

Chapter 7

Construction Documents

7.1 Introduction

Construction document packages usually include two major groups of documents:

1. The bidding document package containing the necessary documentation for bidding the contract. The bidding process is further discussed in Chap. 8.
2. The Contract Document package containing the legal documentation to bind the contract between the Owner and the Contractor. The written document package is also known as the Project Manual.

Construction documents are basically the written and graphic documents, which communicate the design of the project, and govern administration of the contract for its construction. In general, the construction Contract Documents serve the following purposes:

- (a) Defines the project delivery model and describe, in detail, what the project involves.
- (b) Explains the scope of work and services to be performed.
- (c) Identify materials to be incorporated into the project including their quality.
- (d) Describes the contract obligations between the parties and the responsibilities of the Consultant who administers the construction contract for the Owner.
- (e) Serves as a tool for controlling, monitoring, administering, and managing the project.
- (f) Provide information for acquiring regulatory and financial approvals required for construction.

Complete and fully coordinated construction documents are a key component in effective performance, enhanced communication, and avoidance of disputes and litigation in today's world of design and construction. From a management and administrative point of view, every item within the Contract Document is important because it describes and records all aspects of the project.

The Contract Documents normally comprise the following:

1. Contract forms
2. Conditions of contract
3. Specifications
4. Construction drawings
5. Bill of quantities/schedule of rates
6. Addenda

7.2 Contract Forms

Primarily, Contract Documents (particularly in Canada) take the following forms:

- (i) Form of agreement
- (ii) Performance bond
- (iii) Labor and material payment bond
- (iv) *WSIB* (Workplace Safety and Insurance Board) and tax statutory declaration
- (v) Insurance certificate

7.2.1 Form of Agreement

This is the written document signed by the Owner and Contractor and comprises the legal binding between the parties to the contract. The agreement defines the relationships and obligations between the Owner and the Contractor. By reference, it incorporates the other Contract Documents including Contractor's submitted bid, addenda, and bid revisions.

Usually the agreement mentions that the Owner has accepted the bid by the Contractor for the execution and completion of such works in accordance with the terms and conditions of the Contract Documents. The Owner thereby covenants to pay the Contractor in consideration of the execution and completion of the works and remedying of defects therein, in accordance with the prices set out in the contract.

7.2.2 Performance Bond

A performance bond is an undertaking by a surety that the Contractor will perform and complete the contract. The performance bond is obtained to mitigate risk in the event the Contractor defaults or fails to perform. The surety will fulfill the Contractor's obligations in accordance with the terms of the contract in the event of default. This is further explained in Chap. 10.

7.2.3 Labor and Material Payment Bond

A payment bond guarantees the Owner that all bills for labor and materials contracted for and used by the Contractor will be paid by the surety to the vendors if the Contractor defaults. This also is further explained in Chap. 10.

7.2.4 WSIB Declaration

This declaration form is submitted by the contractor, certified by a government officer that the Contractor has paid all compensation owed to the “Workplace Safety and Insurance Boards” and also paid taxes provided for in the article of General Conditions of Contract. This declaration is submitted by the Contractor prior to the start of work. *WSIB* clearance is basically a number issued free of charge by *WSIB*. It declares that a business is registered with *WSIB* and has an account in good standing.

In Canada, The Workplace Safety and Insurance Board (formerly the Workers’ Compensation Board) was established in 1997 by the Workplace Safety and Insurance Act, 1997, (WSIA). Under Part II of this Act, the Workplace Safety and Insurance Board (*WSIB*) has a mandate to promote health and safety in workplaces and to reduce the occurrence of workplace injuries and occupational diseases.

Under this Act, Employers contribute to a province-wide insurance fund. Contributions in the form of (insurance premiums) are based on the Employer’s payroll and the accident frequency in their industry. Injured workers are compensated by the *WSIB* on a “no-fault” basis meaning no matter who is at fault, the Employer, the employee, or someone else. In return for automatic compensation, the Employer is shielded from any other liability. This means an employee cannot sue his Employer for negligence if that negligence causes a work-related injury or disease. However, it is the *WSIB* who decides, according to the Act, whether or not a worker receives compensation, and decides what the worker gets compensation for.

