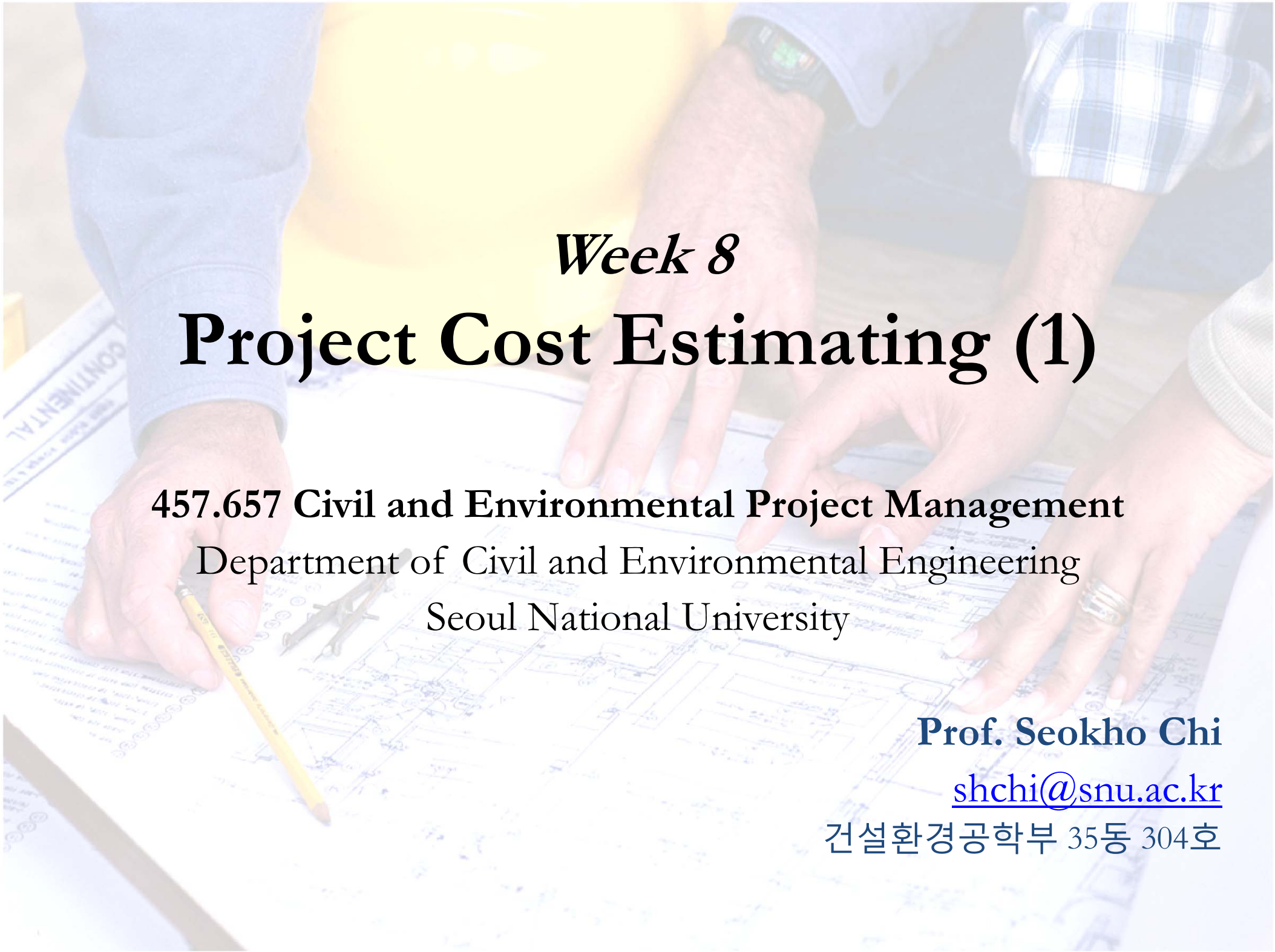


Week 8

Project Cost Estimating (1)

