



[ research / education ]



[ architecture & engineering ]



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[ vibration / acoustics ]



**Bob Harper**  
Vice President  
Gilbane Building Company

**Mike Christeson**  
Regional MEP Coordinator  
Gilbane Building Company

**Buildings for Advanced Technology Workshop II**  
Mesa, Arizona

### Project Management

- Project Contract Delivery Methods
- Quality in Construction
- Commissioning
- Q&A

January 23, 2004

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## Bob Harper, Vice President

Over 34 Years of Construction Experience  
with Gilbane

### Project Experience:

- Sterling Winthrop R&D Complex, Collegeville, PA
- Serono Laboratories, Randolph, MA
- Genentech, Vacaville, CA
- FDA Irvine Regional Lab, Irvine, CA

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## Mike Christeson, Regional MEP Coordinator

Over 34 Years Mechanical Systems Experience

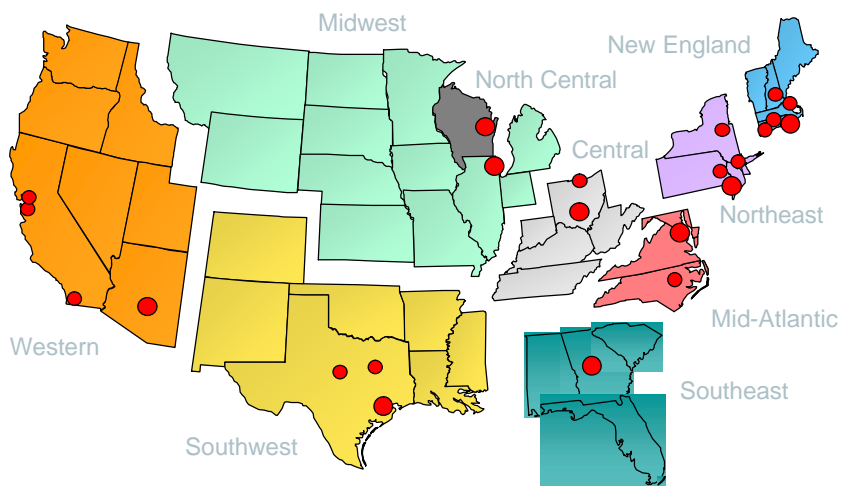
### Project Experience:

- Genentech, Vacaville, CA
- FDA Irvine Regional Lab, Irvine, CA
- UC San Francisco Biology and Genetics Building, San Francisco, CA
- Hundai Microelectronics Wafer Plant, Eugene, OR
- Intel, Santa Clara, CA

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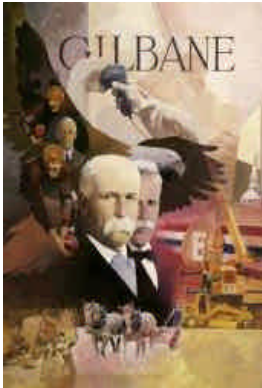
## Gilbane at a Glance



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## Gilbane at a Glance



**Established in 1873**  
**Family owned, Family operated**  
**23 Offices, Over 1,700 Employees**  
**Over \$2.6 Billion Annually**  
 Western Region established 1998  
 4 Offices Regionally, Over 100 Employees  
**Rankings:**

