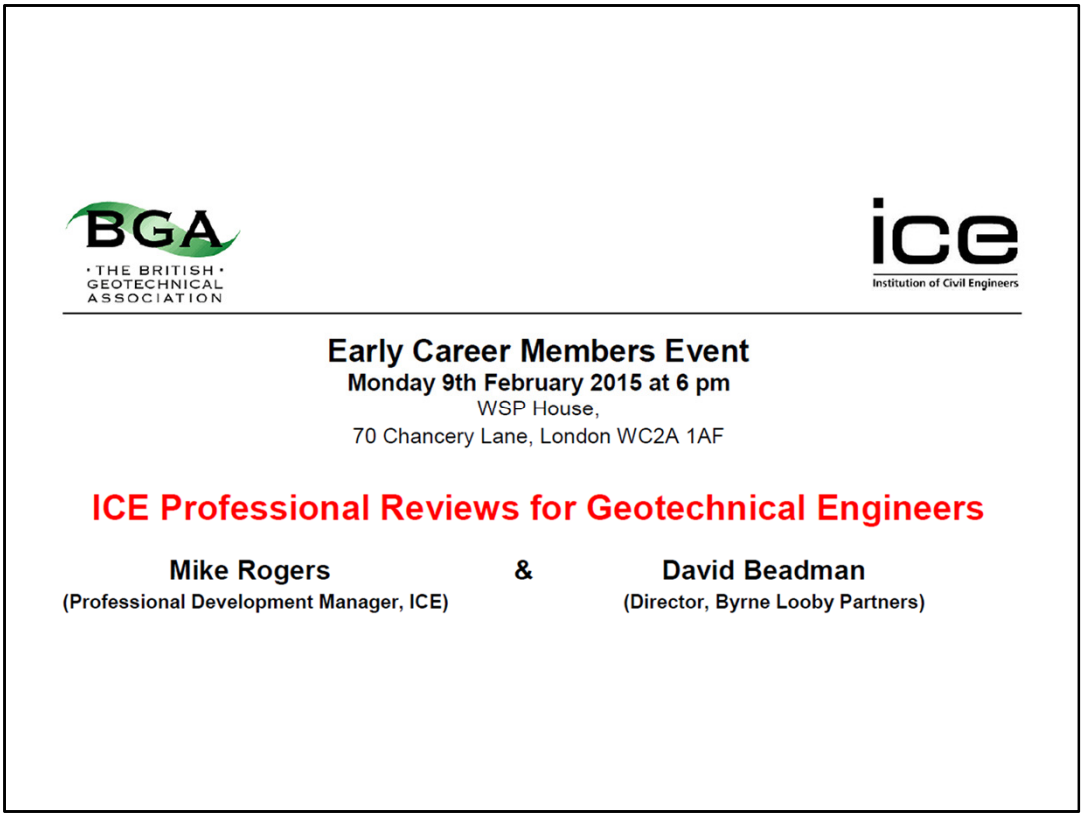


Event Introduction
Format:
18:00
J Murphy: Event introduction, format, fire arrangements and speaker introduction

18:00
Mike Rogers: ICE review changes & engineering geology candidates

18:15
David Beadman: Attributes and how to approach them for geotechnical engineers

18:30
M Rogers, D Beadman & J Murphy: Mock review
5min presentation
20min questions

18:55
J Murphy: Candidate tips & other recent candidate introduction
There will be 4 other recently successful geotechnical engineers to join the panel and answer questions.

19:00
Panel: Q & A from the floor & online

19:15-19:30
Finish: J Murphy to close the event.

19:15-19:30
Finish: panel to circulate and meet attendees to answer further questions.
Speakers free to leave if they wish.

IPD Update & Engineering Geology

Mike Rogers

BSc MSc DiPIC C Geol FGS CEng MICE CEnv

Professional Development Manager

Digitised IPD - Components

- ICE Training Agreement – CATS (as was) but under the single ICE Training Scheme
- Mentor Supported – Self Managed
- Career Appraisal – Retrospective IPD
- Membership Application – AQP and IPD together in one submission

Digitised IPD - Implementation

- In house Tool has been developed
- Go live was19th January 2015
- All new trainees after that date will use the Online scheme
- Retain ICE 3142 for registering (or TAGSO)
- Allow real time recording of evidence by trainee
- Real time comments by DE or SCE

Digitised IPD – Roles

- MDO – retains responsibilities to monitor and verify completion
- SCE – undertakes Annual reviews and interim reviews if required
- DE – will be recorded in the system now and undertakes the interim reviews
- Mentor – trained as per SCE but not tied to a company

Digitised IPD - Transition

- A three year transition will be available
- Up to December 2017 will be possible to complete DO based IPD if you have started
- If less than one year of CATS – transfer to new system at Annual Review
- If likely to complete in say two years – stay on current

Current and streamlined IPD programme

Current Process

Academic
Full-time or part time

Initial Professional Development
(15 Development Objectives)

Derived from 9 Attributes
'Sound and broad base on which to build'

Training Agreement (with ICE approved employer)
or
Career Appraisal (self managed or retrospective)

Consolidation and **Preparation**

Professional Review Application

Professional Review

based on 9 Attributes

2 reports

Streamlined Process

Academic
Full-time or part time

Initial Professional Development
(9 Attribute-based objectives)

Develop competence and Ability

Employer-led Training Agreement using IPD online
or
Mentor-supported Training Agreement using IPD online
or
Career Appraisal (retrospective)

Professional Review Application

Professional Review

Based on 9 Attributes

One report

Digitised IPD - Transition

- Career Appraisals can be submitted in the old format during the transition period
- This will allow completion for those who have started against the old DOs – paper based submission as now
- New Attribute based Career Appraisals will be a retrospective reflection using Attributes - electronic submission

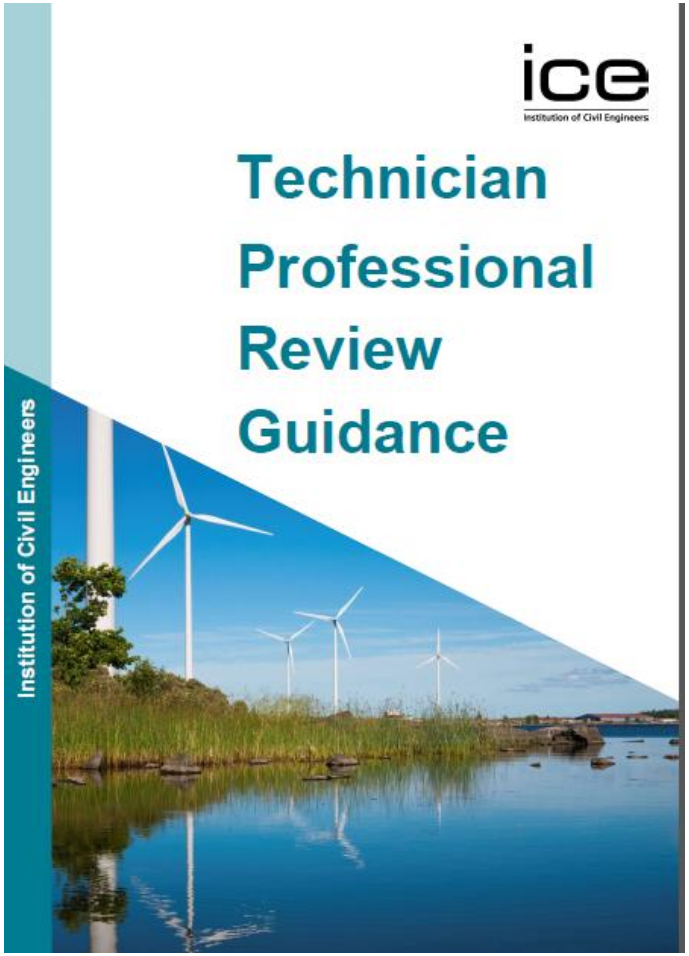
Professional Review Process

Streamlined application process: for members ready to apply for Professional Review (launching spring 2015)

- **One Professional Review report:** instead of two reports (to be used for autumn 2015 reviews and all future reviews)
- **Clearer information, advice and guidance:** on our website (launching spring 2015)

New Professional Review Guidance

http://www.ice.org.uk/Information-resources/Document-Library/Technician-Professional-Review-Guidance



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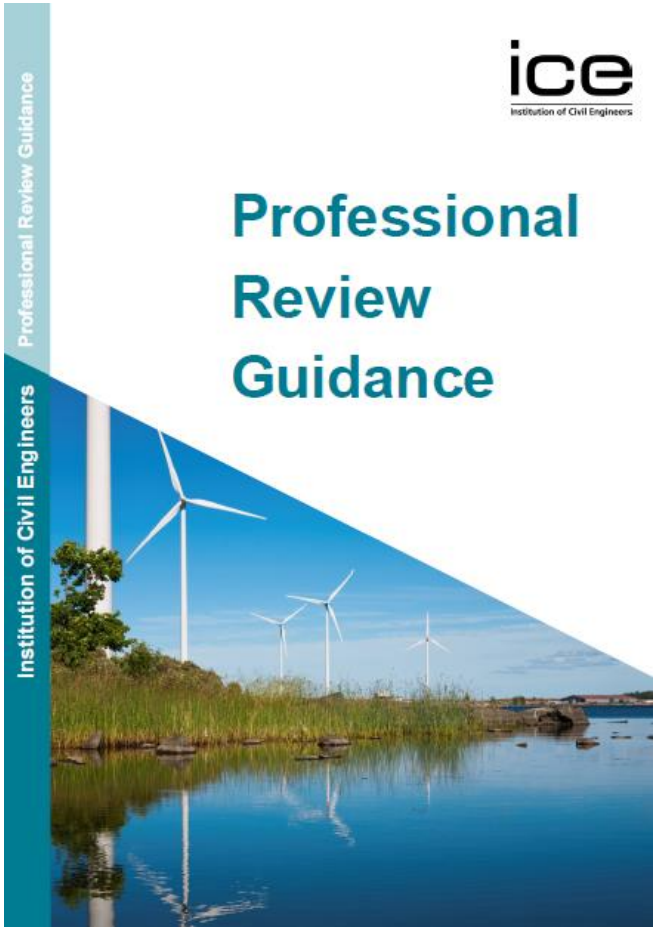


