CHAPTER ONE

CONSTRUCTION SITE SUPERVISION

COTM3231

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CHAPTER ONE: INTRODUCTION

- Dictionary definition of inspection / supervision
  - ✓ A critical examination of **somebody or something** aimed at forming a judgment or evaluation.
- **Construction Inspection/supervision:** the process of ensuring targets (**cost, time and quality)** which has been set at the planning stage.
- Inspection is one of the means of ensuring compliance of design and specifications.
- The primary objective of inspection is to ensure safety of lives and durability of structure.
- Therefore, the inspector has the responsibility of ensuring that the structure being built confirms to the **acceptable standards** and **good workmanship** and **quality materials.**

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- The inspector has professional as well as ethical responsibility to ensure that the structure is built correctly.
- Most of the buildings and other infrastructure fails due to lack of proper and professional supervision causing loss of lives and property.
- Proper **inspection** becomes a **critical aspect of a work** in order to ensure that the works to be accomplished are done as intended, confirming to the technical documents requirement.

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- It is common that inspectors takes side and may think that anything he/she can do to slow down, impede or control the work is to the advantage of the employer.

- The inspector is responsible to control quality of work but if he/she impede the progress, the employer will incur additional costs.

IMPORTANCE OF SUPERVISION

- Supervision is important to ensure that the structures or works being executed are constructed according to **Design, Specification, code requirements as well as accepted practice.**
- Therefore, supervision can be defined as the process of ensuring compliance with technical requirements, government regulations and accepted levels of workmanship
- If the work is executed with **faulty** supervision, it may result in
  - Change in the intention of the designer
  - Unsafe and/ or unacceptable structure
  - Additional costs to the employer
  - Un necessary delay
  - Poor quality of work, …etc

THE PROJECT ENVIRONMENT

- The **influence** of various elements in the executing **inspector's duties** is called **Project environment**.
- Factor affecting the project environment:
  - Contractor attitude,
  - Inspector attitude,
  - Contractor abilities,
  - Trade atmosphere,
  - Field team ability,
  - Completeness of drawings,
  - Field conditions, …etc

THE SKILLS OF INSPECTION

- The inspector is excepted to have the following skills:
  - Observation skills
    - Global observation skills
    - Abstract observational skills
  - Technical skills or competence
  - Interpersonal skills
  - Communication skills
    - Written and oral, Listening and speaking
    - Internal and external
    - Formal and Informal
    - Vertical and Horizontal
  - Negotiating
  - Problem solving skills
    - Problem definition
    - Decision making, “ the right decision at the right time”
  - Analytical skills
    - Looking at the big picture of the effect of the decision

THE ROLE OF INSPECTOR

- An inspector may work for the Employer, the Contractor or the Consultant, in any case however, his responsibilities are the same.

- Most of the time the inspector works on the side of the consultant.

- The main role of supervisor in general is to follow up the execution of a project with the **design, specification and appropriate legal and social practice.**

- The inspector must have a keen eye, be observant and able to see critically.

- In most cases the inspector assumes role of advisory, however his/her main duties are limited to the following
  - Inspect
  - Guide
  - Assist
  - Facilitate
  - Control quality but not to hinder work.

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- The detailed knowledge of the **plans and specifications** for the **particular work** is very important for execution of his duties.
- He/ she should be familiar with any **revisions or amendments** done to the **original documents** and also the reason for such changes and their incorporation to the works.
- He/she must also be able to follow the progress of the work, **record accurately** and follow up the **day-to-day** progress.

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- The inspector needs to exercise professional integrity and high ethical standards.
- He/she must always **understand the problem** of the **contactor** and find a **solution** to assist him in resolving the issues without waiving any of the specific requirements of the specification.
- In summary the inspector must have the following,
  - Knowledge
  - Integrity
  - Ability
  - Good judgment
  - Good attitude
  - practice

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- His specific duties are summarized below:
  - Ensuring compliance by the **contractor with drawings, specifications and contractual provision of the project**.
  - Monitoring project progress according to the schedule
  - Coordinating and monitoring different tests
  - Inspecting contract drawings and specifications
  - Rejection of works which is not within the contractual quality
  - Stopping of works when safety concern override basic contractual commitment.
  - Approval or rejection of shop drawings, materials and samples
- In other hand the inspector has no authority to alter, enlarge, relax, or release any of the requirements of the contract provisions.

NECESSARY EQUIPMENTS

- Make sure that you have the following equipments at hand whenever inspecting a site
  - ✓ Tape mater
  - ✓ Level
  - ✓ Straight edge
  - ✓ Note book, diary
  - ✓ Safety helmet
  - ✓ Suitable site shoes
  - ✓ Appropriate clothing

DEFECTS IN CONSTRUCTION

- Defects in construction may appear due to either of the following reasons
  - Inadequate strength or stiffness
  - Structural instability
  - Settling of foundations
  - Structural members as evidenced by cracking, movement and excessive deflection
  - Weather and moisture intrusion caused by failure of roofing, exterior wall, floors and openings
  - Premature depreciation such as abnormal wear, decay, corrosion
  - Poor Workmanship
  - Un-adequate Supervision
  - Usage of poor quality material
- Some of this defects will result in buildings or parts of buildings that are unsuitable or unusable. Others will result in excessive operating and maintenance costs, premature replacement costs, or depreciated or unacceptable appearance and sometimes property damage, personal injury or death.

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- Defects in structure can occur during the construction period or during times of use.
- The inspector is required to analyze the situation and arrive at a technically sound explanation as well as possible practical recommendations.
- The inspector is therefore expected to answer the following key questions for analyzing the defect and forward the possible recommendations
  - What is the phenomenon?
  - How can it be described and explained?
  - What is the exact cause?
  - How it can be rectified?
    - By removal or replacement?
    - By repair?

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- By coating?
- By strengthening?
- By premature replacement?
- By acceptance of defects and monetary adjustments?
- By some equivalent to the originally specified product or procedure?
- By some creative or innovative procedure?

- The **inspector** should also understand the **costs of remedial** measures.
  - Costs of analysis and recommendation.
  - Costs of Redesign works
  - Costs of inspection and testing
  - Costs of labor, material, equipment coordination
  - Costs of consequential damages
  - Costs due to loss of use of building
  - Costs due to damage of personal injuries.