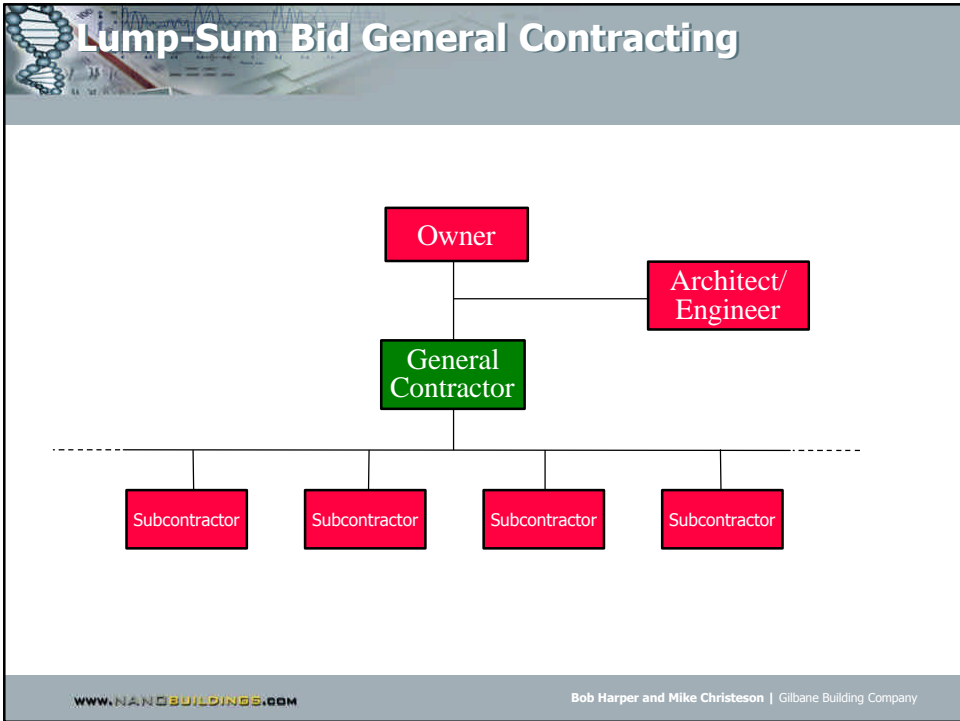
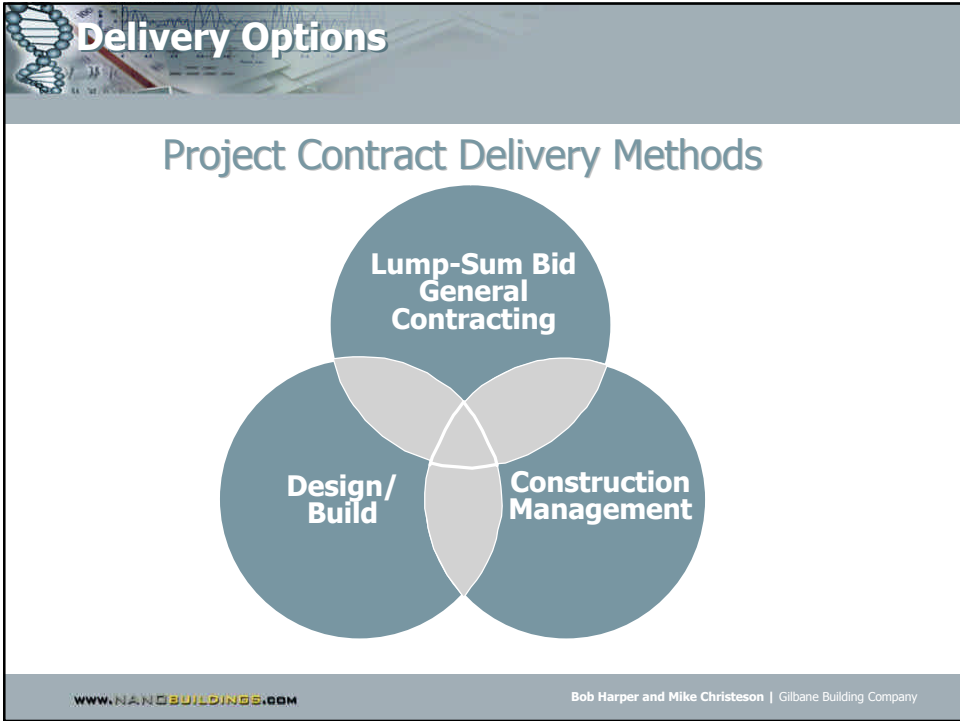
- #4 Largest Construction Manager in the Nation (BD&C)
- #1 in the Construction Industry for the use of Technology (Information Week)
- #1 Largest Construction Manager in Education (ENR)

