Welcome! **The 60-Hour program is made up of 8 separate courses. Many of the courses are available in both Video and/or Text. It is not necessary to complete both versions. We offer both versions to ensure your learning style is addressed. You can choose whether you want to watch the video, or read the text, but you DO NOT have to do both. You can use either version for study purposes- just be sure to take the all quizzes in one version OR the other.**

Project Management for Contractors focuses on the three primary responsibilities of a project manager: managing project costs and time, while completing the project to the expected degree of quality.

If you are taking this course as part of the 60-Hour Prelicense Program, please read the information below:

The 60-Hour program is made up of 8 separate courses listed below. Many of the courses are available in both Video and Text/Online. It is not necessary to complete both versions. You can choose whether you want to watch the video version or read the text version. As the videos for the other four courses are completed, they will be added to your registration at no additional charge.

COURSES

1. Business of Building (Video or text)
2. Contracts, Liabilities and Risk Management (Video or text)
3. Project Management for Contractors (Video of text)
4. Marketing for Building Contractors (Video or text)
5. Building Green (Video or text)

6. Residential Code Review (Video coming soon)
7. Michigan Construction Safety (Video or text)
8. Overview of Building Trades (Video or text)

PLEASE CONTINUE READING:

FREE WITH PURCHASE

These are all optional and not required in order to complete the 60-Hour program, but the math tutorial and exam prep are extremely helpful in studying for the State exam.

--3-Hour Math Tutorial video for State exam prep
--Michigan Exam Prep (sample questions for State exam prep)

You will be sent the following via U.S. Postal Service and should receive them within 3-5 business days:

-- Applications to the state of Michigan
-- PSI Testing Information booklet
-- MIOSHA Test Review sheet
-- Books (if ordered)

Project Management Introduction

The goal of a project manager is to reach three primary objectives: finish the project **on time, within budget** and with the **expected degree of quality**. This requires close attention to detail before beginning actual construction, as well as during the project. Taking proactive measures will help you determine possible obstacles in any one of the 3 major objectives before problems occur. During this course we are going to analyze all three primary areas and learn proven methods used to manage most effectively.

To reach the objectives of finishing on time and on budget with the expected degree of quality, much information will need to be compiled before the construction activities begin. This information will be used to create two very important documents used by a project manager throughout the term of the project: **project budget** and **project schedule**. Without these documents, managing a project would be extremely difficult and most likely inefficient.

Project Budget

Project management includes determining the cost of labor, cost of materials and cost of equipment in a course of time which will achieve the maximum value from each. The budget is based on project overhead, labor, materials, equipment, and subcontractors. By acquiring reliable information before the project starts, you will have the ability to better manage job costs as the project progresses. By comparing actual costs to expected costs, you will become aware of many possible problems, allowing you to take proactive actions to better control cost overruns.

Project Schedule

Collecting as much reliable information about the expected duration of each task in a project will allow you to reach a closer estimate of the time it will take to finish the entire project. If the information is accurate concerning the duration of each task, the schedule will be closely followed. If not, the schedule will deviate, possibly greatly.

Analyzing the details of each task ahead of time will help reduce the possibility of delays during the project. Most often, project delays cause cost increases. **Construction contracting is a very detailed business.**

Project Management

Cost Management (Project Budget)

BUDGET	CHANGE ORDERS	PROCUREMENT	EMPLOYEES	UNIT COSTS

Learning Objective

Explain the steps and considerations necessary to develop a project budget.

Describe the primary elements of procurement and calculating costs.

Developing an accurate budget is an important first step in beginning a construction project. Estimating the costs of the project before it begins will help deter cost overruns and errors

made that could determine the success and/or profitability of the project.

Developing a Project Budget

In order for a contractor to present a proposal to a customer they first have to create a cost estimate of the entire project. This estimate is the sum of the projected costs for each activity, from start to finish. Each activity has a projected cost associated to it. Managing this list of projected costs allows you to manage the cost of the entire project as it progresses.

Construction contracting is a very risky and competitive business. As contractors compete for business, their profit margins are reduced. This makes it even more important to have reliable estimates.

When a General Contractor is working up an estimate for a project, the budget is also being created. The general contractor will produce the individual estimates for tasks they intend to do

themselves while the subcontractors provide estimates for the jobs subcontracted out.

Contemplating each progressive step in the path of a project, from start to finish, as well as the cost of labor, equipment and material associated with each step, is a tall order. Once you have realized each cost concern throughout the entire project, the estimate is complete, and so is the **budget.**

This budget will be reflected upon often while the project is underway. Contractors will be comparing actual costs to projected costs. If the contract is a Lump Sum Agreement, every dollar over budget means a dollar less in profit.

List of Steps:

1. Develop a list of all of the tasks that will need to be completed during the project from start to finish.
2. Establish the cost for each task. This includes material costs, labor costs and equipment costs. Labor costs can come from your own historical records or from subcontractors.
3. Include **project overhead**, such as garbage removal, sanitary facilities, temporary electrical power, financing cost, manager salaries, cost of blueprints and any other costs that do not reflect production.
4. Include **company overhead**. It is reasonable for a company to charge the project for its own overhead for the percentage of actual company overhead the project utilizes. Overhead costs are office expenses, the maintenance cost of the facility where equipment is kept and maintained, electricity and any other costs incurred just by being in business.
5. Add for contingency costs.
6. Add for profit
7. Total all costs.

Contingency Costs

It is a common practice for estimators to consider when developing their estimate that there will likely be budget overruns because of situations that could not have been foreseen. Adding contingency cost into the budget from the start allows more flexibility to absorb these additional expenses without going over budget.

Profit

Typically, people going into business as a home builder are more familiar with construction work than with being a business person. More contractors fail in their efforts to develop a successful construction company because they are poor business people, not poor craftsmen.

When calculating the profit that your company needs to make for a project, that shouldn't include the wages you would charge against the project for your own time. The business itself has to be building financial strength. As an owner, you should be drawing a wage from the company. This wage may be a bit higher in good times

and a bit lower in lean times. If no efforts are taken to make the company itself become financially strong, able to withstand the downturns that will happen in this industry, the business may fail.

As the business bank account starts to increase, investments can be made to improve the production capabilities of your company and your company will begin to grow. These investments may include better tools, more manpower, office staff or even a salesperson to promote your company.

The profit that you will charge should be relative to the degree of difficulty the project entails. If the contract has disclaimers that cause the contractor to assume more liability, then the profit margin should increase. Profit margins range from 5% to above 20%, given the differing circumstances. Keep in mind, **profit** is not a bad word.

Project Cash Flow

Cash flow can become a real problem on a construction project. It is important to insure that funds are available to pay material providers, subcontractors, employees or others involved with the project on time. Contractors should be concerned with maximizing cash flow at the time a job is being negotiated or a bid is being prepared. This concern is often overlooked. After the contract is signed, the contractor loses the power to negotiate terms that would maximize cash flow. The contract should provide a billing

schedule that anticipates the progression of costs incurred as work is being performed.

Change orders should be properly documented and priced. How change orders will be handled should be provided for in the contract. To minimize disputes, it is important to get owner approval promptly on all changes from the original contract. Once a contract change has been documented, priced and approved, the billing procedure provided for in the contract should be practiced.

Cash flow problems have kept many contractors up at night worrying about meeting financial obligations. Structuring the disbursements to front load the project with more cash than needed early in the project can smooth out this problem throughout the schedule. Always pay close attention to job costs by comparing projected costs in the budget to actual costs.

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The Importance of Change Orders

What constitutes a change and how changes may be billed should be provided for in the contract. Not having an appropriate agreement worked out prior to commencement of work could result in misunderstandings.

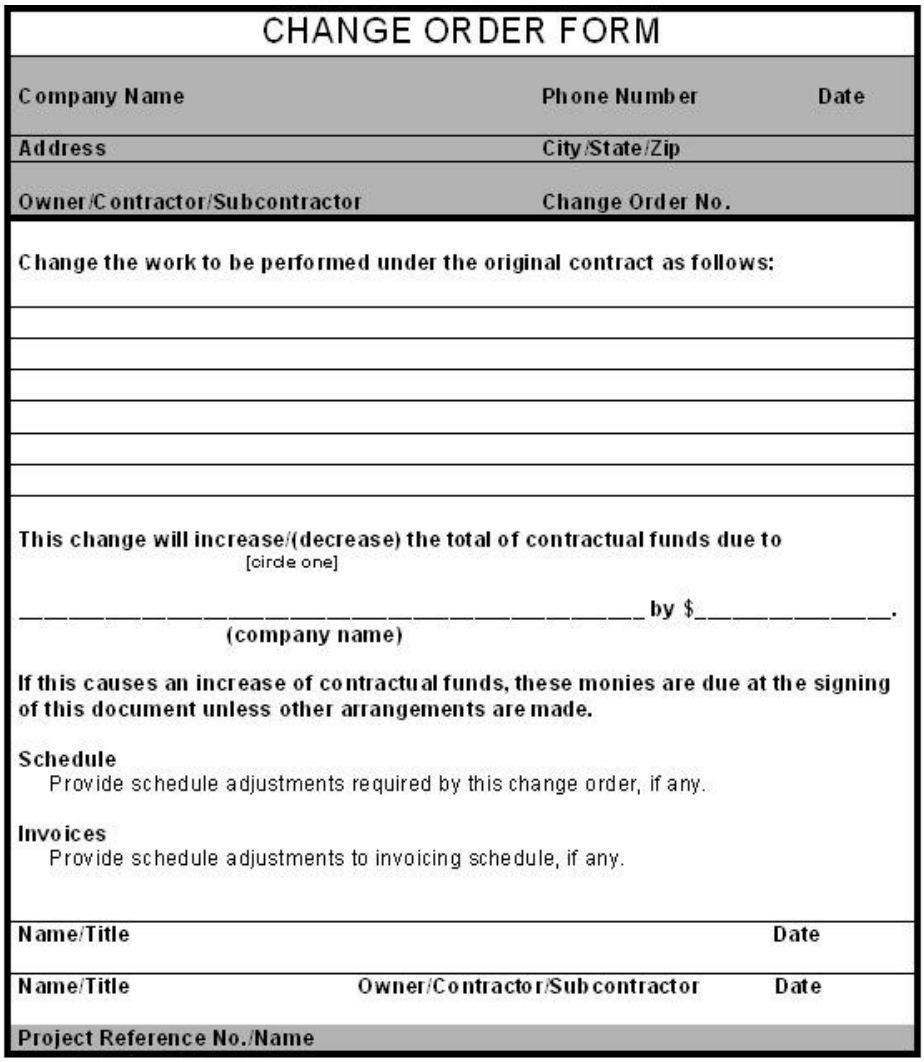
It is critical to be very attentive to the use of change orders. Whenever you are presented with an issue that would result in additional cost or possibly reduced costs, formalize this situation with a change order. The goal is to be businesslike instead of complacent, even for small issues. If a cost was not recognized in the original specifications, then you haven't accounted for it in your estimate.

Many contractors learn about how important change orders are the hard way. For example, when a customer requests additional work after the start of construction and the contractor goes ahead and

complies with the customer's request without addressing the additional funds needed to cover the costs. Often the customer will react negatively when approached about the additional cost if it is not spelled out at the time the request is made. If the customers are more than one person, like a husband and wife, all parties need to be made aware of the request and the additional cost to cover the request. Always be sure to put the request in writing through a Change Order with the signatures of all parties. Without **Change Orders**, customers don't legally have to oblige your request because you didn't get their approval for these additional costs. In any case, from this point, their opinion of you as a professional may be diminished. It may also be difficult for you to collect the additional funds.

If you always use Change Orders when these issues are presented, each individual situation would be worked out between you and your customer beforehand. The likelihood that you would be paid the additional funds is excellent, without any misunderstandings. Also, you will be able to profit from this additional work.

CHANGE ORDER EXAMPLE



CHANGE ORDER FORM

Company Name	Phone Number	Date
Address	City/State/Zip	
Owner/Contractor/Subcontractor	Change Order No.	

Change the work to be performed under the original contract as follows:

This change will increase/(decrease) the total of contractual funds due to
[circle one]

_____ by $_____.
(company name)

If this causes an increase of contractual funds, these monies are due at the signing of this document unless other arrangements are made.

Schedule
Provide schedule adjustments required by this change order, if any.

Invoices
Provide schedule adjustments to invoicing schedule, if any.

Name/Title		Date
Name/Title	Owner/Contractor/Subcontractor	Date

Project Reference No./Name

Job Cost Accounting

It is important to be managing the cost of the project while the project is under construction. First, create a system for accumulating and documenting production costs. **Cost Accounting** involves the continuous determination of labor, material and equipment costs, as well as percentage of completion. This information needs to be analyzed to recognize areas of possible cost concerns.

The value of cost accounting is the ability to recognize a budget problem before it's **too late** to correct it. Obviously there must be

a balance between the cost of generating a production cost report and the value of the information received for construction projects. For most projects, a weekly report is sufficient. Computers can make short work in generating this report. By realizing what the actual costs are for each task, a comparison can be made between the estimate and the budget.

Progress Check

- Explain the impact contingency costs can have on a project budget.
- What is the primary reason for Change Orders?

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Procurement

Procurement is a function of extreme importance. The efficient management of procuring the building materials, equipment and personnel necessary to complete projects on time, within budget and with the expected level of quality, requires very close attention to detail. The primary functions are:

Purchasing - building materials, tools, equipment, fuel.

Expediting and Receiving - after an order is placed, communication must be maintained with the vendor to insure timely delivery.

Inspection - upon delivery, the goods need to be inspected for quantity and quality. Any problems with the orders need to be identified on the receiving report at the time of delivery.

Shipping - Purchase Orders should designate the method of shipping materials and the confirmation number. The confirmation number is necessary if a shipment needs to be tracked.

Subcontracts - preparation and processing of subcontracts are a function of procurement. The information needed is found on the bid provided by each subcontractor.

When a Change Order affects a general contract, suitable changes to each subcontract affected need to be prepared and processed. Communication with your subcontractors is extremely important for all concerned. They need to know if your schedule changes and you need to know if their schedule changes in order for both companies to be better managed.

Cash Discounts from Suppliers

Discounts are often provided to contractors for early payment of bills. If your supplier of building materials allows for a 2% discount for early payment, that equates to $2,000 for every $100,000 in material purchases. Not taking advantage of this offer is net loss for a construction company.

Common cash discount programs provided by suppliers are:

2/10 net 30: 2% discount if paid within 10 days of invoice; otherwise, the entire amount is due within 30 days.

2/10 prox net 30: 2% discount if paid by the 10th day of the month following purchase; otherwise the entire amount is due within 30 days.

2/10 EOM: 2% discount if paid by the 10th day of the month after the purchases are shipped.

Ask for Price Breaks

Contractors, all too often, are reluctant to ask for a break in price. The worst that can happen is you will be told, "No". Many times you will be surprised to find a willingness to help you out. Having the courage to ask can save your projects a lot of money which should result in more profit.

Equipment Cost

Small construction equipment such as power saws, drills and concrete mixers should be charged to the job on a lump sum or flat rate basis. The cost of major construction equipment requires detailed cost analysis.

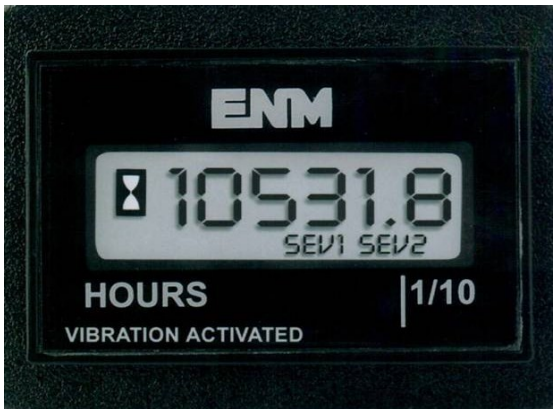
In the case of rental equipment or leased equipment, the costs are known costs, but the field operating cost must also be determined and realized in the budget.

