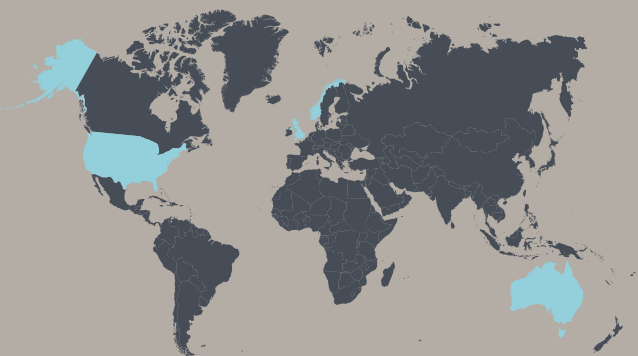


An Independent Review of Design & Build Procurement/ Construction Model

for delivery of school buildings (or other similar
public buildings) internationally.

This report was prepared for the Department of Education and Skills,
for the Government of Ireland



An Independent Review of Design & Build Procurement/ Construction Model

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public buildings) internationally.

Prepared by

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About the Authors

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Dr. Alan Hore is a Chartered Quantity Surveyor and currently the Head of Quantity Surveying in the School of Surveying and Construction Management at Technological University Dublin. Alan was one of the founders of the Construction IT Alliance and completed (CitA) a Ph.D. on the topic of construction informatics in Trinity College Dublin in 2007. He has an extensive portfolio of published work in the discipline area of construction informatics. Alan was the Principal Investigator on the BIM Innovation Capability Programme in Ireland (2015-2017) and sat on the National BIM Council of Ireland during the preparations of the NBC Roadmap for Digital Transition. Alan is a member of a number of editorial boards for international journals and regularly contributes to international journals and conferences.

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Dr. Barry McAuley is a Chartered Construction Project Manager and full-time lecturer in Digital Construction and Engineering within the School of Multidisciplinary Technologies at Technological University Dublin. Prior to his current position, Barry spent a number of years working in the construction and facilities management sector which enabled him to develop his managerial skills through employment in a number of diverse roles. He completed a Ph.D. in 2016, which focused on using Building Information Modelling to demonstrate how early integration of Facilities Management professionals into the design team can result in reducing life cycle costs. On completion of his Ph.D., Barry spent two years working as the primary postdoctoral researcher on the CitA Lead Enterprise Ireland funded BIM Innovation Capability Programme of Ireland. As a result of his research to-date, he has had a significant body of work published through a combination of industry reports, conference proceedings and journal papers.



Pictured from left
Dr. Alan Hore,
Dr. Barry McAuley and
Professor Lonny
Simonian

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Acknowledgements

Executive Summary



Executive Summary

The purpose of this study is to provide an overview of the current use and practices of Design and Build (D&B) (procurement/construction model for the delivery of school buildings in four countries internationally (which includes the United Kingdom).

The authors give a unique insight into the varied approaches taken by these jurisdictions in the use of D&B procurement in the delivery of publically funded school facilities. The authors do not seek to compare the use of D&B procurement in these regions, as it is important to appreciate the interchangeable terminology and established practices that exist in these differing jurisdictions.

The authors report that there is a largely consistent approach in the adoption of D&B as a preferred delivery method in school building programmes in the international regions investigated. In Australia the common term used is Design & Construct (D&C) not Design& Build.

It is within this context that the readers appreciate that there are mix of procurement variants, hybrid delivery vehicles and alternative terminologies surrounding "D&B" that are founded on traditions in those international regions.

The authors consulted a broad spectrum of online resources, noteworthy publications and highly experienced delivery teams, such as, the Los Angeles Unified School District (LAUSD) and Schools Infrastructure New South Wales (SINSW) teams who have a particular responsibility to deliver state-of-the-art Schools building in their regions.

The report sought to give an insight into who was responsible for the delivery of public school building programmes, detailing any design and procurement guidelines, popular forms of D&B contracts in use and presenting a selected case study in each of the international regions investigated.

The report provides a unique insight and opportunity to learn how a selection of international public procurers of school projects are constantly looking to improve project outcomes by delivering projects on time, on budget and to the quality stipulated in their contracts.

It is clear in this report that D&B is increasingly been seen as the default procurement method to deliver School projects in the vast majority of regions investigated in this study.

Scope of study



Scope of Study

This report involves a desktop review from all relevant available reports and other sources of information to establish the current use of D&B procurement in the chosen international regions with a specific focus on:

- 1 The procurement process undertaken by the public entity.
- 2 The form of D&B contract typically used and the key aspects of this.
- 3 The operation of the D&B contracts.
- 4 The certification and quality assurance methods utilised during and on completion of the design and construction phases of such projects.
- 5 Any post occupancy evaluation processes.

The authors collated factual relevant information from the following sources:

- 1 Online Desk Research - a refined search technique to identify specific information from official government and professional body websites.
- 2 Government publications - noteworthy government publications including legislation, policy documents, discussion documents, statistics and reports.
- 3 Peer-reviewed (refereed or scholarly) journals - articles written by experts that are reviewed by several other experts in the field before the article is published.
- 4 Formal industry reports - established industry body reports founded on robust investigations and findings.
- 5 Personal interviews - the authors gained access to senior management in government authorities who were the most informed people to validate current procurement practices.

The research team would like to take this opportunity to thank all those persons who assisted the authors in the preparation of this report, in particular, the authorities in NSW who at the time were experiencing significant bush fires.

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PART ONE
AUSTRALIA

New South Wales



Key Findings

Procurement processes undertaken
by public entities

Form of D&C Contracts and Key Aspects

Operation of D&C Contracts

Certification and Quality Assurance Methods

Post Occupancy Evaluation

NSW Ten Point Commitment to
the construction industry

Case Study

Key Findings

1.7



- 1** The NSW Schools programme falls under the responsibility of SINSW.
- 2** The current NSW Infrastructure Strategy 2018-2038 stipulates the use of D&C as the preferred procurement strategy for a number of the larger projects identified in the 20 year pipeline of school projects.
- 3** The Department of Education (DoE) developed Educational Facilities Standards and Guidelines intended to assist those responsible in the management, planning, design, construction and maintenance of new and refurbished school facilities.
- 4** The NSW Government ProcurePoint online resource provides the definitive data source for construction procurement policy.
- 5** NSW Government Procurement System for Construction is an online solution that provides structured advice on selection of a suitable delivery mechanism for construction.
- 6** The most widely used form of contract in NSW Schools building programme is the GC21 (Edition 2) D&C contract.
- 7** In 2018 the Construction Leadership Group committed to a ten point action plan to the construction sector to help improve the capability and capacity of the construction sector to help the NSW Government achieve its infrastructure objectives.
- 8** GC21 (Edition 2) includes performance evaluation forms that include categories of performance that parties are encouraged to monitor.
- 9** All projects developed by School Infrastructure New South Wales (SINSW) must comply with the Investor Assurance Framework which stipulates that all projects must be delivered on time, and within budget and to the standards expected.
- 10** SINSW conducts post-occupancy evaluations on a selection of projects. NSW publishes Total Assessment Post-Implementation Review Guidelines that are in use today.

Procurement processes undertaken by public entities

1.2



Responsibilities for Schools Programme

In 2018 the NSW Government published its Infrastructure Pipeline¹ and the hosting of an online NSW Infrastructure Pipeline covering the transport, health, education, justice, sports and culture sectors. This pipeline coincided with the publication of the state infrastructure strategy 2018-2038². The pipeline included a commitment of \$87.2 billion (€51.61 billion) earmarked for projects over the next four years, which includes a \$6 billion (€3.55 billion) Schools investment programme to deliver more than 170 new and upgraded schools to support local communities throughout NSW. This document outlines infrastructure proposals under development by the NSW Government. The proposals included have a minimum capital value of \$50 million (€29.50 million). The NSW Schools programme falls under the responsibility of Schools Infrastructure NSW³.

An extract from the 2018 pipeline detailing education projects is shown in Tables 1 and 2 (overleaf).

It is evident in Table 2 that there is a particular reference to the use of D&C as the preferred procurement strategy for a number of the larger projects identified in the pipeline.

School Procurement Guidelines

The DoE developed comprehensive Educational Facilities Standards and Guidelines (EFSG)⁴. The EFSG is a contemporary and intuitive web based platform intended to assist those responsible in the management, planning, design, construction and maintenance of new and refurbished school facilities. The information includes:

- NSW Department of Education school types with content on educational principles, accommodation recommendations, design intent on rooms and spaces, relationships between accommodation components and associated technical data.
- Technical Design and Technical Specification Guide.
- Links to relevant industry design and specification information.



Fort Street School, New South Wales.

¹ NSW Government, 2018, NSW Infrastructure Pipeline, accessed 29th December 2019, <http://www.infrastructure.nsw.gov.au/expert-advice/nsw-infrastructure-pipeline-2017/>

² Infrastructure NSW, Building Momentum State Infrastructure Strategy 2018-2038, accessed 29th December 2019, <https://www.nsw.gov.au/improving-nsw/projects-and-initiatives/nsw-state-infrastructure-strategy/>

³ Schools Infrastructure NSW, accessed 29th December 2019, <https://www.schoolinfrastructure.nsw.gov.au/>

⁴ Educational Facilities Standards and Guidelines, accessed 29th November 2019, <https://efsg.det.nsw.edu.au/>



Procurement processes undertaken by public entities

1.2



| Responsible Organisation | Project Name | Region |
|---|--|-------------------------------|
| EDUCATION | | |
| School Infrastructure NSW | Chatswood Education Precinct | Greater Sydney |
| School Infrastructure NSW | Hurlstone Agricultural High School (Hawkesbury) relocation | Greater Sydney |
| School Infrastructure NSW | Meadowbank Education Precinct | Greater Sydney |
| School Infrastructure NSW | Chatswood Olympic Park new high school | Greater Sydney |
| School Infrastructure NSW | Cooler Classrooms | State-wide/Multiple Locations |
| School Infrastructure NSW | More than 170 new and upgraded school projects across NSW | State-wide/Multiple Locations |
| PRECINCTS | | |
| UrbanGrowth NSW Development Corporation | The Bays Urban Transformation - Bays market District (Sydney Fish Markets) | Greater Sydney |
| UrbanGrowth NSW Development Corporation | Bays West | Greater Sydney |
| UrbanGrowth NSW Development Corporation | Westmead Precinct | Greater Sydney |
| WATER | | |
| Water NSW | Warragamba Dam Raising | Greater Sydney |
| SPORTS INFRASTRUCTURE | | |
| Infrastructure NSW | Redevelopment of Stadium Australia | Greater Sydney |
| Estimated Project Value | Procurement Strategy | |
| \$ 50-100 million | Alliance | Alliancing |
| \$ 100-250 million | ECI | Early Contractor Involvement |
| \$\$\$ 250-500 million | CO | Construct Only |
| \$\$\$\$ Over 500 million | D&C | Design and Construct |
| | DBB | Design Bid Build |
| | MC | Managing Contractor |
| | PPP | Public Private Partnership |
| | Various | Mixture of the above |
| | TBA | Not available at this time |

Table 1 - NSW Schools Infrastructure Pipeline (NSW Government, 2018, pp. 22)

| Estimated Project Value | Procurement Strategy | Project Phase | 2018 | | 2019 | | 2020 | | 2021 | | 2022 | | 2023 | | 2024 | |
|-------------------------|----------------------|---------------|------|-----|------|----|------|----|------|----|------|----|------|----|------|----|
| | | | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 | Q1 | Q2 | Q3 | Q4 |
| \$ | D&C | D | | TBA | | | | | | | | | | | | |
| \$ | D&C | D | | TBA | | | | | | | | | | | | |
| \$\$\$ | D&C | D | | TBA | | | | | | | | | | | | |
| \$ | TBA | I | | | | | | | | | | | | | | |
| \$\$\$ | Various | RP | | | | | | | | | | | | | | |
| \$\$\$\$ | Various | RP | | | | | | | | | | | | | | |
| \$\$\$\$ | D&C | D | | | | | | | | | | | | | | |
| \$\$\$\$ | TBA | SP | | | | | | | | | | | | | | |
| \$\$\$\$ | TBA | I | | | | | | | | | | | | | | |
| \$\$\$\$ | TBA | I | | | | | | | | | | | | | | |
| \$\$\$\$ | D&C | I | | | | | | | | | | | | | | |

Table 2 - NSW Schools Infrastructure Pipeline (NSW Government, 2018, pp. 23)

Procurement processes undertaken by public entities

1.2



The EFSGs are designed to assist:

NSW DoE staff involved in school planning and design.

School staff in the rationale of school design, the design intent and pedagogical implications of the various spaces.

The school design team including project managers, architects, engineers and other specialist consultants involved in school planning and design.

Construction and maintenance contractors

The wider community with an interest in school planning and design.

The NSW Government ProcurePoint resource⁵ provides information on construction procurement policy. The policy requires the contractor, consultant and/or related entities (as applicable) to comply with all aspects of the NSW Code of Practice for Procurement (the 'NSW Code')⁶. This includes ensuring that principal contractors allow NSW Government authorised personnel to monitor and investigate compliance.

The New South Wales Industrial Relations Guidelines: Building and Construction Procurement⁷ have been in force since 1 July 2013 ('NSW Guidelines'). The Guidelines apply to building and construction companies that bid or tender for NSW Government infrastructure work.



Jordan Springs School, New South Wales.

⁵ NSW Government ProcurePoint, accessed 29th December 2019, <https://www.procurepoint.nsw.gov.au/policy-and-reform/construction-procurement-policy>.

⁶ NSW Code, accessed 29th December 2019, https://www.parliament.nsw.gov.au/ladocs/inquiries/1888/code_of_prac_curr.pdf

⁷ NSW Industrial Relations Guidelines: Building and Procurement (updated 2017), accessed 29th December 2019, <https://www.industrialrelations.nsw.gov.au/assets/Uploads/files/New-South-Wales-Industrial-Relations-Guidelines-Building-and-Construction-Procurement.pdf>

Procurement processes undertaken by public entities

1.2



Key players in providing advice to the NSW Government include the Australasian Construction and Procurement Council (ACPC)⁸ and the Construction Leadership Group (CLG)⁹.

More specifically the NSW Government Procurement System for Construction¹⁰ is an online solution that provides a structured approach to procurement. The system assists government agencies to manage effectively and efficiently procurement processes for construction. The system is maintained by the NSW Department of Planning, Industry and Environment.

The Procurement System for Construction provides support for:

- selection of appropriate procurement and contracting strategies, and nomination of an appropriate principal in contracts;
- preparation of tender documents and contracts based on standard forms;
- selection of contractors and consultants with proven performance records;
- effective management of contracts, including clause commentaries, sample letters and checklists;
- maintenance of an effective performance management system through monitoring and reporting
- and resolution of contractual claims and disputes.

Whilst there are a wide range of procurement methods, the CLG has attempted to aggregate the methods into the following types:

- Construct Only
- Design Finalisation & Construct
- D&C
- Design, Construct & Maintain
- Cost Plus
- Managing Contractor
- Early Contractor Involvement
- Framework Agreement
- Incentivised Target Cost
- Alliance Agreement
- Collaborative Client contractor
- Delivery Partner or Construction Management
- Public Private Partnership

The most recent publication on construction procurement selection by the NSW Government in December 2018¹¹ aims to facilitate industry engagement on the development of the guidelines. The goals of the industry engagement are to identify industry drivers for determining selection of the most appropriate procurement method for each project and to identify preferred procurement methods; and agree on definitions of procurement methods.

In addition to the more traditional methods identified above, the CLG also detail more collaborative contracting and Public Private Partnership (PPP) variants¹².

⁸ Australasian Construction and Procurement Council, accessed 29th December 2019, <https://www.apcc.gov.au/>

⁹ Construction Leadership Group, Terms of Reference, 29th December 2019, https://www.procurepoint.nsw.gov.au/system/files/documents/clg_terms_of_reference.pdf

¹⁰ NSW Government Procurement System for Construction, accessed 29th December 2019, <https://www.procurepoint.nsw.gov.au/before-you-buy/construction/procurement-system-construction>

¹¹ EConstruction Leadership Group, Construction Procurement Methods, 2018, accessed 29th December 2019, http://www.infrastructure.nsw.gov.au/media/1788/construction-procurement-methods_industry-discussion-paper_final.pdf

¹² These more specialist procurement methods fall outside the scope of this study.

Procurement processes undertaken by public entities

1.2



The procurement option chosen for the purposes of this report is the D&C¹³ delivery method. Here the client takes responsibility to develop to concept design level detailing 100% of project scope in a functional brief. The contractor in turn responds by completing the detailed design and provides typically a fixed price and agreed timeline. The contractor is responsible for (and assumes risk for) final design and constructability. The client may pay a premium to transfer design risks to the contractor. With this method of delivery the tendering cost to contractors may be relatively higher due to cost of design works. The client generally engages first a consultant to prepare preliminary design and second a contractor to complete the design and to construct the relevant works. The contractor may subcontract works.

It is recommended by the CLG that this method is used where the client is happy to develop the concept design and where the contractor is best placed to manage the design engagement with the client and take risk on the design. It is suited to greenfield and brownfield projects where the risk can be assessed and priced and where there are opportunities for innovation in design.

The main benefits of D&C identified by the CLG are detailed below.

- 1 Commercial alignment between design and constructability.
- 2 Contractor innovation able to be designed into project.
- 3 Price certainty in design management and construction components.
- 4 Price and risk certainty greater with time and procurement risk taken by contractor.
- 5 The client deals with a single entity over the life of the project, which reduces the client's risk.
- 6 Construction phase can be fast-tracked.
- 7 The client can utilise a contractor's full expertise by enabling the integration of the contractor's design and construction experience.
- 8 Reduced likelihood of significant variations or unforeseen constructability issues.

The main risks of D&C identified by the CLG are detailed below.

- 1 Price includes design/constructability risk absorbed by Contractor.
- 2 Design outcome controlled by Contractor.
- 3 Contractor has a low focus on lifecycle costs and considerations including quality. Project will be designed and constructed at the lowest cost to meet the minimum requirements set out in the Works Brief and detailed performance.
- 4 May discourage innovation (due to over pre-specifications).
- 5 Town planning and approvals risks unlikely to be passed to contractor (but contractor assumes appropriate approval condition responsibilities).
- 6 Design development may be difficult to distinguish from a variation which may be a source of disputes.
- 7 Promotes an adversarial relationship between the client and contractor.
- 8 Contract price may include a risk premium to reflect increased contractor risk.

Criteria to consider in selecting most appropriate procurement method.

- Whole-life-costs including cost of risks
- Whole-of-life benefits
- Alignment with program objectives
- Budget certainty
- Timeframes
- Market capacity
- Flexibility
- Allocation of risk
- Innovation

¹³ A variant to the method is Design Finalisation and Construct where the client designs to 100% schematic and 70% detailed design.



Form of D&C Contracts and key aspects

The NSW Government Model Tender and Contract Documentation (May 2013)¹⁴ provides advice on model clauses, developed to assist agencies and principal contractors to comply with the requirements of the NSW Code and the NSW Guidelines referred to earlier.

There are a number of standard forms of contract detailed on the NSW Government ProcurePoint website (Table 3)¹⁵.

| Form of Contract | Brief Description |
|-----------------------------|---|
| GC21 Edition 2 | For D&C contracts valued at \$1 million (€0.59 million) or more, or of lower value with complex contractual requirements. |
| MW21 | For straightforward construction contracts valued at less than \$1 million (€0.59 million). |
| Mini Minor Works | For contracts valued at less than \$50,000 (€29,500) with simple terms. |
| Consultancy Services | Used for the engagement of private sector consultants for construction projects. |
| Project Management Services | Used for the engagement of private sector project managers for construction projects. |
| Expression of Interest | Process of seeking an indication of interest from potential service providers who are capable of undertaking specific work. |

Table 3 – Construction Forms used by NSW Government

The preferred form of contract to be used in the delivery of the vast majority of School building projects in NSW is the GC21 form.

¹⁴ NSW Government Model Tender and Contract Documentation (2013), accessed 31st December 2019, https://www.industrialrelations.nsw.gov.au/assets/Uploads/publications/CCU-related-documents/nsw_model_tender_and_contract_documentation.pdf

¹⁵ Construction Contracts, accessed 31st December 2019, <https://www.procurepoint.nsw.gov.au/before-you-buy/construction/construction-contracts>

Operation of D&C Contracts

1.4



The GC21 (Edition 2) ¹⁶ is intended for use on building projects where the contractor designs and constructs the works in accordance with the contract. There are a complex array of provisions in the contract dealing with the following broad areas. This section only serves to provide an overview of the key provisions of the above contract, namely: ¹⁷

- 1 Contract framework
- 2 Carrying out the works
- 3 Claims and issue resolution

Contract framework

This section deals with the purpose and structure of the Contract. It allocates responsibilities and sets up the procedures for making the Contract work. The Contractor must Design and Construct the works in accordance with the contract, perform all its other obligations under the Contract. The principal (employer) must pay the contractor the contract price for its performance, in accordance with and subject to the contract and observe all its other obligations under the Contract. The principal may give instructions to the contractor concerning the works and anything connected with the works, and the contractor must comply at its own cost unless the contract expressly provides otherwise.

Both the contractor¹⁸ and the principal can appoint an 'authorised person' ¹⁹ to act on their behalf on the project.