New Professional Review Guidance

- **Professional Review Guidance MRP/CPR**
  - From applications after 1st June 2015
  - Single PR Report 5000 words
  - Appendices: 3x A3 drawings plus 12 other A4 sheets
  - 2 page CV
  - Submissions of Report/CV/Photo into one pdf document 20mb max, via email to PR office 15 working days prior
- **CPRP** requirements detailed in guidance document

Engineering Geologists

- Check Educational base is met
- If non accredited need academic assessment – www.ice.org.uk\aqp
- No preferential treatment – the review is the same
- Need to follow the standard IPD then review
- Demonstration of the Attributes is the key
- Look to discuss experience using engineering terms
- Plan the approach you will take

Engineering Geologists

- Issues likely to be Attribute 1 and 2 and how Engineering Geologist express these
- Knowledge and Understanding of Engineering
- Technical and Practical Application of Engineering
- Ensure that Attributes 3 to 9 are also covered in balance with the work you undertake

Engineering Geologists

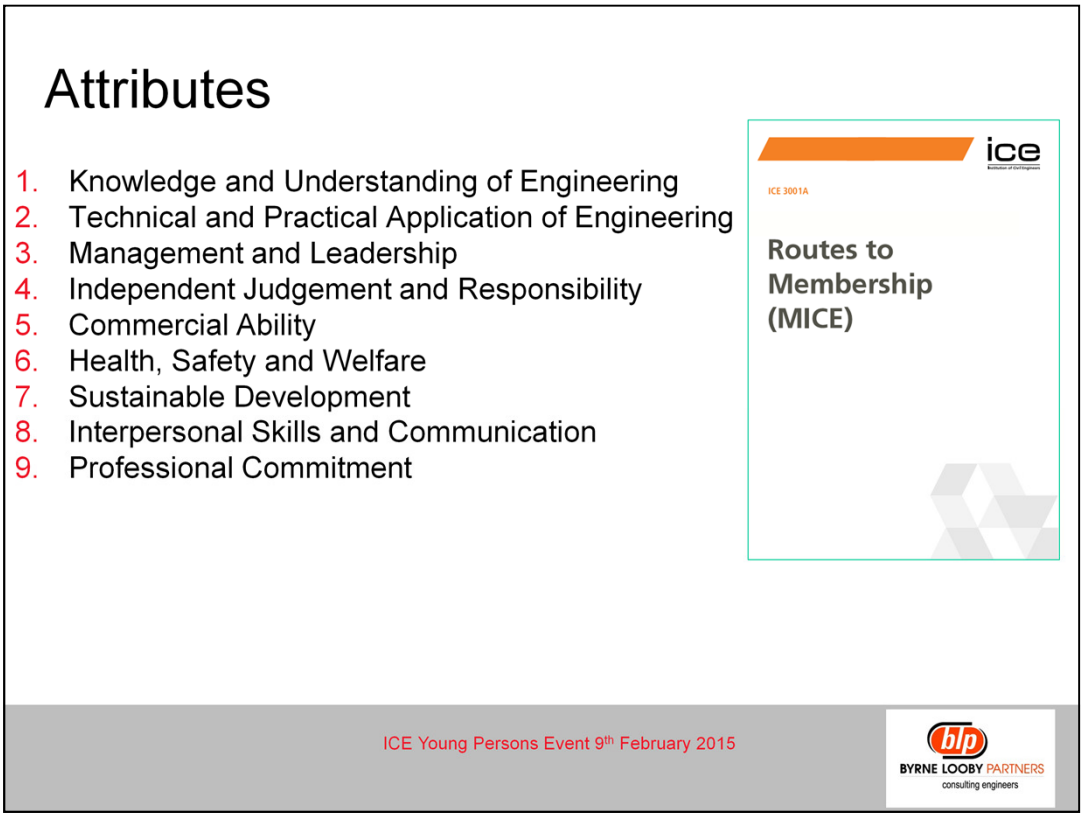
- Look to consider how your experience meets the standard
- Consider forces, ground settlement, risk factors variable ground and solutions offered to cope
- Also look at the breadth and depth of your career
- What is happening above the ground
- Engage with others and ask questions
- Discuss the wider aspects of a project

ANY QUESTIONS ?

BYRNE LOOBY PARTNERS
consulting engineers

Attributes for Geotechnical Engineers

David Beadman



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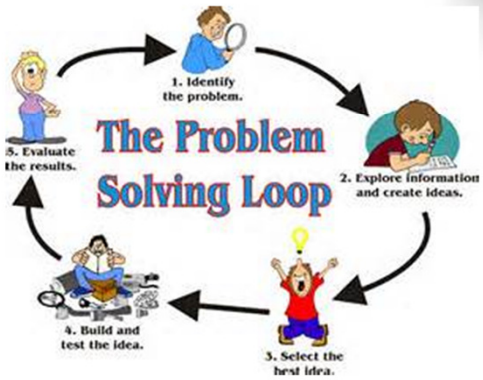

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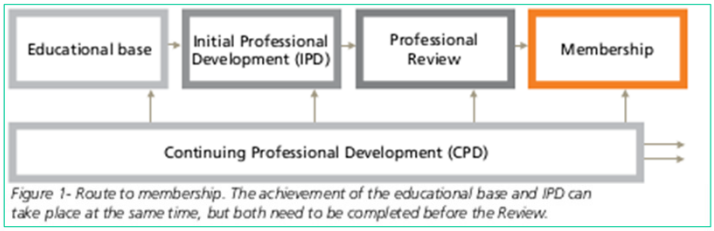

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ICE 3001A

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Demonstrate achievement of Attributes at Professional Review

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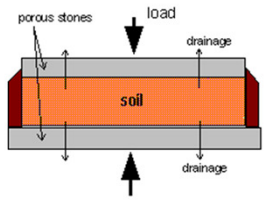
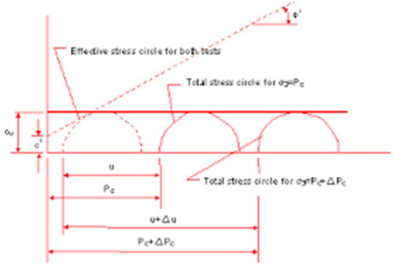
Not just a list of projects

Evidence of understanding

- Technical nuggets – geotechnical design
- Ability to discuss principles





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drained / undrained, effective stress and total stress, flotation,

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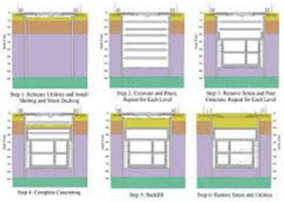
Construction sequence

Construction (Piling etc.) methodology

Detailed design drawings



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3. Management and Leadership

- Difference between Management and Leadership
- Consider your management style
- Delegation

Be prepared for questions about your management style, how you deal with new Graduates, draughtsmen, site operatives etc.

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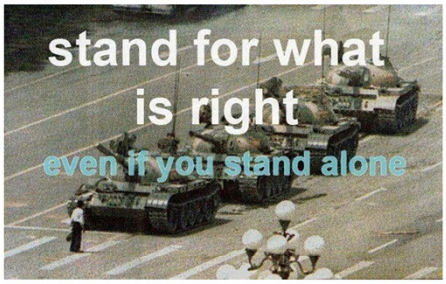

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- Management of Sub-contractors

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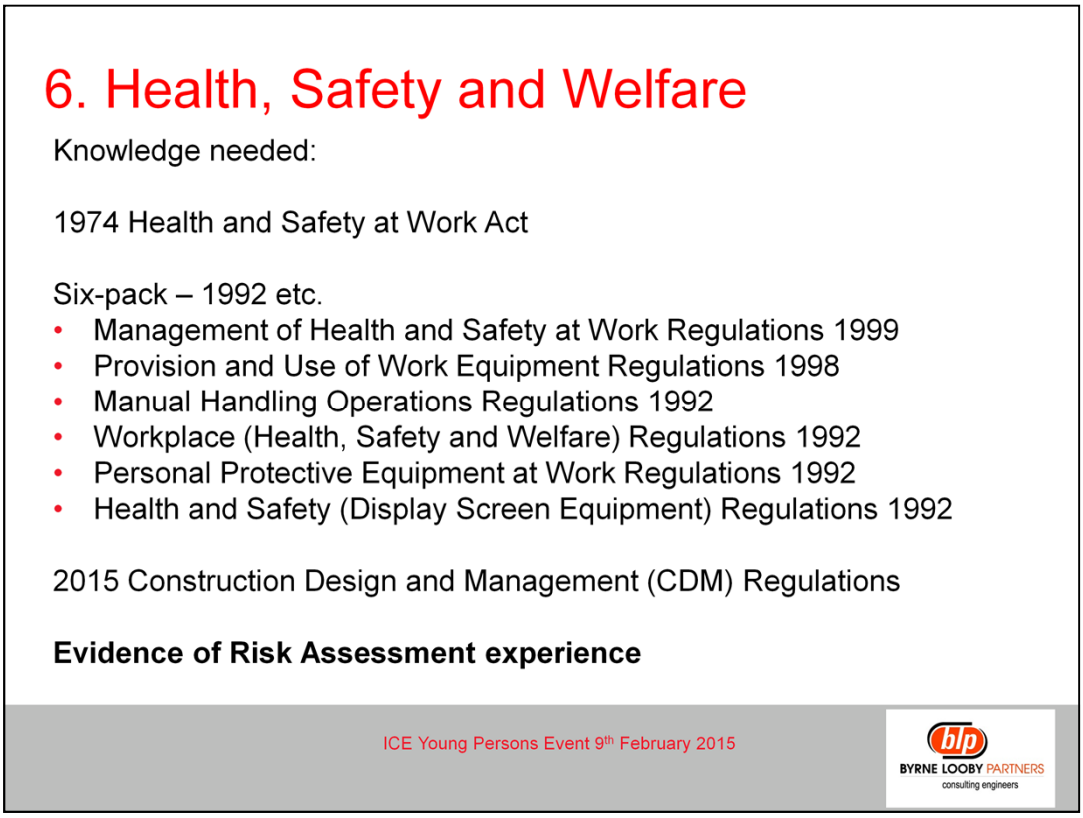

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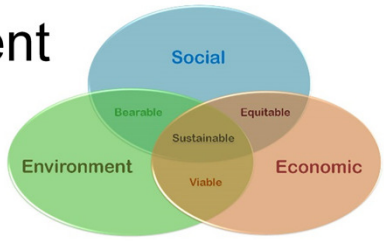

Awareness

Examples
- Cost effective solutions
- Reuse of materials

Often difficult to demonstrate experience of this attribute.