The cost of equipment purchases for the business is recognized through depreciation of the equipment over time. The investment cost and expenses should include the cost of interest, insurance, taxes and storage. Other cost considerations are operating costs such as fuel, maintenance and repairs.

By recognizing the cost of owning, maintaining and operating equipment, the appropriate amount to charge for its use can be calculated. Equipment can be an asset generator for construction companies that keep their equipment active on a regular basis. On the other hand, owning equipment that sits idle and is depreciating is a liability. Reaching the point of balance as to whether to rent or purchase equipment is a matter to address as your company grows.

Equipment Time Cards

It is common management practice to keep records for major construction equipment - much like a labor time card. By keeping this record, it is then possible to properly charge the project for the use of the equipment. If there are several projects, it is important to charge these costs accurately to each project.



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Employee Time Cards

Its clear to see the importance of a reliable estimate for each task. In order to be able to calculate costs, necessary data needs to be generated. This data needs to be assigned to the correct task identifier in order to be able to measure and manage that particular unit of cost. By assigning codes to identify individual labor tasks on a project, the employee can provide on their time card the number of hours worked on individual tasks, rather than lumping all tasks together. By doing this, the number of man hours incurred within each relative task can be calculated. The reality is that historical data is the only reliable method of accurately estimating the cost of labor. We will reinforce the significance of accurate employee time cards in the Time Management chapter.

Wage vs. Production

The skill levels of the craftsmen in competing companies vary greatly. Matching the wage paid to the production rate is very important. Paying a high wage when the amount of output is average is trouble. On the other hand, paying an average wage to someone that is highly skilled may cause you to lose a valued employee to a competitor. As a business owner, keeping things balanced can be a difficult task.

Bonus Systems Work!

An effective way of staying on budget, in the area of labor costs, is to provide incentives for higher production rates than estimated. This could cause a drop in quality which would need to be properly addressed. But, a motivated team of skilled craftsmen are capable of more production than they may even realize. The key is to find out what motivates them. If this "carrot" is something they believe they can reach, they will go for it. If they reach it, gladly celebrate their success! But if they dont, hold firm to your agreement.

Price per Square Foot - Unique to Each Contractor

The actual cost to build a home, given the same specifications, will be different for each general contractor. That means the overall price per square foot to build a home is unique to every business. The cost of materials and equipment that are purchased or rented can certainly make a difference. Contractors that have negotiated better deals will come out ahead.

Labor is the one cost category that provides the greatest opportunity to affect the total cost of a project. How much work is accomplished for every dollar spent? If the cost of production for your company is lower than your competition, you have the advantage. This can be accomplished in a variety of ways. For example, you can increase productivity by increasing the skill level of your employees, creating a team spirit that is motivated toward production and quality, or purchasing the equipment needed to help improve production. If your company's performance level greatly exceeds your competitors, you will likely reap the rewards.

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Calculating Unit Cost

Unit Cost is an item that is measured in feet, square feet, pounds or some other unit of measure. Below is an example of how unit cost can be established. This information can be filed and used by estimators for future projects.

Material take-off for a 2400 square foot floor

Floor Framing & Subfloor Sheathing	Cost
14 - 2"x8"x16' @ $14.25 each	$ 199.50
79 – 4"x8"x3/4" OSB Floor sheathing @ $13.92 each	1099.68
150 – 2"x12"x16' #2 S.P.F. @ $17.38	2607.00
16 Subflooring Adhesive 29 oz. @ $2.50 each	40.25
1 box 8d Framing Nails	47.59
16d Framing	62.50
122 hangers @ $3.85 each	469.70
2 boxes hanger nails @ $14.15 each	28.30
4 - PC W8x15x240" Steel Beams	657.00
5 - 1"x6"x16' @ $6.15 each	36.90
1 box 1/4" x 1-1/2" Carriage Bolts	12.65
1 box 1/4" Hex Nuts	4.15
1 box 1/4" Washers	4.15
Total	**$5269.37**
Sales Tax 6%	**316.16**
TOTAL SALE	**$5585.53**

$5585.53 ÷ 2400 = $2.33 per square foot

The material price per square foot is $2.33.

Production rate provided by the time cards equals 60.5 man hours at an average per hour cost of $27.85 x 60.5 = $1684.92

$1684.92 ÷ 2400 = .70 per square foot

If we add the labor cost to the material cost, the unit price for materials and labor on this project = $2.33 + .70 = **$3.03 per square foot**.

Having this information is critical for a company to properly estimate how much it will cost them to do this work on a similar project.

Advantage of Using Computers in Cost Accounting

Computers are used by many contractors to assist them with their project management system. Cost accounting can be laborious and time consuming. A computer increases the speed and accuracy of collecting information. The information compiled in cost accounting will be used by project managers in three primary ways:

1. To calculate the total cost to date of the project as it progresses.

2. To compare actual costs to estimated costs in the budget. This will help to keep the project on budget.

3. To collect historical information used to estimate future projects.

Manually collecting this information may prove to be adequate for #1 and #3, but falls short of being useful for #2. Because the manual method is slower, by the time the project manager receives the information, it may be too late to take any measure to correct a problem.

These same computer software programs will provide a whole series of job cost accounting and financial accounting functions, such as generating payroll checks, payroll records, equipment account, balance sheets, etc. By computerizing, a contractor can obtain accurate and timely project financial information that will help them control costs, manage cash flow, improve cost estimates and increase profitability.

Here are a few construction software products that have been rated by http://www.ask.com/as the "best products reviewed":

Ranked #1: Goldenseal, manufactured by Turtle Creek Software

Ranked #2: Bid4Build, manufactured by Bid4Build

Ranked #3: Work In Progress, manufactured by Dedicated Software Solutions

Progress Check

- What are the cost considerations of owning your own major equipment?
- Which cost category of a project can affect its overall total the most?

Project Management

General Guidelines of Lending

LOANS	SWORN STATEMENTS	PROJECT FUNDS

Learning Objectives

List four major elements of a typical construction loan.

Describe the process of completing and updating a Sworn Statement.

Describe examples of common cost overruns.

Few lenders will allow an exception to the rule regarding residential building contractors. Usually a borrower must use the services of a duly licensed contractor. The smart and wary lender will not entrust

their funds to an inexperienced or unqualified contractor-neither should the borrower.

The borrower may be allowed to recommend certain subcontractors to the general contractor, but the general contractor will be the one person or party responsible for the project.

Title requirements

Before a standard construction loan can begin disbursements, the borrower must have a legal title to the land, on which the property will be built.

If the borrower took out a separate mortgage to buy the land, and that mortgage is liened against the property, that mortgage **lien** will affect the construction loan-to-value ratio (LTV). Other than acceptable mortgage and tax liens, the title must be clear of all other liens and **encumbrances**.

Some **construction-permanent loans** will include the land purchase in its financing, so that the new home shopper can cover all expenses with one financing program.

Developer vs. Contractor

An important clarification must be made between two seemingly similar situations that require two differing loan programs. Construction loans are needed when the borrower funds the task of actually building the structure on the property.

Large-scale developers usually do **NOT** require the buyer to obtain "construction" financing. Instead, most developers will require that the borrower be approved for a "purchase" mortgage loan. The actual construction of the property is funded with the developer's own cash or assets.

The buyers mortgage loan commitment is simply a guarantee to the developer that the buyer is qualified and will be able to purchase the newly constructed property immediately after construction is completed.

The home shopper may need a construction loan to build a custom home on a specifically chosen lot. The home shopper will also need a general contractor for such construction because most lending institutions will not lend funds without a general contractor involved. A construction loan is used to actually build the home-not to purchase a newly built home.

Overview of the Construction Loan

The typical construction loan will contain elements with different characteristics than found in a standard purchase or refinance loan. Four items are of particular importance:

1. loan commitment

2. rate lock

3. method of disbursement

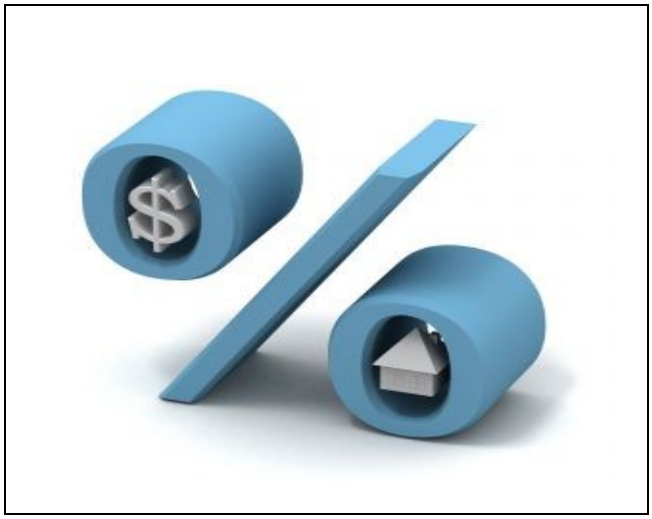
4. loan-to-value (LTV) ratio limits

Upon approval of the construction loan application, the borrower will receive a loan commitment from the lender. **Most lenders do levy a loan commitment fee for construction loans.** This loan commitment normally lasts for nine (9) months, though longer or shorter commitments are also used.

Usually, the interest rate is locked in for the entire term of the construction loan. Remember, however, that the construction loan itself is short-term.

1. Loan Commitment

Getting approved for a construction loan (short term) usually requires being approved for the eventual mortgage first. There are construction loan programs that convert to a permanent mortgage, but these are the exception and not the rule.



2. Rate Lock

Rate lock is an agreement between the lender and the borrower that allows the borrower to lock in the interest rate for a specified amount of time. When the rate is locked, both the lender and the borrower are committed to closing and disbursing the loan with that interest rate-within the lock period.

3. Method of Disbursement

All construction loan payouts and disbursements are normally made through a settlement agent of a title company, although some banks may handle the issue internally.

Disbursements are also usually paid directly to the general contractor and all applicable subcontractors and material providers according to a predetermined schedule.

Before the lender will disburse any funds to the general contractor, subcontractors or material providers, **Waivers of Lien** must be provided to the lender. These waivers insure that liens will not be brought against the property by the material providers and subcontractors.

As you read the waiver, pay close attention to the four different waiver methods:

Partial Conditional - Waiving lien rights on the **condition** that the subcontractors and material providers are actually paid. Partial waivers are used when there will be more funds due to this same contractor for this same building project at a later time.

Partial Unconditional - Waiving lien rights. The material providers and subcontractors have been paid by the general contractor and the general contractor needs to be reimbursed for these payments. Again, partial waivers are used when there will be more funds due to this same contractor for this same building project at a later time.

Full Conditional - Waiving lien rights on the **condition** that the subcontractors and material providers are actually paid in full. No more funds will be owed to this subcontractor or material provider and no more work is expected by them on this building project.

Full Unconditional - Waiving lien rights. The material providers and subcontractors have been paid by the general contractor and the general contractor needs to be reimbursed for these payments.

There will be no more funds due to this material provider or subcontractor on this building project.

Please see the **Waiver of Lien Form** and compare the actual statement with the above explanation.

WAIVER OF LIEN

My/our contract with: _____

to provide _____ for the improvement _____

to the property described as: _____

_____

(CHECK ONE)

☐ PARTIAL CONDITIONAL

I hereby waive my/our construction lien to the amount of $_____for labor/materials provided through_____. This waiver, together with all previous waivers, if any, **(circle one) does/does not** cover all amounts due to me/us for contract improvements provided through the date shown above. This waiver is conditioned on actual payment of $_____.

☐ PARTIAL UNCONDITIONAL

Having been fully paid and satisfied, hereby waive my/our construction lien to the amount of $_____for labor/materials provided through_____. This waiver, together with all previous waivers, if any, **(circle one) does/does not** cover all amounts due to me/us for contract improvement provided through the date shown above.

☐ FULL CONDITIONAL

Having been fully paid and satisfied, all my/our construction lien rights against such property are hereby waived and released this waiver is conditioned on actual payment of $_____.

☐ FULL UNCONDITIONAL

Having been fully paid and satisfied, all my/our construction lien rights against such property are hereby waived and released.

STATEMENT OF ACCOUNT

Date: _____

Signature: _____ Contract Price:.....$

(name & title)

By: _____ Previously Paid:.....$

Company: _____ Retention:.....$

Address: _____ This Payment:.....$

Phone: _____ Balance to Become Due:..$

DO NOT SIGN BLANK OR INCOMPLETE FORM • RETAIN A COPY

Title Companies

Title companies are typically hired by mortgage companies and lenders to represent their interest in closing a loan.

Title companies provide three primary functions:

- Search the title to the subject property and issue a title insurance policy to the lender and/or owner.

- Process, prepare and execute closing documents (lenders loan package), including recording and disbursements.

- Serve as a settlement agent for the buyer, lender, seller and brokers.

4. Loan-to-Value (LTV) Restrictions

The loan-to-value ratio limits for single-family construction loans varies from lender to lender. Some banks normally limit the entire construction-permanent loan to 80% of the appraised value of the completed property. Many lenders today, however, treat the construction-permanent LTV similarly to purchase programs, with total LTVs reaching 90%-95%.

At 80% LTV, the need for private mortgage insurance (PMI) is eliminated. In such cases, the purchase of the lot is considered the loan's down payment, as the land entails 20% of the average propertys total value. To determine the total property value, most lenders generally use the lesser value of two methods:

1. Appraised (projected) value of the finished project, plus the original price of the lot.

2. "Stick & Bricks" price of the construction, plus the original price of the lot.

An inspection by the lenders appraiser or construction administrator is normally performed prior to each draw request. These inspections are meant to ensure that all required work is completed in a satisfactory manner before each draw request is granted. The charge for the inspections is normally billed against the disbursement.

The disbursement may come at the beginning or conclusion of each stage, depending on the lender and contractor.

Sweat Equity

The term sweat equity applies to construction-related services and labor provided by the owner. The use of sweat equity differs among various lenders. Most lenders will not count sweat equity, especially with higher (>80%) LTV (Loan-To-Value) ratios.

This falls within the same realm of the general contractor requirement, wherein lenders need to ensure that the entire project is constructed according to approved specifications.

Loan Application Requirements

In addition to the standard application items in the residential loan application packet, the loan officer also must gather the following items from the borrower at the time of the application:

1. **Plans and specifications.** The borrower must submit copies of the complete plans and specifications for the construction project. These plans and specifications must be approved by the local governing authority-for local zoning and building codes-as well as by the lender.

2. **General contractor.** The name, address and telephone number of the general contractor who will be administering the construction must be provided to the mortgage lender. The borrower should also include a copy of the contractor's license number.

3. **Contract.** A copy of the contract between the borrower and the general contractor must be submitted with the application file.

4. **Estimate.** The application must contain a detailed estimate of the construction costs and requirements involved.

5. **Plat of survey.** A current, legal survey must be provided by the applicant or general contractor. If the borrower purchased the land separately, the land seller normally provides an acceptable plat of survey.

6. **Title policy.** A title policy must be provided or procured, showing no unacceptable liens or adverse encumbrances on the property.

7. **Copy of closing statement from land purchase.** If the land was purchased separately, before the construction loan application, the HUD-1 settlement statement from that land purchase must be provided.

Construction Loans vs. Construction-Permanent Loans

The typical construction loan is short-term financing that provides the borrowers and their general contractor with the funds to build a new home. They are short-term loans in that they must be paid off or refinanced immediately after the project is completed. In some cases, the construction loan will only cover the actual construction of the structure, and not the purchase of the lot on which the structure (house) will be built.

Construction loans are risky for the lender. The lender is lending money for something that does not yet exist, so the requirements for and structure of construction loans are slightly different compared to those of standard purchase loans of existing (or recently built) structures.

The general procedure is for the short-term construction loan to be refinanced with a "permanent" mortgage loan, upon completion. This permanent loan is simply any of the various standard refinance mortgage loan programs available. However, although it is

technically a refinance, the permanent mortgage follows standard purchase guidelines.

This "permanent" refinance is usually arranged before the construction begins. Failure to refinance a standard short-term construction loan can result in higher interest rates and more costly payments.

