

# Design and Construction Cost Trends in Texas Educational Facilities

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presented by

Brad D. Pfluger

Marc H. Brewster



Texas Society of Architects' Committee on Architecture for Education



# Presentation Summary

- ✓ Construction Cost Trends in Texas Educational Facilities
- ✓ Establishing and Maintaining Budgets
- ✓ Case Study: Austin Independent School District's 2004 Facility Improvement Planning



# Planning & Estimating

**Estimating actual construction cost** before a project is designed and maintaining a budget throughout construction can be very difficult.

**Over-estimating** can result in public discontent. **Under-estimating** can lead to lack of money to meet facility needs.

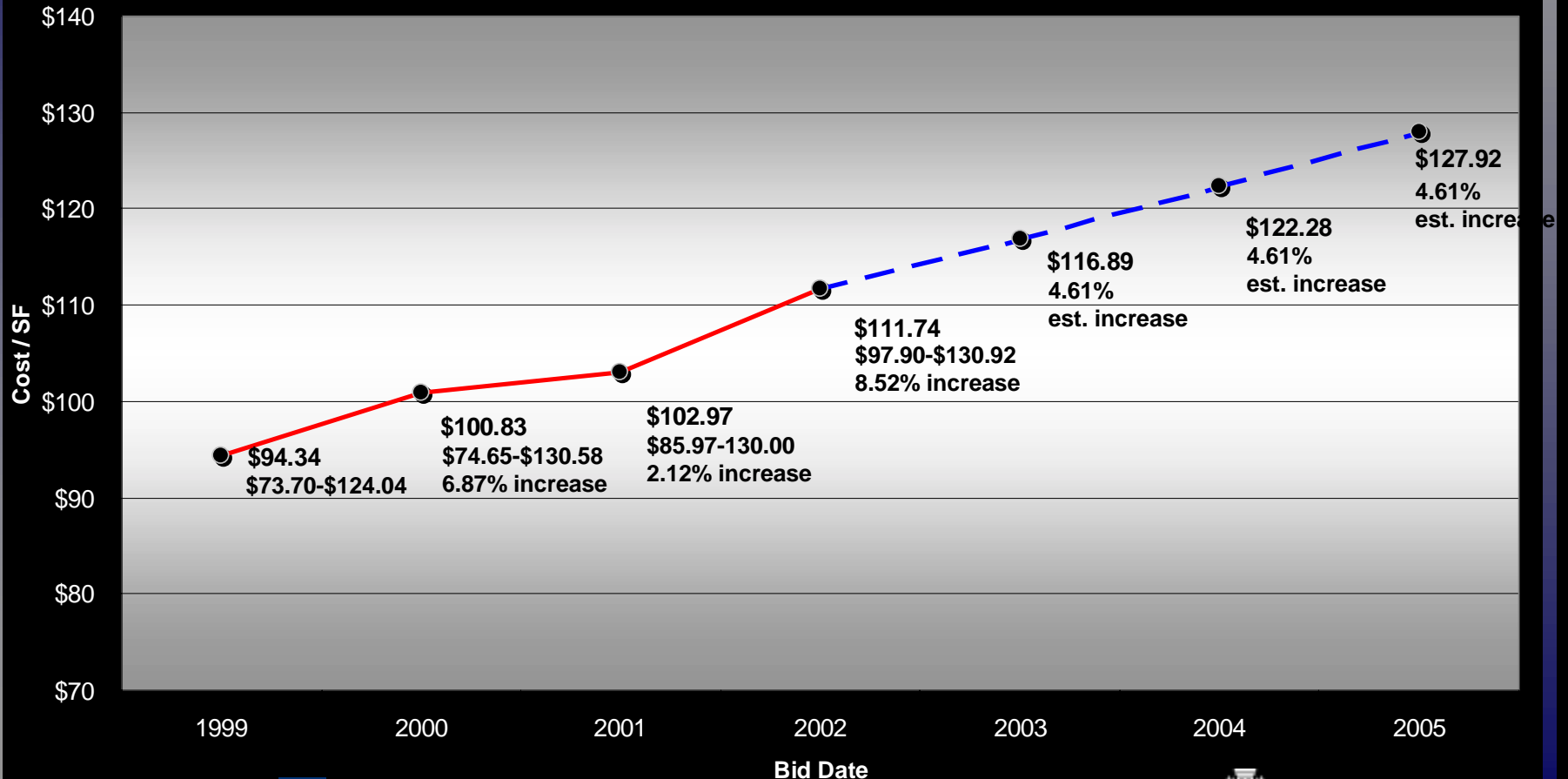
**With proper planning**, these concerns can be eased through careful review of design approaches, budgeting, and a clear understanding of the construction industry.

