



مدیریت کسب و کار در صنعت ساخت (Construction Business Management)

ماژول ۲: مدیریت کسب و کار

بخش پنجم: مدیریت ریسک

ارائه دهنده:

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CMAA Authorized Trainer

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What we will learn?

- ☐ Risk Factors
- ☐ Early Signs
- ☐ Risk Management
- ☐ Risk Management Strategies
- ☐ Insurance
- ☐ Bonding
- ☐ Exercises

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Risk Factors

Risk factors

❑ Today's construction risk environment is dramatically different than it was in the past, and **risk factors** are mutating just enough to be **almost unrecognizable**.

❖ In **addition to project risks**, inherent construction risks can result from **changes** in

the contractor's typical project size, type, geographic area, key personnel, and/or managerial maturity.

✓ The **cyclical nature** of the **construction market** also magnifies the risk of project and contractor failure.

These risks are most pronounced and arise regularly in a recovering market:

1 Shortage of Skilled Labor Risk:

- ❖ Following a construction market **decline**, a **number of workers** leave the industry.
 - ✓ Therefore, when the industry **starts to grow again**, companies are short on skilled labor and
may **not be able** to complete quality work on **time and on budget**.

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2 Company Growth Risk:

- ❖ After an **economic recession**, the **market begins to grow** again.
- ❖ At such a time, **growth is always welcome** and **rarely** seen as a major cause of **impending failure**.
 - ❖ However, research reveals when a construction company **expands in size**, it requires **careful management decisions** to **reduce the risks inherent in changes**.
 - ✓ **Growth** itself **impacts failure** and the potential for **financial distress**.

3 Subcontractor Risk:

- ❖ Subcontractors are a fundamental part of the construction process and are subject to most of the **same market changes** as general contractors (e.g., labor shortages, material price escalation).

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4 Capital Risk:

- ❖ Secured equipment loans, unsecured working capital credit, and surety credit for bid, payment, and performance bonds are **vital to the growing** construction enterprise.
- ❖ **Long durations of market downturns** can financially **weaken some companies** and impact their **credit worthiness**.
- ❖ A **construction company** may show **positive income** on its financial statement, and **then suddenly** experience a **financial crisis** due to a **lack of cash** and **limited borrowing power**.
- ❖ A **considerable number** of construction companies **exit** the business because they **run out of credit**.

5 Commodity Risk:

- ❖ Construction is a **custom service** and **product** that some project owners are beginning to think of as a **commodity**, causing some to believe that all construction companies perform alike.
 - ✓ This, in turn, **encourages owners** to be **less discriminate** about contractor selection and to **think of price** as the **single key differentiator**.
 - ✓ This is one of the reasons **profit margins are low**,
when compared to the **historic norms**.
- ❖ When **buyers** of construction services believe a product is a **commodity**, they generally **expect to pay less**.

6 Contract Risk:

- ❖ In this **highly competitive** growth market, **contract terms** concerning the **responsibility of each party** to the agreement are **changing**.
 - ✓ Construction buyers (owners) and designers **attempt to shift risk** in varying directions.
 - ✓ At the same time, **case law (court rulings concerning construction disputes)** sometimes **further cloud the issue** of which party is responsible.

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7 Change Risk:

❖ When a firm **expands in size**, it **gradually evolves** into a **different organization**.

✓ Change always has **risks associated with it**.

○ For example, growth-related changes impact

1. The amount of capital required,
2. The time and attention management can spend on multiple projects, and
3. The expertise required to complete new types of projects.

8 Accounts Receivable Risk:

- ❖ Accounts receivable are an **asset** but unfortunately cannot be used to pay bills.
- ❖ There are any **number of failed construction** enterprises that **may have survived** if they had all the money that was owed to them.
- ❖ **Poor management** of accounts receivable including managing the payment process is one of the **major risks** in the construction business.

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9 Innovation Risk:

❖ **Advancements** in field and office technology, and developments in project funding methods, introduce **potential risk initially**.

- ✓ Selecting and implementing new technology can significantly **consume management's time** and attention;

if the **selected** innovation **does not perform as expected**,

that time **investment can be costly**.

- ✓ **New methods** (e.g., construction methods, public-private financing) are **initially risky** simply because project stakeholders have **limited experience** with them.

Early Signs

Early signs

❑ **While** most owners, construction managers, designers, contractors may complain when a **project goes bad**,

many express some variation of

“I had a bad feeling about this for months” or

“All the signs were there, but I was hoping for the best,”

so they may **not** always be **totally surprised**.

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Early signs

❑ Some early signs of trouble before default include

- (1) complaints from suppliers or subcontractors about unpaid invoices, partial or late payments,
- (2) contractors asking for advance payment or help making payroll,
- (3) unexplained cuts in crew size,
- (4) declining work quality,
- (5) overbilling of quantities or percentage of work completed,
- (6) unusual requests for payment of materials ordered and stored off-site, and
- (7) changes in foremen, supervisors, or middle management.

Long-term employees can often sense trouble early on and may leave for other opportunities.

Risk Management

Risk management

❑ As discussed in this course, **construction is a risky business**, and risk management is an **essential responsibility** in managing a construction company.

❖ This includes

1. The risks encountered by being a **business enterprise** as well as
2. The risks associated with **constructing projects**.

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Risk management

- ❑ **Depending** on how the contract is priced (lump sum, unit price, or cost plus), the **construction company** may have assumed the **risk** of obtaining the needed materials, labor, and equipment within an **agreed price** and **completing the project** by the contractual completion date.
- ❖ Some of this risk may be **transferred contractually** to **subcontractors**,
but **much of the risk remains** with the general contractor.
- ✓ In addition, the construction company incurs the **risk** of
 1. Subcontractor bankruptcy and
 2. Poor workmanship**when using subcontractors.**

Risk management

- ❑ The **major business risks** faced by most construction companies are
 - ❖ **Health and safety** of its employees while working on the job or at another location,
 - ❖ **Injury or property loss** to third parties as a result of company activities,
 - ❖ **Damage or loss** to construction work in place
but **not yet accepted** by the owner, and
 - ❖ **Loss of or damage** to its vehicles and construction equipment.

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- ❑ **These risks and liabilities** are so great that most construction firms **must purchase insurance policies** to protect, or partially protect, themselves against financial loss that may result from these risks.

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Risk Management Strategies

Risk management strategies

- ☐ Because construction is a **risky business**, risk management is a **major responsibility** of the **leaders** of a construction firm.
- ☐ The major risk categories are
 1. People
 2. Property
 3. Process

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Risk management strategies

❑ Risk management involves

1. Identifying each risk,
2. Assessing the potential impact on company assets, and
3. Selecting an appropriate management strategy,

as illustrated in Figure 3.1

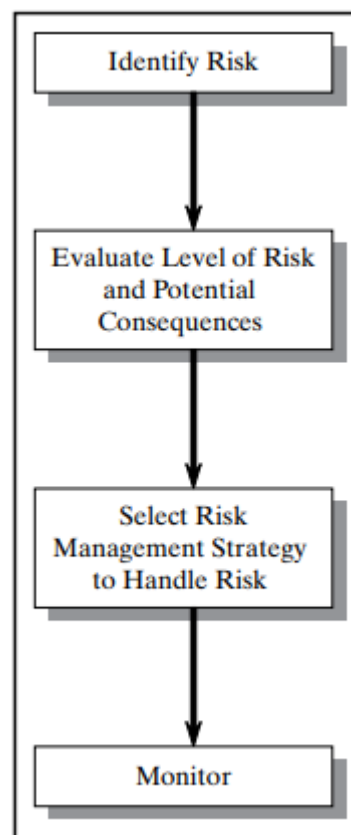


FIGURE 3.1 Risk Management

Risk management strategies

- ☐ Once **strategies** have been **selected**, it is important to monitor the results obtained.
- ☐ **Some** construction firms have a **full-time risk manager**,
while in other companies, risk management is a **part-time responsibility**,
often assigned to the company safety director.