The contract is quite explicit about evaluation and monitoring of the project. Performance evaluation record forms are provided as Attachments 2, 2A and 3. They do not form part of the contract and the parties may amend them to suit the specific attributes of the Contract.

The contract documents include the GC21 General Conditions of Contract, the contract information, the annexed Schedules, the principal's documents as at the

date of contract, the other contract documents listed in contract information item 26; and the deed of contract. In addition the parties must comply with and meet any obligations imposed by the NSW Code and the NSW Guidelines.

The contractor must submit a contract programme to the principal within 14 days after the date of contract. If the principal so instructs, the programme submitted by the contractor with its tender is the contract programme until the contractor submits a contract programme.

The contractor is solely responsible for all subcontractors and is liable for their acts and omissions as if such acts or omissions were those of the contractor. Subcontracting of any obligation under the contract does not affect the contractor's obligations or liability under the contract. The contractor indemnifies the principal against all claims (including Claims), actions, loss or damage and all other liability arising out of any acts or omissions of subcontractors.

“ The Contractor must complete the design in compliance with the SCOPE of WORKS TECHNICAL CRITERIA provided by the Principal and carry out all other design necessary in connection with the Works. The Contractor's design obligations include, but are not limited to:

- completion of design, documentation and workshop detailing in compliance with the SCOPE of WORKS TECHNICAL CRITERIA provided by the Principal, including coordination of design activities and the interaction of the various disciplines;
- development of the preliminary design in compliance with the SCOPE of WORKS TECHNICAL CRITERIA provided by the Principal for elements referred to in Contract Information item 38A.1; and
- full design by the Contractor of elements referred to in Contract Information item 38A.2 and the SCOPE of WORKS TECHNICAL CRITERIA provided by the Principal.”

¹⁶ This is the preferred form of contract for delivery of D&B projects in NSW.

¹⁷ Note the provisions dealing with termination and dispute resolution are not dealt with in this section.

¹⁸ The *Contractor's Authorised Person* acts with the Contractor's full authority in all matters relating to the Contract.

¹⁹ The *Principal's Authorised Person* does not act as an independent certifier, assessor or Valuer. The *Principal's Authorised Person* acts only as an agent of the Principal.

Operation of D&C Contracts

1.4



Carrying out the works

This section deals with Design and Construct activities. It contains provisions that apply to the physical carrying out of the Works and also covers procedures for payment.

A feature that is unique to GC21 is the inclusion of a start-up workshop held to encourage the parties and others concerned with the works to work co-operatively towards achieving a successful Contract. The objective of the start-up workshop is to promote a culture of co-operation and teamwork for the management of the Contract.

Except as expressly identified in the contract, the contractor is responsible for the management in a timely manner so as to comply with the contract programme, of all issues arising in respect of Neighbouring Land.

The contractor must complete the design provided by the principal and carry out all other design necessary in connection with the Works. To the extent specified in the contract, the contractor must review its design in consultation with persons nominated by the principal, and develop the design and the contractor's documents allowing for any matters identified in the review.

There is a provision for an incentive to the contractor to improve its service to the principal by innovation. If the principal accepts the contractor's proposal, the contractor benefits from the variation and the principal benefits from the value added to the works through reduced operating or maintenance costs or other savings.

The Contractor must identify and promptly make good all defects so that the works comply with the contract. At any time before completion, the principal may instruct the contractor to make good defects within the time specified in a defect notice. Similar to other D&B contracts there are explicit provisions and operational clauses dealing with valuation of changes, variations, extensions of time, liquidated damages, acceleration, payment, provisional sums, prepayment, payment claims, final payment and completion.

A novel provision in this contract is the appointment of a valuer engaged to independently determine time and value matters. When a matter is referred to the valuer by either party, the valuer must consult with both parties, determine the matter in accordance with this agreement and as specified in the contract, and issue a certificate stating the determination within 28 days (or another period agreed by the parties) after the matter is referred to the valuer. The valuer may meet with the parties together to discuss a matter referred under this agreement. The parties agree that such a meeting is not a hearing which would give anything under this agreement the character of an arbitration.

Claims and issues

If the contractor makes a claim each claim must include information sufficient for the principal to assess the claim, including the factual and legal basis and detailed quantification. The claim must also include the effect of the event giving rise to the claim on both the contract price and contractual completion date(s). If a party gives notice of an issue, the senior executives named in contract Information must promptly confer to try to resolve the issue.

“ The Contractor must identify and promptly make good all Defects so that the Works comply with the Contract. This requirement does not affect any other remedy or right of the Principal. At any time before Completion, the Principal may instruct the Contractor to make good Defects within the time specified in a Defect Notice issued by the Principal. If the Contractor fails to make good the Defects in the time specified in the Defect Notice, the Principal may have the Defects made good by others and then:

- 1 the cost will be a debt due to the Principal and may be deducted from the Contract Price, unless a Variation applies under clause 50.5; and
- 2 the Contractor will be responsible for the work involved in making good the Defects as if the Contractor had performed the work”

Certification and Quality Assurance methods



The GC21 Contract does not support third party certification. There is no Contract Administrator under this form of contract. As the contract proceeds, regular meetings allows parties and selected stakeholders to evaluate performance and identify priorities. Performance Evaluation forms are provided as attachments to the standard form. They do not form part of the Contract and the parties may amend them to suit the specific attributes of the Contract²⁰. This contractual obligation is in addition to the following NSW Government Policy and Guidelines²¹.

The Principal (Employer) considers the contractor to be an expert in the Design and Construction of the works and holds the contractor responsible for its work. The Principal requires completion to be defects-free²². There is a provision in the contract for a Close-Out Workshop where there is an opportunity to review the management of the contract. It is also used to collect and provide feedback to the parties to enable them to improve the overall communication and management process for any possible future contracts.

Beyond the contract and common law responsibilities SINSW employs a range of certification and quality assurance methods throughout the project lifecycle. This includes but is not limited to:

- Establishment of a Project Control Group and a Project Reference Group which includes technical stakeholders from early stages of the project. These groups ensure that the views of diverse community, educational and technical stakeholders are accommodated throughout the project.

- Communication
- Time
- Relationships with others affected by the works
- Budget and Financial Issues
- Scope Management
- Quality
- Safety
- Environment
- Contract Relations
- Community Consultation
- Aboriginal Participation
- Maintenance of Asset Operation

²⁰ The contractor bears the cost of ensuring its compliance with the NSW Code and NSW Guidelines. This compliance does not relieve the contractor from responsibility to perform the works and any other obligations under the contract, or from any liability for any defect work.

²¹ Industrial Relations Guidelines Building and Procurement, Work Health and Safety Management System and Auditing Guidelines; Environmental Management Systems Guidelines and NSW Government Procurement Guidelines in Skills and Training.

²² Completion applied to any milestone as well as the whole of the work.

Certification and Quality Assurance methods

1.5



Suggested Performance Evaluation Objective Categories to be included in Performance Evaluation

- Some nominated technical stakeholders (such as security, health and safety and ICT) formally endorse project designs as they progress through concept, schematic and detailed design phases.
- During construction, the main construction contractor is required to provide a number of construction plans illustrating adherence to statutory approval conditions, quality and work, health and safety requirements.
- During construction, project managers conduct regular quality assurance audits and inspections of completed works. These include ensuring quality of finish and materials.
- During handover and commissioning, handover documentation is provided by the main construction contractor to ensure compliance with statutory and departmental standards.

All projects developed by SINSW must comply with the Infrastructure Investor Assurance Framework (IIAF)²³ which stipulates that all projects must be delivered on time and within budget and meet community expectations for quality and functionality. The IIAF applies to capital projects with a value of \$10 million (€0.59 million) and above, being developed, procured or delivered by General Government agencies and Government Businesses.

The Assurance Framework consists of:

- project monitoring
- regular project reporting
- expert and independent Gateway Reviews and Health Checks
- Insights sharing and capability building for public sector professionals engaged in the delivery of infrastructure projects

This tiered, risk-based approach to the assurance evaluation ensures that the focus is on the most important and complex projects. The process is confidential to each project, and advice is provided to the NSW Government, as the investor, through regular reporting.

This approach enables “red flags” to be raised and an opportunity for interventions to be ordered to ensure projects are delivered on-time, on-budget, and in accordance with the NSW Government’s objectives. An illustration of the Gateway Reviews is shown in Figure 1 (overleaf).

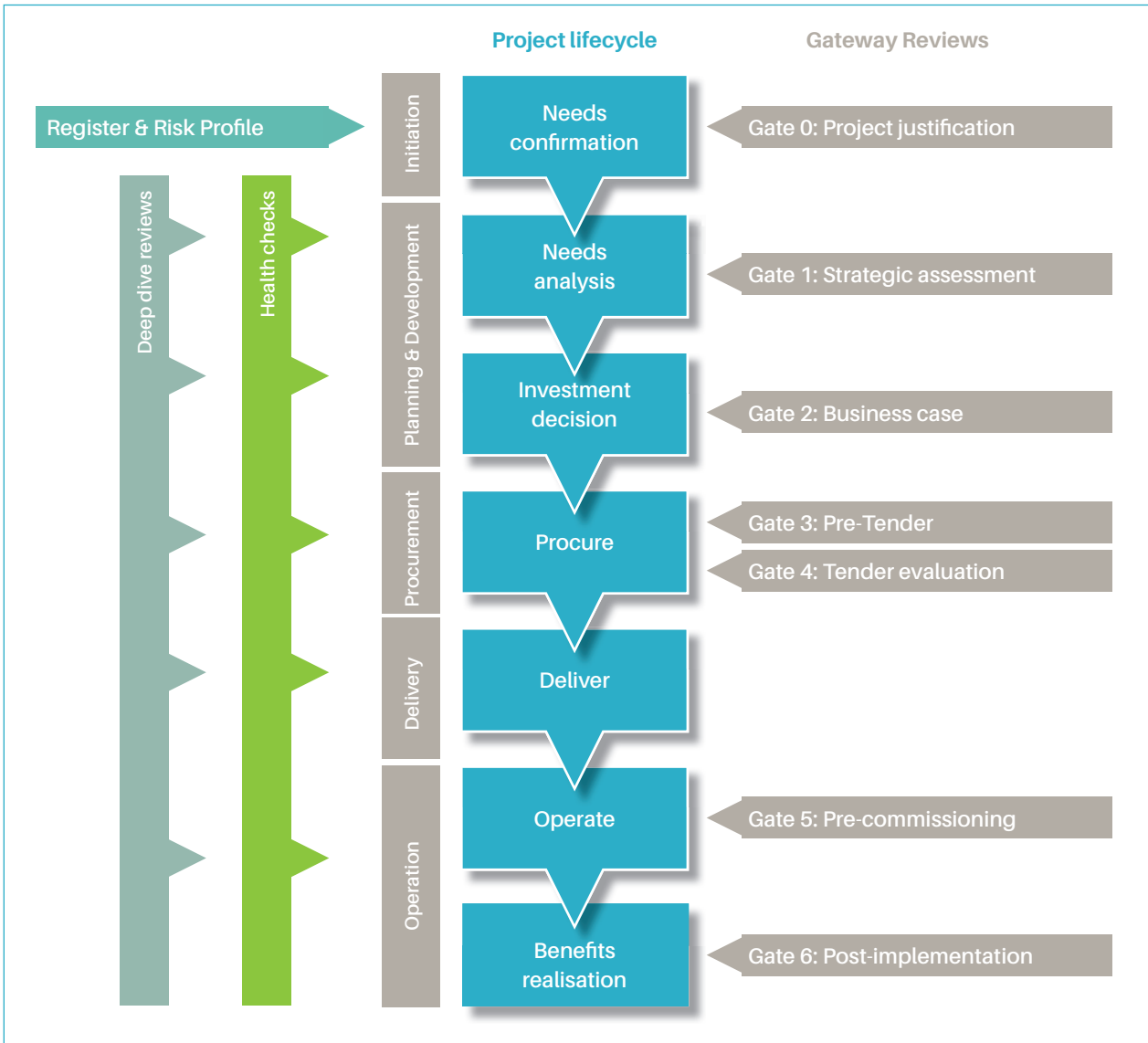
²³ Infrastructure New South Wales, (2018), Making a Difference, How the Infrastructure Investor Assurance Framework is improving capital project delivery in NSW, A summary of the 2018 Trends and Analysis Report, accessed 30th January 2020, see http://www.infrastructure.nsw.gov.au/media/2283/ec_insw_trends-and-analysis_summary_v08.pdf

Certification and Quality Assurance methods

1.5



Figure 1: Process and Timeline for IIAF Gateway Reviews (IIAF, 2018, pp. 7)



The key focus areas in the review includes:

1. Service Need
2. Value for Money and Affordability
3. Social, Economic and Environmental Sustainability
4. Governance
5. Risk Management
6. Stakeholder Management
7. Asset Owner's Needs and Change Management

Post occupancy evaluation processes

1.6



SINSW conducts Post-Occupancy Evaluations (POEs) on a selection of major projects. These POEs consider how the new facilities are being used by educators and whether they are operating in a fit-for-purpose manner²⁴. They are typically utilised to determine whether decisions made by the design, construction and facilities management (FM) professionals have met the envisaged requirements of end-users and the development's commissioners

There are various POE frameworks for evaluating building performance²⁵ used in Australia, for example:

- Post-Occupancy Review of Engineering (PROBE).
- CBE Building Performance Evaluation (BPE) toolkit.
- International Institute for a Sustainable Built Environment (IISBE) Protocol.

A POE is critical to encouraging good educational outcomes. It can identify successes and weaknesses as well as provide benchmarks to inform future projects. A POE is a formal evaluation process where information is accurately recorded to produce an objective impression of the project and its design outcomes.

On a more project specific context New South Wales Treasury published a Total Assessment Management Post Implementation Review (PIR) Guideline in September 2004 which is still relevant and used today²⁶.

PIR Report Headings

- Executive Summary
- Background
- Project Efficiency
- Project Approval and Management
- Operational Performance
- Performance Assessment and Measurement
- Overview and Observations
- Recommendations and Conclusion
- Appendices (Survey results etc..)

²⁴ Such work has significant implications in the area of soft landings (within a building delivery process) by ensuring that future decisions made about similar buildings designs are based upon lessons learnt from an existing building's operational performance and the fulfilment of client and user requirements.

²⁵ Abisuga, A.O., Wang, C.C. and Sunindijo, R.Y., (2019), A holistic framework with user-centred facilities performance attributes for evaluating higher education buildings, *Facilities*, Vol. 38, No. 1/2, 2020 pp. 132-160.

²⁶ New South Wales Treasury, (2004), Total Asset Management, Post Implementation Review Guideline, September 2004, accessed 30th January 2020, see https://www.procurepoint.nsw.gov.au/system/files/documents/total_asset_management_post_implementation_review_0.pdf

NSW Ten Point Commitment to the Construction Industry

Schools Infrastructure NSW are one of a number of agencies²⁷ in NSW that make up the Construction Leadership Group (CLG) all of whom are engaged in the delivery of a large long term pipeline of infrastructure investment on behalf of the NSW Government.

In 2018 the CLG committed to a ten point action plan to the construction sector to help improve the capability and capacity of the construction sector²⁸ to help the NSW Government achieve its infrastructure objectives. The NSW Government is committed to achieving value for money in construction procurement by adopting a longer term view about the need to drive quality, innovation and cost effectiveness by fostering a thriving and sustainable construction sector in NSW.

This Action Plan covers all NSW Government-procured construction and is designed to:

- Encourage an increase in the “supply side” capacity of the sector to meet future demand.
- Reduce industry’s costs and “down-time” by making Government procurement processes more efficient.
- Develop the skills, capability and capacity of the construction industry’s workforce.
- Encourage culture change and greater diversity in the construction sector and its suppliers foster partnership and collaboration between the public and private sectors to drive innovation in the NSW construction sector.



Amdale Secondary College, New South Wales.



“ The NSW Government is committed to achieving value for money in construction procurement. But value for money does not mean obtaining the lowest price for every project. Rather, it is about adopting a broader, longer term view about the need to drive quality, innovation and cost effectiveness by fostering a thriving and sustainable construction sector in NSW”

²⁷ Infrastructure NSW, Transport for NSW, Roads & Maritime Services, Health Infrastructure, Schools Infrastructure NSW, Justice Infrastructure, Public Works Advisory, NSW Treasury, Department of Industry and Department of Premier and Cabinet.

²⁸ NSW Government Action Plan, A Ten Point Commitment to the Construction Sector, June 2018, accessed 2nd January 2019, <http://www.infrastructure.nsw.gov.au/media/1649/10-point-commitment-to-the-construction-industry-final-002.pdf>

NSW Ten Point Commitment to the Construction Industry

1.7



1 Procure and manage projects in a more collaborative way

- a. Elicit industry's views on the best choice of procurement pathway for each major project.
- b. Move away from a reliance on fixed price, lump sum procurement methods, and embrace more collaborative contracting models like alliancing.
- c. Adopt Early Contractor Involvement (ECI) where a project's risk profile justifies it.
- d. Document "best practice" for each of the main procurement methods, and the circumstances in which each method is likely to be prepared.
- e. Ensure that, once awarded, contracts are managed by both parties in a professional and mutually respectful fashion.
- f. Use inception workshops to establish strong behavioural alignment and shared objectives between the parties soon after the contract is awarded.

2 Adopt partnership-based approaches to risk allocation.

- a. Risks must be managed collaboratively.
- b. As a matter of principle, risks should be managed by the party best able to manage them, and should be shared where necessary.
- c. Work with industry to identify collaborative approaches across agencies and projects to manage and reduce utility-related risks.

3 Standardise contracts and procurement methods

- a. Review NSW's standard contracts for large projects against contracting approaches internationally.
- b. Adopt and publish standard guidance materials on key procurement and contract delivery approaches (including ECI and alliancing), to supplement existing materials in relation to GC21 (D&C)²⁹ and PPPs.

4 Develop and promote a transparent pipeline of projects

- a. Publish a "whole of government" NSW major project pipeline document ³⁰ at least every six months, detailing the projects which are planned or likely to come to market over the following 3-5 years.

²⁹ The GC21 standard form is suitable for construction contracts valued at more than \$1 million (€0.59). Accessed 29th December 2019, <https://www.procurepoint.nsw.gov.au/before-you-buy/construction/construction-contracts/gc21-edition-2>

³⁰ NSW Infrastructure Pipeline, 2018, accessed 29th December 2019, file:///C:/Users/alan.hore/Downloads/infrastructure_pipeline_brochure_2018.pdf

NSW Ten Point Commitment to the Construction Industry

1.5



5 Reduce the cost of bidding

- a. Select shortlists of no more than three parties for each major contracts.
- b. Minimise the design requirements imposed on bidders before the selection of a preferred tenderer, including (where appropriate) by the Government procuring design and adopting a "construct only" approach.
- c. Embracing innovative approaches such as Building Information Modelling (BIM) as a standard feature of major project procurement.
- d. Ensure, where possible, that tender evaluation criteria give bidders a clear understanding of the Government's real priorities.

6 Establish a consistent NSW Government policy on bid cost contributions

- a. Agree to partially reimburse unsuccessful bidders' costs where it is necessary to do so in order to secure competition in the market.

7 Monitor and reward high performance

- a. Through CLG, publish practice notes on the key behaviours and values expected of good clients and contractors, as a benchmark for performance measurement.

8 Improve the security and timeliness of contract payments

- a. Measure and publish agency performance data for timeliness of payments, including for agreed contract variations, and commit agencies to meet "best in class", published performance standards.