**This presentation will review concepts for making your project successful by keeping the project within budget.**



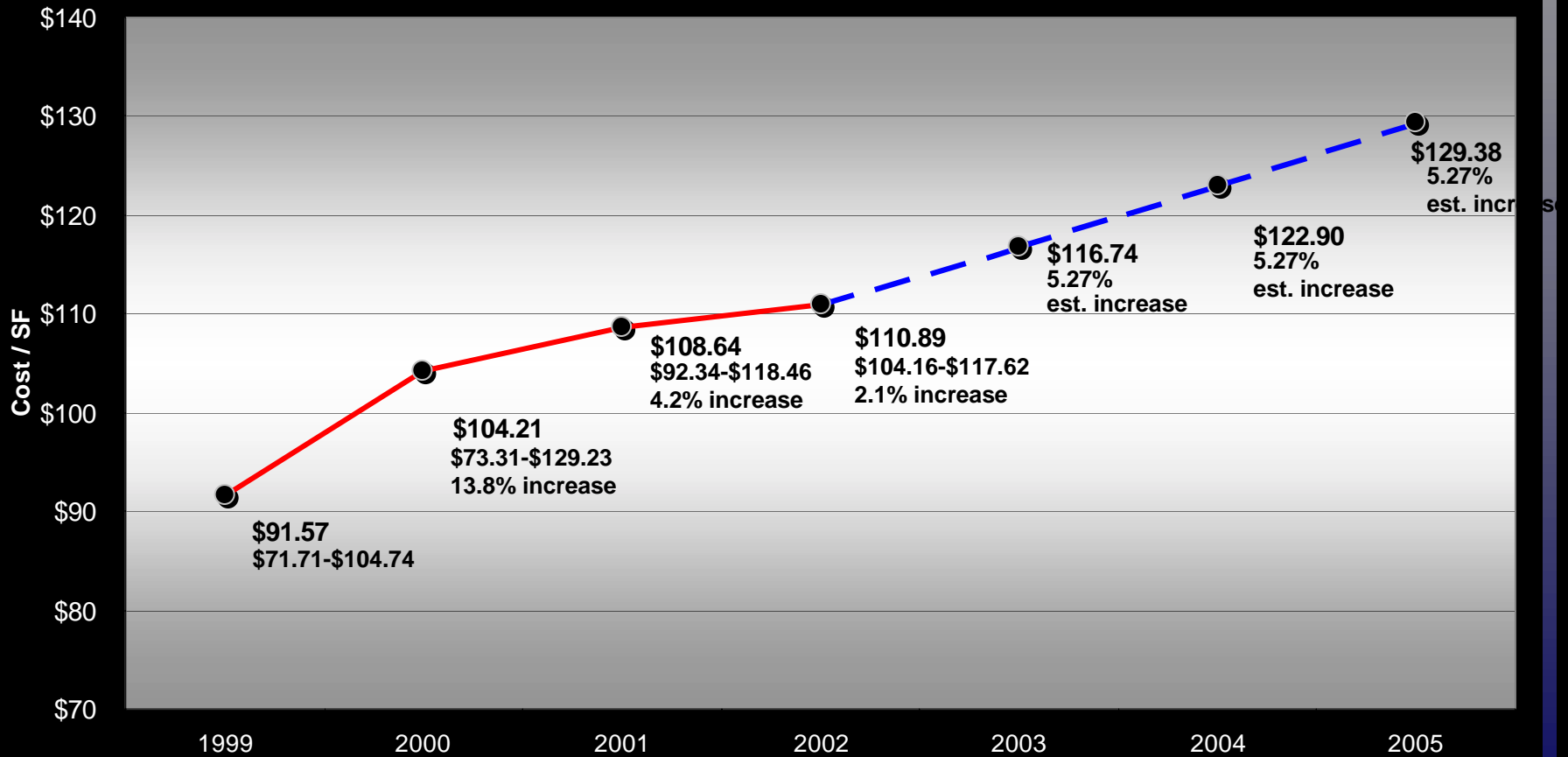
# Average Cost of Construction New Elementary Schools

(Based on 2001-2004 TASB/TASA – Exhibit of School Architecture)



