Bar Bending & Concreting

Level-II

Learning Guide-#18

Unit of Competence: Read and Interpret Plans and Working Drawings

Module Title: Reading and Interpreting Plans and Working Drawings

LG Code: EIS BBC2 M05 1019 LO1-LG-18

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LO5: Correctly read and interpret specifications

Instruction Sheet	Learning Guide #18

This learning guide is developed to provide you the necessary information regarding the following **content coverage** and topics:

- Identifying customer variations and standard specifications
- Interpreting essential elements
- Estimating, planning and supervising tasks
- Identifying & undertaking building codes of Ethiopia

This guide will also assist you to attain the learning outcome stated in the cover page. Specifically, **upon completion of this Learning Guide, you will be able to**:

- Identify customer variations to standard specifications.
- Apply Correct interpretations of essential elements to estimation, planning and supervisory tasks and communicate.
- Identify Building codes or standards affecting the work to be undertaken, including references to Ethiopian standards and the Building Code of Ethiopia

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below 3 to 6.
3. Read the information written in the information “Sheet 1, Sheet 2, and Sheet 3”.
4. Accomplish the “Self-check 1, Self-check t 2, and Self-check 3”.
5. Check the answers for your achievement from the answer key

Information Sheet-1	Identifying customer variations and standard specifications

1.1. Customer variations

Clients can call for variations to the standard specification. Variations can be to:

- quality expected
- Listed PC items
- Materials and finishes
- Variations must be recorded (Addendum to Specs or noted as variation to plans)

1.2. Specifications

A specification is a written description of the building to be constructed. It supplements the information on the drawings and, like the drawings, it is a legal part of the contract between the client and the builder.

A specification might only be a few pages long for a small project such as an addition to a house, or it might be a multi-volume set of bound books for a big project such as a shopping mall or high-rise building.

For a large commercial or industrial project there may be a specification for the architectural features, and additional specifications for the plumbing, electrical and mechanical requirements of the job. For house construction, one specification booklet is usually sufficient.

The purpose of a specification

Drawings are the best way to convey most of the information required for a building project, but a specification is needed to explain anything that cannot be included clearly in the drawings. Specifications are commonly used to communicate the following.

- Fixture and fittings to be used, where things like dimensions, color or model number are important – e.g. ‘Acme ‘De Luxe claw foot bath, 1675mm, white’.
- To provide instructions to the builder or tradespeople for how something is to be done. For example, drawings might show that internal walls are to have a plaster finish, but it is the specification that tells the plasterer how – ‘bring walls to a reasonable flat surface by the application of a cement render float coat while the plaster is setting’. Instructions can also relate to regulations.

- To provide instructions to the builder about things that may not be part of the finished building but that nevertheless need to happen during the project – for example, safety barriers, disposal of rubbish or protection or adjoining properties.

Specifications usually include a clause about making good any damage to footpaths, fences and any other amenities in the vicinity of the project. There will also be a clause that deals with the general quality of the materials and workmanship to be used. This usually reads something like:

All materials are to be new and of best quality and all work is to be carried out to best practice and to the relevant Australian Standard® where one applies.

- **Layout**

The specification (or 'spec') for a house is divided into sections (like short chapters) that each deal with a specific trade that will be involved in the project. The sections are usually arranged in the same order that the job will be done in – starting with excavator, concreter and bricklayer through to painter, floor coverer and landscaper at the end.

Each section may contain detailed descriptions specific to that job or it may just contain general instructions about workmanship, quality and so on. In that case, it will refer to a schedule at the end of the specification. The schedule will have details for a particular job; for example, sizes of skirtings, paint finishes, types of doors, brand of stove, color of bath and so on.

A section called 'preliminaries' at the start of the specification deals with general things, such as the extent of the work, temporary services, the job sign, site sheds and toilets, temporary fences or hoardings and access for the client during construction.

In project-home building – where the same model is built over and over for different clients – they may use a standard specification and add to that an addendum that includes the selections and specific details for each client.

- **Changes**

Sometimes changes, called amendments, might be made to the specification. Amendments could relate, for example, to changes to materials or products used or methods of carrying out specified work. They should be clearly marked so that everyone who needs to notices them. Amendments usually have to be signed or initialed by both the builder and the client to show they both agree.

On rare occasions, the specification may conflict with the drawings. For example, the specification may call for the front door to have a glass panel in the top half, yet the elevation may show no glass in the door. In this case, the builder should contact the architect or client and ask for clarification.

- **Costing**

A section in the specification will deal with ‘provisional sums’ and ‘prime costs.

Provisional sum items are such things as the oven, bath, toilet suite, tiles and so on, which may not have been selected by the time the contract is signed. In that case, the builder will allow a certain amount in the contract (perhaps $600 for the oven and $40 per square meter for the ceramic tiles). When these items are eventually selected by the client, the contract price will be adjusted up or down according to the actual cost.