The overall objective of risk management is to reduce the cost of doing business

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Risk management strategies

□ In general, there are **three alternative strategies** for managing a risk:

1. Avoid the risk
2. Accept the risk
3. Transfer the risk

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Risk management strategies

- ❑ Sometimes a **project is too risky** to undertake, and a construction firm may choose **not to compete** for it.
 - ❖ This is an **example of avoiding** the risk.
- ❑ In another project, the construction firm may choose to **accept the risk and include** an appropriate **contingency in its proposal**.
- ❑ Risk transfer occurs **through contracts**, either by
 1. Language in the construction contract or subcontracts, or
 2. Insurance contracts purchased from insurance companies.
 - ❖ Requiring **surety bonds from subcontractors** is another form of risk transfer

Insurance

Insurance contracts

- ❑ Insurance policies are **two-party contracts** under which the insurer promises, for a fee or premium, to **assume financial responsibility** for specified losses or liabilities of the insured for a specified period of time.
- ❖ Some policies are written with **deductible amounts** that are the responsibility of the **insured**.

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Insurance contracts

- ❑ **One of the most important** areas with respect to insurance policies is to be absolutely certain that the **named insured is correctly shown**.
 - ❖ If an **individual company** is doing business, it should be so **named on the policy**.
 - ❖ **Corporate entities** must be named.
 - ❖ **Joint ventures** or **partnerships** must be named.
- ❑ **Just because** the individual members of a joint venture have insurance, it does **not mean** that the joint venture is insured unless it is specifically identified in the policies.

Insurance contracts

❑ Insurance companies are **rated by the A.M.**

❖ Best Company, using the ratings shown in Figure 3.2.

- ✓ Most construction companies select insurance companies that are rated A or better, but in some circumstances insurance companies rated as B++ or B+ may be used.
- ✓ Using lower-rated companies is not recommended.

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FIGURE 3.2 Insurance Company Ratings

Insurance Company Rating Scale used by A. M. Best Company	
Ratings	Categories
<i>Secure Ratings:</i>	
A++ and A+	Superior
A and A-	Excellent
B++ and B+	Very Good
<i>Vulnerable Ratings:</i>	
B and B-	Fair
C++ and C+	Marginal
C and C-	Weak
D	Poor

Insurance agents

- ❑ Because construction insurance is **specialized and complex**, construction companies rely on insurance **brokers or agents** who are familiar with the risks faced in the construction industry and understand the **types of insurance coverage needed** by a construction company.
 - ❖ These **insurance agents** help the company leaders to develop a comprehensive **insurance program** and to procure the needed policies **at competitive prices**.
 - ❖ **Insurance cost** may account for up to 20 percent of a construction company's total overhead cost, so it must be **carefully managed**.

Insurance agents

- ❑ When **selecting an insurance agent**, a construction company should select an individual or a firm that has **extensive knowledge** of
 1. The construction industry and
 2. The risks and challenges faced by construction companies.

- ❑ The job of the insurance agent is to be a **source of information** regarding
 - ❖ The types of insurance products on the market,
 - ❖ The suitability of specific insurance companies,
 - ❖ The anticipated cost of various levels of coverage, and
 - ❖ The use of deductibles.

Insurance agents

❑ Good insurance agents will provide the following services:

❖ Program administration

- ✓ Monitor the **insurance industry** and keep the construction company **appraised** of changes or trends.
- ✓ Assess **construction insurers** with respect to **service and cost**.
- ✓ Review insurance **policy language** to ensure that the construction firm has the **desired coverage**.

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Insurance agents

❑ **Good insurance agents** will provide the following services:

❖ **Risk management**

- ✓ Assist the construction firm in the development of a **risk management plan**.
- ✓ Respond to **coverage questions** and any **new risk exposure**.

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Insurance agents

❑ Good insurance agents will provide the following services:

❖ Claim support

- ✓ Act as **liaison** between the construction firm and the insurance company on any **claims issues**.
- ✓ Review **coverage issues** and, if necessary, **negotiate** with the insurance company on **behalf of the construction firm**.

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Insurance types

□ Let's now discuss the **major types of construction insurance**.

❖ Typical insurance policies can be grouped into **four areas**:

1. Property insurance for the construction project
2. Property insurance for the construction company's property
3. Liability insurance
4. Business insurance

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Insurance types

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Insurance types

❑ Property Insurance for the Construction Project

- ❖ **Multiple insurance policies** may be needed to provide protection **against financial loss** due to damage to a project under construction, as illustrated in Figure 3.3.

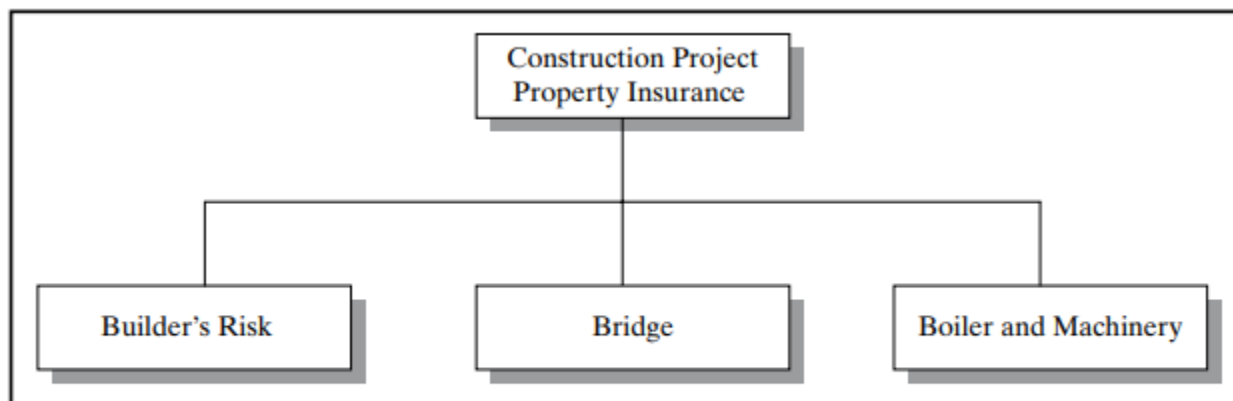


FIGURE 3.3 Insurance Coverage for Construction Projects

Insurance types – Builder's risk insurance

- ❑ Builder's risk insurance is a **first-party insurance** that provides coverage for the **cost of damages** to the project during construction,
 - which include **temporary structures** and any **materials stored** on the project site, but not the contractor's equipment.
 - ❖ It protects both the **owner and the contractor** against direct losses.
 - ❖ If listed as **named insureds**, the insurance also **protects all subcontractors** working on the project.

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Insurance types – Builder's risk insurance

- ❑ **Builder's risk insurance** is often purchased by the **owner**,
with **coverage extending** to both the general contractor and the subcontractors.
- ❖ In **some** instances, the construction **contract requires the general contractor** to purchase the builder's risk insurance and
name both the owner and all the subcontractors as additional
named insureds.
 - ✓ As with other types of insurance, builder's risk insurance policies
may be **purchased with a deductible amount**.

