2022

ACBA 6000 – Construction Management

PROGRAMME CONTROL

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1. Project Information

Here at UWTSD we have received a planning application consent for an innovation hub within SA1 this hub details of our proposal can be found within our drawing package. We are aiming for a handover date of the construction to be Friday 29th March 2024, which will give us an extra 2 days' time within the construction programme for any small delays.

A detailed construction programme has been put together for the construction phase which allows us to clearly show the plan of works, outlining key points within the project and showing the critical path analysis. We can update these programmes monthly, unless you would like them more frequently and issue to yourself to provide you with an up-to-date idea of how the works are progressing.

2. Construction Programme

The construction programme created for any project can be used as a valuable tool as it can be used to allocate resources to specific tasks, we can also add a cost or rate to the programme which then allows us to perform a take-off. Measuring quantities so that we can find out how much money will need to be spent. A construction programme is always a contractual requirement and falls under the Construction Design & Management (CDM) Regulations 2015, *A contractor is responsible for planning, managing and monitoring the project throughout all the phases of construction, ensuring that the work-force and any sub-contractors are performing safely and adequately. (Health and Safety Executive (HSE), 2015).* As with any project it is essential to follow the CDM regulations as a legal and contractual requirement of a project, under NEC3 & NEC4 and JCT contracts we are required to provide a construction programme to monitor and manage progress.

2.1. Critical Path Analysis

The critical path analysis will also be displayed, and this will be used to display the shortest possible time in which our project can be completed. *The term critical path means the precursor of activities, which takes the longest possible path through the construction phase. "The entirety of the critical path corresponds to the minimum time needed to complete a*

project – any delay along the critical path would signify the need for additional time to complete the construction project." (Koutsogiannis, 2020).

3. Production of Site-Specific Reports from A Construction Programme

For this project we have used a software called Microsoft Project, this software allows us to also analyse and create reports to monitor the timeframes of a project and manage effectively and update any delays or advances we may encounter. Further to this it will also allow us to produce reports for Cost, which in effect can help us to monitor and breakdown the key cost of the project through materials and labour. Also, it will allow us to manage our resources effectively outlining when resources used on certain tasks may clash to help us more efficiently manage our resource allocation. These tools will help us to plan, manage and build the project to a high standard of quality.

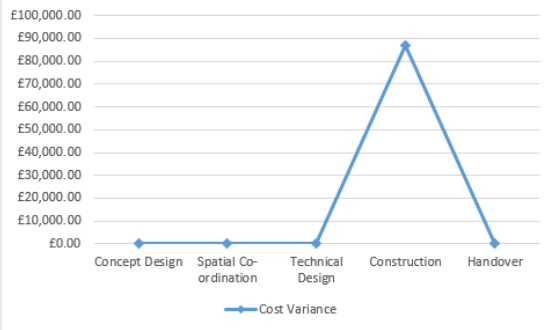
3.1. Production of Reports Monitoring Cost

For this element the programme will allow us to produce reports such as cost overruns, this report will allow us to show a breakdown of the costs we implemented for different stages of the project this is good to understand as our project follows the RIBA Plan of Works so we could understand the cost shown at different stages of the project ranging from concept design through to Handover. It also helps us to understand the cost variance of each resource that we have listed, this tool can prove very valuable when managing resource finances of a project, the report is shown below:

COST OVERRUNS

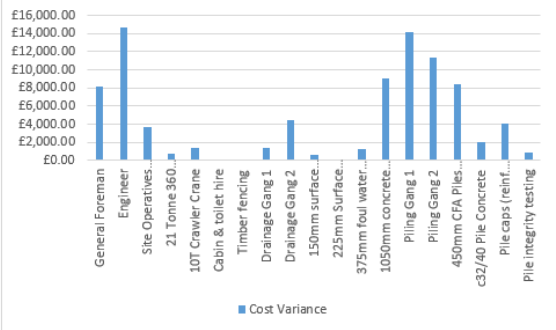
TASK COST VARIANCE

Cost variance for all top-level tasks in the project.



RESOURCE COST VARIANCE

Cost variance for all the work resources.