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Discussion

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Core CPD Cycle

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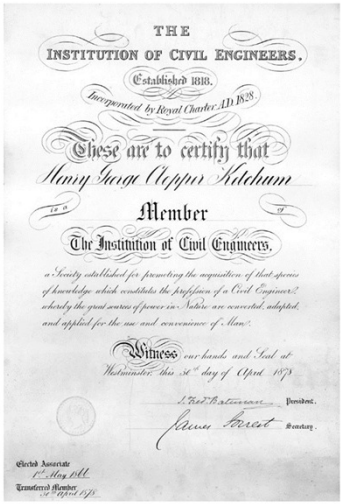
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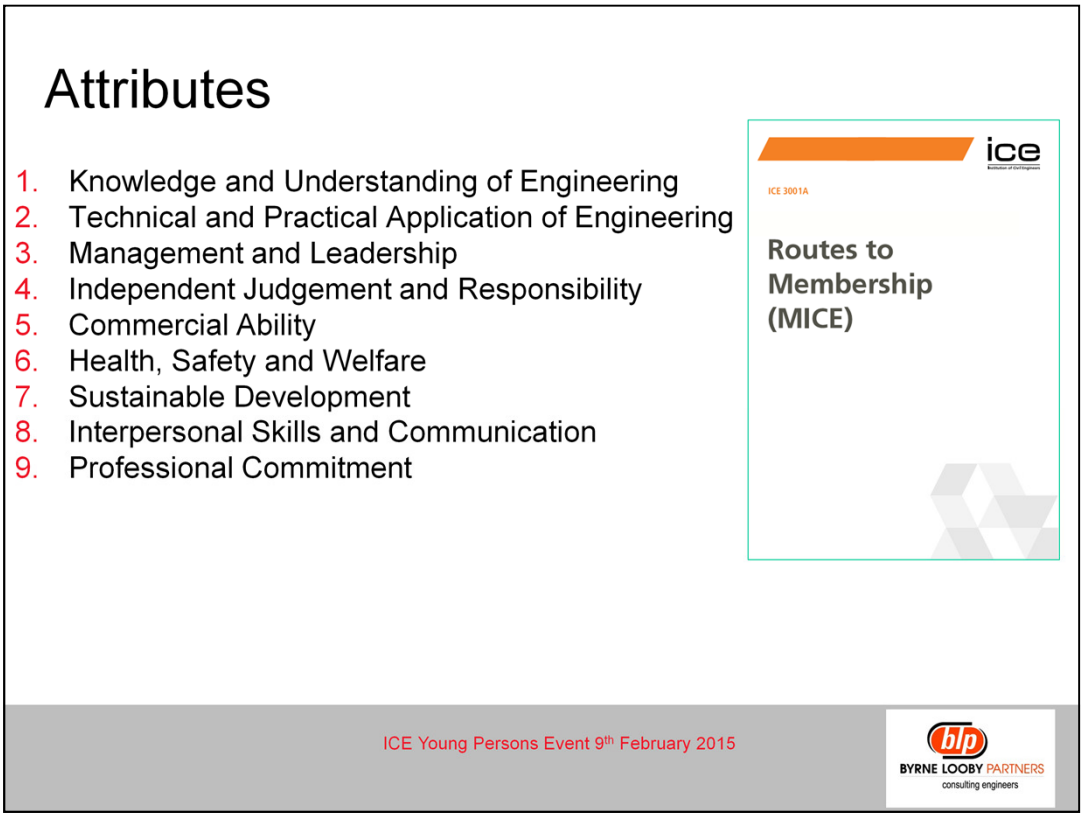

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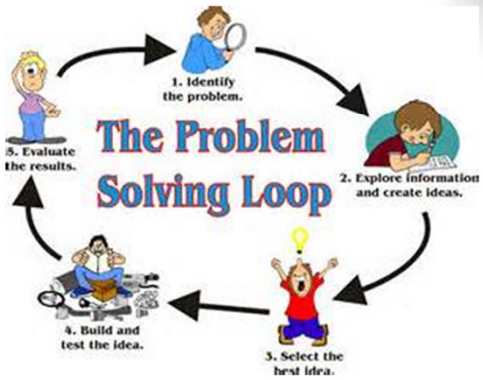

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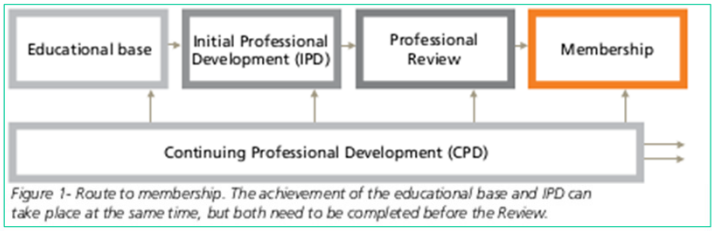

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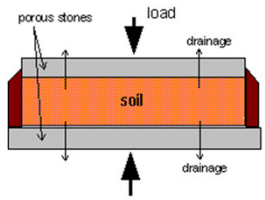

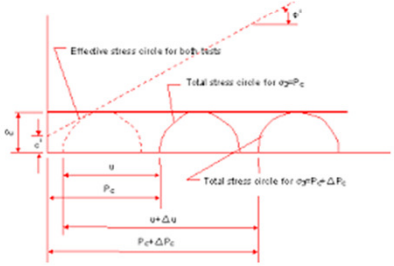

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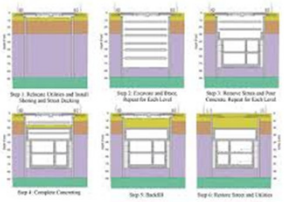

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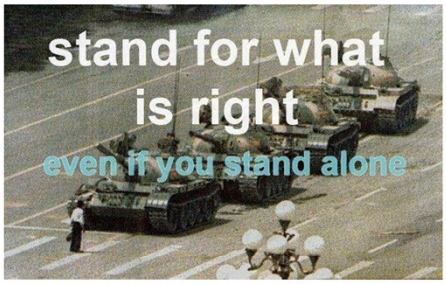

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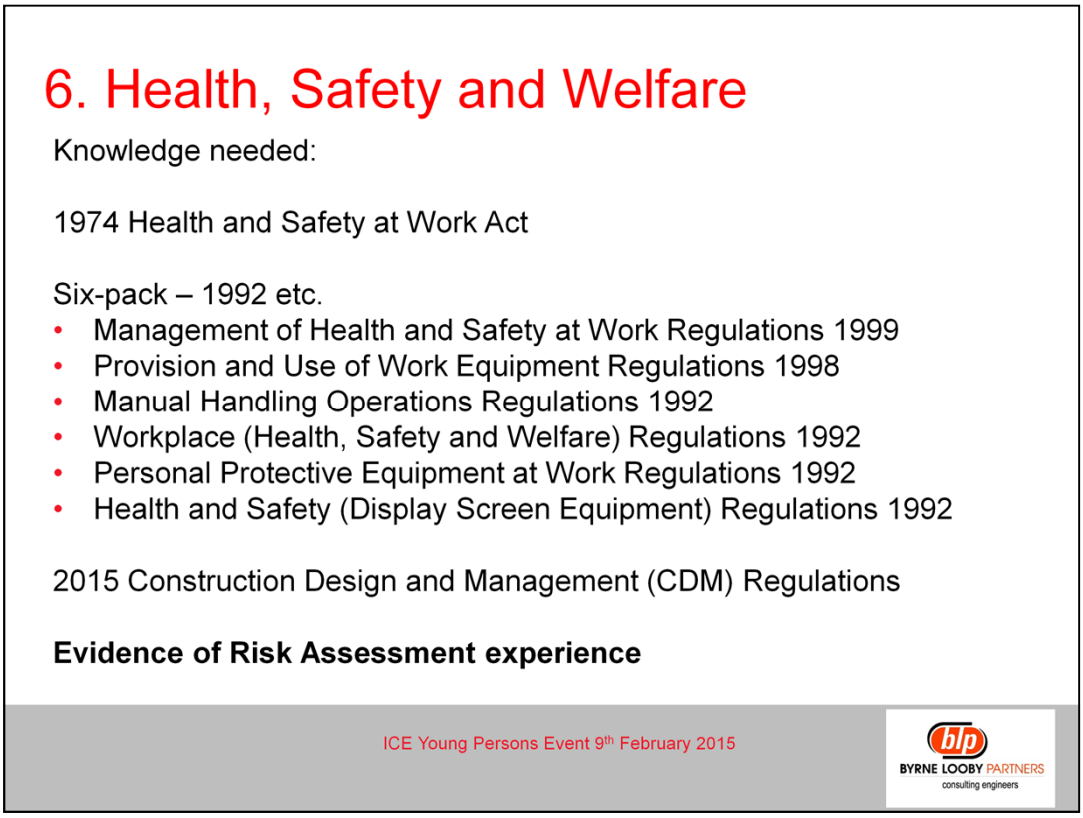

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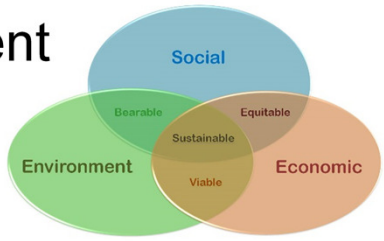