Insurance types – Builder's risk insurance

- ❑ **Coverage** should be **equal** to the initial contract amount plus the value of any owner-furnished material and
be **increased** by the value of any subsequent modifications in the contract amount.
- ❑ The **policy** should be written to cover property in transit and property stored at off-site locations.
- ❑ The **policy** should grant permission to occupy, allowing the building or structure to be **partially occupied prior to completion**,
without detrimental effect to the coverage being provided.
- ❑ The policy should also provide **coverage** for the perils of earth movement (earthquake) and flood.

Insurance types – Bridge insurance

❑ Bridge insurance is a type of **inland marine insurance**

that provides **builder's risk** type of coverage to **bridge projects**,

which **may be excluded** from coverage by conventional builder's risk policies.

❑ Typical coverage includes **damage** to

- ❖ The project under construction,
- ❖ Any temporary structures, and
- ❖ Stored materials.

Insurance types – Boiler and machinery insurance

❑ Most builder's risk and commercial general liability insurance policies **exclude** coverage for **loss or damage** due to breakdown of machinery.

❖ Consequently, **boiler and machinery insurance** may be needed to cover this uninsured risk.

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Insurance types – Boiler and machinery insurance

❑ Such policies cover

❖ **Financial loss** due to mechanical breakdown of boilers, electrical equipment, pumps, motors, compressors, or air-conditioning equipment.

✓ Such mechanical breakdown must be **accidental** and **cause physical damage**

to the **covered item**,

necessitating its repair or replacement.

❖ **Financial loss** incurred because of mechanical failure of covered items, such as **explosion** of a boiler or failure of **refrigeration equipment**

Insurance types

□ Let's now discuss the **major types of construction insurance**.

❖ Typical insurance policies can be grouped into **four areas**:

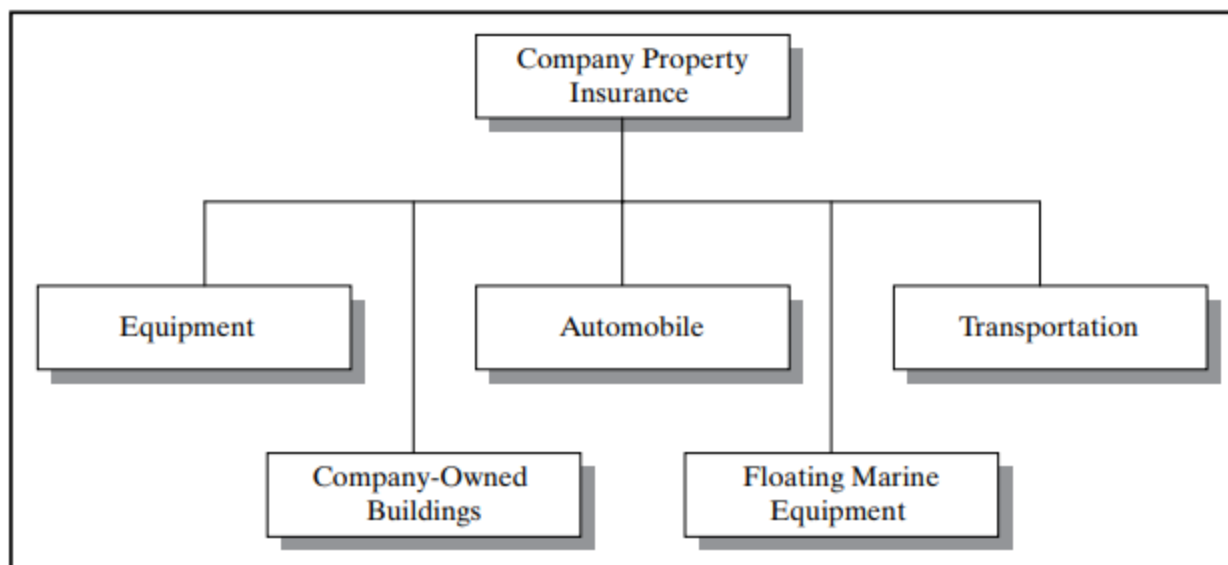
1. **Property insurance for the construction project**
2. **Property insurance for the construction company's property**
3. Liability insurance
4. Business insurance

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Insurance types – Property Insurance for the Construction Company's Property

- ❑ Construction companies need to consider the **consequences of financial loss** due to loss of or damage to owned property.
- ❖ Depending on the **type of property owned**, a company may need to **purchase multiple insurance policies** to transfer this risk, as illustrated in Figure 3.4.

FIGURE 3.4 Insurance Coverage for Company Property



Insurance types

□ Let's now discuss the **major types of construction insurance**.

❖ Typical insurance policies can be grouped into **four areas**:

1. **Property insurance for the construction project**
2. **Property insurance for the construction company's property**
3. **Liability insurance**
4. **Business insurance**

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Insurance types – Liability insurance

□ Liability insurance is needed when in the course of conducting business, a **construction company** happens to **incur any of the following types** of legal liability:

❖ Liability for

1. Personal injury to third parties and/or
2. Physical damage to their property.

❖ Liability for **acts of parties** for whom **it is responsible**, such as subcontractors.

❖ Liability for **latent defects** in **completed projects**.

❖ Liability that **results from design or professional services** provided.

❖ Liability to **employees injured** on the job.

❖ Liability for **actions taken** by **company employees**.

Insurance types – Liability insurance

- ❑ **No one insurance policy** will provide coverage for **all these various liabilities**, so a construction company needs to acquire a **package of various liability** insurance policies, as illustrated in Figure 3.5.

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Insurance types – Liability insurance

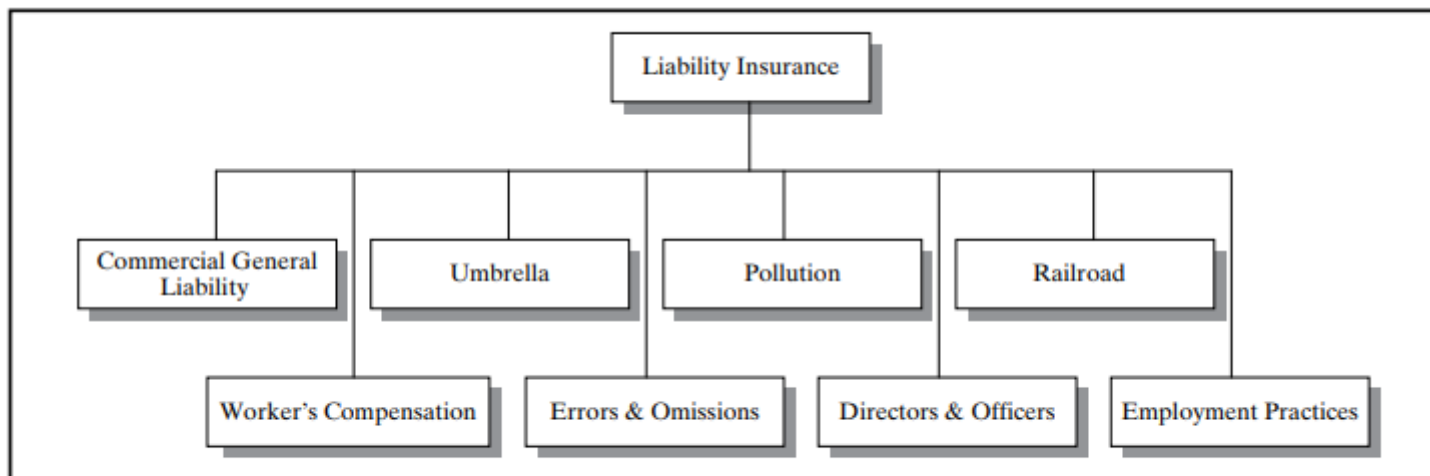


FIGURE 3.5 Liability Insurance Coverage

Insurance types

□ Let's now discuss the **major types of construction insurance**.