Note that if the borrower has paid for the construction with personal funds-but now wishes to be reimbursed for the costs-any new mortgage loan normally would be considered a "cash-out" refinance.

To make the financing route easier for construction-home shoppers, many lenders now offer the hybrid **Construction-Permanent** loans. This program is very similar to the permanent refinancing of construction loans. The difference is that a construction-permanent mortgage loan is an interim construction loan that automatically converts into a permanent mortgage without refinancing.

To determine the maximum Loan-to-Value (LTV) ratio, construction-permanent loans should be considered as purchase mortgages. Whether construction or construction-permanent, most lenders require that all necessary work be completed before the final closing.

Progress Check

- What is the difference between loans issued to developers vs. contractors?
- Define "rate lock".
- Describe the four different waiver methods.

↑**TOP OF PAGE**

Sworn Statement Instructions

A Sworn Statement must be completed for all projects. Each time you are requesting a draw your Sworn Statement must be updated accordingly. The Amount Currently Owing Column indicates the amount of draw you are requesting.

1. Fill in all blanks on the front and back of the Sworn Statement.

2. List all subcontractors, suppliers or laborers, who either provided labor or delivered materials.

3. If an item does not apply (i.e. there is no basement) write in "N/A" or not applicable in the space next to that item.

4. If the house is completely financed and all the subcontractors/suppliers are paid in full, the individual amounts for all the items are not required. In this instance, "paid in full" may be written in large letters across all the columns.

5. If the house is not completed or money is owed, or both, the individual amounts must be indicated on the statement. Normally, the columns to be completed include Total Contract Price, Amount Already Paid, Amount Currently Owing, and Balance to Complete.

Description of Columns:

Total Contract Price:	Total cost for the subcontractor and/or supplier.
Adjustment to Contract Price:	Amount of increase (overage) or decrease (shortage) to contract price.
Amount Already Paid:	Amount that the subcontractor/supplier has been paid to date.
Amount Currently Owing:	This is your current draw amount. It is the amount that is owed to your supplier/subcontractor for work or material in place, but not yet paid for.
Balance to Complete:	This is dollar value of labor or materials that is to be completed.

A. The columns described above must be totaled on the back of the Sworn Statement. Amount already paid + amount currently owing + balance to complete MUST = total contract price!

B. The Sworn Statement must be signed on the deponent line and in the indemnity box just to the right of the deponent line. The Sworn Statement must be notarized. Do not sign until in the presence of a notary.

C. To ensure that your construction loan draw will not be delayed, the Sworn Statement and waivers should be submitted to the title company **at least two days** before your draw is needed.

NOTE: If you are not sure how much it will cost to complete certain items on the Sworn Statement, just fill in an average of your estimates for that item under "Balance to Complete". If you are unsure who will provide the labor or materials simply write TBFL (to be finished later).

*** It is very important to remember that if your "Total Contract Price" on the Sworn Statement is more than your construction loan amount, you will be required to make up that difference before your draw can be processed.

STATE OF MICHIGAN
COUNTY OF Livingston SS.

Ima Builder being duly sworn, deposes and says that she is the contractor for an improvement to the following described real property situated in Livingston county, Michigan, described as follows:
1000 Your Address or Legal Description

This is an example of a completed Sworn Statement for the second draw. The amount of the draw request in this example is $113,300.
Amount Currently Owing = $113,300 (Draw Request)
Amount Already Paid = Items Paid (including paid from Draw #1)
Adjusted Contract Price = Dollar Changes from Original Contract Price

That the following is a state of each subcontractor and supplier and laborer, for which laborer the payment of wages or fringe benefits and withholdings is due but unpaid, with whom the (contractor) (subcontractor) has (contracted)(subcontracted) for performance under the contract with the owner or lessees thereof, and that the amounts due to the persons as of the date hereof are correctly and fully set forth opposite their names as follows:

SUBCONTRACTOR SUPPLIER OR LABORER	TYPE OF IMPROVEMENT FURNISHED	CONTRACT PRICE	ADJUSTED CONTRACT PRICE	AMOUNT ALREADY PAID	AMOUNT CURRENTLY OWING	BALANCE TO COMPLETE	
Frank L. Wright	blueprints	$ 1,000.00		$ 1,000.00	$ -	Paid in Full	
Livingston County Health Dept.	permits/perc test	$ 900.00		$ 900.00	$ -	Paid in Full	
NASA Engineering	plot plan/stakes	$ 3,000.00				$3,000	
Bedrock Foundations	excavating	$ 3,000.00		$ 3,000.00		Paid in Full	
"	foundation	$ 10,000.00	$1,000	$ 11,000.00		Paid in Full	$1,000 over contract
"	backfill/grading/sump	$ 2,000.00			$ 800.00	$ 1,200.00	
"	basement walls	$ 9,000.00		$ 9,000.00		Paid in Full	
"	trenching	$ 1,000.00		$ 1,000.00		Paid in Full	
Pittsburgh Steelers	beams/structural steel	$ 3,200.00	$ 800.00	$ 2,000.00	$ 2,000.00	Paid in Full	$800 over contract
Umbrella Services	waterproofing	$ 4,500.00				$ 4,500.00	
Herb Lumber	rough lumber/materials	$ 58,000.00		$ 29,000.00	$ 10,000.00	$ 19,000.00	
Wee Buildit	rough carpentry	$ 60,000.00			$ 45,000.00	$ 15,000.00	
Acme Cement	concrete flatwork	$ 6,800.00	$ (800.00)			$ 6,000.00	$800 under contract
T. A. Edison	utility connections	$ 2,500.00				$ 2,500.00	
Itza Ouchie	trusses	$ 3,900.00				$ 3,900.00	
HomeStation	windows	$ 25,000.00		$ 3,000.00	$ 22,000.00	Paid in Full	
Wee Roofit	roofer/shingles/materials	$ 9,500.00			$ 9,500.00	Paid in Full	
Wee Wrappitt	siding	$ 6,400.00				$ 6,400.00	
Wee Buildit	exterior trim/labor	$ 7,000.00				$ 7,000.00	
HomeStation	exterior doors	$ 8,000.00			$ 8,000.00	Paid in Full	
Flushing Plumbers	plumbing material/labor	$ 12,000.00			$ 6,000.00	$ 6,000.00	
Warm Fuzzy's	heating & air conditining	$ 9,000.00			$ 4,500.00	$ 4,500.00	
TBD (to be determined)	septic tank & field	$ 5,000.00				$ 5,000.00	
TBD	well	$ 6,000.00				$ 6,000.00	
Zzzzzt	electrical	$ 10,000.00			$ 5,000.00	$ 5,000.00	

HomeStation	insulation	$ 3,500.00				$ 3,500.00
"	brick/materials	$ 8,000.00				$ 8,000.00
Iter Paving	brick layer	$ 5,000.00				$ 5,000.00
Up In Smoke	fireplace	$ 10,000.00				$ 10,000.00
Acme Cement	driveway/gravel/asphalt	$ 6,000.00				$ 6,000.00
Will U. B. Plastered	drywall materials & labor	$ 20,000.00				$ 20,000.00
Leonardo da Vinci	painter materials & labor	$ 3,000.00				$ 3,000.00
HomeStation	cabinets/kitchen,bath,laundry	$ 20,000.00				$ 20,000.00
"	interior doors	$ 3,000.00				$ 3,000.00
Almost Done	finish carpenter	$ 25,000.00				$ 25,000.00
HomeStation	finish trim & labor	$ 8,000.00				$ 8,000.00
"	stair materials/handrails/posts	$ 5,000.00				$ 5,000.00
Wee Washit	brick cleaning/caulking	$ 1,000.00				$ 1,000.00
HomeStation	gutters/sheet metal	$ 2,000.00				$ 2,000.00
"	garage door(s)	$ 6,000.00				$ 6,000.00
"	mirrors/shower doors	$ 2,000.00				$ 2,000.00
"	flooring-ceramic tile	$ 2,000.00				$ 2,000.00
"	flooring-wood	$ 10,000.00				$ 10,000.00
"	flooring-carpet	$ 3,000.00				$ 3,000.00
"	light fixtures	$ 7,500.00				$ 7,500.00
XYZ Warehouse	appliances	$ 8,000.00				$ 8,000.00
HomeStation	kitchen/bath countertops	$ 7,500.00				$ 7,500.00
"	bath accessories/hardware	$ 4,000.00				$ 4,000.00
Bedrock Foundations	pea gravel/sand	$ 1,000.00				$ 1,000.00
Yucky Stuff	debris removal	$ 1,500.00				$ 1,500.00
Bedrock Foundations	dirt haul/removal	$ 3,000.00		$ 500.00	$ 500.00	$ 2,000.00
Flower Power Landscaping	landscaping	$ 40,000.00				$ 40,000.00
Almost Heaven	Hot Tub & Deck	$ 20,000.00		$ 1,000.00		$ 19,000.00
	misc.					
TOTALS		$ 501,700.00	$ 1,000.00	$ 61,400.00	$ 113,300.00	$ 328,000.00

That the contractor has not procured material from, or subcontracted with, any person other than those set forth and owes no money for the improvement other than the sums set forth above.

Deponent further says that he or she makes the foregoing statement as the (contractor)/(subcontractor) or as _____ of the (contractor) (subcontractor) for the purpose of representing to the owner or lessee of the above described premises and his or her agents that the above described property is free from claims of construction liens, or the possibility of construction liens, except as specifically set forth above and except for claims of construction liens by laborers which may be provided pursuant to section 109 of the construction lien act, Act No. 497 of the Public Acts of 1980, as amended, being section 570.1109 of the Michigan Compiled Laws.

WARNING TO OWNER AN OWNER OR LESSEE OF THE ABOVE DESCRIBED PROPERTY STATEMENT TO AVOID THE CLAIM OF A SUB-CONTRACTOR, SUPPLIER, OR LABORER WHO HAS PROVIDED A NOTICE OF FURNISHING OR A LABORER WHO MAY PROVIDE A NOTICE OF FURNISHING PURSUANT TO SECTION 109 OF THE CONSTRUCTION LIEN ACT TO THE OWNER OR LESSEE IF THE DESIGNEE IS OR HAS DIED

WARNING TO DEPONENT: A PERSON, WHO WITH INTENT TO DEFRAUD, GIVES A FALSE SWORN STATEMENT IS SUBJECT TO CRIMINAL PENALTIES AS PROVIDED IN SECTION 110 OF THE CONSTRUCTION LIEN ACT ACT. NO. 497 OF THE PUBLIC ACTS OF 1980, AS AMENDED, BEING SECTION 570.10 OF THE MICHIGAN COMPILED LAWS.

_____

Subscribed and sworn to before me this ____ day of _____, 20__

_____

Notary Public_____ County, Michigan

My Commission expires: _____

The loan funds are disbursed, or "paid out," in stages. A typical construction loan structures four (4) disbursements, each of which will only come as certain stages are undertaken or completed.

An inspection by the lenders appraiser or construction administrator is normally performed prior to each draw request. These

inspections are meant to ensure that all work is completed and finished in a satisfactory manner before payment for that work is disbursed. The charge for the inspections is normally billed against the disbursement. The disbursement may come at the beginning or conclusion of each stage, depending on the lender and contractor.

First disbursement

The first disbursement is normally for the foundation of the property. Before proceeding to the next stage, the lender will usually send its property inspector to ensure that the ground has been prepared and the foundation has been poured according to the specifications indicated in the approved blueprints and schematics.

Second disbursement

The second disbursement is for the building structure, usually including the roof and exterior walls. Again, all work must be performed according to the approved schematics and contract. Minor changes are often allowed; however, major changes or adjustments require additional lender underwriting approval.

Third disbursement

The third disbursement is for the interior elements of the structure, including floors, drywalls, ceilings, doors and windows. The contractor's agreement will normally indicate specific products and brands, which must be strictly met. Some elements of this stage often overlaps with the second and fourth stages, depending on the construction's progress.

Fourth disbursement

The final disbursement is for finishing tasks, such as painting, carpeting and woodwork. Essentially, this final stage is responsible for preparing the house for completion, possession and legal

occupancy. In some cases, the final disbursement may be conducted at the closing of the permanent refinance loan.

Retainage

Customers benefit from having a retainage agreement in the contract. This gives them leverage to insure that there are no loose ends after the contractor receives final payment. With a retainage agreement, everything has to be complete before the contractor will get the last check.

If the retained percentage is 10%, that means that 10% of the contract funds will be withheld until the entire contract is complete.

Because retainage is typically withheld from the disbursements, contractors will pass this retainage along to their subcontractors, which delays the last 10% of the monies that are due to the subcontractors until the general contractor receives the final payment. This final payment is just the last 10% that was withheld. Subcontractors are very likely to bid higher under this arrangement. The additional cost may cause the customer to pay more.

End Loan Commitment

When the construction loan is separate and distinct from the permanent financing, the borrower must have an end loan commitment with a second lender before the construction loan is approved and disbursed. Again, the construction loan is a short-term loan covering only the construction. It is refinanced with an end loan after the construction is completed.

At the final closing, the mortgage and promissory note must be signed and the mortgage must be legally recorded prior to the disbursement of any funds.

Progress Check

- Explain the four stages of disbursement in construction loans.
- What is the benefit of a retainage agreement to the customer?

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Co-Mingling of Project Funds

When you enter into a contractual agreement, you are taking responsibility for the disbursement of project funds according to that agreement. Contractors sometimes make an error by treating the funds associated to that contract as *business* cash flow instead of *project* cash *flow*. They use the money provided for a project to pay debt that is not associated with that project.

Most often when businesses are investigated for financial problems related to projects with financial trouble, the investigation reveals that the contractor has been co-mingling the contract funds. An example of co-mingling is when all contract funds from several contracts are deposited into the same bank account. It does not take long before a contractor cannot recognize what is what. If all contract funds are kept separate right from the beginning, the funds for that project are more easily managed.

The construction business is cyclical. This means there are periods of robust construction activities and there are periods where business can taper off to a trickle. Contractors that have been using contract funds for everyday business cash flow will likely be unable to keep their business out of trouble when business begins to taper off. There is no new business to generate the needed funds to pay off old business. It will soon become evident that contract funds are being managed illegally.

The problem will likely escalate even further, causing the contractor to become desperate to stay afloat, taking drastic measures to avoid eventual exposure. They may purposely underbid projects to insure that they will have some funds coming into their business. In essence, they are taking on a known loser to temporarily avoid the eventual exposure. This is no way to run a business.

Funds for each project must be managed separately, keep them separate from other project funds from the very beginning.

Examples of Common Cost Overruns

Here are two examples of common mistakes that occur when project budgets are not properly managed.

Example 1: Delayed Completions

Part of the overall cost of construction is the money financed for the construction loan. This loan is disbursed in progressive intervals. The interest owed is directly relative to the amount financed for the project at each disbursement and how long the loan is needed before it is closed.

Figure #1 shows the impact getting off schedule has on a budget with respect to the construction loan on a modest residential project. The additional 6 weeks to complete the project costs an additional $477.92 in interest. If the estimated time schedule was attainable and the cause of this time overrun was the way that the project was managed. The additional $477.92 could have been avoided. There are also likely to be many other budget issues relative to this delay of completion.

Figure #1

First disbursement: Miscellaneous Expenses and Prepaid Items $10,000.00.

Estimated Timeline (weeks)	Activity	Interest to Date	Actual Timeline (weeks)	Interest to Date
1	Layout		1	
2-3	Sitework & Excavation		2-3	
3-4	Foundation	$53.85	4-5	$67.31
	2nd Disbursement $25,000			
5-6	Structure Rough In		6-7-8	
7	Roof		9	
8	Exterior Doors & Windows		10-11	
8	Interior Walls	$242.31	11	$335.62
	3rd Disbursement $38,000			
9-10	Electrical		12-13	
9-10	Plumbing		12-13	
9-10-11	HVAC		12-13-14	
12	Insulation Installed	$634.00	15-16	$840.00
	4th Disbursement $59,000			
13-14	Exterior Finish		17-18	
13-14	Flat Work, Sidewalks & Garage		17-18	
13-14	Drywall		17-18-19	
14-15	Painting		20-21	
16	Finish Plumbing		22	
16	Finish Electrical		22	
16	Finish HVAC	$1,344.69 (16 weeks)	22	$1,822.61 (22 weeks)

NOTE: The annual percentage rate in Figure #5 is 7%.