457.657 Civil and Environmental Project Management

Department of Civil and Environmental Engineering
Seoul National University

Prof. Seokho Chi

shchi@snu.ac.kr

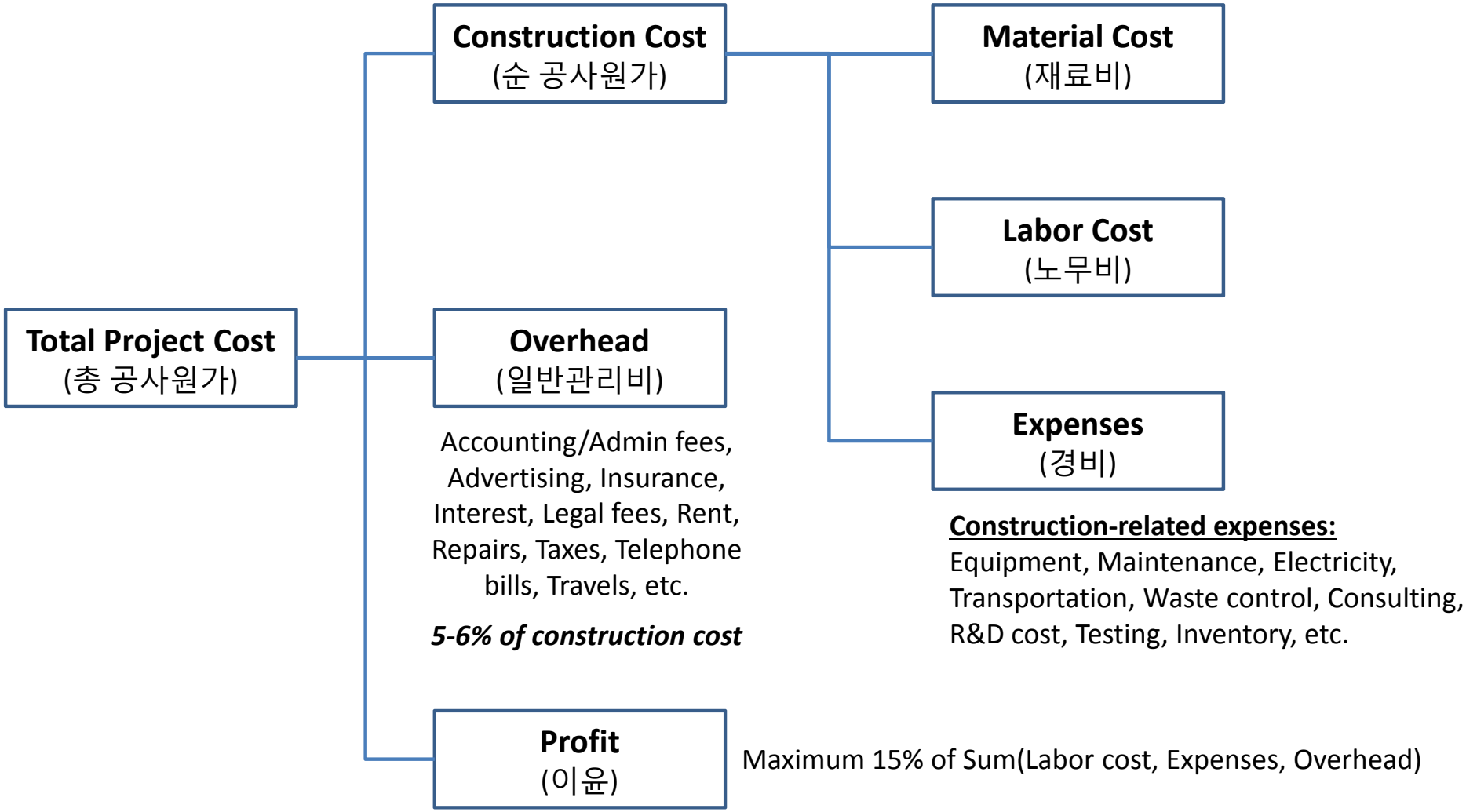
건설환경공학부 35동 304호

Estimating Construction Costs

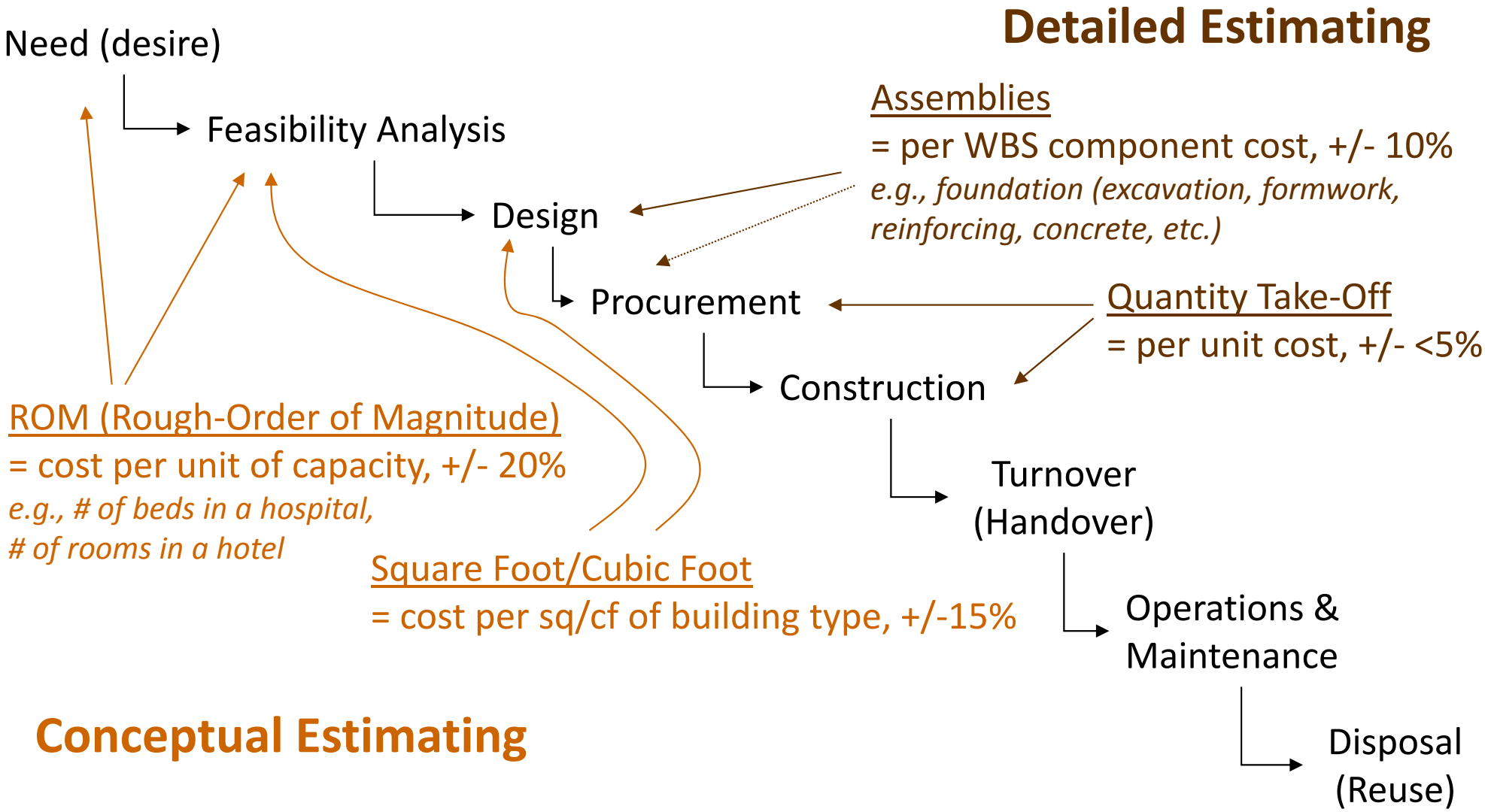
- **Approaches to estimating**
- **Conceptual / Detailed estimating**
- **RS Means data and examples**

