



Prifysgol Cymru
Y Drindod Dewi Sant
University of Wales
Trinity Saint David

ACBA6000 – Construction Management Programme Control Assignment

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1. Task description

Task A

You are to assume that UWTSD has received planning consent for a new start up innovation company hub in SA1.

The construction is described in the drawings provided on Teams.

Work is proposed to start on 6th March 2023.

1. Produce a **Gantt chart** utilising suitable software showing the critical path. Show a programme from concept design through to handover with detailed programming for the construction phase of a specific element of your choice (25%)
2. Develop, evaluate and produce site specific reports for **time, cost** and **resources** of the work activities. Costs should be relevant to the element of your choice (25%)
3. You need to explain possible ways of addressing performance issues in terms of productivity and incentivisation to the client specific to the scenario (25%).

Task B

You will need to **choose ONE** of the following scenarios to address.

1. There is a strike by the local concrete company which is set to begin on the first day you require concrete. The strike is due to last 5 weeks. Show how this affects the project within the report addressed to the client and how is it generally dealt with from a contractual point of view (Gantt chart). (25%).
or
2. The M and E has had to be redesigned just as the work is about to begin due to new information received about Covid transmission. This is predicted to take 4 weeks. Show how this affects the project within the report addressed to the client and how is it generally dealt with from a contractual point of view (Gantt chart). (25%).
or
3. There is a delay in the manufacture of the bespoke windows. The delay is due to be 5 weeks. Show how this affects the project within the report addressed to the client and how is it generally dealt with from a contractual point of view (Gantt chart). (25%).
or
4. The client changed their mind when they saw the first room and has issued an instruction to change the carpet design. The new carpets have been ordered and will arrive in 4 weeks. Show how this affects the project within the report addressed to the client and how is it generally dealt with from a contractual point of view (Gantt chart). (25%).

2. Task A

Part 1

Please find my attached programme 'James Lloyd - ACBA6000 - Construction Programme' for the University of Wales Trinity Saint David's Innovation Company Hub located in SA1.

Given being employed by a housing development contractor, I had very little experience concerning commercial contracts such as schools and colleges. Therefore, to assist with the development of my programme, I sought out to contact an old colleague who was working on a contract resembling UWTSD's proposal for assistance and guidance.

WB Griffiths & Sons, a Haverfordwest Construction and Civil Engineering contractor had been employed to deliver an extension to Pembrokeshire College, resembling that of the construction brief in question for Swansea. Having had a couple meetings and discussions, I was able to develop a concrete understanding of the potential tasks and sequencing to include.



WB Griffith's J604 Pembrokeshire College – Substructure formwork and concrete pour.
Dated 22nd April 2022.



WB Griffith's J604 Pembrokeshire College – Superstructure Steel Frame, including Fall Prevention Railings. Dated 16th May 2021.



WB Griffith's J604 Pembrokeshire College – Superstructure First Fix M&E Installations. Dated June 21st 2021.



WB Griffith's J604 Pembrokeshire College – Superstructure Drylining. Dated July 5th 2021.

Part 2

In order to accurately produce reports for time, cost and resources of my chosen work activity, Carpentry, it required significant planning. From my experience in work, and having recently been involved with the procurement of a carpentry package, I believed that I had developed a sufficient enough understanding to identify the extent of work required and accurately coordinate/programme tasks.

First and foremost, I decided to tackle the problem with the potential labour force I'll be working to co-ordinate for my selected tasks. In order to work to a calculated programme, it was paramount that I ensured to have enough resources available to complete tasks in a timely manner, not to impact sequencing and jobs down the line.