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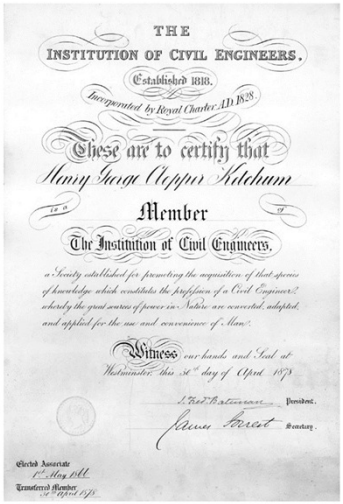
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BYRNE LOOBY PARTNERS
consulting engineers

Chartered Professional Review
Autumn 2014

M1 J10A grade separation

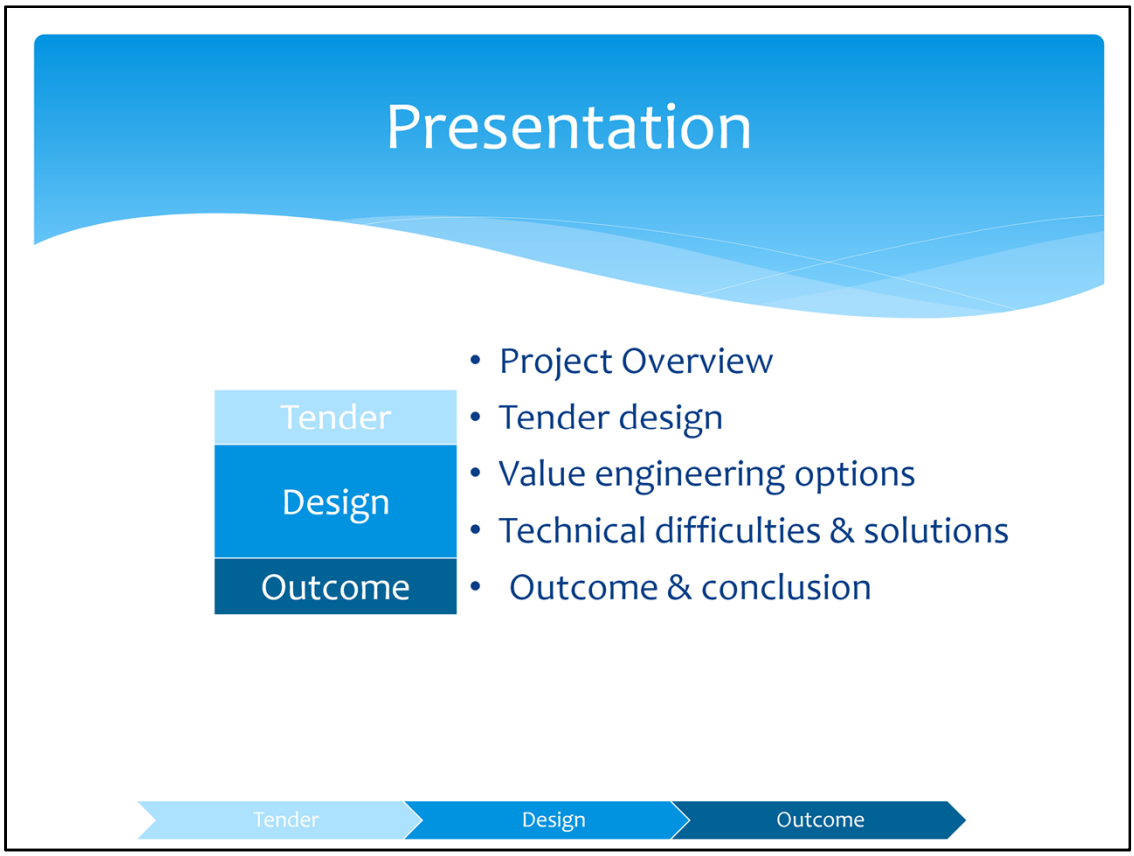
Southern trough excavation

Joseph Murphy

Good afternoon.

My presentation today will cover an aspect of the M1 J10A grade separation upgrade where I had a significant input.

I will focus on the southern trough excavation.



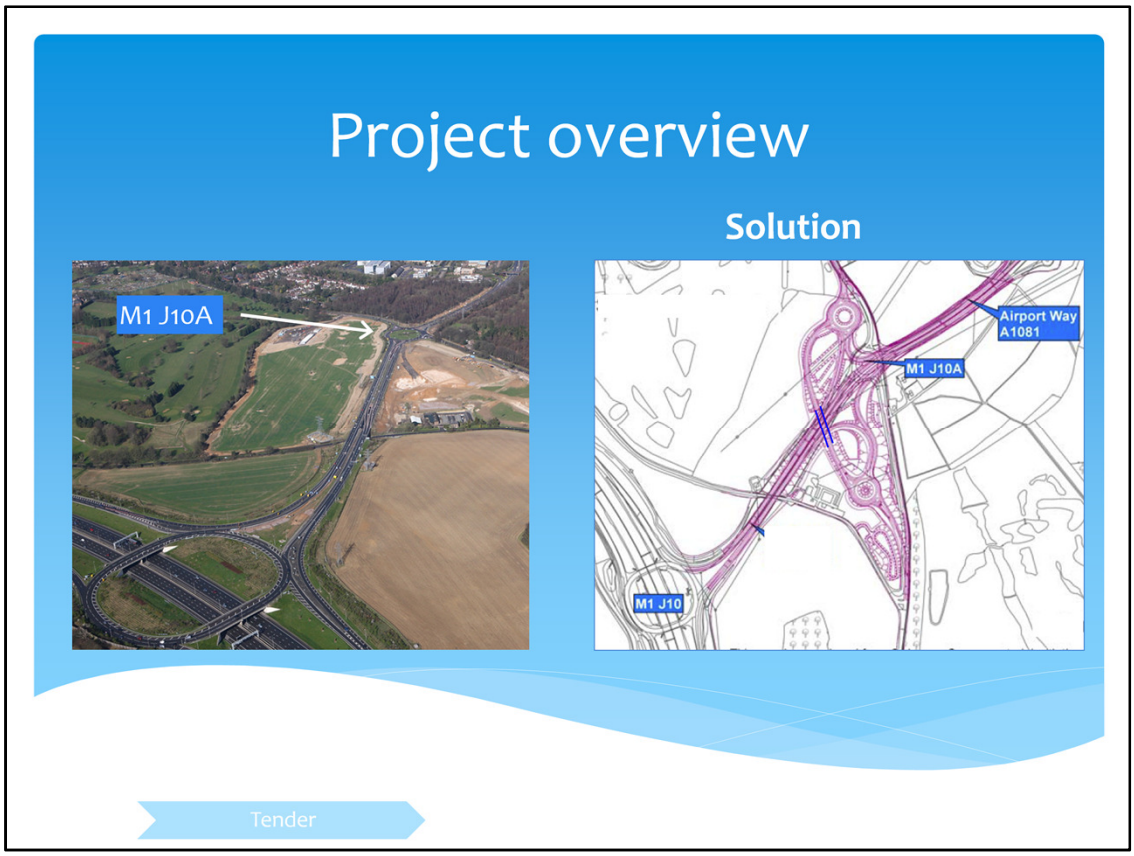
My presentation will cover an **overview** of the project.

My **tender design options** for the southern trough excavation of the underbridge.

The **post contract award** value engineering options.

The technical difficulties with the **value engineered option** and my solutions to these.

and some outcomes and conclusions I have drawn from this project.



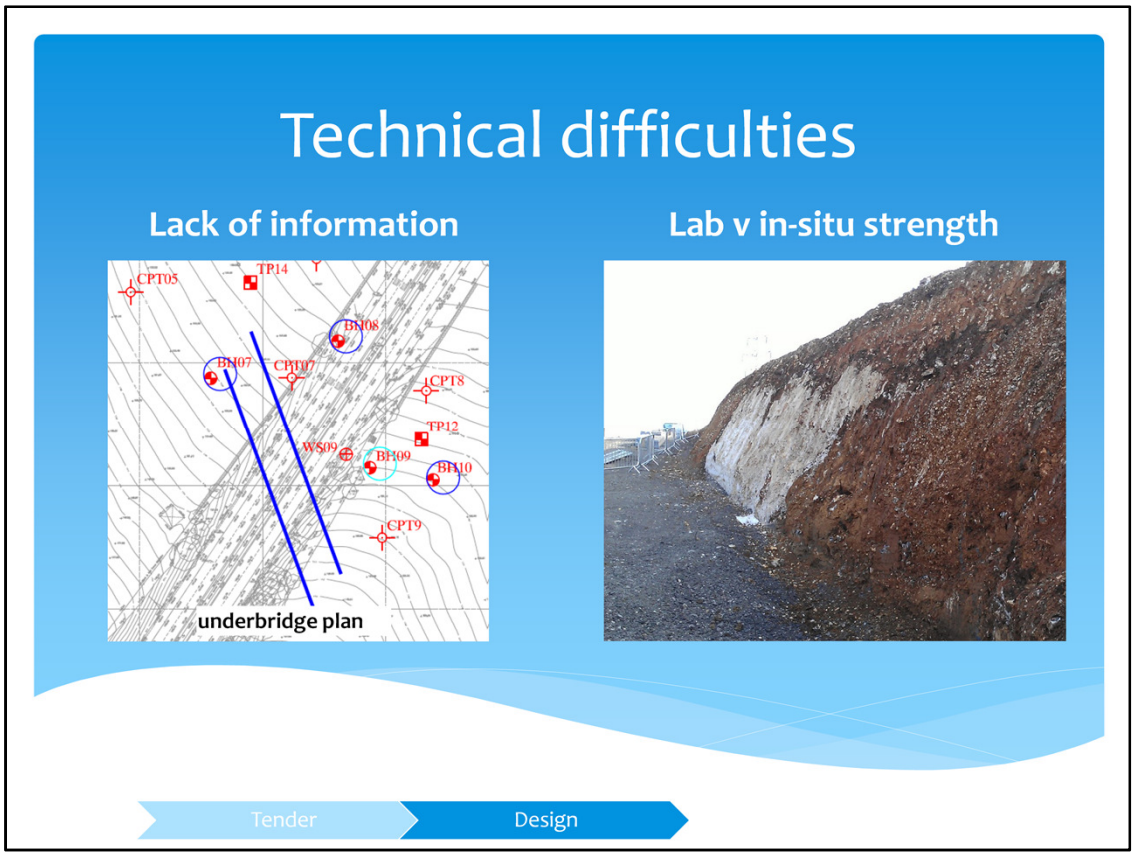
Project Overview
The M1 J10A links the **M1** with **Luton Airport** and South Luton. The M1 is shown on the left of both the images !*here*!
This junction was at **full capacity** and caused queues back onto the M1 at times.