Prime costs are those costs that the builder can’t reasonably be expected to put an exact figure on when tendering for the job. For example, in certain areas the builder may allow a prime cost of so much per cubic meter if rock is encountered during the excavation work. If none is found, then the client doesn’t pay any extra, but if it is, the builder will be reimbursed for any extra costs that may arise.

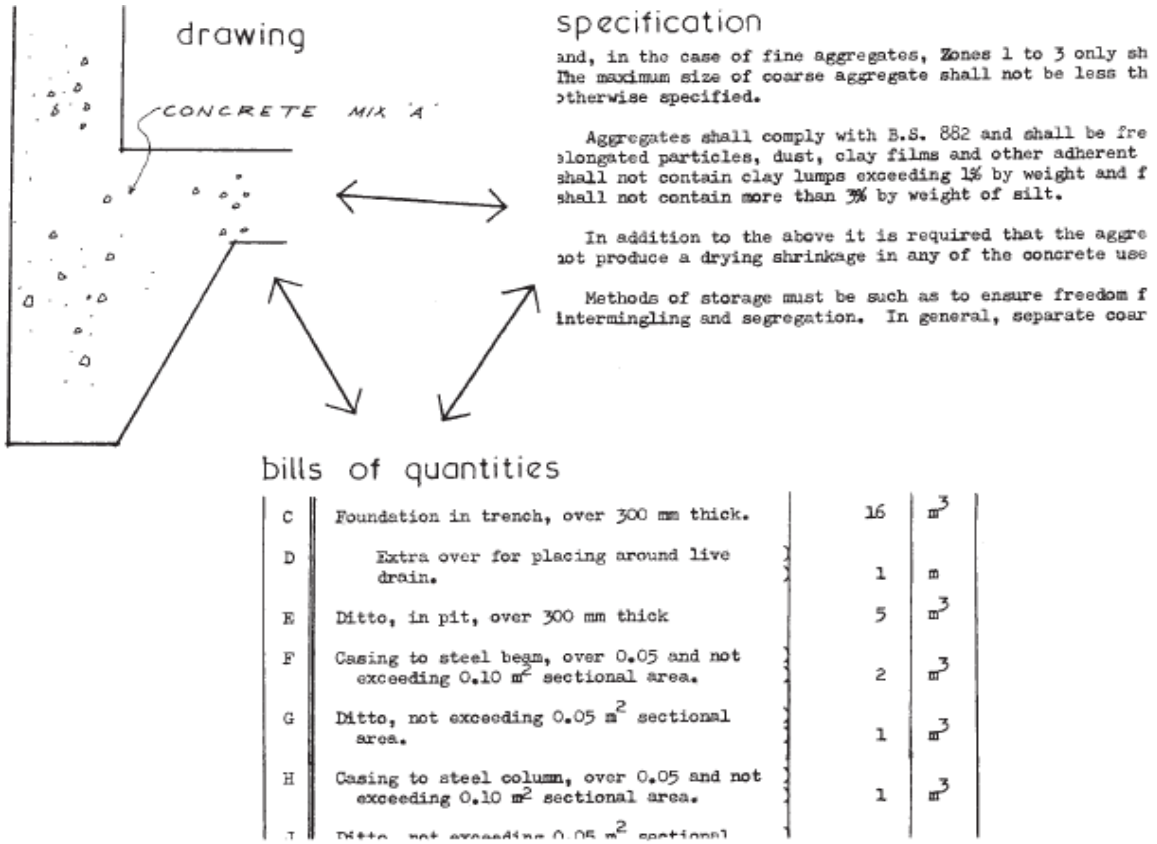

Fig. 1.1: Drawings, specification and bills of quantities role in the building package

1.3. Standard specification

The Building and Transport Construction Design Authority (**BaTCoDA**) has issued the first Standard Technical Specification in March 1991. Four years later the Ministry of Works and Urban Development has updated the Technical Specification and Method of Measurement in 1995 and issued it as two separate Construction Practice Norms.

It is a national resource tool and reference document, containing more than 60 sections, to be used for uniform preparation of specifications in all government building projects. Specifications of all public building projects shall be developed based on requirements of this standard with a consistent logic, appearance and style as of the publication date of this standard. Professionals involved in the preparation of project specifications shall be well trained and knowledgeable on the fundamental principles of specification writing and on the application of requirements stipulated in this technical specification to specific building projects. This document can be cited as **Standard Technical Specification for Building Works, MUDHC 2014**.