IDENTIFYING THE SOURCE OF RESPONSIBILITIES

- Who is responsible for the failure
  - Design problem?
    - Was the construction project properly design?
    - The architect and the engineers are primarily responsible for the design problems. Who is responsible for Temporarily structures?
  - Construction problem?
    - Was the project built in accordance with contract requirement? Was it properly constructed? Does the contractor provide right materials as per the specifications.
      - Who is responsible?
  - Maintenance or usage problem?
    - Was the project and all its systems been properly cared for? Has the project been abused or damaged by its user? has the project been used improperly?
      - Who is responsible?
  - Unforeseen circumstance [natural disaster, war, …etc]
      - Who is responsible?
  - Faulty supervision
      - Who is reponsible?
- Accidents are very common in construction sites, hence, it is very important that healthy and safety issues are addressed properly.

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- Commonly accidents occur due to the following reasons
  - In-adequately installment of formworks
  - Improper construction of temporary structures
  - Improper nails
  - Un-braced underground excavations
  - Improper usage of equipments
  - Negligence of the workers
  - Un usage of safety equipments

CHAPTER TWO

BIDDING PROCEDURES AND CONTRACT TYPES

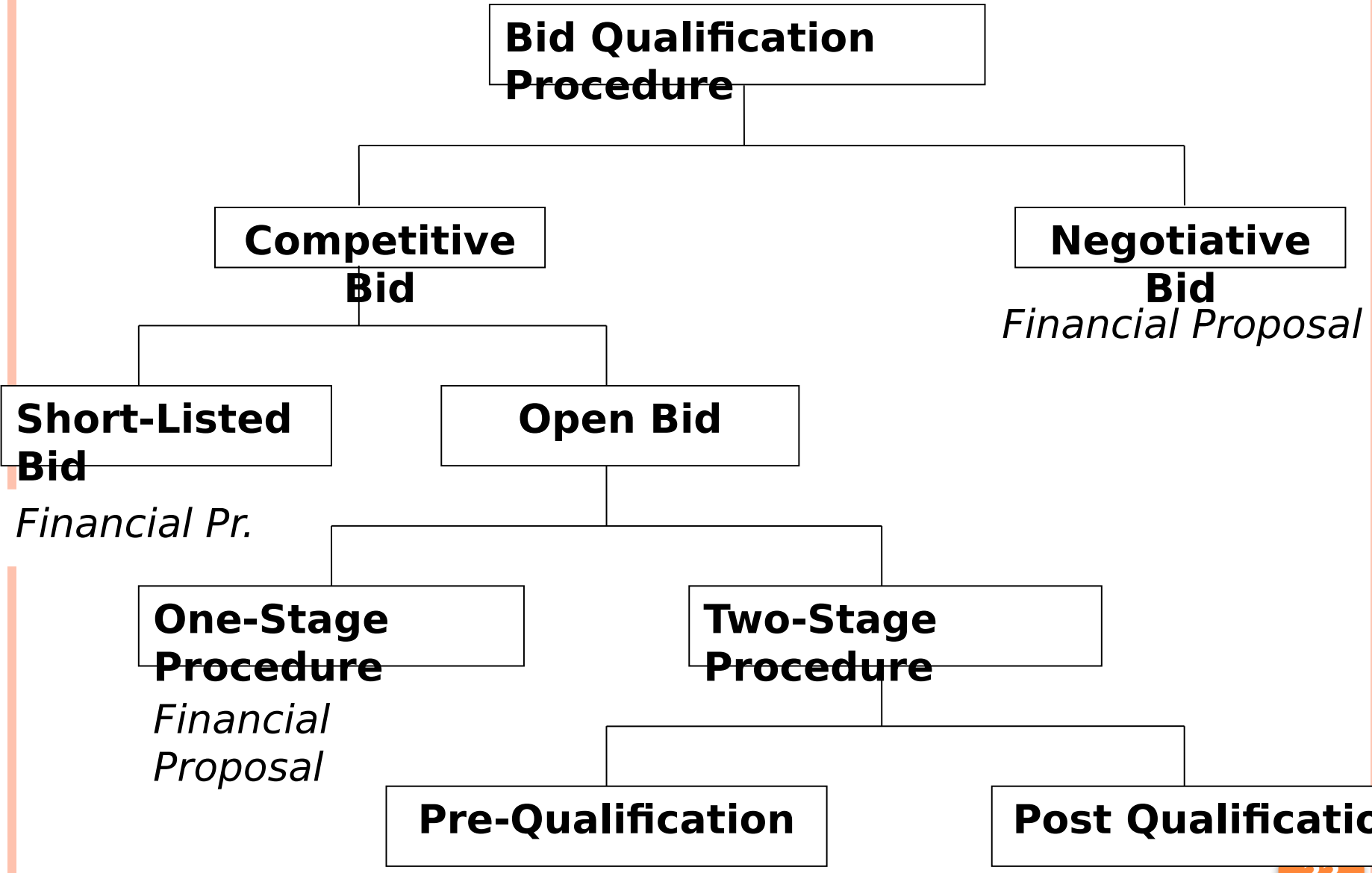
STANDARD BIDDING DOCUMENT

- The significance of having standard bidding procedure, specially for public funded projects is:

  - ✓ To simplify the drafting of a specific bidding document for Procurement of Works by procurement staff
  - ✓ To minimise the time required by the Tender Committee to approve Bidding Documents prior to release
  - ✓ To reduce Bidders' time and effort in the preparation of Bids;
  - ✓ To facilitate and simplify the evaluation and comparison of bids and Contract award by the Procuring Entity

PROCUREMENT METHODS

Bases	Things to be Procured	Bidders' Coverage	Geographical Coverage	Procurement Awareness	Procurement Steps
Types	Goods Services Works	Competitive Negotiated	International Regional National Local	General PN Specific PN	Single Two Staged Pre – Qualification Post - Qualification


Bid Qualification Procedure
Competitive Bid
Negotiative Bid
Financial Proposal
Short-Listed Bid
Financial Pr.
Open Bid
One-Stage Procedure
Financial Proposal
Two-Stage Procedure
Pre-Qualification
Post Qualification
•Technical Proposal
•Financial Proposal
•Financial Proposal
•Technical Proposal

Things to be Procured

(Goods Vs Services Vs Works)

- Depending on the delivery system chosen during the contract planning phase, mixed types of procurement types can be adopted.
- **Procurement of Goods:** Physical resources such as Materials and Equipment's
- **Procurement of Services:** often termed as consultancy services procurement. These include services like
  - *pre-feasibility and feasibility studies,*
  - *design and contract administration of projects,*
  - *Construction management consultancy services,*
- **Procurement of Works:** *In the Construction*

Bidders' Coverage

(Competitive Vs Negotiated Tendering)

- **Competitive Tendering:** Selection of better and capable winning bidder among the various eligible firms. it can either be *Open* or *Limited* Competitive Bidding in the form their invitations.
  - Open competitive bidding allows all eligible bidders to participate
  - Limited competitive bidding allows a number of selected firms only. The major difference between open and limited competitive bidding is the addition of qualifying criteria beyond eligibility

Cont….