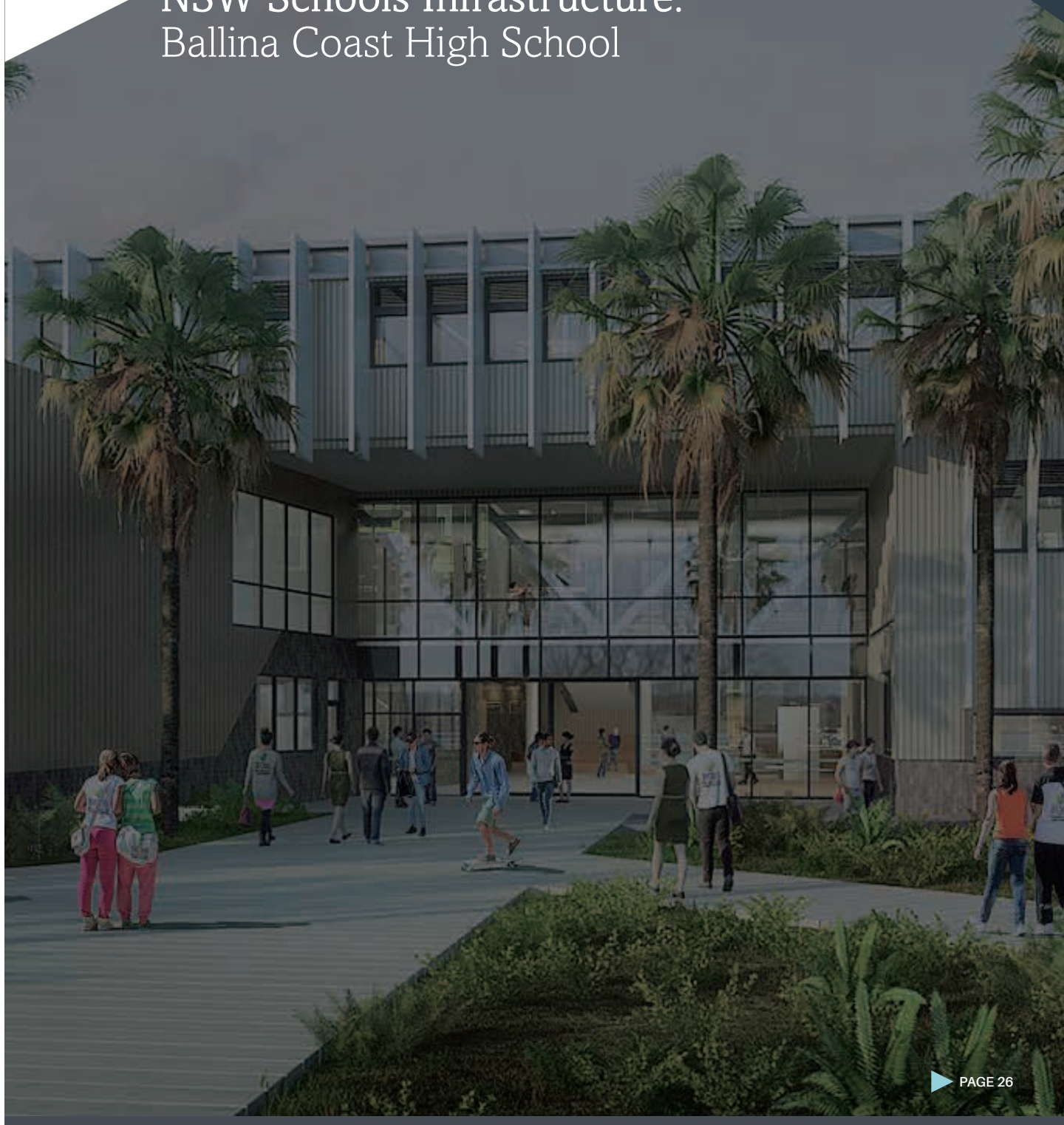
9 Improve skills and training

- a. Work with industry and its representative bodies to identify, measure and report on current and emerging skills gaps in the construction sector and related trades.
- b. Promote opportunities for off-site prefabrication of construction components, drawing where possible on capability and capacity in the domestic manufacturing sector.

10 Increase industry diversity

- a. Work with industry to identify, measure and report on the diversity of the workforce in the construction sector and related trades.

Case Study
NSW Schools Infrastructure:
Ballina Coast High School





Case Study

NSW Schools Infrastructure: Ballina Coast High School

The Ballina Coast High School was an amalgamation of the old Ballina High School and Southern Cross High School. The new consolidated high school includes 63 flexible learning spaces and 6 outdoor learning spaces.

The project also included a joint use partnership with the Ballina Council, which delivered a state-of-the-art indoor sports centre for community use. The consolidated high school will feature the latest technology and innovative classroom design to ensure students are learning in the best possible environments. Built to prepare students for the opportunities and challenges of tomorrow, it will feature new flexible learning spaces so students can work on group and individual projects that require research, problem-solving and critical thinking. The current Southern Cross School site will continue to accommodate Southern Cross School primary students and the existing Distance Education Centre, which currently caters for secondary students. The school is expected to grow within the site.



Model Image of Ballina Coast High School NSW





1.8

Case Study NSW Schools Infrastructure: Ballina Coast High School

| | |
|---------------------------|--|
| Contract Value | \$47 million (€27.6 million) |
| Contract Duration | 16 months |
| Contract Parties | Client/Owner: NSW Department of Education General Contractor: Lipman Pty Ltd Architect: EJE Architecture |
| Procurement Method | The procurement selected was D&C. |
| Contract Form | GC-21 (edition 2) |



Alternative Model Image of Ballina Coast High School NSW



Case Study

NSW Schools Infrastructure: Ballina Coast High School

1.8



Key Challenges

Ballina Coast High School was the first school of its type being rolled out in regional NSW – the school was designed to be able to assist with the delivery of a new pedagogy that had not yet been fully developed. The Department had not yet established an expert team on future-focused learning at the time the design reviews were being undertaken, so the project challenged the traditional model of teaching without any clear guidelines.

Amalgamation of two schools – early discussions considered building on existing sports fields or demolition and building in stages to enable the old Ballina High School to maintain operations. The adopted method involved the early amalgamation of the two schools, allowing the Department to close the school and accelerate the demolition of the old school while awaiting planning approval. This also provided an opportunity for both schools to embrace the new ‘one’ school well before the facilities were completed

To assist teachers and students to prepare for the move into the new school, some spaces were refurbished at the existing Southern Cross Public School. This allowed students to experience future learning pedagogies prior to moving into the new school.

Project Outcomes

The project received positive reports from community and external stakeholders. It was completed on time to allow school to commence as planned.

PART TWO NORWAY



Key Findings

Procurement processes undertaken
by public entities

Form of D&B Contracts and Key Aspects

Operation of D&B Contracts

Certification and Quality Assurance Methods

Post Occupancy Evaluation

Case Study

Key Findings

2.7

- 1** Primary schools are publicly funded by the 422 municipalities and high schools are public-funded by the 11 administrative regions or counties.
- 2** The capital city Oslo is considered both a county and a municipality. The Oslo municipality is the focus of this section.
- 3** There is no single entity in Norway responsible for the School building programme as this is devolved to the 11 administrative regions.
- 4** Public procurements in Norway are regulated by the Public Procurement Act and its accompanying regulations. Norwegian legislation on public procurement is based on European Union directives.
- 5** School Guidelines were developed for all types of buildings in the municipality's portfolio from kindergartens, via schools to retirement homes.
- 6** Standard Norway establishes and publishes the Norwegian Standards for national construction contracts. Specific contracts have to be published on the nation-wide public procurement platform Doffin.
- 7** There is no definitive evidence of the preferred use of D&B in the procurement of Schools in Norway although the delivery method is used extensively.
- 8** The most common standard form of D&B contract in use in Norway is the NS 8407 form which are the General conditions of contract for D&B contracts mainly used on Turnkey projects. NS 8407 has been prepared for use in a contract where one party takes on all or a substantial proportion of the design work in addition to the execution of building or civil engineering work for another party.
- 9** Norway have a requirement that a Qualified Professional must sign off compliance certification at the end of the Design and Construction Phase. A builder must also be recognised or certified by a governmental or accreditation organisation.
- 10** The Municipality State Reporting System 'Kostra' allows municipalities to report to the state on POE performance.

Procurement processes undertaken by public entities

Responsibilities for Schools Programme

Norway is divided into 11 administrative regions, called counties. The counties are further divided into 422 municipalities. The capital city Oslo is considered both a county and a municipality.

Municipalities are the units of local government in Norway that are responsible for primary education, outpatient health services, senior citizen services, unemployment and other social services, zoning, economic development, and municipal roads. Each municipality has its own governmental leaders: the mayor and the municipal council, which is a deliberative and legislative body of the municipality (Figure 1)¹ overleaf.

The municipalities and the county authorities have the same administrative status, whereas central government has the overriding authority and supervision of municipal and county municipal administration. The primary representative of central government supervising local authorities is the County Governor².

Primary schools are publicly funded by the 422 municipalities and high schools are public-funded by the 11 administrative regions. The only exception is Oslo where high schools are public-funded by Oslo County. Universities are also publicly funded by the state through a body called Statsbygg.

The municipalities' responsibilities

- Primary and lower secondary school
- Nurseries/kindergardens
- Care for the elderly and disabled, social services (social assistance, child welfare, drug/alcohol)
- Local planning (land use), agricultural issues, environmental issues, local roads, harbours

The county authorities' responsibilities include

- Upper secondary school
- Regional development
- County roads and public transport
- Regional planning
- Business development
- Culture (museums, libraries, sports)



Skien Fritidpark, sports hall and Hjalmar Johansen upper secondary school

¹ Statistics Norway, (2019), Municipal Facts, accessed 29th December 2019, <https://www.ssb.no/>

² Ministry of Local Government and Regional Development (2004), Local government in Norway, Department of Local Government and Regional Development, accessed 29th December 2019, <https://www.regjeringen.no/en/the-government/previous-governments/ks/ministries-since-1814/ministry-of-local-government-and-regio-2/id648440/>

Procurement processes undertaken by public entities

2.2

Public Procurement

Approximately 70% of all public procurements in Norway are contracts with an estimated value under the EU thresholds. For procurements under the EU thresholds, the National Regulatory Authority is responsible for determining how the procurement will be carried out³.

Only public procurements above this amount and below the EU thresholds (starting at €135,000 and ranging as high as €750,000 for certain specific contracts) have to be published on the nation-wide public procurement platform Doffin (doffin.no). Doffin's leading service is the publication of procurement opportunities. Doffin has registered around 3,300 active buyers. However, for the large number of small and medium-sized enterprises in Norway, Doffin's centralised platform serves as the primary source of information about procurement opportunities.

The Ministry for Trade, Industry, and Fisheries is in charge of public procurement policy. The Norwegian Agency for Public Management and eGovernment (Difi)⁴ supports the implementation of the public procurement rules and provides guidance with regards to public procurement. Difi lies within the Ministry of Local Government and Modernisation (KMD) and also hosts the central purchasing body (Statens Innkjøpssenter), created in 2016 to centralise the procurement of specific categories of goods and services for government agencies and state entities.

Difi offers guidance and support on building in public procurement, such as role descriptions and training. Several web-based platforms are operated by Norway's public procurement institutions to manage public procurement processes and provide guidance⁵.

By establishing the programme for digital procurement, Difi aims to streamline and improve public procurement by fully digitising the procurement process. It will last until 2024, and the direct implementation costs are expected to be NOK 91 million (€8.7 million). Difi estimates the potential quantitative gains directly related to digitisation to be approximately NOK 3.6 billion (€0.34 billion) in this investment period.

“ In Norway when selecting winning tenders they tend not solely to focus on price but have incorporated a requirement for environmental and sustainable conscious construction requirements into the tender. This amounts to 20% of the scoring of the tender, along with quality and price”

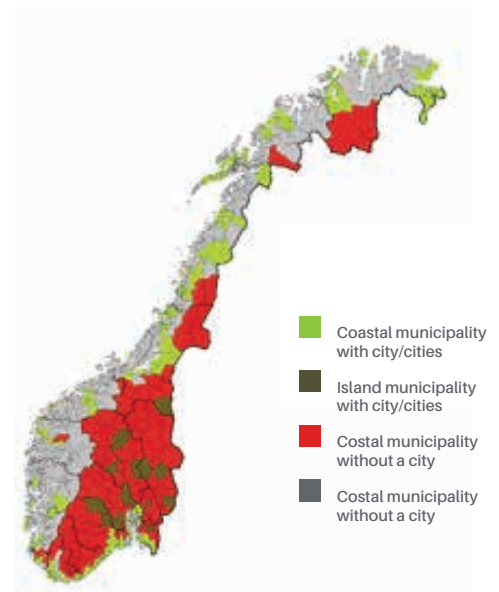


Figure 1 - Norway's Municipalities

³ Egseth, E. and Nybø, M. (2018), A One Minute Guide To Public Procurement In Norway, Nordia law, accessed 29th December 2019, <https://www.nordialaw.com/news/2019/public-procurement-in-norway/>

⁴ The Norwegian Agency for Public Management and eGovernment (Difi), accessed 29th December 2019, <https://plain.difi.no/your-hosts/difi>

⁵ MAPS (2018) Assessment of norway's public procurement system: Testing the new methodology, accessed 29th December 2019, https://www.anskaffelser.no/sites/anskaffelser2/files/maps_norway.pdf

Procurement processes undertaken by public entities

2.2

Difi manages the Anskaffelser.no portal for all professionals involved in public procurement. The portal offers advanced, complete eProcurement and eCommerce services guiding all interested parties through eProcurement stages, from planning to competitive conduct, including follow-up and liquidation. The portal has incorporated eHandel.no, which specialises in eCommerce.

Other initiatives include the Municipality-State-Reporting KOSTRA system which allows municipalities and county municipalities to report electronically to the State, data on the economy, schools, health, culture, the environment, social services, public housing, technical services and transport, and communication.

The Standardisation portal aims to inform its users about the standards that are mandatory or recommended for use in the Norwegian public sector⁶.

One of the leading role players in the Norwegian construction industry is Statsbygg⁷. Statsbygg is the Norwegian Government's principal advisor in construction and property affairs, building commissioning, property management and development. Statsbygg initiated a partnering effort in 2001 to contribute to a change of the culture from adversarial to cooperative procurement that was intended for faster completion and better value for money for public sector construction projects⁸.



Sjoelunda-skola

⁶ Wavestone (2019) The Digital Government Factsheets 2019 – Norway, European Commission

⁷ Statsbygg, accessed 29th December 2019, <https://www.statsbygg.no/>

⁸ Hosseinia, A., Wondimua, P.A, Bellinia, A., Tunea, H., Haugsetha, N., Andersena, B. and Lædrea, O. (2016) Project partnering in Norwegian construction industry, Energy Procedia, Iss 96, pp 241 – 252, accessed 29th December 2019, <file:///C:/Users/alan.hore/Downloads/project-partnering-in-norwegian-construction-industry.pdf>



Procurement processes undertaken by public entities

2.2

Oslo Schools

For the last ten years, Oslo municipality⁹ (the agency for education and the Municipal Undertaking for Educational Building and Property), the Directorate of Public Construction and Property Management and the Directorate of Norwegian Correctional Service have experimented with standardization in project delivery models, functional requirements and building methods for the provision of public schools and prisons.

Investment projects in the municipality, such as new schools and school extensions, are executed in an internal buyer/supplier model consisting of the principal buyer (the office of the Vice Mayor for Education) and supplier (the office of the Vice Mayor for Business Development and Public Ownership), both of which are under direct political leadership. At the operational level, the buyer is the agency for education and the supplier is the Municipal Undertaking for Educational Buildings and Property. The main buyer and primary supplier perform control activities with regards to project cost and progress.

The school projects are initiated by the office of the Vice Mayor for Education by way of an instruction to the agency for education. The instruction informs the agency of which schools or set of schools are to be developed for concept reviews. The concept reviews provide an overview of potential projects or sets of projects in a geographic area of the municipality that are most urgent. The reviews lead to recommendations of projects for retrofit. The concept reviews are subject to external quality assurance before political treatment. The portfolio of school investment projects is collected in a comprehensive ten-year plan that collectively has the political stamp for moving forward to the next project phase. The plan is reviewed every two years. The school needs plan for 2019-2028 was approved by the city council in December 2018¹⁰.

Standards for School Facilities

Standardisation was considered to be the key to the construction and rehabilitation of schools. Guidelines were developed for all types of buildings in the municipality's portfolio from kindergartens, via schools to retirement homes. The rationale behind the drive for standardisation was cost savings (due to economies of scale), predictability in operations and maintenance, uniform and understandable demands to suppliers and contractors, increased ability to transfer experience and learning.

For Oslo, the Municipality's standard requirements specifications are the basis for the preparation of the final requirements specification. The current school standards for schools are the Standard requirements specification for school facilities¹¹.

In addition to the standard requirements specification for each type of building, Technical and FDV-based requirements for purpose buildings have been prepared. This is a compilation of the technical and administrative, operational, and maintenance-based requirements for municipal enterprises that are to operate the building on completion¹². These standard requirements (not published in English) are the basis for the preparation of the final requirements specification in a specific project and are adapted to any new project needs¹³.

“Municipal Undertaking for Educational Buildings and Property in Oslo (Undervisningsbygg Oslo) are charged with the task to develop, build, operate and manage the school buildings in Oslo. The company is Oslo's largest property manager with nearly 1.4 million square meters spread across 167 schools and 750 buildings. About 83,000 pupils and 12,000 employees use the teaching building's premises daily”

⁹ Oslo municipality, accessed 29th December 2019, <https://www.oslo.kommune.no/english/#gref>

¹⁰ Økland, A., Johansen, A. and Olsson, S. N.O.E., (2018), Shortening lead-time from project initiation to delivery A study of quick school and prison capacity, *International Journal of Managing Projects in Business*. Vol. 11, No. 3, pp. 625-649

¹¹ Standard requirements specifications Oslo municipality Schools, accessed 30th December 2019, <https://www.oslo.kommune.no/politikk-og-administrasjon/for-vare-leverandorer/standard-kravspesifikasjoner/>

¹² Oslo Municipality (2020), Standard requirements specifications Oslo municipality, accessed 30th December 2019, <https://www.oslo.kommune.no/politikk-og-administrasjon/for-vare-leverandorer/standard-kravspesifikasjoner/>

¹³ Standard requirements specifications Oslo municipality for School, accessed 29th December 2019,

Form of D&B Contracts and Key Aspects

2.3

All contracts in Norway carry a number beginning with "NS". NS 8405 is the most common and basic construction contract containing legal terms and conditions, together with the simplified version NS 8406 and the EPC contract (Engineering, Procurement and Construction) NS 8407. Also, corresponding sub-contracts have been prepared for each of the mentioned NS contracts, named NS 8415, NS 8416 and NS 8417¹⁴ ¹⁵.

Contract between client, architect, and consultants

When the client is required to get architects and consultants to design or construct a building, they can choose between two contract standards (NS 8401 and NS 8402). The contracts include a contract template or building form. Two standard contracts have been drawn up for use when entering into a relationship between the developer and / or the architect, consultant, or other experts. The two contracts include:

- NS 8401 General contract terms for design assignments: NS 8401 regulates design assignments between the builder and architect, consulting engineer, or other experts on design assignments in

building and construction, including follow-up of the design in the building and the complaints phase. NS 8401 is based on fixed price assignments and is best suited for contract conditions where the scope of the assignment has been clarified in advance so that it is possible to enter a fixed price.

- NS 8402 regulates design assignments between the builder and architect, consulting engineer, or other experts on consultancy assignments related to building and construction. NS 8402 is primarily aimed at appointments where the consultant has a care obligation, where no defined framework is specified for the job¹⁶.

Contract between the client and the building manager

NS 8403 contract conditions provide for the client to employ a building manager. The contract provides for precise construction management guidelines to be followed by the appointed building manager.



Skolehusene

¹⁴ Horne, M. (2018) Doing business in Norway, 2018 Edition, Grette.

¹⁵ Norwegian standard contracts are not published in English.

¹⁶ Anskaffelser.no (202) Contracts – Construction, accessed 31st December 2019, <https://www.anskaffelser.no/hva-skal-du-kjope/bygg-anlegg-og-eiendom-bae/kontrakter>

Form of D&B Contracts and Key Aspects

2.3

Contract between the client and the contractor

There are a number of optional contracts available for the client to enter with the contractor.

Execution contract:

Here the client is responsible for the design and the contractor's work documentation in the form of drawings, descriptions, and specifications. This is usually prepared by architect and technical consultants who are contracted into the project. Also, the developer is responsible for coordination between the various contracts. The contractors are responsible for the execution of their work as per the stipulated contract. Two standard contracts have been drawn up for use between the builder and the contractor in execution contracts. The NS 8405 (Norwegian building and construction contract) is intended for use in contractual relations where the project's scope or organisation requires strictly formalised notification procedures and an extensive duty to coordinate with other entities. The NS 8406 (Simplified Norwegian building and construction contract) is a simplified version of NS 8405. This standard is intended for use in projects where the client can maintain control of progression, quality and finance without formalised notification procedures

Turnkey:

Here the developer creates only a functional description for the most essential conditions of the project. On that basis, each competing contractor, together with their chosen architects and consultants, develops a plan that is drawn up and specified so far that it can be priced. The contract used is the; NS 8407 - General conditions of contract for (D&B) contracts.

Interaction contract - NS 8407 with additions:

Here the project is developed in an interaction between the developer, the interaction group, the users, and any internal technical departments. It is emphasized that all participants in the process are allowed to submit their input to the project, both functional and technical as well as quality. This whole "alliance" is united on a pre-project with an associated target price. One can end the interaction process at this stage.

A general contract for NS 8407 is usually entered into with the group. This model is called "Collaboration to the contract." If the cooperation continues through the execution phase and the first years of use, and all the work is reimbursed at the expense and agreed prices and surcharges, the model is called "Interaction with incentive." The final cost is measured against the agreed target price, and the agreement states how the over or under target price is distributed between the parties. As of today, there is no standard contract for interaction contracts. Many builders, therefore, rely on NS 8407 with clarifications and additional regulations. The supplementary regulations regulate, among other things, organization and form of cooperation, workshops, meetings, tasks and benefits in the phase up to a unified project basis and associated target price.

Public-Private Cooperation (OPS):

Public-Private Cooperation (OPS) is an implementation model that, like the interaction model, is based on the early involvement of the suppliers. Based on the client's needs, a PPP company, in addition to carrying out the design and construction, could take responsibility for financing/ ownership and operation and maintenance for a defined period. There is currently no standard contract for OPS. Builders using OPS therefore often rely on NS 8407 with clarifications and additional regulations.

Operation of D&B Contracts

2.4

NS 8407 Norway Standard

NS 8407 has been prepared for use in a contract where one part (the D&B contractor) takes on all or a substantial proportion of the design work in addition to the execution of building or civil engineering work (including installations, new buildings, maintenance, repairs, and alternations) for another party (the employer). Thus, this standard contract places both the design and construction obligations upon the contractor¹⁷.

