

CAMBRIA

Constructive Thinking

Company Profile 2018

Welcome to the Cambria 2018 Profile

We are Consulting **Civil** and **Structural** Engineers who provide comprehensive services to the construction industry. We deliver the right civil and structural solutions for all our projects, are commercially astute and always aim to exceed our customer expectations.

2017 has been a another great year for **CAMBRIA**, albeit an evolving one. Generally, it has been a quieter year for the industry regionally with more limited opportunities for consultants. Notwithstanding, we have adapted and concentrated on our previously quieter specialist sectors, most notably **Health** and now as the 2018 opportunities are taking off for our clients, we have an exciting period ahead and can't wait to deliver some really inspirational designs.

We have also continued our winning streak and at the end of 2017 were thrilled to be part of the team that won The Constructing Excellence Building of the Year Award at National level, for Bae Baglan Secondary School.



Red Hyperlinks are active within pdf version. If this is a paper copy, please visit www.cambria.co.uk to review with links.

Why Constructive Thinking?

CAMBRIA staff take immense pride in being part of design teams that are consistently delivering award winning projects and we believe that we play a pivotal role in helping that happen. Our Directors and Engineers challenge themselves in all our projects to find new innovative ways to improve the design, reduce the risks and find extra value for the client.

To make this happen we need some key ingredients:

- Highest quality MIStructE engineers
- Empathetic understanding of Architectural and MEP requirements
- Open minded approach
- Staff training and CPD programme to ensure innovative awareness

CAMBRIA are a consultancy that are evolving and redefining the Consulting Engineers' role to be more explanatory, proactive and responsive. A service our **existing clients will testify** to.

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1. Who We Are



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2.1 Professional Memberships



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2.2 Company Accreditations



BUDDSODDWYR | INVESTORS
MEWN POBL | IN PEOPLE



CONTRACTORS HEALTH & SAFETY ASSESSMENT SCHEME
Accredited Contractor
www.chas.gov.uk



Constructionline
Gold Member

2.3 Company Awards



Constructing Excellence
National Project of The Year Winner 2017
Ysgol Bae Baglan

Constructing Excellence Wales
Project of The Year Winner 2017
Ysgol Bae Baglan



2.3 Company Awards



Gwobrau 2016 Enillydd

Awards 2016 Winner

Constructing Excellence Wales

SME of The Year 2016



3. What We Do

Our services can be broadly divided into three distinct areas, corresponding with the usual UK construction process for most kinds of development.

(1) Pre-Planning

Cambria actively encourages early consultant involvement and our pre-planning advice can range from an informal view on likely acceptability of a new highway access, a formal due diligence report on engineering viability, or right through to full pre-planning services including the provision of **Phase I Environmental Assessment, Flood Consequence/Risk Assessment, Surface Water Drainage Strategy, Transport Impact Assessment** and **Travel Plan**.

(2) Pre-Construction

It is often the case that our clients have already progressed to outline planning or independently developed their site location. In our Pre-Construction phase, our services concentrate on the discharging of planning conditions, preparation of **Civil / Structural / Environmental / Highways** tendering information, design development and contractor tender evaluation.

(3) Construction

It is imperative that our design information is clear, concise and easily translated and delivered by the contractor. The Construction period is the critical time, where our reaction to unforeseen changes or site parameters can be the difference between a successful project and not. Whilst this period typically sees the least amount of information production, it is the time when we provide the highest levels of support.

Our expertise is in a wide range of project sectors including:

- **Education** – Primary and Secondary Schools, Colleges and Universities.
- **Residential** – Single and Multi storey developments involving social housing, student accommodation, Care Homes and private developers.
- **Retail** – food and non food retail stores, shopping centres and retail parks.
- **Offices** – single and multi-storey blocks for single and multiple occupation.
- **Public Buildings** – Libraries, Cattle Markets, Fire Stations, Life Boat Stations, HQ Offices.
- **Healthcare** – Hospital Alterations and Extensions, GP Surgeries, Pharmacies.
- **Defence** – Stores, Training and Recreation Facilities, Medical and Motor Transport Facilities.

4. Sectors

Commercial

We have a particular expertise in delivering developments for private developers where the key issues are to be on time and within budget to help Clients maximise their profit margin. We have successfully delivered the widest range of projects from entire Business Parks to individual developments.