<u>Name</u>	<u>Resource</u>	<u>Rate</u>
F. Downes	Labourer	£12.00/hr
D. Robinson	Labourer	£12.00/hr
P. Brown	Labourer	£12.00/hr
F. Stanley	Labourer	£12.00/hr
P. Roberts	Carpenter	£18.00/hr
S. Watters	Carpenter	£18.00/hr
P. Ellis	Carpenter	£18.00/hr
D. Ward	Carpenter	£18.00/hr
R. Harper	Carpenter	£18.00/hr
W. Baker	Carpenter	£18.00/hr
C. Dixon	Carpenter	£18.00/hr
X. Simmons	Carpenter	£18.00/hr
D. Stephens	Carpenter	£18.00/hr
A. King	Carpenter	£18.00/hr
K. Harrison	Skilled Carpenter	£24.00/hr
M. Wood	Skilled Carpenter	£24.00/hr
J. Lewis	Skilled Carpenter	£24.00/hr
B. Cooper	Skilled Carpenter	£24.00/hr
G. Palmer	Skilled Carpenter	£24.00/hr
H. Ford	Skilled Carpenter	£24.00/hr
P. Duncan	Skilled Carpenter	£24.00/hr
P. Parker	Skilled Carpenter	£24.00/hr

Labour Schedule: Schedule of required labour force.

In the table above, I have listed out my selected workforce, in which I have accurately calculated through the use of 'gangs' to meet the time restraints of my selected tasks. The gangs in question have been assumed to be a group of five individuals with varying skills in carpentry terms. These being a labourer, carpenter or skilled carpenter.

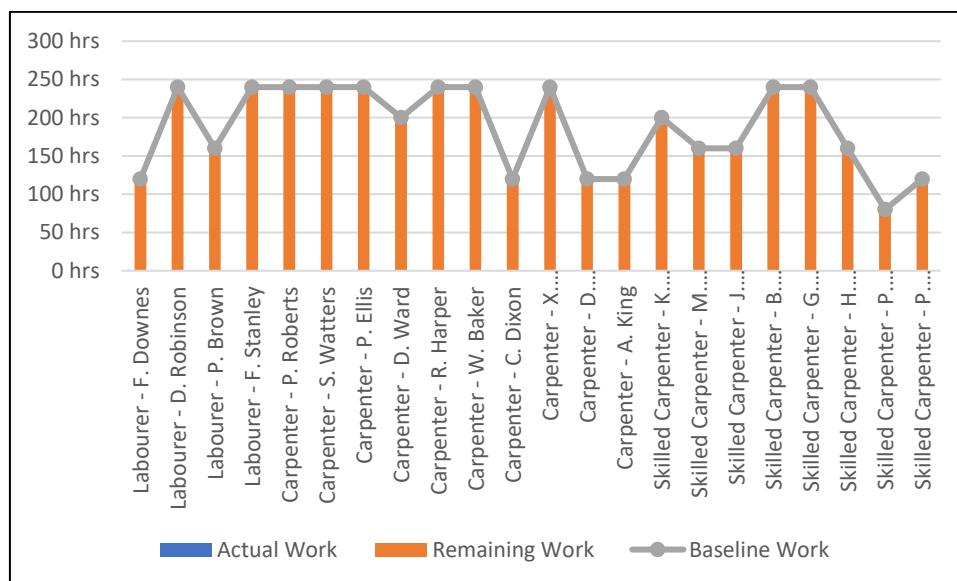
Similarly to the labour element, I later addressed the material requirements for my selected tasks. I didn't go into the detail of every fixing or screw needed for this, however I did consider the available sizes and lengths that material comes in and identify a quantity

required taking that into account. The rates for such materials were obtained through my employment, by consulting and reviewing past supplier orders issued to building merchants in south Wales for identical or similar goods. This therefore ensured I was using accurate and up-to date costs.