Name	% Complete	Cost	Baseline Cost	Cost Variance
Concept Design	0%	£0.00	£0.00	£0.00
Spatial Co-ordination	0%	£0.00	£0.00	£0.00
Technical Design	0%	£0.00	£0.00	£0.00
Construction	0%	£86,662.76	£0.00	£86,662.76
Handover	0%	£0.00	£0.00	£0.00

Name	Cost	Baseline Cost	Cost Variance
General Foreman	£8,160.00	£0.00	£8,160.00
Engineer	£14,652.00	£0.00	£14,652.00
Site Operatives (General)(1 x Ganger & 4 x Labourers)	£3,630.00	£0.00	£3,630.00
Drainage Gang 1	£1,445.40	£0.00	£1,445.40
Drainage Gang 2	£4,496.80	£0.00	£4,496.80
Piling Gang 1	£14,132.80	£0.00	£14,132.80
Piling Gang 2	£11,402.60	£0.00	£11,402.60

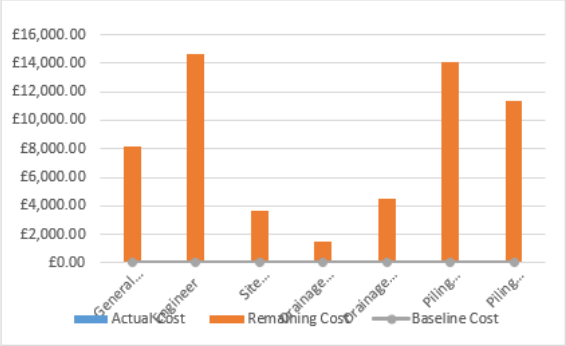
Figure 1 – Cost Overrun Report

Another useful report that Microsoft Project can run is a Resource Cost Overview this helps to show the client and also help us to manage the differentiation in cost between resources it shows clearly the separation in costs between labour and materials, which can also be useful in managing the project, it also shows us a breakdown of cost details showing labour standard rates and also allows us to track actual cost and work hours against planned, this should help us to manage the budget of the project:

RESOURCE COST OVERVIEW

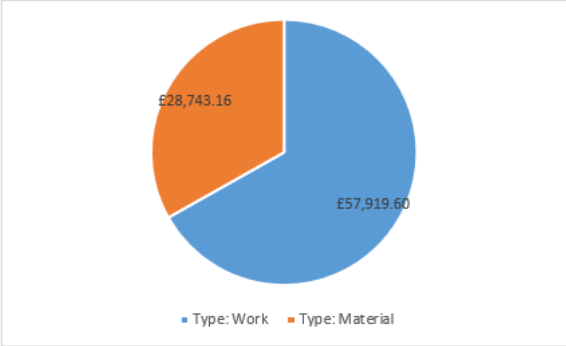
COST STATUS

Cost status for work resources.



COST DISTRIBUTION

How costs are spread out amongst different resource types.



COST DETAILS

Cost details for all work resources.

Name	Actual Work	Actual Cost	Standard Rate
General Foreman	0 hrs	£0.00	£25.50/hr
Engineer	0 hrs	£0.00	£33.00/hr
Site Operatives (General)(1 x Ganger & 4 x Labourers)	0 hrs	£0.00	£30.25/hr
Drainage Gang 1	0 hrs	£0.00	£40.15/hr
Drainage Gang 2	0 hrs	£0.00	£40.15/hr
Piling Gang 1	0 hrs	£0.00	£40.15/hr
Piling Gang 2	0 hrs	£0.00	£40.15/hr