Self-Check -1	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Specifications are commonly used to provide instructions to the builder or tradespeople for how something is to be done. (5 points)

   A. False B. True

2. Customer variations to specification can be _____, _____ , and _____ .(5 points)

Note: **Satisfactory rating - 5 and 5 points** **Unsatisfactory - below 5 and 5 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet- 2	Interpreting essential elements

2.1. Essential elements of specification

Specifications broken into sections such as:

- Introductory Section
- Statutory Requirements
- Owners Obligations
- Plans, Permits, Fees
- Site Works
- Footings

And many other sections covering specific trades such as Carpentry, Joinery, Roofing, Bricklaying and the like.

- Many elements of construction are held within the Specifications only
- Builders need to identify and interpret these elements for quoting and construction purposes
- Builder needs to ensure client is aware of these elements.
- Builder needs to ensure supervision on and off site covers these elements.

Self-Check -2	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. Write sections of specification (6 points)

Note: **Satisfactory rating - 6 points** **Unsatisfactory - below 6 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet- 3	Estimating, planning and supervising tasks

3.1. Estimating tasks

Construction Estimators are estimating work of particular projects. The estimation of work can be done by gathering proposals, blueprints, specifications, and related documents.

In addition, they estimate labor, material, and time requirements in order to be able to compute the overall cost of the project.

In order to attract Construction Estimator that best match your needs, it is very important to write a clear and precise Construction Estimator job description. Construction Estimator duties and responsibilities include:

- Explore documentation to gain a deep understanding of the project requirements
- Select, measure and track important metrics
- Visit sites, warehouses and other venues necessary to do the estimate
- Perform complex analysis of collected data and metrics
- Prepare relevant and reliable forecasts
- Conduct complex risk analysis activities
- Create and present reports to upper management
- Analyze and evaluate offers
- Build and maintain long-term relationships with the key vendors

3.2. planning tasks

Planning is the pre-production activity in Civil Engineering and any technical construction project. It involves drawing up construction plans, financing, recruiting staff, safety, preparing materials, plant and workers as well as getting rights and permission to build or construct. planning involves:

- the choice of technology
- the definition of work tasks
- the estimation of the required resources and durations for individual tasks

- the identification of any interactions among the different work tasks.

A good construction plan is the basis for developing the budget and the schedule for work.

3.3. supervising tasks

A Construction Supervisor oversees the construction activities that take place on the worksite. They are heavily involved in planning, organizing and controlling projects. Construction Supervisors are responsible for supervising the contractors and staff while maintaining a safe work environment.

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Construction Supervisors are responsible for supervising the contractors and staff while maintaining a safe work environment.

The construction foreman acts as a project manager. They are responsible for the projects from beginning to end, including staffing, budgets, maintaining policies, keeping the site safe and maintaining a set schedule.

The construction supervisor job description is optimized for posting on career sites and job boards and is easily customizable for your company.

- **Key Requirements:**
  - ✓ A positive attitude and willingness to encourage co-workers
  - ✓ Excellent communications skills
  - ✓ Experience in supervising construction projects
  - ✓ The ability to set priorities and exercise flexibility where necessary
  - ✓ Ability to read and understand blueprints, schematics, and construction documents
  - ✓ Understanding of proper safety procedures and recognition of hazards
- **Responsibilities:**
  - ✓ Hiring, training and general management of all employees on the project
  - ✓ Monitoring performance of sub-contractors and staff
  - ✓ Monitoring project budget

- ✓ Accomplishing project by defining the scope and resources required
- ✓ Allocating resources, materials, sub-contractors and other staff
- ✓ Maintaining a safe, secure and healthy work environment by adhering to and enforcing safety codes

Self-Check -3	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1) List out at least five the estimation task duties and responsibilities. (5 points)

2) Write the planning task duties and responsibilities. (5 points)

3) List out at least five the supervising tasks duties and responsibilities. (5 points)

Note: **Satisfactory rating - 5 and 5 points** **Unsatisfactory - below 5 and 5 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Information Sheet- 4	Identifying & undertaking building codes of Ethiopia

4.1. Ethiopian Building Codes and Standards (EBCS)

Virtually all residential construction must adhere to comprehensive building codes and standards governed by local and state laws. Because of the cost and complexity of developing and maintaining such codes, state and local governments typically adopt nationally recognized model codes, often amending them to reflect local construction practices, climate and geography.

Most countries and communities adopt internationally recognized Codes for this purpose. The Codes address all aspects of single- and two-family as well as multifamily construction, including structural elements and the electrical, plumbing, heating, ventilation and air conditioning systems, and energy conservation requirements as well as the overall construction elements of the sector. All domestic building materials productions, constructions and installations are affected by EBCS.

