COURSE TITLE

CONSTRUCTION ENGINEERING AND MANAGEMENT

Chapter 11

SPECIFICATION AND VALUATION

Lecture 11 (week 11)

Purpose of specification, Types of specification, Importance of specification, Valuation, Terms used in valuation, Methods of valuation

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Learning Objective

The main objective of this lecture is to understand about:

- Purpose of specification.
- Types of specification.
- Importance of specification.
- Valuation.
- Terminologies in valuation.
- Methods of valuation.

11.1 SPECIFICATION

The specification is the document where the level of intended quality is specified. Specifications are clear concise descriptions of materials and workmanship including the methods of construction and precautions to be taken. A specification is a specific description of a particular subject. A specification definition is "written documentation describing the scope of work, any materials that are to be used, the methods of installation, and the quality of workmanship under contract." [1]

An engineering specification contains detailed description of all workmanship and materials which are required to complete an engineering project in accordance with its drawings and details. Specification specifies or describes the nature and class of the work, materials to be used in the work, workmanship etc. and is very important for the execution of work. Specification should be clear and there should not be any ambiguity anywhere. From the study of specification, one can easily understand the nature of the work and what the work shall be.

Specification depends on the nature of the work, purpose for which the work is required, strength of the materials, availability of the materials, quality of materials etc. Drawings do not furnish the details of different items of work, the quantity of materials, proportion of mortar and workmanship, which are described in specifications. Thus combinations of drawings and specifications define completely the structure. Drawings and specifications form important parts of contract document. Specifications have two basic functions which are: Communicate and Compare.

Purpose of Specification

- To estimate the quantity and cost.
- To specify the nature of the work.
- To clarify any ambiguity.
- To identity the quality of materials.
- To identify the types of workmanship used.
- To identify the material proportion.
- To avoid the lengthy descriptions in bills of quantities and big captions on drawings and to supplements the information given in the drawings. [2]
- It enables department, architect, engineers and contractor to define, procure and check the material's quality as per specification.
- To serve as guide to the bidders about the client's/owner's intended quality requirements and to arrive them at a fair price for the work involved. [2]
- To serve as a part of contract documents between owner and the contractor limiting and describing their risks and responsibilities.
- To serve as a guide for supervisors, engineers and fabricators regarding the methods of construction, fabrication, installation of equipment and materials.

11.2 TYPES OF SPECIFICATION

Depending upon the purpose served, the specifications can be grouped as follows:

1. **Contract Specification**
   (a) General/Brief Specification
   (b) Detailed/Particular Specification
2. **Standard Specification**
3. **Overall Performance Specification**
4. **Manufacturers Specification/Open Specification**

1. **Contract Specification**

Contract specification is developed for a particular construction or project to accompany the working drawings.

(a) General/Brief Specification

This describes the nature of the purposed work, qualities of the materials and workmanship in general for the work as a whole. [2] It gives the general description of the material, labor and types of equipment. General specification gives general idea about whole work or structure and are useful for preparing the estimate.

(b) Detailed/Particular Specification

The detailed specification is a detailed description and express the requirements in detail. It specifies the qualities and quantities of materials, the proportion of mortar, workmanship, and the method of measurement. The detailed specification of different item of work are prepared separately and describes what the works should be and how they shall be executed and constructed. Physical, chemical and electrical tests if any requires for the finished work to ensure the desired strength or quality are specified in the detailed specification.

The detailed specifications are expressed clearly as far as possible in the same sequence of order as the work carried out. These specification if prepared properly are very helpful for the supervisory staff for getting the work executed correctly and become an important part of contract agreement. This also specify the involvements and responsibility for auxiliary works, incidental damages etc. during execution of the original work. The method and duration of protection of finished works as required are specified in the detailed specification.

2. **Standard Specification**

This is generally prepared and published by national standard organizations which cover specific materials or group of materials used by a specific trade or a segment of the construction industry. [2] A standard Specification is a set of the specifications for an item, material, component, system, or service that is defined precisely and established with the standardisation processes to be used for the business, engineering, procurement, construction, operation, and maintenance. [3]

3. **Overall Performance Specification**

This details in comprehensive but general terms, what the client is looking for.

4. **Manufacturers Specification/Open Specification**

Open specifications are specifications of products of manufacturers which state both physical and chemical properties and such other information of the product, but not description of workmanship to be achieved during construction. The physical properties specify mainly the strength, weight, thickness or size and such other physical properties of product.