- **Estimates**
  - Necessary to guide decisions, budgets
  - Hard to do well
  - Are performed by several actors
    - Owners
    - Designers
    - Contractors
    - Subcontractors

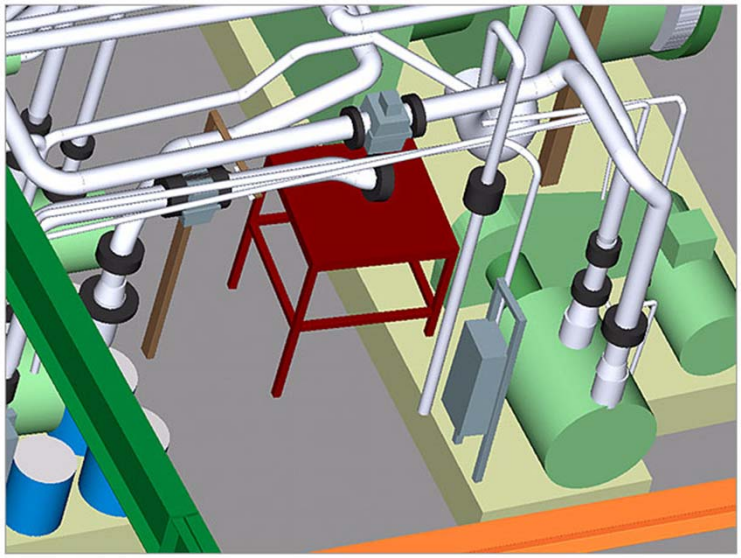
Bid Estimate



Context: Project Timeline



Design



Program-ming

Schematic

Design development

70% complete

Construction documents

100% complete

ROM

Use costs to iterate design concepts

SF/CF

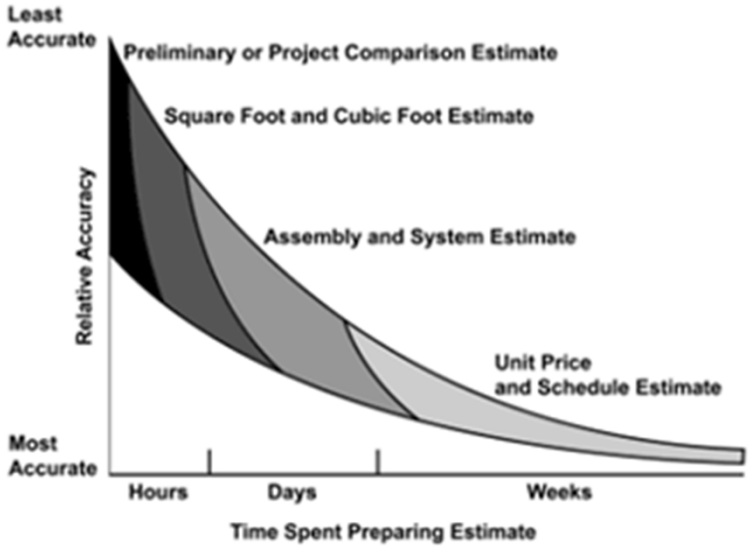
Assemblies

Unit Pricing

Predict final costs

Cost Estimating

- Preparation Time X Accuracy



Conceptual Estimating

- Guide decisions regarding: location, scope, feasibility.
- Very little project information is available
- Size of the project is generally known, although it may be described in terms of capacity (e.g.: number of beds, megawatts)
- Short preparation time
- Estimates prepared for many different program options

Detailed Estimating

- Based on a (near) complete set of documents
- Owner team prepares an estimate to negotiate
- Contractors prepare an estimate to bid (or negotiate)
- Price given by contractors for different work packages may be based on bids from pre-qualified subcontractors

Conceptual Estimating

- **Consideration**
  - Building type
  - Location
  - Rough size
  - Material type
  - Time
- **Compare to historical data (similar buildings)**
  - Apply modifiers as needed

Bid Estimate

- **Resources for Estimate**
  - U.S.
    - RS Means Building Construction Cost Data
    - RS Means Assemblies Cost Data
    - RS Means Square Foot Costs
  - Australia
    - Rawlinsons Construction Cost Guide
  - Korea
    - 표준품셈 (대한건설협회): provide quantity information of activities
    - 실적공사비 (한국건설기술연구원): provide historical database