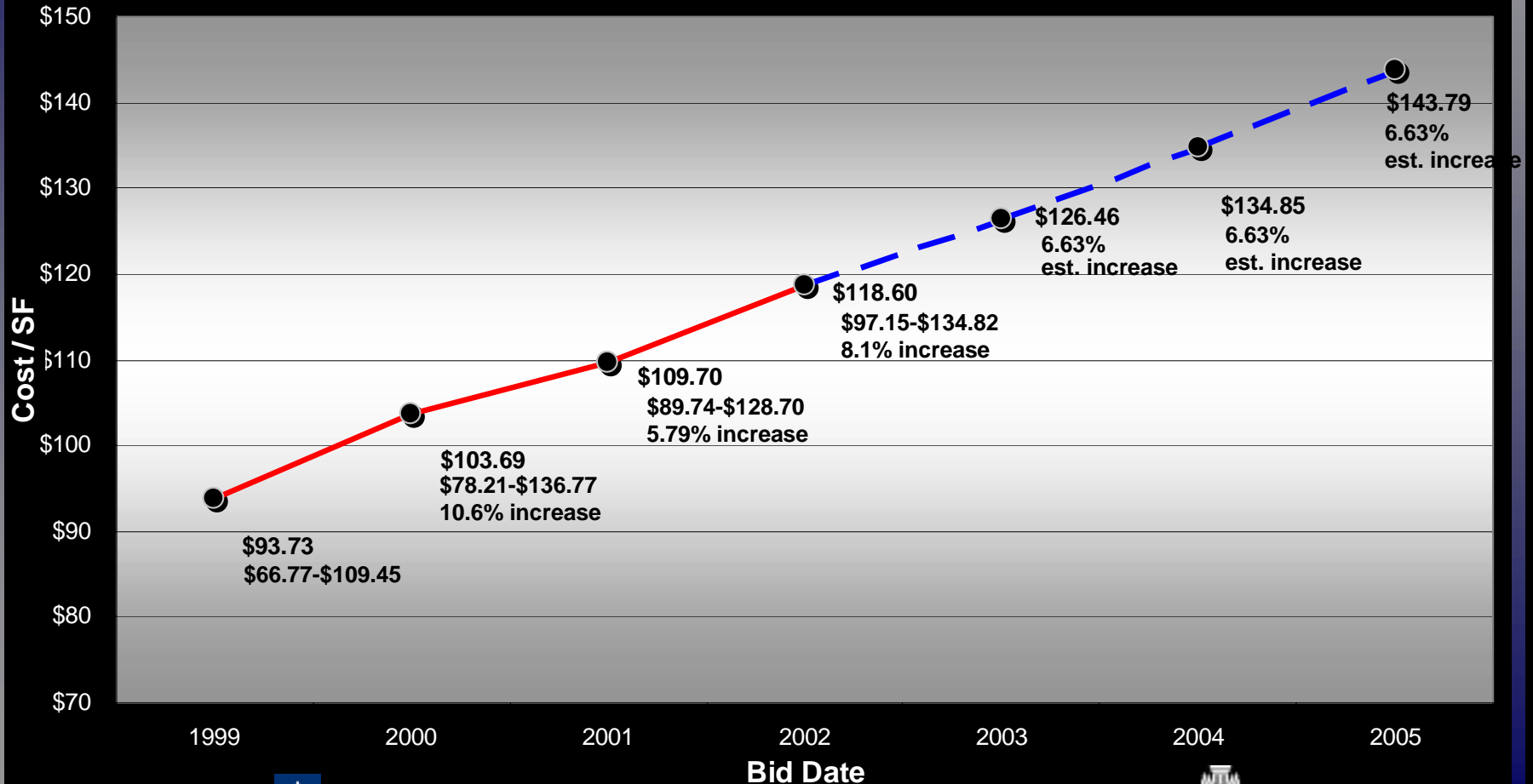
# Average Cost of Construction New Junior High/Middle Schools

(Based on 2001-2004 TASB/TASA – Exhibit of School Architecture)



# Average Cost of Construction New High Schools

(Based on 2001-2004 TASB/TASA – Exhibit of School Architecture)



# Estimating Inflation

## 2003 LABOR COSTS

Projected Increase: 4.1%

Actual Increase: 7.6%

## 2003 MATERIALS COSTS

Projected Increase: 4.3%

Actual Increase: 7.6%

## 2004 PROJECTIONS

Labor Costs: 6.7%

Materials Costs: 9.1%

### Average Projected 2004 Cost Increases Per Division

CSI Division	Labor Cost Projections	Material Cost Projections
05000 Metals	2.0%	20.0%
06000 Wood/Plastics	4.0%	16.3%
02000 Site Work	13.9%	11.0%
10000 Specialties	5.5%	10.0%
07000 Thermal/Moisture	10.5%	9.7%
13000 Special Construction	9.5%	8.3%
09000 Finishes	5.2%	8.2%
08000 Doors/Windows	4.3%	6.3%
03000 Concrete	9.7%	5.7%
15000 Mechanical	4.3%	5.7%
11000 Equipment	2.0%	5.0%
12000 Furnishings	5.0%	5.0%
04000 Masonry	3.0%	3.7%
16000 Electrical	3.3%	3.0%
14000 Conveying Systems	5.0%	2.0%