Residential

Most of our projects involve residential developments for private and public sector clients who are looking to develop their sites as economically as possible either to maximise their gain or to simply be able to deliver new housing stock within their available budget.

Defence

Our Engineers have worked extensively on Defence related projects on Establishments throughout the UK and also on overseas bases such as Gibraltar and The Falklands. We therefore have a thorough knowledge of the MoD's project execution requirements particularly those relating to their JSP Scales, CTM, DREEM and approach to Risk Management.

Education

We have rightly developed a reputation for our breadth and depth of experience within the education sector . We have worked on ALN/SEN, Nursery, Reception, KS1 and KS2, Learning Plazas, Secondary, Further Education, Higher Education, Colleges and Universities. Our teams have worked on the first Primary School to achieve BREEAM Excellent and also the first Secondary School in the UK to achieve BREEAM Outstanding.

Health

We consider our Healthcare experience to be a particular advantage with our engineers and technicians having successfully completed a wide range of healthcare related projects throughout the UK for both private and public sector clients including NHS Trusts.

Retail

Our Retail clients benefit from our commercially astute approach to project delivery which is of particular advantage where there are store opening dates which cannot be missed.

5. Preplanning Services

5.1 Phase 1 Environmental Assessments

Many projects involve sites which have been subject to various previous uses that could have contaminated the ground. We aim to keep the costs of testing for contamination to a minimum by providing our clients with a Phase 1 Environmental desk study which involves:

- Examining historic and geological mapping records and documentation.
- Establishing the previous, potentially contaminative, uses of the site.
- Establishing the potentially contaminative uses of surrounding land.
- Identify the contaminants (sources) potentially associated with these uses.
- Identify the environmental receptors potentially at risk from identified contaminants.
- Establish the potential physical pathways linking potential sources and receptors.
- Highlight factors influencing source-pathway receptor linkages.
- Compare threshold levels for remedial actions.
- Provide a specification for the Phase 2 intrusive site investigation works.
- Provide an appraisal of potential remedial options within a comprehensive report.

5.2 Transport

We provide our Clients with the required **Transport Assessment** and **Travel Plan** reports in support of their Planning Applications and then follow through with the design and detailing of the required highway works.

Our Engineers have successfully delivered Transport Assessments and Travel Plans for Clients wishing to secure Planning Approval on projects throughout the country. These projects mean we are expert in:

- Traffic modelling of Local Highway Networks.
- Delivering **Transport Assessment** reports to Local Highway Authority/Highway Agency/TfL Approvals.
- Securing approvals to cost effective **Travel Plans**.
- Providing **Bus Stop Audits** when requested in support of Planning Applications.
- Attending public planning inquiries and appeals.
- Providing expert witness reports and advice.

5.3 Flooding

Our Flood Risk Screening work establishes the extent of the work necessary to satisfy the Environment Agency (EA/ Natural Resources Wales (NRW) and the Local Planning Authority's (LPA) requirements and involves the following:

- Contacting and liaising with the EA/NRW to obtain any Flood Risk information it has for the site and immediate vicinity and establish its specific Flood Risk Management requirements.
- Establishing (in consultation with the LPA and the EA/ NRW) the design lifetime of the proposed development and the proposed standards for flood defence and safety.
- Researching publicly available relevant documents such as Catchment Flood Management Plans, Regional Flood Risk Appraisal, Preliminary Flood Risk Assessments, etc.
- Contact the local Water Authority to obtain information on the capacity of their existing sewer network in the vicinity of the site, as well as identifying any known problems they may have with their network.
- Establish current local planning authority policies in relation to flood protection, surface water drainage, sustainable drainage and protection/recharge of groundwater (including any strategic flood risk assessments (SFRAs) or precursor documentation which may have been prepared).

6. Structural Engineering

Why do you need us?

We can deliver a building that you can be proud of – Architecturally and Structurally and is easy to construct. We are passionate about minimising construction costs and will exceed whatever is expected of us.