(Competitive Vs Negotiated Tendering)

- Some of the qualifying criteria used for Limited Competitive Bidding are (usually short listing is done based on):
  - the firms past performance,
  - work load at present,
  - presence of a firm in the vicinity of the projects,
  - knowledge of similar type of works before and
  - financial and technical capabilities of the firms
- Usually in Limited Competitive Bidding, cost of

Cont....

(Competitive Vs Negotiated Tendering)

- **Negotiated Tendering:** Under certain circumstances, The nomination of this direct invitation is usually based on
  - good performance,
  - contact with the Project Owner,
  - for supplementary agreements, etc.
- This kind of tendering is exceptionally exercised when the project under consideration is very urgent or needs special skill whereby the required skill is rarely available.
- The main disadvantage of this type of tendering is that the price offered can usually

Geographical Coverage

International Vs Regional Vs National Vs Local Tendering

- These types of procurements are generally caused by three major factors. These are
  - Local Capacity,
  - Financial Sources (dictate regional or international)
  - Globalization (globalization and principles of free trade and trade liberalization also encourages international tendering)

Procurement Awareness

General and Specific Procurement Tendering

- Following requirement like proof of competition and increase accessibility, **General Procurement Notice** (GPN) is made during projects planning phase and it is only interests of the bidders are aroused because sufficient tender documents are not available. This approach is used:
  - The Project Owners to
    - ✓ identify interested bidders to issue Invitations by letters and save time;
    - ✓ identify bidders relevant for the procurement required;
    - ✓ protect loss of cost in preparing lots of

Cont....

General and Specific Procurement Tendering

- The Bidders to:
  - ✓ give sufficient time to assess the cost of the project;
  - ✓ protect loss of cost only to participate; and
- There are two types of General Procurement Notice based on their purpose why and when they are notified
  - The first type of GPN
    - ✓ When?-- announced as soon as the design is started
    - ✓ Why?-- to create awareness and let bidders' prior information about

Cont....

(General and Specific Procurement Tendering)

- The second type of GPN
  - When?--announced after financial sources are determined
  - Why?--to determine interested bidders who could be invited in the form of limited competitive Tendering.
- GPN covers
  - the Employer and its financiers for its project;
  - Description of the project with its probable or planed implementation time;

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General and Specific Procurement Tendering

- Specific Procurement Notice (SPN)
  - is an invitation for tender or a request for proposal when the project is ready for implementation.
  - can be sent to those interested bidders identified following GPN directly. Otherwise, it should be advertise on the bases of enlarging opportunities

Procurement Steps:

Single Vs Two Staged and Pre-Vs Post-Qualification Tendering

- **Single or Two Staged Tendering:** are related with whether tender packaging for submission separately and their evaluations are staged for a single or two steps when invitations are made. Often two staged biddings are made for the submission of technical and financial proposals separately and their evaluations one after the other.
- **Pre-qualification tendering:** It is a procedure in which eligible bidders are invited to provide evidence of their ability to perform the services required by the employer.

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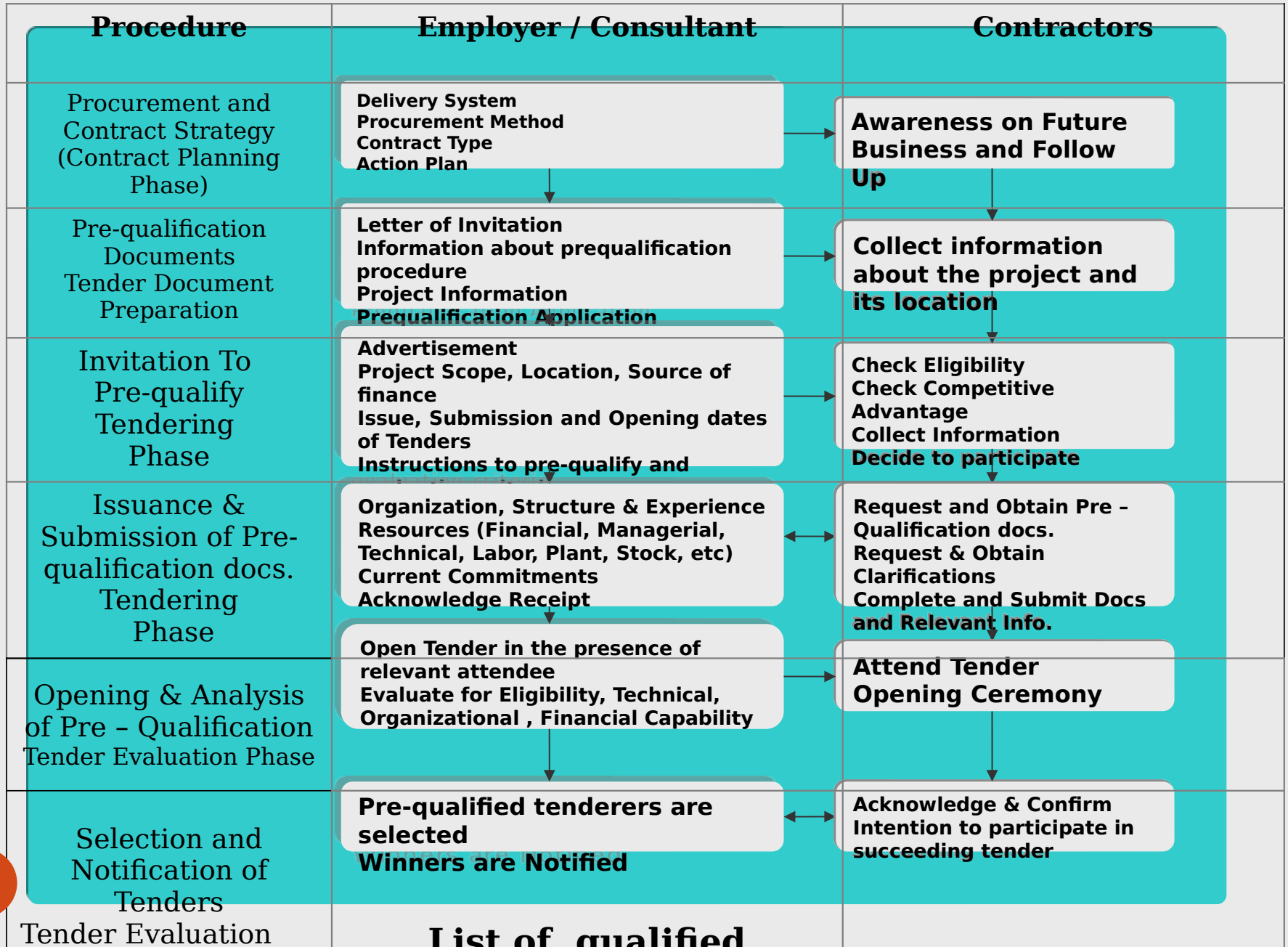
Single Vs Two Staged and Pre-Vs Post-Qualification Tendering

