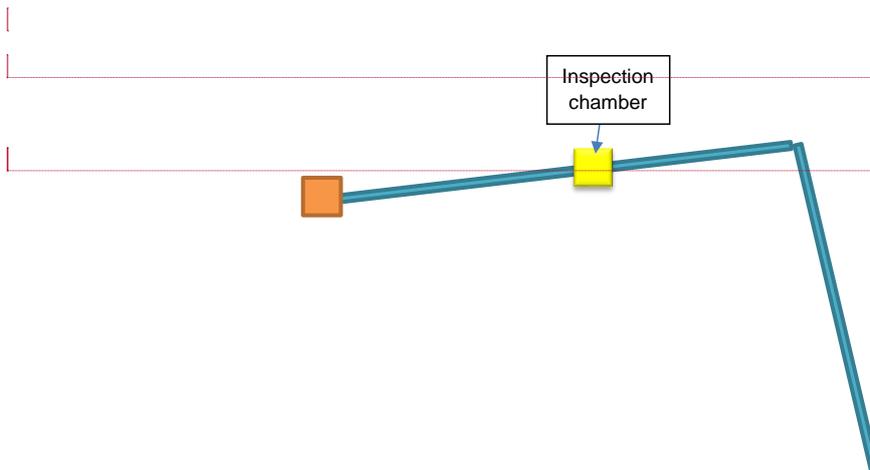


## Recommendations

My recommendations for the surface water drainage systems is to use some of the above methods. The reasons for this are as followed; firstly the arborflow system would take up large amounts of car parking space to be able to be able to guarantee that there would be sufficient water drained from the surface of the car park. For this reason I believe that 2 put in on the left of the car park would drain large amounts of water while making the car park look more aesthetically pleasing. The Arborflow system would also be beneficial in heavy rain.

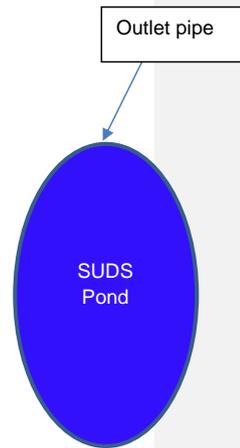
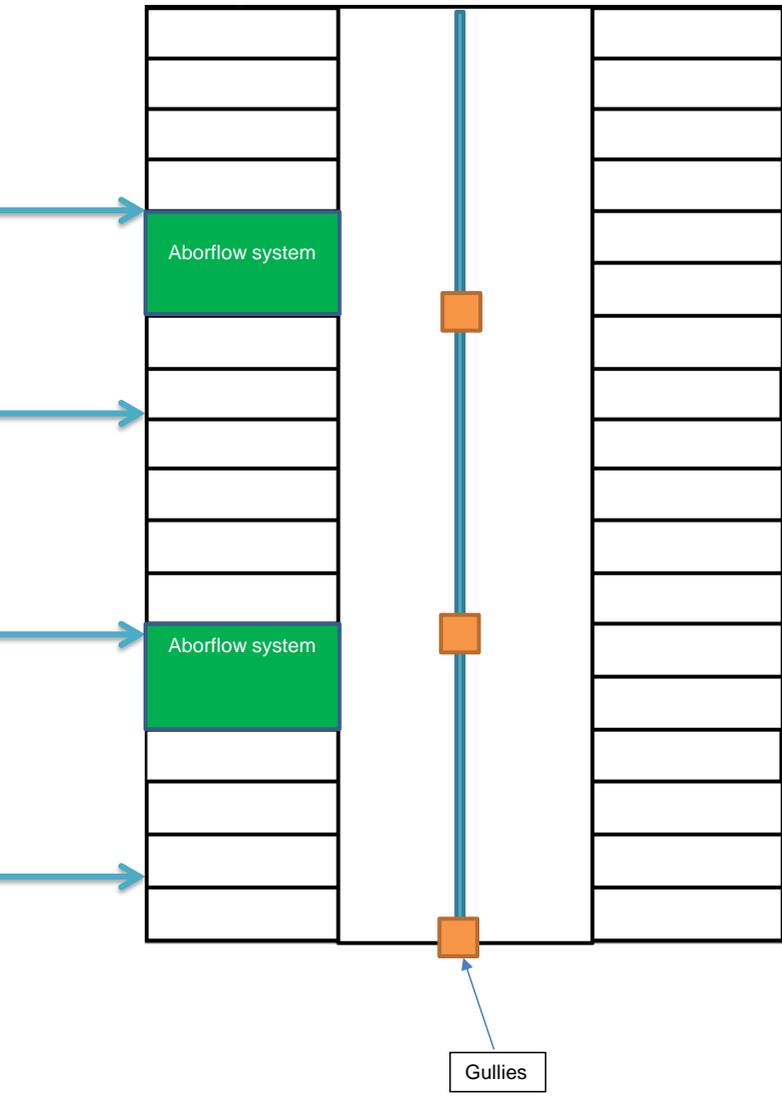
So to combat the fact that there isn't a guarantee of sufficient water drainage I recommend the installation of gullies that are level with the car park surface should be put in place to allow any water that is not collected by the Arborflow system can be drained into the SUDs pond. The panels that are recommended are the ones shown below as they are designed to stop leafs getting inside the drains which may have been a problem as the Arborflow system includes the use of trees.