All projects are individual and we will have your best interest as our top priority. In order to achieve this we will:

- Design a range of potential superstructure options to deliver the best solution.
- Design to a Cost Code not just the Structural Engineering Code.
- Ask questions and test decisions to improve on what's being delivered.
- Propose alternatives whenever we can to reduce costs but not compromise on quality.
- Examine documentary geological and borehole records for groundwater depths and quality data.
- Establish which are the sources as well as the potential sources of flood risk.
- Having undertaken the above work we will have defined the required scope of works to be covered within the FCA/ FRA Report to be submitted in support of the Planning Application.

When do you need us?

Developers, Local Authority, House Builders, Estate Managers - If you wish to build something then you need to contact us as soon as you have decided to go ahead.

Contractors - As soon as you have decided to tender for a contract to construct a building of any kind contact us – preferably before the tender comes out to give us as much time as possible to help you win it.

Our expertise in delivering our structural engineering services:

Our Engineers have extensive experience of delivering structural engineering related projects for Clients throughout the country and overseas. These projects mean we are expert in:

- Structural modelling and 3D analysis of common and complex structures. **BIM** modelling and clash detection – Revit, Navisworks.
- Alterations and extensions to traditional and system build buildings.
- Works to listed buildings and ancient monuments.
- Securing environmental credits for BREEAM, Code for Sustainable Homes, CeCEQUAL, etc
- Delivering Structural solutions to Clients with problem buildings.

7. Infrastructure

In the last two decades the construction industry has reacted to the Egan and Latham reports and, by consensus, achieved a degree of success in delivering off-site, higher quality and low risk building solutions. However, the processes regarding delivering the site were somewhat neglected. The engineering approach to the site and manner in which we decide to prepare the site for development through the various facets of Civil Engineering will have the greatest influence on risk, cost and the local environment.

Why do you need us?

One of the greatest risks in delivering a development project to a budget involves the Civil Engineering design of the works. Abnormal groundwork costs frequently arise but they can often be off-set with clever and often innovative design solutions such as:

Avoiding the need to clean up **contaminated ground** beneath brownfield sites.

Improving the quality of poor ground to avoid the need for costly piling.

Designing **ground levels** to avoid the need for costly import or export of bulk materials.

Designing clever surface water drainage solutions (**SUDS**) to help avoid the need for costly attenuation and still secure the Environments Agency's approval.

Creating foul **drainage** capacity in combined sewers to allow new developments to be connected to them at minimum cost.

When do you need us?

Developers - If you have found a site and wish to develop it then you need to involve us straight away.

Contractors - As soon as you have decided to tender for a contract to construct a building of any kind contact us – preferably before the tender comes out to give us as much time as possible to help you win it.

In all cases the sooner you speak to us the sooner we can identify the Civil Engineering cost risks to your project and the sooner we can lessen them with sustainable solutions which will reduce construction costs.

8. 2018 Projects

Cardiff West Community High School



Images provided by Powell Dobson

Client:	Cardiff City Council
Contractor:	Willmott Dixon Construction
Architect:	Powell Dobson
Sector:	Education
Value:	£36m
Completion Date:	2018
BIM Level:	Level 2

Cambria Consulting are the appointed Civil and Structural Engineers for the new Cardiff West Community High School which forms part of the 21st Century School Programme. Opening in September 2018, the school will replace Michaelston Community College and Glyn Derw High. The school will accommodate 1,200 pupils from Year 7 – 11 plus 320 sixth formers for post 16 education.

The project will provide a first class community facility for the west of Cardiff, with a number of areas of the main building accessible to the public for learning, sport and creative art. The new school will be a pathfinder school with links to the create industries in the city region.

The school compromises three separate blocks on a site which covers 8.8 hectares including the main building, sports block and post 16 building. The buildings are of steel frame on traditional pad and strip foundations and ground bearing slabs. The first floors are of composite concrete/metal decking.

The buildings are brick clad with areas of insulated composite panels. The roof has lightweight purlins with topdek insulated panels.



Surface water drainage has been designed in accordance with SuDs hierarchy. Ground conditions were not suitable for infiltration and the nearest watercourse was 800m from the site. An attenuation system was incorporated with capacity for a 100 year rainfall event plus climate change allowance prior to discharge water saver.

The project is being designed and modelled to BIM Level 2.