❖ Typical insurance policies can be grouped into **four areas**:

1. **Property insurance for the construction project**
2. **Property insurance for the construction company's property**
3. **Liability insurance**
4. **Business insurance**

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Insurance types – Business insurance

❑ Key-Person Insurance

- ❖ Key-person insurance is life insurance obtained by the construction company on company principals.
- ❖ These policies provide protection to the company against financial losses that may result from the untimely death of a principal.
- ❖ They simply are large life insurance policies that are owned by the company.
- ❖ The benefits from such policies are generally used to finance buy/sell agreements that the deceased made with the company as a part of its succession plan.
- ❖ Without such an infusion of capital, the company may be unable to purchase the financial interests of the deceased without resorting to the sale of company assets.

Insurance types – Subcontractor insurance

- ❑ By the terms of its subcontracts, **general contractors** typically require **each subcontractor** to provide and maintain **certain levels of insurance coverage**.
 - ❖ Usually, the coverage limits required of subcontractors are the **same as those required of the general contractor** by the project owner.
- ❑ Many general contractors also require subcontractors to **list the general contractors as additional insured** on the subcontractors' liability insurance policies.
- ❑ This is an important part of a **general contractor's overall risk management strategy**.

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Insurance certificate

- ❑ Under the terms and conditions of most construction contracts, the **contractor is required to submit** a certificate of insurance, similar to the one illustrated in Figure 3.7.

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Insurance certificate

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ماژول ۲: مدیریت کسب و کار

بخش پنجم: مدیریت ریسک

CERTIFICATE OF INSURANCE			
Producer (Insurance Broker) <i>Cascade Insurance Agency</i>	THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.		
	COMPANIES AFFORDING COVERAGE		
Insured <i>Western States Construction Company</i>		INSURANCE COMPANY	BEST RATING
	Company Letter A	<i>National Insurance</i>	AAA
	Company Letter B	<i>National Insurance</i>	AAA
	Company Letter C	<i>National Insurance</i>	AAA
	Company Letter D		

Insurance certificate

COVERAGES

THIS IS TO CERTIFY THAT THE INSURANCE POLICIES LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM, OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED BELOW IS SUBJECT TO ALL THE TERMS, EXCLUSIONS, AND CONDITIONS OF SUCH POLICIES. LIMITS MAY HAVE BEEN REDUCED BY PAID CLAIMS.

Co. Ltr.	Type of Insurance	Policy Number	Policy Effective Date (M/D/Y)	Policy Expiration Date (M/D/Y)	Limits
A	General Liability ☒ Commercial General Liability — —	27ABC649	10/1/05	9/30/06	General Aggregate \$2,000,000 Products/Comp Ops Agg \$2,000,000 Pers. & Adv. Injury \$2,000,000 Each Occurrence \$2,000,000 Fire Damage (any one fire) \$1,000,000 Med. Expenses (any one person) \$100,000
B	Automobile Liability ☒ Any Automobile —	27ABC659	10/1/05	9/30/06	Combined Single Limit \$1,000,000 Bodily Injury (per person) \$500,000 Bodily Injury (per accident) \$1,000,000 Property Damage \$500,000

(continued)

Insurance certificate

FIGURE 3.7 (continued)

C	Excess Liability <u>X</u> Umbrella Form —	27ABC789	10/1/05	9/30/06	Each Occurrence Aggregate	\$10,000,000 \$20,000,000
D	Worker's Compensation				Each Accident Disease Policy Limit Disease (each employee)	\$ \$ \$

PROJECT NAME FOR ALL OPERATIONS:

Northwest Development Company is an additional insured per attached endorsement. The liability insurance referred to in this certificate is primary and non-contributory to any insurance carried by *Western States Construction Company* per attached endorsement.

CERTIFICATE HOLDER

Northwest Development Company

CANCELLATION

SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELED BEFORE THE EXPIRATION DATE LISTED, THE ISSUING COMPANY WILL PROVIDE 7 DAYS' WRITTEN NOTICE TO CERTIFICATE HOLDER NAMED TO THE LEFT.

AUTHORIZED REPRESENTATIVE

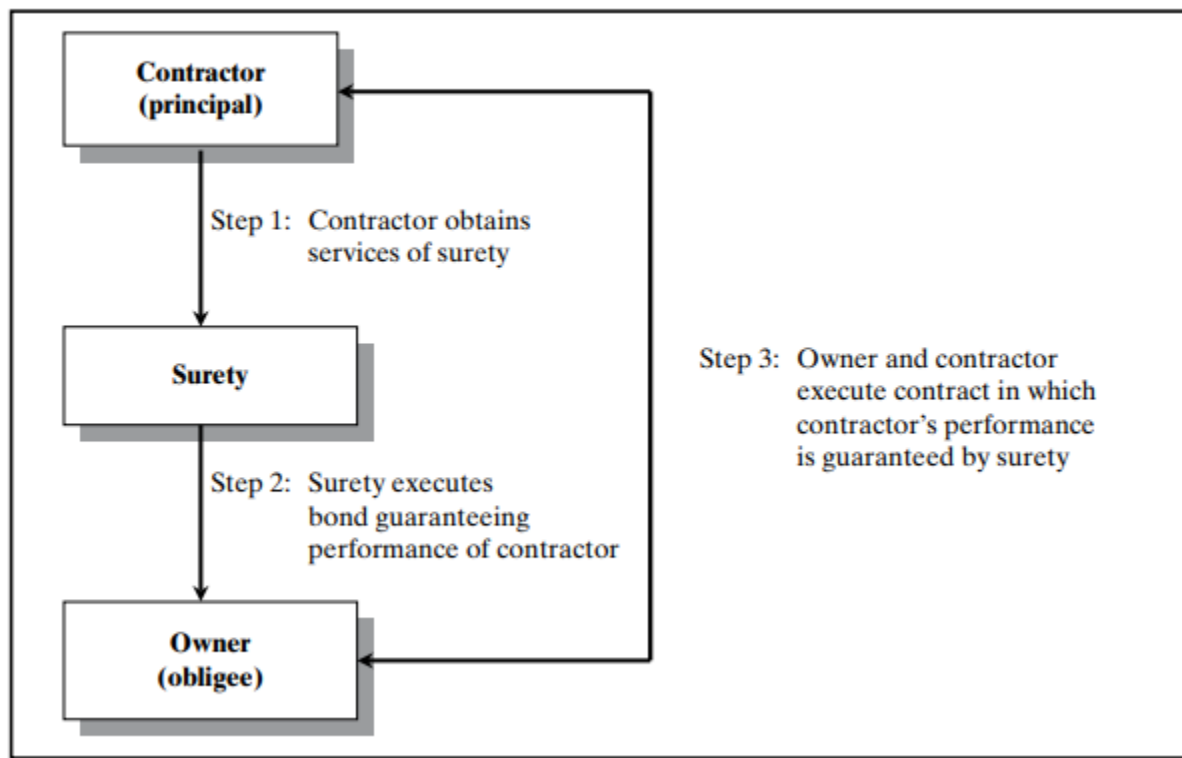
Henry Jones

Bonding

Surety relationship

- ❑ A surety is a party that assumes liability for the performance of another party.
- ❑ A surety bond is a **three-party contract**, as illustrated in Figure 3.8.

