



CONSTRUCTION MANAGEMENT & SAFETY ENGINEERING

MODULE-1

Identify principles involved in construction
management and procedures for land acquisition

Management

- Management is an art of getting things done through and with the people in formally organized groups.
- It is an art of creating an environment in which people can perform and individuals and can co-operate towards attainment of group goal.
- Management process is a process of setting goals, planning and/or controlling the organizing and leading the execution of any type of activity.

Construction Management

Construction management is a professional service that provides a project's owner(s) with effective management of the project's schedule, cost, quality, safety, scope, and function.

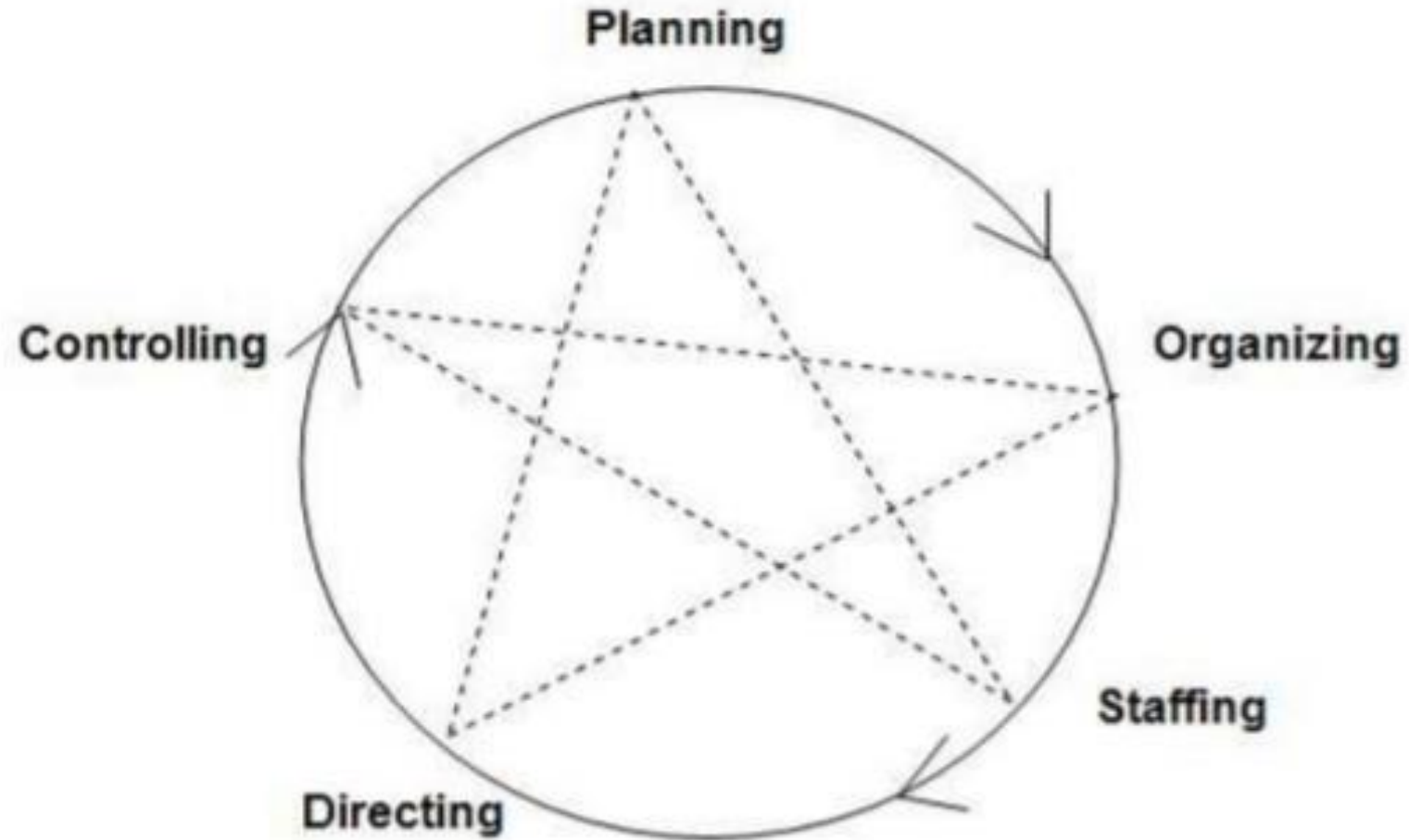
Construction Management is the overall planning, coordination and control of a project from inception to completion aimed at meeting a client's requirements in order to produce a functionally and financially viable project.

Why Construction Management is necessary?

- **It helps in Achieving Group Goals** - It arranges the factors of production, assembles and organizes the resources, integrates the resources in effective manner to achieve goals.
- **Optimum Utilization of Resources** - Management utilizes all the physical & human resources productively. It makes use of experts, professional and these services leads to use of their skills, knowledge, and proper utilization and avoids wastage.
- **Reduces Costs** - It gets maximum results through minimum input by proper planning and by using minimum input & getting maximum output. Management uses physical, human and financial resources in such a manner which results in best combination. This helps in cost reduction.
- **Establishes Sound Organization** - No overlapping of efforts (smooth and coordinated functions). Management fills up various positions with right persons, having right skills, training and qualification. All jobs should be cleared to everyone.
- **Essentials for Prosperity of Society** - Efficient management leads to better economical production which helps in turn to increase the welfare of people. Good management makes a difficult task easier by avoiding wastage of scarce resource.

Functions/Role of management

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Planning

- It is the basic function of management.
- It deals with overseeing a future course of action & deciding in advance the most appropriate course of actions for achievement of predetermined goals.
- Planning is deciding in advance - what to do, when to do & how to do.
- Planning is necessary to ensure proper utilization of human & nonhuman resources.

Organizing

- Organizing is concerned with decision of the total construction work into manageable departments/sections and systematically managing various operations by delegating specific tasks to individuals.

Staffing

- Staffing is the provision of right people to each section / department created for successful completion of a construction project.

Staffing functions includes

- -recruiting the right people
- -arranging staff training courses
- -carryout people staff assessment

Directing

- It is concerned with training sub ordinates to carryout assigned tasks, supervising their work and guiding their efforts. It also involves motivating staff to achieve desired results.