City Heights, Cardiff



Images provided by Holder Mathias

Client:	Draycott Construction Ltd
Contractor:	Intelle Construction
Architect:	Holder Mathias Architects
Sector:	Residential
Value:	£12m
Completion Date:	2018
BIM Level:	Level 2

Cambria Consulting are appointed as Civil and Structural Engineers for the 146 unit residential block at 199-209 City Road, Cardiff.

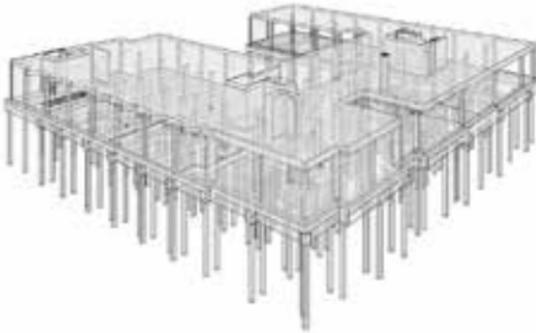
This multi storey building varies in height from 3 to 9 storeys delivering residential and retail units, plant areas, cycle parking and refuse storage.

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The superstructure comprises of a reinforced concrete podium slab to first floor that supports a Metframe structure to the floors above. The structure is clad in a mixture of brick work and cladding panels. Due to poor ground bearing capacity and the proximity of adjacent buildings the building's foundations are piled using CFA piles to minimise the noise and risk of vibrations damaging the adjacent properties.



Golden Mede, Waddesdon



Images provided by C.F. Møller and Virtual Viewing

Client:	The Rothschild Foundation
Contractor:	Allen Build
Architect:	Placebuilder Architects / C.F. Møller
Sector:	Residential
Value:	£2m
Completion Date:	2019
BIM Level:	Level 2

Cambria Consulting are appointed Civil and Structural Engineers for the residential developments at Golden Mede, Waddesdon, Buckinghamshire which delivers 75 high quality bespoke units of stunning architectural design.

The project was conceived by Lord Rothschild and The Rothschild Foundation and aspires to make a step change in the architectural language of British housing. Following an international architectural competition C.F. Møller Architects were appointed and through the design process created a scheme heavily influenced by acclaimed housing in North Copenhagen that utilises long sloping split roofs and other key Scandinavian design features.

The site delivers a mix of one and two bedroom apartments, and two, three and four bedroom houses arranged as meandering terraces that form a 'crescent' surrounding the communal landscape space.



The construction of these two/three storey units is of traditional build with timber cut roofs, engineered joists and are timber brickwork clad. Additional structural steelwork has also been utilised in the design to achieve the unique architectural features. The foundations are of traditional pad and trench-fill footings at various depths to suit the topography and ground conditions.

Lexus Showroom, Cardiff



Client:	GGT Estates
Contractor:	Chiltern Designs
Architect:	Meda
Sector:	Commercial
Value:	£3m
Completion Date:	May 2018
BIM Level:	Level 2

Cambria Consulting are the appointed Civil and Structural engineers for the construction of a new Lexus Showroom and Service Centre Building with an associated Valet Bay Building and Car Parking for 96 vehicles. The site is prominently situated in the go-to area for car sales in Cardiff.

The front of house showroom display area compromises a 30 metre wide, 2 storey full height space enclosed by full height glazed curtain wall with a bespoke entrance lobby.

The office area behind this space includes a mezzanine level for offices, plant room, parts store and archive storage. The rear of the building houses a workshop area with a piston driven car lift installed beneath the floor slab.



The steel frame building is clad to customer branding requirements with integral signage. A parapet encloses the roof, with an internal gutter, allowing for concealed rainwater pipes within the building. Both the main building and the valet bay building are supported on piled foundations.

The car park runs right to the site boundary and highway and has been designed to fit with the neighbouring site levels. The drainage design includes attenuation crates sunk beneath the car park. Cambria's services also included delivering the required Environmental Assessment, Flood Consequence Assessment, Transport Assessment and Travel Plan to secure planning permission.

Willowbrook, Cardiff



Images provided by Pentan Architects

Client:	Cardiff Council
Contractor:	Wates Residential
Architect:	Pentan Architects
Sector:	Residential
Value:	£20m
Completion Date:	August 2020
BIM Level:	Level 2

Cambria Consulting were appointed Civil and Structural Engineers for the first phase of the Cardiff Living Development Partnership between Cardiff Council and Wates Residential.