- **Pre - qualification can be of two types**
  - The first is ***Single stage tendering***: when companies are already considered qualified during their licensing requirements. (evaluation criteria become the low priced bid)
  - The Second is when ***two staged tendering*** is used to pre-qualify tenderers' for their technical competency. Once pre-qualify, either the lowest priced or the lowest evaluated bidder recommended for

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- The following pre-qualification criteria's are often used in determining the ability of the bidder to carry out the works:
  - Experience and past performance,
  - Health, Safety and Environment Records, if any,
  - Capability in respect of personnel and equipment,
  - Organizational arrangement and facilities,
  - Financial Status, and
  - Schedule of Commitments.

pre-qualification flow chart



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- **Post – qualification:**
- where financial evaluation is carried out first and rank bidders on the basis of their offer for tender price.
  - *That is, Technical Evaluation will be done after the Financial Evaluation*
- The advantage of this approach is
  - not to loose the lowest financially evaluated bidder and
  - to save time during technical evaluations.
- However, Post qualification approaches often cause to fix evaluators on financial results

BIDDING PROCEDURE FOR WORKS

- The relevant parts of the bidding process are summarised here as follows:
  - ✓ Selection of Bidders;
  - ✓ Preparation and Issue of Bidding Documents;
  - ✓ Bidding Period and Bid Receipt;
  - ✓ Bid Opening;
  - ✓ Bid Evaluation; and
  - ✓ Bid Acceptance, Contract Award and Signing.

Tender document

Tender Documents: are prepared to

- Instruct bidders on the procedures for the preparation and submissions of bids,
- Inform prospective bidders about the nature of things to be procured,
- Inform bidders about the criteria for evaluation and selection of the successful bidder, and
- lay down the contract conditions, delivery system, procurement methods and contract types of the

Tender document cont…

- Tender documents include:
  - Form of Invitation to Tender or Request for Proposals;
  - Instruction to Tenderers (Standard and / or Particular information) or Terms of References;
  - Prequalification Documents if necessary;
  - Forms of Tender;
  - Forms of Contract Agreement;
  - General and Particular Conditions of Contract;
  - Bill of Quantities and Drawings ;

Tender document cont…

- **Invitation for Tender (IFT):** is a requisition for interested bidders to participate for the procurement of services / works / goods. It shall be:
  - in accordance with the approved provisions of the contract planning phase and applicable laws
  - made public through the wide covering media, newsletter, notice boards, etc

Tender document cont...

- Usually Invitations for Tender include:
  - Name and address of Institutions issuing the invitation and Clarification if requested,
  - Objective and Requirements of the Invitations,
  - Stages and accordingly qualification terms
  - Brief descriptions of the project
  - Sources of Fund and Eligibility requirements
  - Completion time, if necessary

Tender document cont…

- **Instruction to Bidder (ITB)**
  - shall provide all the necessary information to enable bidders to prepare their offer in accordance with the requirements of the Project Owners.
  - Whenever necessary, it will be supplemented by particular information which cannot be standardized or generalized in the General ITB document

Tendering Phase

Invitation:

- Normally open tenders are floated for a period between 30 to 45 days. Limited and Negotiated tenders can be invited between 7 to 15 days. The invitation to tender shall clearly state:
  - the owner and his desirous service or works
  - eligibility requirements,
  - place to get further information,
  - where to purchase & submit tender documents,
  - how long the tender will be floated,
  - how should the tender offer be packed

Tender Opening

- Bids shall be opened in public on the date, at the time and place
- Ethiopian practice in tender opening for public construction projects is that
  - representatives from MWUD
  - Project Owner,
  - Consultant (if available) and
  - Contractors (Who wish to attend)

Tender Opening

- The following will be carried out during tender opening:-
  - Tender Attendee members shall take their place, be registered and shall sign to attest their presence during opening
  - Tender box opened and checked for faulty things,
  - Check the tender is the right one,
  - Bids will be opened one after the other,
  - All necessary data which deem useful will be read aloud and recorded at the

Tender Evaluation Phase

- It is made to determine and make award recommendation for the least evaluated bidder using preliminary and detail evaluations.
- The recommended winner may or may not necessarily be the lowest bidder.
- Factors to be considered in determining the least evaluated bidder are.
    - technical qualification,
    - completion time,
    - commercial terms of the offer

Preliminary Evaluations

- Preliminary Evaluations are made for Eligibility and Arithmetic Review requirements

Eligibility Requirements:

- Most often sited issues considered in eligibility requirements are:
  - Valid & Up to date Trade and Professional License,
  - Valid & Up to date Membership to Financier Organizations
  - Valid provision of Bid Security or Bond

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- Issues considered in eligibility requirements are:
  - Completeness and submittals of all required documents,
  - Turnover requirements fulfilled
  - Power of Attorney, Signature and Sealing Requirements, and
  - Appropriate Invitation, Packaging and Submission Requirements.
- These eligibility requirements together with basic alterations of the conditions of the tender will be considered for

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Arithmetic Review:

- Tenders are not arithmetic error free. Therefore, it is a formal evaluation process to review arithmetic before carrying out detail evaluations.

- Arithmetic review can be done if and only when financial proposals are opened.

Detail Evaluations

- Detail Evaluations include Technical, Commercial and Financial Qualification requirements.

Technical requirements:

- At this stage eligible bidders evidence of their ability to perform the services required by the employer is to be examined.(see per-qualification part)

Commercial Evaluation:

- This includes
  - Benefit Forgone due to Completion Time;
  - Additional Costs due to differences in Foreign Currency Exchange and Advance

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- **Benefit Forgone due to Completion Time:**
  - When tenders are offered with different completion times, comparisons are made to determine the benefit forgone taking into account the least acceptable completion time as a basis for competitions.
- **Additional cost due to**
  - **Foreign Currency Exchange requirements**
    - When tenders have provisions to quote different currencies, their comparison

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- **Advance Payment**
  - When different amounts of advance payment are requested as part of the tender offer, this does not give the same basis for evaluation. so that, there shall be the same basis for proof of competition
  - Therefore, the evaluation should take minimum advance payment request as a basis and consider others for additional cost incurred due to different mobilization advance requirements.