The above example reveals the additional interest paid because of the additional 6 weeks to complete.

Get the most production out of every day by carefully planning to ensure that all material, manpower and equipment needed to perform all given tasks are provided on schedule.

Example of a Planning Error

The task scheduled for this day is applying drywall primer. The method is to spray on the product with an airless spray gun and back roll with paint rollers. The general contractor agreed to rent

the airless spray equipment and have it ready for use at the start of the day at 7 a.m. He neglected to reserve this equipment and found it to be unavailable that morning when he arrived at the equipment rental facility. The closest alternative source for this equipment is 1 1/2 hours away. To complicate the situation further, by getting started later in the day the rental equipment charge will be a 2-day charge instead of a 1-day charge. The labor at the site will be, for the most part, unproductive for 3 hours of the day.

Actual cost of this management error:

3-hour loss by General Contractor @ $45.00/hr.	$135.00
6-hour loss by Labor @ $22.60/hr.	$135.00
1 extra day of rental for equipment	68.80
Total	$339.40

Besides the $339.40 loss, it is possible that this may have caused the project completion date to be extended one additional day all because this general contractor didn't take measures to insure that the equipment needed for that day would be available.

Increased Productivity Means More Profit

An **in-house***** construction company with 25 employees increased their production ability by 10% without hiring any more employees. This increased production was a result of purchasing $35,000 in equipment that speeded up the production rates for many of their tasks. They also implemented new methods of performing tasks to help in reaching this higher level of production. They were averaging 25 homes per year at an average selling price of $350,000. Because of the production increase, they are now building 27.5 homes per year. Also, previously the business had a 5% average profit per home. Now because of the higher production

levels, the average profit is 6% per home. Let's look at the numbers:

25 Homes @ $350,000 = $8,750,000 x 5% =	$437,500
27.5 Homes @ $350,000 = $9,625,000 x 6% =	$577.500
Gross profit increase by	$140,000
Investment in equipment	-$35,000
	$105,000

By improving production levels by 10%, this company improved its gross profit by 24%.

*** In-house construction companies are companies that usually do not use subcontractors; all work is completed by the employees of the company.

Progress Check

- Provide examples of common cost overruns.
- Give an example of a planning error.

Project Management

Time Management

SUBCONTRACTORS	CRITICAL PATH	FIGURES #2-5

Learning Objectives

Recognize the importance of developing a project schedule.

Describe how to develop a Critical Path.

Explain the features and benefits of Activity Nodes.

Creating a Schedule

As a project manager involved in developing a schedule, you're forced to think through the project before it is ever built.

Scheduling forces you to consider the details and elements of the job long before you ever encounter them on the jobsite. You will have to think about all of the materials, labor, subcontractors, and equipment that it will take to complete the project. You must also consider the factors that could influence the project in a negative way and what you can be doing to manage these situations most effectively. Here are a few examples:

- difficult building sites
- availability of custom building products and their purchase lead times
- the weather
- inspections

There seem to be hundreds of other details that could cause a problem if not addressed properly in order to reach the goal of the earliest completion date.

Procuring Subcontractors

Residential projects are private bid situations. You, as the general contractor, will be inviting a select group of subcontractors to bid on

your project. These subcontractors will need the blueprints necessary in order to be able to bid on this project. If you are inviting three companies to bid on each task, you will need to have several copies of the blueprints and specifications available.

Good communication with your bidders is very important. If there is a change to be addressed while these companies are developing their bid, it should be brought to the attention of each subcontractor affected by this change. This information is referred to as "addenda", which addresses changes made before the general contractor enters into the formal contract with the owner.

As a general contractor, you will be bidding against other general contractors. Of course the lowest bidder for each task will carry a lot of weight in your selection process, but there are other factors to consider:

1. **Duration time -** Maybe one of the subcontractors being considered has the capacity to complete this task in half the time as the other two because of having a larger work force. Maybe their bid was higher, but their ability to speed up the completion date might be more important.
2. **Reputation for quality workmanship** - In a perfect world, we could expect the same professionalism from each competitive bidder, but it is not a perfect world. Excellent workmanship will become evident as the project proceeds. Quality workmanship in the early phases of a project will greatly benefit the craftsmen having to provide the tasks in the finishing phases. You, as a general contractor, will also benefit in the long term by enjoying the reputation of a general contractor who provides quality workmanship. Let's face it - much of the recognition that a general contractor receives for their efforts belongs to the persons actually performing the

work. That's why I say, "Great general contractors are made by great subcontractors."

Good communication with your subcontractors is required in order to create a schedule that will be useful. If you expect to rough-in a home in seven days without confirming your expectations with your subcontractor, you are "shooting from the hip" in your method of scheduling. It is possible to get written commitments from these subcontractors as to their duration times. Something you might consider is offering an incentive for early completion or penalties for late completion. Remember, any agreement, as long as it is legal, can be part of a contract.

Bid Invitations

Home building is a private bid situation. Subcontractors and material providers are made aware of bidding opportunities by **bid invitations**. Early in the bidding period, contractors mail out bid invitations to material dealers and subcontractors that are believed to be interested and whose bids would be welcomed. The mailing provides information about the project, the item for which a bid is requested, the place where bids will be accepted, the name of the person to whom the proposal should be directed, the place where the bidding documents are available, and any special instructions that may be necessary.

Subcontractor Relationships

Developing a strong working relationship with subcontractors is critical to reaching your potential as a highly respected and successful contractor. When these other companies enjoy doing business with your company because of the way your company conducts business, they may, in turn, show preference to your company.

An important quality that subcontractors need to learn about your management style is that you are reliable. You need to be reliable in every area of responsibility:

- not missing appointments
- providing materials and equipment on time so as not to cause them a loss of man hours
- paying your bills on time
- dealing with them in an honest and fair manner

By being reliable to your subcontractors, they will more than likely be reliable to you in return. That is what is necessary in order for your company to thrive. A general contractor needs to develop a network of several companies that provide the needed services in order to complete construction projects. If your network of subcontractors believes that your company is one of their most valued customers, you have gained a huge advantage over other contractors who don't enjoy such a reputation. These other contractors may never realize their potential of success because of their inability to establish strong relationships with subcontractors.

Contingency Time

It is a common practice for project managers to consider when developing the work schedule that there will likely be delays because of situations that could not have been foreseen. By adding contingency time, or a little padding, in the schedule, it will be more flexible and able to absorb these delays without getting behind.

Progress Check

- List four factors that can influence a project in a negative way.
- What are some factors to consider when reviewing subcontractors' bids?

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Critical Path Schedule

What is a Critical Path? The Critical Path is the logical sequence of activities within a project that have the longest duration times in order to recognize the projected earliest completion date.

Sources of Information to Develop a Critical Path

You can use various sources of information to develop your critical path, as long as the information is reliable. A great source for obtaining good information is using the historical records of previous jobs completed. There are three common methods of estimating task durations:

1. **In-House information** - some companies complete all aspects of the project themselves and do not out-source work to other companies. Collecting historical

information from in-house is the most reliable source and can be obtained by referring back to records of previous jobs completed.

2. **Subcontractor information** - some companies out-source many job tasks to subcontractors. Bid specifications should require subcontractors to estimate the time needed for them to complete their task. This information can then be used to determine the critical path.
3. **Combination of In-House and Subcontractor** - This is a combination of both historical information from your own in-house records and the information provided by subcontractors.

Gathering Historical Information

When gathering historical information for estimating future duration times, it is important to use the time from the entire task and not just a portion of it. For example, a framing company was able to finish 50% of a task in one day. Everything went right. The weather was good, nobody was sick and everyone showed up on time. The last half of this job didn't go as well. It actually took two days to complete the 2nd half. If the information collected for future estimated purposes reflect only the productivity of the very first day, it wouldn't be as reliable as the production rate (time) reflected over all three days. Collecting information after each task is completed is much more reliable than just using a portion of the productivity time of a task.

It is also important to include detailed information about the projects working conditions, methods of construction, weather problems and any circumstances that affect production capabilities either positively or negatively. This information will become part of the historical records and should be kept in the cost accounts for that project.

In order to effectively manage project cost, we need to first realistically estimate man hours. We could guess, but that method will likely lead us to trouble. By creating historical data about our company, we can more precisely estimate how much time it will take to complete each task. Determining estimated man hours can be easily generated by collecting information from employee time cards. In order for this information to be reliable, it needs to be entered daily on to each card. Each employee should be educated as to the importance of this information. If the employee fills out his time card on Friday for the entire week, the information will be inaccurate. Daily logging needs to be a strict policy. The job foreman should periodically do spot checks to insure that strict adherence is kept.

WILLIAMS CONSTRUCTION, INC. TIME CARD

Name JACK PRIDE **TOTAL HOURS**

Week Ending 4/18/08

Job Name	Code	Task.	Mon	Tue	Wed	Thu	Fri	Sat	Sun
Smith	01	Supervision	1 hr.						
Johnson			1 ½ hrs.						
	02	Set Up							
Johnson	03	Floor Framing	3 hrs.						
	04	Wall Framing							
Smith	05	Roof Framing	2 hrs.						
	06	Exterior Finish							
	07	Roofing							
	08	Drywall							
	09	Demo							
	10	Interior Finish							
	11	Insulation							
Smith	12	Clean Up	½ hr.						
	13	Other							
Total Hours			8 hrs.						
Weather									

Notice that this time card allows the ability to recognize possible changes of sites and tasks on the same date. This information can then be compiled to help in future estimating.

Developing the Critical Path

Here are the basic steps that need to take place in order to create a Critical Path for a project:

1. Make a complete list of all tasks within the entire project.
2. Place each task in the order that they need to be accomplished.

3. Determine those tasks that can be placed in the same time slots, so more than one task can be accomplished at the same time.
4. Of those tasks that can be accomplished at the same time, determine which one will take the longest amount of time. That one belongs in the Critical Path.
5. Develop an Activity Node for each task. Refer to figures 2-4 to see how these nodes are created and what the information in each node is telling about the project.
6. Place these Activity Nodes in the logical order that they need to be accomplished. Do not worry about the start and finish times at this point. This information will be added after the tasks are in order.
7. Place the duration times in each Activity Node. This is an estimate of the amount of time that each task will take, including curing times. This is the information that was collected from subcontractors and historical data.
8. Start from the beginning of the Critical Path (list of Activity Nodes) and enter the earliest start times. This is not a date. This is the earliest work day within the project that the task can begin. For example, if the earliest start time is 13, that would mean that the task cannot begin until the 13th work day from the time the entire project began. (Notice in Figure #3 that **Critical Activity(s)** have the same earliest and latest start times. These are the Activity Nodes that will be placed through the center of the Critical Path Schedule.)
9. Create the Critical Path. This is done by first determining which of the tasks in order have the longest duration times. When there is more than one task that can be accomplished at one time, determine which will take the longest and place that task in the Critical Path. The others will be considered Non-Critical Activities and will go to the side of the one that is Critical.
10. Now that you know the duration times of the tasks and in what order the tasks are to be accomplished, it is time to

fill in the earliest and latest start and finish times for those tasks in the Critical Path.

11. Fill in the earliest and latest start and finish times for those activities that are **not** in the Critical Path (Non-Critical Activities).
12. Fill in Float Times. This is the number of work days that can lapse before the task has to be started, or the entire project will be put behind schedule and this Non-Critical Activity will become Critical. Float Time pertains to Non-Critical Activities only. There is no Float Time for those activities in the Critical Path. (See Figure #5, a completed Critical Path Schedule.)
13. Transfer all information in the completed Critical Path Schedule to a **Working Calendar.** The Critical Path Schedule gives the number of estimated work days, but it does not give the exact calendar date that these work days fall on. Pay attention to any special circumstances that happen to become apparent by the development of this calendar and address them as needed.

The above list of steps is the starting point for time managing each project. Seldom does the project go exactly as planned and most often the Critical Path Schedule is altered throughout the project to reflect any changes, whether that be the addition or subtraction of work days. If productivity is better than expected, the schedule will be shortened and if things don't go as well as planned, the schedule will be lengthened.

A primary function of a Project Manager is to continually monitor the Critical Path Schedule, always having a plan of action to finish the project as soon as possible from any point within the project.

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Figure #2: The Activity Node is used in a Critical Path Diagram to recognize a task, the earliest and latest start times, the earliest and latest finish time, the duration of a task and whether or not there is any float time (and how much float).

Figure #2

Features of an Activity Node

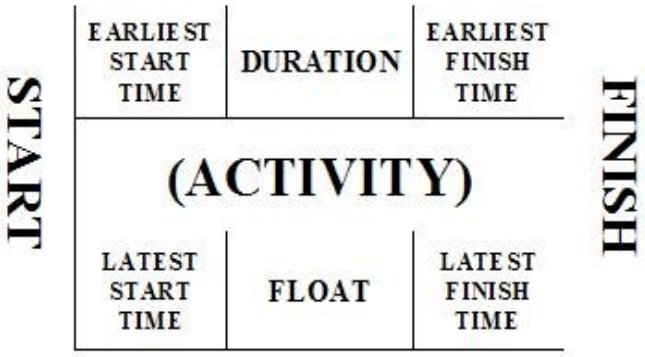


Figure #3: Critical Activity Nodes are easily identified -- the earliest start time and latest start time are the same. Also, the earliest finish time and latest finish time are the same. There is no float time. All of the tasks that are critical need to begin on the Start Date they were schedule for and need to be finished by the end date in which they were scheduled to end. If they are not completed on time, the project completion date will be extended. **These are the Activities that will be placed through the center of the Critical Path Schedule.**

Figure #3

Critical Activity Node

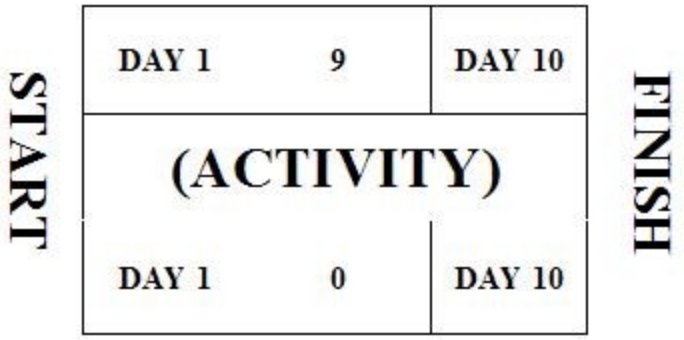


Figure #4: This Activity Node identifies the earliest start time and the latest start time. It also identifies the earliest finish time and the latest finish time. It provides a float time represented by the 4 and the duration time represented by the 5. This task cannot start until day 15 and, if we don't start it by day 19, it will put the project behind schedule. We have four float days. That gives us 4 days from the earliest start time to get this task started and it will take 5 days to complete.