The contractor shall provide the employer with security for the performance of their contractual obligations during the execution period and the guarantee period. The security during the execution period, including liability for delayed completion, shall amount to 10% of the contract price. Upon take-over/delivery of the work, the security shall be reduced to 3% of the contract price in respect of any guarantee claims for three years. The security shall be provided in the form of an ordinary bank guarantee.

The employer is entitled to vary the works to be done under the contract. A variation to the work must be sufficiently connected to the contract in question and must not be materially different to the initially agreed work. Unless otherwise agreed, the employer is not entitled to order the contractor to make changes representing an addition to the contract price of more than 15%.

“ The NS 8407 is the predominant form of contract used to deliver school projects with an estimated 60% of projects delivered through this D&B Contract. The other 40% are delivered through the NS8405 traditional type of construction contract. The NS8407 is primarily used for New Build while the NS8405 is used in the retrofitting of existing school projects. The PPP form of delivery is not used for the building of schools and hasn't been adopted for a number of years in Norway”.

“ When using NS8407, there is a significant amount of work required before they procure the contractor. Usually, before the D&B contractor is selected, an initial design is completed which is used as the basis to choose the contractor who in turn, will develop this into the final design. It has been found that the D&B contract has resulted in less conflict as the contractor has completed the design making it a more straightforward build for them. Some challenges included contractors choosing solutions that fulfill the Client's requirements but at the expense of quality”



Nordahl-Grieg High School

¹⁷ HGlobal legal Group, (2017), The International Comparative Legal Guide to: Construction & Engineering Law, Global Legal Group, accessed 29th December 2019, <https://iclg.com/practice-areas/construction-and-engineering-law-laws-and-regulations/norway>



Operation of D&B Contracts

2.4

According to NS 8407, both parties have a duty to cooperate and show loyalty during the performance of the contract, which is in line with the general principles of Norwegian contract law. A breach of a party's duties may, inter alia, result in liability for damages and loss of rights under the contract.

“ At present, Oslo municipality are using a modified version of 8407, by using a contract addendum. The purpose of this hybrid approach is to enable the Client to have more involvement in the design of the school which promotes a more rewarding collaborative process while ensuring the Contractor does not select the most cost-conscious option”

In recent years Norway due to a high number of delays, budget overruns, disputes, and claims experienced in the infrastructure industry have experimented with Best Value Procurement (BVP) as a means to award projects to an expert vendor. Best Value Approach (BVA) is an approach that includes a procurement model (BVP), a risk management model, and a project management model. In recent years, BVP has gained attention in different industries within Norway, and the first pilot projects are ongoing.



Sagabakken-school



The Certification and Quality Assurance Methods

2.5

Norway introduced the requirement that a qualified professional, either an architect or engineer, must sign compliance certification both at the design and the completion phase. In Norway, the profession is semi-regulated. In Norway, all possible roles must be filled in correctly before a local authority issues building permission. The process starts with an obligatory preliminary consultation meeting where the parties involved decide about an inspection plan. This inspection plan is used during the construction and completion phase. At the end of the process, the controller must deliver a complete report and apply for a completion certificate.

Statutory control activities have been more evenly distributed over the building process. During the process, qualified architects and qualified controllers are responsible for quality control. These specific building professionals that are qualified must generally comply with obligatory demands on education, practical experience, and insurances for building defects and professional indemnity. A builder has to be recognised or certified by a governmental or Accreditation organisation to play a role in the quality control procedure. This also applies to the operational management of the company and the educational and practical experience of those who are going to be responsible for the inspections.

In Norway, independent private control is obligatory for critical building elements (e.g., structural components, fire safety, and the building envelope)¹⁸.

Despite not being an actual Member State of the European Union, Norway applies the common EU legislation for the construction sector in addition to some national requirements for various product types. As of the beginning of 2015, there is one Technical Assessment Body (TAB) and seven Notified Bodies (NB) that are authorised to test product compliance and issue product

“ We have several internal tests/reviews we do before a building is delivered to us/declared finished. We have a technical test where we test that all technical equipment is according to contract. This includes ventilation, water in/out, heating, fire alarms, etc. We don't accept the delivery of a building before this test is passed. At the same time, we do a visual inspection of the building to ensure that there are no errors in the building. If we find errors of importance, so the building cannot be used according to its purpose, we reject the takeover of the building. Also, the building authorities must give a permit to use the building. That is given when we have delivered a statement that the building is according to technical requirements and contracts. This information is provided by the contractor. The building authorities can also do unannounced inspections before a permit is given”

Mr Eilert Haug Flyen of Undervisningsbygg Oslo KF

certification. The TABs and NBs play a significant role in determining whether a construction product complies with both national and European requirements¹⁹.

Stiftelsen for industriell og teknisk forskning (SINTEF) Product Certificate is also a voluntary Norwegian certification scheme. The SINTEF product certificate may be issued for construction products that do not have a CE marking and CPR certificate and states that the product is in conformity with a national or international product standard or other technical specification, and that production is subject to ongoing quality control. SINTEF Building and Infrastructure is accredited by Norwegian Accreditation for the certification of products covered by the EU Construction Products Regulation²⁰.

Norwegian buildings also must perform to NS 3701, which sets out in kWh/m² useful energy demand per year within the building envelope, considering heat recovery from ventilation systems but not considering system losses and energy export. The Norwegian national standard NS 3031 is used for the calculation of the energy performance of buildings.

¹⁸ Meijer, F. and Visscher (2017) Quality control of constructions: European trends and developments, International Journal of Law in the Built Environment Vol. 9 No. 2, pp. 143-161.

¹⁹ Co-Builder (2017) Testing and Product Certification in Norway, accessed on the 2nd February 2020, see <https://cobuilder.com/en/testing-and-product-certification-in-norway/>

²⁰ Sinteff Products Certificates, accessed on the 2nd February 2020, see <https://www.sintefcertification.no/portalpage/index/181>

Post occupancy evaluation processes

2.6

The Municipality-State-Reporting KOSTRA system²¹ allows municipalities and county municipalities to report electronically to the State data on the economy, schools, health, culture, the environment, social services, public housing, technical services and transport, and communication. The data contains financial data and data on service provision. Statistics Norway compiles these data together with other data, such as population figures, and generates key values for priorities, coverage rates, and productivity/efficiency regarding public services. The key indicators are published on the Internet in a format that makes it possible to compare resource use by similar municipalities. While not set up with the purpose of POE, it does offer a reporting feature to feedback from local municipalities to a state Level on school data.

The methodology for evaluating technical condition, functionality and adaptability of public buildings such as schools is based on the principles of condition surveys specified in Norwegian standard 3424 (NS3424, 1995). NS 3424 assesses buildings according to the grades 0, 1,

2 and 3, where grade 3 indicates poor technical condition and grade 0 indicates high technical condition. The Standard State Committee for State Analysis, SN / K 292, has completed this new and improved version of NS 3424. It replaces the 1995 edition²².

In addition Standards Norway publish a proliferation of standards²³ that can be utilised when carrying out a POE. Examples of the more important standards utilised in Norway include:

- NS-EN 16798-1: 2019 - Energy performance of buildings - Ventilation in buildings - Part 1: Indoor climate parameters for dimensioning and assessment of buildings energy performance including indoor air quality, thermal environment, lighting and acoustics.
- ASTM E3224: 19 - Standard Guide for Building Energy Performance and Improvement Evaluation in the Property Condition Assessment.



The hospital school, Counsel.jpg

²¹ Statistics Norway, accessed 2nd February 2020, see <https://www.ssb.no/offentlig-sektor/kostra/>

²² Norway Standard NS3424, accessed 2nd February 2020, see <https://www.standard.no/nyheter/nyhetsarkiv/bygg-anlegg-og-eiendom/2012/bedre-tilstandsanalyser-med-ny-ns-3424/>

²³ Norway Standards associated with POE, accessed 2nd February 2020, see <https://www.standard.no/nettbutikk/sokeresultater/?search=School+occupancy+standard>



2.7

Case Study
Horten Upper Secondary School



2.7

Case Study

Horten Upper Secondary School

Horten upper secondary school won the international sustainable BREEAM Awards 2019 for best public sector building at the design stage. The project is referred to as an example of a future-oriented learning environment and is Norway's most modern and highest environmentally classified education building. The building is innovative and avantgarde in terms of environmental solutions will generate more energy than it consumes.

The school is located in the city park Lystlunden in the center of Horten and is designed for 1200 students and 200 employees. The school opened in August 2019.



Exterior Elevation of Horten Upper Secondary School



Case Study: Horten Upper Secondary School

The project set high ambitions in terms of architectural quality, handling of logistics, environmentally friendly solutions and encouraging next generation pedagogy. In May 2019, the project received certification confirming that it is the first school building in Norway to achieve the BREEAM Outstanding certification level for design in the planning phase. The school adopts passive house standards, makes extensive use of wood and is intended to be energy positive. During the official BREEAM Awards ceremony, the jury emphasized the projects innovative design and potential for ripple effects beyond the building itself. The achievement of BREEAM Outstanding will pave the way for further innovation in energy efficient buildings in Norway.

The material palette is based on sustainable materials. Wood was used extensively in the building, both externally and internally. The floor slabs and stairs are made from massive wood, the façade cladding is made from wood as well as the acoustic elements in the atrium.

The school grounds are idyllically located in the city park Lystlunden, which also contains sports, culture and adventure facilities. LINKs solution was to preserve as much of the park area as possible and develop the building in the least attractive area. The building consists of four floors plus one floor below ground and technical rooms on the roof, a solution that addressed challenges with logistics, long walking distances and accessibility.



Interior image of Horten Upper Secondary School

Case Study: Horten Upper Secondary School

2.7

| | |
|---------------------------|--|
| Contract Parties | Client/Owner: Vestfold municipality Architect: LINK arkitektur AS |
| Procurement Method | D&C. |
| Contract Form | NS 8407 |

“ It’s a real pleasure to highlight and applaud the ‘best of the best’ buildings across the globe. They reflect an exceptional commitment to sustainable construction in a variety of ways and epitomise the value that BREEAM certification brings to projects at all stages of a building’s lifecycle”.

Dr. Shamir Ghumra, BREEAM Director at BRE



Interior teaching facility in Horten Upper Secondary School



PART THREE
UNITED
KINGDOM



Key Findings

Procurement processes undertaken by public entities

Form of D&B Contracts and Key Aspects

Operation of D&B Contracts

Certification and Quality Assurance Methods

Post Occupancy Evaluation

Case Study

Key Findings

3.7



- 1** The responsibilities and procurement guidelines for the UK school building programme differ across the individual jurisdictions of England, Scotland, Wales and Northern Ireland.
- 2** The use of D&B procurement is a predominate feature of the UK Schools building programme, particularly in England.
- 3** The Construction and Procurement Delivery (CPD) unit in Northern Ireland and the Scottish Futures Trust (SFT) in Scotland are specific government owned agencies charged with role of advising and supporting on public procurement infrastructure.
- 4** The most prominent D&B contracts currently in use in the UK are the JCT Design and Building Contract and the NEC Design, Build and Operate Contract.
- 5** The Department for Educations Construction Frameworks Handbook recommends the use of JCT D&B contracts as the default position on England's School building programme.
- 6** The use of framework agreements and hub programmes to develop Scotland's School building programme both stipulate the use of the SFT's bespoke D&B contract.
- 7** The recommendations that flowed from the 2017 Cole report in Scotland has helped to introduce improvements to the procurement and management of the UK Schools programme.
- 8** The Scottish Government published a Project Initiation and Contracts Handbook in 2019 that provides guidance on quality assurance of construction projects.
- 9** All projects in Scotland's Schools Future Programme should be evaluated 12 - 18 months post occupation.

Procurement processes undertaken by public entities

3.2



Responsibilities for Schools Programme

In England, the responsibility for the delivery of school projects is the Department for Education (DfE)¹. The DfE is responsible for children's services and education, including early years, schools, higher and further education policy, apprenticeships and wider skills in England. Scotland, Wales and Northern Ireland have devolved administrations taking on this responsibility. Within each of these regions specific authority for public procurement and the management of School Buildings differ in many respects.

In Scotland, the responsibility for the school building programme falls under the Cabinet Secretary for Education and Skills². The SFT³ are the main advisors to the Scottish government in respect to infrastructure owned by the Scottish Government. They work with numerous public partners across the school building programme in Scotland.

In Wales, the responsibility for school building is the Department of Education and Skills (DoES)⁴. The 21st Century Schools and Colleges Programme⁵ is the

most recent initiative by the Welsh government in the delivery of new school buildings. This Programme is the largest investment in the schools estate in Wales since the 1960s and is delivered in partnership between Welsh Government, local authorities, colleges and other representatives, such as, Diocesan Authorities. Individual programmes of investment are developed by local authorities and colleges, who identify priority projects and the timescale for their delivery.

In Northern Ireland, the responsibility for the delivery of school projects is the Department of Education (DoE)⁶ in conjunction with the Education Authority (EA)⁷. The CPD⁸ group is a specialist unit within the Northern Ireland Department of Finance (DoF) that provides specialist public procurement advice to clients across the Northern Ireland public sector.

¹ Department for Education UK, accessed 28th November 2019, <https://www.gov.uk/government/publications/school-buildings-construction-framework>

² Scottish Government, Cabinet Secretary for Education and Skills, accessed 29th November 2019, <https://www.gov.scot/about/who-runs-government/cabinet-and-ministers/cabinet-secretary-education-skills/>

³ Scottish Futures Trust, accessed 29th November 2019, <https://www.scottishfuturestrust.org.uk/page/education>

⁴ Welsh Government, Education and Skills, accessed 28th November 2019, <https://gov.wales/21st-century-schools-and-education-capital-programme-0>

⁵ 21st Century Schools and Colleges Programme, accessed 28th November 2019, <https://gov.wales/21st-century-schools-programme>

⁶ Department for Education, Northern Ireland, accessed 28th November 2019, <https://www.education-ni.gov.uk/>

⁷ Education Authority of Northern Ireland, accessed 28th November 2019, <https://www.eani.org.uk/>

⁸ The Construction Procurement Delivery group, accessed 28th November 2019, <https://www.finance-ni.gov.uk/construction-procurement-delivery>



Tulbody South Campus



Procurement processes undertaken by public entities

3.2



School Procurement Guidelines

Whilst the public procurement guidelines for each of the jurisdictions have differing support structures, evidence will be presented on the specification of D&B as a preferred procurement delivery option for new school buildings.

All of the UK is subject to Public Procurement Rules of the European Union. A notable feature of the procurement guidelines across the various regions of the UK is the use of frameworks⁹. A Framework from a public procurement perspective is a listing of pre-qualified suppliers that can bid for work around a specific group of goods and services or works.

England

The DfE website provides details of their Construction Framework Handbook¹⁰. The handbook is designed to provide contracting authorities with advice on how to access the framework, conduct local tenders to select a contractor and complete the pre-construction process. The framework is available to all local authorities, schools, academics and other public bodies in England. The framework details the band of projects, preferred D&B contract forms, selecting a procurement route, local competition evaluation and framework timescales. All high value band projects require the use of a DfE JCT D&B contract with standard Departmental amendments to be utilised.

Scotland

Education Scotland is the Executive Agency of the Scottish Government, tasked with improving the quality of the country's education system. The SFT are an infrastructure

“ The main benefit of a framework is that the buyers and suppliers do not need to go through the full EU tendering process when awarding work. Therefore making the process faster and often providing better value for money”

“ **SFT AIM** to improve the efficiency and effectiveness of infrastructure investment and use in Scotland by working collaboratively with public bodies and industry, leading to better value for money and ultimately improved public services.”

centre of expertise owned by the Scottish Government. They work with numerous public and private sector partners across many programmes, for example they:

- Plan future infrastructure investment
- Innovate to secure new ways to fund essential infrastructure
- Deliver important infrastructure programmes
- Improve the management of existing properties

Currently SFT are working on driving improvements in the construction industry through new ways of working, fair work, infrastructure technology, modern construction methods and improved capacity that will lead to better quality buildings¹¹. In March 2019 the Scottish government published the Construction Procurement Handbook¹² which provides Guidance for public sector contracting authorities on the procurement of construction works.

⁹ The aim of frameworks is to allow a purchaser more flexibility around contracted goods or services, in volume and in detail of the requirements. By selecting from multi-supplier framework for its requirements, the contracting authority can ensure that each purchase represents best value. Frameworks are advertised in line with EU & UK procurement law using via an OJEU process.

¹⁰ Guidance Construction Framework Handbook, accessed 28th November 2019, <https://www.gov.uk/government/publications/school-buildings-construction-framework/construction-framework-handbook>

¹¹ Scottish Futures Trust, accessed 29th November 2019, <https://www.scottishfuturestrust.org.uk/page/improving-delivery>

¹² Scottish Futures Trust, Construction Procurement Handbook, March 2019, accessed 30th November 2019, <https://www.gov.scot/publications/construction-procurement-handbook/>

Procurement processes undertaken by public entities

3.2



Wales

Similar to the other UK regions the Wales school building programme is procured in compliance with the EU directives and at a national level with a renewed Welsh Government procurement policy statement¹³. The influence of the contract frameworks proposals by the EU and implemented in other jurisdictions in the UK are prevalent in the Welsh school building system. The Welsh Government announced its 21st Century Schools and Education programme to build new and refurbish schools across Wales in 2009. Band A of the programme started in 2014.

The first wave of funding saw a capital investment of £1.4 billion (€1.62 billion) during the period 2014- 2019, which delivered 170 new build and refurbishment projects. A second wave of funding was launched in April 2019 which will see a further £2.3 billion (€2.65 billion) invested. There are two funding streams: capital funding and revenue funding via a Mutual Investment Model (MIM)¹⁴. These streams have different approaches to the specification of design and building options at procurement stage. The MIM is an innovative way to invest in public infrastructure developed in Wales designed to finance major capital projects due to a scarcity of capital funding. MIM schemes involves private partners building and maintain public assets. In return, the Welsh Government pay a fee to the private partner, which covers the cost of construction, maintenance and financing the project. Documentation includes a Welsh Education Partnership Strategic Procurement Agreement¹⁵ dated July 2019. MIM provides for a contracting approach that builds upon the learning and knowledge of other UK PPP models but is tailored to meet the specific needs of the Welsh Government's infrastructure programme.

In a 2017 Auditor General for Wales report¹⁶, a number of specific recommendations were made in respect to construction procurement.

“ There is evidence that the regional procurement frameworks are not operating as intended, with some duplication and councils not adopting good practice in procurement methods. The Welsh Government should:

- A. ensure that councils adopt accepted good practice in the approach to construction, with a presumption in favour of D&B;
- B. improve communication with industry on the likely timing and scale of work under the frameworks;
- C. understand and address the reasons why some councils are conducting pre-tender exercises despite contractors already having gone through the same process to get on the frameworks; and
- D. engage stakeholders, including councils and the construction industry, in developing and finalising the procurement frameworks in light of changes for Band B”.



Tulbody South Campus

¹³ Auditor General for Wales, Public Procurement in Wales, October 2017, accessed 20th November 2019, https://www.audit.wales/system/files/publications/Public-Procurement-in-Wales-2017-English_0.pdf

¹⁴ Mutual Investment Model, accessed 17th December 2019, <https://gov.wales/mutual-investment-model-infrastructure-investment>

¹⁵ Welsh Education Partnership Strategic Procurement Agreement, accessed 27th December 2019, <https://gov.wales/mutual-investment-model-standard-form-project-agreement-education>

¹⁶ Wales Audit Office, (2017), The 21st Century Schools and Education Programme, Auditor General Wales, May 2017.

Procurement processes undertaken by public entities

3.2



Northern Ireland

Historically schools in the Northern Ireland are segregated into three entities that had a management oversight role:

- Controlled schools which were essentially Protestant.
- Catholic Council for maintained schools.
- Voluntary grammar schools, which are more elite schools.

The challenge for the DoE is to ensure that funding is equally shared across the three broad school sectors. The Department adopts a rigid building handbook (detailing specification) and approval mechanism¹⁷. The Department is directly responsible for overseeing planning and grant-aiding capital works in schools in the Voluntary Maintained, Voluntary Grammar, Irish Medium and Grant Maintained Integrated (GMI) sectors. The EA has responsibility for

capital works in the Controlled Sector. Grant rates¹⁸ for funding can also vary across different school sectors, however, the vast majority of schools in the province now receive 100 percent funding for capital works.

The CPD unit of the DoF sets out the key aspects of Northern Ireland public procurement policy in their construction procurement policy framework¹⁹ that are of particular significance to construction works and services, which include school buildings. Most school projects would exceed the £500,000 (€575,000) threshold for major projects in Northern Ireland. Each year a programme of major capital works to be undertaken is normally announced by the Department. There is a protocol for the selection of major works²⁰. Details of all current major works can be located on the Investment Strategy Northern Ireland Database (ISNID) database²¹.



Tulbody West Elevation

¹⁷ Education Authority, Northern Ireland, Building Handbook, accessed 29th November 2019, <https://www.education-ni.gov.uk/building-handbook>

¹⁸ Education Authority, Grant Rates, accessed 29th November 2019, <https://www.education-ni.gov.uk/articles/glossary-terms>

¹⁹ Department of Finance, Northern Ireland, Construction Procurement Policy Framework, accessed 29th November 2019, <https://www.finance-ni.gov.uk/articles/introduction-policy-framework-construction-procurement>

²⁰ Education Authority, Protocols for Selection of Major Project, Accessed 29th November 2019, <https://www.education-ni.gov.uk/articles/protocol-selection-major-works-projects>

²¹ Investment Strategy Northern Ireland Database, accessed 29th November 2019, <http://www.isni.gov.uk/home/>



Form of D&B Contracts and Key Aspects



England

D&B procurement featured prominently in the DfE Guidance Construction Framework²². The framework structure detailed in the guidance document is shown in Table 1.