### Task 3- drainage system pipe layout



**Commented [JW27]:** Measurements required to demonstrate knowledge, would also be good to see some of the gullies likely to be used.

**Commented [JW28]:**



**Task 4- Prepare a building survey schedule of items that could be saved from the local authority building, scheduled for demolitions, and reused in the hotel.**

Under the site waste management plan regulations 2008 requires all building projects over £300,000 to prepare a site waste management plan in order to recycle as much material as possible in which the building company plans to do.

Material	Recycled use	Use if broke
<b>Brick</b>	-The brick could be used to form the new archway for the main entrance of the new building. - Brick could be used to form new internal and external walls.	If the reclaimed brick is damage and unusable it will be grinded down to 50mm dust and used for MOT Type 1 stone which could be used for roads that may needed to be added to the new build.
<b>Slates</b>	-The slates can be reused on the new builds roof, they may need to be cleaned before they are re-used. -The slates can be re-used for aesthetics details that may be needed in the main entrance archway. -The slates can be re-used for flooring in the new build.	-Broken slates can also be used for aesthetics details around the new hotel builds. -The slates can be broken down and used to create loose slate pathways.
<b>Timber</b>	-Timber could have the metals fixings such as nails removed, sanded and get relayed in the lobby area in the new hotel, they may then be repainted or varnished. -Timber could be re-used for fixtures such as doors, window frames and both inside and outside furniture. -Timber could be reused for fences outside.	-If the timber is broken or deformed then it can be broken down and used for the biomass boiler.
<b>Metals</b>	-Metal pipes can be reused for plumbing, water pipes and other services. -Metal wires can be reused for the same purpose -Structural metal can be reused for the same purpose in the new build but will need to be tested to make sure it can hold the new load.	-Metal that is broken can be melted down and then formed into different metal fixing that may be needed in the new build of the hotel.
<b>Plastic</b>	-Plastic fixtures such as window frames and doors will be able to be re-used for the same purpose. -Plastic pipes can be re-used for the same purpose.	-Plastic fixtures and pipes that are broken can be melted down and reformed into either the same fixtures or different ones.
<b>Concrete</b>	-Concrete flags can be reused for flooring.	-Concrete blocked can be grinded down to a 50mm dust and used for mot type 1 stone that can be used in the building of new roads.

It is in the best interest of the client to recycle as much material as possible as it will lower building cost. Doing this will also lower the carbon footprint of the company, which is very important to them. Reusing materials such as the brick work will also help with planning permission as it matches the old building.

**Task 4- Write a report that describes a specification for, and a practical test procedure to verify the strength of, the structural concrete to be used in the floor in the hotel, as required by Approved document A**

The concrete used in the hotel will have to be tested to guarantee that it is strong enough to be used. This will be done by a concrete cube test. This will verify the compressive strength of the concrete to make sure it is safe to be used in the hotel. The tests are required by law to be done to comply with British standards (BS 1881-108;1983 – Testing concrete). (Method for making test cubes from fresh concrete) it will need to be tested.