Controlling and Motivating

- It involves a constant review of the work plan to check on actual achievements and to discover and rectify deviation through appropriate corrective measures.

Co-ordinating

- It involves bringing together and coordinating the work of various departments and sections so as to have good communication. It is necessary for each section to aware of its role and the assistance to be expected from others

ELEMENTS OF A PROJECT

► Man/Manpower

- ❖ Owner: the owner is an individual or an organization for whom the project is to be build under a contract.
- ❖ Design professionals: they includes architects, design engineers and consultants. It is rule is to assist the owner in developing the projects scope, budget, estimates and prepare construction documents.
- ❖ Construction professionals: they are the parties responsible for consulting the project. The contractor is responsible for developing a complete project in accordance with the contract document.
- ❖ Project manager: individual charged with the overall coordination

► Material: such as bricks, stones, aggregate, cement, scaffolding etc..that are required for construction.

➤ Machinery

- ❖ They includes batching plant, mixer machines, trucks, generators etc. that are required for the smooth running of the construction projects.
- ❖ These equipment should be properly maintained.

➤ Money(fund)

- ❖ Adequate fund should be available for the smooth implementation of the project.
- ❖ All other resources are dependent on the availability of funds. Therefore financial resources should be well planned and managed while using.

Various Stages in Construction Project

- Idea Formulation Stage
- Investigation, Planning & Scheduling
- Tendering & Contracting
- Execution Phase
- Completion and handing over

Idea Formulation Stage

- Project conception is where the first ideas of a project are thought about before commencement into detailed design.
- This follows the search for the project's location and specification of the building codes involved.
- In this stage, it is crucial to involve an architect to ensure everything is feasible.
- Feasibility studies involve checking whether the proposed solutions are in alignment with the main objectives.
- After the project conception, the owner, architect, and construction manager move to the design stage.
- This gives a roadmap that highlights the purpose of the project and foreseeable hurdles.

Investigation, Planning & Scheduling

- The planning phase involves further development of the project in detail to meet the project's objective.
- The team identifies all of the work to be done.
- The project's tasks and resource requirements are identified, along with the strategy for producing them.
- In a broader sense identification of each activity as well as their resource allocation is also carried out.
- A project plan outlining the activities, tasks, dependencies, and timeframes is created.
- The project manager is the one who coordinates the preparation of a project budget by providing cost estimates for the labor, equipment, and materials costs.

Tendering & Contracting

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- Final preparation of the documents necessary for the bid package such as the drawings, specifications, general conditions, and bill of quantities.
- -All documents need to be closely reviewed by the construction manager and appropriate owner personnel to decrease conflicts, and changes.
- -With the contract documents are almost complete; a detailed and complete cost estimate for the project can be done.
- The project formally transits from design into construction.
- This stage begins with a public advertisement for all interested bidders or an invitation for specific bidders.
- -In fast-track projects, this phase overlaps with the design phase.
- -If the project is phased, each work package will be advertised and bid out individually.
- -It is very important stage to select highly qualified contractors. It is not wise to select the under-bid contractors.

Execution Phase

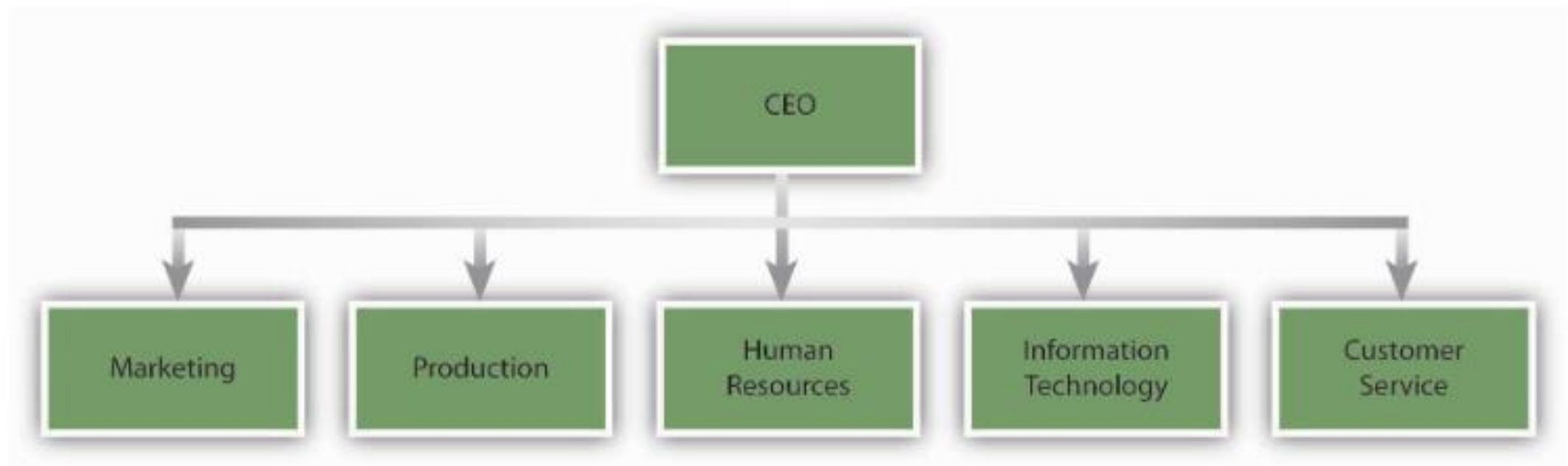
- The actual physical construction of the project stage.
- This stage takes the project from procurement through the final completion.
- It is the time where the bulk of the owner's funds will be spent.
- It is the outcome of all previous stages (i.e., good preparation means smooth construction).
- The consultant will be deployed for contract administration and construction supervision.
- Changes during construction may hinder the progress of the project.

Completion and handing over

- Transition from design and construction to the actual use of the constructed facility.
- In this stage, the management team must provide documentation, shop drawings, as-built drawings, and operation manuals to the owner organization.
- The as-built drawings are the original contract drawings adjusted to reflect all the changes that occurred.
- Assessment of the project team's performance is crucial in this stage for avoiding mistakes in the future.
- Actual activity costs and durations should be recorded and compared with that was planned. This updated costs and durations will serve as the basis for the estimating and scheduling of future projects.