The proposed **solution** shown on the right in purple, was a grade separated junction which included 2 new **roundabouts** North and South shown here, a new **underbridge,** here and improved **cycle and pedestrian** routes.

The contractor employed my company to **inform** their **tender** submission for the **contractor designed elements.** The largest of which was the **underbridge** temporary excavation.

I was nominated the geotechnical **project engineer** for this tender and I reviewed options including an **open** sloped excavation which I ruled out due to the required **land take** based on the **existing soil parameters**.

I designed a sheet pile **retaining wall solution** for the underbridge excavation which was priced and submitted with the contractor's tender.



The contractor was **awarded** the contract and I was the geotechnical **project engineer** for the works.

I am going to focus on my input into how the southern trough excavation design changed from my **tender sheet pile retaining wall** solution shown !*here*! on the left in the purple outline to a open sloped excavation.

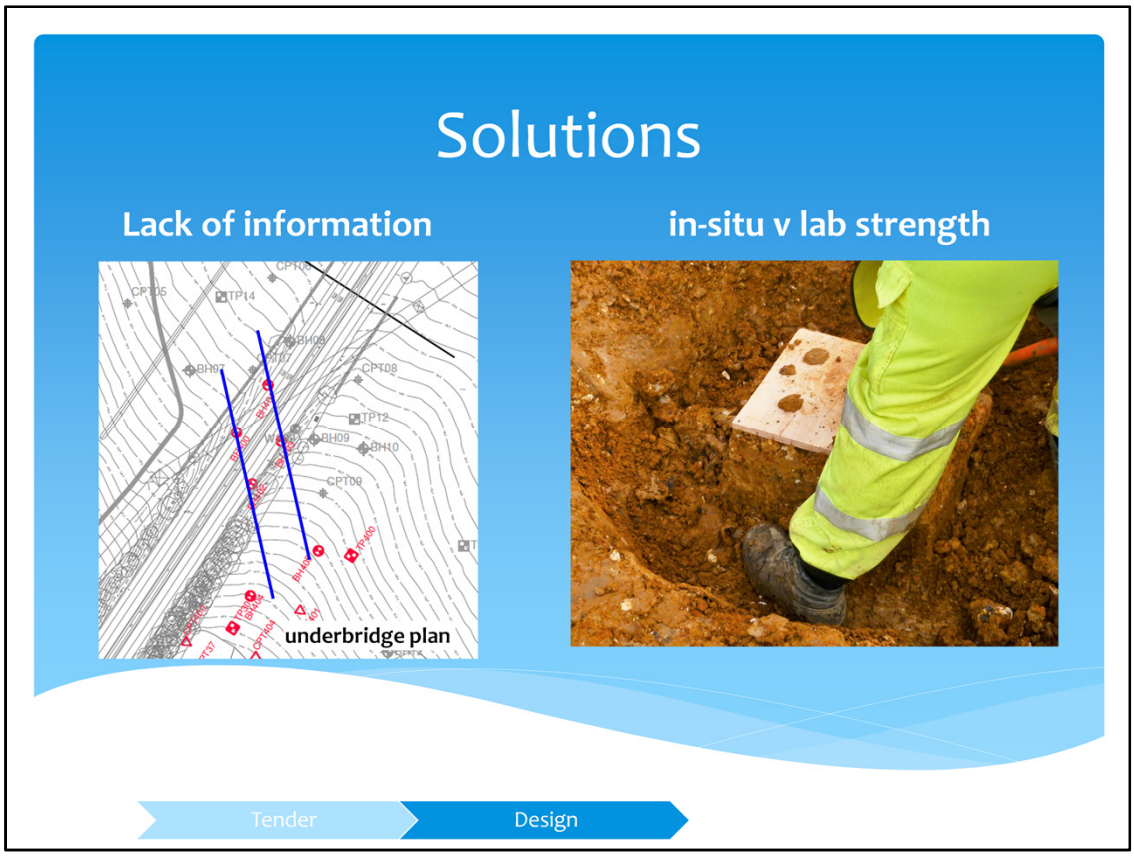
Ground Investigation & Design Stage

My **tender design** ruled out an **open** excavation due to the **low, long term drained strength** of the Clay with Flints surface layer as found in the original ground investigation.

There was a **lack of investigation** information in the area of the underbridge particularly to the **south and west** of it, as can be seen on the plan drawing on the !*left*!. This was due to the underbridge **alignment** being **changed** after the ground investigation was carried out.

The Clay with Flints material had low drained lab strength parameters. I **suspected** that these could be **higher in-situ**, which is apparent from the **steep slope cuts** possible on the !*right*!.

Post contract award I began to look at how to **address these difficulties** and in **communication** with the contractor I **discussed** possible **alternative** excavation options in our **value engineering** exercise.

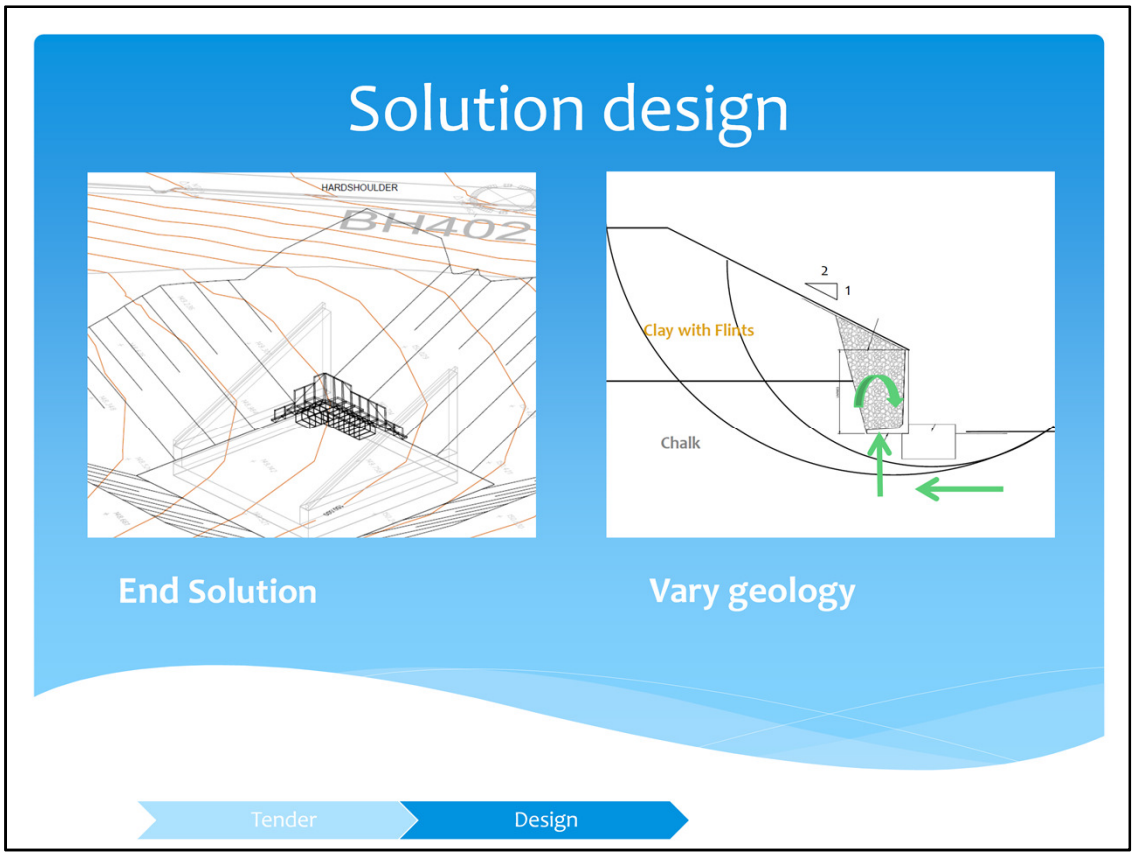


In order to address the lack of information I **planned** and **managed** a further **ground investigation**. I **supervised** the production of a **drawing** detailing the proposed **boreholes**, **Cone Penetration Tests** and **trial pits**, a section of which can be seen on the !*left*!

I **wrote** the investigation **specification** and **BoQ**, both key **contractual** documents.

I **instructed trial slopes** be constructed and monitored, I scheduled large in-situ **block samples** to be taken and tested in a large shear box to determine the **in-situ drained** strength of the Clay with Flints. An example of one of these block samples is shown on the !*right*! 300 – 100mm

Using larger samples and test equipment enabled the large **gravel** size fraction to be included and **accounted** for in the strength which would be **removed** when using a standard shear box.

