OVERVIEW OF THE CONSTRUCTION ESTIMATING PROCESS

The Bidding Process Flow Chart- See Handout "The Bidding Process"

The Detailed Construction Estimate is based on:

- Full set of plans (quantity)
- Specifications (quality)
- Developed construction plan
- Evaluation of construction time
- Stated allowances

The Detailed Construction Estimate, requires:

- Work breakdown into similar categories
- Quantification of similar elements
- Construction plan
- Construction schedule
- Cost of labor, material, equipment, subs, services
- Direct/Indirect Costs
- Solicitation/receipt of quotes for materials services and subcontracted work
- Summary of all elements of work
- Analysis of risk
- Markup to produce bid price

The Art of Estimating

- Law of Averages- actual costs of elements will average close to cost of elements, even though each element will be either too high or low

Use of Computers in Estimating

- Manual Estimating: will always be used
- Accumulating Historical Cost Data: Do NOT average data, keep each project data separate
- Software Programs:
  - Know science/art of estimating without reliance on computer
  - Know assumptions of software
  - Avoid software for items that have little repetition
  - Use software for high-volume/repetitive work
  - Computer does what you tell it to, it doesn't make mistakes
  - Quantifying with Computers
  - Estimating from CADD
  - Computer-generated Estimating Reports

An Overview of the Bidding Process

- Decision to Bid and Planning for the Estimate

- Underlying Studies
- Quantity Survey
- Cost of the Work
- Finalizing and Submitting the Bid
- Post Bid Follow-up and Using the Construction Estimate

DECISION TO BID AND PLANNING FOR THE ESTIMATE

Considerations to help in the Decision to Bid - Develop a "Fact" sheet, consider:

- Internal Review
  - Bidding Time
  - Surety Bond
  - Consistent with Business Plan
  - Personnel
  - Cost of bidding
  - Other projects being bid
  - Equipment
  - Supervision
  - Support staff
  - Finances
  - Adequacy of resources

- External Considerations
  - Competition
  - Experience with parties to contract
  - Design considerations
  - Conditions of the contract
  - Quality of documents
  - Labor
  - Licensing
  - Community relations
  - Availability of suppliers/subs
  - Time
  - Availability of funds
  - Special requirements

UNDERLYING STUDIES

Investigating the Site

- Composition of Investigation Team: Estimator, Design Engineer, Construction Personnel, Financial Personnel, & Legal

- Preparation for Site Visit
  - Study the plans and specs: preliminary construction plan, approximate significant work, tentative decisions on subs, understand local materials, equipment requirements, local supplies/services, legal/financial problems, Q's to be answered by owner's site rep, potential risks
  - Local sources for climate data, maps/charts, tax laws, labor regulations/laws/rates
  - Available transportation
  - Geophysical info
  - Consider contacting contractors/subs/suppliers/insurance providers in area

- Site Visit
  - Take pictures, recording time of day/location, etc. for each photo
  - Take video record with audio documentation
  - Consider ground surfaces, potential conditions
  - Clearing/grubbing considerations
  - Utilities locations/size, availability of water/electricity
  - Preliminary layout of temporary works, plant, and camp

- Site Access and Local Resources and Requirements
  - Site access
  - Labor
  - Material
  - Equipment
  - Subcontractors
  - Services & Local Support
  - Government Regulations
  - Competition
  - Local Sources

- Compose Site Report –timeliness & conciseness **See Handout "Outline for Reports of Site Investigations"**

- Pre-bid Conference and Owner-Conducted Site Tour: to answer Q's & disseminate last minute info to bidders

Planning the Construction Method: the way project is to be executed, sequence of work, type of equipment, temporary works, planning/organizing operation

- Plan of Operation
- Straightforward & simple
- Specs may dictate
- Consider various methods/sequence
- Potential risks
- Season of year
- Coordination with own forces & other subs
- Time allowed for construction
- Equipment and Plant
  - Availability of owned equipment
  - Conditions of Work
  - Time constraints
- Labor force- Skills & knowledge of personnel
- Comparative Studies
  - Evaluate several potential approaches
  - Compare cost of production of different types of equipment
  - If quantity varies based on method, prep volume estimate of each method
  - Consider cost of alternative materials
  - Compare estimates of each method
  - **See Handout "Comparative Cost Calculation"**

