

# **T Level Technical Qualification in Onsite Construction (8711-30)**

**8711-033 Employer-Set Project  
Exemplar – A Grade  
Summer 2024**

# Contents

<b>Introduction.....</b>	<b>2</b>
<b>Task 1.1 Research .....</b>	<b>5</b>
<b>Task 1.2 Report.....</b>	<b>13</b>
<b>Task 1.3 Project plan .....</b>	<b>18</b>
<b>Task 1.4 Presentation.....</b>	<b>22</b>
<b>Task 2.1 Collaborative problem-solving.....</b>	<b>42</b>
<b>Task 2.2 Evaluation .....</b>	<b>47</b>

# Introduction

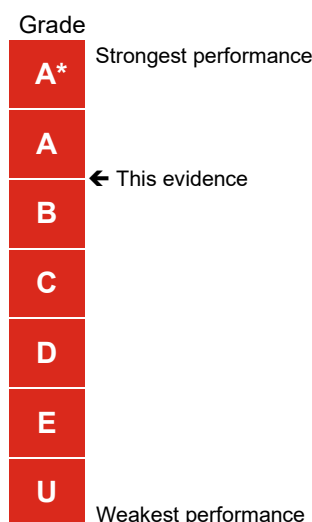
## Summer 2024 Results

This document is aimed at providers and learners to help understand the standard that was required in the summer 2024 assessment series to achieve an A grade for the 8711-033 Onsite Construction Employer-Set Project (ESP).

Providers and learners may wish to use it to benchmark the performance in formative assessment against this to help understand a potential grade that may be achieved if a learner was to attempt the next summative assessment series.

The Employer-Set Project is graded A\* to E and Unclassified.

The exemplar evidence provided for the A grade displays the holistic standard required across the tasks to achieve the A grade boundary for the summer 2024 series. A slightly weaker performance would have resulted in a B grade result being issued.



The Employer-Set Project brief and tasks can be downloaded from [here](#).

### Important things to note:

- We discussed the approach to standard setting/maintaining with Ofqual and the other awarding organisations before awarding this year. We have agreed to take account of the newness of qualifications in how we award this year to recognise that students and teachers are less familiar with the assessments whilst also recognising the standards required for these qualifications ([grading-arrangements-for-vtqsand-technical-qualifications-within-t-levels-in-the-academic-year-2023-to-2024](#)).
- The exemplar evidence presented, as a whole, was sufficient to achieve the A grade. However, performance across the tasks may vary (i.e. some tasks completed to a higher/lower standard than an A grade).

Marking of this Employer-Set Project is by task and Assessment Objective, below is a summary of these along with the mark achieved by the evidence presented and the maximum mark available for each aspect.

Task	Assessment Objectives	Mark achieved	Max mark available
<b>Task 1.1 Research</b>	<ul style="list-style-type: none"> <li>- AO1 Planning skills and strategies</li> <li>- AO2a Apply knowledge to the context of the project</li> <li>- AO3 Analyse contexts to make informed decisions</li> <li>- AO4c Use digital skills</li> </ul>	7	9
<b>Task 1.2 Report</b>	- AO1 Planning skills and strategies	4	6
	- AO2 Apply knowledge and skills to the context of the project	7	12
	- AO3 Analyse contexts to make informed decisions	1	2
	- AO4 Use maths, English and digital skills	4	6
<b>Task 1.3 Project plan</b>	<ul style="list-style-type: none"> <li>- AO1 Planning skills and strategies</li> <li>- AO3 Analyse contexts to make informed decisions</li> <li>- AO4a Use maths skills</li> </ul>	5	8
	- AO2 Apply knowledge and skills to the context of the project	10	16
<b>Task 1.4 Presentation</b>	<ul style="list-style-type: none"> <li>- AO1 Planning skills and strategies</li> <li>- AO3 Analyse contexts to make informed decisions</li> <li>- AO4b Use English skills</li> </ul>	5	6
	- AO2 Apply knowledge and skills to the context of the project	10	12



<b>Task 2.1 Collaborative problem-solving</b>	<ul style="list-style-type: none"> <li>- AO2 Apply knowledge and skills to the context of the project</li> <li>- AO3 Analyse contexts to make informed decisions</li> <li>- AO5a Carry out tasks</li> </ul>	10	15
<b>Task 2.2 Evaluation</b>	<ul style="list-style-type: none"> <li>- AO4b Use English skills</li> <li>- AO5b Evaluate for fitness for purpose</li> </ul>	5	8

## Task 1.1 Research

<b>Assessment number (eg 1234-033)</b>	8711-033
<b>Assessment title</b>	Employer-Set Project

<b>Candidate name</b>	<first name> <surname>
<b>City &amp; Guilds candidate No.</b>	ABC1234

<b>Provider name</b>	<provider name>
<b>City &amp; Guilds provider No.</b>	999999a

<b>Task(s)</b>	1.1
<b>Evidence title / description</b>	Research notes (with record of sources)
<b>Date submitted by candidate</b>	DD/MM/YY

## Approved Documents A

The approved documents are the regulations that must be followed which is specific to the varied steps in the construction process. Approved document A is specific to structure. There are varied site constraints that affect the process of getting a structurally secure building such as the ditch which runs from North to South as specified in the brief. Since the ditch acts as a natural protection against flooding, building near on on the ditch must be done with permission.

<https://www.planningportal.co.uk/applications/building-control-applications/building-control/approved-documents/part-a-structure/approved-document-a>

<https://www.gov.uk/guidance/owning-a-watercourse#:~:text=You%20have%20the%20right%20to,may%20have%20to%20pay%20damages>

There are varied tests that could be done on both the foundation and the soil type to check whether it has a strong enough load bearing capacity. A standard Penetration Test (SPT) is a test that involves “driving a steel rod into the soil at a constant rate and recording the number of blows required to penetrate a certain depth.” This would ensure that once the construction process has begun, the soil is structurally acceptable to build on and is aligned with Approved Documents A.

<https://www.linkedin.com/advice/0/how-can-you-predict-soil-bearing-capacity-skills-civil-engineering#:~:text=Estimating%20soil%20bearing%20capacity%20can,to%20penetrate%20a%20certain%20depth>

## Types of Foundations

There are varied types of foundations that can be used for this project such as the most used, strip foundation, trench foundation, pad foundations, raft foundations and pile foundations.

<https://www.matrixstructuresuk.com/5-main-types-of-foundations-in-the-uk/>

### Strip Foundations

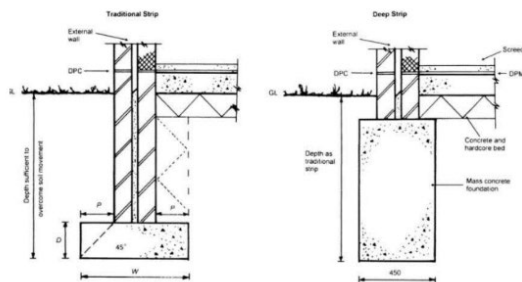
What are they?

Strip foundations are usually used in providing support for buildings by transferring their load into the layers or soil or rock below when they have a sufficient load bearing capacity. Strip foundations are usually placed into two categories, shallow and deep. Shallow strip foundations are usually used when the load is low and therefore relative to the bearing capacity of the soil. Deep strip foundations are used when the load is not relative to the bearing capacity of the soil so therefore needs to be deepened to transfer the load to the layers of soil with higher bearing capacity.

### Depth

Strip foundations are usually laid at 750 – 1000 mm deep however, since the clay and chalk layer of the soil specific to the brief is over 2000 mm , deepened strip foundations would have to be used.