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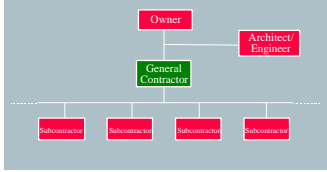
## Markets and Clients

<p><u>High Tech Markets</u></p> <p>Pharmaceutical</p> <p>Biotechnology</p> <p>Microelectronics</p> <p>Other</p>	<p><u>High Tech Clients</u></p> <p>Pfizer</p> <p>Glaxosmithkline</p> <p>Bayer</p> <p>Genentech</p> <p>Human Genome Sciences</p> <p>Amgen</p> <p>IBM</p> <p>Sun Systems</p> <p>Motorola</p> <p>Intelsat</p> <p>Verizon</p> <p>NASA</p> <p>SBC Communications</p>
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# Lump-Sum Bid General Contracting



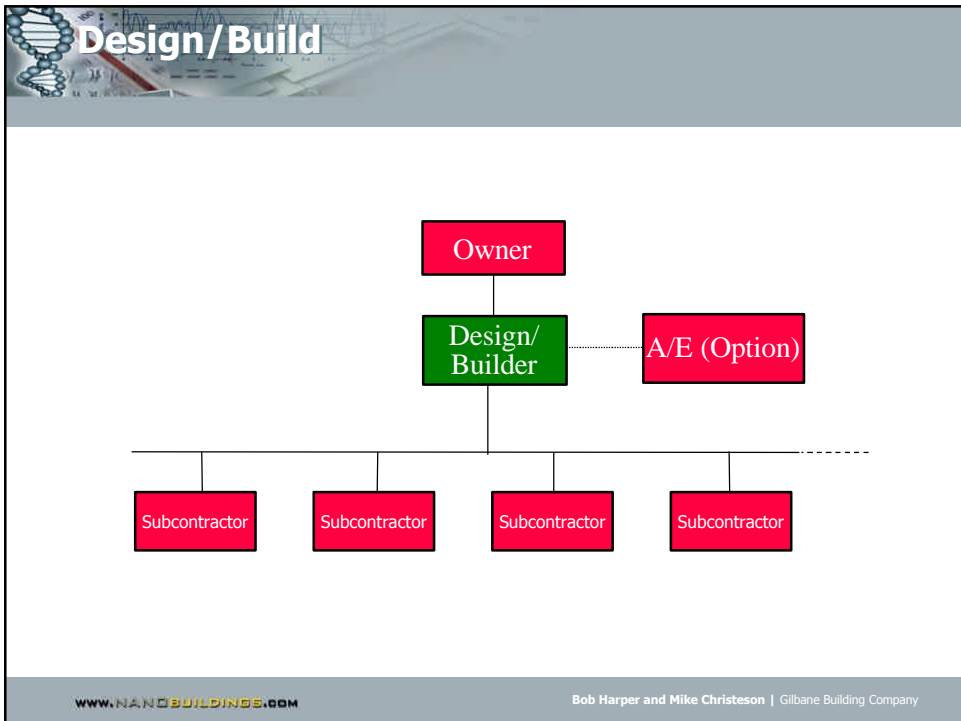
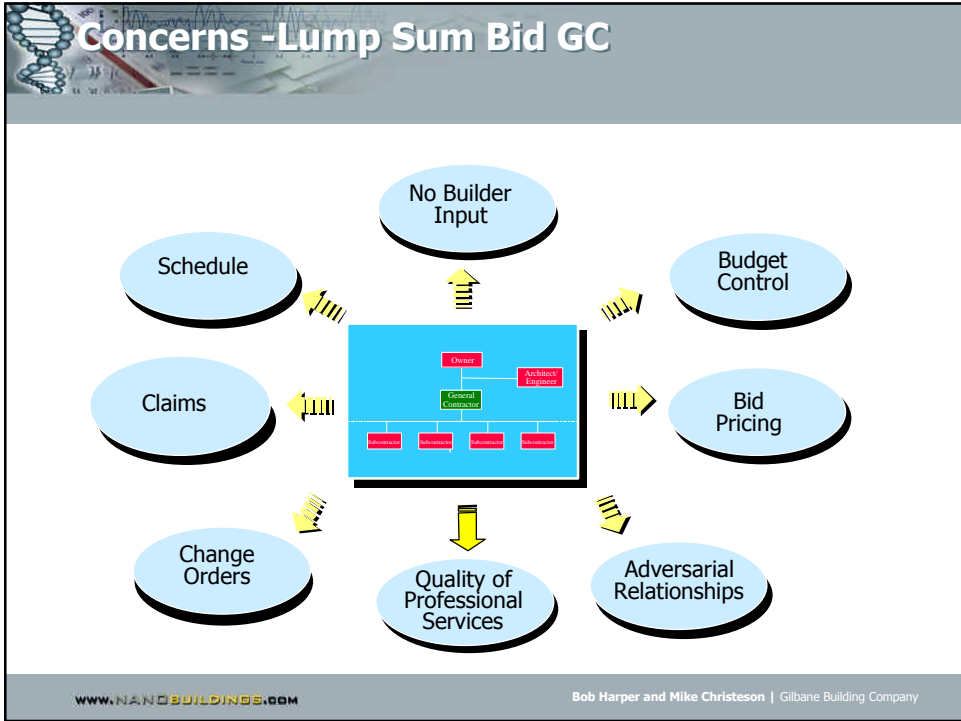
## Advantages:


- “Traditional” Approach; well understood
- Straightforward
- Owner time involvement minimal
- Can be well-suited to simple/small projects

# Lump Sum Bid General Contracting

## Schedule








## Design/Build

Description

- Single entity is contracted to provide both design and construction
- Designer/Builder is either in-house single firm or a team of the builder, architect and engineer
- Design/Builder contracts directly with the subcontractors and is responsible for delivery of the project
- Early selection of D/B firm or team. Sometimes includes concept design and pricing; Alternatively qualifications-based with subsequent GMP.

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## Design/Build

Pros	Cons
<ul style="list-style-type: none"><li>▪ Single point of responsibility for design and construction</li><li>▪ Fastest schedule delivery</li><li>▪ Early identification of guaranteed cost</li></ul>	<ul style="list-style-type: none"><li>▪ Loss of Owner control and/or quality</li><li>▪ Loss of check and balance</li><li>▪ Potential adversarial relationship between Owner and Design/Builder</li><li>▪ Contractor profits may be excessive</li></ul>

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## Design/Build

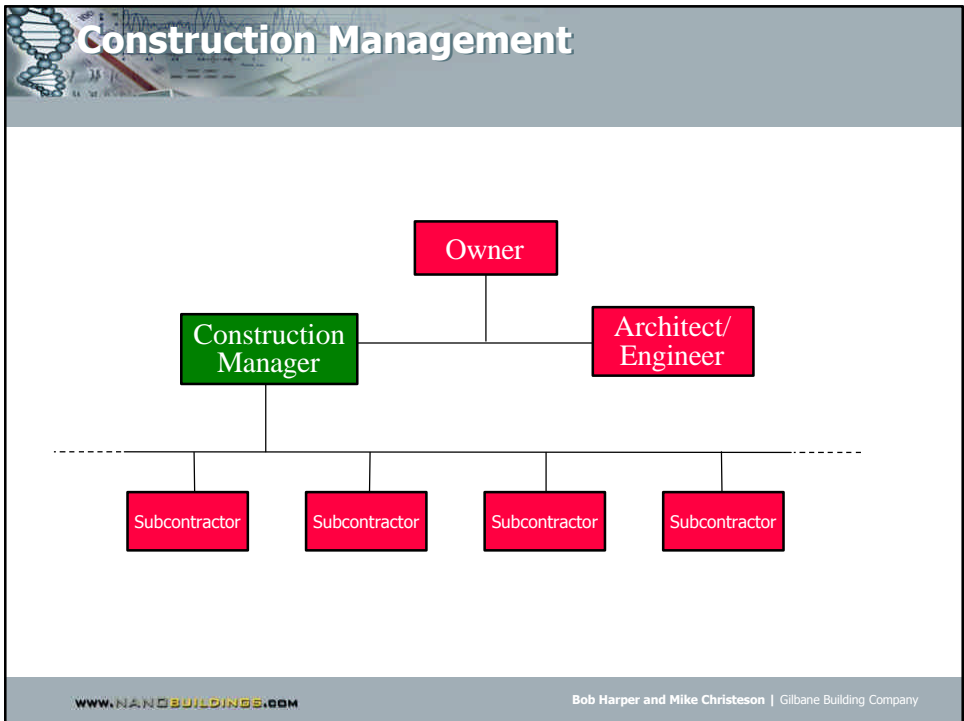
Best Suited

- New or renovation projects that are highly schedule driven
- Prototypical and repetitive projects

Least Suited

- Projects that have difficult-to-define scope
- Projects where potential for design change is high
- Projects less schedule sensitive
- Projects where owners desire strong involvement and/or design/quality focus

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## Construction Management

### Advantages

Cost Savings

- First
- Final
- Operating

Faster Schedule

Owner Control

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## Construction Management

### Cost Savings

- Lower Subcontractor Bids
- Shortened Schedule (less staff and cost of capital)
- Fewer Change Orders and Less Potential Claims
- Design Phase Savings Generated by Construction Manager

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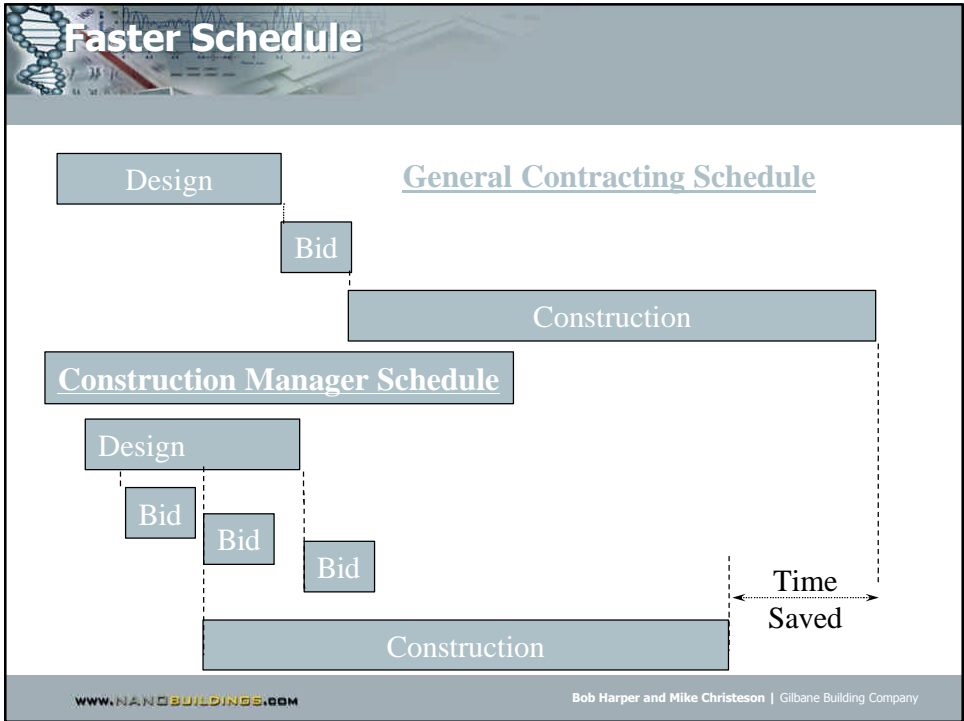
# Construction Management