Award of contract

- After the offers are compared with the engineering estimates and the best offer selected a letter of acceptance is issued to the winner and required to submit the required performance prior to the signing of the contract
- Unsuccessful tenders will be informed about the final result of the bidding process and their tender security is returned

Types of work Contract

- In Construction Industry, the following eight contract types are so far practiced:

1. Lump Sum Contract,
2. Bill of Quantities or Unit Rate Contract,
3. Cost Plus Fixed Fee Contract,
4. Cost Plus Percentage of Cost Contract,
5. Item Rate or Schedule of Rates Contract,
6. Labor Contract,
7. Hybrid Contract, and
8. Special Contract

- **Lump Sum Contract:** When the Project or Tender price is determined and quoted as a total sum of money without individual ratings to execute the whole of the works and / or services according to the drawings and specifications, it is called a Lump Sum Contract. In such contracts:

- It is difficult to administer changes and amendments but experiences of similar projects are used as a basis to this effect,
- Works or services are checked based on the specifications, the conditions of contract or terms of reference and drawings if any for acceptance and closing of accounts, and
- Payments are agreed at different stages of works or services.

- A Lump Sum Contract is more suitable for works of smaller in size and where the contracting parties have

- **Bill of quantities contract or unit rate contract,**
- When the project or tender price is determined and quoted from unit rates assigned to detailed bill of quantities, it is called a **bill of quantity contract.** The bill of quantity includes short description of specifications, unit of measurement, quantities and columns for pricing the unit rate and its total amounts.
- **In such contracts:**

- It is relatively easy to administer changes and amendments because **actual and assigned quantities** can be compared,
- Works or services are checked based on the specifications, the conditions of contract or terms

- **Cost Plus Fixed Fee Contract:** When projects are fast – track and required to be completed expeditiously and where it is difficult to estimate the project cost before, the **project expenses called costs will be recorded** and a **fixed amount** which is agreed upon by the contracting parties will be added as payment to the contractor.
- A contract that stipulates to reimburse cost together with an additional fixed fee, it is called **a cost plus fixed fee contract.** Such a contract is desirable when the scope and nature of the work can at least be broadly defined and for important structures such as monumental buildings which are Time and Quality driven than Cost driven. **In such contracts:**

- The work is executed in the best interest of the owner with regard to the project quality and time,
- There is no way that the contractor can loose,
- Changes and Amendments can be accommodated amicably,
- The amount of the fixed fee is determined as a lump sum

- **Cost Plus Percentage of Cost Contract:** This type of contract is similar to the Cost plus fixed fee contract but its **fixed fee is made variable using a percentage of the cost** which is meant to **cover** the overhead and **profit costs** of the contractor. Contract Administration becomes intense in such type of contract in order to protect the interest of the owner. This is because the payment is made by determining **the actual cost of the work** plus a certain **percentage**. The disadvantage of such kind of contract is the tendency to increase the cost of the work to earn more profit by way of percentage of enhanced actual cost.
- **Item Rate or Schedules of Rates Contract:** A different form of fixed contract but priced **based on the unit rate** approach for **individual or groups of activities**, not the whole project. When accurate specifications and quantities of work or services could not be determined before executions, provisional quantities together with acceptable specifications can be included to determine Provisional sums using unit rates. This type of contract is Item Rate or Schedules of Rates Contract.
- **Labor Contract:** When the Project owner is responsible for the provision of **major resources such as materials and equipment** other than labor, small tools and equipment and

- **Special Contract:** As the name implies, in certain circumstances such as use of specializations, urgency, supplementary nature and continuity of services or works; remoteness and smallness of projects, etc requires special arrangements.

- **Discussion Points:**
  - Merits and Demerits of the different Contract Types

CHAPTER-THREE

Stake holder’s responsibility in construction projects

INTRODUCTION

- Definition
  - ✓ Can be defined as either individuals or units or the organization itself for which they claim a stake in the project such that they get benefit from or affected by the whole processes of the project and its deliverables.
  - ✓ In the construction context then, they are parties who will be interested in projects undertaken or products delivered by the industry.

MAJOR STAKEHOLDERS IN CONST. PROJECT

- The major stakeholders of the construction industry are the client who finance the projects, the contractors who implement the projects, **the consultants who design and supervise the works**, and the regulators who regulate how the industry and its actions functions.

- **Client/Employer:** Are the parties (public or private) under who finance the project is executed
  - ✓ Comes up with the investment needs such as project idea, land, capital etc.
  - ✓ Responsible for Project Scope Definition; Project Financing; Administration (Limited); Organization and Risk allocations
  - ✓ Usually provides the infrastructure needed
  - ✓ Takes care of some of the legal constraints & permits

EMPLOYER'S RESPONSIBILITIES

Right of Access to the Site

- The Employer shall give the Contractor right of access to, and possession of, all parts of the Site within the time (or times) stated in the Contract Data.

Permits, Licenses or Approvals

- The Employer shall provide, at the request of the Contractor, such reasonable assistance as to allow the Contractor to obtain properly
  a) copies of the Laws of the Country which are relevant to the Contract but are not readily available, and
  b) any permits, licenses or approvals required by the Laws of the Country

(2.3)Employer's Personnel and (2.4)Employer's Financial Arrangements

Refer FIDIC 1999/ harmonized FIDIC

CLIENT/EMPLOYER

- In Ethiopian context, the major public clients in the construction industry include ;
  - ✓ The Integrated Urban Housing Development Program Office (IUHDPO) under MoWUD,
  - ✓ The Ethiopian Road Authority (ERA),
  - ✓ The Ethiopian Electric Power Corporation (EEPCO),
  - ✓ The Ministry of Water Resources (MoWR),
  - ✓ The Defense Force, Ministry of Health, Ministry of Education, etc and their regional subsidiaries/equivalents.
  - ✓ Besides, the private sector also takes a huge stake as a client, particularly in the housing sector.

CONSULTANT/ENGINEER

- **Consultants**: are professional bodies who design the project
  - Change the clients project idea into economic and constructible artifact
  - Make sure that design satisfies requirements
  - [Usually] prepare BoQ and contract documents
- **If assigned to supervise:**
  - Look after proper execution of project
  - Administer the contract
  - Certify payment certificates
  - Issue provisional and final acceptance certificate etc.

ENGINEER AND ENGINEER'S REPRESENTATIVE

- **Definition**

✓ "Engineer" means the person appointed by the Employer to act as Engineer for the purposes of the Contract whose duties and autorities are listed below.

