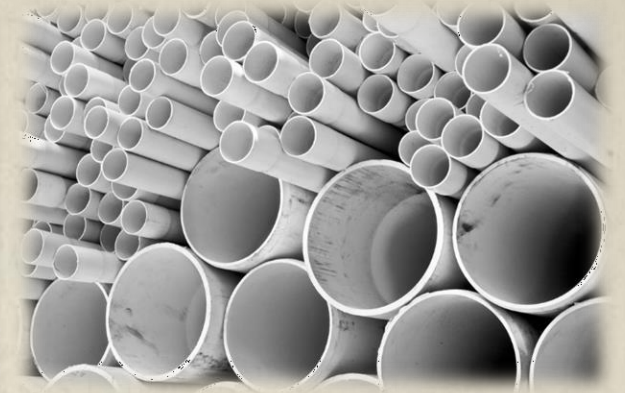


# CONSTRUCTION MATERIAL MANAGEMENT



Tishk International University, Interior Design Department

# CONTENTS

- Introduction
  - Aim Of Material Management
  - Components Of Material Management
  - Planning
  - Purchasing
  - Receiving & Accepting Goods
  - Root Causes of Ineffective Material Management
  - The Proposed Materials Management System
  - Conclusion
-

# INTRODUCTION

- MM has been defined as the management system for **planning** and **controlling** all necessary efforts to make certain that the **right quality** and **quantity** of **materials** are specified in a timely manner, are obtained at a **reasonable cost** and are available **when needed** (see Bell and Stukart, (1985)).
- MM is an important function in order to improve **productivity** in construction projects.
- The materials management system attempts to insure that the right quality and quantity of materials are appropriately **selected**, **purchased**, **delivered** and **handled** on site in a timely manner and at a reasonable cost.
- Dawood (1994) states that materials can constitute over 50% of the cost of a project,.



To get

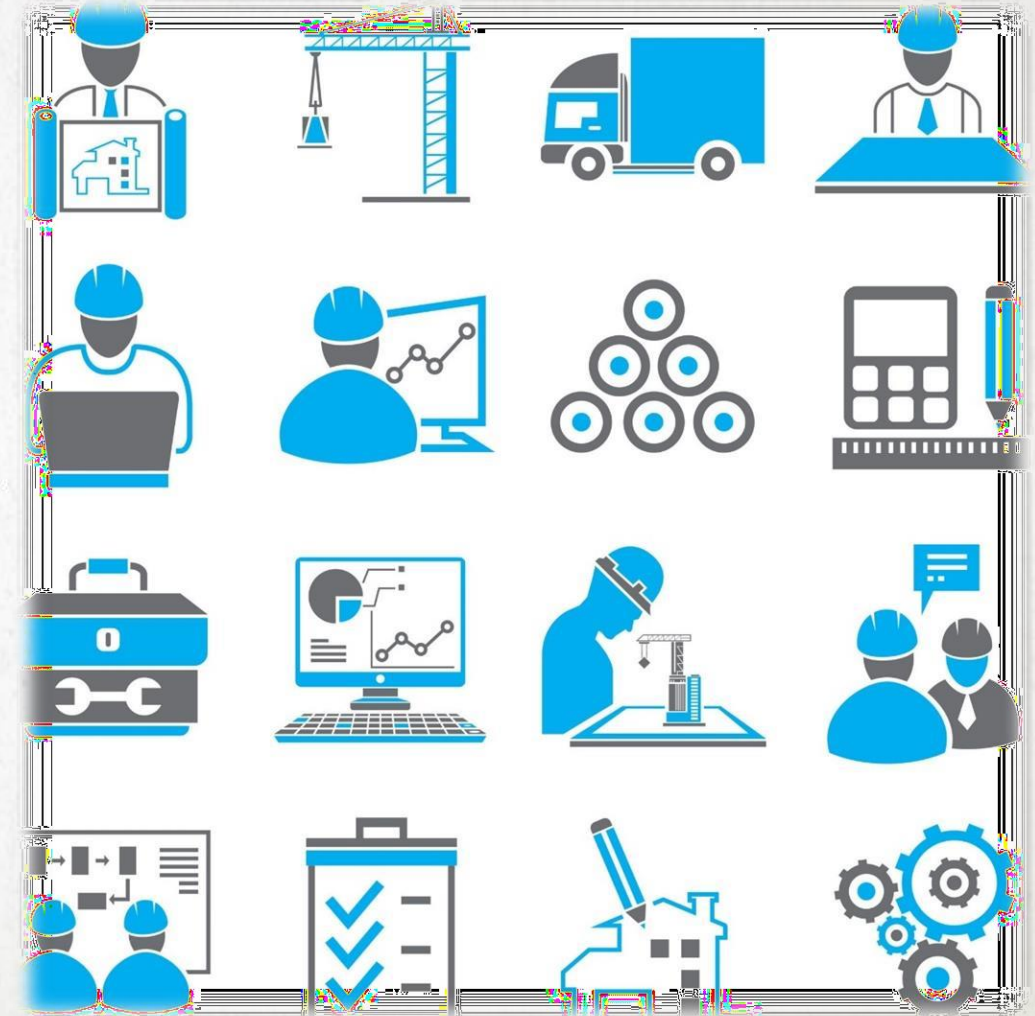
- The Right quality
- Right quantity
- At the Right time
- At the Right place
- For the Right cost