Building Costs

RS Means Building Data

- **Compiles info**
- **Good starting point**
- **Firm data often better (why?)**

More Competitive

Example:

Library - 6,500 sf

RS Means - $97.30/sf

Estimated cost : $632,450

If ¼, 25% of that type of building costs less than the indicated price and 75% costs more

141 | S.F., C.F. and % of Total Costs

14.1 | S.F. & C.F. Costs

			UNIT	UNIT COSTS 1/4	UNIT COSTS MEDIAN	UNIT COSTS 3/4	% OF TOTAL 1/4	% OF TOTAL MEDIAN	% OF TOTAL 3/4	
520	3100	Total: Mechanical & Electrical R141-010	S.F.	36	63.85	75.55	29.20%	31.10%	34.10%	520
530	0010	**LIBRARIES**	S.F.	76.40	97.30	124				530
	0020	Total project costs	C.F.	5.35		8.65				
	0500	Masonry	S.F.	4.37	9.75	16.80	5.80%	9.50%	11.90%	
	1800	Equipment		1.11	2.98	4.65	1.20%	2.80%	4.50%	
	2720	Plumbing		3.09	4.35	5.90	3.60%	4.90%	5.70%	
	2770	Heating, ventilating, air conditioning		6.60	11.20	14.60	8%	11%	14.60%	
	2900	Electrical		7.85	10.15	12.60	8.30%	11%	12.10%	
	3100	Total: Mechanical & Electrical		22.65	30.95	38.75	18.90%	25.30%	27.60%	
550	0010	**MEDICAL CLINICS**	S.F.	75.20	93.15	117				550
	0020	Total project costs	C.F.	5.60	7.25	9.70				
	1800	Equipment	S.F.	2.06	4.33	6.75	1.80%	5.20%	7.40%	
	2720	Plumbing		5.05	7.15	9.55	6.10%	8.40%	10%	
	2770	Heating, ventilating, air conditioning		6.15	7.90	11.65	6.70%	9%	11.30%	
	2900	Electrical		6.40	9.10	12.05	8.10%	10%	12.20%	
	3100	Total: Mechanical & Electrical		20.10	28.25	39.50	22%	27.60%	34.30%	
	3500	See also division 11700								
570	0010	**MEDICAL OFFICES**	S.F.	70.60	87.50	108				570
	0020	Total project costs	C.F.	5.25	7.20	9.85				
	1800	Equipment	S.F.	2.45	4.70	6.70	3%	5.80%	7.20%	
	2720	Plumbing		3.96	6.10	8.30	5.70%	6.80%	8.60%	
	2770	Heating, ventilating, air conditioning		4.79	7.05	9.10	6.20%	8%	9.70%	
	2900	Electrical		5.60	8.15	11.40	7.60%	9.80%	11.40%	
	3100	Total: Mechanical & Electrical		13.90	20	29.70	18.50%	22%	24.90%	
590	0010	**MOTELS**	S.F.	45.20	67	86.40				590
	0020	Total project costs	C.F.	3.95	5.55	9.10				
	2720	Plumbing	S.F.	4.59	5.85	6.95	9.40%	10.60%	12.50%	
	2770	Heating, ventilating, air conditioning		2.79	4.17	7.45	5.60%	5.60%	10%	
	2900	Electrical		4.27	5.45	7.10	7.10%	8.20%	10.40%	
	3100	Total: Mechanical & Electrical		14.50	18.20	31.20	18.50%	21%	24.40%	
	5000									
	9000	Per rental unit, total cost	Unit	23,000	43,800	47,300				
	9500	Total: Mechanical & Electrical	"	4,500	6,800	7,900				
600	0010	**NURSING HOMES**	S.F.	68	89.95	110				600
	0020	Total project costs	C.F.	5.45	7	9.50				
	1800	Equipment	S.F.	2.28	3.04	4.90	2.40%	3.70%	6%	
	2720	Plumbing		6.40	8.15	11.30	9.40%	10.70%	14.20%	
	2770	Heating, ventilating, air conditioning		6.35	8.85	11.30	9.30%	11.40%	11.80%	
	2900	Electrical		7.05	8.80	11.80	9.70%	11%	13%	
	3100	Total: Mechanical & Electrical		16.75	23.45	34.35	26%	29.90%	30.50%	
	3200									
	9000	Per bed or person, total cost	Bed	29,400	36,200	48,200				
610	0010	**OFFICES** Low Rise (1 to 4 story)	S.F.	57.30	73	97.15				610
	0020	Total project costs	C.F.	4.15	5.80	7.85				
	0100	Site work	S.F.	4.32	7.35	11.40	5.30%	9.70%	14%	
	0500	Masonry		1.99	4.66	8.80	2.90%	5.80%	8.70%	
	1800	Equipment		.71	1.30	3.57	1.20%	1.50%	4%	
	2720	Plumbing		2.18	3.30	4.67	3.70%	4.50%	6.10%	
	2770	Heating, ventilating, air conditioning		4.71	6.50	9.65	7.20%	10.50%	11.90%	
	2900	Electrical		4.86	6.70	9.40	7.50%	9.60%	11.10%	
	3100	Total: Mechanical & Electrical		11.40	15.85	23.15	18%	21.80%	26.50%	
620	0010	**OFFICES** Mid Rise (5 to 10 story)	S.F.	63.20	76.65	104				620
	0020	Total project costs	C.F.	4.42	5.60	8.10				
	2720	Plumbing	S.F.	1.91	2.96	4.26	2.80%	3.70%	4.50%	
	2770	Heating, ventilating, air conditioning		4.80	6.85	10.95	7.60%	9.40%	11%	