- **Engineer's Duties and Authority**

(a) The Engineer shall carry out the duties specified in the Contract.

(b) The Engineer may exercise the authority specified in or necessarily to be implied from the Contract, provided, however, that if the Engineer is required, under, the terms of his appointment by the Employer, to obtain the specific approval of the Employer before exercising any such authority, particulars of such requirements shall be set out in Part II of these Conditions. Provided further that any requisite approval shall be deemed to have been given by the Employer for any such authority exercised by the Engineer.

(c) Except as expressly stated in the Contract, the Engineer shall have no authority to relieve the Contractor of any of his obligations under the Contract.

ENGINEER AND ENGINEER'S REPRESENTATIVE

- "Engineer's Representative" means a person appointed from time to time by the Engineer under Sub-Clause 2.2
- Sub-Clause 2.2(**Engineer's Representative2.2)**
  - ✓ The Engineer's Representative shall be appointed by and be responsible to the Engineer and shall carry out such duties and exercise such authority as may be delegated to him by the Engineer under Sub-Clause 2.3

Engineer's Authority to Delegate his representatives

- The Engineer may from time to time delegate to the Engineer's Representative any of the duties and authorities vested in the Engineer and he may at any time revoke such delegation. Any such delegation or revocation shall be in writing and shall not take effect until a copy thereof has been delivered to the Employer and the Contractor.
- Any communication given by the Engineer's Representative to the Contractor in accordance with such delegation shall have the same effect as though it had been given by the Engineer.
- Provided that:

a) any failure of the Engineer's Representative to disapprove any work, materials or Plant shall not prejudice the authority of the Engineer to disapprove such work, materials or Plant and to give instructions for the rectification thereof, and

b) if the Contractor questions any communication of the Engineer's Representative he may refer the matter to the Engineer who shall confirm, reverse or vary the contents of such communication.

- The Engineer or the Engineer's Representative may appoint any number of persons to assist the Engineer's Representative in the carrying out of his duties under Sub-Clause 2.2.

ENGINEER AND ENGINEER'S REPRESENTATIVE

- Engineer to Act Impartially Wherever, under the Contract, the Engineer is required to exercise his discretion by:

(a) giving his decision, opinion or consent,

(b) expressing his satisfaction or approval,

(c) determining value, or

(d) otherwise taking action which may affect the rights and obligations of the Employer or the Contractor

he shall exercise such discretion impartially within the terms of the Contract and having regard to all the circumstances. Any such decision, opinion, consent, expression of satisfaction, or approval, determination of value or action may be opened up, reviewed or revised as provided in Clause 67(Settlement of Disputes).

ENGINEER AND ENGINEER'S REPRESENTATIVE

In general the main responsibility of the resident engineer (RE) include, among other things;

- To check and certify the contractors work program
- To certify the contractors method of carrying out the works
- To check that the works comply with the drawings
- To see that the requirements of the specifications in regard to materials and workmanship are adhered to
- To watch for faulty materials and workmanship
- To issue further instructions and clarifications if necessary
- To measure the amount of work done for payment purposes
- To keep a record of all works measurement
- To periodically report to the owner the progress of the works.

CONTRACTOR

- **Contactors:** are the parties that change the drawings and specification made by the consultants into a physical structure(“construction is physical realization of design”)
  - Prepares a bid document
  - Provides the resources needed to execute the project
  - Executes the project according to the specification and legal requirements
  - Monitors project execution
  - Rectifies defects

CONTRACTOR'S GENERAL RESPONSIBILITIES

Under general obligation sub clause 8.1;

- The Contractor shall, with due care and diligence, design (to the extent provided for by the Contract), execute and complete the Works and remedy any defects therein in accordance with the provisions of the Contract.
- The Contractor shall provide all superintendence, labour, materials, Plant, Contractor's Equipment and all other things, whether of a temporary or permanent nature, required in and for such design, execution, completion and remedying of any defects, so far as the necessity for providing the same is specified in or is reasonably to be inferred from the Contract.
- The Contractor shall give prompt notice to the Engineer, with a copy to the Employer, of any error, omission, fault or other defect in the design of or Specification for the Works which he discovers when reviewing the Contract or executing the Works.

CONTRACTOR'S GENERAL RESPONSIBILITIES

The contractor's right

- Within the exercise of the construction activities the contractor has rights and obligations that are specifically indicated in the contract documents. The inspector must therefore consider these rights of the contractor whenever involvement in site inspection is necessary.
- Such an action would necessitate the careful understanding and observance of the stipulations of the contract documents, including pre tender, tender documents, pre tender site visits minutes of meetings, memorandums of understanding signed during tender negotiations time, pre construction job site conference minutes, drawings, specifications, bill of quantities, addendum, soil investigation reports, standards specified in the contracts etc.

STATUTORY BODIES

- **Statutory bodies**: are government bodies that looks after the project's compliance with the general public's interest
  - Prepare a general development scheme and make sure that the project satisfies the specified requirements .
  - Look after the safety, legal, commercial etc issues associated with the project.
  - Look into the environmental, cultural and social effect that the project can cause,

.....CONTINUED

- In Ethiopia, the major statutory bodies involved in the construction industry includes:

- **Municipalities**: Bodies who are given the mandate to look after urban housing construction and its associated legalities;
- the **Ethiopian Road Authority**: Besides being a major client of the road sector by itself, the ERA is the party mandated to look after the road sector construction works;
- the **Ministry of Water Resources**; is the party mandated to overlook water sector development programs;
- the **Ministry of Works and Urban Development,** the party mandated to regulate and promulgate bylaws, codes, standards, etc meant to promote efficiency, transparency, accountability as well as growth in the industry**;** Etc

ASSIGNMENT

- Write down stake holders other than major stake holders discussed above with their respective role and responsibilities in construction industry.

CHAPTER-FOUR

Time control and monitoring



INTRODUCTION

- Scheduling is a mechanical process for laying out the various activities of a certain project or program along a time scale and in a proper sequence.

- In other words, scheduling is the preparation of a time table or an action plan which serves as a guide for the implementation of the activities and computation of resources required at different stages in time.

- Every construction projects are time bounded.
- Due to the above nature, based on the contract time delays results to penalties while early completion might earn rewards

- There may be many reasons both **foreseeable** and **unforeseeable**, for non-completion of a project on the intended completion time.

…CONT'D

- The absence of a project time plan almost makes certain that a project cannot be completed on schedule without incurring extra costs.