# Why Are Construction Costs Escalating?

- Supply & Demand
  - Increased workload in Texas/U.S.
  - Shortage of skilled labor
- Craft Shortages
  - Electricians
  - Pipe fitters
  - Plumbers
  - Laborers
- Materials Shortages (Delay & Long Lead Times)
  - Metal products
  - HVAC & electrical equipment/supplies
  - Sheetrock/insulation
  - Brick



# Why Are Construction Costs Escalating?

- Other Reasons
  - Fresh air standards
  - Technology implementations
  - Code compliance & regulation enforcement
  - Environmental concerns
    - Storm water pollution abatement
    - On-site detention & sedimentation
    - Endangered species
    - Design sustainability



# Key Factors Affecting Construction Cost

- Budget
- Type of Space
- Quantity (Amount of Space)
- Quality



# Understanding Budgets

## Construction Cost vs. Total Project Budget

- Construction Cost
  - Site work
  - Building construction
  - Specialized equipment
  - Demolition and hazardous material removal
- Soft Cost
  - Professional services
    - Architects & engineers
    - Surveying
    - Environmental reports
    - Geotechnical testing
    - Materials testing
  - Furniture & Equipment (F&E)
  - Land purchase
  - Technology
  - Inflation
  - Contingency

(10% Bond→5% Bidding→3% Constr.)

Both



# Types of Space

## Estimating on the Average

Auditoriums

Kitchens

Restrooms

Dressing Rooms

Gymnasiums

Science Labs

Libraries

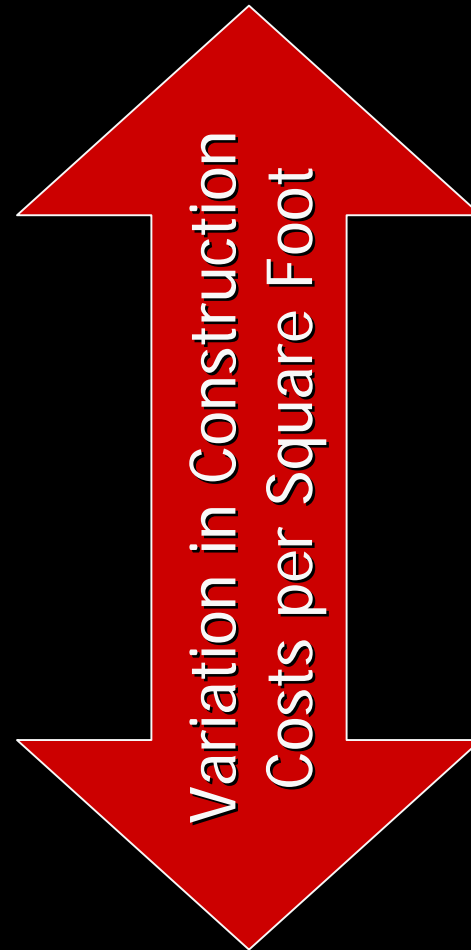
Cafeteriums

Computer Labs

Classrooms

Corridors

Storage



# Specialty Facilities

- Auditoriums & Natatoriums - \$150-200/sf.
  - Specialized equipment (lighting, sound, rigging, seating, HVAC)
  - Long Span Structures
  - Specialized Systems
  - Large Volumes
- Field Houses - \$100-140/sf.
  - Concentration of Plumbing
  - Quantity of Lockers
  - Finishes (ceramic tile, sport court flooring, epoxy paint)
- Maintenance & Transportation Facilities - \$85-120/sf.
  - High Site Work Costs
  - Specialized Equipment (lifts, paint booths, exhaust systems)



