FPS Guidance Note 1: How can BIM help industry problems?

FEDERATION OF PILING SPECIALISTS

MARK PENNINGTON

Guidance Note 1

How can BIM help solve industry problems?

The purpose of this note is to outline how BIM could remove some of the problems encountered on Ground Engineering projects on a daily basis. This note is split into the four main stages of the construction process, Pre-award, Pre-construction, Construction and As-built. Each one will outline the problems and how using BIM processes and technology it can be made easier or removed.

Note: CDE refers to Common Data Environment

PRE-AWARD (TENDER)

Advantages:

- Better Data
- Reduce Risk
- Quicker Turn around
- Reduce overhead
- Improved Safety

Issues	BIM Answer	Examples
We do not receive standard, clear & consistent information	Standard numbering and notation will make information easily searchable. BS 1192, Uniclass, Cobie. Common Data Environment (CDE) to ensure all project data is accessed through one place & linked.	Receive link to a database of tender information. Database structured in a standard fashion so ALL relevant sub-contract information can be found.
Time consuming quantity take off – leading to errors	Standard data would allow searches and extraction of data straight forward	Measuring a length of a secant wall on a PDF print out to calculate number for piles.

Unclear specified clients requirements *Spatial, tolerance, movement, construction tolerances, material specification (strength, durability, etc)*	Accurately indexed (metadata) specifications, following standard and/or project naming convention. *(Cobie/uniclass?)*	Searching all documentation for specific objects with the results showing links to the specification, drawings, and contract.
Unclear scope & 3rd party limitations.	BIM model of the proposed scheme with site constraints. Co-ordinated models will include the local environment, 3rd party boundaries.	Existing structure and surroundings submitted with proposed structure using the same co-ordinate system. Issued in a neutral format.
Difficult to assess clashes in existing infrastructure and/or during construction	3-D model will highlight potential clashes, and constructability issues. Will also highlight temporary works requirements.	Model developed in adequate detail for price and programme allowances to be made.
Presenting and evaluating alternative optioneering solutions	Optioneering using 3D modelling and assessing the impact of various solutions on other elements of the project.	Different options presented in a model to highlight changes in programme, temporary & permanent design.
Lack of and misinterpretation of site investigation	Site investigation information supplied in a standard format which makes it easy to interrogate and link in with a 3D model. This should speed up interpretation and highlight risks and omissions from the SI	AGS data supplied to interrogate strata profiles, strength & stiffness parameters and ground water regime. SI to be co-ordinated to the project system.
Identifying & presenting residual risks	Standard referencing and notation of risks will make them easily identifiable to specific aspects/objects.	When searching the CDE risks will be associated with objects and will appear in search results.

PRE-CONSTRUCTION

- Clarification of baseline that ties in with Clients Requirements
- Facilitates communication with the Client
- Solving clash issues prior to construction
- Improved Safety

Issue	BIM Answer	Example
Ensuring the design & planning of the construction is based on current information.	The CDE will be added to by all relevant parties associated with the project in a standard format. It will be possible to quickly search for and see updated information.	Same searches done at tender stage will quickly reveal revised documentation. E.g. the enabling works contractor has revised his methodology changing how the site will be handed over.
Developing a coordinated, detailed programme and logistics plan for the project. *(own work, following trades)*	Tying the program to all the little 'BIM's' in software such as Navisworks will demonstrate how different operations move around each other and highlight clashes before anyone arrives on site prompting the issue to be resolved.	Particularly key for piling works where large plant is often working on tight sites around other trades.
Generic method statements that are not read in detail by the client & operatives.	Highly visual method statements will: 1. Make difficult tasks easily explainable to the Client. 2. Make method statements easy to brief to the Labour force.	Narrated animated sequence of the construction to demonstrate how the project will be built.
Unclear requirements for procurement of the supply chain	The supply chain can access the CDE to obtain required information. The supplier's information will be input to assess compatibility.	Concrete mix designs, histograms and reinforcement details supplied in a format that can be verified against the project requirements.
Developing alternative/bespoke solutions where clashes are identified for temporary and permanent works.	Allow optioneering with input from other parties to develop the best solution. 3D models would clearly demonstrate various solutions.	• Reduce the pile element in favour of additional propping • Reduce propping in favour of additional piles
Unmitigated risks not closed out before construction	Risks linked to objects/aspects so any interface with that particular element of the work will flag up as unmitigated risk. Improved communication/collaboration between all parties	Changing the project construction sequence to reduce the risk of one particular element.

CONSTRUCTION

- Mobile communications
- Safety
- Working platform management
- Tracking and quantifying changes and variations

Issue	BIM Answer	Example
Ensuring the construction is carried out to the latest information.	The use of mobile devices together with project 'cloud' data will mean information from the CDE can be accessed anywhere on the site. They will be viewing the data in real-time meaning only the latest information will be displayed.	Setting out data is changed due to slight modifications in the sub-structure design. The updated setting out coordinates can be immediately viewed by the setting out engineers on site.
The platform certificate and drawing are not always located together. Modifications and maintenance to the platform are not adequately tracked.	Information contained within the CDE can easily link the information on the certificate to the drawings. This can also track planned maintenance to the platform. All platform data should be referenced in a standard manor to allow searched to return the relevant information	The platform should be inspected and the certificate signed on a regular basis. This can include a search of all relevant information on the platform
Changes are difficult to track through the project	Data saved in the CDE from concept to close out will supply a document history. This will allow identification of when changes materialised in the project cycle	Available working areas outlined in pre-construction not being given therefore affecting programme and production
Task specific method statements / tool box talks not read in detail by operatives	Animated task method statements could be used in daily briefings to explain the construction operation	Ipad with particular task requirements can be shown to operatives at the work face.
Site Inductions	Similar response to task method statements	
Measures identified in risk assessments are not picked up adequately during construction	Risks linked to objects/aspects so any interface with that particular element of the work will flag up as unmitigated risk. Improved communication/collaboration between all parties.	
Management of the supply chain *(supply, quality, variations)*	The supply chain will have to update/input information into the CDE. This will drive the supply chain to be consistent which will make supply, quality and variations easier to assess.	Reinforcement drawings will be directly compatible with the general arrangement drawings.

AS BUILT

Issue	BIM Answer	Example
Data is not captured well from site	Capturing construction information in real time means that it can be recorded electronically in one place. Computer output from rigs can be linked into the CDE	Construction information will be linked in the CDE.
It is not always possible to relate specific testing to areas on site	Testing information will be related to specific objects/aspects.	A search on a particular object will return testing carried out.