## Cost Savings

Shortened Schedule (less staff & cost of capital)

- Earlier Start
- Better Lead Time
- Fewer Request for Information (RFI) Slowdowns
- Better Planning

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## Construction Management

### Cost Savings

#### Fewer Change Orders and Less Potential Claims

- Better Safety/Logistics Planning
- Fewer Subcontractor/Trade Claims
  - Better Document Review & Coordination during Design Phase
  - Explicit Bid Packaging
  - Scope Reviews Prior to Award
- Construction Manager is an Advocate for Owner
- Reasonable Pricing for Legitimate Change Orders

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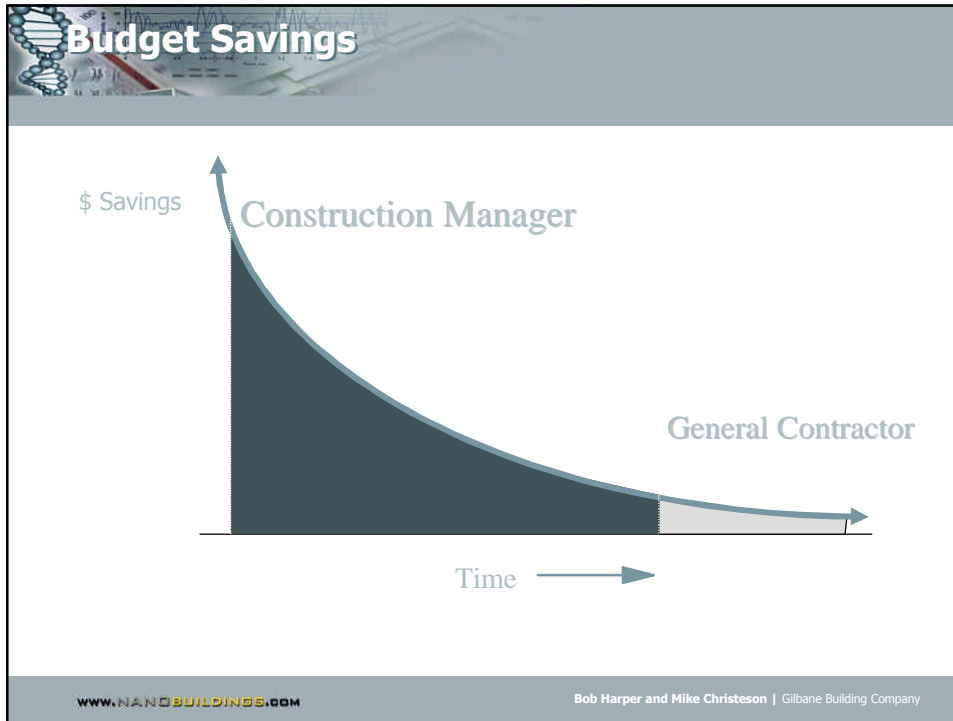
## Construction Management