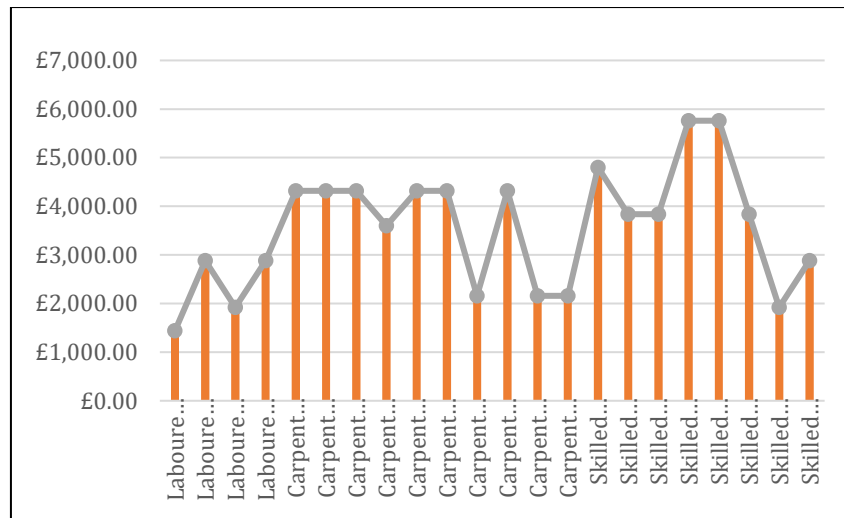
<u>Description</u>	<u>Qty</u>		<u>Rate</u>	<u>Total</u>
Rooflights	64.0	Nr	£265.00	£16,960.00
Rooflights Lead Flashing Kits	64.0	Nr	£35.00	£2,240.00
Aluminium Jumbo Fascia [4m length]	57.0	Nr	£24.69	£1,407.36
Aluminium Soffit Board [4m length]	57.0	Nr	£25.38	£1,446.69
Fascia & Soffits Accessories	1.0	Nr	£750.00	£750.00
Aluminium Half-Round Gutter	45.0	Nr	£10.14	£464.44
Aluminium Down Pipe	18.0	Nr	£13.95	£251.09
Rainwater Goods Accessories	1.0	Nr	£250.00	£250.00
25x50mm Timber Battens [4.8m length]	80.0	Nr	£0.67	£53.60
18mm Plywood Sheet	150.0	Nr	£28.95	£4,342.50
Internal Door Linings	103.0	Nr	£23.95	£2,466.85
194mm Window Boards [3.66m length]	50.0	Nr	£20.60	£1,030.00
Internal Doors 838x1981mm	103.0	Nr	£89.50	£9,218.50
Architrave [5.4m length]	191.0	Nr	£8.34	£1,592.94
Skirting [5.4m length]	264.0	Nr	£10.87	£2,869.68
Ironmongery	1.0	Nr	£3,872.80	£3,872.80
Furniture, Fixtures and Equipment	1.0	Nr	£8,500.00	£8,500.00

Material Schedule: Schedule of quantity and rates for required materials.

Having now sequenced and accurately programmed my tasks, in addition to identifying and assigning the required labour and material resources, I was able to produce site specific reports for the work activities.



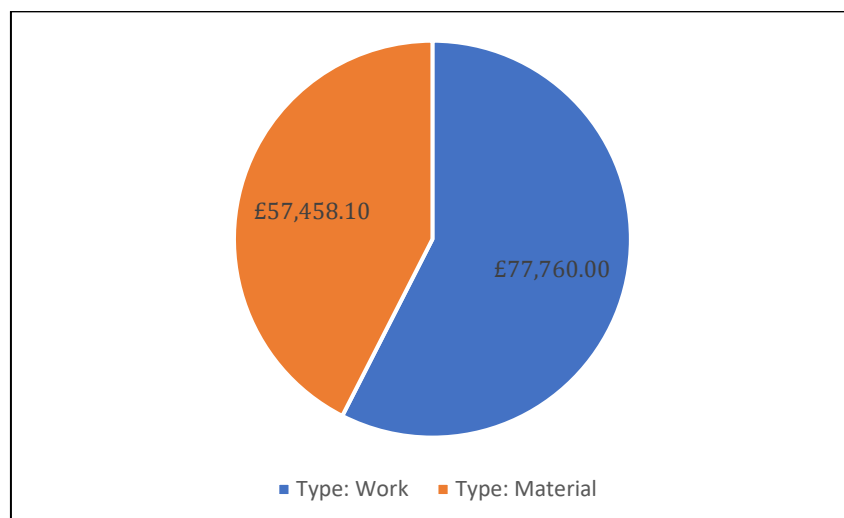
Resource Stats: Work status for all work resources.