[https://www.designingbuildings.co.uk/wiki/Strip\\_foundation#:~:text=Strip%20foundations%20\(or%20strip%20footings,placed%20centrally%20along%20their%20length](https://www.designingbuildings.co.uk/wiki/Strip_foundation#:~:text=Strip%20foundations%20(or%20strip%20footings,placed%20centrally%20along%20their%20length)



[https://www.designingbuildings.co.uk/wiki/Strip\\_foundation](https://www.designingbuildings.co.uk/wiki/Strip_foundation)

Advantages of strip foundations.

+simplicity, cost, versatility to different building types, “suitable for buildings with a linear layout such as row houses or buildings with load bearing walls.”

Disadvantages of strip foundations

-rely on a high load bearing capacity for stability. Where there is unstable soil, strip foundations can only be used if deepened or widened. = increased cost and delayed time.

<https://gravitasbuild.co.uk/articles/strip-foundations#:~:text=Strip%20foundations%20are%20often%20chosen,buildings%20with%20load%2Dbearing%20walls>

Pile Foundations.

What are they?

Pile foundations are deep foundations which are formed by long cylindrical columns made from either steel or reinforced concrete. Pile foundations are usually used to transfer the load through the weak layers of soil into the more resistant and harder layer. There are varied type of piles such as bored piles, friction piles endbearing piles etc.

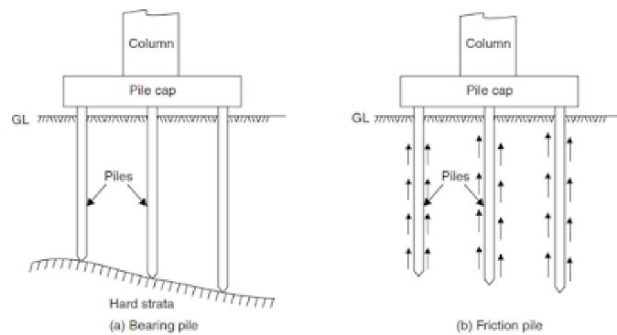
[https://www.designingbuildings.co.uk/wiki/Pile\\_foundations](https://www.designingbuildings.co.uk/wiki/Pile_foundations)

Depth

Piles are usually installed at a depth of <2.5 metres which would be suitable for the requirements of the brief as the chalk layer is over 2 metres.

Piles can be tested on their load bearing capacity and should be before the construction process begins.





[https://civilstagram.blogspot.com/2016/04/types-of-](https://civilstagram.blogspot.com/2016/04/types-of-foundations-and-their-functions.html)

[foundations-and-their-functions.html](https://civilstagram.blogspot.com/2016/04/types-of-foundations-and-their-functions.html)

### Advantages of Pile Foundations

- +offers a high load bearing capacity
- +versatile to varied soil types
- +require less horizontal space
- +durable

### Disadvantages of pile foundations

- high cost for installation due to specialidit equipment required.
- Noise and vibration during installation
- Maintenance is more complex.

<https://civiltoday.com/geotechnical-engineering/foundation-engineering/deep-foundation/449-advantages-and-disadvantages-of-pile-foundation>

### PAD Foundations

What are they?

PAD foundations are rectangular pads used to support loads where the main loads of a struture are imposed at certain points. They are usually used as a shallow form of foundation where the soil has a good load bearing capacity.

### Depth

PAD foundations are usually set at a depth of 600 – 2000 mm which meet the requirements for the type of soil in the brief.

### Advantages of PAD foundations

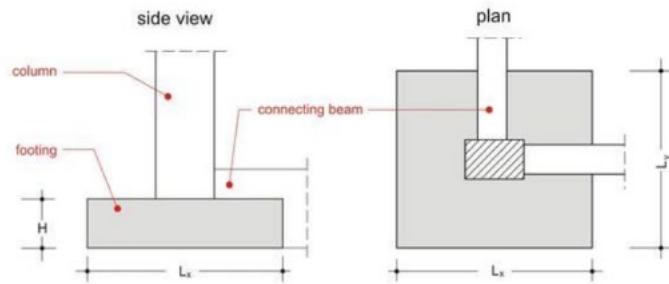
- +time efficient
- +cost effective

### Disadvantages of PAD foundations

- foundation sixze may become large = increased price

-weak against uplift force and lateral force

<https://civiltoday.com/geotechnical-engineering/foundation-engineering/179-pad-foundation-advantages-disadvantages>



Issues with building over sewers.

To build over a sewer, there would need to be permission granted by the local council. Building over manholes is not permitted due to the restricted access if it were inside a house, smells and potential biohazard in the case of flooding. Since there are two manholes on the property, one of them would need to be relocated as it is in the middle of the construction site. The sewer line goes towards the East side of the property which would essentially be the back of the house and therefore could be relocated there. This would be an additional cost for the project however is a necessary cost as the houses are not permitted to be built on top. However the sewer line running through the property aids the construction process as these could be connected to the houses which would reduce costs to installing an entirely new system.

Sustainability

Concrete – Green Concrete

“Green concrete is a form of eco-friendly concrete that is manufactured using waste or residual materials from different industries and requires less amount of energy for production. Compared to traditional concrete, it produces less carbon dioxide, and is considered cheap and more durable.

The aim of using green concrete is to lessen the burden on natural resources and increase dependency on recyclable materials. Of the multiple strategies being utilized to achieve sustainability through eco-friendly concrete, re-using wash water to reduce water consumption is a good technique.

Partial replacement of energy-consuming cement with reusable materials is among the best strategies used to achieve eco-friendly construction material. For example, cement can be replaced with Fly Ash, Silica Fume, and Wood Ash, etc.”

<https://www.specifyconcrete.org/blog/eco-friendly-alternatives-to-traditional-concrete>

This would be suitable for the pile foundations and the pile cap as they are made from reinforced concrete and for the hardcore of strip foundations.

### Timber Frame Construction

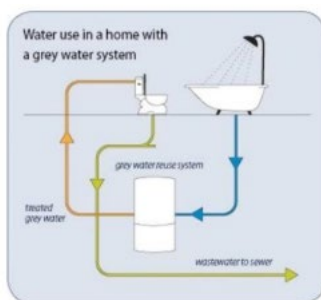
Timber construction has many advantages by also being time and cost efficient, eco-friendly and having a higher quality. Additionally, it is a better insulator than steel or brick, and is highly versatile.

On the other hand, some may question timber frame construction as being weaker as it is susceptible to fire and although this may be true, this is also the case is all types of construction methods however with the correct fireproofing materials and alert systems, the chance of a fire could be drastically reduced. The houses should be equipped with more modern and environmentally friendly technology such as electric hobs and boilers etc, the need for gas is 0%, reducing the risk of a fire to occur even further.

Due to the property having three large trees, there are only a few options that are available. One method that could be possible is to relocate the trees to a different area. This would be done using a tree spade however this would be an increased cost and not an economical benefit for the project. Another, possibly greener method would be to chop the trees down and repurpose their wood for the timber frame construction this would be more sustainable and form a greener method of construction. This would possibly need to be done with permission as trees of that size might be under a protection or preservation order so it will have to be cleared with the local authority first.

### Water Recycling

Greywater recycling is a form of water recycling where water from baths, sinks and showers, is filtered and can be reused for other non-potable uses such as watering plants, flushing toilets etc.



<https://www.edie.net/definition/greywater-recycling/#:~:text=Greywater%20recycling%20systems%20utilise%20the,be%20treated%20through%20blackwater%20>

Rainwater harvesting is another form of water recycling where rainwater is collected and filtered to then be used for non-potable uses such as flushing toilets and watering plants.