### Cost Savings

#### Design Phase Savings Generated by Construction Manager

- True Value Engineering (not cost slashing)
- Eliminate Bid Day Surprises

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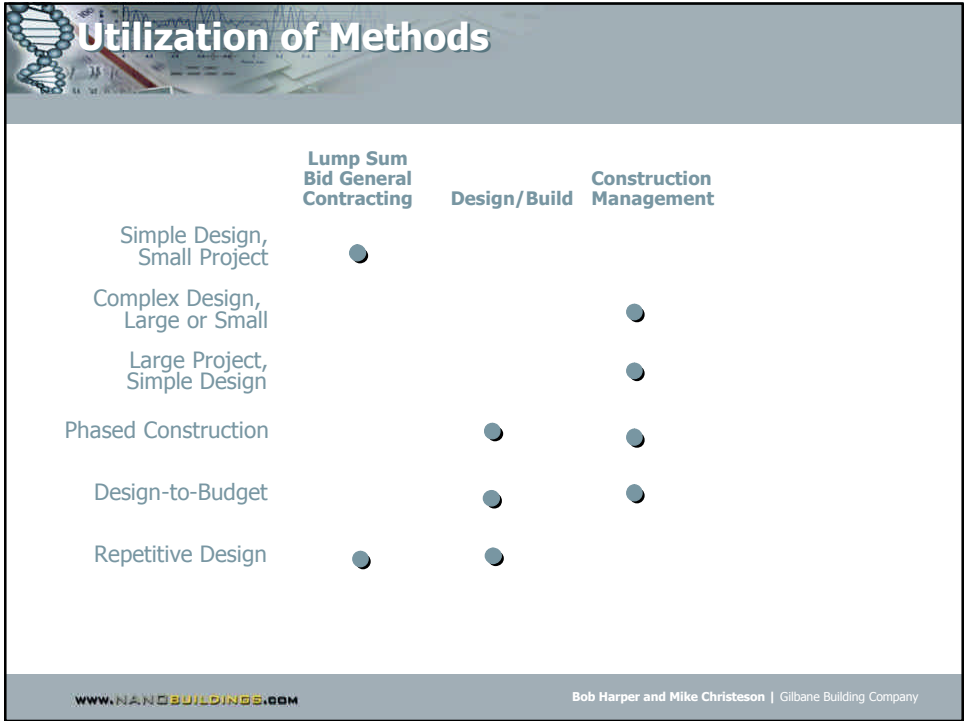
## Construction Management

### Owner Control

- Team approach from the start
- Strong "Check & Balance" (A/E and CM)
- Continuous budget control
- Phased construction option
- "Open Book" financial approach

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 **Quality**



**"QUALITY" IS  
CONFORMANCE TO  
THE REQUIREMENTS**


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 **Where the Requirements Are**

The requirements have been set forth in the Owner's contract to include:

- The Construction Drawings
- Specifications
- Trade Contracts
- Approved Submittal and Shop Drawings
- RFI Responses
- Approved Changes
- Written Directives
- Applicable Codes and Regulations
- Accepted Industry Standards and References

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## Quality in Construction

The primary purpose of Gilbane's QIC process is:

- to insure all work in place has been installed correctly and it was done right the first time
- is turned over complete and defect free
- has been done in accordance with the Contract Documents
- Completed work meets the Owner's expectations

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## Quality in Construction

**Primary Emphasis is on:  
PREVENTION!**

Gilbane's Quality In Construction Program Puts In Place A Process By Inspecting Work At Its Very Beginning


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## QIC Inspection Team

- Establish the QIC Inspection Team Early
- Owner's designated representative(s)
- Architect/Engineer (when available or required)
- Members of the Gilbane Building Team
- Affected Trade Contractors whose work is being inspected

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## QIC Field Construction Activities

A. Doing It Right The First Time Inspections

- 1) First Delivery Inspections of Materials/Equipment
- 2) First Equipment In Place Inspections
- 3) Mock-up Inspections
- 4) Benchmark Inspections
- 5) Follow-up Benchmark Inspections

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## QIC Field Construction Activities

B. Some Other Types of QIC Inspections

- 1) Close In Inspections
  - a) Below Grade Inspections
  - b) In Wall Inspections
  - c) Above Ceiling Inspections
- 2) Equipment/System Start-up & Acceptance Procedures
- 3) Area/Room Interim Turnover and Acceptance Procedures
- 4) Final Inspection & Acceptance

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## Rolling Completion List Process

Rolling Completion List

- Program is designed to achieve zero punch list items by the end of the project
- Running completion list of work to complete that is missing or not meeting the requirements
- Reviewed and updated on a weekly basis