The DfE Guidance Construction Framework recommends that procurers must first decide whether the procurement is for a single scheme or a batch of two or more schemes. Batches are D&B projects which have been grouped together and compete under the same local competition (batching is not available for construct only or direct award schemes).

| Value band | No. of regional lots | Project value range | Procurement route options | Award options | Batching options |
|------------|----------------------|--------------------------------|---------------------------------|-----------------------------|---|
| High | 2 | £12m+ (€13.85 m) | Cost-led D&B | Competition or direct award | Batching available when using competition |
| Medium | 8 | £4.5 to £12m (€15.9 - €13.85m) | Two stage D&B or construct only | Competition or direct award | Batching available when using competition |
| Low | 12 | c£1 to £4.5m (€1.5 - €5.19m) | Two stage D&B or construct only | Competition or direct award | Batching available when using competition |

Table 1 - Construction Framework Structure for England’s School Building Programme (DfE Guidance Construction Framework Structure)

The procurement route options are explained in outline below.

Cost-led D&B

This form of D&B procurement is intended to allow industry to use its experience and knowledge to develop innovative solutions through leveraging design materials, subcontracting and direct labour and experience to the advantage of the public sector client, focusing on achieving target costs whilst maintaining, if not improving value²³.

Two Stage D&B or Construct Only

This is a method of procurement where the employer seeks to appoint a contractor at an initial stage based on an outline scope of works. This achieves an early appointment of the contractor on the basis of an agreement to undertake pre-construction services, with the intention that the parties will ultimately enter into a lump-sum contract following a period of negotiation. It can be seen that the alternative for medium and low value projects is a single stage traditional construct contract.

²² Guidance Construction Framework Handbook, accessed 28th November 2019, <https://www.gov.uk/government/publications/school-buildings-construction-framework/construction-framework-handbook>.

²³ Cost Led Procurement Guidance, Guidance for the Procurement and Management of Capital Projects 2014, accessed 28th November 2019, https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/325012/Cost_Led_Procurement_Guidance.pdf.

Form of D&B Contracts and Key Aspects

3.3



On the DfE website there are specific workflows recommended for each of the following procurement processes²⁴.

- Two-stage D&B process (via competition)
- Two-stage D&B process (via direct award)
- Two-stage D&B process (future school)
- Cost-led D&B process (via competition)
- Cost-led D&B process (via direct award)
- Cost-led D&B process (future school)

The prominence of D&B is evident to see in England's School Building programme .

Scotland

The Scottish Government announced details of funding distributed as part of the 'Schools for the future' programme through the Scottish Futures Trust in February 2019 ²⁵. A total of 117 schools were announced to be constructed or refurbished by March 2020 with funding distributed by the SFT.

Scottish procuring authorities are continuously commissioning construction work via School building frameworks which allows the client to invite tenders from suppliers of goods and services to be carried out over a period of time on a call-off basis as and when required. One or more suppliers are then selected and appointed. When specific projects arise the client is then able to simply select a suitable framework supplier and instruct them to start work.

“ The prominence of D&B is evident to see in England's School Building programme”

The hub programme has been established in Scotland over the past 10 years and consists of five regional hubCo development companies. These are owned 60% by a competitively procured private sector development partner (PSDP) and 40% by the public sector. Each development company, (hubCo), can undertake project development work, strategic support services (professional consultancy services) or facilities management services. Each Hub has a dedicated project management team with detailed guidelines provided by SFT as to their operations and procurement strategies ²⁶.

A consistent feature of these initiatives is the default position of D&B procurement as the core procurement choice for both school framework contracts and school hub programmes²⁷. A particular feature of the hub schools programme is the use of Design-Building FM as a preferred procurement delivery method.

“ Through this initiative, the Scottish government are looking to encourage all parties (both public and private) to work more closely together with a “get it right first time” approach rather than on correcting defects at the end of the construction process”

Construction Quality Assurance initiative

²⁴ The framework makes specific reference to the RIBA Plan of Work, <https://www.ribaplanofwork.com/>

²⁵ Scottish Futures Trust, Schools for the Future: Funding Allocations, accessed 29th November 2019, <https://www.gov.scot/publications/schools-for-the-future-funding-allocations/>

²⁶ Scottish Futures Trust Hub Project Managers Handbook South West Territory, accessed 17th December 2019, https://www.scottishfuturestrust.org.uk/files/publications/hub_project_managers_handbook_-_South_West.pdf

²⁷ The SFT Standard form of Design and Build contract is the default contract recommended in Scotland's School building programme.

Form of D&B Contracts and Key Aspects

3.3



Following recent high-profile construction defects reported on a public sector owned property, the Scottish government established the Construction Quality Assurance initiative. Through this initiative, the Scottish government are looking to encourage all parties (both public and private) to work more closely together with a “get it right first time” approach rather than on correcting defects at the end of the construction process²⁸.

It is evident that lessons learned from the incident at the Oxgangs Primary School in January 2016 and the subsequent Cole Report²⁹ are now reflected in current procurement guidelines prepared by SFT³⁰.

There exists a proliferation of online resources and guidelines to support public sector procurers to make an informed choice about selecting the correct procurement option and contract form. In addition to a very detailed Construction Procurement Handbook³¹ the SFT have recently published Guidance on Selecting a Procurement Strategy and a Form of Contract³². The guidance seeks to encourage a selection process based on best fit for the delivery of project outcomes and for risk management. In particular, it attempts to encourage procuring authorities to include in their consideration the potential for a procurement strategy based on the definition of project outcomes and the early appointment of integrated teams. Whilst the SFT fall short of specifically recommending D&B procurement for School projects, they do provide very detailed guidance and advice for public procurers. The following specific recommendations were made by SFT in respect to procurement selection.

- 1 Thorough consideration of options must be applied to contract selection as part of the pre-commercial stage.
- 2 There must be an open, mature and reasonable discussion between parties when deciding on the allocation of risk.
- 3 Any variations to standard forms of contract should be kept to a minimum and used only when absolutely necessary to take account of the particular circumstances of the project. Any such amendments should be clearly highlighted within contract documentation so that client and contractor are clear on the variations being imposed to the standard terms.



Alyth Primary School

²⁸ Scottish Futures Trust, Improved Delivery, accessed 17th December 2019, <https://www.scottishfuturestrust.org.uk/page/improving-delivery>

²⁹ Report of the Independent Inquiry into the Construction of Edinburgh Schools, February 2017, accessed 17th December 2019, https://policy.ciob.org/wp-content/uploads/2018/03/Inquiry_into_Edinburgh_Schools_February_2017_FINAL_VERSION.pdf

³⁰ Specific procurement recommendations made in the independent inquiry report are included later in this section.

³¹ Scottish Government, accessed 17th December 2019, <https://www.gov.scot/publications/construction-procurement-handbook/>

³² Scottish Futures Trust, Guidance on Selecting a Procurement Strategy and a Form of Contract, accessed 17th December 2019, <https://www.scottishfuturestrust.org.uk/storage/uploads/guidanceonprocurementstrategy270917kWWW.pdf>

Form of D&B Contracts and Key Aspects



Wales

The Welsh government 21st Century Schools and Education Programme was announced back in 2009. The programme is a collaboration between the Welsh Government, Welsh Local Government Association (WLGA), local authorities, Diocesan education authorities for the voluntary-aided sector and Colegau Cymru, representing further education. The Welsh Government's requires for councils to come together to procure construction and refurbishment using common regional frameworks. The procedures for the Welsh School building programme is similar in many way those adopted by the DfE in England.

A 2016 report by Constructing Excellence in Wales³³ highlighted inefficiencies in the operation of the frameworks in Wales. Contracts let to-date include a mix of two-stage procurement with early contractor involvement, D&B and traditional construction-only contracts. Industry good practice suggests a single stage D&B approach best enables collaborative working between the client and contractors. This variation frustrates contractors, increases bidding costs and results in councils bearing differing levels of risk depending on their chosen procurement approach. The strategic outline case for Band B makes clear that contracts will be expected to be either D&B or design, build, finance and maintenance for revenue-funded projects.

In a 2017 Wales Audit Office report³⁴ it was recommended that councils adopt good practice in the approach to construction with a presumption in favour of D&B.

“ The strategic outline case for Band B makes clear that contracts will be expected to be either D&B or design, build, finance and maintenance for revenue-funded projects”

The Welsh Government does not specify a preferred procurement option for schemes funded through capital. Local authorities and colleges often procure their schemes through regional frameworks using D&B contracts. Some of the stakeholders do use the traditional route, designing in house and then letting the building contract separately but D&B as a delivery route is much more common under capital delivery.

The MIM Programme is a Public-Private Partnership (PPP) model that includes design, build, maintenance, lifecycle and funding over 25 years under a single project agreement.

³³ Constructing Excellence Wales (May 2016) Optimising the procurement and delivery of 21st century schools in Wales, Main report and Appendices B, E and H, Unpublished report

³⁴ Wales Audit Office, 2017, the 21st Century Schools and Education Programme, May 2017.

Form of D&B Contracts and Key Aspects

3.3



Northern Ireland

Typically, CPD and the Centres of Procurement Expertise (CoPEs) develop procurement policies through various task groups. They consult the Construction Industry Forum for Northern Ireland (CIFNI) where relevant. CPD has endorsed these policies, where they have been issued as formal Procurement Guidance Notes (PGNs)³⁵.

In October 2005, the Procurement Board of CPD agreed that Departments would implement the recommendations

of 'Achieving Excellence in Construction - Procurement Guide 06 - Procurement and Contract Strategies'³⁶.

In particular, all Government Construction Clients will develop procurement and contract strategies aligned to the preferred integrated procurement routes (PFI, Prime Contracting or D&B). Traditional procurement routes will only be used if they demonstrably add value in comparison to the three recommended routes.



Tulbody West Elevation

³⁵ Construction & Procurement Delivery, Procurement Guidance Note, PGN 06/10, accessed 17th December 2019, <https://www.finance-ni.gov.uk/publications/procurement-guidance-note-0610-procurement-construction-works-and-services>

³⁶ This document has not been updated since 2007.



Form of D&B Contracts and Key Aspects



In the most recent edition of the National Building Specification (NBS) National Construction Contracts and Law Report³⁷ it was reported by consultants that traditional procurement (46%) and D&B (41%) were the leading procurement methods adopted in the UK (Figure 1).

In comparison when clients and contractors were surveyed D&B surfaced as the most frequently used procurement method by the contractors (46%), whilst the clients (43%) reported traditional procurement (Figure 2).

The NBS reported that traditional procurement was in decline albeit at a slow rate. The first NBS survey in 2011 reported that 72% of consultants used it most often; in 2012, this declined to 61%; then 52% in 2015; and now 48%. Similarly, for clients, the figures have moved from 59% to 57%, 53% and now 46%.

When asked which contract form was in most use in the UK, JCT featured strongly, followed by NEC³⁸. In 2018 JCT had shown a marked growth, and is now at levels that were not seen since the first NEC survey in 2011. NEC, which had been growing year on year, has contracted and has returned to the levels seen in 2011. Use of bespoke contracts has fallen from 11% to 5% (Figure 3).

Which procurement method was most frequently used in projects you were involved in?

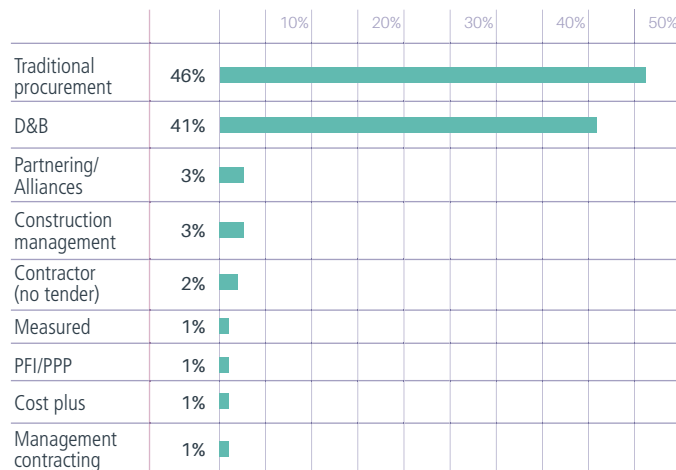


Figure 1 Most commonly Used Procurement Method (NBS, 2018, pp.10).

Which procurement method was most frequently used in projects you were involved in, during the past 12 months?

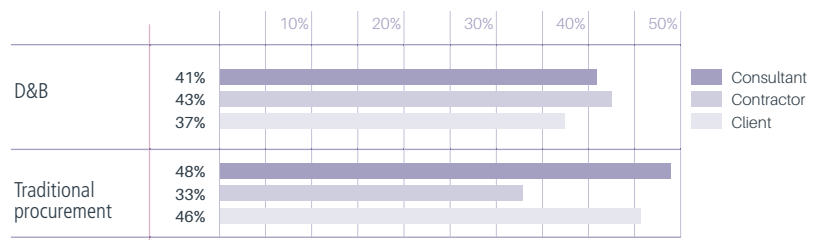


Figure 2 Most commonly Used Procurement Method (NBS, 2018, pp.11)

Which contracts have you/your organisation used most often?

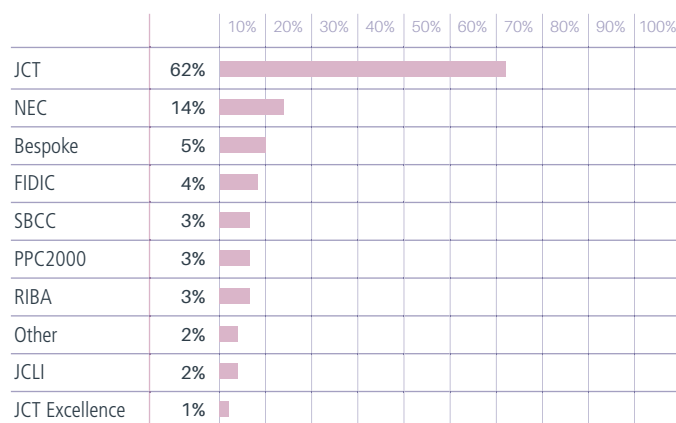


Figure 3 Most commonly Used Contract Forms (NBS, 2018, pp.18).

³⁷ NBS National Construction Contracts and Law Report, accessed 17th December 2019, <https://www.thenbs.com/knowledge/national-construction-contracts-and-law-report-2018>

³⁸ New Engineering Contracts.

Form of D&B Contracts and Key Aspects

3.3



There are many different standard forms of construction contracts available for use in the UK. The principal contracts in use are:

The Joint Contracts Tribunal (JCT)

The D&B Contract 2016³⁹ is intended for use on construction projects following the D&B procurement route. This involves appointing a main contractor to design (or complete the design) of the project and to progress to construct it also. The latest edition is the Standard Form of D&B Contract 2016 edition. This form imposes on the contractor a liability for the design equivalent to that imposed on an architect or other professional designer ie. to take reasonable care in the preparation of the design.

The New Engineering Contract: Engineering and Construction Contract (NEC)

The NEC4 Design Build and Operate Contract (DBO) June 2017⁴⁰ (Turquoise Book) is widely used in some regions of the UK. The contract is designed to provide a contractual vehicle suited where the contractor is appointed with responsibility to design, construct and operate assets in new or refurbishment projects. The objectives of NEC are flexibility, clarity and simplicity, as well as providing a good stimulus to good management). The contracts are written in plain and simple English in the present tense, require all communications to be in a form that can be read, copied and recorded. The contracts are modular, with a comprehensive range of primary and secondary options providing full flexibility in the country of use, choice of procurement route, pricing options, design input and allocation of risk.

Standard Government Conditions of contract

Whilst the suite of standard Government Conditions of contract, GC Works, are still available, they are no longer being updated by the government, as they have moved to the New Engineering Contract, now in its fourth edition (NEC4).

The Association of Consulting Architects (ACA)

An important feature of this form is the inclusion of standard alternative clauses. A combination of particular clauses can in effect create a D&B contract. The ACA PPC 2000 Standard Form of Contract for Project partnering⁴¹ was first published in 1998. PPC 2000 pilot schemes are undertaken on a range of housing, office and school projects, including refurbishments and new builds in both the public and private sectors. PPC 2000 provides a pathway for the partnering process. It creates a single contractual hub that allows all team members to contract on the same terms. It aligns project management processes, methods and behaviour covering all project stages from design to completion. Trust and cooperation are encouraged and promoted through PPC 2000.

Other, less often used, contracts are published by:

- The Institution of Chemical Engineers produces a suite of contracts used mostly in process industries.
- FIDIC (International Federation of Consulting Engineers) publishes a suite of contracts used internationally, and by the World Bank. If contemplating use in the UK, amendments would be needed to comply with UK legislation requirements.
- The Institution of Mechanical Engineers and the Institution of Engineering and Technology produce contracts for electrical and mechanical work.
- The Chartered Institute of Building has launched a contract for use with Complex Projects – CPC 2013.
- SFT publishes contracts for use on revenue financed schemes, and for D&B projects using the hub programme.

³⁹ Joint Contracts Tribunal, accessed 17th December 2019, <https://www.jcttd.co.uk/category/design-and-build-contract>

⁴⁰ NEC, Design, Build and Operate Contract, accessed 17th December 2019, <https://www.neccontract.com/NEC4-Products/NEC4-Contracts/NEC4-Design-Build-and-Operate-Contract>

⁴¹ The Association of Consulting Architects, accessed 17th December 2019, <http://ppc2000.co.uk/>



Form of D&B Contracts and Key Aspects

3.3



The DfE require that all high value band projects a need a DfE D&B contract. All medium and low value band projects need one of the following with standard DfE amendments:

- JCT D&B
- JCT intermediate works with contractor design
- JCT intermediate works without contractor design
- JCT minor works with contractor design
- JCT minor works without contractor design

The forms of construction contract used in Scotland and Wales are generally either JCT or NEC contracts. JCT however have specific Scottish Building Contracts with variants for alternative procurement options ie. traditional, D&B etc. Each variant and/or option reflects differences in risk allocation between the parties and differences in the mechanisms for payment, variations and disputes. SFT provide useful generic construction strategies to selecting the most appropriate form in Scotland. A summary of the generic procurement strategies and associated forms of contract is contained in Table 2 below.

“ There are occasions when D&B is perfectly sensible. But the more complex the project, the less likely it is you’ll get a solution through D&B which meets the clients requirements. D&B contractors are good at putting up buildings, they are not so good at understanding the core business of the client... who needs to articulate very clearly what the required standards are, and then monitor their delivery, otherwise the D&B contractors motivation is least cost”

“ This form of contract likely needs stronger design skills in house (in comparison to a traditional procurement where the client has a direct relationship with an architect to assist them in this) in order to better brief for design and ensure the most appropriate design is being developed. Clients without any in-house design skills can lack the knowledge and confidence to appropriately direct the design outcomes”

The preferred contract in use Northern Ireland is the NEC 4 traditional form of contract for all their School building projects.

| Procurement Strategies | Integrated | | Traditional | Design and Build | | Management | | Revenue Financed | |
|--|--|---|---------------------------------------|--|---|--|---|------------------------------|-------------------------|
| | Early Integrated Team | Hub D&B | Traditional | D&B | Design, develop and construct | Management contracting | Construction management | Hub DBFM | NPD |
| Option for cost reimbursable target cost | ✓ | ✓ | ✓ | ✓ | ✓ | ✗ | ✗ | ✗ | ✗ |
| Option Two-Stage Tendering | ✓ | ✗ | ✓ | ✓ | ✗ | ✗ | ✗ | ✗ | ✗ |
| Option for framework | ✓ | ✗ | ✓ | ✓ | ✓ | ✓ | ✓ | ✗ | ✗ |
| Available forms of contract | SBCC Constructing Excellence NEC 3 Option C with Secondary Partnering Option X12 PPC2000 | Standard hub Design, Build, Development Agreement | SBCC Various NEC 3 Options A and B | SBCC D&B NEC 3 Various Options and Combinations | SBCC Constructing Excellence NEC 3 Option C with Secondary Partnering Option X12 | SBCC Management Contract NEC 3 Option F | SBCC /JCT Management Contract NEC 3 Option F | Standard Hub DBFM Model Form | Standard NPD Model Form |

Table 2 - Summary of Generic Procurement Strategies

(SFT, Guidance on Selecting a Procurement Strategy and a Form of Contract, 2019, pp. 9)



Operation of D&B Contracts

3.4



JCT D&B Contract 2016

The JCT D&B 2016 (DB16) is intended for use on building projects where the 'employer has defined the project requirements. The contractor carries out the works stipulated in the project requirements but also completes the design⁴². The form is only published in one version for both public and private clients⁴³.

There are however some special provisions that only apply to public sector clients. The structure follows the normally JCT layout i.e. agreement, recitals, articles, contract provisions, attestation and conditions. There are a complex array of provisions dealing with the following broad areas. This section only serves to provide an overview of the key provisions and framework of the above contract⁴⁴.

- 1 Documents
- 2 Obligations of the contractor
- 3 Possession and completion
- 4 Control of the works
- 5 Sums properly due
- 6 Payment

The contract includes the use of a suite of additional documents published by the JCT⁴⁵.