11.3 SPECIFICATION WRITING

A specification becomes an essential contract management document which is used to ensure that the chosen supplier provides what is specified. [4] It must therefore be clear and accurately define what is expected from a supplier regarding the outputs or the functional and performance requirements. Specification serves as evidence in case of dispute. Most of the dispute occur only because of not properly explained/written specifications. The general principles of specification writing are substantially the same regardless of the subject matter. It should include:

1. ***Specification language:*** Simple and clear. Same tense and repetition of a noun is preferable
2. ***Brief:*** as brief as possible. Standard article is specified by references and code numbers.
3. ***Fairness:*** fair to all parties. Proper sharing of risks
4. ***Expression:*** requirement of each and every item
5. ***Repetition of information is avoided*** **to avoid the possibility of contradiction.**
6. ***Standard size and patterns:*** commercial size should be specified as far as possible, unusual; dimensions should be avoidable.
7. ***Cross-references*** should be minimum as possible
8. ***Inclusion of proper paragraph***
    - specification of materials
    - combinations of materials
    - preliminary works prior to construction
    - installation of materials
    - test, if any
    - clearing on completion
    - mode of measurements

9. ***Quality of materials and workmanship*** should be specified
10. ***Nothing impossible to achieve and not intended to be enforced*** should be specified
11. ***While specifying the brand of materials options and choices*** should be given

11.4 IMPORTANCE/ NECESSITY OF SPECIFICATION

- Tender/contract document and agreement without specification is incomplete, baseless and invalid.
- The cost of a unit quality of work is governed by its specification
- To verify and check the strength of material for a work involved in a project
- To specify the equipment, tools, and plants to be employed for works and thus enables to procure or hire
- To procure the materials required for a project and to check the quality of materials
- It serves as a guide for the site Engineer
- Serves as an evidence in case of dispute
- Changes in specification change the contract cost

11.5 VALUATION

The process of determining the current worth of an asset or company is known as Valuation. There are many techniques that can be used to determine value. Valuation is the process of estimating what something is worth. Items that are usually valued are financial asset or liability. The value of construction shall be based on the value of the work that is being performed. The total value of work shall include materials and labor for which the permit is being sought for.

In another way, valuation is an art of determining actual unbiased, legal and logical value of the property. Property may be the land, building, both land and building, factory, machineries, jewelries and other engineering structures of various types. The value of the property depends upon its structure, life span, location, maintenance etc. Cost is the original cost and the original cost may be either construction cost or a purchase cost. Value means the present (current) salable value of the property. Value may either less than or greater than the cost.

Purpose of Valuation

- Buying and selling of property
- Taxation (local bodies tax , property tax and wealth tax)
- Rent fixation
- Security for loan or mortgage

- Compulsory acquisition
- For insurance
- To determine the court fee
- To prepare the balance sheet of company
- Partition of the property
- Reinstatement (to get the original value)

Principle of valuation [2]

- Costs depends upon supply and demand
- Costs depends upon its design, specification and location
- Costs varies with the purpose
- Costs depends upon age and condition of property
- Costs depends upon the psychology of the buyer and seller
- Depends upon the present and future use of the property
- Costs analysis must depends upon the statistical data

Factors affecting the value of the property

1. **Location** (Land under urban and city area are expensive than in rural and semi-urban areas).
2. **Climatic condition**
3. **Population census** (Rate of migration and increase in population increases the demand for land and so cause in an increment of value)
4. **Supply and demand function** (like other business, real estate business runs under the law of supply and demand)
5. **Rate of interest** (the transaction of real estate business increase when interest rate is decreased)
6. **Topography** (Mild slope and flat terrain land are of greater value in general than the sloppy and hill).
7. **Rent restriction act** (Government's rent restriction act and its provisions affect the value of a property).
8. **Abnormal condition** (like insurgency, disaster, financial difficulties, etc. affects the value of a property).
9. **Purpose** (The same land for the agriculture purpose and industrial purpose differs).

Qualification of Valuer's

- Planning, Designing and Construction works
- Surveying and leveling
- Estimating and quantity surveying
- Knowledge on market rate of land
- Rate of interest
- Knowledge regarding rent act, and other prevailing acts and regulations
- Building codes and bye-laws
- Knowledge on Vastu Science
- Report writing skills
- And other required computer skills

11.6 TERMS USED IN VALUATION

1. **Gross income**

➢ Gross income is total income and includes all receipts from various sources. Outgoings are not deducted.

2. **Net income**

➢ Net income is saving or the amounts left after deducting all outgoings from gross income.

$$Net\ income = Gross\ income - outgoings$$

3. **Outgoings**

➢ Outgoings or the expenses which are required to be incurred to maintain the revenue of the property. These includes, taxes, repairs, management and collection charges, loss of rent and miscellaneous. [5]

4. **Book Value**

➢ The amount is shown in the account book after allowing depreciation.

➢ The book value depends on the amount of depreciation allowed per year and will gradually reduce year to year.