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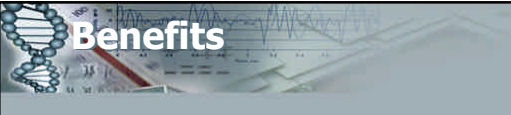


## Benefits

Benefits

- Virtually eliminates rework; saves everyone money
- Promotes a constant state of awareness of the quality process
- Shifts inspection and acceptance from the last month of the project to an in-sequence activity over the entire length of the project
- Forces people to read the specifications and drawings at the right time

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## Benefits

Benefits

- Allows the trade contractors to demonstrate their means and methods up front
- Provides for safe activation of all equipment or systems which prevented damage to equipment or harm to personnel
- Accelerates delivery of activities like O&M manuals; facilitates quicker contract close-out
- Virtually eliminates post-occupancy work

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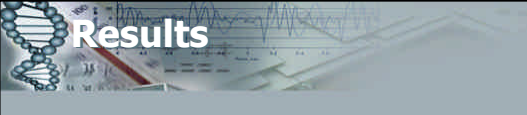
## Results

**Results**  
Sterling Winthrop Pharmaceutical R&D Campus

- Subcontractor acceptance
- On move-in day:
 

▪ Non-lab office building – 4 floors	22 open items
▪ Lab Wing Chemical Development	14 open items
▪ Lab East Building	8 open items
▪ Drug Evaluation Laboratory	6 open Items
▪ Drug Safety Assessment	8 open items

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## Results

**Results**

- Owner satisfaction
  - Facilities Engineering
  - Facilities Management
  - End Users
- Callbacks – warranty work
  - No installed work had to be removed due to non conformance after occupancy


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## What is Commissioning?

Commissioning is a well-planned, systematic, documented and managed approach to the installation, start-up, turnover and verification of facilities, systems and equipment to the end-user which results in a safe, productive environment that meets the designers intent and the owner's quality expectations.

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## Why Commission?

- Cost Effective
- End User Needs
- Functional Facility

Commissioning assures a correctly operating facility and is the basis for successful continued operation due to documentation and facilities staff training.

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## The Commissioning Process

A Defined Approach

- Documentation
- Verification
- Training
- Monitoring

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## The Commissioning Process

Levels of Commissioning

- Basic
- Intermediate
- Comprehensive
- Critical

To work successfully, the Owner, Design Team, Contractors, Facilities Operators and Commissioning Agent (C<sub>a</sub>) develop a team relationship throughout the project.

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## When Does Commissioning Start?

Starts Day One

- Pre-Design
- Design Phase
- Construction
- Acceptance
- Post-Acceptance

The early involvement of the commissioning process ensures the most benefit will be gained in the performance, final design, construction processes, and the Commissioning process itself. The outcome of the early processes will greatly enhance the facilities ability to function as intended.

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## Who Performs the Commissioning Process?

- Owner led commissioning process
- Designer led Commissioning process
- Contractor led Commissioning process
- Independent Commissioning
- Hybrid Commissioning

The method of Commissioning selected is crucial to the success of the project. The team approach and relationships established at the onset of the project are significant drivers for success.

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## The Costs of Commissioning

- No set Standards
- Extent of Commissioning Process
- Extent of Ongoing Services
- Orders of Magnitude

The cost of Commissioning is directly related to the degree of equipment, services, testing and documentation provided and should be evaluated based on the complexity of the facilities intended use and complexity. Further, the level of Commissioning will affect the Energy Savings, ongoing facility maintenance and trouble-shooting costs.

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## Benefits of Commissioning

The Commissioning process is a methodical planned systematic approach to ensure the facility will perform as intended by the Owner for the benefit of the occupants, the performance intended, and the ongoing facilities operation. This process, if executed properly, avoids the shortcomings of the traditional “turn-over” of documentation and limited training provided as currently provided in the construction industry.

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Questions and Answers

# Q&A

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