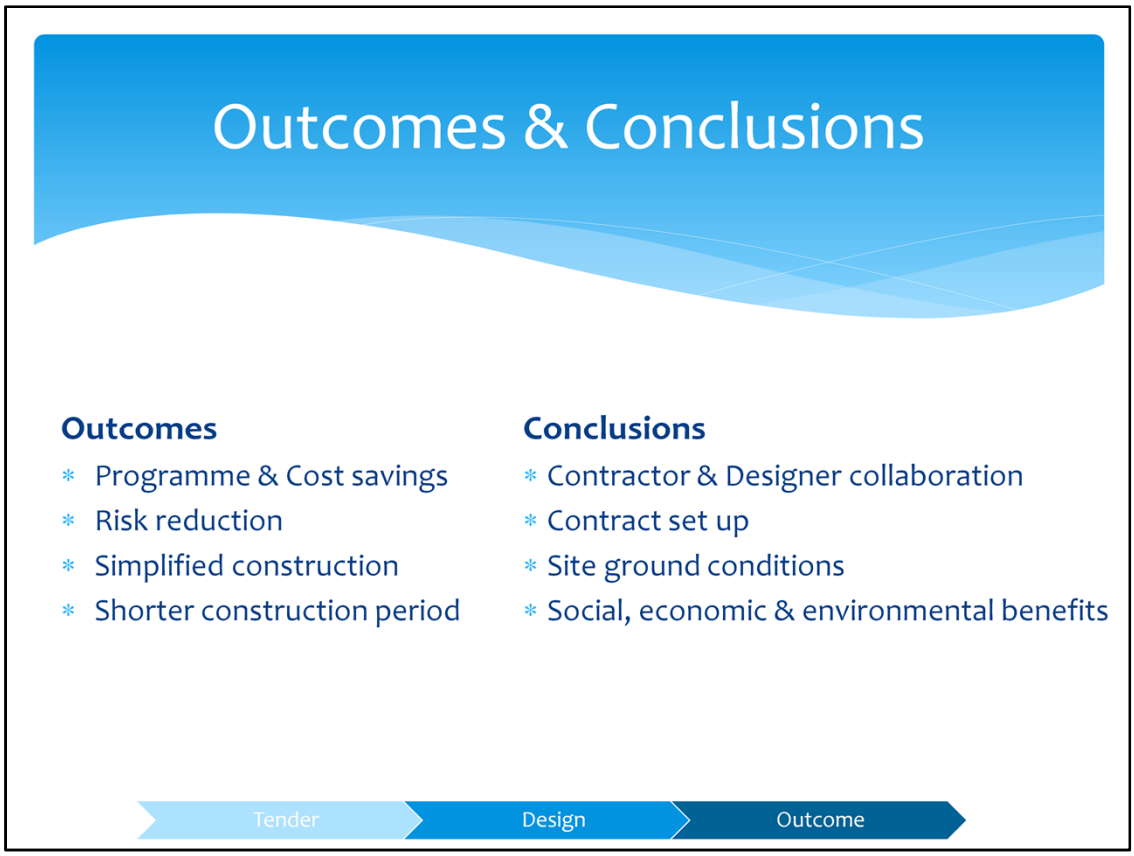


Using the **enhanced** drained shear strength parameters from the large shear box results I **developed** the solution by carrying out a open **sloped excavation design**.

A **typical cross section** is shown on the !*right*! with indicative **failure surfaces** !*here*! investigated. This design was carried out in compliance with **Eurocodes.** I varied the level of the CwF & Chalk boundary, I carried out **undrained** short term analyses and long term **drained** analyses, which were the worst case.

I found a slope of **1:2** was acceptable but a **retaining wall** at the base was required to allow for a safe working space to construct the underbridge. The retaining wall is shown in detail on the !*right*!.

The design of this retaining wall was carried out by a **junior engineer** under my **direction** and included checks for overturning, bearing capacity and sliding as shown on the !*right*!. The shear key shown was required to improve the shear resistance.



Value Engineering outcomes

My **input** in the **tender design**, **value engineering**, **detailed design** and **construction** enabled the **successful** implementation of a **design change** which resulted in significant **programme** and **cost savings**.

In my design I applied the **principles of prevention** for example by using **precast** retaining wall units which **eliminated** the risk of steel and formwork fixing in the excavation. I also ensured **monitoring** took place to reduce the risk of a slope failure.

This change resulted in a simplified construction sequence being used which reduced the budget and programme risk.

The **impact** on the **public** was limited and a **shorter** construction period came about. This was welcomed **locally** by road users and by the **client** Luton Borough Council.

Conclusions

Collaboration between contractors and designers can result in efficiencies and programme and cost savings. This requires good **relationships**, and utilisation of respective **knowledge** and **experience**.

The contract which was a **NEC3 Option B priced** with **Bill of Quantities** only specified certain elements including the underbridge as **contractor designed** which meant that this **value engineering** exercise only took place on those elements. Perhaps there were **other** value engineering **opportunities** which were **missed**.

The importance of the **ground conditions**, in particular the **difference** between **lab** and **in-situ** strengths was key in this exercise. My **understanding** and **ability** to procure the **tests** I needed to **demonstrate** the higher in-situ strengths resulted in this change being possible.

The **social** benefits of this excavation design include a **reduced** construction **period** and disruption to the public who use the road.

Economic benefits accrued to our **client** and there were

environmental benefits in my use of the **precast** solution which was subsequently **reused** on site a number of times.

In summary

My **responsibilities** included leading the design at tender stage and detailed design.
I was responsible for the management of the Ground Investigation and Tony Gee's geotechnical design, cost and programme management.

That is the **end** of my presentation, **Thank You** for your attention.

Joseph Murphy

Subject: FW: BGA Early Career MICE evening

In terms of the questions I have a few additional one

1 What water levels did you consider in the design – highest possible, highest recorded or estimated.
Supplementary – what are the implications of this and how long should you monitor the water level for
My ULS calculations used a directly assessed most unfavourable value which could occur i.e. 15m below ground level. This was used in both DA1 C1 and DA1 C2 calculations.

The monitored water levels showed water strikes at 17mbgl and this was monitored for a month during the ground investigation, this was sufficiently long and occurred during the wettest part of the year.

2 Have the Eurocode principles made a real difference to the design of temporary works – what are the challenges with temporary works design using the Eurocodes
The main difference to the design of temporary works is the more complicated factoring of actions, material parameters and resistances rather than the lumped factor of safety previously employed. There was also a practice of reducing factors of safety for temporary rather than permanent works i.e. reduced slope FoS in temporary condition. This is not now possible and has therefore led to steeper slopes, deeper embedments etc.
The challenge with temporary work design to Eurocode is the increased assessment of actions resistances and factors. This is largely a familiarisation issue and as time goes by will become easier. There is also the challenge of dealing with contractors who do not appreciate the design change leads to more onerous slopes, embedments etc.Another challenge is the nature of the loading, i.e. largely short term but often quite high magnitude (cranes etc.) and the time element i.e. whether slopes are drained or undrained and whether enough GI has been done to accurately assess this, was the fabric of the soil observed and noted or are lab samples the only available record.

3 – How do you select a single design parameter from the data available – desk study/published, field work etc
A combination of all sources must be checked to ensure suitability. The primary source would be the field data; provided there is enough data to accurately characterise the parameter. Plotting of data along with desk study values is important. Guidance on choosing a characteristic and subsequent design value would be followed from codes and textbooks such as Decoding Eurocodes.

There does not need to be a single parameter, there can be an upper and lower chosen however this increases the number of calculations required.

4 – problems of foundations in variable grade of chalk and impact of solution features in the short and long term
Varying strength and deformation parameters across the foundation i.e. differential settlement of foundation due to the varying ground, increased stresses in a certain wall location due to quicker undrained to drained conditions.

Solution features if encountered could be a major issue. For example if a solution feature were just below the toe of a pile then the pile could easily punch through upon loading. Embankment instability could be caused if there were a solution feature close to the slope edge or base. The way to reduce the risk of this happening is to carry out targeted GI i.e. boreholes in pile locations to depth below the toe and trial pits and boreholes in slope excavation locations.

5 – Do you think the CDM Regulations apply to Site Investigation for development projects
Supplementary – thoughts on CDM 2015

Yes. CDM applies to all phases of a construction project from planning, site investigations, design, construction and demolition.

- Replacement of CDM-C with the Principle Designer
- Domestic clients included
- Improved industry guidance, focus on small projects

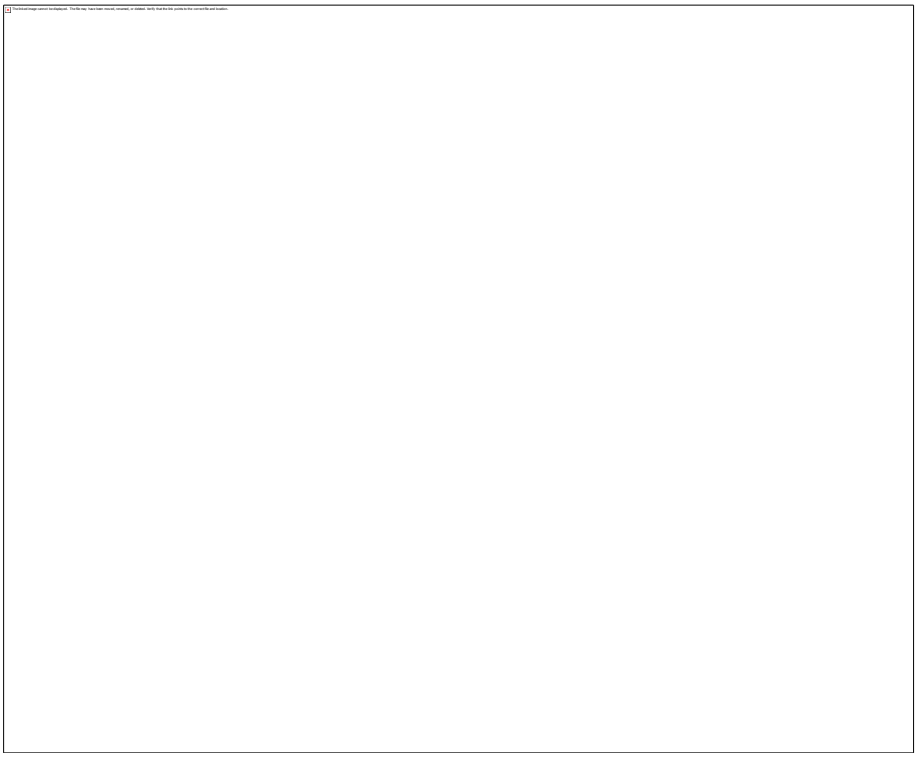
- Changes to competence demonstration

Thoughts:
Increased responsibility on designers, training required and allowance for time on site, meetings etc to carry out the new responsibility.
Domestic client inclusion will not have a major impact due to transfer of responsibility to principle contractor.
Small project focus will be difficult to implement.
Competence changes are positive and will remove unneccesary paperwork. It will also require a discerning judgement on behalf of assessors.

a. Technical understanding: Page 5. Retaining wall design. Explain drained and undrained states. What was the failure mechanism for the wall and explain why the undrained state caused failure? (supplementary question – did you apply minimum equivalent fluid pressure for the undrained analysis?)