➢ At the end of the utility period, the book value will be equal to scrap value.

$$Book\ Value = original\ Cost - Depreciation$$

5. **Salvage Value**

- It is the value of the property at the end of its utility period without being dismantled. In case of a machine, sale value at the end of its usual life span is the salvage value.

6. **Scrap Value**

- It is the value of the dismantled property (materials) after deducting labor charge to dismantle.

7. **Distress value**

- Distress value is the value of the property at financial difficulties. It is always lower than the market value due to insufficient knowledge of property valuation.

8. **Monopoly Value**

- Value of monopoly in nature and is always greater than the market value.

9. **Assessed value**

- The value recorded for the municipal taxes.

10. **Obsolescence**

- It is the loss in the value of property due to an old design, out of fashion, out of date. The obsolescence may be due to the reasons such as progress in arts, design, changes in fashion, trends, changes in design technique, planning ideas, etc.

11. **Capital Cost**

- It is the total cost of construction including land or the original total amount required to possess a property. It is the original cost and does not changes, while the value of a property is the present cost which may be calculated by methods of valuation.

12. **Capitalized Value**

- The capitalized value of a property is the amount of money whose annual interest at the highest prevailing rate of interest will be equal to the net income from the property. [6] To determine the capitalized value of a property, it is required to know the net income from the property and the highest prevailing rate of interest.

$$\textit{Capitalized Value} = \textit{Net income x year's purchase}$$

Year's purchase is defined as the capital sum required to be invested in order to receive a net annual income as an annuity of $ 1 at a fixed rate of interest. [6]

13. **Sinking fund**

- It is the fund where a certain amount of gross rent is accumulated annually to reconstruct or to replace the property after useful life period.

14. Depreciation

- Depreciation is the gradual reduction in the value of an asset due to wear and tear, usage, passage of time, obsolescence, depletion or inadequacy.[7]The methods of calculating depreciation are straight line method, declining balance method, sinking fund method, SOYD method and MACRS method.

11.7 METHODS OF VALUATION

1. Cost-based method of valuation

The cost approach method is based on the assumption that a potential buyer of a property should pay a price that is equal to the cost of constructing an equivalent building. [8] This is the most accurate method of valuation in which detailed cost estimation of property is carried out by drawings and as-built structure.

$$\textit{Value of property} = \textit{Value of building by detailed cost estimate} - \textit{Total depreciation} + \textit{Value of land}$$

$$\text{Total depreciation (D)} = \frac{\{\text{cost of building} - \text{salvage value}\}}{\text{Life of building}} * \text{Age of building}$$

2. Depreciation method of valuation

In this method, the depreciated value of the building is calculated.

$$\textit{Value of property} = \textit{Depreciated value of building} + \textit{Value of land}$$

Where depreciated value of a building is calculated as,

$$\text{Depreciated Value of Building} = P\{1 - \gamma_d/100\}^n$$

Where

- γ_d = fixed rate of depreciation
- P = *Cost of building at present market rate = Total or Built-up area × Prevailing plinth area rate per meter square*
- n= Age of Building

3. Plinth area method

In this method, the plinth area of the building is measured and calculated and plinth-area rate of a similar building in the locality is obtained by enquiry and cost is calculated. [9] It is one of the popular method of valuation.

$$\textit{Value of property} = \textit{Total plinth area (built-up area in } m^2) \times \textit{prevailing plinth Area rate per } m^2 - \textit{Total depreciation} + \textit{Value of land}$$

- Where, Total Depreciation (D) is calculated as,

D = (C – S)/n * age of building

4. Rental method

In this method capitalized value of the property is calculated. It is used for the valuation of property which fetches the rent.

- Value of property = Capitalized value
- Capitalized value = Net rent × Years purchase
- Net rent = Gross rent – outgoing (expenses)
- Expenses: Repair, taxes, sinking fund, insurance, management and collection charges, loss of rent, etc.
- Year's purchase = $\frac{1}{i_p + i_c}$, $i_c = \frac{i}{(1+i)^n - 1}$

- i_p = highest prevailing rate of interest in decimal
- i = rate of interest for sinking fund in a decimal
- n = life of a structure

5. Profit based method

Used in the valuation of Hotel, Commercial complex, Cinema Hall, etc.

Value of property = Capitalized value of building + value of land

- Capitalized value = Net income / profit × year's purchase
- Net income = Gross income – outgoing

6. Capital value comparison Method of valuation

Use in land valuation by comparing the prevailing rate of land nearby vicinity.

7. Development method

Development method of valuation is also used for properties or buildings which are required to be renovated by making alterations, additions, improvements etc. [9] The value is calculated based on the anticipated net income generated from the building after renovation work is complete.

Developed value: Cost of land + Cost expenditure in development

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