Preparing the Construction Schedule

- All time related costs are determined from schedule
- Construction Method forms basis for schedule logic
- Estimating team should determine time required to perform work, consistent with minimum cost
- Developing Preliminary Schedule Logic:
  - Bid documents may dictate certain items be completed before others
  - Project Start dictated by Award of K or Notice to Proceed
  - Completion date & days – working or calendar days, adverse weather days, Review Specs
  - Milestones, interim required completion dates by owner
  - Increase in interim dates increases risk, more critical items
  - Consider availability of material
  - Procurement of key items, long lead times
  - Activities for inspection/testing
  - Submittals/shop drawings, etc.
  - Assembly Period/Work being done during mobilization period
  - Weather restrictions or Hazardous work items
  - Limited Access to/on site
  - Equipment req's- do work sequentially to minimize time on project, compare cost of de/remobilizing equipment with cost of leaving idle on jobsite
- Preliminary Schedule Time
  - Activity durations- time to review submittals, samples, etc.
  - "Long lead" time items for material or equipment

  - Time available within contract based on interim completion dates
  - Weather sensitive activities
  - Labor needs/availability
  - Subs availability/resources
  - Type of material
  - Equipment req's & availability
  - Time for A/E/O to review/inspect
  - Financial resources
- Special Schedules- evaluate resources
  - Labor loaded
  - Equipment loaded
  - Cash flow (cost loaded) – ES & LS curves

QUANTITY SURVEY

Preparing for the Quantity Survey

- Purpose of evaluating cost & time of a project
- Must include all material and items of work required, including all temporary and permanent materials required to construct the work

Prior to the Start of the Survey

- Review Instructions to Bidders, Technical Specifications, General & Special Conditions, & Proposal Form that will affect way in which work must be taken off and assembled
- Review the following:
  - Breakdown of the price
  - Alternate prices
  - Unit prices or lump sum
  - Bill of materials
  - Special rule of measurement for payment of certain items
  - Specific descriptions of scope for bid items (unit-price bids)
  - Bid items that have firm quantities (unit-price bids)

Quantify Survey Based on Complete Documents

- Use one set of bid documents & use a code system for work taken off
- Check all addenda, date & mark changes to bid documents
- Review bid form for specific breakdown of bid price prior to take off

Principles of Quantity Surveying

- Bid quantities are provided by A/E for unit price contracts
- Do not rely upon these for purchasing material or costing the work
- Bid form quantities are intended for:
  - Determining low bid price
  - Determining partial/final payments

Construction Method

- Quantities must be included for:
  - Material to be procured (permanent or temporary)
  - Labor for installing materials
  - Construction equipment required
  - Services or other items
- Listing one item of work on two lines
  - List in unit that item will be costed in estimate
  - List in unit that item will be purchased from Bill of Materials
- Indirect costs
  - Identify all direct costs first
  - Must understand scope and time of project

Rules of Measurement

- Actual quantities versus measured quantities
  - Must be based on basis of how work is to be executed under assumed construction method
  - Make two take offs based on plan of execution and rules of measurement

Quantification Mechanics

- Conversion to decimal numbers- quantify same way as historical data
- Measuring quantities by zones for orderly accounting in take off: Stations, mile markers, or other identification
- Easier self-checking by quantity surveyor or others
- Establishment of control budgets for easier monitoring of progress
- Preparing CPM schedules

Quantifying to Industrial Standards

- Must allow for actual materials based on industry, including material lost because it will be consumed (ex: lumber, plywood, etc.)

Allowance for Waste

- Waste Factors
- Consider:
  - List net quantities without waste leaving this to person costing the work
  - Post quantities with waste allowances included but state quantity added as part of description of item
  - Post quantities with waste included, but meet with person costing work to explain quantity added & rationale
  - Tolerances allowed by specifications: subgrading tolerances, form deflection, etc.
- Quantifying Shrinkage or Swelling
  - For earthwork- physical characteristics of soil and possibility of excavation and backfilling shrinking or swelling
  - Determine loose vs. undisturbed material before determining number of loads