Cost Status: Cost status for work resources.

Based on the above graphs, you can identify both the required hours of work and, by using rates, the total cost of each member of my carpentry workforce. Of course, this is projected as the works are scheduled for later in the year and therefore no costs have yet been accounted for, hence the lack of the colour blue on the Resource Stats chart's key.

By reviewing the above graphs, it is recognisable that despite having similar amounts of work, the skilled carpenters in comparison to the ordinary carpenters cost much more. This is because of the level of expertise of the skilled carpenters and the tasks at hand that may require such additional knowledge, understanding or skill. For example, installing the 64nr rooflights and the mass amount of ironmongery to the one-hundred plus doors within the building. The workload has also recognisably been distributed evenly amongst the varying skills of carpenters, with the exception to labourers, whose role is to assist with the movement of materials or easy/basic tasks. Each activity in fact has at least 1 labourer assigned for this reason, despite both graphs not providing evidence for this.



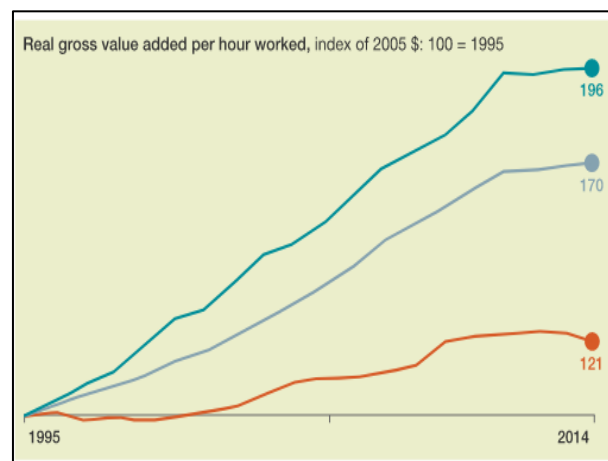
Cost Distribution: How costs are spread out amongst different resource types.

As a summary of the costs, when combining the total costs for both the programmed labour, and material take-offs, the carpentry package is going to cost approximately £135,000. There is an evident £20,000 difference between the labour and materials total, with the labour amassing 58% of the total package cost. This is surprising given the large sum items such as the '*Day-Lite Trapezoidal*' rooflights, costing just shy of £17,000 alone – not including any labour to install. On the other hand of the review however, you can identify that the programme outlines a significant amount of labour to the job. Given the scale of Innovation Building and the duration of the carpentry element of my programme, you can recognise it is focused on utilising a large workforce in order to complete the works with more haste, thus reducing the programme duration.

Part 3

In order to meet programmed deadlines and to not effect forthcoming tasks in the sequence of works, it is imperative to ensure the workforce is working productively.

The McKinsey Global Institute (MGI) 'Reinventing construction: A route to higher productivity' report conducted a study into the construction industry's notable productivity problem.



Global, labour-productivity growth in Construction (Orange) lags far behind that of Manufacturing (Cyan) or the Total Economy (Grey)

“The report confirmed many reasons for this persistently poor performance, including stringent regulations and dependence on public-sector demand, informality and sometimes corruption, industry fragmentation, and mismatches in risk allocations and rewards. In addition, project owners reported that it can be hard to navigate the opaque construction marketplace—particularly when they do not frequently manage major projects. This struggle often results in subpar project management and execution, inadequate design processes, and underinvestment in skills development, R&D, and innovation.”¹

Intro

Firstly, whilst promoted within all industries, improving best practice approaches improves reliability and predictability through digital and technological changes. A great example concerning the construction industry is to promote digitising procurement and supply-chain work flows to enable more sophisticated logistics management.