## AIM OF MATERIAL MANAGEMENT



# COMPONENTS OF MATERIAL MANAGEMENT ARE:

- Material estimation, budgeting, planning and programming.
- Scheduling , purchasing and procurement
- Receiving and inspection.
- Inventory control, storage and warehousing
- Material handling and transport
- Waste management



# Classification of Construction Material

Material Type	Details	Example
<b>Bulk materials</b>	Materials that are delivered in mass and are deposited in a container.	Sand,Gravel,Topsoil,Cement, Concrete
<b>Bagged materials</b>	Materials delivered in bags for ease of handling and controlled use.	Cement
<b>Palleted materials</b>	Bagged materials that are placed in pallets for delivery	Cement, Doors
<b>Packaged materials</b>	Materials that are packaged together to prevent damage during transportation and deterioration when they are stored.	Pipes,Tiles,Electrical Fitting

# PLANNING

- Materials planning include measuring, ordering and scheduling.
- The most commonly used basis for planning things out for the project is the **BOQ** prepared by the client.
- Adopting a good material management plan can **increase productivity** and **profit**. (Kasim, et al., 2005).



# PURCHASING





- Purchasing, simply is the “*process of buying*”.
- Obtaining the **right** material, in the **right** quantities, with the **right** delivery (time and place), from the **right** source, and at the **right** price are all purchasing functions.
- The purchasing department has the major responsibility for **locating suitable sources** of supply and for negotiating prices.
- Purchase the materials and have the **services** from **supplier** to get the support of operations as the construction project from production to marketing, sales and logistics. For examples, a detailed material list and coordination of the purchasing and order of material are significant to assuring the material will available on construction site.

## CONT...

According to Ninad Shah and Manish Dave Purchasing procedure can be described as below:

**Step 1:** Material Indent

**Step 2:** Enquiry to Vendors

**Step 3:** Vendor Comparison

**Step 4:** Vendor Selection and Negotiations

**Step 5:** Purchase Order

**Step 6:** Vendor Evaluation



# PURCHASING OBJECTIVES

- Obtaining goods and services of the **required** quantity and quality.
- Obtaining goods and services at the **lowest cost**.
- Determining **purchasing specifications**: right quality, right quantity, and right delivery (time and place).
- Selecting supplier (right source).
- Negotiating terms and conditions of purchase (right price).
- Issuing and administration of purchase orders.

# PROCUREMENT

- Procurement is not only about **appointing contractors** and **preparing contract**, but is also very much a starting point in the process of delivery (Mead & Gruneberg, 2013).
- Another author has defined procurement as **identifying** and **analysing** user requirements and type **of purchase**, **selecting suppliers**, **negotiating contracts**, acting as liaison between the supplier and the user, and evaluating and forging strategic alliances with suppliers.
- Many authors have suggested that choosing best option of procurement can help to **reduce** the impact of **uncertainties** such as **late deliveries**, **substandard raw material qualities**, **resource constraints** and so on (Morris & Pinto, 2007).

# PURCHASING CYCLE

1. Receiving and analyzing purchase requisitions.
2. Selecting suppliers. Finding potential suppliers, issuing requests for quotations, receiving and analyzing quotations, and selecting the right supplier.
3. Determining the right price.
4. Issuing purchase orders.
5. Following up to ensure delivery dates are met.
6. Receiving and accepting goods.
7. Approving supplier's invoice for payment.



# RECEIVING AND ANALYZING PURCHASE REQUISITION

- Identity of originator, signed approval, and account to which cost is assigned.
- Material specification.
- Quantity and unit of measure.
- Required delivery date and place.
- Any other supplemental information needed.