Figure 2 – Resource Cost Overview Report Example

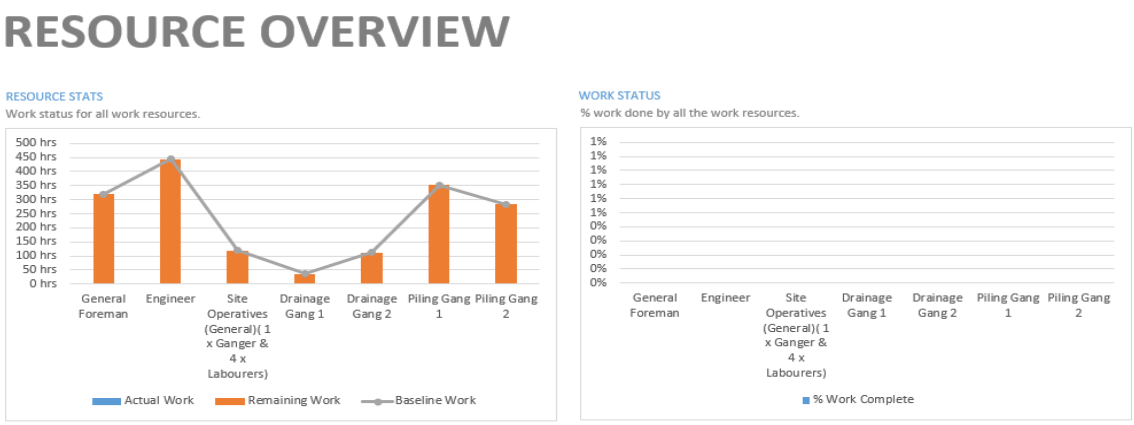
There are several other cost reports we could run off Microsoft Project these include Task Overview Cost, Earned Value Report & a Cash Flow report all these types of reporting will add value to our project by understanding the costs and comparing actual against predicted costs to manage the project more efficiently. Looking over this type of report they have many advantages and some disadvantages as well. The main advantage this provides is it makes cost control of the project much easier and will allow us to present reports easily and quickly to the client to show how finances are looking throughout the stages of construction. *"Cost control relies on sound estimates and constant monitoring over the course of a project. Without cost control, a project quickly burns through its budget and leaves the construction firm with very little profit or even a loss. As a result, good cost control is a must for any construction business that wants to be successful." (Taylor, 2022).*

Looking at the disadvantages of this service the only main disadvantages for using this is that it will require training within a specific type of software to undertake these reports, further

to this the software packages can be quite costly, which may prove to be a problem for some smaller contractors and sub-contractors especially when working on larger sized projects such as our proposal we will need to receive a construction programme off our sub-contractors through JCT or NEC3 & NEC4 contractual requirements. To conclude We think the benefits outweigh the negatives, we think that given the circumstances it would be within any small contractor or sub-contractors best interests to invest in this type of software to help them to manage their workflow better to coincide with our contract goals.

3.2. Production of Reports Managing Resources

We can also utilise our construction programme to manage our resources used on the project this can be an essential tool to use when we are aiming to prioritise certain tasks to try and achieve the critical path of the project in the timeliest manner. One of the reports we can produce is a Resource Overview this report helps us identify the number of hours each resource is predicted throughout the project and compare against actual hours worked in a live project which can be very useful to use as a check on payments made to sub-contractors, this can also be viewed as a percentage as seen below:



RESOURCE STATUS

Remaining work for all work resources.

Name	Start	Finish	Remaining Work
General Foreman	Mon 20/03/23	Wed 02/08/23	320 hrs
Engineer	Mon 10/04/23	Wed 30/08/23	444 hrs
Site Operatives (General)(1 x Ganger & 4 x Labourers)	Mon 20/03/23	Fri 07/04/23	120 hrs
Drainage Gang 1	Thu 10/08/23	Wed 16/08/23	36 hrs
Drainage Gang 2	Thu 10/08/23	Wed 30/08/23	112 hrs
Piling Gang 1	Mon 10/04/23	Mon 07/08/23	352 hrs
Piling Gang 2	Tue 06/06/23	Wed 09/08/23	284 hrs

Figure 3 – Resource Overview Report Example

We can also produce a report showing overallocation of resources, in some cases we may have shown that for example one of our Piling Gangs are associated with undertaking a task

that conflicts another, this will then get flagged up within the Gannt chart and the report so that we can identify these clashes quickly rather enabling us to reorganise resources within plenty of time so that the timescales of the project do not get affected an example of what this report will look like is shown in the next figure:

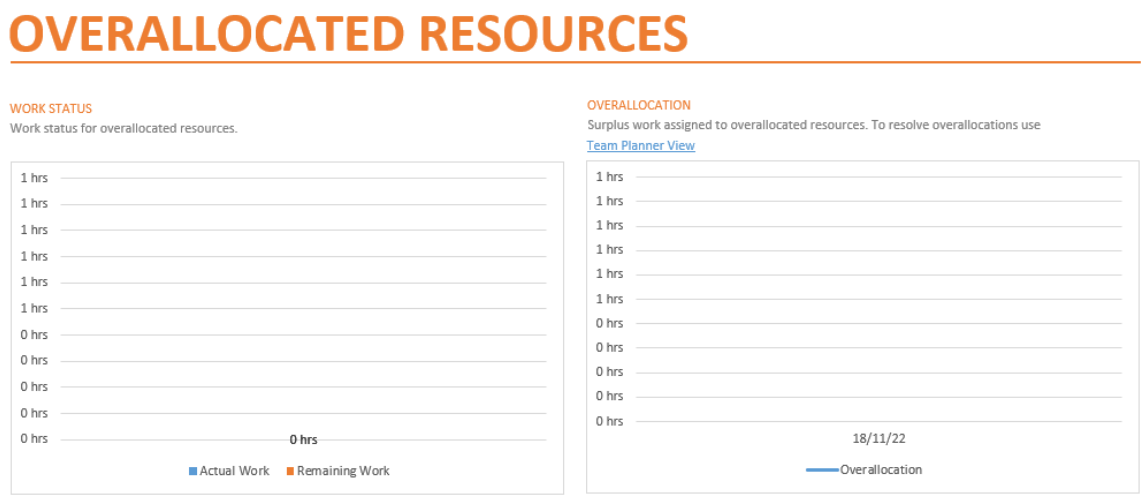


Figure 4 – Overallocated Resources Report Example

Analysing the advantages and disadvantages of this procedure is that the resource management of the project as previously mentioned can be greatly improved and more easily managed. These types of reports can the be issued to the client within a weekly or monthly progress report which will discuss several items, giving the client a better idea of the works progress. *To make sure that everything runs smoothly during a construction project, you need to keep track of what's happening at every stage. It Is essential to keep accurate records of everything that goes on including, workload, cost of resource and materials, so this information can be utilised later.* (techteamdigitlab, 2021). The disadvantages of this are much the same as what was stated in the cost section of this report.

3.3. Production of Reports Managing Progress

The reports we can produce for time are very useful as they can allow us to closely monitor the critical path of the project and manage the project delays, we encounter, these would also be issued to the client weekly or monthly in a progress report which can be contractual requirement of a given project. A critical tasks report can be used to show the critical path

tasks and the percentage of them that have been completed throughout the project this will help the project manager to monitor closely these key tasks, it also shows the resources allocated so that the manager can understand that if a task is underperforming it could be down to lack of resource, report shown below:

CRITICAL TASKS

A task is critical if there is no room in the schedule for it to slip.

Learn more about managing your project's critical path.

Name	Start	Finish	% Complete	Remaining Work	Resource Names
Prepare Stage design Programme	Fri 18/11/22	Tue 29/11/22	0%	0 hrs	
Preapre draft drawings suitable for planning and building regulations applications	Wed 30/11/22	Tue 20/12/22	0%	0 hrs	
Undertake design reviews with client and stakeholders	Wed 21/12/22	Wed 04/01/23	0%	0 hrs	
Obtain pre-application advice/submit outline planning application	Thu 05/01/23	Wed 11/01/23	0%	0 hrs	
prepare and Sign off stage report	Thu 12/01/23	Wed 18/01/23	0%	0 hrs	
Stage 2 Information package check and review	Thu 19/01/23	Mon 23/01/23	0%	0 hrs	
Stage 2 Information Exchange	Tue 24/01/23	Tue 24/01/23	0%	0 hrs	
Review Design against Building regulations	Wed 25/01/23	Fri 27/01/23	0%	0 hrs	
Prepare and submit Planning Application	Mon 30/01/23	Wed 08/02/23	0%	0 hrs	
Preapare and sin-off stage report	Thu 09/02/23	Tue 14/02/23	0%	0 hrs	
Prepare Stage design programme	Wed 15/02/23	Fri 24/02/23	0%	0 hrs	
Update Initial drawings to incorporate detailed design solutions across all disciplines	Mon 27/02/23	Wed 08/03/23	0%	0 hrs	
Discharge Pre commencement planning conditions	Thu 09/03/23	Mon 13/03/23	0%	0 hrs	
Submit Building Regulations Application	Tue 14/03/23	Fri 17/03/23	0%	0 hrs	
Stone up and test Crane pad for cabin installation	Mon 20/03/23	Tue 21/03/23	0%	32 hrs	21 Tonne 360 Excavator[1],General Foreman,Site Operatives (General)(1 x Ganger & 4 x Labourers)
Set up Timber fencing and work exclusion zones	Wed 22/03/23	Thu 23/03/23	0%	32 hrs	21 Tonne 360 Excavator[1],General Foreman,Site Operatives (General)(1 x Ganger & 4 x Labourers),Timber fencing[1]