**Health and safety**

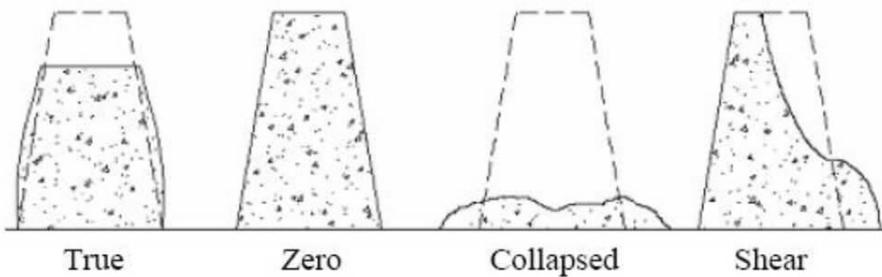
Prior to the test being carried out. Various health and safety measures need to be done. Method statements and risk assessments will have to be carried out and the persons carrying out the test must be correctly trained and wear PPE as concrete testing comes under Control of Substances hazardous to health regulation 2002.

**Slump test**

The slump test is put in practice in order to measure the consistency of concrete before it sets. The concrete must meet British Standard (BS EN 12350-2:2009 – testing fresh concrete), if it does not the concrete should be rejected.

The slump test procedure goes as follows; first the internal surface of the cone mould should be cleaned carefully. The mould should then be placed on a smooth, clean, horizontal and non-porous base plate. This mould should then be filled with fresh concrete in three layers. The layers should be tamped 25 times with a steel rod in order to reduce voids in the concrete. Excess concrete should be removed and the surfaces should be level. The mould is then lifted gently in a vertical direction, the unsupported concrete will then slump. The decrease in height from the centre point will be measured to the nearest 5mm.

Commented [JW29]: Strength???



European Standard ENV 206: 1992

- S1: 10-40 mm
- S2: 50-90 mm
- S3: 100-150 mm
- S4: more than 160 mm

### **Concrete cube testing procedure**

Once the slump test is done and the consistency of the concrete has been determined the concrete cube test can be carried out.

#### **Mixing the cement**

The cement and fine aggregate on a water tight none absorbent platform until it is blended and is all the same colour. Add the coarse aggregate until it is thoroughly mix through the batch. Add water and add mix until the concrete is the desired consistency.

#### **Pouring the concrete**

Select the moulds that are being used and clean them and apply oil. Fill the moulds in layers. Compact each layer in order to remove all air pockets and voids. Level the top surface with cement paste and smooth it with a trowel.

#### **Curing the cubes**

The cubes should be stored in conditions with moist air for 24 hours, after this they should be removed from the moulds and kept submerged in clear fresh water for 28 days prior to the test taking place. The water should be tested every 7 days as the temperatures must be at  $27 \pm 2^\circ\text{C}$ .

#### **Testing the cube**

Remove the specimen from the water after the 28 days and wipe the excess water away. Take the dimension of the cube to the nearest 0.2m. Clean the bearing surface of the testing machine. Place the cube in the cube so it is centrally on the base plate of the machine. Apply the load gradually without shock and continuously at the rate of  $140\text{kg}/\text{cm}^2/\text{minute}$  till the cube fails. Take a record of the maximum load and note any unusual features in the type of failure.



Three cubes are made because followed:

The first is used to test to make sure the concrete is safe and strong enough to be used.

The second goes to the company using the concrete in order to independently test if the concrete fails in use.

The third goes to the courts to test if there is a hearing about the concrete failing, the courts will then send it off to be tested