# SELECTING SUPPLIERS

- Identifying and selecting suppliers are important responsibilities of the **purchasing department**. For routine items or those that have not been purchased before, **a list of approved suppliers** is kept. If the item has not been purchased before or there is no acceptable supplier on file, a search must be made. If the order is of small value or for standard items, a supplier can probably be found on the Internet, in a catalogue, trade journal, or directory.



# DETERMINING THE RIGHT PRICE.

- This is the responsibility of the purchasing department and is closely tied to the selection of suppliers. The purchasing department is also responsible for price negotiation and will try to obtain the best price from the supplier.





# ISSUING A PURCHASE ORDER

- A purchase order is a **legal offer** to purchase. Once accepted by the supplier, it becomes a **legal contract** for **delivery** of the goods according to the terms and conditions specified in the **purchase agreement**. The purchase order is prepared from the **purchase requisition** or the **quotations** and from any other additional information needed. **A copy is sent to the supplier**; copies are retained by purchasing and are also sent to other departments such as **accounting**, the originating department, and receiving.

Purchase Order

Purchase Order No. \_\_\_\_\_

Name \_\_\_\_\_ To \_\_\_\_\_

Street Address \_\_\_\_\_ Vendor Code \_\_\_\_\_

City, State \_\_\_\_\_

PO Date \_\_\_\_\_

# ORDERING

- How much should be ordered at one time?
- When should an order be placed?
- Lot-for-lot: The lot-for-lot rule says to order **exactly** what is needed, **no more, no less**.
- Fixed-order quantity. Fixed-order quantity rules specify the number of units to be ordered each time an order is placed for an individual item or SKU. The quantity is usually arbitrary, such as 200 units at a time.



VENDOR:

MAIL INVOICE TO:  
 HENRY C. BECK COMPANY  
 1210 S. Old Dixie Highway  
 Jupiter, Florida 33458

DATE:

CHG. TO JOB # 21330 \_\_\_\_\_

SHIP TO: 1210 S. Old Dixie Highway / Jupiter, Florida 33458

QUANTITY	ARTICLE	U.P.	AMOUNT	COST CODE

STATE AND LOCAL SALES TAXES MUST BE SET OUT SEPARATELY ON INVOICE

Invoice in Triplicate

To Above Address

No Later Than 25th of Month — Vendor's Acceptance (when required)

Show S.P.O. Number On Invoice

WHITE (ORIGINAL) - VENDOR'S COPY

CANARY

-JOB OFFICE COPY

(MAIL TO DALLAS WITH INVOICE)

SUPT. OR PROJECT MGR.