Documents

The 'Contract Documents'⁴⁶ are detailed as the Agreement and the Conditions, the Employer's Requirements and the Contractor's Proposals, the Contract Sum Analysis and (if applicable) the 'BIM Protocol'⁴⁷. Supplemental Provisions 1-10 are incorporated as appropriate.

The JCT D&B Contract 2016 is widely used and is seen as an industry benchmark.

“ the contractor is responsible for only that portion of the design that it completes and not for the design as a whole ”

The contractor tenders a lump sum and a contract sum analysis will form part of the contract⁴⁸. There are optional provisions for the use of a bill of quantities. It is important that there is a clear basis for the value of design work including those named sub-contact works.

Further detailed provisions are incorporated to deal with discrepancies within and between various contract documents.

Obligations of the contractor

It is important to note that the contractor is responsible for only that portion of the design that it completes and not for the design as a whole. The key difference between DB16 and the more traditional standard form of contract is that the employer provides no further information to the contractors after the contract is entered into and that no individual is appointed to exercise the function of an architect or contract administrator. The form provides for the facility for the employer to employ an agent to represent its interest⁴⁹.

⁴² JCT DB/G Design and Build Contract Guide 2016, 2016, accessed 1st January 2019, <https://www.jctltd.co.uk/product/design-and-build-contract-guide>.

⁴³ The contract particulars indicate that some provisions, such as, advanced payments and associated bonds will not apply to local authorities.

⁴⁴ Note the provisions dealing with indemnity and insurance, default and terminations and dispute resolution are not dealt with in this section.

⁴⁵ JCT Design and Build Contract Guide (DB/G), JCT Design and Build Sub-Contract Agreement DBSub/A and C, JCT Sub-Subcontract (SubSub).

⁴⁶ These comprise the documents that that parties are bound.

⁴⁷ CIS Building Information Model (BIM) Protocol, Standard Protocol for use in projects using Building Information Models, accessed 1st January 2020, [file:///C:/Users/alan.hore/Downloads/the-bim-protocol%20\(1\).pdf](file:///C:/Users/alan.hore/Downloads/the-bim-protocol%20(1).pdf). The BIM Protocol creates additional obligations and rights for the Employer and the contracted Party or Parties. It's based on the direct contractual relationship between the Employer and the Supplier. The Protocol doesn't cater for any rights or liabilities between different Suppliers.

⁴⁸ This takes the form of a breakdown of the lump sum.

⁴⁹ This may well be an architect. This person has no express obligation to act impartially, although it will be implied that a duty of good faith will apply or liabilities between different Suppliers.



Operation of D&B Contracts

3.4



The contractor's level of design is limited to that of a professional person, therefore there is no strict duty to produce a building to meet the requirements set out in the employer's requirements, only to use due skill and care in preparing the design.

The contractor may sub-contract the work, including the design work, to domestic sub-contractors with the written approval of the employer⁵⁰.

Whilst there are no provisions for nominated sub-contractors there are provisions for sub-contractors to be named.

Possession and completion

It is a requirement that a date of possession and a date of completion is inserted in the contract particulars. There is also the facility to complete the works in phases. As there are no independent administrators in DB16, it is important that the employer operates any entitlement to an extension of time and ensure that there is full compliance with the detailed provisions of the contract in this regard. There is also a provision for partial possession of completed parts of the works ahead of practical completion.

Typical provisions apply in regard to the consequences of achieving practical completion and the possibility of applying liquidated damages, if found applicable.

Control of the works

The administration of the contract is very much the responsibility of the contractor as there is no reference to an architect or administrator. The employer is nevertheless required at various stages of the contract to issue instructions, notifications, consents and decisions, and is

- Complete the design (cl. 2.1.1)
- Carry out the works in conformity with the contract standards (cl.2.1.1) and with statutory requirements (cl.2.1.2) (note this would include clearance of any outstanding planning and building control matters)
- Completion on time (cl.2.3)
- Appoint a full-time site manager (cl.3.2)

entitled to appoint an employer's agent to give advice on this. Whilst there is no explicit requirement for the contractor to submit a contract programme, it is usual practice that this is provided as a control document but it does form part of the contract documentation.

The contractor is required to employ a competent site manager. Other key roles identified in the contract include the 'Principal Contractor⁵¹' and the 'Principal Designer'⁵².

There are detailed provisions regarding the submission of developing design by the contractor. This information is essential in order for the employer to monitor the development of the design and overall progress.

“ The administration of the contract is very much the responsibility of the contractor as there is no reference to an architect or administrator ”

⁵⁰ There are JCT standards forms of sub-contract that should be used..

⁵¹ The contract assumes the contractor will act as the principal contractor for the purposes of the CDM Regulations. The Construction (Design & Management) Regulations (CDM 2015) are the main set of regulations for managing the health, safety and welfare of construction projects. CDM applies to all building and construction work and includes new build, demolition, refurbishment, extensions, conversions, repair and maintenance.

⁵² Main responsibility for ensuring that correct health and safety measures are employed on site rests with the contractor, both under statute and the express terms of the contract.



Operation of D&B Contracts

3.4



The employer may instruct the contractor to open up works for inspection. If the work is found to be defective, the employer has the power to issue an instruction to remove this defective work. The contractor is responsible to make good any defective work. The contractor's liability for defective work is not limited to defects notified by the employer, and does not end with final payment. Should the contractor receive final payment, the employer remains entitled to losses as a result of defective work but the contractor is no longer entitled to return to site to rectify the works. The rights of the employer will reside in common law.

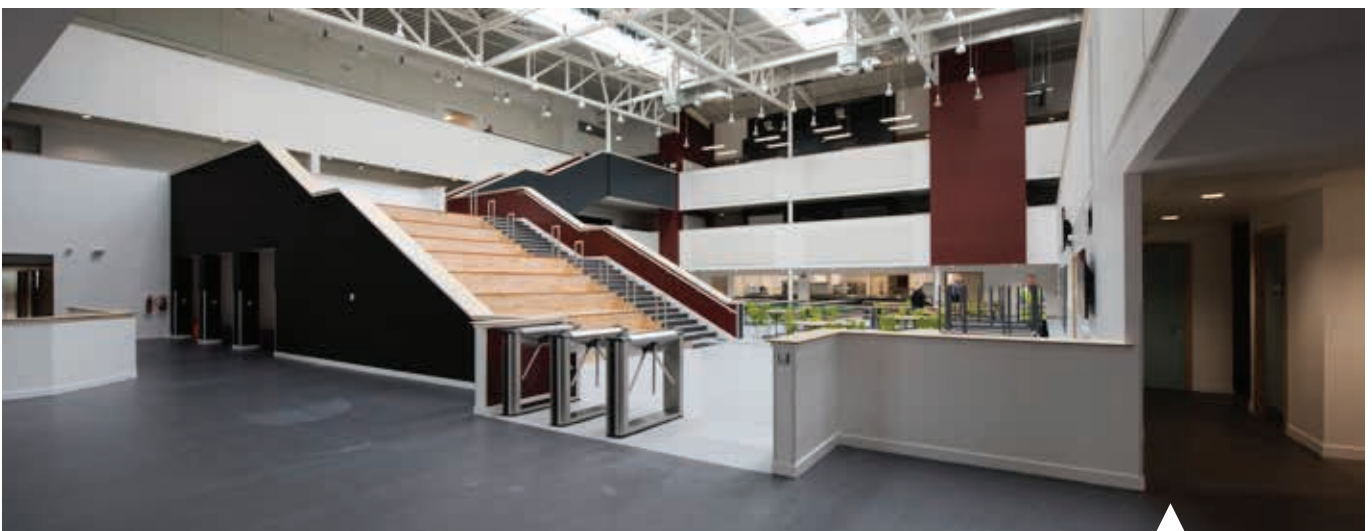
Sums properly due

Although the employer may assume that the contract sum is 'fixed', in D&B procurement this is rarely the case. Like most forms of contracts there are provisions included to deal with an adjustment to the contract sum, such as, employers instructions for additional work, adjustment of provisional sums, dayworks, fluctuations, approved loss and/or expense etc.

“ Although the employer may assume that the contract sum is 'fixed', in D&B procurement this is rarely the case”

Payment

The contractor is entitled to sums properly due to him by the employer and within the timeline stipulated in the contract⁵³. Whilst the payment provisions are complex there are two alternative mechanisms for payment ie 'stages' (Alternative A) or 'periodically' (Alternative B)⁵⁴. In addition there includes detailed provision in respect to the calculation of interim valuations and final payment. for defective work is not limited to defects notified by the employer, and does not end with final payment. Should the contractor receive final payment, the employer remains entitled to losses as a result of defective work but the contractor is no longer entitled to return to site to rectify the works. The rights of the employer will reside in common law.



Waid Academy

⁵³ There are several safeguards in place, such as, the Housing Grants, Construction and Regeneration Act 1996 (HGCRA) as amended by the Local Democracy, Economic Development and Construction Act 1999 (LDEDCA) which legislate for statutory payment timelines.

⁵⁴ Whilst the contractor will be paid monthly in both instances, the method of calculation differs in each case. Detailed provisions are included in respect to these calculations.



Certification and Quality Assurance Methods

For the purpose of this report this section will focus on the jurisdiction of Scotland.

It is for the authority that is procuring the works to determine how it will satisfy itself that the design and construction of the works is to the standards required. The Scottish government provide guidance on this area to assist contracting authorities to successfully deliver construction projects and achieve value for money⁵⁵.

Consideration must be given as to how the client will satisfy itself that the construction works will be carried out in accordance with the contract and to the required quality. This may include the engagement of a Clerk of Works, Inspector or Technical Adviser.

Clients have a number of options as to how to discharge this obligation, including:

- In-house resource with the appropriate availability, experience and capability.
- From a partner or associated organisation which has the requisite resource.
- The requirements in the remit for the Technical Adviser to the Authority.
- Appointing an independent external organisation with the required experience and capability.

A key issue to achieving the required quality is determined by how much time a Clerk of Works should spend on site. Not all projects will merit, or could justify, a full-time Clerk of Works. Whilst larger, more complex projects may do so, smaller, less complicated projects will not. The proportion of time a Clerk of Works should spend on site must be arrived at through a risk assessment, as noted in paragraph four above. The allocation of time must be sufficient for the Clerk of Works to inspect the key aspects of construction and to sign off areas of work before they are covered up or enclosed.

Time should be sufficient in project programmes and well managed so as not to create a rush towards the end. This is equally true at the design, procurement and construction stages.

3.5



“Regardless of the procurement strategy, it is incumbent upon public sector clients to implement project appropriate site inspection and assurance processes that mitigates resultant risk from the construction phase”.

Scottish Government Construction Policy Note
CPN 1/2017



Eden Park High School

⁵⁵ Construction procurement: project initiation and business cases handbook, accessed on the 2nd February 2020, see <https://www.gov.scot/publications/project-initiation-business-cases-handbook/pages/14/>



Certification and Quality Assurance Methods

3.5



All parties involved in a construction project should exercise caution when deciding to handover / take possession of a facility when it is known to have significant snagging/defects or incomplete works.

There needs to be a clear understanding across all parties involved in a construction project of the roles and responsibilities regarding the issues noted below. Clear lines of authority and reporting are also necessary in this regard. Project Execution Plans should set all of this out clearly.

- who designs which elements of the building
- design management and coordination
- design review and approval of design
- inspection and validation of the works as constructed

SFT have published a number of lesson learned reports designed to deliver a quality initiative. The clients, delivery partners and contractors are implanting a number of initiatives to improve quality. This is not just about quality assurance but starts at increased efforts to get things right in the first place⁵⁶.

On revenue funded projects the Completion Certificate must be issued by the Independent Tester (IT). This is done once the IT has satisfied themselves that all completion criteria have been fulfilled. This includes that the works are in accordance with the Authorities Construction Requirements. The role of the IT and the process for Completion are in clauses 15 and 17 respectively in the SFT DBFM Standard Form Contract⁵⁷.

On capital funded projects it is normally the procuring authority that issues the Completion Certificate. It is for them to decide how they will satisfy themselves as to the compliance, completion and quality of the works.

⁵⁶ SFT Lessons Learned reports, North West Community Campus, Dumfries, Learning Lessons, February 2020, accessed 6th March 2020, see <https://www.scottishfuturestrust.org.uk/storage/uploads/nwccsftlessonslearnedsft050220.pdf>

⁵⁷ SFT Publications, accessed 6th March 2020, see <https://www.scottishfuturestrust.org.uk/publications/search?q=DBFM>

Post-Occupancy Evaluation

For the purpose of this report this section will focus on the jurisdiction of Scotland.



All projects in the Scotland's Schools Future Programme should be evaluated 12-18 months post occupation⁵⁸. There are three levels of POE utilised by SFT, namely:

- The *Strategic Review* would take place 3-5 years post occupation where users have had time to work with the building over a longer period of time. This enables the opportunity to assess how the building meets the organisations long term strategy, with a full review of flexibility, fit for purpose, suitability and cost effectiveness.
- The *Operational Review* would be carried out between 12 and 18 months post occupation to allow various building systems and materials etc to bed in. This also allows a seasonal cycle to take place where feedback can be gained on how the building performs in a variety of conditions.
- The *Project Review* would be the initial POE which looks to gain end users feedback on how well the building is working operationally and if there are any immediate issues that need resolving.

The purpose of the POE is to better inform the briefing, design and execution of future projects and assess the scope for reducing operating costs and environmental impact, and/or to increase the whole-life value and improve user satisfaction⁵⁹.

Each evaluation type should cover five areas (albeit to different levels of investigation and analysis dependent on evaluation type). The five areas are:

- Design and Construction - Analysis of design proposals to cover: whether the building is being used in accordance with the client requirements/designer's intentions, whether consultation with stakeholders was undertaken/used and review of engagement with stakeholders throughout the life of the project.
- Development, Construction and Cost Review Process - Review of construction and cost/budget to highlight any improvements that could be made to the process. Review of cost management including setting of project budget and management/control of same through the design, development and construction process, assessing areas such as affordability, how final costs align with original budget, cost management throughout the project stages etc.
- Suitability Assessment - Assessment on suitability and sufficiency of space, specifically in terms of space management, adjacencies and efficiencies.
- Environmental and Sustainability Assessment - Analysis and review of environment and sustainability to assess daylight, artificial lighting, temperatures, overheating, CO2 emissions, acoustics, energy consumption, water consumption and lifecycle analysis and how performance aligns with original requirements.
- Operation Cost Analysis - Operating costs review to establish current spend is in accordance with predictions (especially energy and cleaning) and whether a building's lifecycle replacement, planned preventative and reactive maintenance costs are in accordance with predictions.

⁵⁸ Scottish Futures Trust, Scotland's School for the Future, Interim Findings Report, May 2018, accessed 6th March 2020, see <https://www.scottishfuturestrust.org.uk/storage/uploads/scotlandsschoolsforthefutureinterimfindingsreportmay2018.pdf>

⁵⁹ The objective is to measure the efficiency and performance of the projects, and to ascertain the level to which expectations of a broad range of stakeholders have been met.



3.6

Post-Occupancy Evaluation

Another initiative in the UK is Soft Landings. This is a building delivery process which runs through the project, from inception to completion and beyond, to ensure all decisions made during the project are based on improving operational performance of the building and meeting the client's expectations⁶⁰. The primary function of Soft Landings is to help provide sustainable, functional assets that meet the needs of the End Users. Performance management, lessons learnt, improved design intrinsically come with the Soft Landing process and should be used to enhance capability and performance. To reinforce the need to focus on End User requirements, specific requirements on Aftercare and POE should be developed by the employer⁶¹.

Five areas to be covered in SFT POE

- D&C
 - Development, Construction and Cost Review
 - Suitability Assessment
 - Environmental and Sustainability Assessment
 - Operation Cost Analysis
-



Waid Academy

⁶⁰ Gana, V., Giridharan, R. and Watkins, R. (2018), "Application of soft landings in the design management process of a non-residential building", *Architectural Engineering and Design Management*, Vol. 14 No. 3, pp. 178-193.

⁶¹ SFT BIM Level 2 Workflow, Operation in Use, accessed 2nd March 2020, see <https://bimportal.scottishfuturetrust.org.uk/level2/stage/7/task/19/post-occupant-education>

Case Study
Hub East Central Scotland -
Bertha Park Secondary School

 Perth & Kinross Council welcomes you to
Bertha Park High School
All visitors please report to Main Entrance



3.7

Case Study

Hub East Central Scotland - Bertha Park Secondary School

This secondary school included special needs facilities for 1100 pupils, externally full-size grass football pitch, 4G artificial pitch and a MUGA (Multi-Use Games Area). An external energy centre serves the building and has been designed to support the proposed 2 stream primary school and early years facilities planned to create an all through campus in the future. This advanced planning by Perth and Kinross Council is to cope with the growing demand as the adjacent residential area develops.

The school is located on the northern outskirts of Perth, sitting in the heart of a new community being developed. Bertha Park secondary school is quite unique in that it is the first entirely new school in Scotland for over 30 years, not replacing an existing one and forms part of the Scottish Government's Schools for the Future programme.



Perspective View of Elevation





3.7

Case Study Hub East Central Scotland - Bertha Park Secondary School

| | |
|---------------------------|--|
| Contract Value | £32.50m (€37.60m) |
| Contract Duration | 38 months |
| Contract Parties | Client/Owner: Hub East Central Scotland & Perth / Kinross Council Design-Builder: Robertson Construction Tayside Architect: KORR |
| Procurement Method | DBFM |
| Contract Form | SFT Standard Form of Agreement (hub DBFM Projects) version 2.3 November 2015 |



Interior view of Assembly Area





3.7

Case Study Hub East Central Scotland - Bertha Park Secondary School

Key Challenges

Mid way through construction the adjacent residential developer advised they were experiencing difficulties with the Public Utility Infrastructure providers and that there would be a delay to all live service installations for which they were responsible. Through collaboration between Perth and Kinross Council, Robertson Construction and their M&E Subcontractor developed a mitigation strategy that protected the July 19 handover date, which was an excellent outcome considering they had a 6 month utility delay to contend with.

“ There was nobody to tell us ‘you can’t do things like that here’, because there was no ‘here’ before. We started with a blank canvas, so we could really challenge the norm”.
“It has been a real once-in-a-lifetime opportunity.”

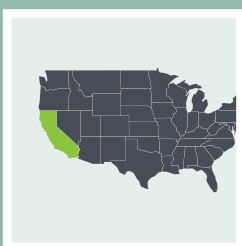
Stuart Clyde Head Teacher



Exterior



PART FOUR
CALIFORNIA
USA





Key Findings

Procurement processes undertaken
by public entities

Form of D&B Contracts and Key Aspects

Operation of D&B Contracts

Certification and Quality Assurance Methods

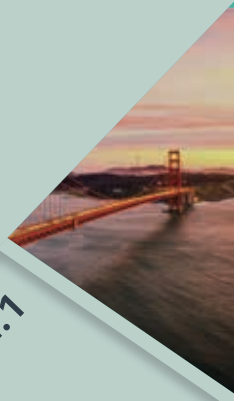
Post Occupancy Evaluation

Case Study

4

Key Findings

4.7



- 1** LAUSD is the second largest public school district in the entire United States.
- 2** The use of D&B procurement in school buildings is legislated for in the State of California.
- 3** The Design Build Institute of America (DBIA) Standard form of Agreement between Owner and Designer-Builder is a commonly used D&B form in the State of California.
- 4** The primary owner concerns with respect to D&B include risk liability, lack of familiarity, and higher contract costs.
- 5** LAUSD possesses a detailed Design Guide and Standards Conditions of Approvals for District Construction that provides guidance and Quality Assurance.
- 6** Post-occupancy Evaluation is routinely deployed on all LAUSD projects.
- 7** The subject case study successfully used a D&B type of project delivery, and the subject school district currently uses D&B procurement on more than half of the current projects underway in the LAUSD.



Procurement processes undertaken by public entities

4.2

Responsibilities for Schools Programme

The State of California has an estimated population of 39.75 million people. If it were an independent country it would rank 34th in the world. Los Angeles is the second most populous city in the United States after New York City. Other major cities in state include San Diego, San Jose and San Francisco¹.

California is home to the largest Kindergarten through 12th grade (K-12) public school system in the states². LAUSD is also the second largest public school district in the entire United States, with an estimated enrolment of 667,273 students (Figure 1 and 2)³. Currently the state legislates for the use of D&B procurement in their school building programme.

School Procurement Guidelines

Each California school district has their own individual and unique procurement responsibility. Due to this, their procurement contracts for school design and construction have principally been developed internally, best meeting their own needs. Historically, California school districts have opted to use the traditional method of Design-Bid-Build (DBB) in public school construction contracts. Although the D&B project delivery method had been available for several years, this method was historically used somewhat infrequently until 2015, when the California Legislature amended laws making a D&B method more accessible and streamlined, giving school districts more flexibility.