# Quantity

**The amount of  
space and volume  
you build directly  
affects the  
Project Budget.**

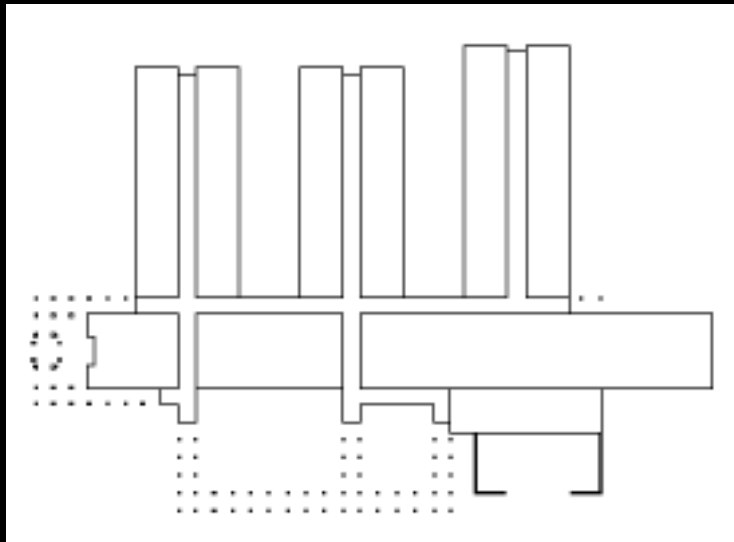


# Efficiencies in Numbers & Programs Being Taught

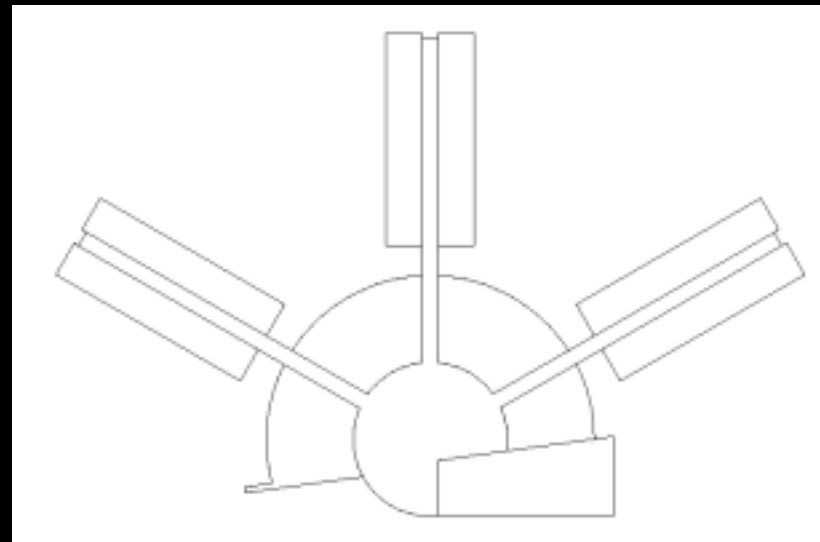
Campus Enrollment Capacity	Square Feet Per Student		
	Elementary/ Intermediate Schools	Junior High/ Middle Schools	High Schools
300-600	130-140		
600-800	110-130	160-180	
800-1200	100-110	150-160	175-200
1200-1500		125-150	160-190
1500-2000			150-180
2000-3000			140-170



# DESIGN: Simple Plan vs. Complex



simple



complex

Reduce circulation by good design  
30% to 25% to 20%



# DESIGN: Simple Massing vs. Complex



# Quality of Construction

Scope of Work	Construction Cost Range		
	Low	Medium	High
Sitework	Gravel	Asphalt	Concrete
Parking	Surface	PVC	Reinforced Concrete
Athletics	Practice Fields	Running Track	Stadiums
Landscaping	Seeding	Hydromulch & Entries	Irrigation Sod, Trees & Bushes
Site Lighting	From Buildings	Pole Lights	Pole Lights, Trees & Signage
Site Concrete	Minimal Sidewalks	Entry Plazas	Covered Gathering Areas
Building Envelope	Low	Medium	High
Foundations	Slab on Grade	On Grade w/ Piers	Suspended Slab
Exterior Walls	Metal Siding	EIFS or Split-face CMU	Brick or Stone
Roofing	Asphalt Shingles	4-Ply B.U.R. Membrane	Concealed Fastener Metal or Coal Tar B.U.R.
Doors & Windows	Fixed Glass Hollow Metal vs. Storefront & Aluminum		