ORGANIZATION

- **Organizational structure** refers to how individual and team work within an organization are coordinated.
- To achieve organizational goals and objectives, individual work needs to be coordinated and managed.
- Structure is a valuable tool in achieving coordination, as it specifies reporting relationships (who reports to whom), delineates formal communication channels, and describes how separate actions of individuals are linked together.
- Organizations can function within a number of different structures, each possessing distinct advantages and disadvantages.
- Although any structure that is not properly managed will be plagued with issues, some organizational models are better equipped for particular environments and tasks.



PRINCIPLES OF ORGANIZATION

1. Unity of Objectives.
2. Division of Work and Specialization.
3. Delegation of Authority.
4. Coordination.
5. Unity of Command.
6. Flexibility.
7. Simplicity.
8. Span of Control.
9. Authority and Responsibility.

Unity of Objectives

- Objectives of the enterprise influence the organization structure and hence the objectives of the enterprise should first be decided clearly and firmly.
- In addition, there should be unity among the objectives decided. This gives clear direction to the whole organization and it will be geared for the achievement of such objectives.
- The organization acts as a tool for achieving the objectives.

Division of Work and Specialization

- There should be proper delegation of authority in every organization, particularly in large organizations.
- The basic idea behind delegation is to see that decision-making power is placed at a proper place.
- Delegation should go to the lower levels of management.
- Everyone should be given authority, which is adequate to accomplish the task assigned to him.
- Delegation is useful for getting the things done through others.
- A successful manager normally does not perform the jobs by himself. He delegates the authority and responsibility to his subordinates.
- He also motivates his subordinates and sees that they take initiative, work efficiently and contribute for achieving organizational objectives.

Coordination

- Organization involves division of work and departmentation.
- This naturally suggests the need of proper coordination among the departments and efforts of people working in an organization.
- Due to coordination one clear-cut direction is given to people/departments, and efforts will not be wasted.

Unity of Command

- Unity of command principle suggests that each subordinate should have only one superior whose command he has to obey.
- Dual subordination is undesirable as it leads to confusion, disorder, uneasiness and indiscipline.
- An employee should not have more than one boss to whom he has to report and also function as per his orders and instructions.
- Reporting to more than one boss leads to confusion.

Flexibility

- According to the principle of flexibility, the organization structure should be flexible and not rigid.
- Such structure is adaptable to changing situations and permits expansion or replacement without any serious dislocation and disruption.
- There should be an in-built arrangement to facilitate growth and expansion of an enterprise.

Simplicity

- The organization structure should be simple for clear understanding of employees.
- The structure should be easy to manage.
- Internal communication will be easy due to simplicity of organization.
- The organization structure should be simple as far as possible.
- The levels of management should also be limited.

Span of Control

- The span of control, as far as possible, should be small and fair.
- This means a manager should not be asked to keep supervision on large number of subordinates.
- The span of control should be narrow and manageable.
- It should be properly balanced.

Authority and Responsibility

- Authority acts as a powerful tool by which a manager can achieve a desired objective.
- Authority of every manager should be clearly defined. Moreover, it should be adequate to discharge the responsibilities assigned.
- The superior should be held responsible for the acts of his subordinates.
- He cannot run away from the responsibility simply by delegating authority to his subordinates.

Central Government departments deals with construction projects

- Central Public Works Department (CPWD).
- Post and Telegraph Construction Department.
- Military engineering services (MES).
- National Thermal Power Corporation (NTPC)
- National Hydroelectric Power Corporation Limited (NHPC).
- Indian Railways - Construction and maintenance of permanent way buildings and other facilities.
- Bridge wing : Construction and maintenance of culverts, bridges tunnels etc.

State Government departments deals with construction projects

- Public Works Department.
- Irrigation Department (Major and Minor irrigation Development Corporation (IDC)).
- Public Health Engineering Department.
- Panchayat Raj Engineering department engineer ring wing.
- Roads and Buildings Department (R & B).
- State electricity board civil engineering.
- S.C. Corporation.
- Medical and Health Infrastructure (technical wing)

➤ 1. Individual Ownership:

- As the name suggests, such type of business is owned & operated by one person.
- This is the oldest and simplest form of business organization. The businessman invests capital, employs labor & machines. Stands owner alone
- enjoys the profits and suffers the losses in his business. Therefore, he is the supreme authority to decide into different matters concerning his business and has unlimited freedom of action within legal jurisdiction.
- Overall control in single hand helps him in quick decision efficient administration and working.
- Such organization owner himself is responsible for the liabilities.
- Hence the creditor can collect the money even from the personal property.

➤ 2. Partnership Organization:

➤ 3. Joint Stock Company:

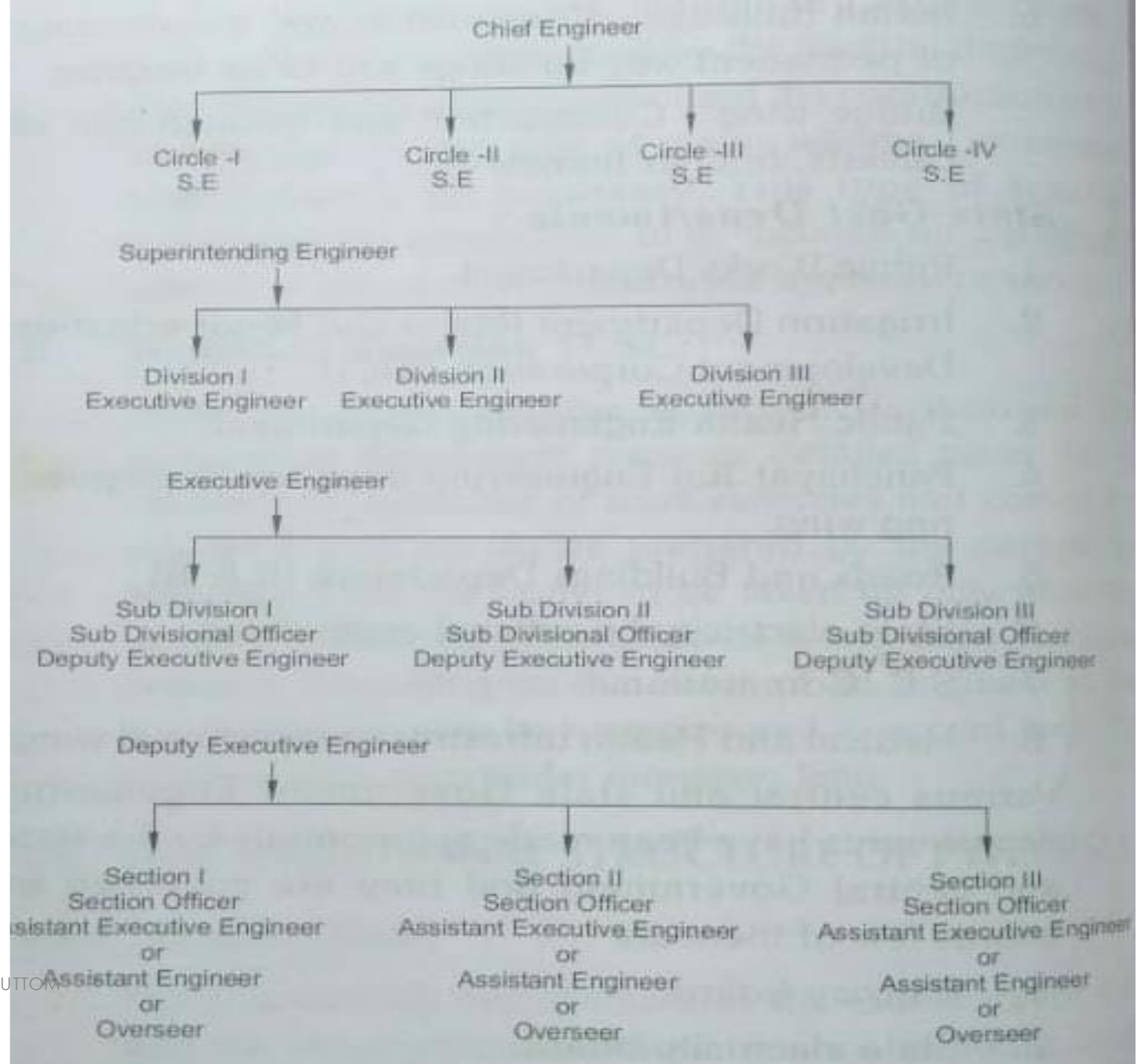
- Limited financial resources & heavy burden of risk involved in both of the previous forms of organization has led to the formation of joint stock companies these have limited dilutives.
- The capital is raised by selling shares of different values.
- Persons who purchase the shares are called shareholder.
- The managing body known as; Board of Directors; is responsible for policy making important financial & technical decisions. There are two main types of joint stock Companies.
- **Private limited company**
- **Public limited company**

B. Public Sector Organization

The Public Sector refers to all governmental organizations, including federal, state, and local governments. Public Sector Organizations focus on services to the general public, including education, welfare, legal systems, employment, natural resources and medical services.

- Public Sector Organizations are of three forms:
 - Departmental undertakings
 - Public corporations/statutory corporations
 - Government company

ORGANIZATION STRUCTURE OF P.W.D AND OTHER ENGINEERING DEPARTMENTS IN THE STATE:



- **Minister:** One minister of legislative assembly of the state may look after one engineering department or two.
- **Secretary:** Every department will have a secretary as IAS officer on behalf of the Government.
 - There may be number of chief Engineers to act as head of concerned engineering departments. He is responsible to the Government for all works in his jurisdiction.

Chief Engineer:

Each of the engineering departments has a chief engineer, who is the administrative head of the department and is responsible to the government. He manages to prepare annual budget estimation relating to the works under his control and administers the grants allotted. He control the expenditure and progress of works against the sanction grant. He prepares important scheme reports and gets the approval of the government. He also keeps a close watch on the expenditure of works and ensures that the sanctioned grant is completely utilized. He tours his entire Jurisdiction and inspects major works and solves the bottlenecks in the works. He is technically responsible for the sound ness of the schemes. Chief engineers are also appointed for major projects.

Superintending Engineer:

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1. He is responsible to the chief engineer for the following in respect of his circle.
2. Exercises financial control and execution of original and repair works.
3. Inspects the progress of works periodically.
4. Carries inspection of works under his jurisdiction. A report of such inspection is submitted to the chief engineer.
5. Responsible for finalising the schedule of rates do works in the region.
6. Exercises administrative control in respect recruitment, transfer and discipline of subordinates staff in his circle.
7. Keeps himself informed about the progress of work by conducting monthly meeting with executive engineers and contractors.

Executive Engineer:

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Each circle is divided into a number of divisions and each division is headed by an executive engineer. Executive Engineers are the king pins of engineering department.

1. He ensures that all the works in his division are covered by proper sanction and budget allotments are made.
2. He accords technical sanction for works with in his financial powers.
3. He has to approve the rates from items not covered by tender.
4. He should see that the works are carried as per plans and estimates with each deviation if any duty authorised by competent authority.
5. He has to maintain proper accounts for the expenditure incurred on works according to rules and regulations. In this task he is assisted by divisional accountant.
6. He has to prepare completion report for works and close the account for such works
7. He has to tour the division and inspect the works in progress.
8. He has to guide deputy executive engineers, Assistant executive engineers, Assistant engineers and overseers or supervisors.

9. He is also responsible for preparing plans, and estimates of schemes to be taken up in the future.

10. Checks the structural stability of all government building in his jurisdiction and provide, for repairs if necessary.

11. Utilizes the power of fixing rents for buildings required for Government offices.

12. Invites tenders and fixes the contracting agency with in the financial powers.

13. Checks measurement of work in some important cases.

DEPUTY EXECUTIVE ENGINEER:

Each division is divided into number of subdivisions and each subdivision is headed by the subdivisional officer or deputy executive engineer.

1. Arranges execution of works and completion of all original works in his subdivision.
2. Carries out regular checks of works in progress and ensures quality and quantity.
3. Ensures the execution of works according to plans designs and specifications.