Figure 5.1
Sample square foot costs for various structures.
From *R. S. Means Assemblies Cost Data 2000.*

Location Indices

City Cost Indexes | R13.3-010 | Building Systems

DIV. NO.	BUILDING SYSTEMS	NEW YORK														
		HICKSVILLE			NEW YORK			RIVERHEAD			ROCHESTER			SCHENECTADY		
		MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL
1-2	FOUND/SUBSTRUCTURES	98.0	154.0	133.7	120.3	157.0	143.7	97.5	153.3	133.0	100.0	102.1	101.3	94.8	99.0	97.5
3	SUPERSTRUCTURES	105.8	151.1	125.5	111.5	154.2	130.0	106.0	149.7	125.0	101.6	106.0	103.5	99.5	103.2	101.1
4	EXTERIOR CLOSURE	111.9	157.6	133.8	119.9	161.0	139.6	114.4	157.3	135.0	107.6	101.6	104.7	103.4	97.8	100.7
5	ROOFING	105.9	150.3	125.3	108.0	155.0	128.5	106.0	150.3	125.4	100.8	99.4	100.2	92.5	95.5	93.8
6	INTERIOR CONSTRUCTION	97.5	151.9	119.8	103.5	167.7	129.8	97.8	151.9	120.0	96.7	99.0	97.6	97.5	88.3	93.7
7	CONVEYING	100.0	129.8	108.4	100.0	143.2	112.2	100.0	123.4	106.6	100.0	99.1	99.7	100.0	97.0	99.1
8	MECHANICAL	99.8	150.6	122.9	100.4	161.4	128.0	99.8	150.6	122.8	100.0	93.4	97.0	100.4	93.3	97.2
9	ELECTRICAL	103.3	159.8	141.8	112.0	177.7	156.8	104.4	159.8	142.2	107.0	95.2	99.0	103.3	96.1	98.4
11	SPECIAL CONSTRUCTION	100.0	162.9	104.0	100.0	172.3	104.6	100.0	162.7	104.0	100.0	97.7	99.9	100.0	88.4	99.3
12	SITE WORK	119.1	132.8	129.3	142.2	128.8	132.2	119.7	131.5	128.5	77.6	107.2	99.6	73.8	108.1	99.4
1 - 12	WEIGHTED AVERAGE	102.9	151.8	126.6	108.6	160.5	133.8	103.4	151.2	126.6	100.6	99.7	100.1	99.0	96.9	98.0

DIV. NO.	BUILDING SYSTEMS	FLORIDA														
		PANAMA CITY			PENSACOLA			ST. PETERSBURG			TALLAHASSEE			TAMPA		
		MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL
1-2	FOUND/SUBSTRUCTURES	103.5	53.6	71.7	102.5	69.7	81.6	105.3	69.6	82.6	100.3	62.7	76.4	103.9	69.7	82.1
3	SUPERSTRUCTURES	98.2	57.6	80.6	97.4	75.3	87.8	101.9	76.4	90.8	99.2	69.9	86.5	102.4	76.5	91.2
4	EXTERIOR CLOSURE	94.8	36.2	66.6	92.9	62.9	78.5	106.3	61.4	84.7	89.2	50.4	70.6	88.7	61.5	75.6
5	ROOFING	97.3	36.6	70.8	97.0	61.5	81.5	96.6	57.2	79.4	97.1	55.6	79.0	97.0	58.4	80.1
6	INTERIOR CONSTRUCTION	101.7	31.1	72.7	100.3	62.2	84.7	101.3	58.2	83.6	102.9	46.5	79.8	102.9	58.2	84.6
7	CONVEYING	100.0	61.7	89.2	100.0	65.0	90.1	100.0	69.4	91.4	100.0	76.2	93.3	100.0	77.2	93.6
8	MECHANICAL	99.9	31.3	68.9	99.9	62.3	82.9	99.9	62.1	82.8	99.9	49.6	77.1	99.9	62.2	82.8
9	ELECTRICAL	94.1	41.4	58.2	99.5	61.9	73.9	96.3	59.7	71.4	96.4	51.2	65.6	95.3	59.8	71.1
11	SPECIAL CONSTRUCTION	100.0	33.3	95.7	100.0	61.9	97.6	100.0	56.9	97.2	100.0	45.2	96.5	100.0	56.9	97.2
12	SITE WORK	135.2	84.6	97.5	132.8	86.9	98.6	122.0	86.6	95.6	121.9	86.3	95.4	121.9	86.6	95.6
1 - 12	WEIGHTED AVERAGE	99.8	44.6	73.1	99.4	67.0	83.7	101.8	65.9	84.4	99.3	57.4	79.0	100.0	66.2	83.6