- Advantages of having a Construction plan/ Work program before the commencing the construction project is:
  - ✓ Formulating directions,
  - ✓ Optimum utilization and orderly arrangements of resources,
  - ✓ control of cost, progress and quality of executed work,
  - ✓ Controlling performance and motivating people

…CONT'D

- Planning requires an intimate knowledge of construction methods combined with the ability to visualize distinct work elements and to establish their mutual interdependencies.

- Construction planning is a fundamental and challenging activity in the management and execution of construction projects.

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

…CONT'D

- Construction planning consists of the following basic steps

  - ✓ Choice of technology and method of construction,
  - ✓ Definition of work tasks,
  - ✓ Creating logical relationship among individual tasks
  - ✓ Estimation of the required resources and durations for individual tasks, and

Project schedule

- The approved Master schedule, called the schedule baseline, is a component of the overall project plan.
- It provides the basis for measuring and reporting schedule performance.
- In PPA, the general conditions of contract Clause 29-32 has clear stipulation on project schedule (program)

TIME CONTROL (PPA)

- Clause 27.1
  - The Contractor shall submit the work program showing the general methods, arrangements, order, and timing for all the activities in the Works within the time stated in special condition of contract
- Clause 27.2
  - The work program shall be updated based on the progress of the work including any changes
- Clause 27.3
  - The contractor is responsible for updating the work program within the time stated in SCC

…CONT'D

- Clause 27.4
  - The Engineer's approval of the Program shall not alter the Contractor's obligations,
  - The Contractor may revise the Program and submit it to the Engineer again at any time.
  - A revised Program shall show the effect of Variations and Compensation Events.
- Clause 28, Extension of the intended completion date
- Clause 28.1
  - The Engineer shall extend the Intended Completion Date if a Compensation Event occurs or a Variation are issued

…CONT'D

- Clause 28.2
  - The Engineer shall decide whether and by how much to extend the Intended Completion Date within 21 days after recipt of the time extention claim.
  - If the Contractor has failed to give early warning of a delay or has failed to cooperate in dealing with a delay, the delay by this failure shall not be considered in assessing the new Intended Completion Date.

…CONT'D

- Clause 29, (Acceleration)
- Clause 29.1 and 29.2
  - ✓ When the Employer wants the Contractor to finish before the Intended Completion Date, the Engineer will obtain priced proposals for achieving the necessary acceleration from the Contractor
  - ✓ If the Employer accepts these proposals,
    1. the Intended Completion Date will be adjusted accordingly and confirmed by both the Employer and the Contractor.
    2. The new proposal will be incorporated in the Contract Price and it will be treated as a Variation.

…CONT'D

- Clause 30, (Delays ordered by the Engineer)
- Clause 30.1
  - The Engineer may instruct the Contractor to delay the start or progress of any activity within the Works.
- Clause 31, (Management Meetings)
- Clause 31.1
  - Either the Engineer or the Contractor may require the other to attend a Management meeting,
- Clause 31.2
  - The Engineer shall record the business of management meetings and provide copies of the record to those attending the meeting and to the Employer

…CONT'D

- Clause 32, (Early Warning)
- Clause 32.1
  - The Contractor shall warn the Engineer at the earliest opportunity of specific likely future events or circumstances that may adversely affect the quality of the work, increase the Contract Price or delay the execution of the Works.
  - The Engineer may require the Contractor to provide an estimate of the expected effect of the future event or circumstance on the Contract Price and Completion Date
- Clause 32.2
  - The Contractor shall cooperate with the Engineer in making and considering proposals for how the effect of such an event or circumstance can be

PERFORMANCE REPORTS

- Performance reports provide information on schedule performance such as which planned dates have been met and which have not. It may also alert the project team to issues which may cause problems in the future.

- Performance reporting involves collecting and disseminating performance information in order to provide stakeholders with information about how resources are being used to achieve project objectives.

CHANGE REQUESTS

- Change requisites may occur in many forms-oral or written, direct or indirect, externally or internally initiated, and legally mandated or optional. Changes may require extending the schedule or may allow accelerating it

CONSTRUCTION WORK PROGRESS RECORDINGS AND KEEPING DAIRIES

Site records

- Delay in construction projects are very common specially in countries like Ethiopia.
- This demand the follow up of the activities over a prolonged time.
- Therefore keeping accurate records plays a significant role, particularly when there is a tendency for varying the work.
- It is therefore become imperative to maintain accurate written site records, which include;
  - Work progress
  - Material quality for quality control
  - Weather data
  - Working hours
  - Any incidents
  - Material on sites
  - Labor and equipment deployed
  - Instructions issued (co-signed by all)

CONSTRUCTION WORK PROGRESS RECORDINGS AND KEEPING DAIRIES

- Maintain work progress
- Maintain a log sheet of materials delivered/used
- Maintain record of instructions, date given and to whom given
- Maintain record of variation orders given, date given and to whom given
- Keep record of measurements, co-signed
- Record details of works before covering up(ex. Foundations)
- Keep record of tests and relevant material data

CONSTRUCTION WORK PROGRESS RECORDINGS AND KEEPING DAIRIES

- The following items should also be a part of the construction administration record keeping

  - Field observations reports: follow-ups on all unresolved items
  - Shop drawings, samples, product data, checklist of all required submissions
  - Submittals: checklist of all required submittals correspondence
  - Payment requests, schedules of contract sum and time, change orders
  - Change orders and construction change directives
  - Drawings and revisions
  - Specifications and revisions
  - Status of requests for information's and requests for quotations
  - Memos on delay caused by weather, strikes, unavailability of materials, and other things.

REPORTS

- The purpose of the inspector's site visit is to become "**generally familiar**" with the progress and quality of the work and to determine if the work is being done in a manner which will yield results consistent with the contract documents.
- The supervisor is required to keep the owner informed of the progress and quality of the work.
- Most inspectors discharge this continuing obligations by sending the owner a written report of each site visit with a copy sent to the contractor.
- The report should be a complete record of the proceedings at the inspector's job site visit and should include;

REPORTS

- Date
- Time, duration
- Weather conditions
- Persons present
- Percentage of work completed by trade
- Work progress compared to schedule
- Work now being accomplished, work scheduled before next visit
- Questions raised by the contractor or owner
- Determinations made by the engineer
- Any questions or actions which remain pending for appropriate later attention.

…FORMATS

- ✓Site Diary
- ✓Progress report
- ✓Schedule

CHAPTER-FIVE

Cost control and monitoring

INTRODUCTION

- In countries like Ethiopia most construction projects didn’t completed with the estimated project cost because of the following reasons:
  - ✓ Variations due to request from either parties,
  - ✓ Delay,
  - ✓ Under estimated quantities,
  - ✓ Incompleteness of designs,
- The method of cost controlling in PPA has been defined from clause 37 up to 54 of General conditions of contract.