4. Carries out check measurement on the measurements recorded by assistant executive engineer or assistant engineer or supervisor.
5. Carries out physical verification of all the measurement books in the subdivision periodically.
6. Maintain all building/roads or irrigation works and keeps relevant records as per the instruction of the executive engineer.
7. Reports to the executive engineer any unusual occurrence or damage to Government assets in his charge.
8. Collects rent or revenue for land or belonging to the department and from tree yielding fruits which have been auctioned.

Assistant Executive Engineer/Assistant Engineer/Section Officer:

Each subdivision is divided into number of sections and each section is headed by section officer, A.E.E or A E or Supervisor/ overseer.

1. The section officer is responsible for all the works in his section for execution.
2. He has to interpret the drawings and specifications to the field staff and ensure quality in construction
3. He has to maintain and make attendance of daily wage labourers on form known as nominal muster roll.
4. Measurement of works in his section in M.Book and prepare bills and send them to the D.E.E for approval.

Duties of an Overseer:

An overseer also called supervisor or a fore person performs a job title that entails providing instructions guidance and orders to junior employee. At the same time an overseer is held responsible for the work and actions his subordinates, overseers typically supervise factory, construction and other manual labour workers.

Agencies associated with Construction work:

- Owner
- Promoter
- Builder/Contractor
- Designer/Engineer
- Architects

Owner

- The person who owns the project and has full authority to control the whole project.
- Mainly involved in the process for supporting the financial matter for the construction project to go through easily. He has to pay for fees and charges associated with the work.
- He has to work together with architect and other consultants to achieve the goal of the construction project.

Architects

- Monitors the construction of the project to assure that construction is in accordance with the plans and specifications and approved by the owner and contractor.
- He has to engage in inspection and completion of the building process for the designing and supervising of the building work which the architect has full control of the proceedings.

Designer/Engineer

- Civil Engineers are responsible for foundations and general structures, with additional qualifications they become Structural Engineers who design the skeleton or structure of a building.
- Engineers want to ensure their designs satisfy given criteria; that they are safe, serviceable and perform well.
- Engineers will monitor the progress of a project and when work has begun, they should inspect the work and advise contractors.

Contractor

1. Project Planning Responsibilities

- Plan important project development and implementation in advance
- Determination and estimation of various issues
- Anticipation of any potential modification in the project
- Practicing excellent communication between all parties involved in the construction such as client and subcontractors

2. Project Management

- Manage the budget
- Find and hire right subcontractors and individuals
- Manage generated waste
- Submit bills based on terms of contract documents

3. Project Monitoring

- Monitor project in terms of time schedule, safety, work quality, and other project-related details as specified in the project contract
- Review, modify, and update the project programme dependent on latest changes and feedback
- Practice economic construction techniques
- Monitoring safety related issues

4. Legal and Regulatory Responsibilities

- Contractor is responsible for building permits application
- Ensure that the project is in compliance with required legal and regulatory issues
- Making sure the project is in compliance with all the necessary legal and regulatory issues

5. Health and Safety Responsibilities

- Guarantee viable safety policy to ensure health and safety in the workplace. This may involve risk management strategies, emergency response system, and other preventive means for construction site safety.
- Make sure that all individual at construction site utilize safety equipment.
- Provide safety awareness to workers.

Role of consultant in construction project

Consultation

- Consultation is the situation which arise when a person needs and an opinion regarding a technical engineering problem from an expert civil engineering consultant.
- This may be requiring varied amount of time depending upon the critical nature of the problem.
- The duration of consultation may be brief or may be extended to some duration or may require considerable travel to the site.

Investigation of Problem

- The construction consultant needs to study the problem over the field which might involve some amount engineering calculations and where as some consultants may also require pay visit to the site and inspect the structure and the equipment over the construction site.
- Consultants also need to review the reports and investigation prepared by client's management and engineers.

Feasibility reports

- These reports play a crucial role in determining the feasibility of the project after obtain the results of survey and engineering studies performed over the site.
- These reports are also necessary in order to confirm the engineering solution adopted to confirm with the economic feasibility of the structure.
- The aspects considered in the feasibility report are the requirements and the special needs of the project, estimated construction cost, alternate solution and expert recommendation and conclusions.

Engineering design

- This aspect includes the dimensions and physical characteristics of the structure to be constructed.
- The dimensions of the structure are presented in the form of drawing which in laymen terms are refereed as blueprint. These blueprint are supplemented with along with written documents, commonly known as specifications.
- Plans and specifications are curatively studied by consultant in order to direct the contractor regarding the work expected from him. The design process is also helpful in preparing the list of the materials to be procured often known as bill of quantizes to initiate the construction process.

Construction Supervision

- Consultant has to keep a keen eye over the construction which is primarily bifurcated into two parts as of general supervision and resident supervision:

- **General supervision**

- Timely and periodic visit to the site
- Consultation and guidance to client/owner
- Interpretation plan drawings and specification
- Checking the authenticity of drawing and data provided
- Processing and estimating contractor progress and further payments
- Guiding in amendments to contractors contract
- Final inspection and validation of project
- Preparation of "as-built" drawings

- **Resident supervision**

- This aspect of supervision requires the consulting engineer to send a representative or an engineer to the site of the project.
- The resident engineer over the site takes care of detailed inspection of the structure being constructed as per specifications and plans.

Detailed Project Report

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- A detailed project report is a comprehensive document that outlines all aspects of a construction project, from its objectives and scope to its budget and timeline.
- It provides a roadmap for the project team to follow, ensuring that everyone is on the same page and working towards the same goals.
- The purpose of a detailed project report is to minimize risks and ensure project success.
- By providing a clear plan and outlining potential challenges, the report helps project managers make informed decisions and take proactive measures to mitigate any issues that may arise.
- It also serves as a communication tool, keeping stakeholders informed and involved throughout the project lifecycle.

- It can help minimize costs and delays.
- By providing accurate and timely information about the project, these reports can help identify areas where resources are being wasted or where changes need to be made.
- This can help prevent costly mistakes and delays, ultimately leading to a more successful project outcome.