Figure #4

Non-Critical Activity Node

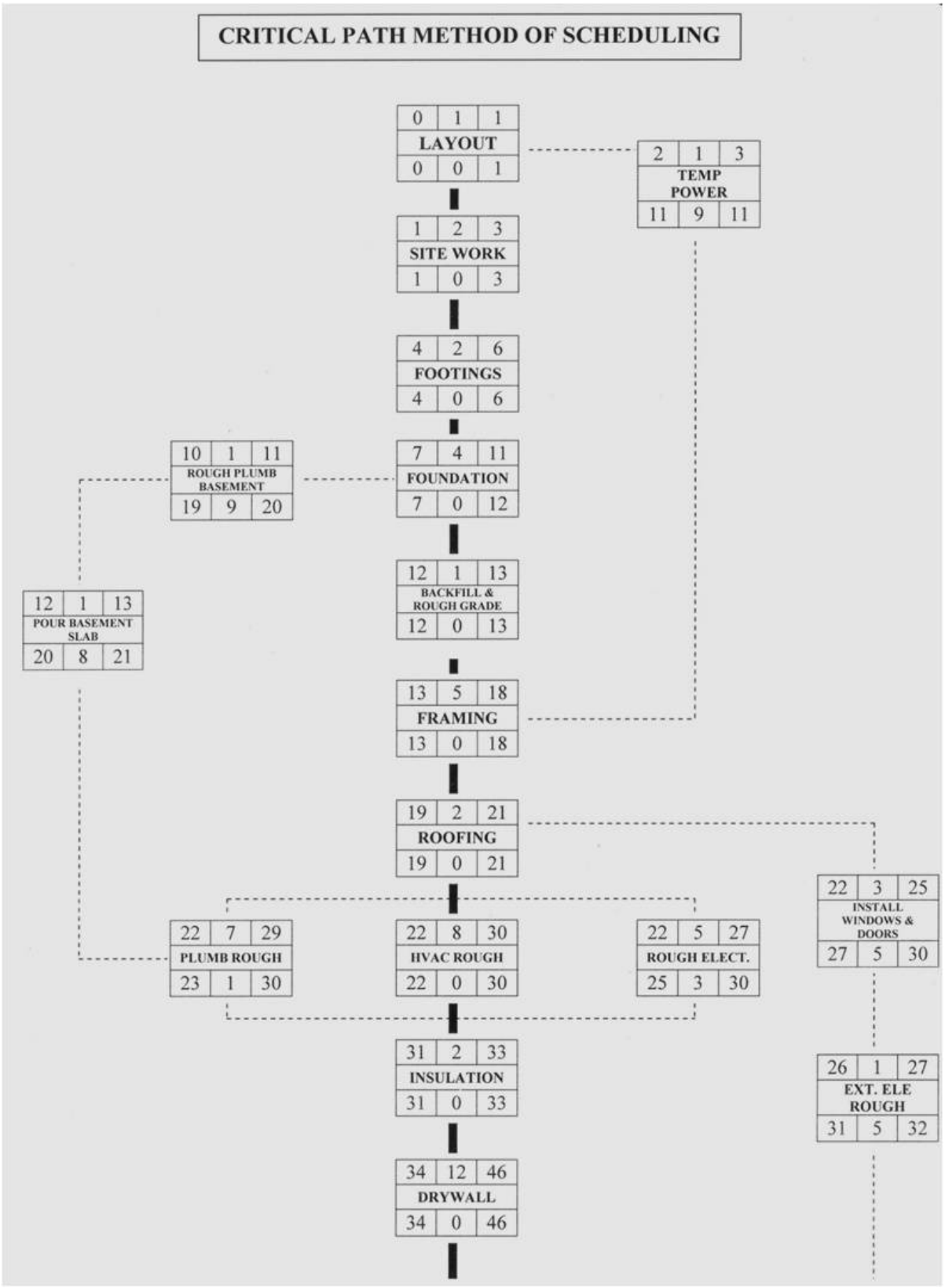
Critical Path Schedule

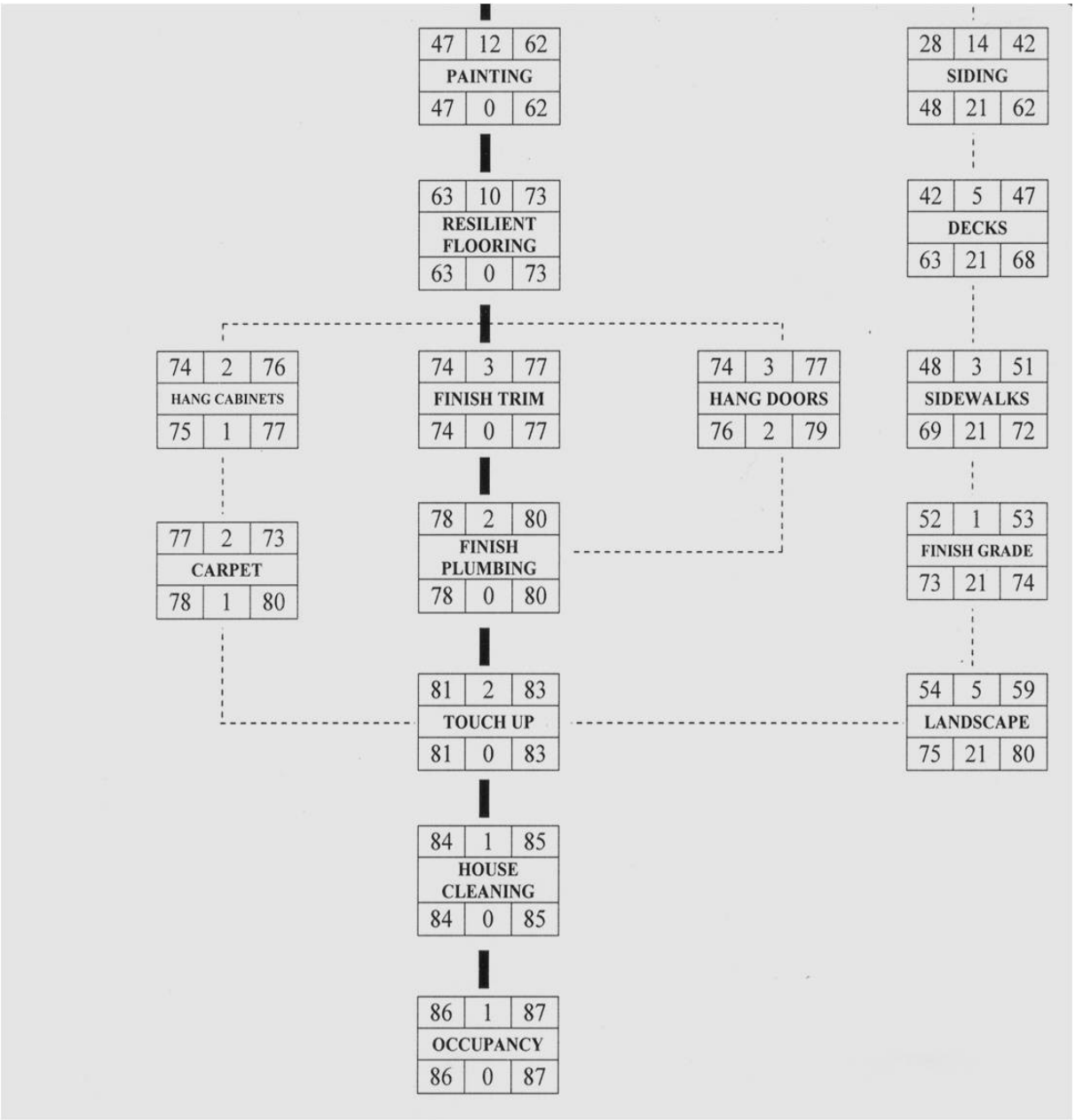
On the following page is an example of a completed Critical Path Chart (figure #5). This chart will be adjusted as the job progresses allowing the project manager to recognize the earliest projected completion date from any point in the schedule.

This gives you a clear picture of managing construction projects using time as efficiently as possible. You should be recognizing how important it is to be communicating with all parties affected by adjustments made in the schedule allowing these parties to be reschedule if needed.

Figure #5:

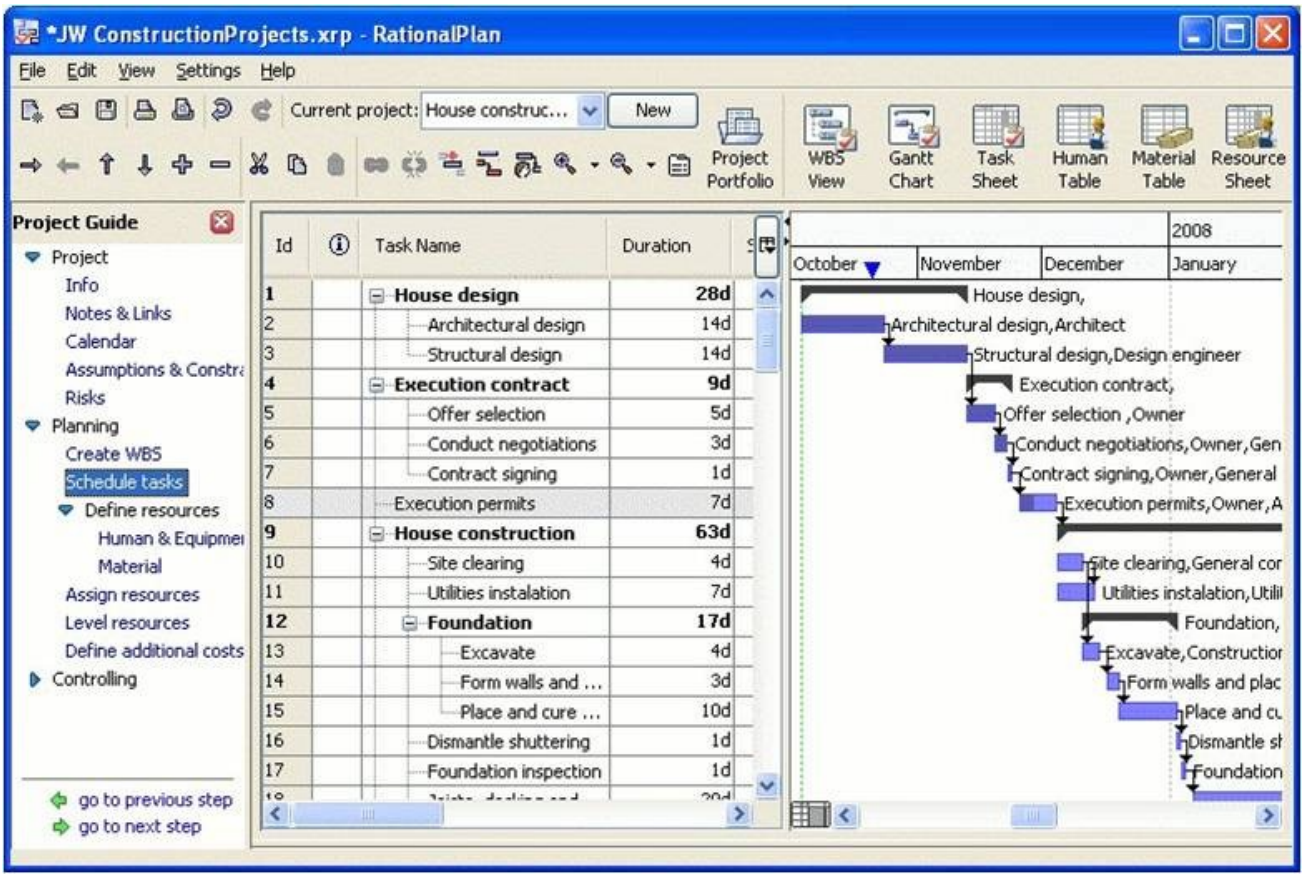
CRITICAL PATH METHOD OF SCHEDULING





Advantage of Using Computers in Time Management

Computers are used by many contractors to help them with their project management system. Time management can be time consuming. A computer increases the speed and accuracy of collecting and organizing information.



The information compiled in time management software will be used by contractors to automate the steps for critical path development and path management during the project.

Progress Check

- What are the three common methods for estimating task durations?
- What is the purpose of developing an Activity Node?

Project Management

Quality Control

MATERIALS	LOG BOOKS	STANDARDS

Learning Objective

Describe the benefits of good communication with subcontractors.

Recognize the key elements in a construction Daily Log Book and the benefits of improved recordkeeping.

Quality control begins with business ethics. Hopefully, your business endeavor will be successful, and you will become established as a builder and business owner. You will be developing relationships with product and service providers. Their impression

of you and your company will be very important to the future of your business. If, in the course of their business dealings, subcontractors know you to be honest, they won't hesitate to refer their customers to you. A lot of business can be generated by word of mouth. Contractors who are not known to be reliable can miss out on a lot of opportunity and not even know it.

Operate your business with integrity. Integrity is in the same family as honesty. It is the strength of honesty. It is something that is accomplished when no one is watching or listening.

As a business owner, there are responsibilities that need to be continually addressed in the daily activities of your business. Providing a safe work environment is one of them. Contractors conforming to the safety standards provided by MIOSHA will also benefit from increased quality. When a craftsman is put in an unsafe working condition, they will be more concerned about not getting injured than they are with the task at hand. By taking the correct safety measures, it is easier to concentrate on quality.

One way to manage quality control as a general contractor who uses subcontractors is to seek out and do business with subcontractors who perform to the level of quality you expect. You cannot assume that a contractor will provide the level of quality you would expect just because they are licensed and have been in business for ten years.

Seeking out quality subcontractors takes some effort. A good place to start is by joining your local Home Builders Association. This will help you to gain the contacts that are necessary to your business. Also, take the Parade of Homes Tour. This gives you a firsthand look at the quality of workmanship of many contractors at the same time. Find out what contractors perform at the level of quality you expect. Dealing with the companies performing at this level will help tremendously.

Many times a general contractor will know the correct steps to take in a given skill in order to achieve the quality desired. These steps can be described in a spec sheet that is given to a subcontractor, showing what is expected. For example, if you hire a drywall company to hang and finish drywall, you may end up with a job that has two coats of mud instead of three - and only three coats will provide the quality you expect.

Providing bid specifications to subcontractors that describe the details relative to what you expect concerning quality is very important. This information should be made part of the contract that becomes legally binding. These companies will know what is expected and they will bid on the project accordingly.

Be Available

If general contractors are available to their subcontractors and employees, situations that present themselves during construction will be handled the way the general contract would like them to be handled. Subcontractors won't be making spot decisions that may disappoint the General Contractor or the customer. General contractors need to be involved with each project. Subcontractors need to know that you are easily contactable when situations arise that you may want to be involved in.

Good Communication with Subcontractors and their Employees

By having a meeting with each subcontractor and their crew before the start of construction, you can accomplish much. For example:

1. You can get to know persons who are new to you, as well as get reacquainted with those you worked with in the past.

2. You can bring to the subcontractors attention any areas of particular concern as far as details on how you would like situations handled.

3. You can express the level of quality you are expecting to the crewmembers. This can be a touchy area where a foreman might feel you are stepping on his toes - be tactful.

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Quality - Material and Craftsmanship

A reality in construction is that you can be using average quality materials and still end up with a product that will provide for the use it was intended for and hold up to the wear and tear of everyday use because care was taken by the craftsman to build it properly. On the other hand, you can have above average quality materials and below average workmanship resulting in below average serviceability and a below average useful life.

It is the project manager,s job to have control over quality concerns. We cannot expect perfection, but we can expect a minimum amount of flaws and blemishes. The idea is to continually improve in the skills of your craftsmen and in the methods they use.

When ordering material such as lumber packages, you may receive a percentage of unacceptable lumber. If you order the exact amount of lumber needed to accomplish the task, you may end up

wasting precious time sorting for acceptable pieces. You may be able to find uses for the shorter parts of the unacceptable pieces that you salvage, such as cripples and blocking, but this can take a lot of time. It is a good idea to over order lumber. When the job is complete return what is unacceptable.

Knowing When to be Present

Project managers need to be at the project site at critical times to a make sure everything gets done properly and to the expected level of quality. For example, the basement floor slab is on the schedule to be poured. Preparing the substrate properly is very important to provide for uniform support under the entire slab. Installing the polyethylene vapor barrier is also important to keep dampness out of the basement and avoid possible problems with radon emissions. Grade stakes need to be placed to insure that the slab is level and has the correct thickness throughout. If this slab gets poured before these things get done, the quality of this job is poor and may not hold up over time. However, once the concrete is poured, flaws of this nature are covered up forever, or until problems begin. The preparation process has become impossible to inspect. By being there at critical times, you can insure that these important details get accomplished.

It seems as if you should be able to trust the subcontractors to always do their work correctly. Sometimes you can, but until you are absolutely confident that the subcontractor and their employees are completely reliable, you shouldn't take chances at critical stages in the construction process.