DIV. NO.	BUILDING SYSTEMS	NEVADA									NEW HAMPSHIRE					
		CARSON CITY			LAS VEGAS			RENO			MANCHESTER			NASHUA		
		MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL	MAT.	INST.	TOTAL
1-2	FOUND/SUBSTRUCTURES	108.4	100.5	103.3	103.1	109.8	107.4	108.5	101.4	104.0	100.9	87.7	92.5	99.6	87.7	92.0
3	SUPERSTRUCTURES	105.9	100.5	103.6	104.9	108.7	106.6	106.4	102.5	104.7	100.3	85.4	93.9	100.0	85.4	93.6
4	EXTERIOR CLOSURE	118.2	89.0	104.1	115.5	102.8	109.4	118.3	88.9	104.1	106.0	94.8	100.6	106.2	94.8	100.7
5	ROOFING	104.0	92.6	99.0	103.7	104.0	103.8	104.1	92.6	99.1	100.5	97.1	99.0	100.8	97.1	99.2
6	INTERIOR CONSTRUCTION	96.6	94.8	95.8	97.2	107.9	101.6	97.3	95.1	96.4	102.5	79.0	92.9	102.6	79.0	92.9
7	CONVEYING	100.0	129.4	108.3	100.0	115.6	104.4	100.0	129.4	108.3	100.0	100.8	100.2	100.0	100.8	100.2
8	MECHANICAL	100.0	97.9	99.0	100.0	112.7	105.7	100.0	98.0	99.1	99.9	82.9	92.2	99.9	82.9	92.2
9	ELECTRICAL	93.7	91.7	92.3	95.8	108.2	104.2	93.7	91.7	92.3	104.6	75.8	85.0	104.4	75.8	84.9
11	SPECIAL CONSTRUCTION	100.0	95.7	99.7	100.0	105.9	100.4	100.0	95.7	99.7	100.0	67.9	97.9	100.0	67.9	97.9
12	SITE WORK	67.2	102.6	93.6	67.2	104.0	94.6	67.5	102.6	93.7	94.6	96.5	96.0	96.6	96.5	96.5
1 - 12	WEIGHTED AVERAGE	102.0	96.9	99.5	101.5	108.3	104.8	102.2	97.3	99.9	101.5	85.1	93.6	101.5	85.1	93.6

100 = National Average

MAT: Material Cost, INST: Labor Cost

Figure 5.4

City cost indices for selected cities.

(1) ROM Estimate

- **100-bed dormitory (low rise); median quality; 2003 data; in Nashville, TN; Jan 2003 construction start**
  - Total cost = Number of units × Unit cost
    = 100 units × 36,300 per unit
    = $3,630,000 (**without adjustments**)
- **Location Adjustment**
  - National average city index = 100
  - Adjusted cost for a city = Estimated cost × City index / 100
  - For Nashville: 86.2
  - Adjusted total cost = $3,630,000 × 86.2 / 100
    = **$3,129,060**

(2) SF Estimate – Modeled

- **19,386 ft^2 fire station; face brick with concrete block back-up; steel joists; 2003 data; in Austin; January 2005 construction start; 2.5% projected increase per year.**
  - Total cost = Size in ft^2 × Cost/ft^2
    = 19,386 ft^2 × \$97.95/ft^2 (approximately)
    = **\$1,898,858** (without adjustments)

(2) SF Estimate – Modeled (Cont'd)

- **Add-on Features:**
  - Combination range, refrigerator, sink, microwave oven & icemaker (quantity = 1) = 1 × $5,275
  - Steel lockers, single tier, 72" (8 openings) = 8 × $200
- **Cost with add-on features = $ 1,905,733**
- **Key point**
  - Estimates can mix level of detail
    - If you find, you can add now
  - Danger is to double count
    - You need to figure out which one has been included already through itemized building code
    - Clearly determine included/not-included items

(2) SF Estimate – Modeled (Cont'd)

- **Location Adjustment**
  - National average city index = 100
  - Adjusted cost for a city = Estimated cost × City index / 100
  - For Austin
    - Adjusted Austin cost = $ 1,905,733 × 79.7 / 100

      = **$1,518,869**

(2) SF Estimate – Modeled (Cont'd)

- **Time Adjustment**
  - 2003 data used for 2005 construction
  - Time adjusted cost = $(1 + \%\text{ projected yearly increase})^n \times$ Adjusted Cost

    $= (1 + 0.025)^2 * \$1{,}518{,}869$

    $= \underline{\mathbf{\$1{,}595{,}761}}$

Detailed Estimating

- **Scope definition**
  - Dimensions, specified quality, construction methodology, potential problems and solutions
- **Quantity take off**
  - Packaging of project components' scope into units that can be priced
- **Pricing**
  - Applying marketplace labor, material, and equipment costing to the quantities
  - Factors such as schedule, construction process, productivity, labor agreements, and resource allocation should be considered
- **Overhead and profit issues**
  - Overhead, profit, sales taxes, labor benefits, bond, and contingency

Scope Definition

- **Contract documents**
  - Drawings
  - Specifications
  - Technical references
  - Addenda
- **Site analysis**
  - Soil
  - Utilities
  - Access
  - Neighbors
  - Existing structures
- **New construction vs. Repair and remodeling**
- **Bonding and insurance requirements**

Basic Detailed Process

- **Estimated Cost =**

  Quantity × Price (material + installation) per unit

  - Quantity: by counting
  - Price: by time, materials, and crew cost
    - Materials: vendor data
    - Crew cost: varies by composition of junior and senior members as well as size; also equipment
    - Time (duration): by productivity per unit
      - » Can vary a lot by method, crew size

Estimate Setup

- Format
- Organization of cost items } **Typically by CSI codes**
- Separation of subcontractors from in-house work
- Adjustments
- Overhead and profit (markup) summary
- Estimate summary