“California is home to the largest Kindergarten through 12th grade (K-12) public school system in the states, known as the Los Angeles Unified School District (LAUSD)”



Figure 1: Map of California⁴



Figure 2: Area of LAUSD⁵

¹ World Population Review, accessed 11 December 2019 <<http://worldpopulationreview.com/states/california-population/>>
² Los Angeles Unified School District accessed 11 December 2019 <<https://achieve.lausd.net/domain/4>>
³ World Atlas, accessed 11 December 2019, <<https://www.worldatlas.com/articles/largest-school-districts-in-the-united-states.html>>
⁴ Geoscience News and Information, accessed 10 December 2019, <<https://geology.com/county-map/california.shtml>>
⁵ Los Angeles Unified School District, Local District Map, accessed 10 December 2019, <<https://achieve.lausd.net/domain/34>>



Procurement processes undertaken by public entities

4.2

California's current regulations regarding the use of D&B in public schools is governed by California AB-1358 School facilities: *D&B contracts*⁶ approved on the 10th October 2015 which (prior to amendment) read, in part:

“ Existing law authorizes the governing board of a school district, until January 1, 2020, and upon a determination by the governing board of the school district that it is in the best interest of the school district, to enter into a D&B contract for both the design and construction of a school facility if that expenditure exceeds \$2,500,000 (€2,220,500), as provided.”

This was amended one year later, extending the expiration date and decreasing the entry-level contract amount:

“ This bill would make those provisions inoperative on July 1, 2016, and as of that date would instead authorize, until January 1, 2025, a school district, with the approval of the governing board of the school district, to procure D&B contracts for public works projects in excess of \$1,000,000 (€888,000), awarding the contract to either the low bid or the best value, as provided.”

Prior to enactment of this legislation, California passed Senate Bill No. 328 in 2013 permitting a different alternative project delivery system, Construction Management at Risk (CMAR) for California counties .

This is now codified as Public Contract Code § 20146 (PCC § 20146). This statute permitted CMAR in lieu of DBB on projects over \$1 million (€880,000) using either the lowest responsible bidder or the best value method to a properly bonded CMAR entity.

Passage of the Senate Bill No. 328 allowed California counties to join the University of California, the California State University System, the Administrative Office of the Courts and other public entities which already had enabling legislation permitting them to enter CMAR agreements, potentially reducing their risk in public sector projects⁷.

Although price is a factor, a construction manager is not engaged only on the basis of lowest price. They become involved in design development, typically after the schematic design is completed, and assists the designer develop the construction documents. This usually results in a better design and lower construction costs. The CM then acts on behalf of the owner to manage the trade contractors.

⁶ California Legislative Information, accessed 10 December 2019, <https://leginfo.ca.gov/faces/billNavClient.xhtml?bill_id=201520160AB1358>

⁷ ERN California, accessed 10 December 2019, <<http://www.caccfc.org/documents/PreA.pdf>>

Procurement processes undertaken by public entities

4.2

The three main procurement options used in new K-12 school building projects in the State are summarised in Table 1. An owner has several areas of concern when embarking on a project. The chosen project delivery method may be a combination or hybrid of multiple delivery methods. Each of these delivery methods establishes different relationships among the parties involved and, subsequently, different levels or risk.

| Procurement Options | Outline Description of Delivery Method |
|--|--|
| Design-Bid-Build | This the traditional linear delivery method where the owner employs designers to create the tender design and specification documentation and enters into a contract with a constructor to build the project. |
| D&B | This method involves combining the design and construction responsibilities into a single responsibilities contact executed by a D&B entity. |
| Construction Management at Risk | This method entails a commitment by a Construction Manager (CM) to deliver the project within a Guaranteed Maximum Price (GMP) which is based on the construction documents and specifications prepared at the time of entering the GMP agreement. |

Table 1: Key Procurement Option in New School Building Projects in California

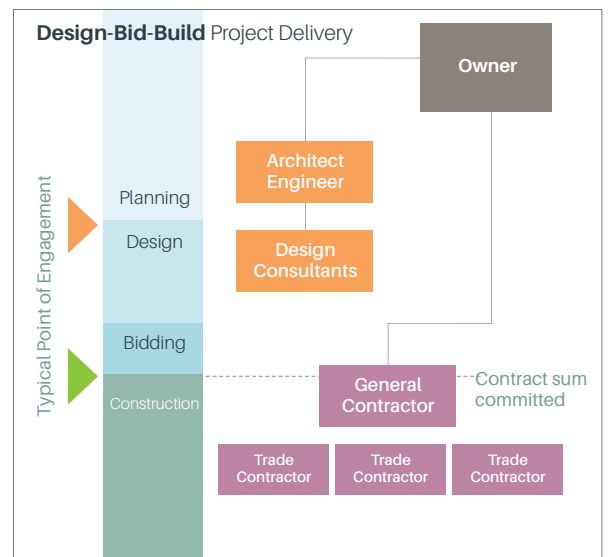


Figure 3: DBB Contractual Relationship⁸

Design-Bid-Build

This is the more traditional procurement method with three linear phases: DBB. There are three prime players: the owner, designer and the contractor. A traditional DBB contractual relationship is shown in Figure 3 where it can be seen there are two separate contracts: owner to designer and owner to contractor.

In this method of delivery, the owner warrants the sufficiency of the plans and specifications to the contractor. The contractor is responsible to build the project as designed and the designer is responsible to design to a professional standard of care. In addition, the owner is responsible for any "gaps" between the plans and specs and the owner's requirements for performance.

⁸ Design-Build Institute of America, Choosing a Project Delivery Method, accessed 12 December 2019, <<https://dbia.org/wp-content/uploads/2018/05/Primers-Choosing-Delivery-Method.pdf>>



Procurement processes undertaken by public entities

4.2

The key characteristics of DBB are:

- Widely applicable, well understood, and well-established/clearly defined roles for parties.
- Very common approach for public owners due to procurement statutes.
- The owner has a significant amount of responsibility for the success or failure of the end product, particularly since the facility's features are fully determined and specified prior to selection of the contractor (Owner "owns" the details of the design).
- The contractor and designer work directly for the owner.
- Process may have a longer duration when compared to other delivery methods since all design work must be completed prior to solicitation of the construction bids. The construction may not begin until the design and procurement phases are complete.
- The absence of construction input into the project design may limit the effectiveness and constructability of the design. Important design decisions affecting the types of materials specified and the means and methods of construction may be made without appropriate consideration from a construction perspective. As there is no contractual relationship between the contractor and the designer there is no opportunity for collaboration during the design phase.
- The owner generally faces exposure to contractor change orders and claims over design and constructability issues since the owner accepts design liability. Here the owner is liable for any "gaps" between the plans and specifications.
- This traditional approach may promote adversarial relationships rather than cooperation and coordination among the contractor, the designer and the owner.



Theodore Roosevelt High School



Procurement processes undertaken by public entities

4.2

D&B

In this delivery method the contractor takes on responsibility for both the D&B phases. The contractual relationship is shown in Figure 4. This method fast tracks the project by integrating and overlapping the design and construction phases. The two prime players are the owner and D&B entity who enter into a single point of responsibility contract. This D&B entity can take on many forms including an integrated D&B; contractor led; designer led; Joint venture; or Developer led firm. The D&B firm is responsible to D&C the project to meet the performance standards set forth by the owner in the contract. With respect to any prescriptive designs or specifications, the D&B entity is responsible for discovering any inconsistency between the prescriptive requirements and the performance standards. The owner remains responsible for the cost to reconcile the inconsistent standards.

The key characteristics of D&B are:

- Cost efficiencies can be achieved since the contractor and designer are working together throughout the entire process leading to fewer changes, fewer claims and less litigation, earlier knowledge of firm costs with change orders typically limited to owner changes.
- D&B can deliver a project more quickly than conventional DBB or CMAR.
- Owner can, and should, specify performance requirements in lieu of prescriptive specifications.
- D&B team qualifications are essential for project success; owner must be willing to place a heavy emphasis on the qualifications portion of the selection process.
- Owner must be willing to allow the D&B team to handle the design details.

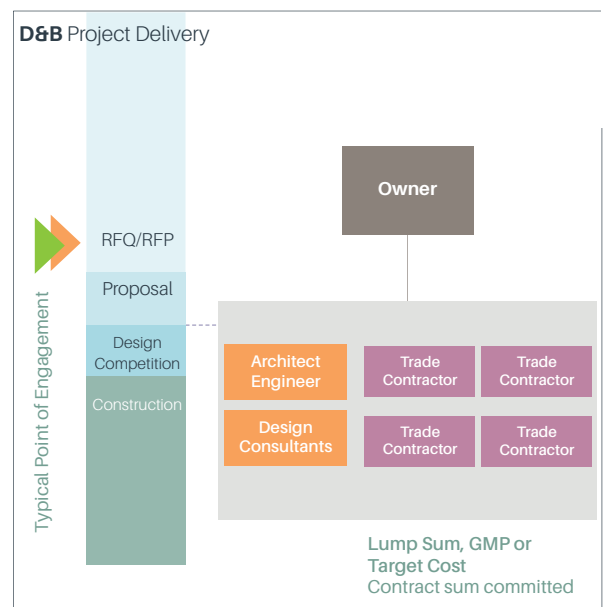


Figure 4: D&B Contractual Relationship⁹

“As a general matter, many public owners are required to competitively bid construction contracts and award them to the lowest responsive, responsible bidder. However, public owners are not required to award design and construction management agreements to the lowest responsive and responsible bidder. They can award based upon an assessment of best value, with price being one of the considerations. Risk arises when a CMAR agreement is entered into without statutory authority”

⁹ibid

Procurement processes undertaken by public entities

4.2

Construction Management at Risk

In this delivery method the CM takes on the responsibility for management of the project delivery. The contractual relationship is shown in Figure 5. CMAR can retain the three linear phases: design, bid, build or may be fast tracked. There are three prime players: owner, designer and the CM-constructor who enter into two separate contracts: owner to CM-constructor and owner to designer.

The owner warrants the sufficiency of the plans and specifications to the CM-Constructor, whilst the owner is responsible for the “details” of design and is liable for any “gaps” between the plans and specifications and the owner’s requirements for performance.

The key characteristics of CMAR are:

- Designer works directly for the owner.
- The owner gains the benefit of having the opportunity to incorporate a contractor’s perspective and input to planning and design decisions leading to a more professional relationship with contractor, earlier knowledge of costs and earlier involvement of constructor expertise.
- Project delivery typically faster than traditional DBB.
- A primary disadvantage in CMAR delivery involves the lack of direct contractual relationship between the contractor and designer, placing the owner between those entities for the resolution of project issues which can lead to disagreements regarding construction quality, the completeness of the design, and impacts to schedule and budget may arise.

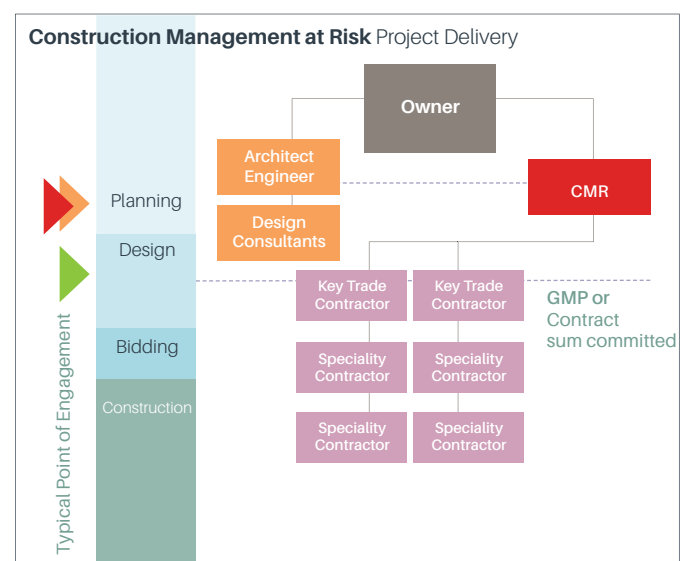


Figure 5: CMAR Contractual Relationship ¹⁰

¹⁰ ibid

Form of D&B Contracts and Key Aspects



Given the scale of the United States the country offers a wide variety of contract types¹¹. In recent decades, however, statutory changes have seen an increased use of D&B contracts. There is no standard form of construction agreement applicable across the United States. Federal construction projects are generally governed by the Federal Acquisition Regulation (FAR) a book containing numerous clauses mandated on various types of jobs.

On public and private construction, the A-201 General Conditions and other contracts published by the American Institute of Architects (AIA) are probably the most widely used. Other well-known suites of contracts are published by ConsensusDocs, the Engineers Joint Contract Documents Committee (EJCDC) and the DBIA.

All of these forms attempt achieve a degree of balance between the parties that typically participate, although that balance can be easily lost if the form are overly modified. In addition to D&B, CM is popular with some “at risk” where the CM has direct contracts with trade contractors, whilst the “not at risk” CM merely acts as an advisor to the owner. Online access to information within the LAUSD is limited to employees; however, their website¹² lists three types of contract categories that they use (Table 2).

| Contract Category | Types of Contract |
|--|---|
| Best Value Procurement | <ul style="list-style-type: none"> ■ Construction ■ Lease-Leaseback ■ D&B |
| General Contractors | <ul style="list-style-type: none"> ■ Pre-Qualification ■ Formal ■ Informal |
| Professional Services & Architects/Engineers | <ul style="list-style-type: none"> ■ Architectural and Engineering ■ Professional and Technical Services RFP / RFQ / IFB Listings |

Table 2: LAUSD contract categories and types of contracts ¹³

¹¹ International Comparative Legal Guides, accessed 10 December 2019, <https://iclg.com/practice-areas/construction-and-engineering-law-laws-and-regulations/usa>

¹² Los Angeles Unified School District, main page, accessed 10 December 2019, <https://achieve.lausd.net/domain/4>

¹³ Los Angeles Unified School District, Facilities Department, accessed 10 December 2019, <https://www.laschools.org/new-site/about-fsd/management-contacts>



Form of D&B Contracts and Key Aspects

4.3

In addition to public agency contracts, there are several forms available through industry organisations. These include the Construction Management Association of America (CMAA), an advocate for public agencies; the Association of General Contractors (AGC), an advocate for general contractors; DBIA, an advocate for Design Builders; and AIA, an advocate for architects.

CMAA contracts include Agency Series¹⁴ and CMAR¹⁵. Agency Series includes Standard Form of Agreement between Owner and the CM, CM as Owner's Agent, Standard Form of Agreement between Owner and Contractor, General Conditions between Owner and Contractor, and Standard Form of Agreement between Owner and Designer. CMAR includes Standard Form of Agreement, Owner-CM; Standard Form of Agreement, CM-Contractor; General Conditions, CM-Contractor and Standard Form of Agreement between Owner and Designer.

Association of General Contractors (AGC) contracts¹⁶ include both Long and Short Form Prime Contracts between Owner and Contractor and Standard Form Prime Contract between Owner and Contractor.

DBIA contracts¹⁷ include a Standard Form of Agreement between Owner and Design-Build, Standard Form of General Conditions between Owner and Design-Build, and Progressive D&B Agreement. AIA contracts¹⁸ are numerous, and include more than a dozen different Owner/Contractor Agreements and an additional a variety of different Owner/Architect Agreements.

DBIA contracts include a Standard Form of Agreement between Owner and Design-Build, Standard Form of General Conditions between Owner and Design-Build, and Progressive D&B Agreement.

¹⁴ Construction Management Association of America, accessed 10 December 2019, <<https://www.cmaanet.org/bookstore/book/contract-documents-agency-series>>

¹⁵ Construction Management Association of America, accessed 10 December 2019, <<https://www.cmaanet.org/bookstore/book/contract-documents-construction-manager-risk>>

¹⁶ Association of General Contractors in California, accessed 10 December 2019, <<http://agc-ca.org/OnlineContracts/>>

¹⁷ Design- Build Institute of America, accessed 12 December 2019, <<https://dbia.org/contracts/>>

¹⁸ The American Institute of Architects, accessed 12 December 2019, <<https://www.aiacontracts.org/resources/6150803-list-of-all-current-aia-contract-documents/>>



Operation of D&B Contracts



A 2014 McGraw Hill Construction study¹⁹ (which is their most recent one available) indicated that the vast majority of architects and contractors had been involved in K-12 DBB projects with close to half using CM-at-Risk. D&B was far less common, with only 25% of contractors and just 13% of architects reporting involvement (Figure 6).

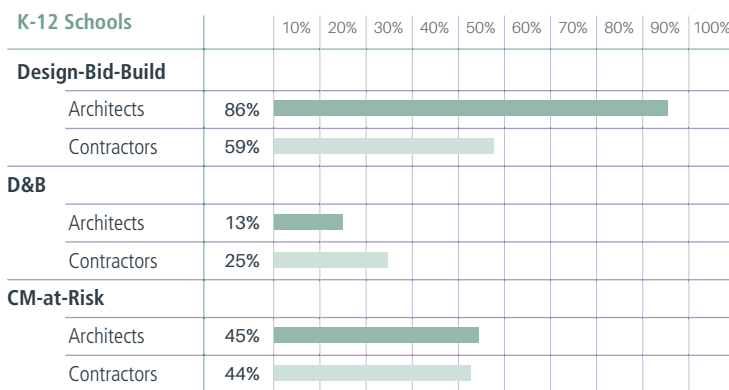


Figure 6: Architect and Contractor Experience with K-12 School Delivery Systems²⁰

This same study examined the top drivers and obstacles influencing adoption of established project delivery systems (Tables 3 and 4 overleaf). Looking at these collectively, we see that the primary owner drivers in using D&B included: maximising budgetary risks control. Key obstacles includes their knowledge of the familiarity with the D&B delivery system, higher contract costs and too few checks and balances.

¹⁹ Design-Build Institute of America, McGraw Hill Construction Smart Market Report 2014, accessed 12 December 2019, <<https://dbia.org/wp-content/uploads/2018/05/Research-Project-Delivery-Systems-SmartMarket.pdf>>

²⁰ ibid

Operation of D&B Contracts

4.4



Table 3: Top Drivers Influencing Adoption of Established Project Delivery Systems²¹

| Drivers | | | |
|------------------|--|---|---|
| | Selected as influential by the highest percentage | Top Ranked | |
| | Owners | Architects | Contractors |
| Design-Bid-Build | <ol style="list-style-type: none"> 1 Maximise Budget 2 Reduce Cost | <ol style="list-style-type: none"> 1 Reduce Project Cost 2 Maximise value for work for budget | <ol style="list-style-type: none"> 1 Reduce Project Cost 2 Maximise value for work for budget |
| D&B | <ol style="list-style-type: none"> 1 Maximise Budget 2 Concerns about risk/liability | <ol style="list-style-type: none"> 1 Reduce Project Cost 2 Reduce construction schedule | <ol style="list-style-type: none"> 1 Reduce construction schedule 2 Reduce Project Cost |

Table 4: Top Obstacles Influencing Adoption of Established Project Delivery Systems²²

| Obstacles | | | |
|------------------|---|--|---|
| | Selected as influential by the highest percentage | Top Ranked | |
| | Owners | Architects | Contractors |
| Design-Bid-Build | <ol style="list-style-type: none"> 1 Too few checks and balances 2 (tie) Higher contract costs/ additional cost due to length of contract | <ol style="list-style-type: none"> 1 Higher cost contracts 2 Additional cost due to length of contract | <ol style="list-style-type: none"> 1 Owner unfamiliar with delivery method 2 Higher cost contracts |
| D&B | <ol style="list-style-type: none"> 1 Lack of familiarity with delivery method 2 (tie) Higher contract costs/ too few checks and balances | <ol style="list-style-type: none"> 1 too few checks and balances 2 Owner unfamiliar with delivery system | <ol style="list-style-type: none"> 1 Owner unfamiliar with delivery system 2 Lack of owner interest |

²¹ ibid

²² ibid

Operation of D&B Contracts

4.4

The 2014 report outlook in respect to the preferred use of delivery methods on K-12 school projects included:

LAUSD Director, Facilities Planning and Development
(Asset Management)-

“ I do not foresee LAUSD developing an appetite to utilize a CM-at-risk model. In addition, while other states may allow CM-at-risk for K-12 I don't believe the California Education Code gives us the option.

I have not heard of any instances where a contractor could not find an architectural firm to partner with them on one of our D&B projects. On the contrary we have heard of architects who wanted to propose on one of our projects but could not find a contractor to partner them. I suspect architects will always prefer DBB because they do not need to find a partner and then compete for the work. With DBB once the architect is selected by the owner they get to negotiate their fee and is 99.9% certain they will get the job.”

Not sure I have an opinion of the DBIA statistic but the feedback from architectural firms who have participated in a D&B project have indicated they were pleased with our process. Possibly it could be that no one likes change but once you get your feet wet you find out it is not that bad.”

“ A strong majority of architects (62%) and contractors (59%) expect to see greater use of CM at Risk project delivery for K-12 projects. ... Satisfaction with the two separate contract structures of both design-bid-build and CM-at-risk options may drive this expectation.”

“ Predictions about the use of D&B are split. A majority of contractors (63%) anticipate greater use of D&B, but only a quarter (26%) of architects believe that will occur. The reason for this split among K-12 practitioners is not clear, beyond possibly the generally greater comfort level that contractors have with D&B.”



East Valley High School



Operation of D&B Contracts

4.4

A 2018 Fails Management Institute (FMI) study cited the opportunities to innovate and the ability to fast track a project as the top benefits associated with D&B. The top benefit for DBB is cited as owner project/design control, which is also the only category listed where DBB has a perceived benefit greater than both CMAR and D&B (Figure 7).