Improvements through on-site execution can see a massive step forward in improving onsite productivity. The industry in general struggles to meet standard and consistent on-site execution, with a variety of inconsistent uses of practices and approaches across sites within individual companies. Different projects and staff all work in varying

¹ www.mckinsey.com, n.d.

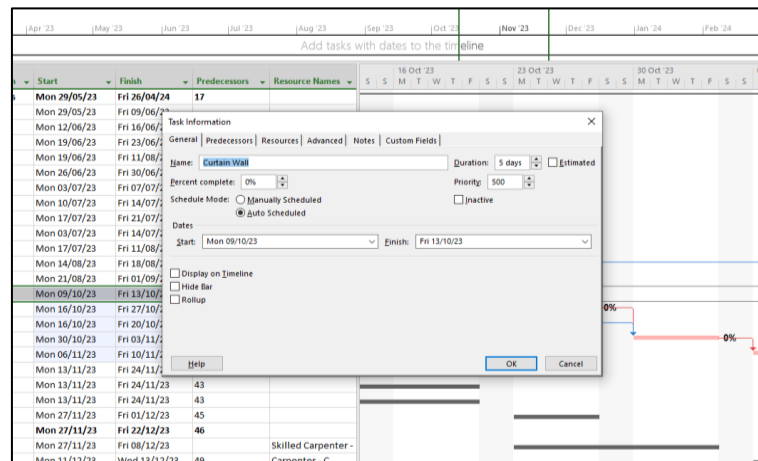
ways, some more notably beneficial than others, therefore making finding and developing talented project managers and staff a chore.

On the same point, an uncompromising planning process can help ensure activities are achieved on time, whilst still meeting budget constraints by ensuring all work is completed within a timely manner. Subcontractor contracts can be agreed and completed prior to starting on-site work and even careful planning and coordination of different disciplines on-site through rigorous programmes and schedules.

Most prominently, in order to promote change and encourage progression in the right direction, the problem needs to be stopped from the source. With the forever growing workforce in the industry, it is notable that the UK construction sector is dominated by an aging workforce. In addition with growing concerns over rising costs, cost-cutting alternatives such as cheaper foreign, sometimes inexperienced, workers is also a highly considered option. Therefore I cannot express this enough, that it is paramount that more consideration is taken into upskilling the workforce. The UK construction industry in general has come up in heaps and bounds with positive steps such as encouraging and promoting apprenticeship schemes to the younger generations to aim to get more feet in the door and later onto the sites. Training has never been more diverse with a variety of courses to take to broaden an understanding of the industry, whether its more mechanical with machinery tickets, more literate with health and safety or just general procedures – growing in importance to become aware of like COSHH, considerate constructors and many more.

3. Task B

As part of introducing a delay into my project, I decided to utilise the delay concerning the bespoke windows, with a duration of five weeks. This work concerned the installation of the two curtain wall systems at the North and South elevations of the building. Below is a screenshot of the process of my delay being implemented:



MS Project: Adding the delay

Originally programmed to commence on the 4th September 2023, the five week delay has unfortunately seen the new commencement date for the works to 9th October 2023 instead. Due to this task being on the critical path of the programme, it does unfortunately see the proposed completion of the project to also see the same delay of five weeks, falling back to the 6th July 2024. This is as apposed to the 7th June 2024.

To put this delay into context, without the installation of the two curtain wall systems, we cannot ensure the interior of the building will be watertight, therefore jeopardizing any works completed in the event they get water damaged. The most notable trades that could suffer from this would be the timber carpentry items becoming water logged and the same can be said for drylining and plasterboards. That's not to mention the works that will be negatively impacted by presence of water such as the screed pour, M&E fit-out and stud wall partitions.