Most *WSIB* claims are straightforward. The injured worker is paid benefits while recovering and returns to his or her regular work. But some cases are complicated and may take time to resolve. Some injured workers are denied with *WSIB* benefits or have their benefits stopped by the *WSIB* because the Employer has the right to contest an employee’s *WSIB* claim. For example, an employee might have a back injury which he says was caused on the job. The Employer may claim that the injury was caused in a car accident or somewhere else.

The main concept of the *WSIB* system is to get the injured worker back to his or her work as soon as practicable. The worker and the Employer must cooperate toward this goal. If the injured worker cannot perform his or her regular duties, the Employer may offer suitable modified work that the worker can perform without aggravating the injury. If the work is suitable, then the injured worker must accept it.

7.2.5 Insurance Certificate

Contractors are required to provide evidence of all insurance coverage as part of the terms and conditions of contract prior to start work. This certificate is issued by an insurer who certifies the existence of insurance coverage under specific conditions. More specifically, the document lists the validity date of the policy, the type of insurance coverage purchased, and the types and dollar amount of applicable liability. Construction insurance details are further discussed in Chap. 10.

7.3 Conditions of Contract

In the construction industry, the conditions of contract define the basic rights, responsibilities, and relationship of the parties involved or the rules by which each party must comply. Conditions of contract mostly consist of:

7.3.1 General Conditions

General conditions contain general clauses that establish how the project is administered and are intended to be used unchanged for every project. It is usually in the form of published standard document that include written principals common to most construction contracts.

7.3.2 Particular/Supplementary Conditions

Supplementary conditions are specially prepared to modify or supplement the general conditions as needed to accommodate the unique requirements of a specific project.

The conditions of contract form a very important part of the Contract Documents; hence careful attention must be paid, to the written agreements that Consultants, Owners, and Contractors enter into. Standard general conditions of contract are mostly prepared to the mutual benefit of all parties to the contract as they establish measured and predictable standards among the parties. Standard forms are based on generally accepted professional and industry norms and are fair and balanced.

Another reason for using standard general conditions is that they provide language and provisions that have been tested in practice as well as in the courts. They are well understood and familiar to all parties involved in the construction. The standard forms are amended periodically as legislation and conditions change, thereby making improvements for both the Owner and the Contractor. The standard forms are usually drafted by committees representing professional experts in construction industry, lawyers, and financial/insurance experts.

There are, in practice, several private and public forms of general conditions of contract that have been established by various large organizations for their own use. The impositions of conditions of contract which are biased in favor of the Employer are not recommended.

7.4 Standard Forms of Conditions of Contract

There is variety of standard forms of contract in use in the construction industry. The selection of a particular form will depend upon the circumstances surrounding the project and size of the project. Some of the standard general conditions for construction prepared and published by professional organizations are:

7.4.1 Canadian Construction Documents Committee (CCDC)

The CCDC is comprised of Owners (two members from the private sector and two members from the public sector), the Association of Consulting Engineering Companies – Canada (three members), the Canadian Construction Association (four members), Construction Specifications Canada (three members), the Royal Architectural Institute of Canada (three members), and an ex officio member from the legal profession. The various documents published by CCDC are:

7.4.1.1 CCDC 2 – 2008 Stipulated Price Contract

This general conditions document can be used between Owner and Prime Contractor to govern the required work for a single, predetermined fixed price or lump sum contract.

7.4.1.2 CCDC 3 – 1998 Cost Plus Contract

This general conditions document can be used between Owner and Prime Contractor to govern the required work on an actual-cost basis, plus a percentage or fixed fee which is applied to actual costs.

7.4.1.3 CCDC 4 – 2011 Unit Price Contract

This general conditions document can be used between Owner and Prime Contractor to govern the required work for a predetermined, fixed amount for each specified unit of work performed. The total price is determined by multiplying the unit price by the actual, measured quantity of work performed for each specified unit.

7.4.1.4 CCDC 5A – 2010 Construction Management Contract: For Services

This general conditions document can be used between Owner and Construction Manager for which the work is to be performed by Trade Contractors. The Construction Manager acts as a limited agent of the Owner providing advisory services and administering and overseeing the contracts between the Owner and Trade Contractors.

