

FEDERATION OF PILING SPECIALISTS

FPS Digital Progression Group Guidance Note 1

How can BIM help solve industry
problems?

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This document was initially produced during the early stages of Building Information Modelling (BIM), when clients, contractors, and all those involved were grappling with comprehending the standards and navigating their way to comply with the BIM level 2 mandate. Fast forward to today, 'BIM' has become commonplace language within the construction industry, and the BIM process is now an everyday practice. This document has undergone revisions based on updated standards and years of practical experience.

First, let's clarify our understanding of 'BIM.' Initially, it was commonly misconceived as being primarily graphical, reliant on a 3D model and environment to showcase its advantages. However, this misconception has evolved, and it's now recognized that the 'IM'—the information and data—is the linchpin. The data that is generated, shared, validated, and meticulously managed holds paramount importance in the realm of BIM. The graphical and technological components are only as effective as the data that powers them.

So how can BIM help the piling industry? This document is divided into the different phases of project that piling will generally be engaged in:

- Tender (Pre-contract)
- Pre-Construction
- Construction
- As-Built/ Handover

We will investigate each section and ask the questions that BIM techniques could solve or help make easier.

The last section will outline the advantages and pitfalls surrounding BIM implementation. There are varying scales to address when it comes to adoption, small quick wins to large scale process changes requiring whole teams of people.

Tender / Pre-Contract

This is the first point where GOOD data can have a big impact. Historically it has been one of the most challenging – getting clients or designers to share the existing data for the likes of ground investigations or details of existing structures in the ground, there was generally a lot of assumptions made and therefore risks introduced.

1. Receiving good ground investigation

Imagine receiving a digital file containing all of the project's ground data that you put into a platform to interrogate, validate and visualise. Then use that with design software to get the optimal foundation solution.

Compare that to the current process of receiving PDF scan copies of documents that have to be transposed into a format to visualise. There is also a risk here that during the formatting that mistakes can be made. There isn't a way to use the visualisation to validate or enhance designs.

So by receiving good ground investigation data we can save time, reduce risk and maximise opportunity.

2. Use of FPS E-Pile Schedule

If we received technical data in the FPS E-Pile schedule structure it enables multiple teams to start working from a single source of truth. The designers have all the relevant information to produce the design and the digital teams are able to build a digital project which aligns to the data. Using this process, it reduces the amount of time needed to review design data, improves the quality of the tender and produces clearer costing.

Currently when we receive data not structured in this way, there is a risk in transforming it and communicating it between multiple teams. Information can be missing so assumptions will be made which can increase time and risk. If the data isn't contained in one structured file, and is spread over multiple files and formats the single source of truth won't be clear.

If we receive the FPS E-Pile Schedule, it enables smarter ways of working.

3. Data Requirements

If the clients BIM requirements (BEP, EIR) are headlined as a major factor in a successful tender it is likely more attention will be paid. The relevant people will have time to review, plan and comply. This will promote internal capabilities, and highlight any gaps in being able to deliver the requirements.

Often, we receive a tender and the BEP, IMP and other data requirements are included as an appendix and not given the same priority or weighting as other documents. This means they often go un-reviewed at the time of tendering and companies don't fully appreciate what is contractually required. At present this is often a reactive exercise post tender, which doesn't allow for the same level of planning to comply and deliver.

By working in a more digitally structured way we can optimise how we tender and allow for better optioneering. This also fully support other aspects like Health & Safety, Sustainability, Social Value.

Pre-Construction

This is the first point where good change management is key once we start receiving the construction information. It's also the first time logistics and programming are going to be looked at in detail and shared.

1. Construction Information

Once the contract is awarded a review of the tender info can be carried out and a dialogue started with the client to ascertain current understanding, deadlines and deliverables of the construction information. By having the data digitally structured changes are identified and managed in a smart, efficient way. Having a single source to manage change makes it easier to communicate to all the team members and helps mitigate risk of using out of date information. Having the data issued via a CDE draws a clear line in the sand.

Without having the data structured, teams can proceed on out of date information, change management can be done at a team level but not always communicated which increases risk, time and quality issues. Without starting a dialogue with the client around construction information and change management there will be an element of re-work.

2. Programming & Logistics

Having the programme and design data digitally allows the sequence of works to be visualised and interrogated quickly. This will show at an early stage if there are potential risks, safety concerns or delays to the programme, which can then be resolved before we get to site. Digital rehearsals of specific element or tasks can be carried out supporting the Right First Time initiative and aid toolbox talks and daily activity briefings. Having the programme visualised helps stakeholder engagement so they can understand the process and space required to construct the foundations.

It's hard to imagine how the project will be delivered when looking at a gantt program and a 2D plan drawing which aren't linked. You're not able to visualise the space requirements of the plant and have to work in a safe manor. Any potential problems remain unseen until we're on site and they arise, leading to delays.

Having a well-structured CDE to issue and manage the projects construction information is a key requirement to support a digital way of working. When the client can issue all of the relevant data in this manner it clearly marks the milestones and enables good change management.

Delivery

If the project has been set up to support a digital way of working, the delivery of the project should progress with minimal unknowns and therefore minimal risk. If the pre-construction elements are set up before going to site, it will be a process of maintaining good practice. During this phase progress monitoring and capturing construction records are the main focus.

1. Progress Monitoring

The benefit of having the data digitally means you have flexibility in how to visualise it. There are many ways to report on site progress, but having the data digitally means you can take the elements you want and present them in various ways including in real time. This gives clarity around progress on site.

Having to produce any report on progress without having the data digitally is time consuming, going to different people or documents can be inconsistent, unreliable and not give an accurate picture.

2. Construction Records

If we enable our workforce with smart devices, the data can be collected in real time enabling other team members to view and validate what is being constructed. It gives assurance that as the data is input at the time of construction it will be correct and visible to all. Working this way enables other teams to use this data to produce their own reports based on a single source.

Traditional ways of recording construction data are clumsy, time consuming and reliant on multiple people recording the information correctly, compiling and transposing the info to be digital without error before communicating it. This has many risks at every stage, often records can be lost or miss-read.

Being able to capture site information digitally through smart devices gives many benefits, not only in terms of time but also risk. It allows visibility of the site in real time for other team members to validate and report on progress quickly and easily.

As-Built

The days of having numerous A4 files full of paperwork are long gone, this should be replaced with a good digital handover via a structured CDE. It could take many different forms, but the data captured will be at the heart of it as a single source of truth.

1. Digital Twin

By using the data driven graphical model produced earlier in the project, you can update the source information to read your construction records producing a digital twin of what has been constructed. This can be your source of truth where you link other required information such as NCRs and testing information. It makes it easier for the client to review and manage the data going forward.

Currently, files are manually produced and combined into a non-indexed PDF file, making it difficult to link into the client's facilities management system. It can also frustrate the client if digital deliverables have not been met.

Challenges & Opportunities

As part of the digital journey, including more frequent automation of design steps, we have to acknowledge changes, revisions and updates are much easier and we typically experience more changes as a project progresses.

- Change control/checking
- Process in communicating change
- Training
- Validating/Auditing data
- Supply chain / 3rd Party digital capabilities
- Future planning

Glossary

Below is a list of terms used in all of the FPS guidance notes:

- BIM – Building Information Modelling
- BEP – BIM Execution Plan
- EIR – Employers Information Requirements
- CDE – Common Data Environment
- TIDP – Task Information Delivery Plan