# Interior Finishes

Scope of Work	Construction Cost Range		
	Low	Medium	High
<b>Floors</b>	Sealed Concrete	Stained Concrete	Ceramic Tile
	Vinyl or Carpet		Terrazzo
			Quarry Tile
<b>Walls</b>	Paint on Gypsum Board	Vinyl Wall Covering	Plastic Laminate Panels
		Paint on CMU	Ceramic Tile
		Paint on Impact Resistant Gypsum Board	Glazed Block/Split Face
		Specialized Paint on Gypsum Board	Structural Glazed Tile
			Brick
<b>Ceilings</b>	Lay in Acoustical	RH Lay-in Acoustical	Wood
	Paint Exposed Structure	Gypsum Board	Elaborate Furr Downs
			Suspended Metal Systems
			Suspended Gypsum

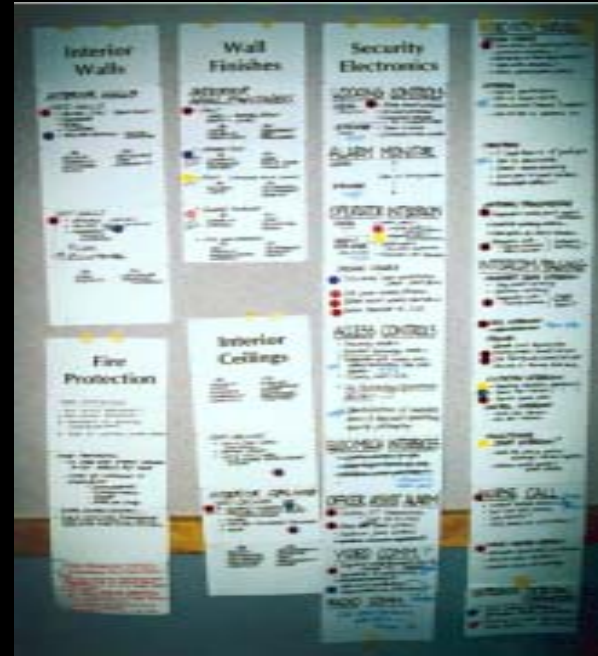


# Systems

Scope of Work	Construction Cost Range		
	Low	Medium	High
<b>Mechanical</b>	Roofing Package System	Split Systems	Four Pipe System w/ Boilers & Chillers
<b>Electrical</b>	Conduit & Wire	Motion Detection	Energy Management Systems
	2 x 4 Fluorescent	Recessed Cans	Pendent Lights & Wall Sconces
		Parabolic Lens	Motion Detection Controls
		Ceiling Fans	
<b>Plumbing</b>	Standard Fixtures	Gas Fired Water Heating	Glass-lined Pipe
	Electric Water Heaters	Trap Primers	
		Vandal Resistant Fixtures	
<b>Structural</b>	Pre-Engineered Mtl.	Structural Steel	Concrete w/ Steel Roof Framing



# Balancing Quality & Durability with Initial Construction Costs & Project Budgets



## Life Cycle Cost Analysis

Paying more for better materials or systems can be justified as long as the payback is within 5 to 10 years and within 50% of the material or system life expectancy.



# Sustainable School

*Sustainably-designed schools* are those that aim to *lessen* their *impact* on our *environment* through *energy* and *resource efficiency*.

- Goal

Develop Cost Effective Solutions (Initial Construction cost –vs- Long Term M & O.)

- Benefits

- Better student performance
- Increased attendance
- Reduced operating costs
- Positive influence on environment
- Increased teacher satisfaction
- Increased opportunities to use facility as teaching tool



# Project Construction Delivery Methods

Six Methods to Choose From:

- Competitive Bids
- Competitive Sealed Proposals
- Construction Management Agency
- Construction Management @ Risk
- Design Build
- Job Order Contracting