Building a Network of Quality Subcontractors

Most contracting companies use a variety of subcontractors. We rely on these companies to fulfill the services required. If your dealings with these companies are honest and fair, strong relationships will be built between you and your subcontractors. They will understand your ways because they have worked with you in the past. You, in turn, will be more familiar with their ways and have more confidence in their abilities. Because you consistently work with a select group of subcontractors, these subcontractors find themselves working on the same projects often and end up learning to work well together. The idea is to build a network of companies that deal fairly with you in order to reach a common goal to complete projects on budget, on time and with the expected degree of quality.

Quality Control Starts with Know How

To build products and achieve an expected level of quality without first becoming educated about the craft will more often than not produce undesirable results. The true measure of quality exposes itself over the test of time. There may well be a distinct difference between what your job looked like when you completed it, and the way it performs and looks after reasonable exposure to expected use and the elements. Taking the time to become educated about our crafts may reveal information that is critical in order to achieve the desired results.

Sometimes an employee will feel they are working hard and doing a good job at what they are doing when they are not. And they don't even know that the quality of their work is poor because they have not been properly trained for that particular task. They can go on for years making the same mistake thinking all along that they are doing good work. It may be a very simple task that requires no real preparation yet can create a real problem later on. This is from lack of knowledge, not lack of a spirit of good will.

Much of what contractors know is learned through trial and error. Very often the errors are never corrected because the customers are unaware of the error. This method of becoming knowledgeable and skillful comes at our customer's expense, but most of these mistakes could have been avoided by becoming educated about our tasks before we start them. We need to always accept the fact that there is more to know. With this spirit of humility we will always take some time to learn new information.

Progress Check

- Why is it so important for project managers to be at the job site?

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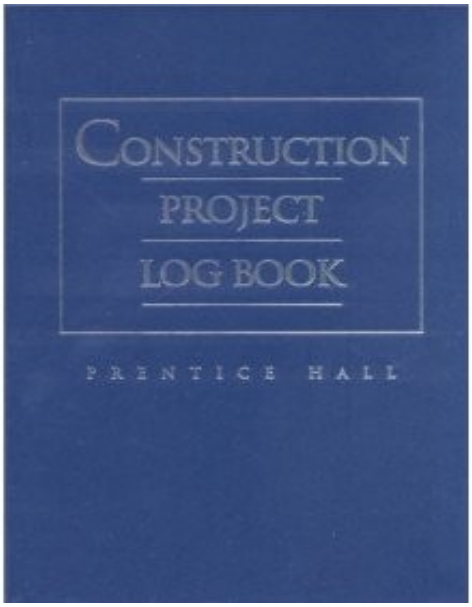
Daily Log Book

A daily work log book kept onsite at construction projects aids the project manager in several ways. The information collected in this book reveals its importance:



- Hours worked
- Equipment rented
- Materials purchased
- Craftsmen on the job
- Tools and supplies
- Scheduling milestone events

- Project budget changes
- Cost changes
- Weather and site conditions
- Accidents and injury reports
- Project contacts
- Writers guide and check
- Any immediate concerns worth noting

This will help to record all of the days important events. Improved recordkeeping will lead to better project organization, a clearer understanding of the work and the cost, fewer hassles over disputed changes, and ultimately, increase profitability.

Trying to keep track of the activities that are taking place on a day-to-day basis in your head can drive you nuts. Besides, it's not efficient. Good records can save your profit margin and protect you from lawsuits.

Keeping the goal of managing labor, materials and equipment in the most effective way, in order to finish the project as soon as possible, gives a project manager much to think about.

Its a tall order for a manager to insure that the materials, manpower and equipment necessary on each given day are provided in order to maximize the productivity of each day.

Some materials require a long lead time, such as steel, roof trusses and custom products being manufactured. If the project manager does not consider the lead times needed, it can be a very costly mistake. Close attention to detail is key. A project manager is mentally viewing the activities of each day long before that day arrives.

Keep a record to document each day's activities, the productivity of each day, the goals that were attained and also the delays and why they occurred. This is a very smart thing for a project manager to be recognizing. By keeping this log book and using it to reflect on successes and errors made, you can better manage other projects in the future.

Progress Check

- What are some benefits of improved recordkeeping?
- List several components in a log book.

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Standards

The amount of attention employers pay to critical issues, such as customer service, quality of workmanship, organization, continuing education and punctual work habits, typically will reflect the efforts and level of concern shown by upper management.

This is true in every business. Employees generally perform to the level of expectation from upper management. If the upper management performs at a low standard, the employees will also. By being a good example for employees to follow, managers are more able to achieve the management objectives that they have been assigned to. Considering the subjects mentioned in the first paragraph, every one of these will be affected by upper management.

Customer Service

Upper management should always conduct themselves in a way that shows respect to everyone, not just the customer. By acting in a way that is demeaning or even subject to question gives permission for their subordinates to act in the same way. Subordinates know that if they are reprimanded for their behavior, they can remind their superior of the same behavior, leaving a manager without any reasonable justification for their behavior concern.

By the very nature of residential construction, homes are built in neighborhoods. Sound travels a long way. If workmen are using offensive language, it affects the public perception of a contracting company. Project managers need to address this issue before it becomes a problem.

Quality Workmanship

If upper management pays attention to quality concerns, employees will recognize the importance of quality. If this issue is just given lip service and not practiced, the products will suffer.

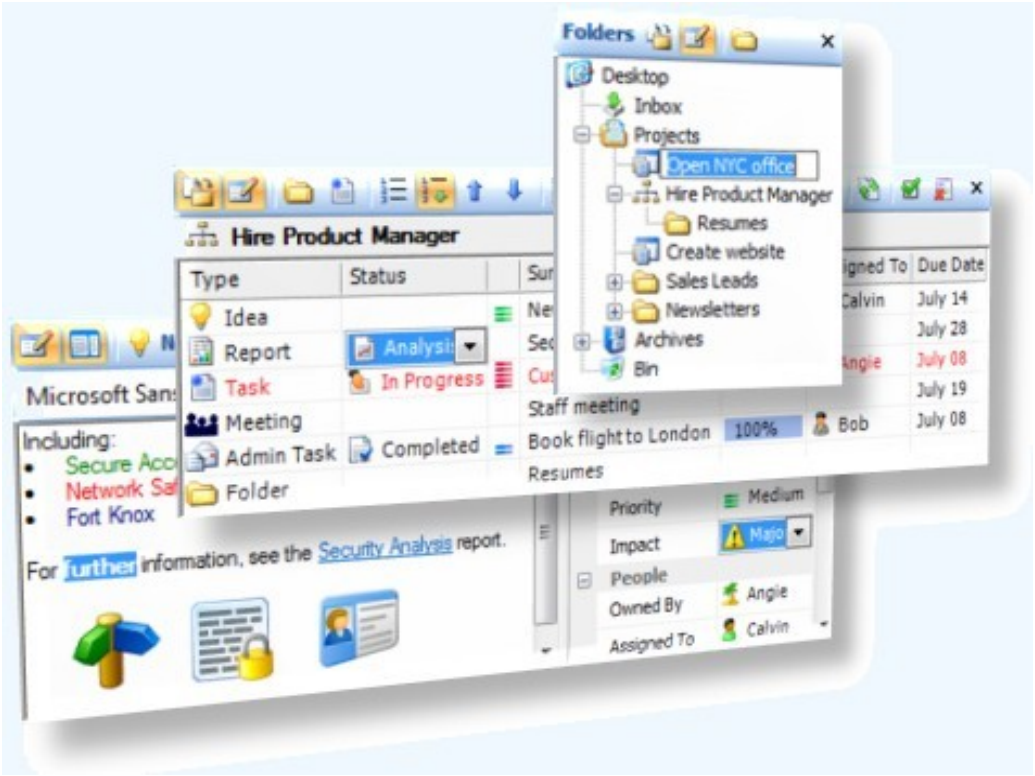
Many poor quality problems are the result of not being aware of the undesirable results that poor craftsmanship causes. These problems are not often evident at the time the work is being done. Much of the work we do gets covered up with drywall, sheathing, siding and paint. Managers who continually express the importance of quality with their actions and verbal attention will reap the rewards.

Becoming skilled at a craft is learning the systematic actions and sometimes ever-so-slight moves to make in a proper sequence resulting in high production and high quality. It is possible for someone to become good at doing something the wrong way. That's not a good thing.

Organization

Being organized makes life more enjoyable! The frustration of being unorganized causes a lower quality of life. The meaning of

the term "skilled" requires that a person be organized. Managers need to perform their functions in an organized fashion. Setting a good example to employees will result in higher production and quality. This is something much easier said than done. I've heard it said that it takes 3 weeks to form a habit. By committing to being organized, we will acquire these good habits. I've also heard it said that being a good manager doesn't require that you need to have all of the ideas, but it does require that you recognize one when you see it. Most successful people aren't pioneers. They copy the proven methods used by the generations of contractors that have come before them, although there is more help available recently with the development of computer software programs that assist us in our organizational responsibilities. Taking the time to be organized will pay great dividends.



Product Certification

Many manufacturers have training available to accompany their products. For example, a manufacturer of vinyl siding may offer a

course that teaches you how to install their product. If this is a product that you use often in your business, you may want to get certified to install it. Basically, this means completing the course and receiving a Certificate of Completion stating that you are certified to install the product.

By becoming certified in various products you will also be added to their list of installers for these products and they will direct business to your company. Perspective customers who recognize your certification may choose your company over a competitor because of the confidence your formal training has given them.

Progress Check

- What is the importance of good customer service?

Project Management

Erosion Control

BEST PRACTICES	SEDIMENT FENCES

Learning Objective

Understand the contractor's responsibility for erosion control.

Identify Best Management Practices that can reduce soil erosion and potential pollutants.

According to the Environmental Protection Agency, the most environmentally dangerous part of the construction process is the phase when land is cleared of vegetation and excavated to grade

levels. This removal of plant material and topsoil makes the area especially susceptible to erosion--transforming existing natural drainage pathways and endangering water resources, native vegetation, and local aquatic habitats.
http://www.epa.gov/owow/NPS/ordinance/erosion.htm

All construction sites disturbing more than one acre are required to obtain permit coverage. Most residential construction soil erosion activities are regulated at the county level. Contractors need to be familiar with the Best Management Practices (BMPs) for soil erosion on their work sites and implement erosion prevention measures.

Plan in Advance

♦ Remove existing vegetation only as needed.

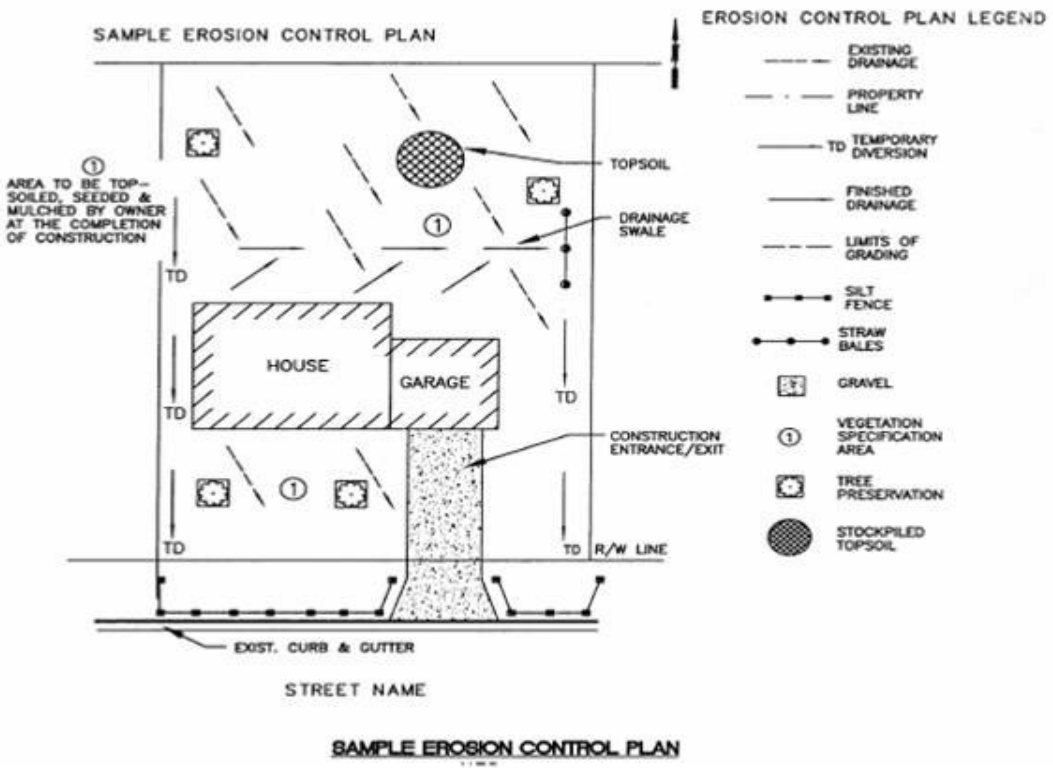
♦ Schedule excavation, grading and paving operations for dry weather periods, if possible.

♦ Designate a specific area of the construction site well away from storm drain inlets or water courses for material storage.

♦ Develop and implement an effective combination of erosion and sediment controls for the construction site.

♦ Educate employees and subcontractors about storm water management requirements and their pollution prevention responsibilities.

♦ Control the amount of surface runoff at the construction site by impeding internally generated flows and using berms or drainage ditches to direct incoming off-site flows to go around the site.



SAMPLE EROSION CONTROL PLAN

Implement Best Management Practices

The following Best Management Practices (BMPs) can significantly reduce pollutant discharges from your construction site. Compliance with storm water regulations can be as simple as minimizing storm water contact with potential pollutants by providing covers and secondary containment for construction materials. Implement good housekeeping practices at the construction site.

♦ Protect all storm drain inlets and streams located near the construction site to prevent sediment-laden water from entering the storm drain system.

♦ Limit access to and from the site. Stabilize construction entrances/exits to minimize the tracking of dirt and mud onto adjacent streets. Conduct frequent street sweeping.

♦ Protect stockpiles and construction materials from winds and rain by storing them under a roof, secured impermeable tarps or plastic sheathing.

♦ Avoid storing or stockpiling materials near storm drain inlets, gullies or streams.

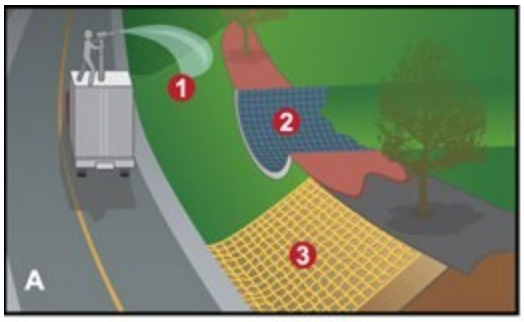
♦ Construct detention/retention structures or ponds at key outfall areas to capture rainwater and allow it to percolate into the ground rather than drain from the site.

♦ Keep construction sites clean by removing trash, debris, wastes, etc. on a regular basis.

♦ Clean up spills immediately using dry clean-up methods (e.g. absorbent materials such as cat litter, sand or rags for liquid spills; sweeping for dry spills such as cement, mortar or fertilizer) and by removing the contaminated soil from spills on dirt areas.

♦ Prevent erosion by implementing any or a combination of soil stabilization practices such as mulching, surface roughening, and temporary silt fencing.

♦ Practice proper waste disposal. Many construction materials and wastes, including solvents, water-based paint, vehicle fluids, broken asphalt and concrete, wood, and cleared vegetation can be recycled. Materials that cannot be recycled must be taken to an appropriate landfill or disposed of as hazardous waste.