Explain drained and undrained states.
The undrained state is where the excess pore water pressure due for example to loading or unloading has had no time to dissipate.
The drained state is where the excess pore water pressure due for example to loading or unloading is fully dissipated.
Undrained states only exist for significant periods in soils of low permeability.

What was the failure mechanism for the wall?
The failure mechanism initially was of an overturning wall (a) due to insufficient strength of the passive material, which led to multiple props being required. The failure mechanism then changed to base uplift failure (d).



Explain why the drained state caused failure?
The wall was retaining Clay with Flints at the top and weathered Chalk at the bottom. Both materials were weaker in a long-term drained state. The wall was stable in the short-term undrained analysis and was failing in the drained analysis. The failure of the multi-propped wall in the drained analysis was due to insufficient strength of the base passive material. There was also no stronger layer to toe into providing sufficient passive resistance.

b. Commercial: Page 7. What insurances do Tony Gee and Partners carry to allow for the direct employment of a Ground Investigation contractor?

Tony Gee do not carry insurance suitable for the direct employment of a GI contractor and therefore similarly to the GI in this project work is carried out under contract with a contractor and Tony Gee and I provide the technical instruction. This is cc'd to the contractor and if there is an issue then the contractor's say is final as they are the party in contract with the GI subcontractor.

c. Technical understanding and application: Page 10. '*The main M1 carriageway was being carried at the top of this slope so it was slightly different to other temporary works in that it had to be designed for full Eurocode compliance.*' Why are other temporary works not designed in full compliance with Eurocodes?

I would suggest it is best practice to design to Eurocode currently but it would also be adequate to design to British Standard for example as there is not requirement for temporary works to be Eurocode compliant just to have been designed to a code i.e. British Standards.

d. Management and Leadership: Page 10. What is your strategy for managing junior members of staff?

I endeavour to be aware of junior members of staff level of knowledge and background in order to better understand the level of responsibility they are able for and how the level of supervision required. I follow the company procedures in carrying out design reviews, ensuring the correct level and frequency of checking is carried out. This means I can keep well informed of their progress, knowledge, ability as well as enter dialogue about the type of work they want to be involved in going forward etc. like if they need/want experience of site, contracts, project management etc.

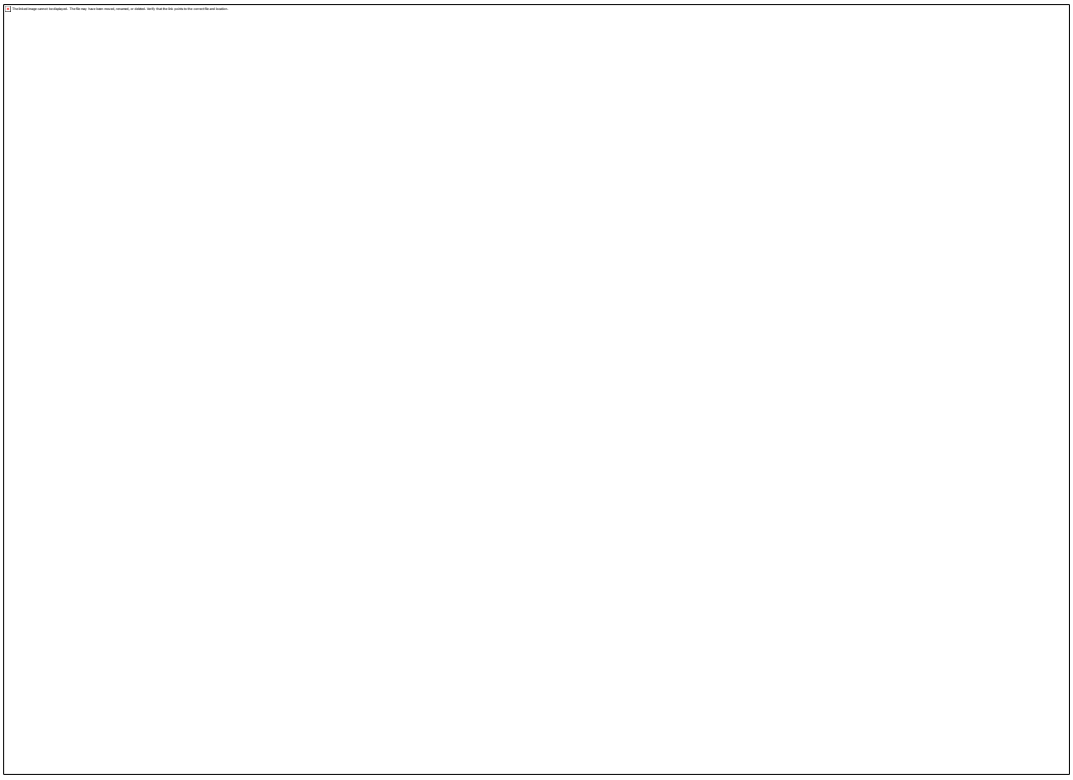
e. Technical understanding: Page 11. Explain load combinations in accordance with Eurocode 1.

Gamma & Psi factors come from NA BS EN 1990 footbridge tables rather than building tables as gantries historically were man access "bridges".

Combination 1: A1 + M1 + R1

$\gamma G_K + \gamma Q_K + \gamma \psi Q_K$

Combination 2: A2 + (M1 or M2*) + R4 A2 factors below. *negative skin friction or transverse loading



Accidental load cases taken from the bridge accidental section:

The leading variable actions was varied between the two different wind directions and temperature.

f. Commercial: Page 15. '… *due to the time and monitoring required by the site team the contractor went elsewhere for the slope design.*' Why did the Contractor go elsewhere for the slope design?
The contractor wanted an un-monitored slope stability solution. We were not able to provide one which was steep enough to meet the site requirements and therefore presented an observational approach design. An alternative design which did meet the site requirements and did not include all the requirements of an observational approach was sought and found. I imagine the design worked due to an undrained design being carried out and an assumption that undrained conditions would be appropriate for the duration of the slope standing. We were not prepared to make this assumption.

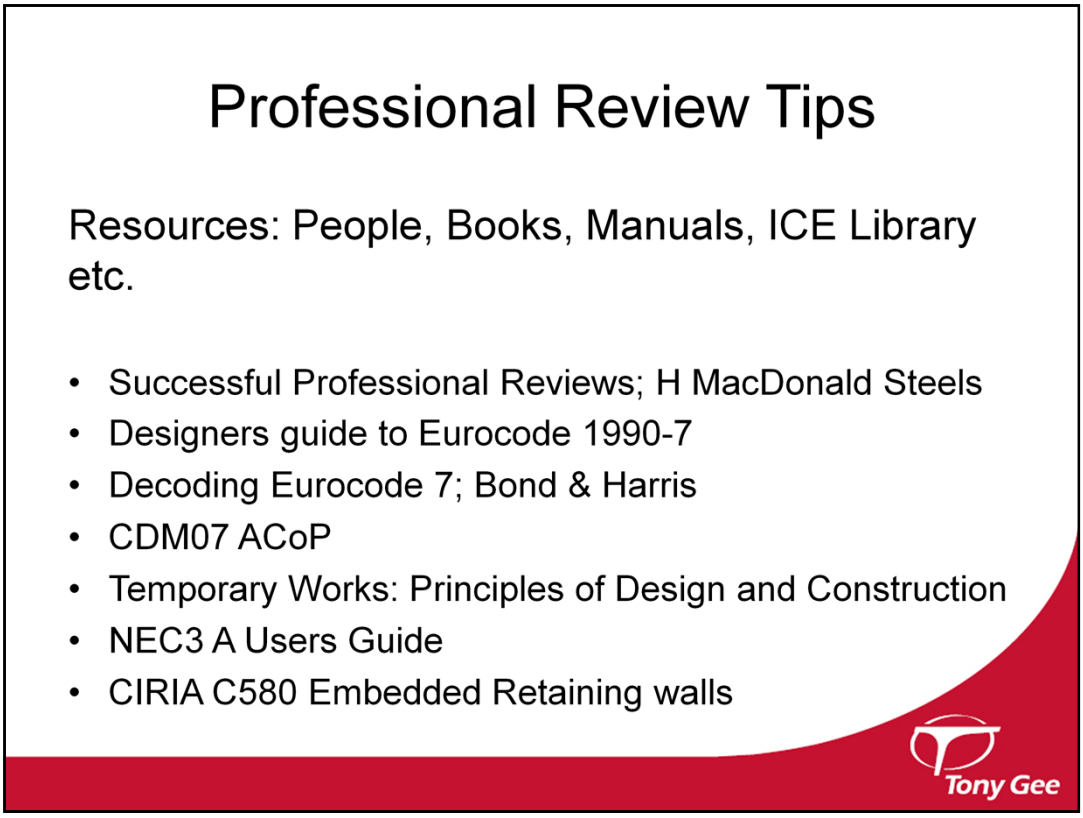
g. Commercial / Independent Judgement: Page 16. Site investigation '… *to cease work due to high winds and heavy rain*'. Who took the weather risk in the contract and how were such delays paid for? (Supplementary question: Is this reasonable?)
We never received a copy of the contract that the GI contractor was operating under despite repeated requests for it. Under the Geotechnical Investigation Conditions of Contract the weather risk is xxx's and this was my assumption. The delays did not directly cause an increase in cost, only time. This created pressure on the GI contractor's and our programme which were subsequently adjusted but not by the full amount of lost time.
It is reasonable to share the weather risk, for example, the additional cost being partly covered by the client and the impact being mitigated by additional resourcing of the job to reduce the lost time by the contractor. As a third party contractually, but in reality acting almost as the Principal Contractor, we are in a difficult position as our design time is reduced by late GI results which the Principal contractor could argue was our fault.

h. Health, Safety and Welfare: Page 16. List the responsibilities of the Designer under the CDM Regulations (this will have to be the 2007 Regulations although the 2015 Regulations may be published prior to the Spring 2015 Reviews). What did you consider to be the major Health, Safety and Welfare risk for this project?