# Performance targets of hotel project



# Plan Charts

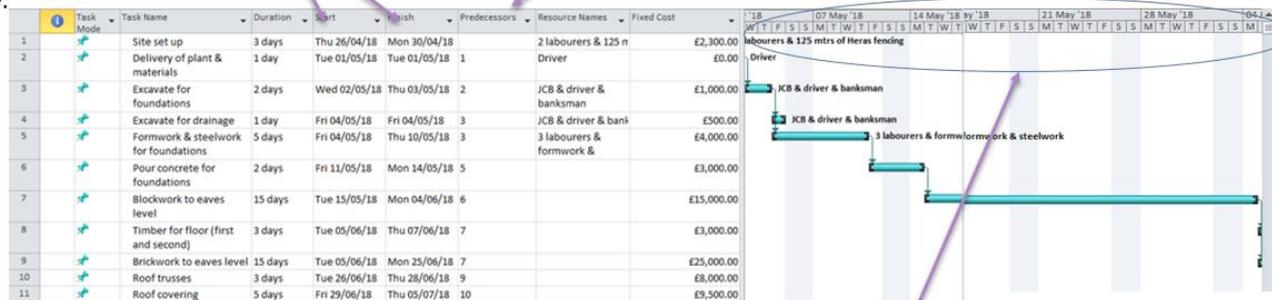
- ▶ While planning the rebuild of the hotel Microsoft planning chart was used in order to measure certain aspect of the project.
- ▶ One of the measurements was keeping track of time. This is done to see what order work has to be done onsite. It is also done to get an idea of the desired total project time.
- ▶ The other measurement used is to get an idea of the total project cost and where each individual cost will be going.

Task Mode	Task Name	Duration	Start	Finish	Predecessors	Resource Names	Fixed Cost
1	Task Name (Name)		Thu 26/04/18	Mon 30/04/18		2 labourers & 125 m	£2,300.00
2	The name of a task or a resource.		Tue 01/05/18	Tue 01/05/18	1	Driver	£0.00
3	Press F1 for more help.		Wed 02/05/18	Thu 03/05/18	2	JCB & driver & banksman	£1,000.00
4	foundations		Fri 04/05/18	Fri 04/05/18	3	JCB & driver & bank	£500.00
5	Excavate for drainage	1 day	Fri 04/05/18	Fri 04/05/18	3	JCB & driver & bank	£500.00
6	Formwork & steelwork for foundations	5 days	Fri 04/05/18	Thu 10/05/18	3	3 labourers & formwork &	£4,000.00
7	Pour concrete for foundations	2 days	Fri 11/05/18	Mon 14/05/18	5		£3,000.00
8	Blockwork to eaves level	15 days	Tue 15/05/18	Mon 04/06/18	6		£15,000.00
9	Timber for floor (first and second)	3 days	Tue 05/06/18	Thu 07/06/18	7		£3,000.00
10	Brickwork to eaves level	15 days	Tue 05/06/18	Mon 25/06/18	7		£25,000.00
11	Roof trusses	3 days	Tue 26/06/18	Thu 28/06/18	9		£8,000.00
12	Roof covering	5 days	Fri 29/06/18	Thu 05/07/18	10		£9,500.00

# Benefits of timing to the client/contractor using planning software

Using the timing aspect of Microsoft plan benefits the contractor as they can see specific start and end dates for the different tasks that need to be done.

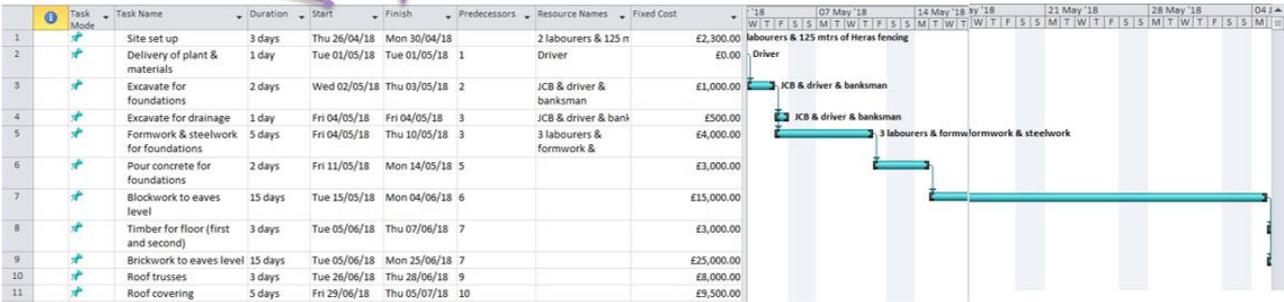
The predecessors help the contractor as it is easy for them to determine what task will need to be done before others can begin.



The separate chart shows specific start and end dates of the works that's have to be done, this help the contractor as they can know what works should be done before entering the site.