Of course, there are possible methods and procedures in which a principal contractor may explore in order to reduce the impact of such unforecastable and unprecedented delays. Utilising my curtain wall delay example, a potentially costly yet still viable option would be to still construct something to fill the otherwise empty void of the curtain wall. Expensive procedures could see more robust and sturdy covers being made, but given the context of this such example and the nature of the build, I believe that the cheaper route may perhaps be more beneficial.

By closing the opening with cheaper and more flimsy material such as tapped sheets or even a plywood sheet wall, the contractor can replicate a closed environment, as if the

curtain wall was installed as originally planned. Given the delay is only five weeks, where other sites have seen delays of much bigger magnitude, it would be unreasonable to require such a robust and high-spec construction. Additionally, given the time of the install is in the summer, where weather conditions can arguably be better (understandably Wales is still not renowned for its Spain-like summer weather) and the likelihood of rain being its lowest, it further encourages the cheaper alternative. Not to mention the cheaper alternative clearly has the obvious financial advantage in comparison too.

This would therefore allow the programme to continue with minimal delays as opposed to putting down the tools due to the obstruction to the critical path for five weeks – in construction timescales that will include at least one contractual valuation for the principal contractor to ‘take a hit’ with.

It goes without saying, but in the unfortunate event of a delay in the construction industry, where a project’s completion cannot meet an agreed programmed date then one of the two parties involved, whether it be the principal contractor or the client, will have to shoulder the burden of its lateness financially.

In most modern-day construction contracts, the client will outline Liquidated Ascertained Damages (LADs) within the contract from the get-go. In the event in that a contractor does not meet the pre-agreed completion date of the contract, and in-turn breaches the contractual agreement between themselves and a client, then LADs come into play where the contractor must pay the client a sum of money over an agreed time-scale. This can often be a weekly fee, deducted at the at each overrun valuation date or a lump sum, either of which had been previously agreed to.

“The effect this could have on a contractor could be detrimental in so far as the solvency of a contractor or turning a profitable contract into a loss making contract.”²

This can alternatively be negated in the event the contractor and client agree to an extension of time, a clause in which an agreement is reached where the client offers a ‘relief’ from any potential financial delay damages. In this case, the contractor can have an opportunity to ‘argue their ground’ where they can establish a duration of time for the project.

“If a delay has been caused by an event that is the employer’s responsibility, then in general, the contractor will be entitled to an extension of time. An extension of time defers the contract completion date and thereby gives the contractor a longer period within which to complete the works.”³

Often, an extension of time is dependent on whether an effective notice was provided to the client, or if the argument is plausible – leading to client being sympathetic.

To relate it back to the Innovation Matrix building, before even considering the programme and the forthcoming delays, I am under the impression that the specification of the expansive curtain wall system was agreed and potentially even the necessary

² *Construction Law: Liquidated Ascertained Damages (LADs).*

³ RICS professional guidance UK, Extension of time

supplier/subcontractor due to the sheer extensive size and possibly the specification (considering the coastal environmental protection too) of the glazing. This could lead to the client being sympathetic to the delay therefore agreeing to negate LADs and provide an extension of time for the prolonged five weeks.

Alternatively, given the upcoming event in the programme, you'd believe the contractor would be making regular contact regarding it's delivery/installation ensuring it is still on programme. On one hand, if the delay was notified early, there is consideration to also notify the client early. While on the other hand, the supplier/installer, yet confirming to meet the date and subsequently failing to do so, could be hit with the costs and forwarded said LADs at the later date.

Where the contractor can establish a contractual ground for the extension then, subject to having given effective notice and being able to demonstrate causation, it ought to be entitled to an extension of time. It may also be entitled to associated loss and expense

4. Assignment Documents

References

- www.mckinsey.com. (n.d.). Improving construction productivity | McKinsey. [online] Available at: <https://www.mckinsey.com/capabilities/operations/our-insights/improving-construction-productivity>.
- Barker, C. (2018). *Construction Law: Liquidated Ascertained Damages (LADs)*. [online] Nockolds Solicitors. Available at: <https://www.nockolds.co.uk/construction-law-liquidated-ascertained-damages-lads/>.