Quantity Take Off

- **Break a project down into work packages (e.g., excavate for spread footings, place concrete for spread footings)**
  - This can be really hard!
- **Determine quantity for work package**
  - Requires a strong understanding of the work involved
  - Be careful with details, scales, and units
  - Take advantage of repeated project elements
  - Make sure you don't quantify the same element twice
  - Account for waste, shrinkage, swell, equipment wear

Unit Pricing

- **Sources of pricing information**
  - Publications
  - In-house data
  - Material suppliers
  - Equipment rental companies
  - Subcontractors
  - Unions
  - Government offices
  - Insurance and bonding providers

Unit Pricing (Cont'd)

- **Material Costs:**
  - Specifications (e.g.: model number, color, finish)
  - Price valid until delivery time
  - Delivery
  - Warranties and guarantees
  - Lead time to delivery
  - Supplier's stock
  - Supplier's reputation
  - Payment terms ***Important to control to prevent negative cash flow!***

Unit Pricing (Cont'd)

*Total Fringe: Health + Pension + Apprentice
FICA: Federal Insurance Contributions Act

- **Labor Costs:**
  - Wage rate
    - Trade
    - Union vs. Non-Union
    - Project location
    - Fringe
  - Productivity
    - Crew efficiency
    - Concurrent work
    - Weather conditions
    - Workspace
    - Regular vs. overtime

Washington State Carpenters (sample)	Journeyman	
	Regular Time	Time & a Half
Rate	$27.95	$41.93
Health	2.90	2.90
Pension	3.87	3.87
Apprentice	0.35	0.35
Total Fringe	7.12	7.12
Taxable Wage Rate	35.07	49.05
FICA @ 7.65%	2.14	3.21
State Unem. @ 5.42%	1.51	2.27
Fed. Unem. @ 0.8%	0.22	0.34
Workers Comp @ $2.0859/hr	2.09	2.09
Total Payroll Taxes & Insurance	5.96	7.91
Labor Burden (fringe + tax & ins)	13.08	15.03
Total Labor Rate	**41.03**	**56.96**

Unit Pricing (Cont'd)

- **Equipment Costs**
  - Cost of ownership, lease, or rental
    - Interest
    - Storage
    - Insurance
    - License
    - Taxes
  - Operation
    - Gasoline/oil
    - Maintenance
    - Transportation
    - Mobilization
    - Operator (may be included with labor)
- **Item-by-item basis vs. project basis**

Overhead and Profit

- Job organization
- Travel expenses
- Engineering support
- Marketing, legal, and accounting fees
- Testing
- Equipment (project basis)
- Field office
- Temporary utilities
- Permits
- Temporary roads
- Insurance and bonds
- Clean up
- Safety devices/signs/barricades
- Photographs
- Taxes (other than direct costs)

In Class Exercise

- **In Austin:**
  1. Find the estimated cost of putting in place 500 lf of 10' high large columns

  2. Find the estimated installation cost of 10 25'x25' waffle slab bays with a 75 psf load

  3. Find the cost of elevated floors on a 5 story (5 stories with 4 elevated floors and a roof) apartment block with 10,000sf/floor. Slab on grade construction.

RS Means

In Class Exercise

1. **Find the estimated total cost of precast concrete 500 lf (linear foot = regular feet) of 12' high large columns**
   - 12' high large columns = $175/lf
   - Austin city cost index = 73 (concrete)
   - Total estimated cost = $175/lf × 500 lf × 0.73 = **$63,875**

In Class Exercise

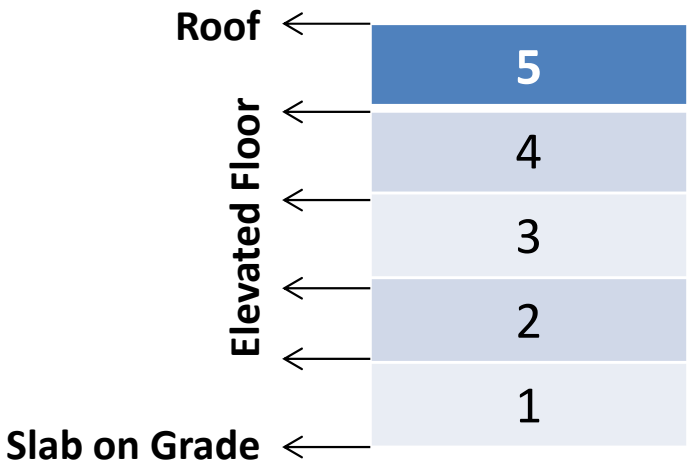
2. **Find the estimated installation cost of 10 25'x25' cast in place waffle slab bays with a 75 psf load**
   - 25'×25' waffle slab, 75 psf load = $8.45/sf (installation)
   - Austin city cost index = 64.9 (concrete installation)
   - Total estimated cost = $8.45/sf × 10 × 0.649 × (25' × 25')

     = **$34,275**

In Class Exercise

3. **Find the cost of elevated floors** on a 5 story (5 stories with 4 elevated floors and a roof) apartment block with 10K sf·floor. Slab on grade construction.
   - 5 story, elevated floors = \$12.49/unit
   - Austin city cost index = 73 (concrete)
   - Total estimated cost = \$12.49/unit × 10,000 × 0.73 × 4

     = **\$364,708**



Bid Estimate

- **표준품셈**
  - Provide material quantity, labor hour information for given construction activities in standard construction environment
  - Yearly updated by 50 review committees

Civil 6-1-2 Mortar (m^3당)