WORKS TO BE MEASURED ON SITE

Quantities 55.1

The quantities set out in the Bill of Quantities are the estimated quantities for the Works, and they are not to be taken as the actual and correct quantities of the Works to be executed by the Contractor in fulfilment of his obligations under the Contract.

Work to be Measured 56.1

The Engineer, shall except as otherwise stated, ascertain and determine by measurement the value of the Works in accordance with the Contract and the Contractor shall be paid that value in accordance with Clause 60. The Engineer shall, when he requires any part of the Works to be measured, give reasonable notice to the Contractor's authorised agent, who shall:

(a) forthwith attend or send a qualified representative to assist the Engineer in making such measurement, and

(b) ....

(b) Supply all particulars required by the Engineer.

- Should the Contractor not attend, or neglect or omit to send such representative, then the measurement made by the Engineer or approved by him shall be taken to be the correct measurement of such part of the Works.
- For the purpose of measuring such Permanent Works as are to be measured by records and drawings, the Engineer shall prepare records and drawings as the work proceeds and the Contractor, as and when called upon to do so in writing, shall, within 14 days, attend to examine and agree such records and drawings With the Engineer and shall sign the same when so agreed. ...

WORKS TO BE MEASURED ON SITE

- If the Contractor does not attend to examine and agree such records and drawings, they shall be taken to be correct. If, after examination of such records and drawings, the Contractor does not agree the same or does not sign the same as agreed, they shall nevertheless be taken to be correct, unless the Contractor, within 14 days of such examination, lodges with the Engineer notice of the respects in which such records and drawings are claimed by him to be incorrect. On receipt of such notice, the Engineer shall review the records and drawings and either confirm or vary them.

Method of Measurement57.1

- The Works shall be measured net, notwithstanding any general or local custom, except where otherwise provided for in the Contract.

CERTIFICATES AND PAYMENT

Monthly Statements60.1

- The Contractor shall submit to the Engineer after the end of each month six copies, each signed by the Contractor's representative approved by the Engineer in accordance with Sub-Clause 15.1, of a statement, in such form as the Engineer may from time to time prescribe, showing the amounts to which the Contractor Considers himself to be entitled up to the end of the month in respect of:

(a) The value of the permanent works executed,

(b) Any other items in the bill of quantities including those for contractor's equipment, temporary works, day works and the like,

(c) The percentage of the invoice value of listed materials, all as stated in the appendix to tender, and plant delivered by the contractor on the site for incorporation in the permanent works but not incorporated in such works,

(d) Adjustments under clause 70, and

(e) Any other sum to which the contractor may be entitled under the contract or otherwise.

CERTIFICATES AND PAYMENT

Monthly Payments60.2

- The Engineer shall, within 28 days of receiving such statement, deliver to the Employer an Interim Payment Certificate stating the amount of payment to the Contractor which the Engineer considers due and payable in respect of such statement, subject:

(a) firstly, to the retention of the amount calculated by applying the Percentage of Retention stated in the Appendix to Tender, to the amount to which the Contractor is entitled under paragraphs (a), (b), (c) and (e) of Sub-Clause 60.1 until the amount so retained reaches the Limit of Retention Money stated in the Appendix to Tender, and

(b) secondly, to the deduction, other than pursuant to Clause 47, of any sums which may have become due and payable by the Contractor to the Employer.

- Provided that the Engineer shall not be bound to certify any payment under this Sub Clause if the net amount thereof, after all retentions and deductions, would be less than the Minimum Amount of Interim Payment Certificates stated in the Appendix to Tender.

- Notwithstanding the terms of this Clause or any other Clause of the Contract no amount will be certified by the Engineer for payment until the performance security, if required under the Contract, has been provided by the Contractor and approved by the Employer.

CERTIFICATES AND PAYMENT

Correction of Certificates60.4

- The Engineer may by any Interim Payment Certificate make any correction or modification in any previous Interim Payment Certificate which shall have been issued by him and shall have authority, if any work is not being carried out to his satisfaction, to omit or reduce the value of such work in any Interim Payment Certificate

CERTIFICATES AND PAYMENT

Sample of payment certificate

and how to prepare ……

VARIATIONS

Alterations, Additions and Omissions

Variations51.1

- The Engineer shall make any variation of the form, quality or quantity of the Works or any part thereof that may, in his opinion, be necessary and for that purpose, or if for any other reason it shall, in his opinion, be appropriate, he shall have the authority to instruct the Contractor to do and the Contractor shall do any of the following:

(a) Increase or decrease the quantity of any work included in the contract,

(b) Omit any such work (but not if the omitted work is to be carried out by the employer or by another contractor),

(c) Change the character or quality or kind of any such work,

(d) Change the levels, lines, position and dimensions of any part of the works,

(e) Execute additional work of any kind necessary for the completion of the works, or

(f) Change any specified sequence or timing of construction of any part of the works.

- No such variation shall in any way vitiate or invalidate the Contract, but the effect, if any, of all such variations shall be valued in accordance with Clause 52. Provided that where the issue of an instruction to vary the Works is necessitated by some default of or breach of contract by the Contractor or for which he is responsible, any additional cost attributable to such default shall be borne by the Contractor.

VARIATIONS

Instructions for Variations51.2

- The contractor shall not make any such variation without an instruction of the engineer. Provided that no instruction shall be required for increase or decrease in the quantity of any work where such increase or decrease is not the result of an instruction given under this clause, but is the result of the quantities exceeding or being less than those stated in the bill of quantities.

Valuation ofVariations52.1

- All variations referred to in clause 51 and any additions to the contract price which are required to be determined in accordance with clause 52 (for the purposes of this clause referred to as “varied work”), shall be valued at the rates and prices set out in the contract if, in the opinion of the engineer, the same shall be applicable. **....**

VARIATIONS

- If the contract does not contain any rates or prices applicable to the varied work, the rates and prices in the contract shall be used as the basis for valuation so far as may be reasonable, failing which, after due consultation by the engineer with the employer and the contractor, suitable rates or prices shall be agreed upon between the engineer and the contractor.
- In the event of disagreement the engineer shall fix such rates or prices as are, in his opinion, appropriate and shall notify the contractor accordingly, with a copy to the employer. Until such time as rates or prices are agreed or fixed, the engineer shall determine provisional rates or prices to enable on-account payments to be included in certificates issued in accordance with clause 60.

How to order etc, sample.....

Thank you!