FIGURE 3.8 Surety Relationship



Surety relationship

- ❑ The **construction company**, known as the principal, **purchases a bond** from a surety, **guaranteeing** to the project **owner**, the obligee,
that the **construction firm will perform all its obligations** as specified in the construction contract.
- ❖ Should the **construction company default** on its contractual obligations, the **surety agrees to**
 1. **Step in** and perform the contractual obligations or
 2. **Compensate the obligee** for any additional costs up to the penal sum of the bond.

Surety relationship

- ☐ The **construction company** pays the surety a **fee** or **premium** in exchange for the bond guaranteeing performance to the obligee.
- ☐ **Most surety companies** in the United States are divisions of **major insurance companies**.

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Surety relationship

- ☐ Unlike bank credit, the surety does **not actually loan money** to the contractor.
- ☐ **In exchange** for the credit provided by the bond, the construction **company pays a fee, or premium**,
which generally **averages between 1 and 3 percent** of the **bond value**.

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☐ The **amount** of the **premium** charged depends on such factors as

1. The total project cost,
2. The project duration,
3. The type of project, and
4. The construction firm's financial condition

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Surety relationship

- ❑ A surety bond is **not an insurance policy**, as illustrated in Figure 3.9.
- ❑ The surety is a **guarantor of the performance** of the principal,
not an insurer of the obligee.
- ❑ A **surety agreement** is a three-party agreement,
while an **insurance** contract is a two-party agreement in which the **insurance company agrees to assume** those risks of the insured's that are **specified in the insurance policy**.
- ❑ **Insurance protects a party** from the risk of loss,
while a **surety bond guarantees** the performance of a contractual responsibility.

FIGURE 3.9 Comparison of Surety Bond with Insurance

Contract Surety	Insurance
<i>Type Agreement</i>	
3-party agreement	2-party agreement
<i>Term of Obligation</i>	
indefinite—until contractual obligation is performed	stated policy period
<i>Coverage</i>	
performance	named perils
<i>Indemnity Available to Surety or Insurance Company</i>	
indemnity agreement signed by company officers on behalf of principal	none

- ❑ **When selecting a bonding agent**, a construction company should **seek a firm that**
- ❖ Has experience with construction and has current clients performing similar types of construction work.
 - ❖ Has a reputation for honesty and integrity.
 - ❖ Has access to multiple surety markets.
 - ❖ Has an awareness of local, regional, and national construction markets.
 - ❖ Is actively involved in construction and surety industry associations.
 - ❖ Is a good personality match with the business culture of the construction firm.

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Bonding agents

- ❑ The **bonding agent** helps the construction company establish a **bond program**, which **revolves around two figures**,
 - (1) the **largest size project** that the company **should undertake** and
 - (2) the **total amount of bonded work outstanding** at any one time.
- ❑ The bonding agent should **periodically visit** the construction company's **projects** and should arrange **periodic meetings** between the construction firm and the surety, preferably at **least once per year**.

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Types of bonds – Bid bond

- ☐ A bid bond generally states a specified penal sum, which is usually **5 to 20 percent** of the **value of the total bid**.
- ☐ An example of a bid bond is shown in Figure 3.11.

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Types of bonds – Bid bond

FIGURE 3.11 Bid Bond

American Surety Company
126 William Street
New York, New York 10038

Bond No. BQ-157

KNOW ALL BY THESE PRESENTS, That we, Western States Construction Company of Seattle, Washington (herein called the Principal) as Principal and American Surety Company, a New York Corporation of New York, New York (herein called the Surety) as Surety are held and firmly bound unto the City of Seattle (herein called the Obligee) in the penal sum of nine hundred eighty-five thousand dollars (\$985,000) for the payment of which the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, That WHEREAS the Principal has submitted a bid to the Obligee on a contract for construction of the Sand Point Library.

NOW, THEREFORE, If the said contract be timely awarded to the Principal and if the Principal shall, within such time as may be specified, enter into the contract and give Bond with surety acceptable to the Obligee for performance of said contract, then this obligation shall be void; otherwise to remain in full force and effect.

Signed and sealed this fifth day of January, 2006.

<i>Harry P. Jones</i> (Witness) <i>Samuel T. White</i> (Witness)	<i>James B. Smith</i> James B. Smith, President Western States Construction Company (Principal) <i>Terry L. Johnson</i> Terry L. Johnson, Attorney-in-Fact American Surety Company (Surety)
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Types of bonds – Performance bond

- ☐ **Bond coverage** is for the **life of the contract** which includes the **one-year warranty** period.
- ☐ Bond premiums are based on the **value of the coverage**.
 - ❖ The rate per \$1,000 coverage **decreases as the size of the bond increases**.
- ☐ An example of a performance bond is shown in Figure 3.12.

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Types of bonds – Performance bond

FIGURE 3.12 Performance Bond

American Surety Company
126 William Street
New York, New York 10038

Bond No. BP-157

KNOW ALL BY THESE PRESENTS, That we, Western States Construction Company of Seattle, Washington (herein called the Principal) as Principal and American Surety Company, a New York Corporation of New York, New York (herein called the Surety) as Surety are held and firmly bound unto the City of Seattle (herein called the Oblige) in the penal sum of nine million, eight hundred fifty thousand dollars (\$9,850,000) for the payment of which the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, That WHEREAS the Principal has entered into a written contract with said Oblige, dated January 16, 2006, for the Sand Point Library in accordance with the terms and conditions of said contract, which is hereby referred to and made a part hereof as if fully set forth herein.

NOW, THEREFORE, If the Principal shall promptly and faithfully perform said contract and reimburse the Oblige for all loss and damage sustained by reason of failure or default on the part of the Principal, then this obligation shall be void; otherwise to remain in full force and effect.

Signed and sealed this sixteenth day of January, 2006.

Harry P. Jones
 (Witness)

Samuel T. White
 (Witness)

James B. Smith
 James B. Smith, President
 Western States Construction Company
 (Principal)

Terry L. Johnson
 Terry L. Johnson, Attorney-in-Fact
 American Surety Company
 (Surety)

Types of bonds – Labor and material bond

- ☐ **Labor and material bonds** assure that the surety will pay these claims, in the event that the **construction contractor refuses to pay**.
- ☐ Coverage is usually the **same as that required for payment bonds**.
- ☐ Like performance bonds, premiums are based on the **value of the coverage**.
- ☐ An example of a labor and material bond is shown in Figure 3.13.

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Types of bonds – Labor and material bond

FIGURE 3.13 Labor and Material Bond

American Surety Company
126 William Street
New York, New York 10038

Bond No. LM-157

KNOW ALL BY THESE PRESENTS, That we, Western States Construction Company of Seattle, Washington (herein called the Principal) as Principal and American Surety Company, a New York Corporation of New York, New York (herein called the Surety) as Surety are held and firmly bound unto the City of Seattle (herein called the Oblige) in the penal sum of nine million, eight hundred fifty thousand dollars (\$9,850,000) for the payment of which the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, That WHEREAS the Principal has entered into a written contract with said Oblige, dated January 16, 2006, for the Sand Point Library in accordance with the terms and conditions of said contract, which is hereby referred to and made a part hereof as if fully set forth herein.

NOW, THEREFORE, If the Principal shall promptly and faithfully make payment to all Claimants for all labor and material used or reasonably required for use in the performance of the contract, then this obligation shall be void; otherwise to remain in full force and effect.

Signed and sealed this sixteenth day of January, 2006.