Ethiopian Building Codes and Standards (EBCS) includes:

- EBCS 1: Actions on structures
- EBCS 2: Design of concrete structures
- EBCS 3: Design of steel structures
- EBCS 4: Design of composite steel & concrete structures
- EBCS 5: Design of timber structures
- EBCS 6: Design of masonry structures
- EBCS 7: Geotechnical design
- EBCS 8: Design of structures for earthquake resistance
- EBCS 9: Plumbing service of building
- EBCS 10: Electrical installation of building
- EBCS 11: MVAC in buildings
- EBCS 12: Building spatial design
- EBCS 13: Fire protections during building construction design, works & use
- EBCS 14: Occupational Health and safety

This Ethiopian Standard, which is based on EN 1990, incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this Ethiopian Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

Note: The following Ethiopian Standards which are published are cited in normative clauses:

EBCS EN 1991:2014	EBCS 1: Actions on structures
EBCS EN 1992:2014	EBCS 2: Design of concrete structures
EBCS EN 1993:2014	EBCS 3: Design of steel structures
EBCS EN 1994:2014	EBCS 4: Design of composite steel and concrete structures
EBCS EN 1995:2014	EBCS 5: Design of timber structures
EBCS EN 1996:2014	EBCS 6: Design of masonry structures
EBCS EN 1997:2014	EBCS 7: Geotechnical design
EBCS EN 1998:2014	EBCS 8: Design of structures for earthquake resistance

Fig. 4.1: Ethiopian Building Codes and Standards

Working Drawings

Technical drawings describing the project in pictorial form for the builder to execute, fully explaining what has to be done.

How a building gets built:

3 main parties involved:

- Owner
- Design Professional
- Builder

Typical Contractual Agreements:

- Owner hires architect to develop a design
- General Contractor is selected to build the project, usually via competitive bidding

Key Roles:

- Architect / Engineer: codes, MEP, structural
- General Contractor: responsibility for constructing the project
- Sub-Contractors: independent construction firms that specialize in a specific trade (carpenter, electrician, concrete, etc.)

5 Project Phases:

- **Preliminary / Schematic Design:** explore ideas for the building, code research
- **Design Development:** develop one design exclusively
- **Contract Documents:** develop to fully describe the project
  - ✓ working drawings
  - ✓ Specifications
- **Bid Documents:** bidding and negotiation
- **Construction Administration:** administer the contract documents, shop drawings and construction sketches. Architect continues to coordinate with the GC to make sure the project is built to the standards defined in the CD's

Building Code: laws that provide for the health, safety, and general welfare of the public.

- Working Architectural Drawings must conform to the applicable building codes.

Building Permits:

Plans and specs are submitted and reviewed by building department officials to determine whether the project meets local building codes. A GC must have a building permit to begin construction on the project. Work is inspected by building officials and construction progresses.

Building Permit Drawing Includes:

- Site Plan, Floor Plans
- Elevations, Sections
- Foundation & Structural Details
- MEP & Shop Drawings
- Fire Fighting & Landscaping
- Electrical Plans, ETC.

Self-Check -4	Written Test

Directions: Answer all the questions listed below. Use the Answer sheet provided in the next page:

1. List drawings that Building Permit Drawing should include. (5 points)

2. Define the term building code and standard. (5 points)

Note: **Satisfactory rating - 5 and 5 points** **Unsatisfactory - below 5 and 5 points**

You can ask you teacher for the copy of the correct answers.

Answer Sheet

Score = _____

Rating: _____

Name: _____ Date: _____

Short Answer Questions

Answer key

Self-Check -1

Question #:

1. B) True
2. quality expected, Listed PC items and Materials and finishes

Self-Check -2

Question #:

1. Introductory Section, Statutory Requirements Owners Obligations, (Plans, Permits, Fees), Site Works, and Footings

Self-Check -3

Question #:

1. **Construction Estimator duties and responsibilities include:**
   - Explore documentation to gain a deep understanding of the project requirements
   - Select, measure and track important metrics
   - Visit sites, warehouses and other venues necessary to do the estimate
   - Perform complex analysis of collected data and metrics
   - Prepare relevant and reliable forecasts
   - Conduct complex risk analysis activities
   - Create and present reports to upper management
   - Analyze and evaluate offers
   - Build and maintain long-term relationships with the key vendors
2. **planning involves:**
   - the choice of technology
   - the definition of work tasks
   - the estimation of the required resources and durations for individual tasks
   - the identification of any interactions among the different work tasks.
3. **supervising tasks**
   - Hiring, training and general management of all employees on the project
   - Monitoring performance of sub-contractors and staff

- Monitoring project budget
- Accomplishing project by defining the scope and resources required
- Allocating resources, materials, sub-contractors and other staff
- Maintaining a safe, secure and healthy work environment by adhering to and enforcing safety codes

Self-Check -3

Question #:

1. **Permit Drawing should include:**
   - Site Plan, Floor Plans
   - Elevations, Sections
   - Foundation & Structural Details
   - MEP & Shop Drawings
   - Fire Fighting & Landscaping
   - Electrical Plans, ETC.
2. laws that provide for the health, safety, and general welfare of the public.

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