<https://www.rainwaterharvesting.co.uk/wp-content/uploads/2021/11/rainwater-harvesting-information.pdf>

Green roofs are roofs of a building which are completely covered in a layer of vegetation. These act as an insulator for the building, provide shade and reduce the energy consumption of the building.



<https://www.permagard.co.uk/advice/introducing-green-roofs-and-benefits>

Solar panels are a type of technology which absorb sunlight and convert it into electrical energy. These are highly environmentally friendly and would reduce the cost of energy bills in the long term.



<https://www.renewableenergyhub.co.uk/main/solar-panels>

To maximise the idea of sustainability and living greener, it is important that the workers are briefed on the target for this project and enlightened on their CSR (Corporate Social Responsibility) which would result in everyone working in a way that would protect and benefit the environment rather than harm it. This would be included in the toolbox talk which would also provide the workers with the correct health and safety information.



## Regulations

### Lifting At Height Regulations

Although the modules are only one story high, it is still important for the workers to use the correct safety equipment's such as harnesses and guardrails. Employees must follow the Working At Height Regulations 2005 which state how and what to do when working at heights.

### Lifting Operations and PUWER.

LOLER – Lifting Operations and Lifting Equipment Regulations.

PUWER – Provision and Use of Work Equipment Regulations.

Both PUWER and LOLER overlap in the idea that equipment should be thoroughly inspected and kept up to date for any faults to minimise the risk of injury however LOLER is specific for lifting equipment only. It is important that employees follow both sets of regulations, inspecting the equipment's regularly and specifically for the crane, risk assessments are carried out and any faults to be corrected as soon as possible before use.

## Task 1.2 Report

<b>Assessment number (eg 1234-033)</b>	8711-033
<b>Assessment title</b>	Employer-Set Project

<b>Candidate name</b>	<first name> <surname>
<b>City &amp; Guilds candidate No.</b>	ABC1234

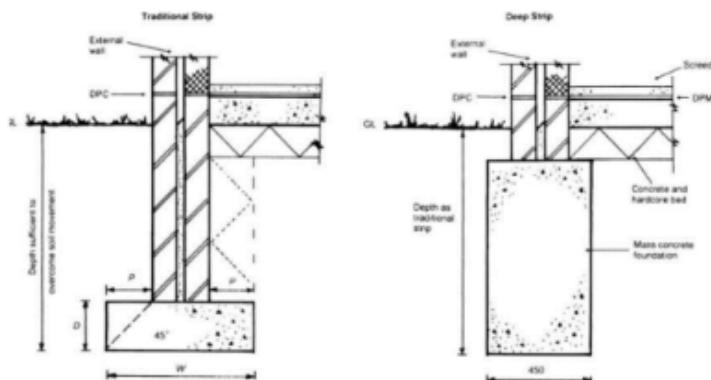
<b>Provider name</b>	<provider name>
<b>City &amp; Guilds provider No.</b>	999999a

<b>Task(s)</b>	1.2
<b>Evidence title / description</b>	Report
<b>Date submitted by candidate</b>	DD/MM/YY

This report will entail details on the AMEC Development Project for the construction of the series of two-storey, two-bedroom houses. Key factors on the project such as the foundation specification and pricing will both be discussed below.

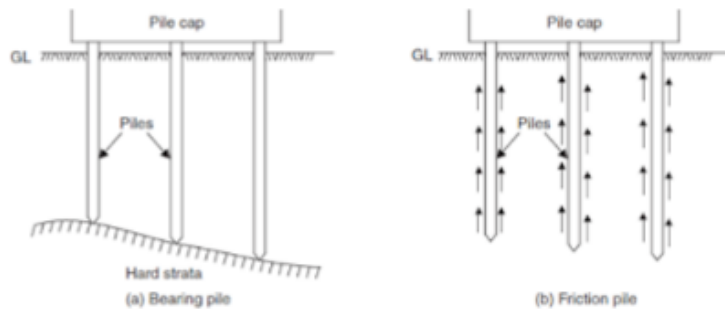
In this project brief, there are many variables that would contribute towards a good workflow and inducing efficient processes within the workplace. It is important that before construction begins, employees are briefed on the idea of sustainability and enlightened on their CSR (Corporate Social Responsibility) which would result in everyone working in a way that would protect and benefit the environment rather than harm it. A toolbox talk is an efficient way of getting employees to understand these principles and also receive information on health and safety, another key variable that would contribute towards a good workflow. The idea of working sustainably should be instilled at every moment possibly and will be a recurring idea throughout this report.

As stated in the brief, the requirement of 'the most economical foundation construction method' was specified and there are varied foundation types that could be used for this project such as trench foundations, strip foundations and piles. Strip foundations are used in providing support for buildings by transferring the load into the layers of soil or rock below when they have a sufficient load bearing capacity. Strip foundations can be split into two categories, shallow and wide strip foundation. Generic shallow strip foundations are usually used when the load is not too heavy, so the foundation does not need to be dug too deep. The usual depth for strip foundation is 0.65 - 1 metre however, table 1 in the brief shows that the chalk layer of soil was found over 2 metres deep which however strip foundations can be placed on soil layers that are from the organic layer and below. Which would mean that deepened strip foundations would have to be used but how deep is up to the AMEC development manager. Strip foundations are characterised by their cheap cost whilst also remaining a sufficient type of foundation to use when the load is not heavy, which would meet the requirements of the brief as timber frame construction is not as heavy in comparison to other materials. They are also known for being highly versatile for different building types. Strip foundations are the best type of foundations for this project as it follows the brief's expectation of being the most economically beneficial and although the deepened strip is required, this ensures the strength of the foundations enabling them to last for long periods of time without maintenance.



Another foundation type that could and should be used are piles. Piles are deep foundations which are formed by long cylindrical columns made from either steel or reinforced concrete. They transfer the load through the weak layers of soil into the more resistant and harder layer. There are varied types of piles such as bored piles, friction piles, end-bearing piles etc. Once the piles are installed into the ground, they are topped with a pile cap which allows for the loads to be distributed evenly into the ground. The most important advantage of using piles is that they penetrate deep into the ground, offer a high load bearing capacity and that they are versatile to varied soil types which is perfect for the requirements of the brief. It may seem unusual for piles to be used as a foundation in a timber frame construction as they have a high load bearing capacity whereas timber is not a heavy load however the focus is on the fact that piles can be placed deep into the ground ensuring that a building is secure. However, a main disadvantage of using piles is that they have high installation costs. A specific machine called a piling rig would need to be

brought onsite to drill the holes for the piles and then a piling hammer would need to be used to install them. This does not reflect the brief as being the most economic foundation construction method but would also be a good competitor if it was not as expensive. Below is a cross section image of how piles work, and this shows how it would be easy for the sewer line would pass straight through.



The brief mentions the use of timber framed construction (TFC) for the houses, and this is a great method for being environmentally friendly. TFC can also be considered a lightweight material in comparison to others such as brick or steel and therefore has a lower load bearing capacity. It is also cost efficient, time efficient, eco-friendly and is a better insulator than brick or steel. TFC is a more sustainable form of construction and would reduce waste onsite drastically. Due to one of the site constraints being that there are 3 large trees in the area of construction, there are two options that are possible to carry out. One being that the trees are moved elsewhere, but this would require the use of a tree spade which is an additional cost and not an economic benefit for the project since the foundations have a high cost already. Two being that the trees are chopped down and the wood is repurposed for the use in the timber frame construction. This would reduce the cost on buying new stock and is also reducing waste by chopping the trees and not reusing them for anything. This would first need granted permission by the local authority first as large trees like that may be under a preservation act. Some may question timber frame construction as being weaker as it is susceptible to fire, and although this may be true, when TFC catches fire, it crumbles and breaks allowing for people to escape on time however steel in comparison warps and collapses when surrounded by fire which would make it extremely hard and unsafe for people to escape. Both cases of a fire are severe however a fire in TFC would increase the chances of a person's survival. Also, TFC is fit with the correct fireproofing materials and alert systems which would drastically reduce the risk and affects of a fire. Houses built in this time and age should be equipped with eco – friendly devices such as electric boilers, and hobs therefore the need for gas is 0%, reducing the risk of a fire even further.