7.4.1.5 CCDC 5B – 2010 Construction Management Contract: For Services and Construction (CM-at-Risk)

This general conditions document can be used between Owner and Construction Manager to provide advisory services during the preconstruction phase and perform the required work during the construction phase. At the outset, the Work is performed on an actual-cost basis, plus a percentage or fixed fee which is applied to actual costs. The parties may agree to exercise the following options: guaranteed maximum price (GMP), *GMP* plus percentage cost savings, or conversion into a stipulated price contract.

7.4.1.6 CCDC 14 – 2013 Design-Build Stipulated Price Contract

This general conditions document can be used between an Owner and Design-Builder where the Design-Builder performs Design Services and Construction under one agreement, for a single, predetermined stipulated or fixed price.

7.4.1.7 CCDC 17 – 2010 Stipulated Price Contract for Trade Contractors on Construction Management Projects

This general conditions document can be used between an Owner and Trade Contractor when performing work for a single, predetermined fixed price, regardless of the trade Contractor's actual costs. It is specifically for use where the project is performed under the CCDC 5A Construction Management method of contracting.

7.4.1.8 CCDC 18 – 2001 Civil Works Contract

This general conditions document can be used between Owner and Contractor for civil works construction, e.g., roads, bridges, dams, underground utilities, etc.

CCDC also produces guides to assist with using and understanding the aforementioned contract types. Other professional organizations in Canada have similar publications available to assist the user, such as:

- Association of Consulting Engineering Companies (ACEC)
- Canadian Construction Association (CCA)
- Construction Specifications Canada (CSA)
- Royal Architectural Institute of Canada (RAIC)

7.4.2 FIDIC: International Federation of Consulting Engineers

Founded in 1913, the FIDIC (International Federation of Consulting Engineers) with headquarters in Geneva, Switzerland, is charged with promoting and implementing the consulting engineering industry's strategic goals on behalf of its Member Associations and to disseminate information and resources of interest to its members. Today, the FIDIC membership currently covers 100 countries of the world.

The FIDIC, in the furtherance of its goals, publishes international standard forms of contracts for Owners, Consultants, Sub-consultants, joint ventures, and representatives, together with related materials such as standard prequalification forms. In 1999 the FIDIC updated its standard forms of conditions of contract, with the publication of a first edition of a new family of contracts comprising major four new standard forms of contract, usually known by their color:

- (i) *FIDIC Conditions of Contract for Construction* (Red Book)
- (ii) *FIDIC Conditions of Contract for Plant and Design-Build* (Yellow Book)
- (iii) *FIDIC Conditions of Contract for EPC/Turnkey Projects* (Silver Book)
- (iv) *FIDIC Short Form of Contract* (Green Book)

7.4.2.1 Red Book

This is the most widely used form of contract throughout the world. The Red Book is drafted for the use of building and engineering works. The Red Book contains three parts:

Part I: General conditions of contract. This part comprises Clauses 1–20 together with the Appendix and Annex for dispute adjudication board agreements.

Part II: Guidance for the preparation of particular conditions.

Part III: Forms – this part includes examples of the letters and agreements which are referred to in the general conditions.

7.4.2.2 Yellow Book

The FIDIC recommends use of the Yellow Book when building an electrical and/or mechanical plant and building and engineering works designed by the Contractor. Under the usual arrangements for this type of contract, the Contractor designs and provides, in accordance with the Employer's requirements, plant and/or other works, which may include any combination of civil, mechanical, electrical, and/or construction works.

7.4.2.3 Silver Book

Silver form is applicable for international major turnkey projects, with the idea that responsibility for all work (engineering, procurement, and construction (EPC)) is to be taken by the Contractor who completes the finished product ready for operation (at the "turn of the key").

7.4.2.4 Green Book

The Green Book is recommended for engineering and building works of relatively small capital value. However, depending on the type of work and the circumstances, the Green Book may be suitable for contracts of considerably greater value. They are considered most likely to be suitable for simple or repetitive work or work of short duration without the need for specialist subcontracts. This form may also be suitable for contracts which include, or wholly comprise, contractor-designed civil engineering, building, mechanical, and/or electrical works.