# Benefits of timing to the client using planning software

The client will be able to see start and end dates for when the site should be finished. This will allow them to start advertising for the hotel.



The client will also be able to see where the project is without going onto the site. The client will then be able to see weather the project is in regards to the scheduled dates.

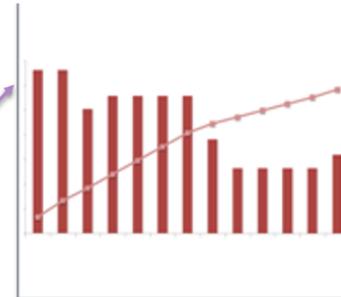
# Benefits of cost to the client/contractor using planning software

Using the 'report' aspect of the planning software can help the client as it shows where the budget they are using is going.

Budget Report as of Thu 26/04/18  
Project hotel

ID	Task Name	Fixed Cost	Fixed Cost Accrual	Total Cost
9	Brickwork to eaves level	£25,000.00	Proratec	£25,000.00
7	Blockwork to eaves level	£15,000.00	Proratec	£15,000.00
11	Roof covering	£9,500.00	Proratec	£9,500.00
10	Roof trusses	£8,000.00	Proratec	£8,000.00
5	Formwork & steelwork for found	£4,000.00	Proratec	£4,000.00
6	Pour concrete for foundations	£3,000.00	Proratec	£3,000.00
8	Timber for floor (first and second	£3,000.00	Proratec	£3,000.00
1	Site set up	£2,300.00	Proratec	£2,300.00
3	Excavate for foundations	£1,000.00	Proratec	£1,000.00
4	Excavate for drainage	£500.00	Proratec	£500.00
2	Delivery of plant & materials	£0.00	Proratec	£0.00
		<b>£71,300.00</b>		<b>£71,300.00</b>

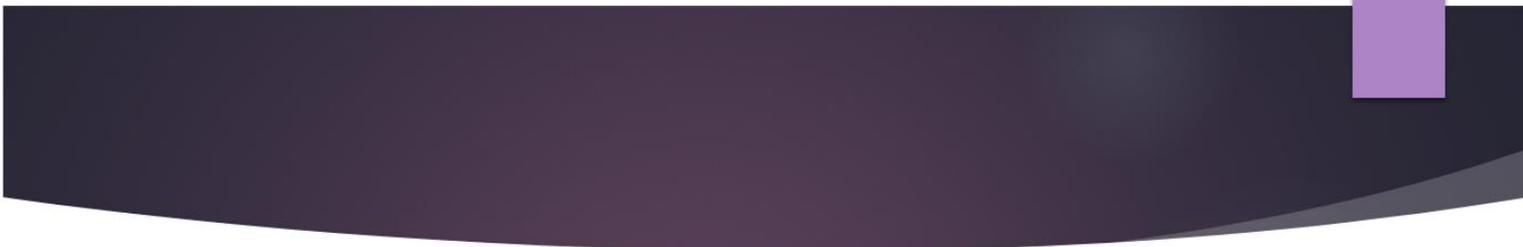
The 'visual reports' aspect can benefit both the client as it shows diagrams of cash flow and how much they will be paying out of the duration of the project.



The reports can also benefit the contractor as it will show how much money they will be getting paid over the duration of the project.

Cash Flows as of Thu 26/04/18  
Project hotel

	28/04/18	30/04/18	07/05/18	14/05/18	21/05/18	28/05/18	04/06/18	11/06/18
Site set up	£1,333.33	£766.67						
Delivery of plant & materials								
Excavate for foundations		£1,000.00						
Formwork & steelwork for foundations		£800.00	£3,200.00					
Pour concrete for foundations			£1,500.00	£1,200.00				
Blockwork to eaves level				£4,000.00	£5,000.00	£5,000.00	£1,000.00	
Brickwork to eaves level							£6,666.67	£8,333.33
Roof trusses								
Roof covering								
<b>Total</b>	<b>£1,333.33</b>	<b>£3,066.67</b>	<b>£4,700.00</b>	<b>£5,200.00</b>	<b>£5,000.00</b>	<b>£5,000.00</b>	<b>£10,666.67</b>	<b>£8,333.33</b>



Questions?

---