**Construction Cost** is directly proportioned to the amount of control you place on a project.

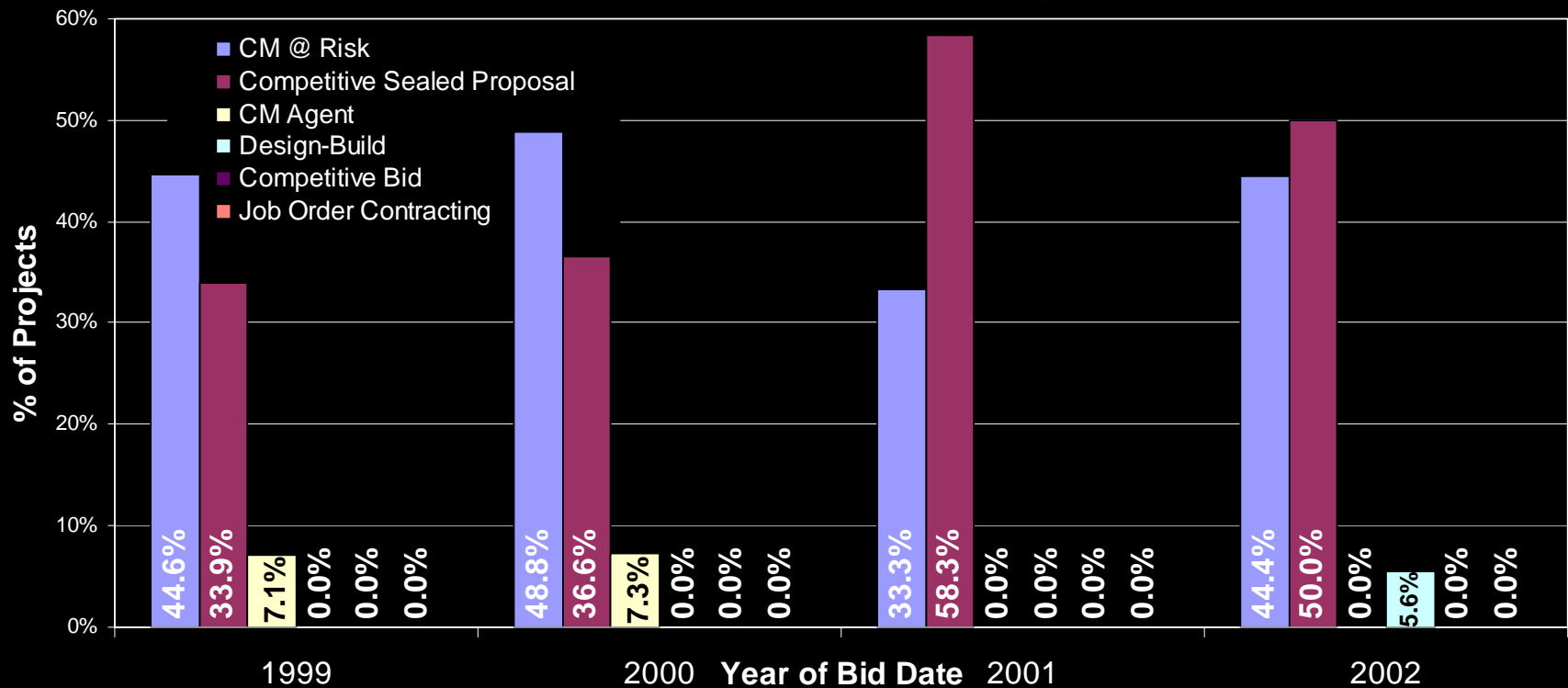
Increased competition results in reduced construction costs.



# "Best Value"

The two most commonly used delivery methods today:

- Construction Management @ Risk
- Competitive Sealed Proposals (Design-Bid-Build)



# Case Study: Austin Independent School District's 2004 Facility Improvement Planning

- Assess
- Estimate
- Budget
- Schedule
- Manage
- Referendum



# Assess

- Austin ISD's Joint Task Force effort
- Regardless whether with Consultants or Staff Work Orders, need a factual basis that can stand up to public examination.
- It is a Multi-Disciplinary effort.
- Consider whether you want to be tied to proprietary software.



# Estimate

- Joint Task Force provided varying unit prices that needed consistency provided through Staff review.
- Consider rising energy prices and their impact on steel & roofing materials.



# Budget

- The estimate is only the beginning.
- Factor escalation to mid-point of construction.
- Factor fees, including design and testing.
- Include contingency and management costs.



# Schedule

- Determine priorities starting with likely order of system failures.
- Spread work geographically and across trades.



# Manage

- Determine if you will manage with Staff, a Program Management firm, or both.
- Plan projects per Project Manager considering workload of design and construction.



# Referendum

- Two or more propositions.
- Political action and polls by persons outside District.



# Questions & Answers



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# Concepts for Cost Savings

- Preliminary **Programming** and **Estimating**
- Cost Savings during **Design Development**
  - Owner Furnished Items**
- Cost Savings during the **Bidding Phase**
  - Cost Savings during the **Construction**
  - Cost Savings during **Warranty Periods**



# Preliminary Planning & Estimating

- Space Program Development
- Review existing spaces to determine:
  - Space requirements
  - Quality expectations
  - Curriculum/instructional needs
- Develop program with end users:
  - Principal
  - Admin. Staff
  - Special Education
  - Career
  - Science Teacher
  - Athletic Coaches
  - Counselors
  - Teachers
  - Custodial
  - Technology
  - Librarian
  - Nurse
  - Computer
  - Maintenance



# Preliminary Planning & Estimating

1. Have Civil Engineer determine utilities expense, roadways to site, and other site development construction costs.
2. Conduct preliminary geotechnical testing to verify subsoil conditions and foundation types.
3. Meet on-site with environmental specialties to determine any remedial work.
4. Contact Texas Historical Commission to assess antiquities concerns.
5. Include contingencies for changes during design and inflation.
6. If using Construction Manager or Program Manager, hire them to assist in cost estimating and value engineering prior to final estimates.
7. Develop realistic schedule for planning and design thru construction.
8. Insist on hiring Architects and Engineering Consultants who specialize in educational facility planning and design.