Harry P. Jones
 (Witness)

Samuel T. White
 (Witness)

James B. Smith
 James B. Smith, President
 Western States Construction Company
 (Principal)

Terry L. Johnson
 Terry L. Johnson, Attorney-in-Fact
 American Surety Company
 (Surety)

Types of bonds – Maintenance bond

- ☐ A **maintenance bond** (sometimes called a **warranty bond**) is a guarantee that the construction contractor **will return to the completed project** and **repair or replace any defective or inferior** materials or workmanship during the specified warranty period.
- ☐ Maintenance bonds may be required for components with **warranties that exceed** the normal one-year warranty.
- ☐ The bond value may be based on
 1. A **percentage of the contract value**, such as 20 percent, or
 2. The value of a **specific component**, such as a roof.
- ☐ An example of a maintenance bond is shown in Figure 3.14.

Types of bonds – Maintenance bond

FIGURE 3.14 Maintenance Bond

American Surety Company
126 William Street
New York, New York 10038

Bond No. MT-145

KNOW ALL BY THESE PRESENTS, That we, Western States Construction Company of Seattle, Washington (herein called the Principal) as Principal and American Surety Company, a New York Corporation of New York, New York (herein called the Surety) as Surety are held and firmly bound unto the Emerald City Development Corporation (herein called the Obligee) in the penal sum of eight hundred fifty thousand dollars (\$850,000) for the payment of which the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, That WHEREAS the Principal has entered into a written contract with said Obligee, dated March 18, 2005, for the Cascade Medical Office Building that provides that the Principal will furnish a bond conditioned to guarantee the roof of said facility for a period of ten years against all defects in workmanship and materials which may become apparent during said period, said contract, which is hereby referred to and made a part hereof as if fully set forth herein, and WHEREAS said contract was completed on January 4, 2006.

NOW, THEREFORE, If the Principal shall promptly and faithfully make good, repair, and replace at its own expense any defects discovered prior to January 4, 2016 in work done or material furnished under said contract relating to the roof, then this obligation shall be void; otherwise to remain in full force and effect.

Signed and sealed this fourth day of January, 2006.

<i>Harry P. Jones</i> (Witness) <i>Samuel T. White</i> (Witness)	<i>James B. Smith</i> James B. Smith, President Western States Construction Company (Principal) <i>Terry L. Johnson</i> Terry L. Johnson, Attorney-in-Fact American Surety Company (Surety)
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Types of bonds – Supply bond

- ☐ A supply bond is a guarantee to the construction firm that a **material supplier** will **comply** with the terms of a **purchase order** or **supply contract**.
- ☐ This includes both
 1. The **correct** quantity and quality of **ordered materials** and
 2. The **delivery** by a specified date.
- ☐ The **liability of the surety** is for any cost incurred by the construction company due to **late delivery** of the ordered materials.
- ☐ An example of a supply bond is shown in Figure 3.15.

Types of bonds – Supply bond

FIGURE 3.15 Supply Bond

American Surety Company
126 William Street
New York, New York 10038

Bond No. SP-126

KNOW ALL BY THESE PRESENTS, That we, Northwest Electrical Supply Company of Seattle, Washington (herein called the Principal) as Principal and American Surety Company, a New York Corporation of New York, New York (herein called the Surety) as Surety are held and firmly bound unto the Western States Construction Company (herein called the Obligor) in the penal sum of ten million, five hundred thousand dollars (\$10,500,000) for the payment of which the Principal and the Surety bind themselves, their heirs, executors, administrators, successors and assigns, jointly and severally, firmly by these presents.

THE CONDITION OF THIS OBLIGATION IS SUCH, That WHEREAS the Principal has entered into a written contract with said Obligor, dated November 15, 2005, for purchase and delivery of two (2) generator units for the North Shore Power Plant in accordance with the terms and conditions of said contract, which is hereby referred to and made a part hereof as if fully set forth herein.

NOW, THEREFORE, If the Principal shall promptly and faithfully perform said contract and reimburse the Obligor for all loss and damage sustained by reason of failure or default on the part of the Principal, then this obligation shall be void; otherwise to remain in full force and effect.

Signed and sealed this fifteenth day of November, 2005.

<i>Karen B. Taylor</i> (Witness) <i>Samuel T. White</i> (Witness)	<i>Henry L. Jamison</i> Henry L. Jamison, President Northwest Electrical Supply Company (Principal) <i>Terry L. Johnson</i> Terry L. Johnson, Attorney-in-Fact American Surety Company (Surety)
---	---

Underwriting considerations

- ❑ The **primary function** of the surety is to prequalify and issue bonds on **behalf of construction companies** deemed capable of performing the construction contract.
 - ❖ Because of this, sureties prequalify a construction company through an **in-depth examination** of its **business** operation.
- ❑ This process involves
 1. **Determining** the liabilities of the company and
 2. **Investigating** the background, the capabilities, and the financial condition of the firm.

Underwriting considerations

❑ This will include

- ❖ Resumes of key personnel,
- ❖ Company organization chart,
- ❖ Company business plan,
- ❖ Company continuity of operation plan,
- ❖ Company tax returns,
- ❖ Bank statements,
- ❖ Audited financial statements,
- ❖ Personal financial statements of company owners/officers,
- ❖ List of owned equipment,
- ❖ List of major subcontractors,
- ❖ List of major suppliers,
- ❖ Work in progress, and
- ❖ List of current and past customers.

Underwriting considerations

- ❑ The **bonding agent evaluates** the construction company's **ability** to
 1. Perform bonded work,
 2. Recommends a surety company, and
 3. Facilitates communicationsbetween the construction company and the surety underwriter.
- ❑ The **agent compiles information** regarding the construction company's financial condition and work experience.
- ❑ **Most bonding agents** require construction companies to complete a **questionnaire** similar to the one illustrated in Figure 3.16 as a part of this process.
- ❑ **If**, in the agent's opinion, the **construction firm is capable** of performing such work satisfactorily,
the **agent submits** the collected information to a **surety underwriter**.

Underwriting considerations

FIGURE 3.16 Contractor Questionnaire

Thomas White Agency
1700 Pike Street, Suite 500
Seattle, Washington 98101
CONTRACTOR QUESTIONNAIRE

1. Name of Firm: _____

2. Address: _____ 3. Fiscal Year End _____

(city) (state) (zip)

4. Phone: _____ 5. Contracting Specialty: _____

6. Contract Person: _____ 7. Title: _____

8. Year Business Started: _____ 9. Type of Business: ☐ Corp. ☐ Part. ☐ Prop. ☐ Other

10. State of Incorporation: _____ 11. Area of Operation: _____

12. List corporate officers, partners, or proprietors of firm:

	<u>Name</u>	<u>Year of Birth</u>	<u>Position</u>	<u>Percent Owned</u>	<u>Name of Spouse</u>
a.	_____	_____	_____	_____	_____
b.	_____	_____	_____	_____	_____
c.	_____	_____	_____	_____	_____
d.	_____	_____	_____	_____	_____

13. Will the above-named individuals and spouses personally indemnify Surety? ☐ Yes ☐ No If no, explain: _____

Underwriting considerations

14. Is there a buy/sell agreement among the owners of the business? [] Yes [] No
15. Is this agreement funded by life insurance? [] Yes [] No
16. How many people does your firm employ? _____ 17. How many work crews? _____
18. Has your firm or any of its principals ever petitioned for bankruptcy, failed in business, or defaulted so as to cause a loss to a Surety? [] Yes [] No If yes, explain:

19. Is your firm or any of its owners currently involved in any litigation? [] Yes [] No If yes, explain:

20. Typical percentage of the firm's work: Government Agencies _____ Private Owners _____
21. What percentage of the firm's work is normally subcontracted: _____
22. Are bonds required of subcontractors? [] Yes [] No
23. What trades do you normally subcontract? _____
24. What is the largest amount of uncompleted work on hand at one time in the past?
Amount: \$ _____ Year: _____
25. What is the largest job you expect during the next year? \$ _____
26. What is the largest uncompleted work program expected during the next year? \$ _____

(continued)

Underwriting considerations

27. What is your expected annual volume next year? \$ _____
28. What trades do you normally undertake with your own forces? _____
29. Do you lease equipment? ☐ Yes ☐ No 30. Type of lease: _____
31. What are the terms of the lease? _____
32. Name of your Certified Public Accountant: _____
- Address: _____
- Telephone: _____ Contact Person: _____
33. On what basis are taxes paid? ☐ Cash ☐ Completed job ☐ Accrual ☐ % of completion
34. On what basis are financial statements prepared? ☐ Cash ☐ Completed job ☐ Accrual
☐ % of completion
35. On what level of assurance are financial statements prepared? ☐ CPA audit ☐ Review
☐ Compilation
36. How often are financial statements prepared? ☐ Annually ☐ Semi-annually ☐ Quarterly
☐ Monthly
37. Do you have a full-time accountant on staff? ☐ Yes ☐ No 38. Yrs. Experience: _____
39. Are job cost records kept? ☐ Yes ☐ No
40. How often reviewed? _____ 41. How often updated? _____
42. Name of your bank: _____ Contact Person: _____
- Address: _____ Telephone: _____
43. Amount of line of credit: \$ _____ Expiration date: _____
- Interest rate: _____
44. Is your firm union? ☐ Yes ☐ No

Underwriting considerations

45. What is firm's Dun & Bradstreet Number? _____ 46. D & B Rating: _____

46. Previous bonding companies:

	<u>Name</u>	<u>Reason for Leaving</u>
a.	_____	_____
b.	_____	_____
c.	_____	_____

47. List three of your largest contracts:

	<u>Job Name</u>	<u>Contract Price</u>	<u>Gross Profit</u>	<u>Completion Date</u>	<u>Bonded?</u>
a.	_____	\$ _____	\$ _____	_____	[] Yes [] No
	Owner: _____ Designer: _____				
b.	_____	\$ _____	\$ _____	_____	[] Yes [] No
	Owner: _____ Designer: _____				
c.	_____	\$ _____	\$ _____	_____	[] Yes [] No
	Owner: _____ Designer: _____				

(continued)

Underwriting considerations

FIGURE 3.16 (continued)

48. List three of your major suppliers:				
<u>Name</u>	<u>Address</u>	<u>Telephone</u>	<u>Contact</u>	
a. _____	_____	_____	_____	
b. _____	_____	_____	_____	
c. _____	_____	_____	_____	
49. List three subcontractors (or contractors if you are a subcontractor) with whom you do business:				
<u>Name</u>	<u>Address</u>	<u>Telephone</u>	<u>Contact</u>	
a. _____	_____	_____	_____	
b. _____	_____	_____	_____	
c. _____	_____	_____	_____	
50. List three architects with whom you have done business:				
<u>Name</u>	<u>Address</u>	<u>Telephone</u>	<u>Contact</u>	
a. _____	_____	_____	_____	
b. _____	_____	_____	_____	
c. _____	_____	_____	_____	
51. List key personnel:				
<u>Name</u>	<u>Position</u>	<u>Yr. of Birth</u>	<u>Yrs. Exper.</u>	<u>Previous Employer</u>
a. _____	_____	_____	_____	_____
b. _____	_____	_____	_____	_____
c. _____	_____	_____	_____	_____
d. _____	_____	_____	_____	_____
e. _____	_____	_____	_____	_____

Underwriting considerations

52. List any life insurance in effect on key personnel:

	<u>Name</u>	<u>Beneficiary</u>	<u>Amount</u>	<u>Cash Value</u>
a.	_____	_____	\$ _____	\$ _____
Insurance Company: _____				
b.	_____	_____	\$ _____	\$ _____
Insurance Company: _____				
c.	_____	_____	\$ _____	\$ _____
Insurance Company: _____				

53. List other insurance coverage currently in effect:

	<u>Limits in '000's</u>		<u>Carrier</u>	<u>Expiration Date</u>
	<u>BI</u>	<u>PD</u>		
a. General liability	\$ _____	\$ _____	_____	_____
b. Auto liability	\$ _____	\$ _____	_____	_____

(continued)

Underwriting considerations

c. Umbrella	\$ _____	\$ _____	_____	_____
d. Owner's protection	\$ _____	\$ _____	_____	_____
54. List any subsidiaries and affiliates of the contracting firm:				
	<u>Firm Name</u>	<u>Ownership</u>	<u>Type Business</u>	
a.	_____	_____	_____	
b.	_____	_____	_____	
c.	_____	_____	_____	
55. Remarks: _____				

Completed by: _____				
Title: _____				
Date: _____				

Exercises

1. A construction company has a \$100 million contract to construct a major industrial plant. What types of insurance policies should the construction company purchase to cover its risks on the project?

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مدیریت کسب و کار در صنعت ساخت (Construction Business Management)

ماژول ۲: مدیریت کسب و کار

بخش ششم: مدیریت فناوری اطلاعات

ارائه دهنده:

سید محمدرضا علوی پور

(PhD, PMP, CMIT)

CMAA Authorized Trainer

دانشگاه Illinois Tech آمریکا



What we will learn?

- ☐ Technology
- ☐ Reticence about Adopting Technology
- ☐ First Things First
- ☐ Emerging Trends
- ☐ Virtual Construction
- ☐ Measuring the ROI of Your Technology Investment
- ☐ Compelling Business Reasons to Invest in Technology
- ☐ Information Management
- ☐ Information Requirements
- ☐ Hardware and Infrastructure
- ☐ Software
- ☐ Security Systems
- ☐ Company Security Policy
- ☐ Company Websites
- ☐ Exercises

Technology

- ❑ The **construction industry** is highly fragmented, with many companies doing **many different things** and many companies in **competition to win** the same work.
- ❑ Most contractors are “**wildcatters**”; they don't seek collaboration with other peer firms.
- ❑ **Business practices** are also **fragmented**.
 - ❖ There are **few standards** as the industry **lacks a few dominant players**.

❑ However

fragmented the industry may be,

your construction company's business operation should never be fragmented.

❖ **Fragmentation** is inefficient and inefficiency results in lower profitability.

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❑ Taking **advantage** of the latest technology to **handle your data**

makes the **business cycle** of

1. Work acquisition,
2. Building work, and
3. Getting paid for that work

far more cost effective and efficient.

It allows you to do the following:

❑ **Access information** in real time without tying up a second person to provide it to you **when you phone.**

❖ **Calling only** when you really need something

1. Allows your employees to **concentrate more fully** on their essential work and
2. Improves your relationships by keeping annoying “drop everything” **favors to a minimum.**

❑ **Accurately gather complex data and analyze** it in ways far more detailed and cost effective than would be practical **if it were done by humans.**

- ❖ Disseminate information in **real time throughout your firm**
- ❖ Facilitate **timely** billing and tracking of payments
- ❖ Automate the **bid process**
- ❖ Speed up business **communications**

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❑ **Eliminate** costly errors and rework.

❖ This assists in **accurate projections** of needed materials and labor by **allowing virtual building** before actual work begins.