The approved documents are rules and regulations but also act as a guideline to how instructions should be followed during the multiple steps in the construction process. Approved document A is specific to structure and is a key document to pay attention to during the construction of foundations and houses. The soil is the first step into following this document by making sure that it is suitable to be built upon. Many tests can be done on soils in the lab or on site to check whether the soil is suitable and should be done before the construction process begins. In Approved document A, it mentions that strip foundations are able to be built in the clay layer of soil.



The cost for the foundation would vary between using shallow or deepened strip foundations however an estimated average price of \_\_\_\_\_ per linear metre is what's expected for the foundations of one house.

#### Cost Breakdown

$$11.832\text{m} \times 5.211\text{m} = 61.656552\text{m}^2$$

$$3.102\text{m} \times 2.429\text{m} = 7.534758\text{m}^2$$

$$61.656552 - 7.534758 = 54.121794\text{m}^2 = \text{square metres for each house.}$$

$$54.121794 \times 1\text{m (depth)} = 54.121794\text{m}^3 = \text{cubic metres for foundations}$$

$$54.121794 \times £80 = \text{just under } \underline{£4330} \text{ (£4329.74352)} = \text{cost of foundation}$$

$$\text{Two ground workers getting £20 per hour for 8 hours for two days} = \underline{£640}$$

$$(\underline{£4330} \text{ (£4329.74352)} + \underline{£640}) \times 25 = \underline{£124,243.59} \text{ total cost for labour and foundations for 25 units.}$$

*linear metre?*

Health and Safety in the workplace is imperative for employers and employees and as mentioned briefly earlier, this would be spoken about in the toolbox talks or even extra workshops / lessons for those who need information on health and safety. HASAWA is the main Health And Safety At Work Act and ensures that everything in the workplace is done safely and correctly. In this project, the groundworkers are required to construct the foundations and so should be fully skilled and qualified to do so. The health and safety executive (HSE) may perform routine checks on the construction site to ensure that everything is being carried out up to a standard that is safe and complies with all the regulations. Employees must be given the correct personal protective equipment (PPE) such as hard hats, masks, earmuffs etc. This must be worn correctly to reduce the risk of harm onsite. It is also the duty of the employees to maintain the construction site and ensure that it is a safe place for people to work. This includes tidying up when necessary, clearing things away after being finished with them, and respecting other colleagues on site.

Other regulations which also do relate to health and safety but are more on the methods of how to be and keep safe are the Lifting At Height Regulations 2005, LOLER (Lifting Operations and Lifting Equipment Regulations) and PUWER Provision and Use of Work Equipment Regulations). These regulations overlap in the idea that equipment should be thoroughly inspected and kept up to date for any faults to minimise the risk of injury however LOLER is specific for lifting equipment only. It is important that employees follow both sets of regulations and also carry out risk assessments before and after using any lifting equipment to ensure that any issues do not go unreported. Working At Height Regulations are another set of regulations that are important for employees specifically for this project. Since the houses being built are two storey, safety equipment for the employees are required. Handrails, harnesses, scaffolding, ladders, railings etc, are all required in a two-storey construction. A scissor lift is also beneficial but not essential as this would create additional costs.

On the plot of land there are many site restrictions due to it being a brownfield site, being previously built on. The two manholes and the sewerline that goes from West to East of the property cause a disturbance for the houses to be built as it is not permitted for anything to restrict access to manholes. Building on top of one is against the law as in the case of flooding or a blockage in the sewer line, could pose a risk to people. Since the plot of land is 600 metres long and 120 metres wide, the AMEC Development project is a larger development and in phase 1 of construction, figure 3 shows that there will be 25 units, assuming these are the houses, being built. These would essentially need road access and therefore infrastructure would need to be built in this case. The infrastructure for these houses could be placed along the sewer line therefore eliminating the issue of moving the manholes and sewer lines and reducing additional costs. This would give the manholes unlimited access and also make it easier for the construction of the houses during the project. Another site constraint that may make it difficult for the groundworkers to carry out their jobs is the

high levels of ground water as specified in the brief. This would cause many hazards for the workers whilst also making it difficult to carry out the excavation. One way to mitigate this issue is to do a process called sump pumping. This is most cost effective and simple way to get rid of groundwater. The water is simply pumped elsewhere, and efficiently, the drains at the end of the property would be a good place to release the water allowing it to flow away.

Aesthetics of the construction project are possibly the most important finishing touches which entice people to live in the area. These would be great selling points and although may seem unnecessary at first, it may bring in extra people therefore benefiting AMEC economically. One of these that was mentioned in the brief was a driveway for each house that fits one car. A driveway made from gravel which is compacted allows for an aesthetically pleasing design and is also a functional surface as it is semi permeable allowing water to penetrate through and not causing surface run off. Other aesthetics that should be installed as part of the construction project is solar powered street and paved lighting. This firstly reduces electricity costs for AMEC development in the long term and also allows people living in the area to feel safe. Another possible aesthetic is to address the ditch in the plot of land and turn it into designated area to walk round, possibly even installing a bridge over it allowing the people living in the houses to go for walks and spend some leisure time with family.

As mentioned in the beginning, the construction project should be carried out whilst being mindful towards the environment. There are varied methods to benefit the environment and modern technology help aid this. Previously, the proposal of electric hobs and boilers to be installed in the houses along with smart meters would be greatly beneficial towards the homeowners in the long term as it keeps them mindful of the resources they use whilst also reducing costs for AMEC. External technology that would also benefit the homes and the environment are water recycling systems. Greywater recycling systems are where water from baths, sinks and showers is filtered and can then be reused for other non-potable uses such as watering plants and flushing toilets. The brief mentions the issue of high levels of ground water which is assumably due to heavy rainfall. Rainwater harvesting systems are another form of water recycling where rainfall is collected and filtered which can also be used for non-potable uses. This won't solve the issue of high groundwater levels, but it will enable homeowners to use the rainfall to their advantage whilst also reducing costs for AMEC. A natural form of technology are green roofs which are where roofs of a building are covered in a complete or partial layer of vegetation which acts as a insulator for the building, reducing the cost of energy bills for the homeowners. These help spread biodiversity and possibly encourage new growth of creatures, benefitting the environment. The most common form of energy saving today is the use of the solar panel. Although initial costs are high, there are long term benefits of reduced electricity costs for the homeowners in the long term. Especially since this plot of land is so large, building the houses so that they are south facing means that the solar panels would be able to be used to their maximum capacity.

To conclude, this report shows how the AMEC Development project could use strip foundations as a base for phase 1 of their construction project. It also shows how timber frame construction is a sustainable form of construction whilst also maintaining a sustainable workforce onsite. Although the actual linear budget wasn't calculated, the £35 suggested by the brief would have been too low and therefore not in line with the rest of the required costs. The report also shows the mitigation strategies for the site constraints and other mitigation strategies for developing a sustainable future.