PINK - SUPERINTENDENT'S COPY

GOLDENROD - PROJECT MANAGER'S COPY

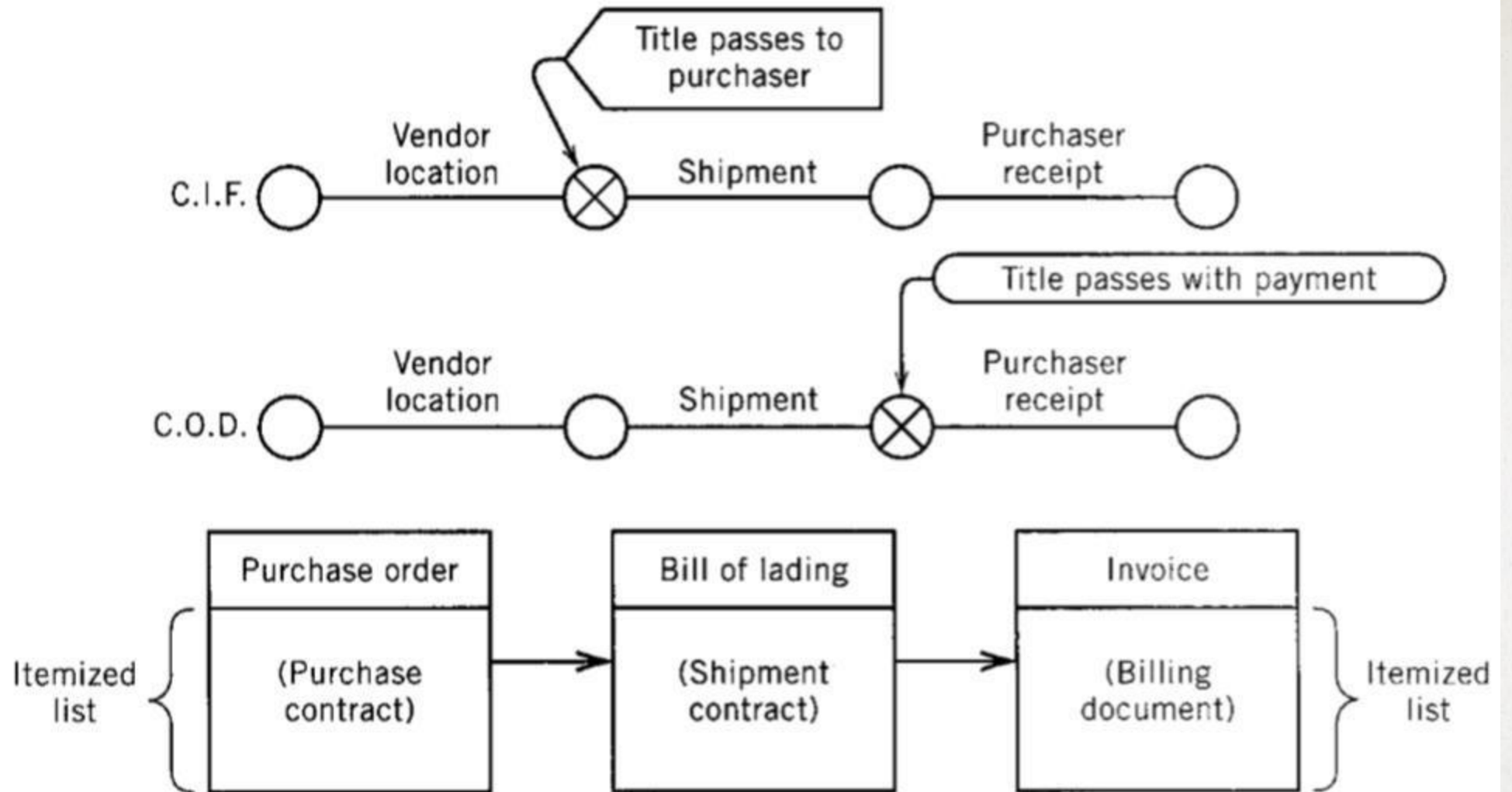
Figure 18.3 Field purchase order (Courtesy of Henry C. Beck Co.).

EXAMPLE

## CONT...

Regardless of the complexity of the transaction, certain basic elements are present in any purchase order. Five items can be identified as follows:

1. Quantity or number of items required.
2. Item description. This may be a standard description and stock number from a catalog or a complex set of drawings and specifications.
3. Unit price.
4. Special instructions.
5. Signatures of agents empowered to enter into a contractual agreement.



**Figure 18.5** Procurement documents and title transfer sequence.

# APPROVAL PROCESS

- Approved.
- Approved with noted corrections; no return submittal needed.
- Approved with noted corrections; however, a final submittal is required.
- Not approved; resubmit.

# FOLLOWING UP AND DELIVERY

- The supplier is responsible for **delivering** the items ordered **on time**.
- The purchasing department is responsible for **ensuring** that suppliers do **deliver on time**. If there is doubt that delivery dates can be met, purchasing must find out in time to take corrective action. This might involve expediting

# RECEIVING AND ACCEPTING GOODS

- When the goods are received, the receiving department **inspects** the goods to be sure the **correct ones** have been sent, are in the **right quantity**, and have **not been damaged** in transit.
- the receiving department then **accepts the goods** and writes up a receiving report noting any variance.
- If further inspection is required, such as by **quality control**, the goods **are sent to quality control** or held in receiving for inspection.
- If the goods are received **damaged**, the receiving department will advise the purchasing department and **hold** the goods for further action.
- If the order is considered **complete**, the receiving department closes out its copy of the purchase order and advises the purchasing department. If it is not, the purchase order is held open awaiting completion. If the goods have also been inspected by the quality control department, they, too, will advise the purchasing department whether the goods have been accepted or not.



# TESTING

- Quality is a prime factor to **measure** the **performance of a project**. **Quality assurance** of building materials is vital in order to create strong durable and cost effective structures (Savitha, n.d.). Each construction project has a different set of **specification and requirements**.
- **Proper assessment** of the various materials is important to **ensure quality** and **durability** of the final product.