7.4.3 *NEC (New Engineering Contract) Contracts, UK*

NEC is produced by the Institute of Civil Engineers UK (ICE). NEC published its third edition, NEC3, in 2005 and introduced more recent editions in 2013. NEC3 is endorsed by many organizations nationally and internationally.

NEC3 provides a wide range of Contract Documents and can be used for civil, building, nuclear, utilities, infrastructure, facilities management, oil and gas, purchasing, and supply. NEC3 main versions of Engineering and Construction Contracts (ECC) are:

- (i) Option A: Priced contract with activity schedule
- (ii) Option B: Priced contract with bill of quantities
- (iii) Option C: Target contract with activity schedule
- (iv) Option D: Target contract with bill of quantities

- (v) Option E: Cost reimbursable contract
- (vi) Option F: Management contract

7.4.4 *Infrastructure Conditions of Contract, UK*

Infrastructure Conditions of Contract has replaced original *ICE* (Institute of Civil Engineering, UK) *Conditions of Contract* on 1 August 2011. The ICE has transferred its ownership of ICE Conditions of Contract to the ACE and CECA. ACE (Association of Consulting Engineers) and CECA (Civil Engineering Contractors Association) now solely own the *Infrastructure Conditions of Contract*.

The *Infrastructure Conditions of Contract*, a standard suite of forms of contract, is mainly based on the highly successful ICE Conditions of Contract and comprises following main versions:

- (i) Measurement Version – 01 August 2011
- (ii) Design and Construct Version – 01 August 2011
- (iii) Target Cost Version – 01 August 2011
- (iv) Term Version – 01 August 2011
- (v) Minor Works Version – 01 August 2011

7.4.5 *JCT (Joints Contracts Tribunal) Contracts, UK*

This form of contract is produced by the following seven members (UK):

- (a) Royal Institute of British Architects (RIBA)
- (b) Royal Institute of Chartered Surveyors (RICS)
- (c) British Property Federation (BFP)
- (d) Contractors Legal Grp. Limited
- (e) Local Government Association
- (f) National Specialist Contractors Council
- (g) Scottish Building Contract Committee

The JCT suite of contracts' most recent version was published in 2011. The main JCT contract forms are:

- (i) Standard Building Contract
- (ii) Design and Build Contract
- (iii) Construction Management Contract
- (iv) Management Building Contract
- (v) Minor Works Building Contract
- (vi) Intermediate Building Contract
- (vii) Major Project Construction Contract (MP11)

7.4.6 *Engineers Joint Contract Documents Committee (EJCDC) Documents, USA*

These documents are prepared by Engineers Joint Contract Documents Committee (EJCDC) which includes:

- (a) American Council of Engineering Companies
- (b) American Society of Civil Engineers
- (c) National Society of Professional Engineers
- (d) Associated General Contractors of America and more than 15 other organizations

The family of documents published by EJCDC is based on various series as follows:

- (i) Construction family of document (C-Series)
- (ii) Engineering family of documents (E-Series)
- (iii) Environmental remediation family of documents (R-Series)
- (iv) Procurement family of documents (P-Series)
- (v) Design and build family of documents (D-Series)

The EJCDC has released new editions of the Construction Series (C-Series) documents recently in 2013. The documents in the new C-Series are specifically written for use on public and private engineered facility projects. They are most commonly used for infrastructure and public works construction in the United States.

The most commonly used document is C-700, Standard General Conditions of the Construction Contract (2013), which is based on the traditional contract method, i.e., design-bid-build.

7.4.7 *American Institute of Architect (AIA) Documents, USA*

There are nearly 200 forms and contracts comprising AIA Contract Documents. These forms and contracts define the relationships and terms involved in design and construction projects. Prepared by the AIA with the consensus of Owners, Contractors, attorneys, Architects, Engineers, and others, these documents have been finely tuned during their 120-year history. As a result, AIA comprehensive contracts and forms are now widely recognized as the industry standard. AIA organizes Contract Documents by two methods:

- By “families” based on types of projects or particular project delivery methods
- By “series” based on the use of the document

By Families Based on families, AIA Contract Documents are divided into nine families based on project type or delivery method. Documents in each family provide a consistent structure and text base to support the major relationships on a

design and construction project. Understanding AIA document families helps in selecting the most appropriate standard forms for the project.