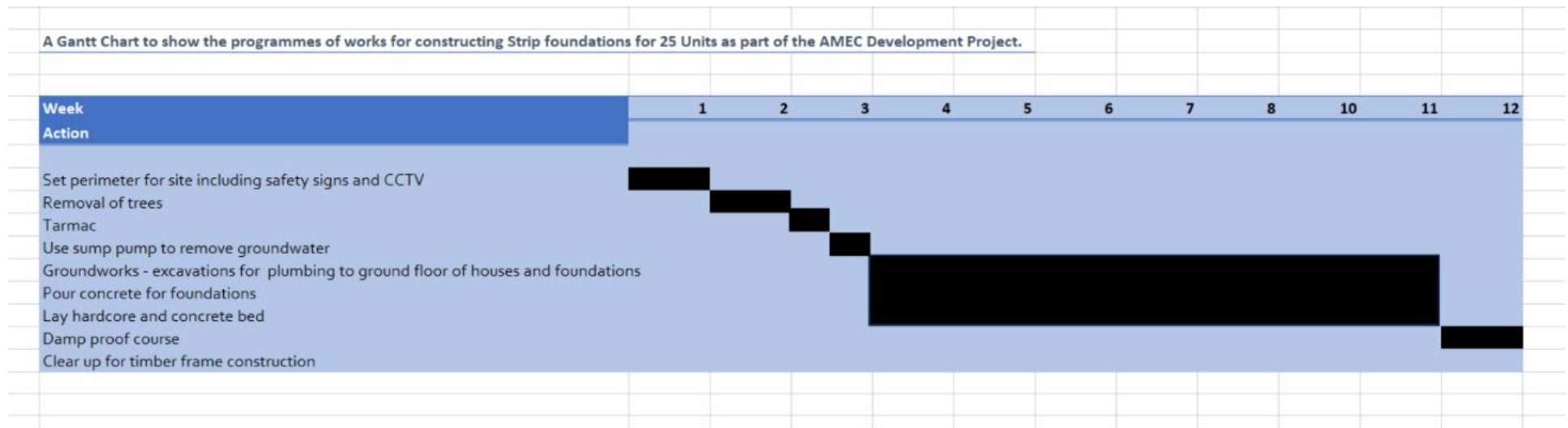
## Task 1.3 Project plan

<b>Assessment number (eg 1234-033)</b>	8711-033
<b>Assessment title</b>	Employer-Set Project

<b>Candidate name</b>	<first name> <surname>
<b>City &amp; Guilds candidate No.</b>	ABC1234

<b>Provider name</b>	<provider name>
<b>City &amp; Guilds provider No.</b>	999999a

<b>Task(s)</b>	1.3
<b>Evidence title / description</b>	Programme of works Supporting statement
<b>Date submitted by candidate</b>	DD/MM/YY





## Supporting Statement / Method Statement

Before construction onsite begins, a safety perimeter must be set around the construction site with the correct safety signs and possible CCTV. These are important as it reminds employees to wear the correct PPE when entering the construction site but is also a sign to the general public not to enter unless authorised. CCTV should also be installed in the case of someone being at harm, workers or the public, which allows management to have a video copy of any incidents that occur which would be efficient to use for insurance purposes. Information on health and safety regulations for employees will be given in the toolbox talks. As mentioned in the report, employees should be given the correct PPE and specifically for the groundworkers such as masks as the dust from the concrete could cause major breathing problems in the long and short term.

Once all safety precautions have been put in place, construction should start. The removal of the trees is the first step in the construction process as the large oak tree is directly above the sewer line. This will then allow for the trees to be sent off and turned into lumber that will then in turn be used for the timber framed construction. The timber frame won't solely consist of lumber from the trees however, it would decrease the costs for the lumber if it were all to come from a supplier.

Before and after construction begins, a Health and Safety Executive (HSE) will visit the site and ensure that all works and processes are being carried out in a way that complies with all health and safety laws. HSE's have the power to shut down a construction site for misconduct or simply offer employees advice on how to be safer in the workplace. Anything that the HSE notices will be reported and written down for the next time they arrive and fines can be dealt with if issues have not been resolved. Similarly, employees and employers are required to report any injuries or near misses that may be a result of misconduct, unchecked equipment or an accident that has taken place in the workplace. This is according to RIDDOR: Reporting Injuries, Dangerous Diseases and Occurrences Regulations.

A building inspector is also required to visit the site at each step of the construction process as they are the ones that check the construction is being carried out in the correct way and won't be punished by the HSE or local authority.

The construction of the road is next in the development process. Tarmac is a quick and easy material to lay and is cheap in comparison to other materials. This would take approximately 2 - 3 days as the stretch of road would be less than 600 metres. This road gives access to all vehicles onsite and, after the project is finished, access to the houses built as well whilst also keeping the manholes clear of any obstacles.

As mentioned in the brief, there were high levels of groundwater and therefore a sump pump will be used to remove the excess water. Since the existing drain is at the East side of the property, this will be where the water should be pumped, reducing costs to move the water elsewhere.

The excavations and laying of the foundations of one house takes 2 days as mentioned in the brief. It also shows that there will be 25 units built in phase one and therefore that will take 50 days in total to complete the foundations for all houses assuming that there are no days of severely bad weather that would delay this. Excavating is a process that must be done with competence and caution. Both groundworkers are expected to be qualified for their work and therefore must have the correct training for using the excavation equipment. For strip foundations, the load bearing walls must be identified in the plan of the houses and this allows the groundworkers to excavate trenches to a depth of 1 metre, into the clay layer of soil as shown in table 1 of the brief, and this is also accepted as stated by Approved Document A. Although clay is accepted by the Approved Documents it is still important to recognise that the high groundwater levels can cause the clay to get waterlogged at times and cause a normal foundation to become unstable. This is why deepend strips are required and therefore the width and height for the mass of concrete that will be poured in the ground will be greater than shallow strip foundations. This concrete can be reinforced with steel rebar. Once the foundation has been set and laid, the concrete and hardcore slab should be laid alongside the outside base of the timber frame. This allows for the outside edge and the hardcore to be level and ready for the installation of the damp proof course. Since the brief mentions that groundwater levels are high, it is important that damp proofing materials are used higher up along the walls of the houses to ensure that the wood does not become susceptible to rot or mould. After the damp proof course

is installed, then the rest of the timber framed construction can continue. In the construction process work should be done simultaneously and efficiently to minimise how much time is taken for the project. For example, when the foundations for the first 5 houses are laid, whilst the next houses foundations are being laid, the hardcore for the first 5 houses can be laid etc.

The Gantt Chart associated with this project is for the programme of works for the construction of the foundations for the 25 units as part of the AMEC development project.

## Task 1.4 Presentation

<b>Assessment number (eg 1234-033)</b>	8711-033
<b>Assessment title</b>	Employer-Set Project

<b>Candidate name</b>	<first name> <surname>
<b>City &amp; Guilds candidate No.</b>	ABC1234

<b>Provider name</b>	<provider name>
<b>City &amp; Guilds provider No.</b>	999999a

<b>Task(s)</b>	1.4
<b>Evidence title / description</b>	<p>Presentation slides</p> <p>Note: Presentation recording is not included with this document. Please refer to the Observation Record below the presentation slides for commentary</p>
<b>Date submitted by candidate</b>	DD/MM/YY

# AMEC Development Project

<first name> <surname>

# Types of Foundations

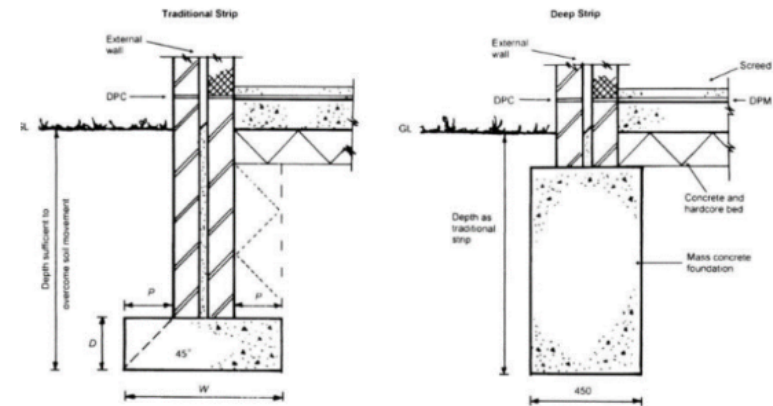
Initially out of the foundations that were researched, piles seemed to be the most effective foundation for this project as the brief mentions the varied site constraints such as the sewer line, the ditch and the high groundwater levels however, the option of piles as the foundation of the project just was not representative of the briefs main requirement of it being economically beneficial towards the project.