Figure 5 – Critical Tasks Report Example

Similar reports to the above we can produce are late tasks & slipping tasks reports these reports can do exactly as they say by keeping a log and highlighting tasks that are not being done within the project timescales, this allows the project manager to alter resource allocation to try get the construction back onto timescales provided.

The milestone report that we can produce is also another helpful report which can help us monitor the project in terms of progress against key milestones through the RIBA plan of work, this information can be key to monitor as the project may provide procurement details given the completion of certain milestones, so contractually this report will prove very useful as this type of requirement is usually used on larger scaled contracts:

Figure 6 – Milestone Report Example

As you can see from the analysis of reports above all these reports that can be generated and then included and issued to the client in a progress report this of which can usually be a contractual requirement. It is also very good to track as much as possible throughout the project in order manage the project so that the project can be delivered on time, within budget and to a high standard of work, from our past experiences within the industry we recommend that we can plan and document as much information as possible into the programme as it is an invaluable tool that needs to be used daily through the construction phase, it could also help to settle any contractual disputes undertaken further down the line of a contract or sub-contract if the document is well updated. "*Project parties need to carry out a periodic assessment of the progress status and understand how the project is performing over time. It is not effective to wait until the project end and find out that the project can't be completed on time. Regular alarms and progress highlights are essential because they will help you identify progress issues and prepare recovery measures in timely frame manner. It is not enough to report that the project is in delay; rather you need to explain what you will so to cope with such delay." (Saad, 2022).*

4. Productivity & Incentivisation of Resource

We are also aware that trying to ensure that the workforce allocated to the project will need to be regularly motivated and incentivised in order to ensure that they perform at the best of their ability throughout the project so that, we can share the same goal and make sure that all working relationships are maintained as this will be essential and could negatively affect the project in terms of cost, resource retention and keeping to the project timescales. To ensure this doesn't become a problem for the construction phase of our Innovation Hub proposal, we plan to ensure that the workforce is rewarded for good practices and incorporating and involving them all within health and safety provisions to also comply with CDM Regulations 2015. We will also ensure to incorporate the ISO 45003 standard throughout our working practice which provides guidelines for occupational health in the workplace. After reading a report on construction workers working long hours "*Participants described how long hours of worked are incentivised in project-based construction work. Blue-collar workers who are paid an hourly wage described how working long hours (including overtime) provides them with necessary income. For some of these workers, reduced hours were seen as undesirable because their weekly wages would be reduced. However, this was not a concern for all blue-collar workers, some of whom indicated they would sacrifice pay to have more free time outside of work." (Lingard and Turner, 2022).* We would need to consider the circumstances of the workers to provide them with suitable incentivisation tailored to the workforce. We could do this by offering overtime works as an option for the workforce rather than a requirement this should help to satisfy a large group of construction workers suit their needs, further to this we could aim to provide an occupational health charity to come on board onto our project to show the workforce that help is available to them wherever needed.