- *Conventional (A201) family*: Conventional (A201) is the most commonly used family of AIA Contract Documents because the documents are suitable for the conventional delivery approach of design-bid-build. These documents can be used on small to large projects. The keystone document under this family is A201–2007, General Conditions of the Contract for Construction.
- *Construction Manager as Adviser (CMA) family*: The main document under this family is A232–2009 (formerly A201CMA–1992), General Conditions of the Contract for Construction, Construction Manager as Adviser Edition.
- *Construction Manager as Constructor (CMc) family*: The main documents under this family are coordinated for use with AIA Documents A201–2007, General Conditions of the Contract for Construction, and B133–2014, Standard Form of Agreement between Owner and Architect.
- *Design-Build family*: The main document under this family is A141–2014, Standard Form of Agreement between Owner and Design-Builder.
- Based on family setup, other AIA Documents are Integrated Project Delivery (IPD) family, Interiors family; International family, Program Management family, and Small Projects family.

By Series Based on series, AIA Contract Documents are classified alphabetically by document use or purpose.

- A-Series: Owner/Contractor Agreements
- B-Series: Owner/Architect Agreements
- C-Series: Other Agreements
- D-Series: Miscellaneous Documents
- E-Series: Exhibits
- F-Series: (Reserved)
- G-Series: Contract Administration and Project Management Forms

7.5 Specifications

Specifications define the qualitative requirements for products, materials, and workmanship for a proposed project. Many public authorities and consulting firms publish standard format of “general specifications,” which establish a uniformity of standard work to be produced. Specifications usually describe the type and quality of products required for the project.

Specifications usually contain following information for prospective bidders:

- (a) General requirements specifying contractual procedures and performance of work by a Contractor
- (b) Technical specifications covering construction of the particular work to be performed

Buildings, highways, bridges, sewerage, and water works are some examples of the types of improvements for which agencies may have standard specifications. In general, the quality of materials and the standards of workmanship to be provided by the Contractor must be clearly described. Details must be included of samples to be provided and tests to be carried out by the Contractor during the course of the contract.

Generally, there are two basic types of specification: (1) performance based and (2) prescriptive based [1].

7.5.1 Performance Based

Under this method, the required end results are specified along with criteria by which the performance of a product, system, or material will be judged and the method by which it can be verified. Performance-based specifications focus on outcomes or results rather than process and the required goods and services rather than how the goods and services are produced. The Contractor is free to choose the materials and methods that comply with the performance specification. Performance specifications are designed to reduce Owner risk by transferring responsibility to the Contractor.

Example Paint: paint all damaged equipment with products matching original finish and quality in appearance.

7.5.2 Prescriptive Based

Prescriptive specifications are the most common method of specifying construction work results. Prescriptive specifications convey the requirements of a project through a detailed explanation of the materials that must be used and the activities and procedures of installing those materials to achieve the end result. The prepared specifications are mostly a combination of at least two and sometimes all three of the specification styles mentioned below. Most specifications also have a combination of prescriptive and performance specifications. Prescriptive specifications are further subdivided in main three specification styles:

- *Descriptive specifications*: Under this method, the required properties of the materials and methods of installation are described in detail without using proprietary or manufacturer's names. A descriptive specification is usually used to describe properties of complicated components or systems that cannot be adequately shown on drawings. Many industry standards, produced by trade associations or by standards association writing organizations, may be descriptive specification. However, these standards are normally included in a Project Manual by reference only.

Example: epoxy Grout – premixed, nonshrink, consisting of thermosetting resin base, with inert fillers, with minimum 7-day compressive strength of 10,000 psi, suitable for use on dry or damp surfaces.

- *Proprietary specifications:* A proprietary specification is one which requires the use of a sole source product. A specification, under this method, describes a product, material, assembly, or piece of equipment by trade name and manufacturer name that produces products acceptable to the owner or design professional.

Example: Interlocking pavers – shall be 80-mm-thick “Uni Eco-Stone or Ecoloc” as manufactured by Unilock Ltd.