This allowed me to steer towards the idea of using strip foundations. Strip foundations are more economically beneficial towards the project fulfilling the requirements of the brief.

# Strip Foundations

Strip foundations are used in providing support for buildings by transferring the load into the layers of soil or rock below when they have a sufficient load bearing capacity. Strip foundations can be split into two categories, shallow and wide strip foundations.

Specific to the brief, timber frame constructions are not a heavy load in comparison to other materials such as brick or steel and therefore doesn't require a soil type with a high load bearing capacity. Also, in Approved Documents A it mentions that strip foundations are able to be built on the clay level of soil.





# continued..

Advantages of strip foundations

+simplicity

+cost effective

+versatile to different building types

# Timber Frame Construction

Timber Frame Construction is a form of construction that is more sustainable, greener, lightweight and cost effective than other construction methods. This makes it the most efficient form of construction for this project as it aligns perfectly with the brief.

Some may question timber frame construction as being weaker as it is susceptible to fire, and although this may be true, when TFC catches fire, it crumbles and breaks allowing for people to escape on time however steel in comparison warps and collapses when surrounded by fire which would make it extremely hard and unsafe for people to escape. Both cases of a fire are severe however a fire in TFC would increase the chances of a person's survival. Also, TFC is fit with the correct fireproofing materials and alert systems which would drastically reduce the risk and affects of a fire. Houses built in this time and age should be equipped with eco – friendly devices such as electric boilers, and hobs therefore the need for gas is 0%, reducing the risk of a fire even further.



# Approved Document A

The approved documents are rules and regulations but also act as a guideline to how instructions should be followed during the multiple steps in the construction process. Approved document A is specific to structure and is a key document to pay attention to during the construction of foundations and houses. The soil is the first step into following this document by making sure that it is suitable to be built upon. Many tests can be done on soils in the lab or on site such as a geo to check whether the soil is suitable and should be done before the construction process begins. In Approved document A, it mentions that strip foundations are able to be built in the clay layer of soil.

# Cost

$$11.832\text{m} \times 5.211\text{m} = 61.656552\text{m}^2$$

$$3.102\text{m} \times 2.429\text{m} = 7.534758\text{m}^2$$

$$61.656552 - 7.534758 = 54.121794\text{m}^2 = \text{square metres for each house.}$$

$$54.121794 \times 1\text{m (depth)} = 54.121794\text{m}^3 = \text{cubic metres for foundations}$$

$$54.121794 \times \text{£}80 = \text{just under } \textbf{£4330} \text{ (£4329.74352)} = \text{cost of foundation}$$

$$\text{Two ground workers getting £20 per hour for 8 hours for two days} = \textbf{£640}$$

$$(\text{£4330 (£4329.74352)} + \text{£640}) \times 25 = \textbf{£124,243.59} \text{ total cos for labour and foundations for 25 units.}$$

# Sustainability

It is evident that AMEC Development are keeping sustainability at the core of their project as the choice of using timber framed construction is a more ecofriendly and sustainable solution than other construction methods such as steel or brick. This allows for the principles of sustainability to be enforced in the other aspects of construction and even after the completion of the project. AMEC Development should have a high corporate social responsibility (CSR) which would result in everyone working in a way that would protect and benefit the environment rather than harm it. This would be included in the toolbox talk which would also provide the workers with the correct health and safety information.

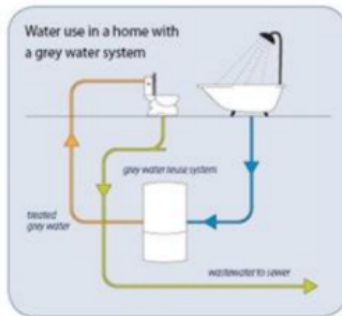
Sustainable technology in modern time would not only reduce costs for homeowners but also for the AMEC Development in the long term. A few of these that could be included in these houses are electric boilers and hobs and smart metres.

This would allow for the homeowners to think actively about the planet therefore protecting and benefitting the environment which would reflect the principles of the AMEC development possibly bringing in more homeowners to purchase their houses = AMEC economic benefit.

Additionally, the strip foundations are a large percentage of concrete and since cement is quite harmful to the environment, a newer form of concrete called green concrete should be used for the foundations. Green concrete is made from replacing cement with Fly Ash, Silica Fume or Wood Ash. This would

# Sustainable solutions

## Water recycling Systems



### Greywater recycling systems

Greywater recycling is a form of water recycling where water from baths, sinks and showers, is filtered and can be reused for other non-potable uses such as watering plants, flushing toilets etc.



### Water recycling Systems

Rainwater harvesting is another form of water recycling where rainwater is collected and filtered to then be used for non-potable uses such as flushing toilets and watering plants. A communal system could be installed and used by all of the homeowners which would reduce costs as each house wouldn't need their own.

# Sustainable solutions continued...



## Green Roofs

Green roofs are roofs of a building which are completely covered in a layer of vegetation. These act as an insulator for the building, provide shade and reduce the energy consumption of the building.



## Solar Panels

Solar panels are a type of technology which absorb sunlight and convert it into electrical energy. These are highly environmentally friendly and would reduce the cost of energy bills in the long term.

# Health and Safety Regulations

HASAWA – Health and Safety At Work Act

RIDDOR – Reporting Injuries, Diseases and Dangerous Occurrences Regulations

Working At Heights Act

LOLER – Lifting Operations and Lifting Equipment Regulations

PUWER – Provision and Use of Work Equipment Regulations

PPE – Personal Protective equipment.



# Site constraints.

AMEC Development is part of a 2-phase project where in phase 1 they are building 25 units of housing and is therefore a larger scale development project. In figure 2, the 25 units of housing are aimed away from the main road and would therefore need a new form of infrastructure to be connected.

## Sewer and manholes

A new road could be laid over the sewer line and the manholes which allows for unlimited access and no homes being built on top of it. This would not allow access for the homes after completion but also for the site construction

## Trees

The three large trees scattered through the plot make it difficult for any construction to take place and would be an active interruption for the employees working onsite, therefore the best solution should be to chop the trees down and repurpose the wood for the timber frame construction itself or the wooden fences that surround the houses. This is not only a sustainable solution but also focuses on waste management as the wood is being used for something beneficial towards the project rather than it being wasted and used for nothing. This would first have to be checked with the local authority as the trees may be under a preservation act since they are large, old trees.



# Site constraints.

## High Groundwater Levels

High ground water levels is most likely due to consistent bad weather. This would aid the idea of a rainwater recycling system to be installed for the homes. However, a sump pump which would pump water off site is what should be used whenever the groundwater levels increase. Since there are existing drains at the East side of the property, this would make it easy for the water to be pumped there which would reduce the costs for AMEC to transport the water elsewhere. Also if the groundworkers are given the correct PPE this would allow them to work in high groundwater levels without causing themselves any health and safety issues.