We can also introduce a monthly reward to our construction workers this why we can recognise good practices within different elements that will affect the construction programme and project positively, we will aim to offer rewards for good quality of work, this should help encourage the rest of work force to aim for the best standards they can achieve. We will also aim to provide rewards for good health and safety practices, as it is most important that we can maintain a safe working environment for all workers within the site.

Lastly, we could also offer an incentive plan to the workforce as they are employed this could include a pension payment, health insurance and other tax-free benefits. This option may not be the most cost-effective option, we would need to assess the options and choose what will suit our workforce, budget and resources the most.

This will also help us to combat performance issues as these are mostly associated to a neglected and deflated workforce, if the conditions on site are not great for construction workers this can become a problem to the project. *Lack of safety, lack of skills, lack of quality of materials, lack of wages, communication barriers like that are mainly create psychological stress to the labours. It totally affects the labour production efficiency. (Prabhu and Ambika, 2013).* This research enforces the fact that poor construction management can massively impact the project and the wellbeing of the workforce which will also affect the projects quality, resources, and timescales, therefore the productivity of the workforce will also be closely managed throughout the project.

5. Delay Warning Due to Concrete Supply Chain Strike

We have recently been made aware that we have encountered our first problem as the day, we have planned to pour our first concrete pile, is the same day that our concrete supplier is planning on going on strike for 5 weeks. This will have a big impact on our predicted Timescales and could possibly affect our key handover date. Thankfully we can use our construction programme to track these changes against the original planned timescales and update the resources section to see how it will affect the project financially to.

As you can see below from the project statistics, we can compare quickly looking at timescales and cost, we can now see that this delay will push our completion date out a further 35 days, meaning this will affect the project handover date.

Project Statistics for 'Construction Management - Assignment 1 GANNT Chart'

	Start	Finish
Current	Fri 18/11/22	Mon 20/05/24
Baseline	Fri 18/11/22	Mon 01/04/24
Actual	NA	NA
Variance	0d	35d

	Duration	Work	Cost
Current	375.5d	1,668h	£86,662.76
Baseline	340.5d	1,668h	£86,662.76
Actual	0d	0h	£0.00
Remaining	375.5d	1,668h	£86,662.76

Percent complete:

Duration: 0% Work: 0%

Close

Figure 7 – Project Statistics Comparison

In the first instance in this situation we will further manage our resources and supply chain to see if this delay can be addressed by using a new supplier or rearranging some of our tasks to see if we can save as much time as possible throughout this period, Looking at this now we have assessed the risk of the delay before it has happened we are also now able to try come to an agreement as to what our our options are, this can easily transform into a conflict and contractual claim as shown below:

Figure 8 – Transformation of conflict into delay (Tariq and Shujaa Safdar Gardezi, 2022)

Contractually we would be expected to pay Liquidated Ascertained Damages for any delays on the contract, unless we can put a claim in for an extension of time supporting our cause as the scheduled strike is out of our hands, we may have an argument to provide an extension of time to allow this so that all parties involved are satisfied with the outcome. In the event of a claim providing accurate up to date evidence of site activities will be essential to bring forward as evidence, this includes keeping our construction programme up to date and logging email trails to support our claim. It is essential that all parties can find satisfaction contractually as a serious conflict could cause further impact on the project's productivity, Like *Conflicts and delays could possibly damage the contracts potential for success by creating a divide in the workforce. The consequences can be poor relationships, internal disputes and*

negative attitude which can adversely affect the performance of individuals in an organization (Tariq and Shujaa Safdar Gardezi, 2022).

Conclusion

After reading much literature on this subject for the benefit of the projects success we must try and work together in closing out any issues or delays proposed to us within the construction phase, the more closely problems are managed and the better working relationship that we have as contractor and client the more likely we are to achieve project success. Working relationships will also play a key part within project success ensuring that we can provide a suitable incentive plan to encourage productivity, we think using a combination of incentives to increase productivity, which will then maximise the working atmosphere positively.

We must also update the construction programme with as much detail as possible so that we can identify any positive or negative trends, throughout the construction phase. Which will then allow us to manage any float times we could add to the project or increase working time and resources to add overtime to allow us to get the critical path of the project back to the planned timescales.

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