A

Matting

1. Hydromulch
2. Permanent Matting (TRM)
3. Erosion Blanket
   - Single, Double Sided Straw Matting
   - Straw Coconut Matting
   - Coconut Matting
   - Coir Mat
   - Eco Stakes
   - Staples

B

Posts & Stakes

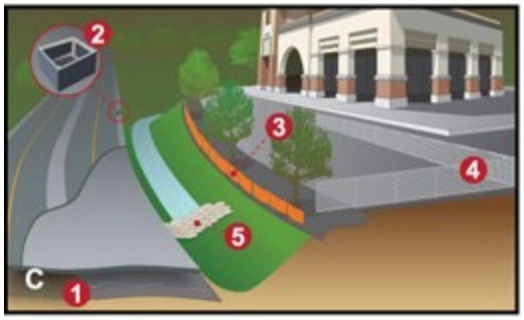
1. T-Posts (4ft, 5ft, 6ft)
   - Wood Stakes (3ft, 4ft)

Silt Fence

2. Silt Fence w/out Backing
   - Silt Fence w/ Backing

Sediment Tubes

3. Temporary Sediment Tubes
   - Coir Logs



C

Geotextile

1. Woven
   - Non-Woven

Misc

2. Inlet Protectors
3. Safety Fence / Tree Protection
4. Chain Link Fence
5. Sandbags
   - Pre-made Sandbags

D

Seed

- Contractor Seed Mix
- Annual Rye Seed
- Straw
- Seasonal Temporary Mixes
- Fescue

Misc

- Floc Logs
- Dewatering Bags
- Erosion Eels

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Contractor Responsibilities

1. The permit holder is responsible for the on-going maintenance of all lot specific erosion and sediment control devices.

2. Periodic inspection shall be whatever is deemed necessary to ensure that erosion and sediment control measures are functioning as designed. In addition to standard periodic inspections, inspections need to be conducted after each rain event of 1/2" or more within 24 hours. Any problems noted during these inspections shall be corrected immediately.

3. Once construction has commenced, the permit holder is responsible for the maintenance of erosion and sediment control measures protecting area inlets on their lots, as well as curb inlets along the street frontage. It is critical that sediment not be allowed to invade the storm sewer system.

4. The temporary construction entrance provides a place for parking vehicles off-street and a spot where material can be off-loaded. The intent of the requirement is to provide a stable surface for parking vehicles where mud and other debris is not likely to be tracked onto the street. Proper maintenance of the area is required until such time as a permanent driveway can be put in place.

5. During the entire construction process the permit holder is responsible to ensure that mud, dirt, rocks, and other debris are not allowed to erode onto city streets and sidewalks or tracked onto the streets by construction vehicles. Should any mud or other debris find its way to the street, the contractor shall take immediate steps to have it removed.

Sediment Fences

Minimum Requirements:

Length- Maximum of 600', flare ends of fence uphill to temporarily impound water.

Spacing of support posts- 6' maximum.

Trench- bottom of the fence must be buried a minimum of 6" deep.

Impounded water height- depth of impounded water should not exceed 1.5' at any point along the fence.

Support posts- 2"x 2" wood or 1.0 lb. linear foot steel. Steel posts should have projections for fastening fabric.

Support wire- wire fence (14-guage with 6" mesh), necessary if standard strength fabric is used.

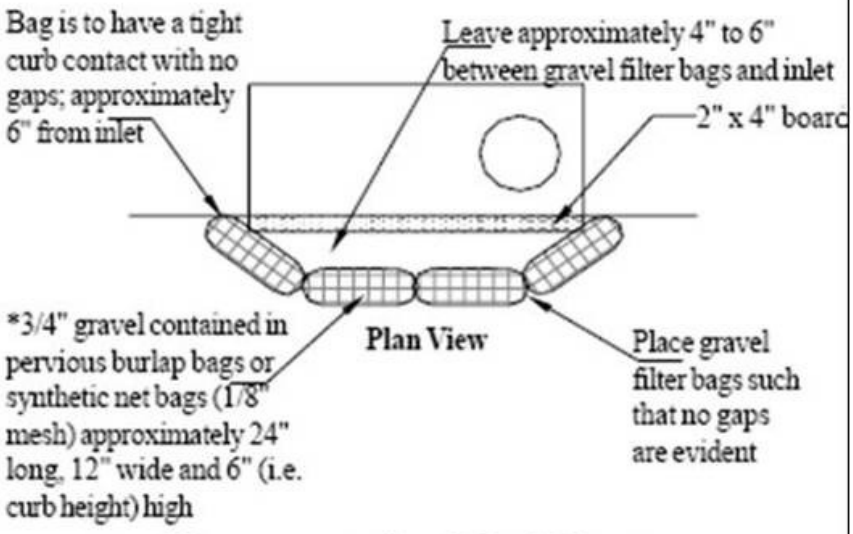
Synthetic geotextile fabric- conforming to specifications in Table 1 and continuing ultraviolet light inhibitors and stabilizers. Minimum design life of 6 months.

Table 1

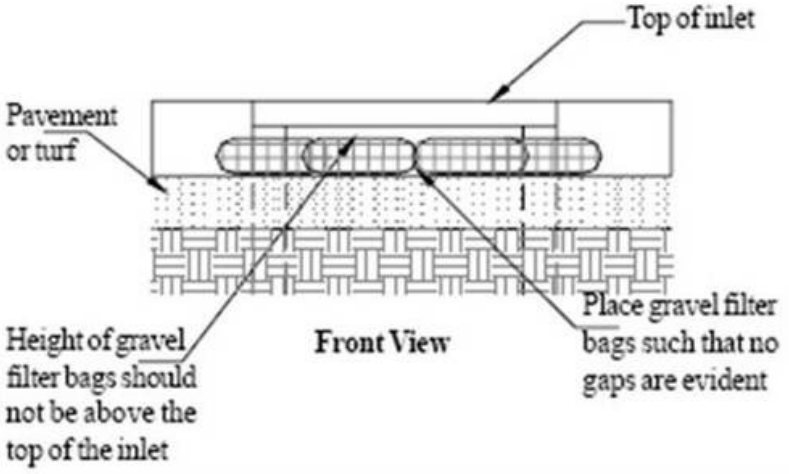
Specifications For Sediment Fence Fabric

Physical Property	*Minimum Requirement*
Filtering Efficiency	*85%*
Tensile strength at 20% (maximum) elongation: Standard Strength=	*30 lb. linear inch*
High Strength=	*50 lb. linear inch*

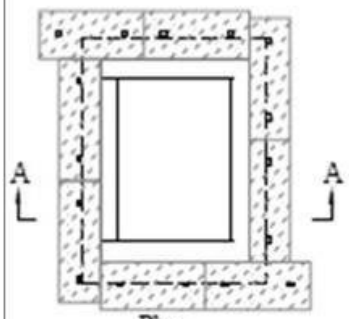
Curb Inlet Protection - Gravel Filter Bag



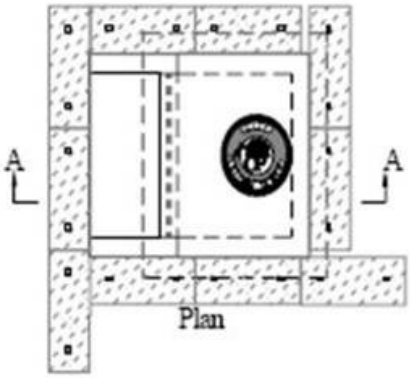
*Coarse aggregate from 1/2" to 1" diameter

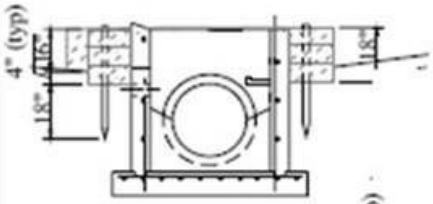


Area Inlet Without Installed Throat and Top

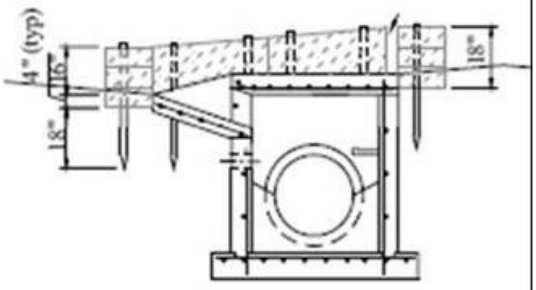


Area Inlet With Installed Throat and Top

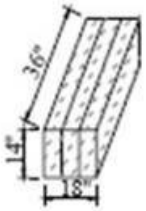




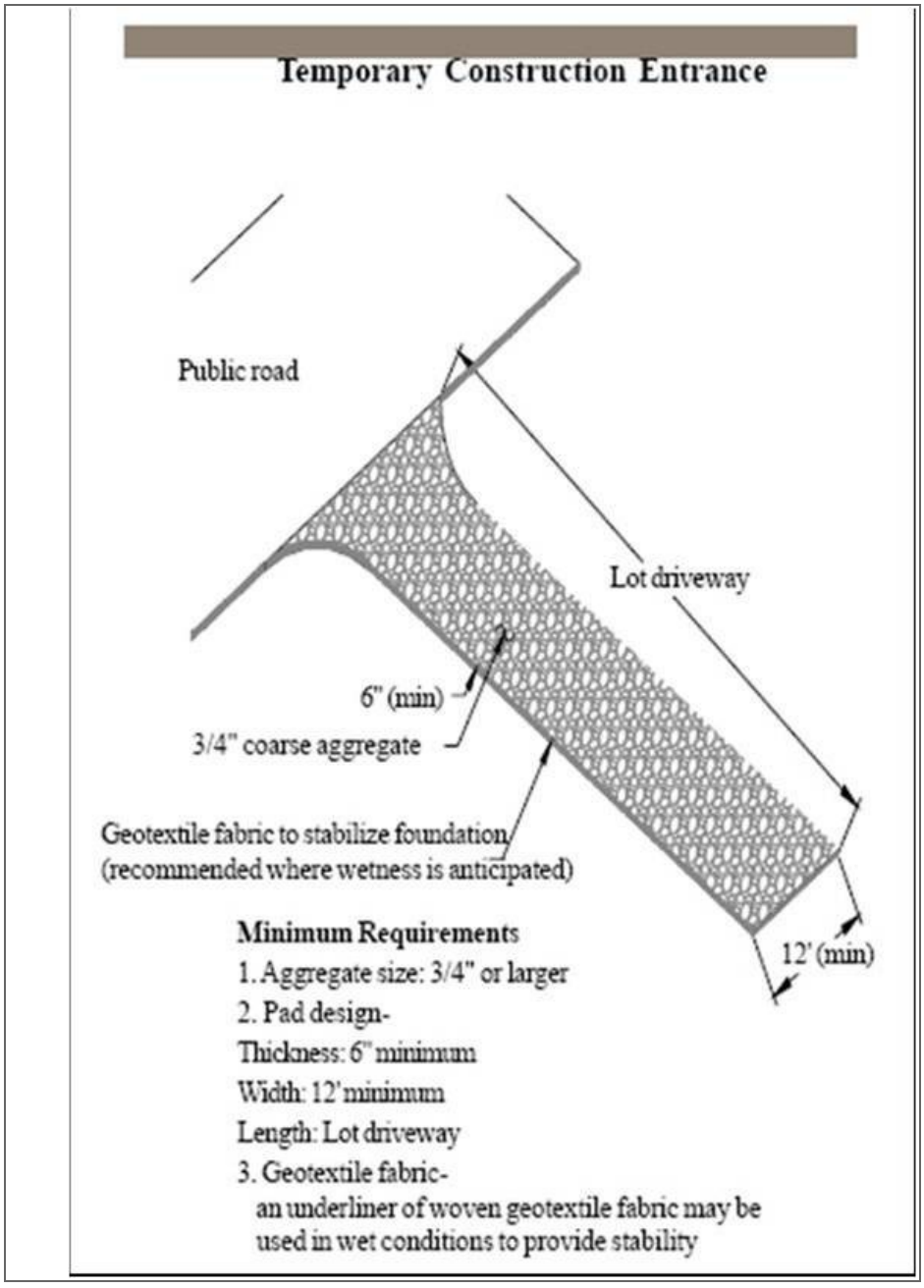
* Note



Typical Straw Bale



*Pack any voids between bales with loose straw allowing no gaps



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Sediment Fence Installation

Construction

1. Dig a trench at least 6" deep along the fence alignment.

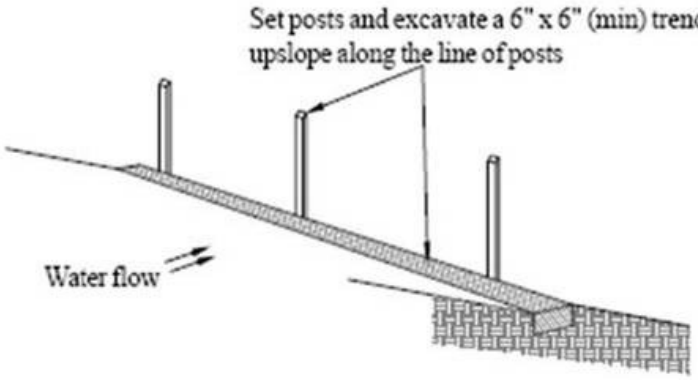
2. Drive posts at least 18" into the ground on the down slope side of the trench. Space posts a maximum of 6'.

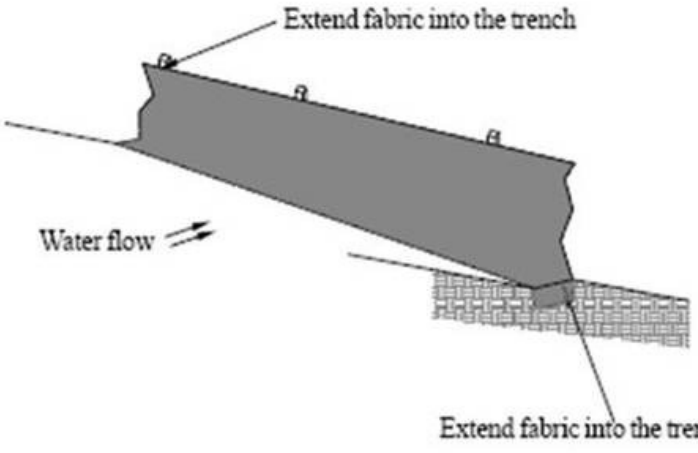
3. Fasten support wire fence to upslope side of posts, extending 6" into the trench.

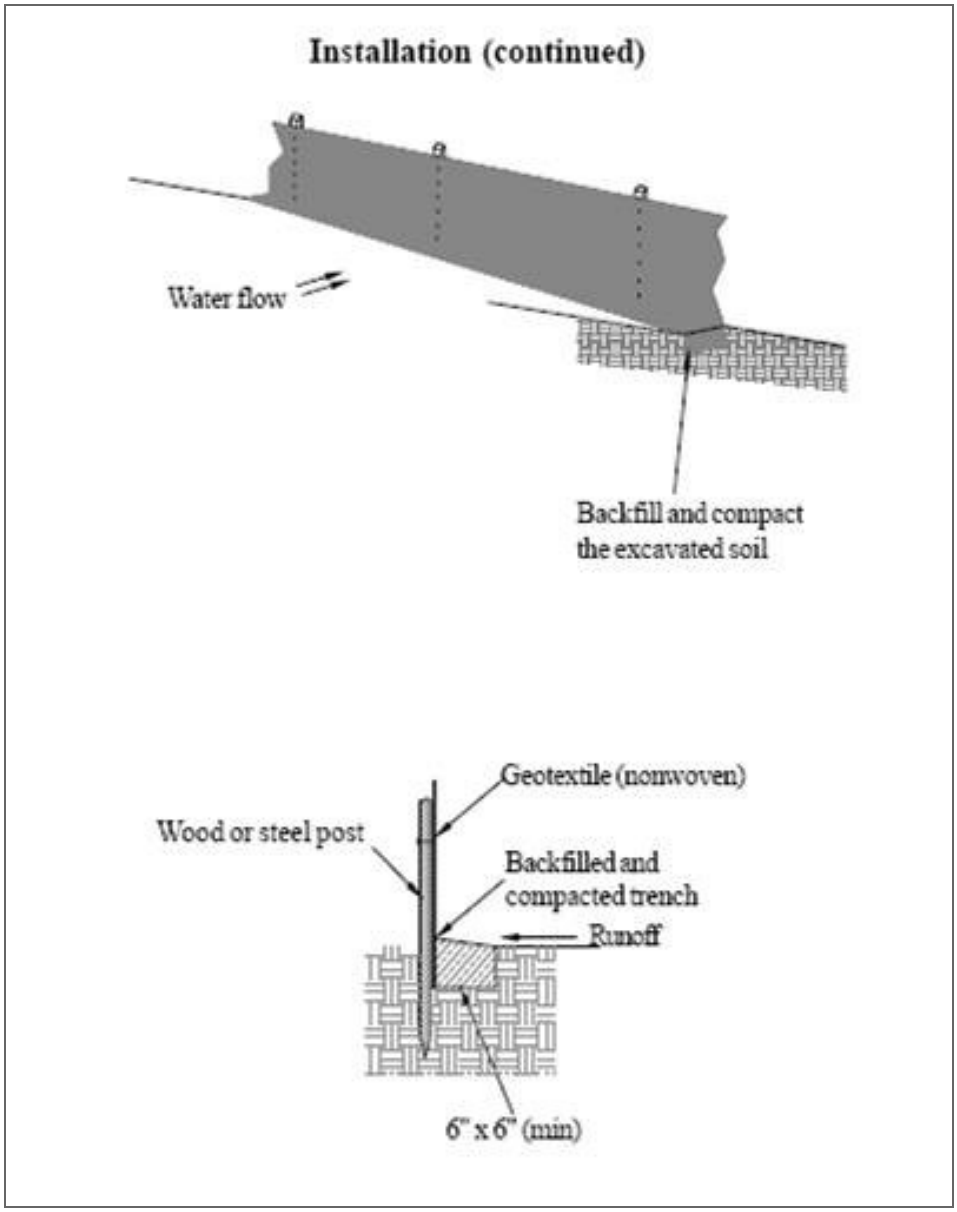
4. Attach continuous length of fabric to upslope side of the fence posts. Try to minimize the number of joints. Avoid joints at low points in the fence line. Where joints are necessary, fasten fabric securely to support posts and overlap to the next post.