## Clay

Clay is not a suitable soil type to build on especially in waterlogged conditions however, the sump pump would eliminate this issue and reduce the risk of clay becoming waterlogged. Additionally, the Approved Document A mentions that it is safe for strip foundations to be built in and on clay. It is possibly for the foundations to be dug deeper into the chalk layer of soil which would make it definite that there would be no issue with the foundations.

# Aesthetics.

Aesthetics of the construction project are possibly the most important finishing touches which entice people to live in the area. These would be great selling points and although may seem unnecessary at first, it may bring in extra people therefore benefiting AMEC economically.

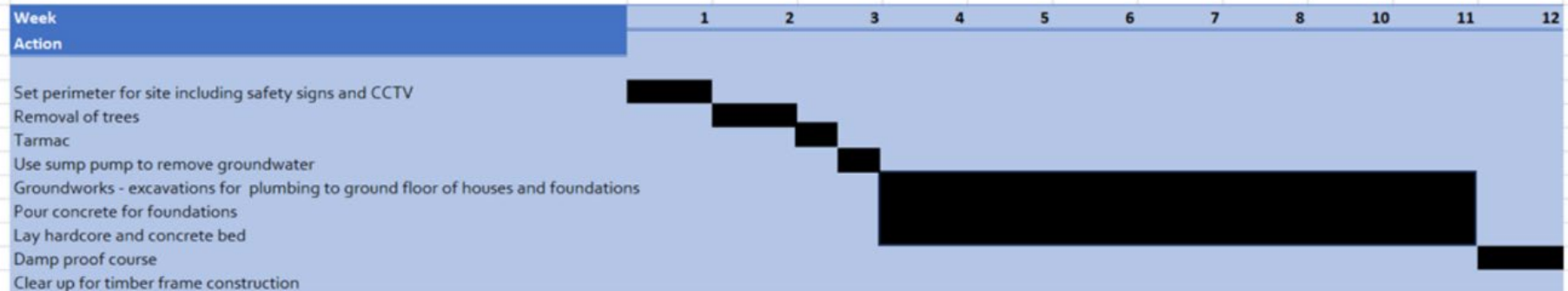
One of these that was mentioned in the brief was a driveway for each house that fits one car. A driveway made from gravel which is compacted allows for an aesthetically pleasing design and is also a functional surface as it is semi permeable allowing water to penetrate through and not causing surface run off.


Other aesthetics that should be installed as part of the construction project is solar powered street and paved lighting. This firstly reduces electricity costs for AMEC development in the long term and also allows people living in the area to feel safe.

Another possible aesthetic is to address the ditch in the plot of land and turn it into designated area to walk round, possibly even installing a bridge over it allowing the people living in the houses to go for walks and spend some leisure time with family.

# Gantt Chart

A Gantt Chart to show the programmes of works for constructing Strip foundations for 25 Units as part of the AMEC Development Project.





Thank You

## Employer-Set Project – Observation Record (Task 1.4 Presentation)

8711-30 T Level Technical Qualification in Onsite Construction

8711-033 Core: Employer-Set Project (Summer 2024)

<b>Candidate name</b>	<first name> <surname>
<b>City &amp; Guilds candidate No.</b>	ABC1234
<b>Date</b>	DD/MM/YY

<b>Provider name</b>	<provider name>
<b>City &amp; Guilds Provider No.</b>	999999a

Record observation notes below to inform external marking. **Notes must be detailed, accurate and differentiating. They should identify areas of strength and weakness to distinguish different levels of performance quality for each of the prompts below.**

### Structure/detail

The presentation is detailed, structured and logical in its approach. It is clear that the presentation has been considered in terms of its audience as a result of detailed and effective planning.

### Techniques

Techniques used to deliver the presentation are effective with well justified reasoning behind the information provided.

### Terminology

Terminology used is accurate and error free. The content provided is clear, grammatically correct and easily understood by the target audience.

### Theories and concepts

Theories and concepts relating to the core knowledge and core skills conveyed through the presentation. These may not always be accurate or be directly linked to the brief requirements.

### Communication

Concepts and theories are communicated effectively most of the time in an appropriate manner for the target audience. There are minor inaccuracies in the delivery of information which causes a lack of clarity in some instances.

### Tutor questions to candidate

### Candidate responses

How have you overcome high water during foundation excavation?

The use of a sump pump to remove.

What other foundation methods did you consider?

Piles but they are not as economical and are more expensive.

How does your foundation choice comply with approved document 'A'?

Because Doc' A' states that strip is built largely on clay soil.

### Any other aspects

Tutor signature	Date
<div data-bbox="220 421 272 477">X</div> <hr data-bbox="204 488 722 492"/>	<div data-bbox="1129 443 1278 477">DD/MM/YY</div>

If completing electronically, double click next to the 'X' to add an electronic signature once the record is **finalised**.



## Task 2.1 Collaborative problem-solving

<b>Assessment number (eg 1234-033)</b>	8711-033
<b>Assessment title</b>	Employer-Set Project

<b>Candidate name</b>	<first name> <surname>
<b>City &amp; Guilds candidate No.</b>	ABC1234

<b>Provider name</b>	<provider name>
<b>City &amp; Guilds provider No.</b>	999999a

<b>Task(s)</b>	2.1
<b>Evidence title / description</b>	Draft email  Note: Collaborative discussion recording is not included with this document. Please refer to the Observation Record below for commentary
<b>Date submitted by candidate</b>	DD/MM/YY

**To:** TeamManager@gmail.com

**Subject:** Mitigation techniques for Phase 1 of the AMEC Development Project.

Dear Sir/Madam,

This email is to inform you of the mitigation techniques that should be used for building over the site constraints/implications that are the sewer line, the 3 large trees, the high groundwater conditions, the clay at 1 metre deep and the ditch.

The existing sewer line poses a distinctive issue if houses were to be built on top of it as this would not only limit access to it and the manholes, but would also be a potential health risk to homeowners if the line happens to be blocked or floods. To mitigate this issue, it solely depends on the positioning for the construction of the houses. As shown in the brief, the 25 units will be built at the North of the land and at a full length of 11.832m in comparison to the 120m that the property is measured to be, the houses would not interfere with the sewer line as this is approximately halfway through the property. The 25 houses are not going to be built along the main road which means that they would need road access. Therefore, a road is what should be built over the sewer line and manholes. This allows for unlimited access to the manholes and sewer pipes and does not pose a risk to people's health. It also aids the construction process as site workers, excavation and lifting equipment can take advantage of the road, reducing construction time and cost in the long term. When construction takes place however, it is important that permission to shut off the sewer line is granted to ensure that any construction processes do not cause spillages or leaks due to damage to the pipes. This would create a major biohazard and delay the construction process drastically.

Another site implication are the 3 large trees. This is a simple issue that could be resolved by chopping down the trees and using the lumber for the timber frame construction or the wooden fences that perimeter the houses. This would reduce costs for management as all timber would not solely be coming from a supplier, checking first that the trees are not under a preservation act by the local authority due to their size and age. Additionally, the relocation of the trees is also a plausible mitigation method however, this would cause great additional costs for AMEC and delay the construction process greatly and therefore is not efficient.

The high groundwater levels are another issue that could be simply resolved. A sump pump is a water pump that takes groundwater elsewhere. The drains on the East side of the property aid this process even further as this is where the excess water could be pumped to, reducing the costs for AMEC to transport the water elsewhere.

As mentioned in the brief, there is clay at 1 metre deep and could be an unstable soil for foundations to be built on however, strip foundations can be built on soils with a low load bearing capacity and in Approved documents A, it also mentions that strip foundations can be built on the clay layer of soil.