# Cost Savings during Design Development

- Avoid scope creep.
- **Material Selection:** Reduce variety of materials and trades to maximize economy of large orders.
- Consider **life cycle cost** and district's availability to maintain HVAC systems.
- Consider **alternate systems** recommended by Architects, Maintenance Staff, Contractors, etc.
- Select construction **delivery method** early.
- Keep design **simple** and design around standard and manufactured products.
- Reduce **exterior wall** construction.



# Owner-Furnished Items (Direct Purchase)

- Engineering Consultants
  - Environmental
  - Geotechnical
  - Surveying
  - Civil Engineering
  - Demographics
  - Technology
- Furnishings & Equipment
  - Landscape
  - Irrigation
  - Playground Equipment
  - Furniture
  - Specialized Moveable Equipment (Vocational, Appliances, etc.)
  - Technology



# Owner-Furnished Items (Direct Purchase)

- Potential Savings
  - Architect/Engineer – 6%-8%
  - Constructor's Markup – 4%-10%

A/E Consultants should work with you to coordinate MEP connections and allocate space for Owner-furnished items.



# Recommendations for Selection of a Contractor or Construction Manager

- Include “best value” criteria in Proposal Documents
- Check references
  - Avoid Contractors with bad references or unsatisfied clients.
  - Verify success of Contractors on similar sized projects.
  - Price: Verify & compare initial proposal & final Change Order.
  - Schedule: Verify if Contractor met schedule.
  - Personnel: Consider who will be on site. Check references with School Districts and Architects.



# Cost Savings during the Bidding Phase

- Advertise and notify Bidders two consecutive weeks prior to bidding in county paper.
  - Letter of intent – 60 days prior to ad.
  - Letters to Contractors and Subs.
  - Make plans available to big and small Contractors and Manufacturers.
- Expect at least **3 proposals** as a means to control cost.
- Seek out **equal products**.
- Consider **alternate proposals** as a means to control cost.
- Conduct Pre-Proposal Conference.



# Cost Savings during the Bidding Phase

- Allow sufficient **time for bidding** and coordinate date with planholders.
- Clarify all questions by Addenda to **reduce guesswork**.
- Have Contractor propose completion **schedule**, but include **liquidated damages** for non-performance.
- Include criteria for "**Best Value**" in proposal documents.
- Avoid Contractors with bad references or unsatisfied clients.
- Verify **success** of Contractor on projects of **similar scope**.



# Cost Savings during the Construction Phase

- Develop a **team relationship** between Owner, Contractor, Subcontractors, Architect, and Consultants.
- With hundreds of workers and thousands of parts, a **give and take** relationship is essential.
- **Clarify** the use of **contingencies** early on.
  - Identify all contingencies.
  - Agree on what contingencies can be used for.
  - Verify who decides when each type of contingency can be used.



# Cost Savings during the Construction Phase

- Plan ahead for **long lead order** materials to avoid crisis orders.
- Allow Contractor to present cost-efficient **alternatives** to construction materials, techniques, and methods.
- Require Architects and/or Engineers to conduct **cover-up reviews**.
- Conduct weekly **site meetings** and monthly **progress meetings** to answer questions and monitor progress.



# Cost Savings during Warranty Periods

- Require project **close-out manuals** with **warranty summary**.
- Keep **Subcontractor** and **material supplier information** readily available in several locations for quick access.
- Require the Contractor to submit a master copy of all **as-built drawings** on mylar. (Make 3 sets of copies for daily use.)
- Architect should furnish **contract documents** on **CD-Rom** for Owner's use in maintaining facilities.



# Cost Savings during Warranty Periods

- **Videotape** equipment demonstrations for future training.
- **Notify** Contractor and A/E of **warranty** repair work ASAP.
- Perform **11-month facility review** to identify needed repairs. (Solicit list of repairs from teachers, maintenance and staff in April to avoid end of school year rush.)
- Avoid making **repairs** to items under **warranty** with district staff except in case of emergency.