5. Place the bottom 1" of fabric in the 6" deep trench (minimum) lapping toward the upslope side. Backfill with compacted earth or gravel.

Installation







Maintenance of a Sediment Fence

♦ Inspect sediment fences at least once a week and after each 1/2" or greater of rainfall. Make needed repairs immediately.

♦ Should the fabric of the sediment fence collapse, tear, decompose or become ineffective, replace promptly.

♦ Remove the sediment deposits as necessary to provide adequate storage volume for the next rain and to reduce pressure on the fence. Take care to avoid damaging or undermining the fence during cleanout.

♦ If the utilities are installed after BMPs have been put in place, the permit holder is responsible for control of erosion and sediment during the construction process and they are responsible to ensure that all BMP devices are reinstalled per the original design.

Progress Check

- List several construction materials that can be recycled.
- Name at least four minimum requirements for a sediment fence.

Project Management

Glossary of Terms

Activity Duration - The best estimate of the time (hours, days, weeks, months, etc.) necessary for the accomplishment of the work involved in an activity, considering the nature of the work and resources needed for it.

Activity File - A file containing all data related to the definition of activities on a particular project.

Activity Node - Diagram of an individual activity showing various characteristics of that activity or task.

Actual Cost - Incurred costs that are charged to the project budget and for which payment has been made, or accrued.

Actual Finish Date - The calendar date that work actually ended on an activity. It must be prior to or equal to the data date. The remaining duration of this activity is zero.

Actual Start Date - The calendar date work actually began on an activity. It must be prior to or equal to the data date.

Addenda - A list of things to be added.

Appraised Value - The value placed on an item, product or service by an appraiser, recognized in a specific field.

As-Built Documentation - Drawings and diagrams that provide an accurate representation of how the product or facility is actually built.

As-Built Schedule - A reconstruction of the Project Schedule to reflect the sequence and durations in which the project work was actually accomplished. A process frequently used in developing or analyzing contractor claims for extra money by high-lighting delays to progress.

Backcharge - The cost of corrective action taken by the purchaser, chargeable to the supplier under the terms of the contract.

Bar Chart - A view of project data that uses horizontal bars on a time scale to depict activity information. Frequently called a Gantt chart.

Bid - An offer to perform the work described in a set of bid documents at a specified cost.

Budget - When unqualified, usually refers to an estimate of funds planned to cover a fiscal period. (See project budget.) Also a planned allocation of resources.

Business Cash Flow - Investment outlays and cash that you are able to access through your business, whether it be through accounts receivable or a line of credit.

Cash Flow Management - The planning of project expenditures relative to income in such a way as to minimize the carrying cost of

the financing for the project. This may be achieved by delaying some of the major activities, but only at the risk of late completion and consequent increased cost.

Cash-Out Refinance - A type of refinance where you take out a mortgage for more than you currently own, then pocket the difference.

Claim - The assertion of one of the contracting parties against the other seeking financial adjustment or interpretation with financial implications of an existing contract, subject to the terms of the contract's dispute clause.

Closeout - The completion of all work on a project.

Commitment Fee - A charge by a lender for holding credit available for a borrower.

Completed Activity - An activity with an actual finish date and no remaining duration.

Conceptual Project Planning - The process of developing broad-scope project documentation from which the technical requirements, estimates, schedules, control procedures and effective project management will all flow.

Construction-permanent loans - A loan designed for borrowers who choose to finance the construction of their home by a reputable builder. The loan is made directly to the borrower and not to thebuilder.

Contract - A binding agreement to acquire goods and/or services in support of a project.

Contract Change Order - An authorized modification to some terms of the contract. This may involved any of the following: A change in the volume or conditions of the work involved, the

number of units to be produced, the quality of the work or units, the time for delivery, and/or the consequent cost involved.

Cost Accounting - The process of tracking, recording and analyzing costs associated with the products or activities of the business.

Cost Analysis - The analysis of the cost elements of a proposal or on-going work. It includes verification of cost data, evaluation of all elements of costs, and projection of these data to determine the effect on price.

Cost Estimating - The process of assembling and predicting the costs of a project. It includes economic evaluation, project investment cost and the prediction of future trends and costs.

Critical Activity - Any activity on a critical path.
Editors Note: Any activity viewed as requiring special attention, i.e. particularly effective or efficient execution because of high risk to scope, cost or time, should be included on the critical list for the project to be successful.

Critical Path Method ("CPM") - A technique used to predict project duration by analyzing which sequence of activities has the least amount of scheduling flexibility. Early dates are figured by a forward pass using a specific start date and late dates are figured by using a backward pass starting from a completion date.

Data - All recorded information, regardless of form or characteristic.

Direct Project Costs - The costs directly attributable to a project, including all personnel, goods and/or services together with all their associated costs, but not including indirect project costs, such as any overhead and office costs incurred in support of the project.

Document Control - A system for controlling and executing project documentation in a uniform and orderly fashion.

Draw Request - A sum of money requested from the lender for the purpose of paying the contractors, subcontractors and/or suppliers who have furnished services, materials or labor as of the date of the request.

Duration - The length of time needed to complete an activity.

Earliest Finish Date - The earliest date that the work item can finish if it starts on its earliest start and is completed in its expected time.

Earliest Start Date - The earliest date that the work item can start provided every preceding work item starts at its earliest start date and is completed in its expected time.

Efficiency - The ratio of the useful work obtained to the energy expended.

Encumbrances - A legal term for anything that affects or limits the title of the property, such as mortgage, lease easement, lien or restriction.

Estimate - The prediction of a quantitative result. It is usually applied to project costs, resources and durations.

Ethics - A set of moral principles or values: the principal of conduct governing an individual or group.

Float - The difference between the time available for performing a task and the time required to complete it. If the total float for a task equals zero, then that task is on the critical path.

Floating Task - A task that can be performed earlier or later in the schedule without affecting the project duration.

Free Float - The maximum amount by which an activity can be delayed beyond its early dates without delaying any successor activity beyond its early dates.

Front Loading - An attempt by a performing contractor to provide adequate budgets for the near-term work, but at the expense of the far-term effort which will be underfunded. It is an attempt to delay the acknowledgment of a potential cost overrun, in the hope that the contractor may "get well" through changes in the contract statement of work. Front loading is often the result of inadequate or unrealistic negotiated contract target costs.
Editors Note: Also referred to as Front End Loading.

Gantt Chart - A chart using time lines and other symbols that illustrates multiple, time-based activities or projects on a horizontal time scale.

Historic Records - Project documentation that can be used to predict trends, analyze feasibility and highlight problem areas/pitfalls on future similar projects.

Historical Database - Records accumulating past project experience stored as data for use in estimating, forecasting and predicting future events.

Idle Time - A time interval during which either the workman, the equipment or both do not perform useful work.

In-House - Within the organization. Typically refers to work undertaken by the employees of the organization rather than by outside contract.

Incurred Cost - Total cost to date (i.e. including liabilities for all goods, service, work.) See also Total Expenditure to Date.

Indirect Project Cost - All costs which do not form a part of the final project, but which are nonetheless required for the orderly

completion of the project and which may include, but not necessarily be limited to field administration, direct supervision, incidental tools and equipment, startup costs, contractors fees, insurance, taxes, etc.

Integrity - In dealings between parties, firm adherence to a code of moral values including completeness, honesty, honor, forthrightness, straightforwardness and entirety.

Invoice - A contractors bill or written request for payment under the contract for supplies delivered or services performed.

Just-In-Time - A pull system driven by actual demand. The goal is to produce, provide or deliver parts or supplies just in time for the next operation. The approach reduces stock inventories or storage costs, but leaves no room for error. As much a managerial philosophy as it is an inventory system.

Key Personnel - People who are critical to the project organization.

Lag - The amount of time after one task is started or finished before the next task can be started or finished.
Editors Note: A Lag may have a negative value tied to the finish of a previous activity, reflecting a Fast Track approach.

Latest Finish - The latest day a work item can finish without affecting the project duration assuming that all subsequent work items start as soon as they are able and are completed in their expected times.

Latest Start - The latest day that a work item can start without affecting the final project duration. This assumes that it is completed in its expected time and all subsequent work items start as soon as they are able and are completed in their expected times.

Lead Time - The time required by one task before another task can begin.

Loan-To-Value Ratio - Mathematical calculation which expresses the amount of a first mortgage lien as a percentage of the total appraised value of the real property.

Overall Quality Philosophy - The universal belief throughout a company that quality is important and performance is based on conformance to requirements/specifications, based on established quality policies and procedures. These policies and procedures become the basis for collecting facts about a project for study and analysis.

Parallel Activities - Two or more activities than can be done at the same time. This allows a project to be completed faster than if the activities were arranged serially in a straight line.

Plat of Survey - A drawing that represents a single property that has been surveyed in the field and certified by a land surveyor.

Positive Float - The amount of time available to complete non-critical activities or work items without affecting the total project duration.

Post Project Analysis and Report - A formal analysis and documentation of the project's results including cost, schedule and technical performance versus the original plan.

Price Variance ("PV") - The difference between the budgeted costs for a purchased item and the actual costs.

Problem Analysis Report ("PAR") - A report made by the responsible manager to explain a significant cost or schedule variance, its probable impact on the project, and the corrective actions to be taken to resolve the problem(s).

Procurement Planning - The determination of what to procure (i.e. buy or otherwise obtain), when and how.

Project Budget - The amount and distribution of money allocated to a project.

Project Cash Flow - The investment outlays and net cash flows after a project goes into operation.

Project Management ("PM") - The art and science of managing a project from inception to closure as evidenced by successful product delivery and transfer.

Project Quality Management - A subset of project management that includes quality planning, quality assurance and quality control in an effort to satisfy the needs and purpose of the project.

Project Records Management - The system and procedures established by the Company for the consistent and effective storage and retrieval of all project information for the efficient use by the project manager and his/her project Team.

Punch List - A list made near to the completion of a project showing the items of work remaining in order to complete the project scope.

Quality Control ("QC") - The process of monitoring specific project results to determine if they comply with relevant standards and identifying ways to eliminate causes of unsatisfactory performance.

Quality Plan - A document setting out the specific quality practices, resources and sequence of activities relevant to a particular product, service, contract or project.

Quality Policy - The overall quality intentions and direction of an organization as regards quality, as formally expressed by top management.

Rate Lock - A promise by a lender to hold an interest rate for a period of time while a loan application is being processed.

Real Time - Immediate response to an outside stimulus.

Records Management - The effective and efficient receipt, processing, storage and retrieval of all project records, in whatever form (hardcopy, electronic, etc.). A good Records Management program should:

- Encompass all records having a bearing on the project's activities including procurement and technical aspects
- Establish policies for standardizing required forms, reports, procedures and manuals
- Ensure smooth and consistent distribution of information throughout the project organization on a need-to-know basis
- Expedite all required or outstanding information
- Ensure security of vital records
- Provide necessary retention for historical purposes
- Meet legal retention requirements
- Withdraw and destroy obsolete duplicates

Every project large and small is involved in records management to a greater or lesser degree whether recognized or not. A conscious effort in this area can greatly reduce the time and effort required to trace information or to avoid duplication of work in the field due to oversight or misplaced information.

Remaining Float ("RF") - The difference between the early finish and the late finish date.

Retainage - A sum of money withheld from the progress payments to the contractor and later paid in accordance with the terms of the construction contract.

Schedule - A time sequence of activities and events that represent an operating timetable. The schedule specifies the relative

beginning and ending times of activities and the occurrence times of events. A schedule may be presented on a calendar framework or on an elapsed time scale.

Scheduled Cost ("SC") - The total cost of work when completed as calculated according to the current schedule.

Scheduled Finish Date ("SF") - The date work was scheduled to finish on an activity. The scheduled finish date is normally within the range of dates delimited by the early finish date and the late finish date.

Scheduled Start Date ("SSD") - The date work was scheduled to start on an activity. The scheduled start date is normally within the range of dates delimited by the early start date and the late start date.

Settlement Agent - The party involved in completing a transaction between a buyer and seller.

Specification - The document that prescribes the requirements with which the product or services has to conform.

Statement of Work - A narrative description of the work to be performed.

Subcontractor - Any supplier, distributor, vendor, or firm that furnishes supplies or services to or for a prime contractor or another subcontractor.

Substantial Completion - The point in time when the work is ready for use or is being used for the purpose intended and is so certified.

Successful Project - A project is successful when:

1. The objectives of the project have been achieved to the full satisfaction of the users,

2. All closeout activities have been completed, and
3. All designated interests, including the project's sponsor and/or initiator officially accept the project results or products and close the project.

Sweat Equity - The contribution made to a project by people who contribute their time and effort.

Systems and Procedures - The standard methods, practices and procedures for handling frequently occurring events within the project.

Team Meeting - A formal assembly of the members of the project team, at which progress reports may be presented, directions given, or problems reviewed and solved. A record, or minutes of meeting, should be issued following any such meetings.

Team Motivation - The process by which the project manager influences his project team to initiate effort on the project tasks, expend increasing amounts of effort on those tasks, and to persist in expending effort on these tasks over the period of time necessary for project goal accomplishment.

Time Management - The function required to maintain appropriate allocation of time to the overall conduct of the project through the successive phases of its life cycle.

Title - Bundle of rights in which a party may own either a legal interest or an equitable interest of a piece of property.

Title Company - Company that coordinates the interest of all parties to a real estate transaction.

Total Cost - The calculated cost of a project, task or resource over the life of a project.

Total Float ("TF") - The maximum number of work periods by which an activity can be delayed without delaying project completion or violating a target finish date.

Total Quality Management ("TQM") - A strategic, integrated management system for customer satisfaction that guides all employees in every aspect of their work.

Unavoidable Delay - A production delay the operator cannot prevent.

Unit Cost - Total labor, material, and overhead cost for one unit of production, i.e., one part, one gallon, one pound, etc.

Working Calendar - The total calendar dates which cover all project activities, from start to finish.

Zero Float - A condition where there is no excess time between activities. An activity with zero float is considered a critical activity. If the duration of any critical activity is increased (the activity slips), the project finish date will slip.