The Willowbrook West site is the largest of the Phase 1 developments, delivering 192 new residential units on a greenfield site in St Mellons.

The site presented a number of challenges; with a section of the southern area of the site designated in a flood zone, there are a number of watercourses & reens along the site's boundaries, numerous PROW routes traverse the site, and there are a number of mature tree lines.

To allow development, Cambria obtained several ordinary water-course consents to divert and culvert the watercourses to enable both permanent and temporary access routes into the site. A S247 Stopping up Order was obtained from WAG for the existing highway land on the site, which was no longer used, and the PROW routes were diverted via a S257 agreement to align with the new proposed street layouts.



Cambria designed all the Sustainable Drainage Systems (SuDS) which were incorporated into the surface water drainage scheme, the run-off from the site being restricted to the QBar Greenfield run-off rate with all attenuation provided by a pond and wetland area in the southern corner of the site. A pond dipping deck and soft landscaping have ensured that the pond also provides amenity and biodiversity benefits to the development. Cambria also secured all the required S38 Agreements, S104 Drainage Agreements from the Local Highway Authority and Welsh Water respectively.

Seminar, Swansea



Image provided by Oxford Architects

Client:	Seminar Components
Contractor:	TBC
Architect:	Oxford Architects
Sector:	Commercial
Value:	£3m
Completion Date:	December 2019
BIM Level:	Level 2

Cambria Consulting are appointed Civil and Structural Engineers for the proposed Seminar Components Factory at Plot H, Felin Fach Industrial Estate, Fforestfach, Swansea. This Brownfield site was previously occupied by a large industrial unit which had been demolished prior to re-development.

Seminar Components are the UK's leading designers and manufacturers of automated seating mechanisms. The project delivers a 4,700m² factory (Class B2) including offices with ancillary parking, bicycle shelters, smoking shelter, switch room, service yard and associated landscaping on the 1.8ha site.

Cambria initially produced the required FCA, TA and Surface and Foul Drainage Strategy reports which were submitted in order to secure Planning Approval. The site's ground conditions were of made ground to depth so in order to avoid the need for costly piled foundations ground improvement techniques were adopted which allowed all foundations to be of traditional pad and strip footings and the ground slab to be ground bearing which significantly reduced construction costs and time on site.

The main building's superstructure is of 25m spanning double bay portal frames with a central row of 'hit and miss' columns to minimise their impact on the main production and storage areas. Externally the site-wide surface water SuDS system was designed for the critical 1 in 100 year storm event plus allowances for Climate Change to comply with the design criteria approved at Planning. The SuDS solution made best use of an open detention pond and tanked sub-base storage system to provide the required attenuation volume which then discharged from the site through a Hydrobrake flow control mechanism at the site's agreed Green-field run-off rate.

A symphonic drainage system was also specified which allowed all roof areas to discharge at the Eastern end of the building nearest to the detention pond thereby avoiding the need to pipe roof water from the opposite end of the site. All the SuDS measures adopted together with the provision of a full retention petrol interceptor provided an element of cleansing to the surface water flow from the site prior to it discharging into Welsh Water's adopted sewer.

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9. Client Testimonials

Remember the testimonials from our
Company Profile 2015 to 2017...



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Here are our new testimonials received for 2018...



"I have worked with Cambria on a number of projects over several years. I have always found the service to be excellent. They work in a collaborative way, provide cost effective innovative solutions, and are particularly good at thinking outside the box in difficult situations. They are always responsive and have delivered for us in very tight timescales, when needed, and have never failed to deliver a good quality service."

**Associate Director
Newport Norse**



"We are currently working with Cambria on a number of varied developments and have found their knowledge, commercial understanding and advice to be consistently excellent. We look forward to continuing our working relationship and would have no hesitation in recommending Cambria."