# APPROVING SUPPLIER'S INVOICE FOR PAYMENT

- When the supplier's invoice is received, there are three pieces of information that should agree: **the purchase order**, **the receiving report**, and the **invoice**.
- The **items** and the **quantities** should be the **same** on all; the prices, and extensions to prices, should be the same on the purchase order and the invoice.
- All discounts and terms of the original purchase order must be checked against the invoice. It is the job of the purchasing department to verify these and to resolve any differences. Once approved, the invoice is sent to accounts payable for payment.

# PROCUREMENT PROBLEM

- Availability of material
- Availability of quantity
- Price reduction to match competitor's price
- Late deliveries Materials are not delivered as per schedule
- Late or incorrect submittals
- Poor communication between parties
- Lack of conformance to requirements
- Unrealistic delivery dates
- Re handling of materials
- Storage areas are limited or are far from working area
- Theft or damaging during handling or other conditions



# AVAILABILITY OF MATERIALS ON MARKET

- Steady flow of materials throughout project duration is among the primary function of material management. However, this can be affected by market availability of the material of work.
- Occasionally manufacturers can run out of raw material or be affected by government policy to the extent that production may have to be slow or suspended. Unavailability of materials of work on market can affect material management by either increasing competition in material purchase or delay the general work progress

# STOCK AND WASTE CONTROL

- Adopting a proper stock control will help to increase the productivity and also can be one of the way to improve waste control in the construction site.
- By introducing minimizing strategies to reuse materials in both design and construction phase can be a mean to reduce waste (Dainty & Brooke, 2004).

# STORAGE SPACE

- Large number of materials is required depending on the magnitude of the project. And the term storage space implies both **enclosed** and **open space** that can be used to **keep** materials of work **safe** until the **need** for it arise.
- All materials need **protection** against many threats such as **pilferage**, **theft**, **damage or loss**.
- Material such as aggregates, bricks/blocks may not require enclosed storage protection than proper outdoor positioning and stacking. However, other materials such as reinforcement bars, steel columns, timber, and galvanized steel for trusses must be protected against contact with water in order to avoid rust/corrosion.

# HANDLING

- Effective material handling involves **handling, storing** and **controlling** of construction material.
- It is also recommended that the storage area needs to be **enclosed, clean** and **dry** with good air circulation and for some materials need to be stacked on pallets.
- By adopting proper material handling and storage will help to keep the material **intact** and in **good quality**.



# STOCK LOCATION

- Floating location. In a floating-location system, goods are stored wherever there is appropriate space for them. The same SKU may be stored in several locations at the same time and different locations at different times. The advantage to this system is improved cube utilization. However, it requires accurate and up-to-date information on item location and the availability of empty storage space so items can be put away and retrieved efficiently.
- Central storage. As opposed to point-of-use storage, central storage contains all inventory in one central location. There are several advantages:
  - Ease of control; Inventory record accuracy is easier to maintain; Specialized storage can be used; Reduced safety stock, since users do not need to carry their own safety stock.



# ROOT CAUSES OF INEFFECTIVE MATERIAL MANAGEMENT

- During the past years, various academics researchers have conducted studies investigating to find out the issues causing ineffective materials management in construction projects. Dey (2001) emphasized that the common issues regarding material management are as follows:
- Receiving materials before they are required which may increase inventory cost and may increase the chance of deterioration in quality.
- Not receiving materials during the time of requirement causing to decrease motivation as well as productivity.
- Incorrect materials take-off from design and drawing documents.

## CONT...

- Theft or loss of item
- Choice of type of contract for specific material procurement
- Vendor evaluation criteria
- Management of surplus material.

# THE PROPOSED MATERIALS MANAGEMENT SYSTEM

- Activities in construction work which will be modelled in "work break down structure" using object oriented programming. In this case detailed information about materials needed will be presented.
- Timing of activities and sub-activities in the "work break down structure" and materials needed for the planning period .
- Stock information system which keeps track of materials used, materials in the storage yard and decides on the safety stock.
- Site layout model that shows where activities should be carried out, the travelling route of materials and the handling method needed.
- Vendors information system.
- Forecast of materials needed and lead time needed.
- Reporting facilities on the progress of the work, and materials used and materials needed.

# CONCLUSION

- Good **planning** of MM can help to avoid any **delays** of works on site and **reduce** any **extra cost** for a project.
- It is important to manage all **materials** and **inventory** throughout construction activity and processes
- Having good buying or purchasing department will directly improve the performance of work progress.
- Having good handling of construction materials will lead to have good performance of construction projects in term of time, budget (cost) and quality.
- <https://www.youtube.com/watch?v=ZcHNvSvnzv4>

**THANKS FOR YOUR ATTENTION**

**END OF CHAPTER 8**