Detailed Project Plan and Schedule

- The detailed project plan and schedule is the backbone of any construction project.
- It outlines all the activities, milestones, and timelines for the project, ensuring that everyone involved is on the same page.
- The plan should be structured and organized, with clear headings and subheadings for each section.
- The project plan should include a breakdown of all the tasks required to complete the project, along with their estimated durations.
- This will help in identifying potential bottlenecks and delays, allowing for proactive measures to be taken.
- Additionally, the plan should also include contingency plans for unforeseen circumstances, ensuring that the project stays on track even in the face of challenges.

Preparation of Detailed Project Report

Every project should accompany an estimate describing the various feature of the work.

The report is usually given at the beginning of the estimate followed by layout plan designs and calculations; general and detailed specifications, analysis of rates, material statement and detailed estimate. The plans and detailed drawings are enclosed at the end. Report should cover the following main points.

- a) Brief history with reference to the proposed project.
- b) Object, necessity and utility of the projects with reasons.
- c) Nature of soil, subsoil conditions, topography of the land.
- d) Climatic conditions of the locality.
- e) Required equipment to carry out the works.
- f) Approach roads, position of existing roads and availability of other facilities such power water sources etc.
- g) Labour available and their skill level.
- h) Availability of construction materials and their
- i) Cost benefit ratio.
- j) Method of execution of work and time required to complete the project
- k) Labour amenities, temporary accommodation for staff etc.

Monitoring of Construction work??

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- Ensuring that the project stays on track and meets all necessary standards.
- Small issues can quickly escalate into major problems that can delay the project or even lead to safety hazards.
- Can identify potential issues early on and take corrective action before they become more serious.
- Effective communication between all parties involved in the project is essential, any issues or concerns are addressed in a timely manner.
- Daily log is used to record all activities that take place on the site, including work completed, materials used, and any issues or challenges that arise.
- The daily log provides a detailed record of progress and can be used to identify areas where improvements can be made.
- Checklist and punch list is used to track progress and ensure that all tasks are completed to a high standard.

CONSTRUCTION DISPUTES

- Construction disputes arise as a result of disagreements between the parties involved in a contract.
- These disputes themselves are not a breach of contract, but they may lead to a breach of contract, termination, or even claims threatening the contractor's surety bonds if unmitigated.
- Parties in a contract, therefore, need to take the necessary steps to reduce the possibility of disputes arising for parties in a contract.

Types of construction disputes

➤ CHANGE OF FINISH DATE

- A change in the finish date may lead to increased project costs. Contractors may incur **additional fees from idle labor** or equipment.
- Rental charges of equipment may accrue even though the equipment is lying idle.
- Supervisors and workers may also be idle, leading to unrecoverable costs.
- Therefore, these changes in finishing dates put a lot of pressure on contractors and may even affect their other projects. This will result in a **considerable loss in profit**.

➤ DELAYS

- When delays occur, the party responsible should issue a notice in writing, letter, or electronic mail.
- The written notices clarify and pass on complete information to all the involved project stakeholders.
- Delays bring about disputes as to who should bear the responsibility for them.
- Most construction contracts deal with delays by extending the time of completion.
- The owner can keep the rights to recover the damages from the delays from the contractor.

➤ DESIGN

- Mistakes in design can also lead to additional costs, which become the cause of delays.
- There is no planning sequence followed for the release of design information, which impacts construction.

➤ GOALS

- Subcontracted firms engaged in large construction contracts may employ a lot of personnel.
- Each of these firms may have its own goals and commitments that are not compatible with the goals of other key players in the project. As expected, this may lead to disputes.

➤ QUALITY OF MATERIALS

- Sometimes disputes may come up as a result of the **quality of materials** used.
- Specifications may be vague on the conflicts, and each party may have different views on whether the quality is in accordance to contract specifications.
- The parties may have different opinions as to whether the quality and craft are sufficient. This can lead to additional contract costs that may lead to many costly disputes if left unresolved.

➤ DIFFICULT PROJECTS

- The project stakeholders may need to carry out proper **risk management** before a project commences, and more often than not, this is not done.
- Projects take longer than planned if there is insufficient accounting of possible risks associated with a project's complexity.
- The delays and claims remove the owner's rights to claim for delays or damages.

SETTLEMENT OF DISPUTES

- There are primarily four main methods in resolving contractual construction disputes,
- **NEGOTIATION**
 - Usually, negotiation is the first part of dispute resolution.
 - Negotiation is when the parties in dispute try to reach amicable conclusions between themselves before moving further to other means of dispute resolution.
 - It is the easiest, least expensive, and could yield the most immediate productive results.
 - If it does not deliver results, it at least maps out the actual points of disagreement so that the parties know where they stand.

➤ **MEDIATION**

- Mediation is when the parties in dispute involve a neutral third party to help in resolving the dispute.
- Mediation is not a legally binding method of conflict resolution but is one of the most effective ways to get out of a situation before it worsens.
- The parties attempt to reach a just resolution outside the court before moving to other means.

➤ **ARBITRATION**

- Arbitration is the method contractors and lawyers prefer when it comes to dispute resolution.
- Most contractors list it as the way to address disputes in contractual terms.
- If the parties opt for arbitration, they must choose a neutral third party with the relevant experience to bring them to an amicable solution.
- Unlike in mediation, the arbitrator gives the final verdict to the conflict, whereas in mediation, the mediator only assists the parties to conclude.
- The costs of arbitration are significantly higher, and the decisions are legally binding in some jurisdictions.