The final issue which ultimately is not a great issue is the ditch, also at the East side of the property. The ditch can serve the purpose of being a great selling point for the homeowners as part of the AMEC Development project as a leisure area could be made from it. Safety features such as signs, railings and lightings should be installed to ensure that the public are not at risk when near the ditch, but pathways and possibly even a bridge could be built for people to go on walks or go out for leisure. This would act as a pull factor for people to move into the AMEC houses and therefore be an economic benefit in the long term.

To conclude, I have shown and stated the varied methods/mitigation techniques that could be and should be used onsite for the AMEC Development project. These have only been thought of with the principle of being the most economically beneficial towards AMEC Development and I hope you take these ideas into consideration when construction begins.

Thank you for taking the time to read this email.

Sincerely, <first name> <surname>

## Employer-Set Project - Observation Record (Task 2.1 Collaborative problem-solving)

8711-30 T Level Technical Qualification in Onsite Construction

8711-033 Core: Employer-Set Project (Summer 2024)

<b>Candidate name</b>	<first name> <surname>
<b>City &amp; Guilds Candidate No.</b>	ABC1234
<b>Date</b>	DD/MM/YY

<b>Provider name</b>	<provider name>
<b>City &amp; Guilds Provider No.</b>	999999a

Record observation notes below to inform external marking. **Notes must be detailed, accurate and differentiating. They should identify areas of strength and weakness to distinguish different levels of performance quality for each of the prompts below.**

### Communication skills

Communication skills are well developed and clear. Discussed and asked questions that are relevant, working with peers to find solutions. Effective progress towards solutions. Listening to others and working with their opinions, that supports effective progress in the task. Levels of engagement are high.

### Collaboration/contribution

Levels of contributions to discussions were high, listened to others and worked to find the correct solutions throughout all points of the task. Contributions and responses to solving the problem were informed and sensible. Information seems accurate, resulting in effective and timely progress being made.

### Methods to solve the problem

Evidence content is structured, thought about the task and used notes. The methods discussed will address the issues and seem effective and justified.

Any other aspects

Tutor signature	Date
<div>X</div> <hr/>	

If completing electronically, double click next to the 'X' to add an electronic signature once the record is **finalised**.

## Task 2.2 Evaluation

<b>Assessment number (eg 1234-033)</b>	8711-033
<b>Assessment title</b>	Employer-Set Project

<b>Candidate name</b>	<first name> <surname>
<b>City &amp; Guilds candidate No.</b>	ABC1234

<b>Provider name</b>	<provider name>
<b>City &amp; Guilds provider No.</b>	999999a

<b>Task(s)</b>	2.2
<b>Evidence title / description</b>	Evaluation
<b>Date submitted by candidate</b>	DD/MM/YY



For this ESP there were varied areas that I feel as though I accomplished quite successfully but also areas where I feel that I have not completed as successfully. Overall, I feel quite confident about the work I have produced and am looking forward to receiving my grade on the project.

In 1.1 for the research aspect of the project, I found this to be quite smooth and easy going as we had access to the internet, and I could gather as much information I needed and take as much time as I needed to review and understand the brief. However, at first, I did not analyse figure 3 well enough as I had initially pictured one house being built on the entire plot of land when it was in fact 25 houses being built at the North of the property. I noticed this midway through the research task and luckily, I had caught it early in the ESP and didn't have to make any drastic changes to my work later. I also found that the information provided by the brief required deep analysis and it was only as I continuously read through it that I caught new information to use for my research and the following tasks. Especially after the misconception with the scale and number of houses, I ensured to thoroughly read the brief after this.

In task 1.2, it was definitely something that I had mixed feelings for. Although I feel as though I covered a lot of content, I noticed that for some topics I could easily write about as the words would come to my mind with haste. This was mostly due to my previous knowledge on the topic but also the research in 1.1 aided this, however, in some areas I would get completely stuck not knowing what to write even when crossing over to my research. This was increasingly frustrating as I was trying to compose my knowledge and condense it into the report, but it would waste time when I would get stuck. Usually after a few minutes I would regain focus and start typing again but it was just unfortunate for the time lost each time this would occur. The report overall was quite good, and I feel like I used my time wisely. Except for when I stopped.

Task 1.3 I found to be the easiest of them all. Partially due to me being able to split my time efficiently in comparison to task 1.2 where we had 6 hours to divide the amount of work we had. In the first hour and a half, I decided to write up my method statement as this would give me a basis for the gantt chart and if I needed to make any alterations, I would be able to do so without making too much of a hassle. Since the brief mentioned that the programme of works was only required to go up to laying the floor slab, this acted as an aid to me even further as the gantt chart essentially didn't need to be completed. This helped with time and allowed me to finish and read through my method statement. When using Excel to create the gantt chart, I found it quite tedious at first because it took some time getting used to the way that it works and how to type in each box; there's a bar at the top where you can finish typing which I didn't realise at first and so each time I needed to re-type something, I would need to restart. Not great in timed conditions but easy to overcome.

The presentation for task 1.4 also was quite swift. Though, through this task and task 2.1 I found that verbally expressing my ideas is where I lack the confidence to speak with clarity. I noticed that I sometimes mumble or go silent when my mind goes blank or I am unsure of what to say and as much as I tried to avoid this in the presentation it would still sometimes occur, similarly with the group discussion. The presentation I feel went better than the group discussion, but this is also partially due to the fact that I was able to have my powerpoint as a guidance with me whereas the group discussion was solely based off of the ideas that we gained from reading the 2.1 brief and how we could bring previous knowledge into it. The written content I provided I feel was good but the execution was lacking in some areas.

To conclude, this ESP had many areas that needed more work on but in review it went better than I had expected and was expecting. It didn't cause much stress in the process of it compared to the weeks before and it was one of the better ESP's that I have seen also in comparison to the mocks that we have received in the past. To make this ESP even better I think I could have deepened my knowledge on all aspects of

the brief in the research task as I would later find myself questioning a few things when I should have found out earlier. I could have also managed my time in task 1.1 and 1.2 better than I did which I feel would have given me a greater advantage later on in the project. Overall, it was a pleasant but on edge type of experience.

## Get in touch

The City & Guilds Quality team are here to answer any queries you may have regarding your T Level Technical Qualification delivery.

Should you require assistance, please contact us using the details below:

Monday - Friday | 08:30 - 17:00 GMT

T: 0300 303 53 52

E: [technicals.quality@cityandguilds.com](mailto:technicals.quality@cityandguilds.com)

W: <http://www.cityandguilds.com/tlevels>

Web chat available [here](#).

The T Level is a qualification approved and managed by the Institute for Apprenticeships and Technical Education.

Copyright in this document belongs to, and is used under licence from, the Institute for Apprenticeships and Technical Education, © 2024. 'T-LEVELS' is a registered trademark of the Department for Education. 'T Level' is a registered trademark of the Institute for Apprenticeships and Technical Education. 'Institute for Apprenticeships & Technical Education' and logo are registered trademarks of the Institute for Apprenticeships and Technical Education.

We make every effort to ensure that the information contained in this publication is true and correct at the time of going to press. However, City & Guilds' products and services are subject to continuous development and improvement, and the right is reserved to change products and services from time to time. City & Guilds cannot accept responsibility for any loss or damage arising from the use of information in this publication.

City & Guilds is a trademark of the City & Guilds of London Institute, a charity established to promote education and training registered in England & Wales (312832) and Scotland (SC039576). City and Guilds Group Giltspur House, 5–6 Giltspur Street London EC1A 9DE