The basic reason for using proprietary specifications is to control product selection. When a product is required for which no consensus standards exist, or for which special qualities are desired, a proprietary specification can be used. The main disadvantage of using proprietary specifications is they eliminate competition resulting in high prices.

- *Consensus standards:* These standards are developed by an authority, custom, or general consent with a recognized and accepted criteria. Under this method, the technical characteristics of certain aspects of the construction are defined by reference to standards. The specified standards should be internationally accepted and widely used. The standards to be applied should be clearly identified in the contract specifications. Usually standards define minimum criteria.

Example: Portland cement – conforming to CAN/CSA- A3001 normal, Type GU Portland Cement.

Standards used in the Canadian construction industry are mostly published by Canadian standards writing organizations, such as Canadian Standard Association (CSA), Canadian General Standard Board (CGSB), Canadian Gas Association (CGA), etc. These standards are generally endorsed by Standard Council of Canada (SCC). SCC is a federal government agency established by an Act in parliament to foster and promote voluntary standardization in Canada.

The Canadian construction industry also uses standards that are written by US-based standards writing associations, such as The American Society for Testing and Materials (ASTM). The SCC equivalent standards endorsement organization in the United States is American National Standards Institute (ANSI). Both SCC and ANSI are authorized by the North American Free Trade Agreement to exchange and share standards freely and to share their respective authorized testing and certifying organizations. Both SCC and ANSI are ISO (International Organization for Standardization) members [1].

The specifications for any activity should describe the material requirements as well as the method of whole process. For example, the “Standard Specifications for Structural Concrete” prepared by American Concrete Institute (ACI) committee 301-96, outlines materials and proportioning of concrete, reinforcing and prestressing steels, production, placing and curing of concrete, and formwork design and construction. It also describes the methods of treatment of joints and embedded items, repair of surface defects, and finishing of formed surfaces.

Some of the renowned institutions who produce standard specifications are Construction Specifications Canada (CSC), Construction Specifications Institute USA (CSI), Canadian Standard Association (CSA), British Standard Institute (BSI),

American Concrete Institute (ACI), American Society for Testing Materials (ASTM), American Association of State Highway and Transportation Officials (AASHTO) etc., which most of the organizations incorporate in any required project applications. Standard specifications, published periodically, may be updated in the interim by issuance of amendments, revisions, or supplements.

CSC and CSI have jointly developed a consensus document called “MasterFormat” [2]. It is the most widely used standard for organizing specifications for building projects in the United States and Canada. Mainly, there are two documents which are being used in the construction industry for organizing construction information: MasterFormat [2] and UniFormat [3]. UniFormat is also jointly produced by CSC and the CSI.

MasterFormat MasterFormat [2] organizes information by work results (material and methods) with the primary purposes of organizing specifications with a standardized system of numbers and titles. The number and titles are grouped under two general headings: (1) Procurement and Contracting Requirements Group (Division 00) and (2) Specifications Group (Divisions 01–49) such as Division 01: General Requirements; Division 02: Site Construction; Division 03: Concrete; Division 04: Masonry; and so on. Specification sections are numbered using six digits or more; the first two digits are represented by division number.

It may be noted that MasterFormat does not include pre-written specifications. For specification templates that can be used to prepare project specifications, Spex.ca or CSI may be contacted.

UniFormat [3] This format is used to provide construction information based on physical parts or elements of a facility. UniFormat is not divided into divisions but is divided into eight major elements as follows:

- A – Substructure
- B – Shell
- C – Interiors
- D – Services
- E – Equipment and furnishings
- F – Special construction and demolition
- G – Site work
- Z – General

7.6 Drawings

The drawings basically convey the intentions of the Designers, Engineers, Architects, or Draftsman to the Contractor. The drawings are graphic representation of the work upon which the contract is based. They show the materials and their relationship to one another, including sizes, shape, locations, and connections.

The drawings must be in sufficient detail to enable Contractors to assess accurately, in conjunction with the specification and bill of quantities, the nature and

scope of work included in the contract. It must be ensured that on all drawings for any one contract, the same conventions are adopted and uniformity of appearance and size is achieved, making the drawings easier to read. The element detailing must comply with any of the standard code requirements. For example, for dimensioning sequencing, length should always be given first, width second, and thickness third. Additionally, the dimensioning sequence and scale employed should be consistent throughout.