Designer's duties (CDM07 ACoP)

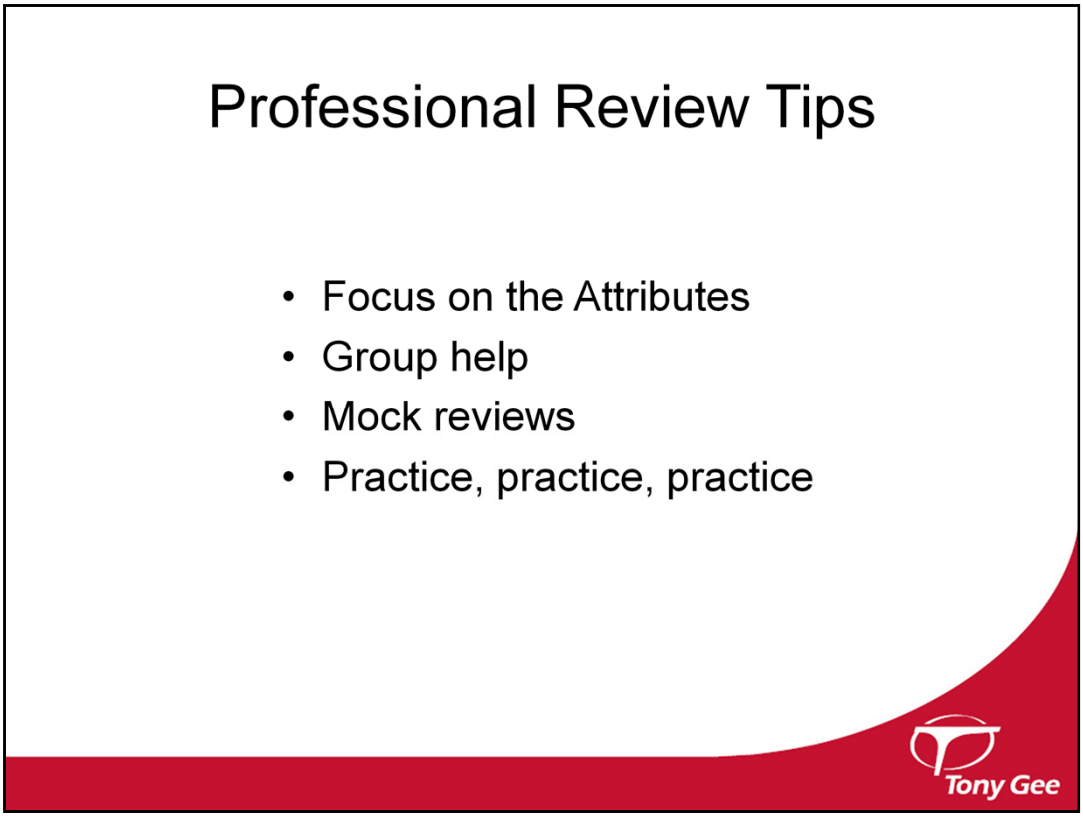
- Check client is aware of their duties
- Eliminate hazards and reduce risks during design
- Provide information about remaining risks
- Check CDM co-ordinator has been appointed
- Provide any information needed for the health and safety file
- Ensure they are competent and adequately resourced
- Co-ordinate their work with others to improve risk management and control

The major H, S & W risks on the project were plant and traffic movements, working at height and lifting. risks associated with temporary works i.e. cuttings



Use the resources available to you: People; the people best placed to help are your DE, SCE reviewers in your organisation and recent candidates. They are obliged by the Code of Conduct to help you but they will want to help you, however you have to ask!

Identify what you need to know and fill in the gaps; this is individual to every candidate.
Books, Manuals ICE Library



Make the reviewers job easy! You have 6 opportunities to pass. Experience report, project report, DAP & CPD record, Presentation, Review Q & A and finally written exercise. You are trying to demonstrate you have had 'responsible and relevant experience at a level such that you can demonstrate the Attributes.'

Show in your reports you competence with examples. Focus on what you did, not others. You will largely be questioned on what you have covered. Don't cover areas you are not confident on.

Answer the question; be it in demonstrating the Attributes, answering the reviewers or answering the question that you are given in the written exercise!

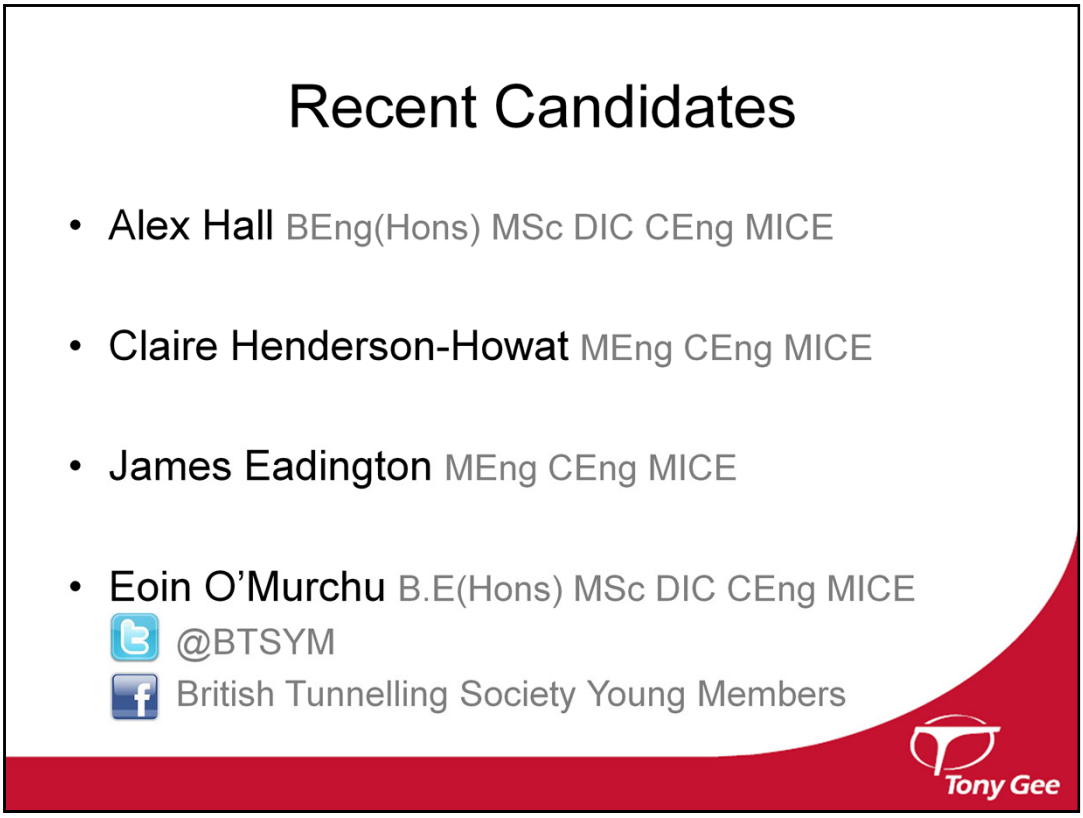
Form a group of people doing the same review as you. Write essays and share these, review each others reports etc. motivate each other.
Get your experience and project reports reviewed early enough to be able to incorporate any changes if needed. DE & SCE as well as recent candidates should help with this.

Do a mock review(s): with a reviewer or SCE watch each others, give each other mock reviews. Think like a reviewer, looking for examples of the Attributes so spell it out.

The easiest way to improve your chances is to have a clear, simple, very well prepared presentation.
Cover something you have touched on in the report. Give the presentation to non-

engineers to ensure it is simple and easy to follow.

Smile and relax



Alex Hall
Studied Civil Engineering at Edinburgh University and graduated in 2006 with a BEng (Hons). Worked for Jacobs in Edinburgh on the ground investigation for Dublin Metro. In 2010 moved to Dubai and worked for Atkins on the Dubai Metro and Kolkata Metro. Completed a Soil Mechanics MSc in Imperial College London in 2011. After that joined Atkins Energy Geotechnics team designing piles for offshore windfarms, multi storey towers, retaining walls. Passed his chartered review in Autumn 2012 and was shortlisted for ICE James Rennie medal.

Claire Henderson-Howat
Studied Civil Engineering at Durham University graduated in 2009 with an MEng. Joined Mott MacDonald in Croydon after graduation designing underground structures – station box, pile and retaining wall design. Spent one year on secondment to Taylor Woodrow working as a tunnels section engineer on Victoria Station Upgrade. Passed her chartered review in Autumn 2014.

James Eadington
Graduated with a Masters in Civil, Structural and Environmental Engineering from Cambridge University in 2008 after which he joined the Foundations and Geotechnics department of Mott MacDonald in 2009. Has predominantly worked in the rail sector designing slope stabilisation solutions for London Underground earthworks and more recently designing underground station boxes for Crossrail and Doha Metro. Passed professional review in autumn 2014.

Eoin O'Murchu
Studied civil engineering in UCD Dublin, graduating in 2009. Continued to Imperial College London to study for an MSc in Soil Mechanics, graduating in 2010. Joined Atkins Tunnelling in October 2010 where he worked on Crossrail, Tideway Tunnel and HS2. Joined CH2MHill in December 2012 and is currently working on the Hinkley Point C tunnels. Current Chair of the British Tunnelling Society Young Members. Passed review in Spring 2014. Eoin has greatly improved the online and social network presence of the BTSYM and asks that anyone on twitter follow and that you like their facebook page.