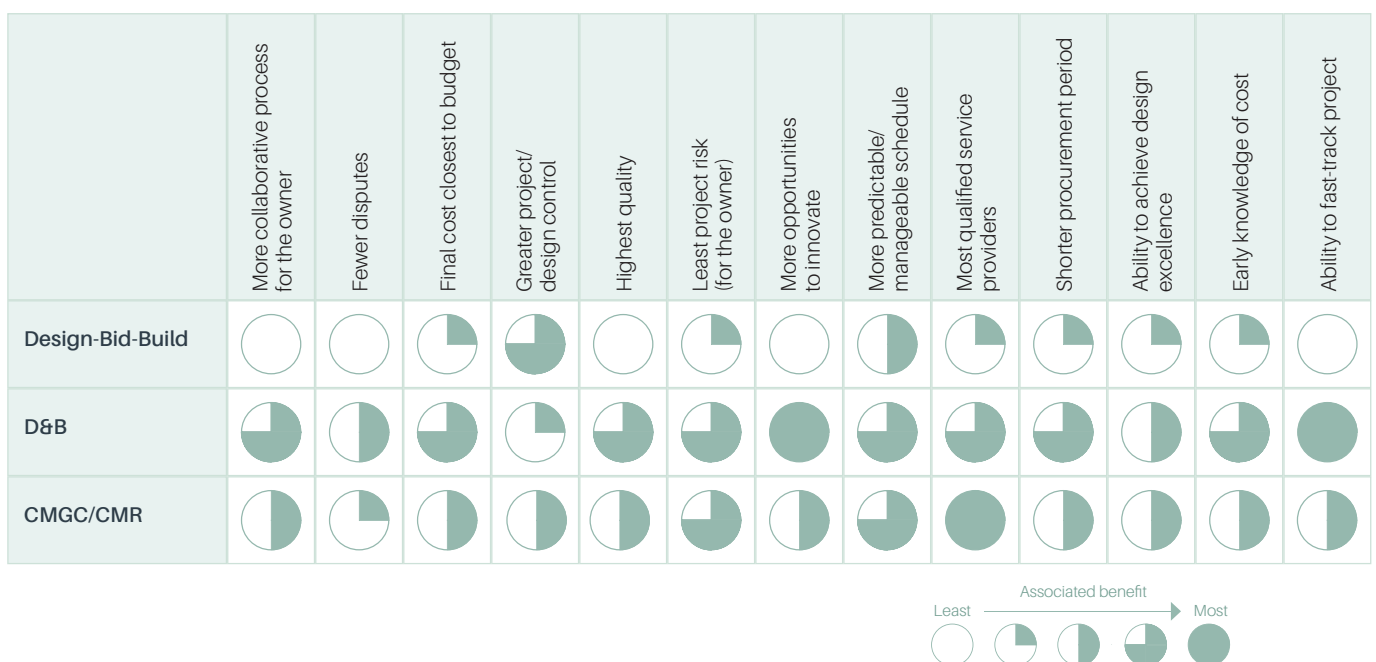
The 2018 FMI study concluded why D&B is becoming so popular with public sector owners.

- Speed-to-market has become the critical factor for owners to select D&B as a project delivery method.
- 76% of respondents reported very good to excellent experiences with design-build projects.

FMI 2018 Market commentary

- “ We’ve seen more projects using the collaborative D&B model.”
- “ During the design phase on a progressive D&B project you are not designing in a vacuum. You are designing with the owner at the table.”

Figure 7: Which Project Delivery Method do you most associate the following benefits with? ²³



²³iFMI Design-Build Utilization, Combined Market Study June 2018
<https://dbia.org/wp-content/uploads/2018/06/Design-Build-Market-Research-FMI-2018.pdf>

Operation of D&B Contracts

4.4

The LAUSD D&B Contract & Contract General Conditions template is relatively short at 23 pages in length. It has 13 articles, including the following clauses:

- Scope of Work
- Standard Of Performance
- Contract Time
- Contract Sum
- Required Meeting Attendance
- Design And Construction Phase Responsibilities
- Termination/Suspension For Convenience
- Electronic Data
- Miscellaneous
- Levels Of Authority
- Enumeration Of Contract Documents
- Fingerprinting
- Key Staff

Some of the key contract language includes the Design-Builder Scope of Work:

“ Design-Builder shall execute the entire Work called for by the Contract Documents and reasonably inferable from the Contract Documents, except to the extent, if any, expressly and specifically enumerated in the Contract Documents to be the responsibility of District or another Project Team member retained or to be retained by District. District reserves the right in its sole discretion to modify the Scope of Work and/or remove any work from the Scope of Work for Design-Builder and assign this work or any portion of the Work to others”.

and a Design Professional Standard of Care provision:

“ All design professional services performed to execute the Work shall be the care and skill ordinarily used by members of the design profession practicing under similar conditions at the same time and locality of the Project. And with the usual and customary professional standards of skill, care, diligence and timeliness applicable to architects, engineers and other design professionals who regularly similar services on projects of similar nature, size and complexity to the Project”.

“ I talk to a lot of architects and get some mixed feelings about D&B. The way it tends to work out is that the builder and designer are not usually equal partners when it comes to making decisions. The builder has the bond capacity and the most money invested and generally calls the shots and some architects feel the impact of their role is lessened when they essentially become a subcontractor of the builder. Most seem to like it better when they have a direct line to the owner and don't have to go through the builder who might have a different set of priorities.”

LAUSD Executive Director of Facilities



Operation of D&B Contracts

4.4

Interestingly, no reference to either design or construction “quality” appears anywhere within the referenced document. In practice, many California public agencies do not require a quality requirement within their contract, but instead, require that contractors provide a Quality Plan as part of the Owner’s General Conditions or Supplemental Conditions, which are legally binding and form a part of the contract.

Per Aaron Bridgewater, LAUSD Director, Facilities Planning and Development (Asset Management)-

“ We like the D&B delivery method and it has proven to deliver large projects 1-2 years faster than traditional DBB. However, staff involvement in overseeing a D&B contract and enforcing the Districts design standards is more involved than with the DBB delivery. In DBB the architect does much of the heavy lifting of enforcing District standards and quality of materials. In D&B we, the owner, have to play a more active role to ensure we get the materials that comply with our standards.”

LAUSD Executive Director of Facilities

“ LAUSD has developed its own Design Guide and standard specifications. In many instances the District’s design guide and specifications require products and materials that exceed building code and much of our quality issues are controlled through the enforcement of these standards. All of our recent D&B contracts have been design completions where we require the D&B teams to disclose their proposed designs. We require specific deliverables as part of the design competition and final submittals represent something between a 25%-30% design, DD (design development) being 35%. D&B competitions are best value awards and the scoring criteria includes a category where we award points for architectural quality & materials. Our design competitions have 3-4 workshops/presentations and we give feedback on areas we do not believe they are meeting our standards for quality. The District’s design guide, specifications and the D&B contractor’s final proposal are made part of the D&B contract at time of award. Post award the District requires the design reviews at DD, 50% CD (construction documents) and 100% CD as well as submittals during the construction. Much of the District’s workload post award involves enforcement of our standards.”



South Region High School



Certification and Quality Assurance Methods

4.5



LAUSD possesses its own Design Guide²⁴ prepared to establish and sustain consistent representation of requirements and quality standards for those environments to all members of the Design Teams for LAUSD school facilities. It is based on the current curricula, teaching methodologies, student groupings, and site constraints of the District. Coordination of all architectural, engineering and other associated design disciplines working on the project – including those provided by District staff or under separate contract to the District – shall take place throughout each design phase and shall be the responsibility of the commissioned Project Architect. Such coordination shall include processing and review of all drawings, specifications, cost estimates and other documentation necessary for the integration of all building trades and systems, equipment and furnishings, and resolution of constructability issues. With each design submittal, the Architect shall certify in writing that all required coordination has occurred and shall accept responsibility for all changes in the design and construction work which result from failure to properly coordinate the efforts of the design entities. In the case of D&B contracts the District's A/E Contract may define different design phases, submittal terms, adjust the requirements described below for submittals to the specific contract and as directed by the District's authorized representative.

As stated earlier in this section contractors have ultimate responsibility for quality under the contract and are required to submit a quality plan as part of their overall responsibilities which are legally binding and form part of the contract.

The LAUSD employ Building/Construction Inspectors. Their typical duties include:

- Supervision and coordination of the work of subordinate personnel, including providing daily field observation, performance evaluation, guidance and inspection team resource assessments.
- Resolving issues related to service charges and corresponding funding sources.
- Reporting on deviations from approved contract documents and minimum code requirements to project stakeholders and coordinates with them for resolution of such issues.
- Consulting with the Division of the State Architect on California Building Code Inspection assignment requirements.
- Resolving issues that cannot be resolved at the field level by subordinate staff.
- Obtaining decisions and interpretations from architects and engineers on issues impacting multiple projects.
- Reviewing the project inspection team documentation during construction and through the certification process.
- Ensuring that the project inspector fulfils the requirement to monitor and oversee the special inspection, material sampling and testing requirements.
- Reviewing logs, diaries, job files, and any written correspondence for compliance with applicable State, municipal, and District policies, procedures, and requirements.
- Advising construction project management staff and inspectors on code matters and procedures.

²⁴ School Design Guide, Los Angeles Unified School District, March 2012, accessed 6th March 2020, see http://www.cctvcad.com/Files/School_Design_Guide_March_2012.pdf

Certification and Quality Assurance Methods

4.5

LAUSD Standard Conditions of Approval for District Construction, Upgrade, and Improvement Projects 2018 are uniformly applied development standards²⁵. The standard conditions were compiled from established LAUSD standards, guidelines, specifications, practices, plans, policies, and programmes, as well as typically applied mitigation measures. Compliance is triggered by more holistic factors, such as, the project type, existing conditions, and type of environmental impact. Table 5 provides a sample only of the broader topics that are monitored for compliance under the standard conditions.

| Topic | Trigger for Compliance | Design Phase | Construction Phase |
|---------------------------------|---|--------------|--------------------|
| Aesthetics | Protection of neighbourhood, outdoor electronic message display | ✓ | ✓ |
| Air Quality | Air toxics, health risks, Construction emissions | ✓ | ✓ |
| Biological resources | Sensitive Species and Habitat, Bird and Bat Nesting Sites, Protection of trees | ✓ | |
| Cultural Resources | Historic architects, temporary protection plan, documentation, Archaeological Resources | ✓ | ✓ |
| Geology and Soils | Seismic Hazards | ✓ | ✓ |
| Greenhouse Gas Emissions | Water Use and Efficiency, Energy Efficiency, Construction Waste Management | ✓ | ✓ |

Table 5: LAUSD Standard Conditions – Compliance Monitoring During Design and Construction

²⁵ LAUSD Standard Conditions 2018, accessed 6th March 2020, see https://achieve.lausd.net/cms/lib/CA01000043/Centricity/Domain/135/2018_Standard_Conditions_UPDATE_final.pdf



Post-Occupancy Evaluation

4.6



Facility activation, user orientation, and POE are important to educational specifications in that evaluation completes the planning cycle and provides corrective feedback for the next project.

There are several examples of POE schemes used in the North America based on actual performance, rather than modelled or anticipated performance, where some aspects of POE play a role in their process.

- 1 The *Living Building Challenge*²⁶ is particularly noteworthy for this; projects must be operational for at least 12 consecutive months prior to the final audit for certification.
- 2 The *WELL Building Standard*²⁷ also has large parts based on in-use building conditions. An authorized WELL Assessor will usually spend one to three days in the building to validate the project's design documentation and to complete a series of performance tests, spot-checks and measurements spanning all WELL Concepts.
- 3 *BOMA BEST*²⁸, a voluntary programme designed by industry for industry, is Canada's largest environmental assessment and certification program for existing commercial real estate.
- 4 STARS^{®29} is a transparent, self-reporting framework for colleges and universities to measure their sustainability performance, created by Higher Education for Higher Education in the US beginning in 2010³⁰.

LAUSD is seen as a leader in Zero Net Energy (ZNE) efforts and ultra-low energy. LAUSD is committed to energy conservation through a variety of projects and policies that increase energy efficiency in district facilities, reduce reliance on fossil fuels, and increase conservation behaviour through awareness and education. LAUSD is focused on its commitment to becoming the most environmentally-friendly large urban school district in the nation undergoing installation of renewable energy sources such as photovoltaic panels that has a generating capacity of 21.5 MW—enough to power 3,500 homes for a year.

²⁶ International Living Future Institute, accessed 6th March 2021, see <https://living-future.org/lbc/>

²⁷ Well Certification, accessed 6th March 2020, see <https://www.wellcertified.com/>

²⁸ Boma Canada, accessed 6th March 2020, see <http://bomacanada.ca/aboutbomacanada/>

²⁹ Sustainability Tracking, Assessment & Rating System™, accessed 6th March 2020, see <https://stars.aashe.org/>

³⁰ An institution completes the STARS report online and submits it to the Association for the Advancement of Sustainability in Higher Education (AASHE), and then an AASHE staff member reviews portions of each report for accuracy and consistency. No further third-party verification or on-site visit is required.

Post-Occupancy Evaluation

4.6



The National Renewable Energy Laboratory in the US recently published a report on *A Guide to Zero Energy and Zero Energy Ready K-12 Schools*³¹. In 2003, the LAUSD passed a resolution titled "Sustainability and the Design and Construction of High Performance Schools." Since then, district requirements have been updated to incorporate high-performance goals as they are established and refined during integrated design team workshops. These workshops include practitioners of relevant disciplines and a range of stakeholders, all of whom impact project design and participate in the development and review of the final project recommendations.

In LAUSD POE includes both a technical evaluation of all facility subsystems and a functional evaluation of the extent to which the facility meets educational program objectives³². In addition to the need for a quality school building to be handed over to the client more fundamental questions are increasingly include in the POE.

- Does the environment contribute or not contribute to better learning by students, better teaching, and professionalism by teachers and administrators?
- Does the building teach about sustainable architecture and ecology?

Sample Facilities Inspection Checklist

Project Details

Scope of Inspection

Site Considerations (with rating)

Existing Conditions and Maintainability (with rating)

Mechanical (with rating)

Learning Environment - Aesthetics (including rating)

Learning Environment - Space (with rating)

Learning Environment - Sound (including rating)

Learning Environment - Technology (with rating)

Life Safety/Code Compliance - Structural (with rating)

Life Safety/Code Compliance - Electrical (with rating)

Life Safety/Code Compliance - Fire Alarm (with rating)

Accessibility (with rating)

³¹ National Renewable Energy Laboratory, (2019), *A Guide to Zero Energy and Zero Energy Ready K-12 Schools*, edited by Paul Torcellini and Kim Trenbath, NREL, Nathaniel Allen, U.S. Department of Energy and Maureen McIntyre, McIntyre Communications Inc., accessed 7th March 2020, see <https://www.nrel.gov/docs/fy19osti/72847.pdf>

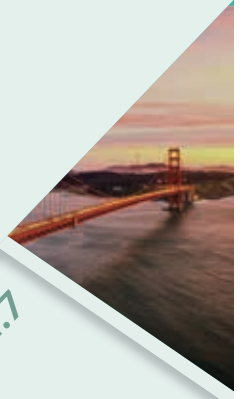
³² No particular POE template for LAUSD was found at the time of preparing this report.



4.7

Case Study

Los Angeles Unified School District
Jordan High School Redevelopment Project



Case Study

Los Angeles Unified School District Jordan High School Redevelopment Project

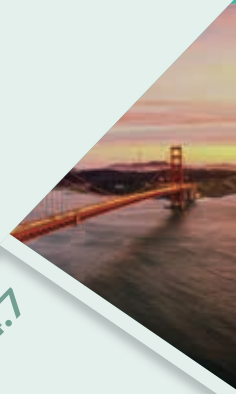
The LAUSD Jordan High School was a 2017 DBIA National Award Project that transformed the campus, creating two learning academies that improved the educational model on campus and increased graduation rates significantly. These goals were achieved by collaborating with LAUSD stakeholders, the community, students and staff.

The nearly 100-year-old Jordan campus was in desperate need of improvement. Thanks to an influx of bond money, the Design Builder was able to partner with LAUSD to renovate nearly every building on campus. To ensure that the Design Builder worked in conjunction with the LAUSD's goals and minimized impact to students and staff, the project included four phases.

Phase 1 involved renovating two existing buildings, which consisted of converting a former wood shop building into a girl's locker room and transforming a gym into a food service kitchen area, student store, and three classrooms. Phase 2 included the ground-up construction of two new three-story buildings, while Phase 3 involved renovations to the historic administration and multi-purpose buildings, along with construction of new lunch areas with shelters. Construction rounded off with Phase 4, which involved various site improvements and accessibility upgrades.



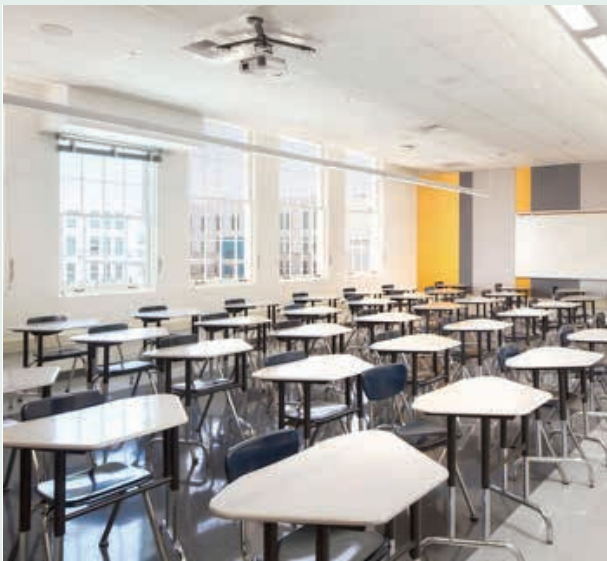
Figure 1 - Jordan High School (Rear Elevation)



Case Study

Los Angeles Unified School District Jordan High School Redevelopment Project

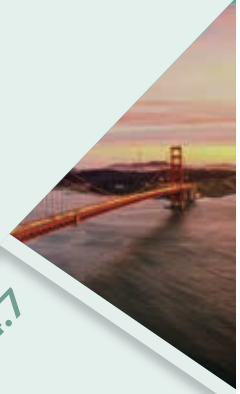
| | |
|---------------------------|---|
| Contract Cost | \$72,682,845 (€64,100,000) |
| Contract Duration | 22 months |
| Contract Parties | Client/Owner: Los Angeles Unified School District Design-Builder: Swinerton Builders Architect: DLR Group Engineers: Budlong & Associates, Inc., Saiful Bouquet Structural Engineers Specialty Consultant: AHBE Landscape Architects |
| Procurement Method | D&B. |
| Contract Form | LAUSD D&B Contract & Contract General Conditions. |



Gymnasium



Classrooms



4.7

Case Study

Los Angeles Unified School District Jordan High School Redevelopment Project

Key Challenges

LAUSD chose to use D&B to mitigate a number of challenges, including: speed of delivery, cost control, quality and team integration. Ultimately, they were looking to reduce comparable project costs, expedite the project's completion and control project costs through integration, collaboration and innovative design and construction solutions. During the course of construction, the LAUSD issued several change orders due to unforeseen site conditions, which ultimately added scope to the project.

Project Outcomes

Mark Hovatter, the LAUSD Executive Director of Facilities, mentioned that everyone loves it, the site is located in Watts, which was considered a very run down area. The project completely transformed both the campus and local district. Mr. Hovatter also mentioned that the LAUSD has tried several different forms of project delivery, including CMAR, but they very much prefer D&B. They are using D&B as the project delivery method on more than 50% of the twenty-two (22) major renovations they currently have under contract. The remaining projects use DBB, but with a Best Value component. A Best Value component modifies the traditional low bid form of award to take into consideration the perceived value derived from a contractor's proposal. In order to avoid the appearance of favoritism in the award, this "value" component must be qualifiable and stated in the bid document.



Conclusions



Conclusions



Conclusions

This report details the increased importance and practice of using D&B procurement in national school building programmes among a selection of international regions.

Deciding on a preferred method for the delivery of School infrastructure requires careful consideration and this was evident given the array of protocols and guidelines that exist in the regions investigated. Whilst terminology, contractual processes and contract conditions in respect to D&B procurement vary among the jurisdictions selected, the main attraction for this method of delivery is the single point of responsibility taken on by the contractor.

In NSW it is evident there is a preference for design and construct favoured in the vast majority of projects in the NSW School infrastructure pipeline. The CLG in NSW highlighted commercial alignment, contractor innovation, price and risk certainty, single point of responsibility and reduced likelihood of variations as just some of the many advantages of D&B.

In Norway an estimated 60% of school projects were procured through D&B. The Oslo Municipality used a modified NS8407 form of contract which enables the client to have more involvement in the design of the school which promotes a more rewarding collaborative process.

In the UK the delivery of school buildings is a devolved function of government, other than in England. D&B features prominently in the UK school building programme. The use of framework agreements are commonplace across the UK school build programme, with particular initiatives like the Welsh governments 21st Century Schools programme, Scotland's Schools Future programme and Scotland's Hub programme vehicles all reporting the default position of D&B as a preferred procurement delivery vehicle for their school building programmes.

In the State of California D&B contracts are legislated for in the development of school facilities. The LAUSD routinely work with D&B procurement and have developed internal systems that can reduce project durations of between 8 months to 2 years by fast tracking projects. They typically do not use D&B when a project has historical significance.

The implementation of Post-Occupancy is inconsistent internationally with the prevailing practice in the US more advanced than the other international counterparts investigated.

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