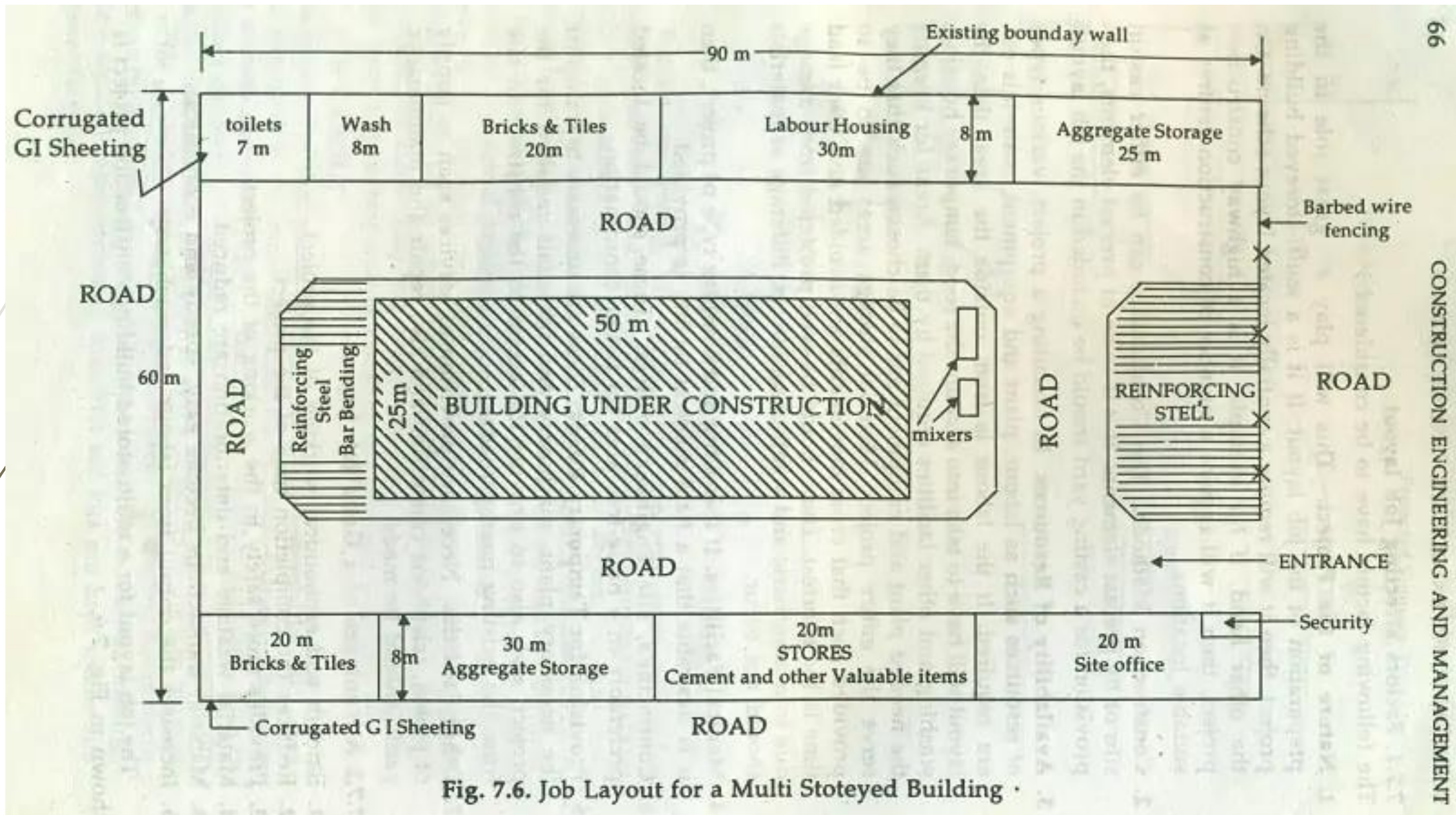
➤ LITIGATION

- Litigation involves trials that are enforceable and legally binding.
- It is the most thorough, complex, and costly dispute resolution process. It is also very slow, so most parties opt for other dispute resolution processes instead.

Site Layout Or Job Layout At Building Site

- Site layout is the plan of the construction site.
- It shows the area and the exact location for placing the resources required in the work.
- It also indicates the place for offices, godowns, workshops, accommodation etc.
- It shows the existing relationship of the site with its surrounding in respect of communication, approaches and existing facilities.

- A systematic and scientifically prepared site layout is necessary to
 - 1. Get a continuous supply of materials in sufficient amount.
 - 2. Have an easy access to material and to check its wastage and deterioration.
 - 3. Decrease the number of plants and reduce the movement of heavy equipment.
 - 4. Avoid confusion and reduce accidents.
 - 5. Have a tidy outlook to facilitate the inspection of the materials.



- The layout satisfying maximum of these conditions increases efficiency and thus productivity. Such a layout is known as optimum layout. The site layout depends very largely on the following factors.
 - 1. Location of the site.
 - 2. Availability of space.
 - 3. Access to the site.
 - 4. Material bulk.
 - 5. Type of equipment to be used.
 - 6. Ground conditions.

Principles of Job Layout:

The following are the principles of job layout. They promote economy, efficiency tidiness and safety.

- 1. The site should have preferably two openings, one for entry and the other for exit. It promotes flow of traffic. If there is only one gate then it is preferable to provide a cross-over near the gate.
- 2. The general office should be located near the main gate. This avoids confusion at construction site.
- 3. The godown should be located just behind the general office. It facilitates delivery of the material to be stored in it. It also permits a closer supervision of the stores.