Simply put, technology can enforce discipline and improve efficiency and cost-effective practices.

Firms with these characteristics out-perform their peers.

Accounts payable (A/P) processing may represent one of the greatest potential time savings for office personnel. Reviewing and streamlining the invoice handling and payment process can be a leverage point. If you have a dozen projects, you may be processing hundreds of A/P invoices each month. Using technology and processing take wasted time out. Don't forget, consistent mistakes by a supplier should be grounds for a penalty. Keep the A/P area from distracting your focus on installing work.

Reticence about Adopting Technology

Reticence about adopting technology

- ❑ If **you grew up** with **computers** on the desktop, you may be surprised to learn that **some people are still slow** to adopt technology.

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Reticence about adopting technology

❑ If you are **older**, you may have **sensed** the possibility that technology could give **construction a real boost**.

❖ However, you remember how **poorly managed most technology companies** were in the past two decades.

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Reticence about adopting technology

- ❑ Just as **significant** was the **poor financial management** that technology companies practiced.
- ❑ They spent **venture capital at enormous rates**. Why?
 - ❖ Many of us still don't know.
 - ❖ **Confidence** in tech companies in and out of the **construction industry** has **decreased**, not increased.
 - ✓ Many contractors still take a **wait-and-see attitude**.

Reticence about adopting technology

❑ Through the **integration** of the Internet and project-management systems, tasks can be accomplished better, faster, and cheaper.

❖ **Internet-based systems** also offer easily searchable archives for retrieval and reference purposes.

❖ **Improving communication** between project participants, increasing accountability, and streamlining the development process from site selection to design, construction, and operation,

project-specific websites (PSWs) reduce the costs incurred by change orders, claims, and record maintenance, as well as minimize or eliminate delays.

Reticence about adopting technology

As-built drawings have great value to owners. Keeping a retrievable system of project documentation is essential. The law of repose makes contractors responsible for being able to produce these documents for more than a decade in some states. Also, questions about previous work arise and demand accurate, verifiable answers. Contractors need a failsafe, organized retrieval system. Electronic filing systems fill this function well.

First Things First

First things first

- ❑ Investing in technology is an **expensive proposition**.
 - ❖ Over time, it will **save** you time and money.
 - ❖ If you discover **only after making your initial investment** that the system does not meet your needs,
migrating to any other system is a **costly** proposition.
 - ✓ **Making prudent choices** from the start is key.

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Define your business process

- ❑ Technology is of **little value** if you **don't define** your business process up front.
- ❖ **Computers** only process data that **human beings input**.
- ❖ **Adding technology** first without such scrutiny and refinement is just “paving the cow path.”
- ❖ **Nobody moves faster**, but their feet are cleaner and they are more comfortable.

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Determine the What and How Much You Need to Get the Job Done

❑ Keep in mind that to **have too much technology** is as problematic as having too little or none.

❖ **Computer applications** that are too complex for your employees to use competently can **confuse them**.

✓ The **results produced** by the computer can only be as **accurate as the data** your people feed it.

○ With our **low margins and high risks**, be very careful.

We **don't have room** for grand experiments.

Size Your Technology to Your Firm

❑ To illustrate with an absurd extreme,

a firm that **consists of only a single person** would have no need for a computer network designed to **disseminate information** among many employees.

❖ On the other hand, **even a small firm** with only a few employees and one billing person **cannot operate efficiently** with a single computer to share.

✓ As soon as you **increase your number to more than one**, you need to think about **networking to keep everyone connected** to each other.

Hardware should come from well-established firms

- ❑ This hardware should have **excellent records** of customer service and warranty service.
- ❖ Most of these firms will be glad to assign a **single point of contact person** to you to ensure that **navigation through their system** is efficient and painless as well as discounts for business purchases.
- ❖ In addition, these firms can ensure that the **software placed** on the machines is **customized to your business**.

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Compatibility is key

❑ Make sure all your **hardware is compatible**.

❖ As an example of the **trouble incompatibility** can cause, in the early days of the **BlackBerry device**,

some construction firms discovered much to **their dismay** that the **devices were not compatible with the wireless service** provided by the **telephone company** they had already contracted to provide their service.

✓ Consequently, they **could not send data** input onto the BlackBerry **through the Internet** to the **construction office**.

○ **Costly modifications** to the hardware were required; this also **resulted in costly delays**.

Email, text messaging, and voice mail are key communication tools. Having a dependable service provider cannot be overemphasized. No bells or whistles are needed, just consistent delivery of messages in a timely manner. Failing here has rippling negative effects throughout a contractor's business.

You can't use what you don't understand.

❑ A **small software firm** in start-up, for example,

1. May lack satisfactory customer support,
2. Fail to provide training,
3. Offer no or expensive upgrades, and
4. Have bugs in the software that can cost you expensive delays.

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Technology to have and master – Networks

❑ Obviously, if it is helpful for

1. Each employee to have access to a computer with internet access,
2. Each employee having real-time access to every other employee is even more helpful.
 - ❖ Setting up a **network** allows you to connect **multiple computers** and peripherals—printers, scanners—and to have them **all share Internet access and access to your business data.**

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Wireless or Ethernet: that is the question

❑ **Wireless network** connections have become **more economical** and allow even better data sharing.

❖ For example, a **craftsperson in the field** can send a communication from a **handheld device to all others** involved in the project,

❖ some of whom may **read it on their handheld device** and

others, who may **access it from their desktop computers**, have it **printed out in the office** without ever going in to the office to do so.

Wireless or Ethernet: that is the question

- ❑ All of the major operating systems have networking capabilities built into them.
- ❖ A wireless setup in your office space creates a **more attractive and safe environment (fewer wires tangled all over the place)**.
- ❖ It allows far more flexibility where you place your desktop computers, laptops, and peripherals.
- ❖ It also enables you to **offer customers and other visitors Internet access and hotspot facilities for their laptops,**
which allows them to access their business data **during your business meetings.**

Wireless or Ethernet: that is the question

❑ On the other hand, **Ethernet-based, hard-wired networking** can still be more advantageous than wireless systems

because they are **more reliable, lower in cost**, and offer **faster Internet connection speeds**.

❖ Wireless signals **can vary** depending on placement in the office, thickness of walls, and sometimes even the weather.

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Data backup

- ❑ Whether they be estimates, schedule narratives, cost reports, billing, or company process documents, all are critical.
- ❖ Tracking revisions and ensuring that you have **ready access to the most recent revisions** is crucial.
- ❖ Your **bookkeeping and accounting records**, as well as your building plans, bids, and every other documentation of your business are as important to you as your building machinery, materials, and employees.

Without them, you have no business.

Emerging Trends

Touch screen and voice activation technology

- ❑ Touch screens make **optimal use** of icons, which are small graphics on the screen that communicate the function they perform.
 - ❖ It **precludes** the use of a **mouse or touchpad** to interact with the computer.
 - ❖ This technology can be helpful for users who **don't speak English fluently** or those not **conversant in complex computer operations**.
- ❑ Bookmarking and thus hardwiring a path to a website, program, or form is a **smart way to lead people directly** to a needed computing task.

Touch screen and voice activation technology

- ❑ Similarly, voice activation technology allows **voice input without** the use of any **keyboard** or other data interaction devices.

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Virtual Construction

موسسه مهندسی و مدیریت ساخت علوی پور (ACEMI)

دفتر آموزش



تهران، بلوار فردوس شرق، مجتمع آبگینه، طبقه سوم اداری، واحد C42



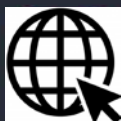
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