**Development Director
Draycott Group**



“Lawray have an excellent working relationship with Cambria. Their staff are always approachable and go the extra mile to ensure true collaboration is achieved on all projects. What’s fundamental to our business is the implementation of BIM Strategies to which Cambria fully embrace. Their proactive as opposed to reactive nature ensures that they provide innovative and quick solutions to any problems that may arise during construction”

Director
Lawray Architects



“Neath Port Talbot County Borough Council have worked with Cambria on three of the County’s most significant recent schools investments, namely, Ysgol Newydd Margam, Sandfields Comprehensive School and the award winning Ysgol Bae Baglan. The team at Cambria are proactive, enthusiastic, reliable and consistent in the service they provide. They strive to deliver the best possible design solutions and go to great lengths to achieve a very high level of customer service and satisfaction.”

Architectural Design & Project Management Manager
Neath Port Talbot County Borough Council

Trago®

“Cambria have contributed invaluablely to the structural design and delivery of our long-awaited mega-store at Swansea Road. 357,000 sq ft (33,166m²) of built development has risen from this remediated brown field site in just 78 weeks since Kier Western and Wales were awarded the contract, and Cambria has proven a accommodating, accomplished and dependable partner throughout. Work on Phase 2, the Leisure Park will commence shortly, and we are delighted that our association will continue into the future on this next project and chapter of the development of what is a very substantial asset.”

Chairman
Trago Mills Group

The following information is provided as a useful 'high-level' aide memoire.

If your reliance is critical please contact this office.

10. High Level Costing

It is imperative that all construction disciplines have a sound grasp of the 'high level' costs of a range of different types of construction work. There has never been so much information available on historical data and construction trends, such that estimation at the outset, is actually a lot more accurate than most people would think.

We are often approached by customers for our thoughts at the very early stages of potential projects, when the idea might not be more than a piece of land and wanting to know what they could do with it, but the initial question of affordability should be answered positively before everyone involved starts racking up costs, including the customer!

We were once asked to look at a 15 storey residential building, which both the client and their Architect had been working on, they had decided that there was no point in involving PM/QS services until we had something on paper to manage/price, so we were approached to look at column spaces and how we could get the car park to work. We were told there was a significant budget and the client wanted something exemplar. All very exciting and we set about due diligence on the site.

As designers, it can be tempting to ignore the elephant in the room, intentionally or not, and allow customers to progress, get your feet under the table and wait for someone else more appropriate to deliver the bad news. Our view is that there is a collective responsibility to provide the right advice no matter what, rather than look the other way.

The 15 storey residential building had a footprint of 1520m², and hence a construction cost of circa £40m (if high quality and exemplar). The client's budget was £22m. Obviously the gap can be reduced by reducing area and specification, but instantly we knew we had a problem. This is very relevant currently, with a high profile Architect losing their high court dispute when tender costing revealed a scheme over double the original budget. The client couldn't afford the scheme as designed, had to effectively start again but having paid their original consultants was left with worthless tender drawings. The claimants' lawyer commented at the end of the trial "Cost and budget is a key constraint and should always be identified and considered when designing any project, even when the provision of cost advice is expressly excluded from the designer's obligations".

The above serves as a stark warning and we must all accept that the construction industry has a collective budget responsibility at every stage of the process across all disciplines.

We have listed below some construction guide prices for the most common commercial projects, not published here to be relied upon, but figures we might use in establishing if the overall construction budget is realistic for common types of buildings (these are build costs alone).

Residential	£/m²
High Rise (→20 storeys)	1750-2250
Medium Rise (10←storeys←20)	1500-2000
Low Rise (←10 storeys)	1250-1750

Student Accommodation	£/bed
High Rise (→20 storeys)	55k-70k
Medium Rise (10←storeys←20)	50k-65k
Low Rise (←10 storeys)	45k-60k

Hotels (shell)	£/m²
Four Star	900-1500
Budget	600-900

Offices	£/m ²
High Specification	1650-2000
Medium Specification	1300-1600
Business Parks	1000-1500

Retail (shell)	£/m ²
Shopping Centre	850-1500
Retail Park	500-1000

Warehouses	£/m ²
Typical	400-800

Car Parks	£/space
Surface	2000-4000
Multi-Storey	8000-12000
Basement	20000-40000

11. New Standards in BIM

BIM is now widely used in the construction industry and is here to stay as a core part of the UK Governments Construction Strategy 2016-20. This strategy builds upon the Government's Construction Strategy 2011-15 where a deadline of April 2016 was set for government procured construction projects to use fully collaborative 3D BIM. BIM Level 2 was developed to meet this mandate.