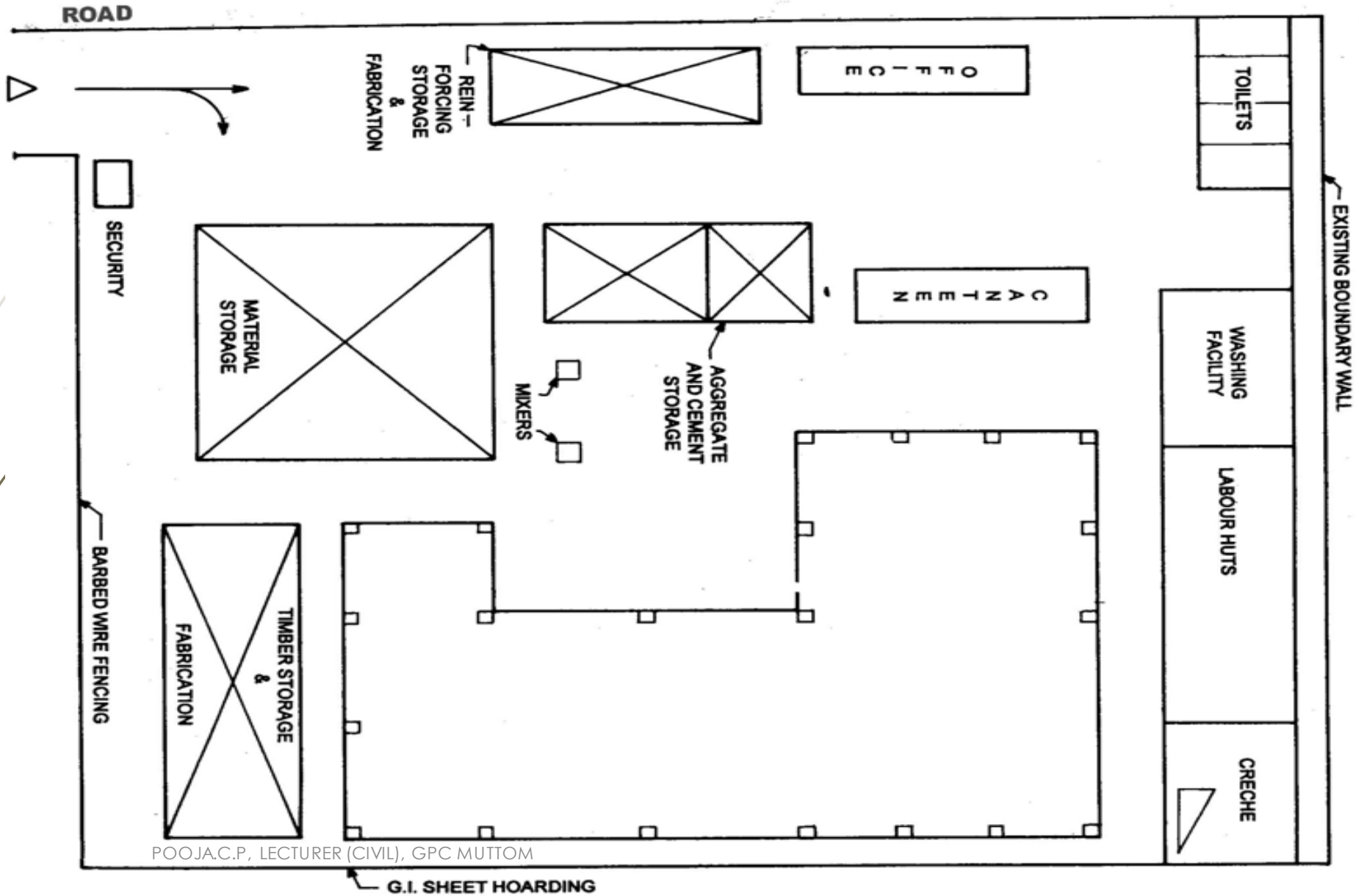
- 4. Temporary roads may be constructed around the operation area. It promotes the flow of material and movement of equipment. In fact, if such roads are required to be constructed in the project, it is better to construct them first so that these can be used during the construction proper.
- 5. The workshops for joiner, fitter, electrician etc should be decided and located by balancing easy and short access routes.
- 6. Staff accommodation should be away from noise. It should be concentrated in one area to promote communication and reduce the cost of facilities and services.
- 7. The existing services should be used to the maximum extent.

Preparation of job layout

- ▶ The first duty of a site engineer is to prepare a job layout.
- ▶ The construction plans, specifications, contract documents are carefully studied to get an idea of the nature and extent of the work.
- ▶ A drawing drawn to scale is then prepared showing the out lines of the jobs to be constructed.
- ▶ The entry and exit points, areas to be used for various temporary facilities, such as office, repair sheds, reinforcement structural fabrication, carpentry and form work fabrication, material stacks, and personal facilities such as toilets, canteen, labour huts, drinking water supply, first aid measures and other essential requirements for construction purposes are marked on the drawing

- ▶ When deciding the layout of equipment, the following points should be kept in mind.
 - The equipment should be placed near the material it utilizes.
 - For costly equipment, temporary sheds should be provided.
 - Provision should be made for repair and maintenance work.
 - Adequate parking space should be provided for equipment.
 - The main office should be located near the entrance so that visitors on business need not have to go across the work site.

- ▶ The location of security checkpoints should be such that no materials could pass in or out without proper check.
- ▶ Fire prevention equipment and safety measures should be provided in the layout.



Land acquisition process for public construction

- The government can acquire private land for the purpose of public work. This is called land acquisition.
- Land Acquisition is simply the process by which the Government can acquire private land. This may include any other private property.
- It is usually done for the purpose of public work building infrastructure, urbanisation, development and industrialisation.
- Government can also acquire land for private firms for setting up factories or other industrial setups.
- Purchase of land is a contract between willing buyer and willing seller, while in case of land Acquisition the land owner has no choice. This is the reason right to property is not a fundamental right.

The state can do anything in public interest. It is based on two latin political concepts

- - Welfare of public is paramount
- - Public necessity is greater than private necessity

Land Acquisition in India occurs in three ways

- - Acquisition through Land Acquisition Act 2013
- - Through various other Acts
- - Through negotiation

Land Acquisition Act 2013

- - No consent from owners is required for land acquired for public purposes.
- - Consent from 80% of affected families is required for land acquired for private companies and from 70% for private-public projects.
- - The act requires Social Impact Assessment to be done before acquiring any land. SIA will assess if potential benefits would outweigh the social cost.
- - The owners will have to be compensated for the land and have to be rehabilitated and resettled if needed.
- - There is an urgency clause in case of national defence and natural disasters
- - The act forbids land acquisition when the land is a multi crop irrigated area.
- - If the land is not used in five years it returns to the owners

Compensation, Relief and Rehabilitation aspects of the law:

- - For rural areas - 4 times the market value of land acquired
- - For urban areas - 2 times the market value
- - People whose livelihood is dependent on these lands have to be paid a one time payment apart from other compensations
- - Provision of employment to one member of affected family
- - In case of land acquired for private companies, the said company will be responsible for relief and rehabilitation.
- - If fertile land, the govt will have to develop an equal size of wasteland for agricultural purposes.
- - If people live there, they have to be resettled.
- - Special provisions for SC/ST

Process of Land acquisition as per the Land Acquisition Act 2013:

- - SIA done in consultation with respective local government
- - SIA is accessed by state government
- - After approval, a public notification is published in official gazette and 2 local newspapers
- - 60 days are given for people to raise objection
- - Land survey is done along with relief and rehabilitation assessment
- - Land is marked, measured and planned
- - Claims regarding acquisition and relief and rehabilitation are dealt with
- - Govt takes the possession of land