Mixing Ratio (배합용적비)	Cement (시멘트, kg)	Sand (모래, m^3)	Labor (인부, 인)
1 : 1	1,093	0.78	1.0
1 : 3	510	1.10	1.0
1 : 5	320	1.15	0.9

Bid Estimate

- **일위대가 (Itemized Unit Cost)**
  - Quantity identified from 표준품셈 X Cost from 일위대가

Mortar 1:1 Mixing Ratio (m³당)

Item	Size	Unit	Quantity	Material Cost		Labor Cost		Expenses		Total		Others
				Unit ₩	₩	Unit ₩	₩	Unit ₩	₩		₩	
Cement		KG	**1,093**	80	87,440							
Sand		㎡	**0.78**	11,000	8,580							
Labor		Person	**1**			57,820	57,820					
Total					**96,020**		**57,820**				**153,840**	

- **Estimate (공사비 내역서)**

(단위: 원)

Activity (공종)	Type	Unit	Quantity (물량)	Material Cost		Labor Cost		Expenses		Total	
				Unit ₩	₩	Unit ₩	₩	Unit ₩	₩	Unit ₩	₩
Mortar	**1:1**	**㎥**	**10**	**96,020**	**960,200**	**57,820**	**578,200**	**-**	**-**	**153,840**	**1,538,400**
~											
Total										**000**	**000**

Bid Estimate

- **일위대가 (Itemized Unit Cost)**
  - **Material cost**: Government cost info + Market cost info
    (조달청 발행 가격정보, 물가자료 또는 물가정보)
  - **Labor cost**: Construction Association of Korea yearly collects labor cost information from 50-60 construction sites and announces standardized labor cost every 1st of January
    (대한건설협회 고시 노임단가, 50-60개 현장을 대상으로 년1회 실사 후 매년 1월1일 공표)

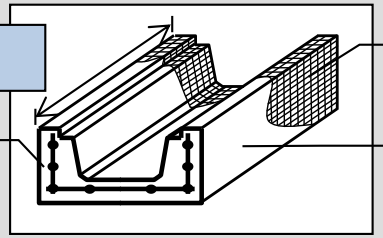
원가계산방식 vs 실적공사비

직접비	재료비	• 품셈재료량 × 단위당가격	공종별 [공종수량×실적단가]
	직접노무비	• 품셈노무량 × 시중노임	
	직접공사경비	• 품셈소요량 × 단위당가격	
간접비	간접노무비	• 직접노무비 × 요율	각 항목별 [직접공사비 × 요율] (공사규모,종류 구분)
	산재보험료	• 노무비 × 요율	
	고용보험료	• 직접노무비 × 요율	
	퇴직공제부금	• 직접노무비 × 요율	
	안전관리비	• (재+직노+관급자재) × 요율	
	기타경비	• (재료비+노무비) × 요율	
이윤		• (노무비+경비+일반관리비) × 요율	(재+노+경+일반관리)×요율

출처: "국내 건설 적산 제도" (한국건설산업연구원 최석인 연구위원)

원가계산방식 vs 실적공사비

원가계산방식

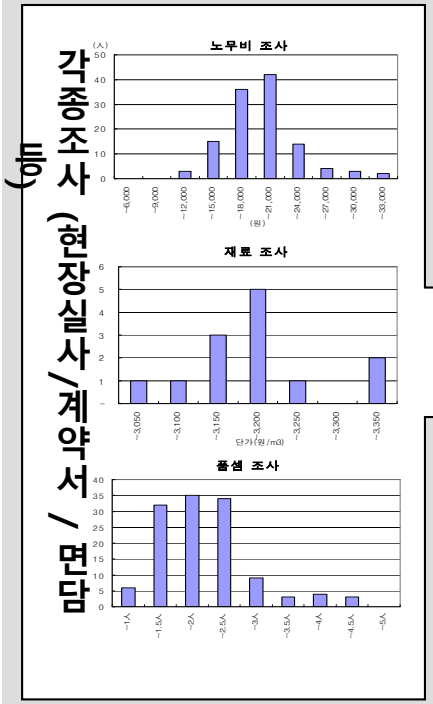


측구 30m

Conc 0.410㎥/m

철근1.990kg/m

거푸집 1.4㎡/m



철 근

◎재료비 : 0.00198t × 300,972원 = 613.8
◎노무비 : 0.00198t × 415,397원 = 826.6
◎경 비 : 0.00198t × 2,962원 = 5.8

소계 : 1,446.2원

거 푸 집

◎재료비 : 1.4 ㎡ × 5,158원 = 11,553.9
◎노무비 : 1.4 ㎡× 16,057원 = 35,967.6

소계 : 47,521.5원

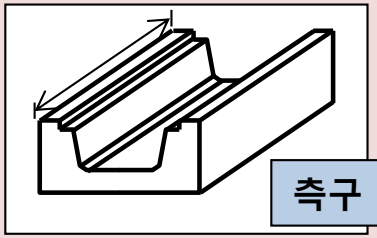
콘크리트

◎재료비 : 0.410㎥ × 33,136원 = 13,420
◎노무비 : 0.410㎥ × 4,903원 = 1,985.7
◎경 비 : 0.410㎥ × 6,751원 = 2,734

소계 : 18,139.8원

합계 1,785,240 원

실적단가방식



측구 30m

계약 A (A공사) | 계약 A (B공사) | 계약 A (C공사) • • •

실적DATA DB

59,508원/m

30m X 59,508원/m

합계 1,785,240 원

출처: "국내 건설 적산 제도" (한국건설산업연구원 최석인 연구위원)