The fundamental idea behind the use of BIM is to create and share the right information at the right time throughout the design, construction and operation of a building or facility, in order to improve efficiency and decision making. The emphasis is therefore on collaborative working between all various parties involved throughout the lifecycle of an asset.

It isn't just 3D CAD, it's a collaborative way of working that allows for Contractor involvement at the early stages of a development. Having a three-dimensional model allows the designers, clients and end users to work together to develop the most suited design and to test it on the computer throughout the design process before construction.

During construction BIM also enables the supply chain to efficiently share precise information about components, quantities and construction sequencing. This can lead to a reduction in errors and waste. This is not new technology and it's not next generation, **it is being done now!** and employs the latest digital technologies and more efficient methods for designing, building and maintaining our assets.

So, what do the letters mean?

'B': Building - for some of us this may relate to everything within the building envelope, but it can also include the surrounding infrastructure - roads, drainage and landscaping.

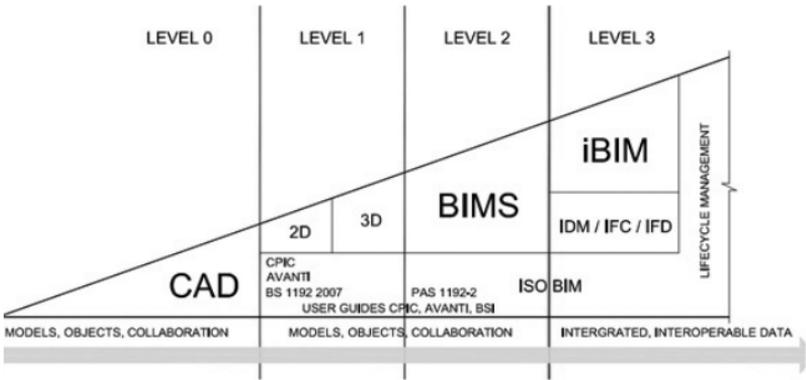
'I': Information - this is the key word out of the three. The virtual 3D models do not only contain intelligent objects, they are also a database of product data and all sorts of other non-graphical information.

'M': this has a few different meanings, it can be a model, the task of modelling, or management.

BIM is both a noun and a verb. A 'model' is created by Cambria's experienced structural team 'modelling' using 3D design and analysis software packages which are fully coordinated with the architectural and services models. The model can also be used by the fabricator to save time on project delivery.

BIM Levels

The process of BIM implementation has taken time and been developed in stages as technologies have improved. These are currently defined as being in four key levels expressed as the past, present and future of BIM in the construction process.



BIM Level 0 (pre-2011)

BIM Level 0 is its basic form and is defined by the lack of Building Information Modelling. At this level information is produced in 2D and the collaboration between the parties collating information is limited. Output of the information is via simple 2D electronic prints or on paper.

BIM Level 1 (2011)

BIM Level 1 uses 2D or 3D with the work governed by standards set mainly for CAD where British Standards (BS 1192:2007) is adopted. Limited Electronic sharing of data is carried out from a common data environment (CDE). This is the level at which many organizations are currently operating, although there is no collaboration between different disciplines – each publishes and maintains its own data.

Projects at this level are generally managed by the contractor with some collaboration between different parties being achieved.

BIM Level 2 (2016)

BIM Level 2's main attribute is the introduction of collaborative working using 3D CAD models but not necessarily working on a single shared model. Output has to adhere to the regulations laid out in the BSI document PAS 1192-2 which sets the standards and methods of working.

Models can be shared between all parties by the use of common file formats such as IFC (Industry Foundation Class) or COBie (Construction Operations Building Information Exchange) on a common data environment (CDE) allowing the coordination of a combined BIM model.

BIM Level 3 (TBA)

BIM Level 3 is the next step in the deployment of BIM. This is also referred to as 'open BIM' and driven by the Government's Construction Strategy 2011-15 this will be achieved using a single shared project model allowing the coordination process to be taken even further.

The desired end product is to create a single, fully coordinated 3D model which incorporates all the disciplines involved in the construction process being used throughout the design and construction phases and thereafter by the end user for the entire life span of the building.