Construction involves many forms of drawings, such as:

- (a) *Bid or tender drawings*: Tender drawings together with the other bid documents describe the project scheme to the Contractor so that he can price the construction work accordingly.
- (b) *Construction or working drawings*: Construction drawings are usually same as tender drawings; however some tender drawings may carry amendments based on approved addendum. Construction drawings used on site therefore should carry stamp “issued for construction” to avoid confusion between tender drawings and construction drawings.

Sometimes additional drawings are issued during construction due to changes. The Contractor and Consultant site staff must ensure that they have an adequate filing system for all of their drawings, which is of particular importance when recording changes. Superseded drawing copies should be clearly marked. They should not be destroyed or discarded until the final account has been agreed, since they may contain relevant information used for contractual claims.

- (c) *Shop drawings*: During construction, the Contractor is required to submit shop drawings for the items specified in the Contract Documents. Shop drawing means drawings, diagrams, illustrations, schedules, performance charts, brochures, and/or other data which illustrate details of a portion of work. Shop drawing must indicate references to design drawings and specifications. These shop drawings are then reviewed by the consultant and returned as “R” (reviewed) or “RN”(reviewed as noted) or “RR”(revise and resubmit) as the case may be.
- (d) *As-built drawings*: As-built or record drawings are the final set of drawings produced at the completion of a construction project. The construction drawings are continuously updated during the course of construction to mark any field changes of dimension and detail or changes to utilities etc. They include all the changes that have been made to the original construction drawings, including notes, modifications, and any other information that have been specified in Contract Documents or Contractor intends to include.

7.7 Bill of Quantities (B of Q)

The B of Q or schedule of rates comprises a list of items of work to be carried out, providing a brief description and estimated quantities of the work under contract. This is usually required under unit rate contracts. It allows each bidder to price the same information. The bill may include firm or approximate quantities depending upon the completeness of the drawings and other information based on how it was prepared. Calculation of the quantity of each item is prepared from the drawings and specifications.

Along with bidding facilities, the B of Q is also useful for other purposes, such as:

- (a) Preparation of interim valuations for work under construction
- (b) Ordering of materials, based on available estimated quantities
- (c) Preparation of final accounts
- (d) To assist in obtaining quotations from Subcontractors for sections of the measured works

Contracts based on stipulated prices usually have a schedule of prices including contingency to cover alterations, extras, and deductions. These schedule of prices are very helpful in determining pricing for changed items. Usually very few items are added/provided in schedule of prices which are not enough to properly address valuation for changes made during construction. Hence, calculating pricing for changes can create conflict between the Contractor and Consultant. It is therefore advisable to add pricing for as many items as possible within schedule of prices based on the work required. Since it will be priced by the Contractor during bidding, valuation for most of the changes can be agreed by both the parties.

7.8 Addendum

An addendum is the revisions of the bid documents made after the call for bids but before the bid closing. The main purpose of an addendum is to add, delete, or amend bidding documents, such as revisions to bid closing date, changes in the contract drawings and specifications due to errors or omissions, clarifying questions raised by bidders, etc.

Addenda (plural for addendum) should be delivered sufficiently in advance of the bid-opening date to permit all the proposed bidders to make the necessary adjustments in their bids. Addenda should be issued to all parties who purchased the bid documents. Bidders must acknowledge receipt of all addenda; otherwise their bids may not be accepted.

Faxing or emailing addenda shall be permissible, as long as record is kept, verifying that fax or emails were delivered to the recipients [1]. Addenda will become part of the Contract Documents when the construction contract is executed.

References and Further Reading

1. Notes from a course. (2014). *Principles of construction documents*. Attended by the Author – SAIT Polytechnic School of Construction, Calgary Alberta.
2. MasterFormat. (2011). *Master list of numbers and titles for the construction industry*. Jointly Published by Construction Specifications Canada (CSC) and The Construction Specification Institute USA (CSI).
3. UniFormat. (2010). *A uniform classification of construction systems and assemblies*. Jointly Published by Construction Specifications Canada (CSC) and The Construction Specification Institute USA (CSI).