BIM Dimensions

As BIM continues to evolve it is crucial to understand the difference in 'dimensions' that can be used within a BIM project. BIM dimensions are different to BIM Levels and categorises the additional intelligence available within BIM software and categorises the extra information available rather than the format in which it is produced.

3D (The shared information model)

3D BIM is the most common form of BIM - the process of creating graphical and non-graphical information by Architects, Civil and Structural Engineers, MEP System Engineers, Builders, Manufacturers and Project Owners. All parties can extract and generate views and information according to their needs. With the use of CDE the models from other disciplines can be incorporated using IFC files to help manage the multidisciplinary collaboration process and effectively coordinate, identify and analyse complex spatial and structural problems.

4D (Construction sequencing)

4D BIM adds the ability to schedule additional data assigned to 3D components. This data can relate to time-related information which allows for easier detection of site clashes either physical or sequential and visualize the progress of their activities through the lifetime of the project.

Additional information assigned to components can assist during the construction phase showing information such

as lead in times, how long it takes to install/construct, the time needed to become operational/harden/cure, the sequence in which components should be installed, and any inter-dependencies with other elements of the project. This allows the Project Planner to develop an accurate delivery programme while ensuring works are safely, logically and efficiently sequenced.

5D (Cost)

5D BIM incorporates additional information to that scheduled in 4D by assigning monetary values to materials used and anticipated time need to complete task. 5D BIM provides methods for extracting and analysing estimated costs and evaluating the potential impacts of changing scenarios can have on budgets.

6D (Sustainability)

6D BIM aids in energy consumption analysis and can deliver lower energy consumption. This is accomplished via the ability to take measurements and perform verification checks during the building occupation.

7D (Facility management)

7D BIM allows the extraction of information on the life cycle of the development. Providing performance information on elements extending to component status, specifications, maintenance/operation manuals and warranty data.

Cambria & BIM

At Cambria we are committed to being at the forefront of BIM implementation and aim to always be ahead of the game. We understand the vital importance of BIM and what it brings to the Construction industry enabling the better exchange of information and permits better interdisciplinary integration and coordination reducing the risk of mistakes or discrepancies and a smoother design phase when done correctly. We are currently in the process of being accredited to the BRE's BIM Level 2 Certification Scheme to ensure we are working to the highest and most up to date standards.

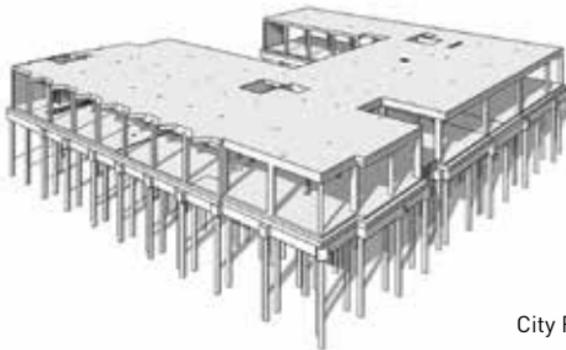
Throughout this process we have reviewed our ways of working and developed our standards to comply with the regulations laid out in BSI PAS 1192-2 to meet BIM Level 2 requirements. This includes submitting our BIM Execution Plan and supporting documents to the BRE for verification in order to demonstrate our compliance.

Our documentation establishes exactly how we utilise BIM on a day to day basis. We outline the importance of using BIM Execution Plans, Staff Training Schedules, BIM/CAD Procedures & Task Information Delivery Plans. These standards are all critical in the BIM Environment and are the foundations of a truly collaborative BIM enshrined project.

As BIM continues to be implemented within the industry It is always useful to re-assess our ways of working. Via the use of BIM Execution Plans and by developing Common Data.

Environment procedures / protocols and Clash Avoidance Procedures to ensure that as Task Team we are best positioned to collaborate by other members of the Design Team to best share all the information we produce.

As BIM implementation sweeps through the industry's Clients are looking to ensure that they can rely on their Task Team to deliver and BIM certification can provide that assurance. We at Cambria have always known that we have the knowledge, expertise and processes in place to deliver to the highest of BIM standards – and now we will have the Certificate to prove it.



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