Accuracy of Quantities

- Calculations of quantities
  - Brief description of what item is & where its located
  - Put dimensions
  - List L, W, D in same order every time
  - Write enough description for positive identification
  - Learn and used standard abbreviations and symbols
  - Make all figures legible, keep inside column lines
  - Identify each sheet with project name, date, quantity surveyor, & checker
  - Identify item with the source (plan sheet #, section, or detail #)
  - Clearly identify total for each item that will be posted to a costing sheet
  - Adopt standard code or marking system so that items checked and items posted are easily identified
- When scaling dimensions:
  - Never use scale rule if dimensions are readily available
  - Make sure each detail is drawn to scale and not just schematic
  - Use given dimensions for the smallest dimension used as a multiplier, as an error in larger dimension is less significant than one in smaller multiplier

- Suggestions for maintaining satisfactory & consistent accuracy when quantifying work:
  - Be able to convert fractions to decimals readily
  - Generally faster and accurate to convert fractions to decimals as info is put on quantity sheets
  - It is seldom necessary to use dimensions more accurate that 1/8" and it is easy to remember 1/8" is close to .01'
  - For mass earth 0.1' may be accurate enough, if specs require 0.1' accuracy
  - High-cost items logically require more accurate quantification than low cost items
  - Industry standards must be considered when taking off material quantities
- Posting of quantities to cost extension sheets
  - Carry no more than 3 significant figures for any quantity
  - Ex: 272,727 SF is posted as 273,000 SF

Prevention of Mistakes

- Common mistakes:
  - Items missed entirely
  - Items doubled up
  - Decimal placed wrong
  - Columns totaled with a calculator without a tape
  - Number is transposed
  - Number that has been corrected or changed is not changed from original posting
- Self-Checking
- Checking by others, suggestions:
  - Quantification Sheets
  - Cost sheets
  - Check by lead estimator or management for reasonableness
  - Check by others for mechanical mistakes before posting to recap
  - Check night before bid to ensure changes are posted to recap
  - Recap Check all "plugged" numbers night before bid
  - Recap Check all posting and addition the night before the bid (save copy)
  - Recap Check posting and addition about two hours before bid time (save copy)
  - Recap Check again ½ hour before bid time (check against saved copies)
- Other Errors to Check for:
  - Check all transferring of numbers
  - Check scope of work
  - Math mistakes
    - Do not rely of calculator for reasonableness

- When adding 3 or more numbers, use calculator with tape printout
- Setup cost sheet with columns so a check can be made adding across and down
- Use a bookkeeper or person with machine skills to check all extensions
- Use someone familiar with type of work to determine if it "looks right"
- Photocopy each sheet after every check, with note of date & time of check
- Check sheets with late changes against earlier photocopied sheets

Making the Quantity Survey **See Handout "Quantity-Cost Extension-Summary Sheets"**

Getting Organized

- Performed in consistent order, following sequence of construction
- Keep detailed notes of conflicts, errors, omissions, or questions
- Write down all assumptions
- Read technical specifications, standard specs & plans, etc.
- If discrepancy occurs in plans, generally larger scale detail will take precedent over smaller scale detail

Keeping Track of What Has Been Measured

- Mark the plans, establish code structure for what has been taken off, etc.
- Taking off items in general order of construction sequence

Quantity Sheets

- List dimensions & calculations of quantities on quantity forms
- Items considered for consistency include:
- Identify source of each entry by drawing, plan, section, etc.
- Learn and used standard abbreviations for descriptions
- List number of items and dimensions in same order for every entry
- List all dimensions as: feet-inches or feet-decimal
- Indentify each final quantity to be posted in distinctive way (circle, underline, etc.)

Organization of the Work for Quantity Survey

- A separate recap sheet should be used for each bid item for unit price bids
- Maintain recap draft sheet
- Split bids from subcontractors if for more than one bid item
- Unit price bid project starts with breakdown conforming to bid items **See Handout "Flow of Cost Information From Bid Documents to Bid Form for a Unit Price Bid"**

Quantifying Subcontracted Work

- Recommended to still quantify all items of work, even if it will be subcontracted to:
  - Recognize quotations may be out of line
  - Check scope of work of sub's proposal
  - Understand special problems of specialty subcontractor
  - Evaluate time allowed or required
  - Cost the scope of work missing
  - Obtaining historical cost data

- Gain better understanding of overall project
- Better understanding of time schedule
- Better understanding of each quotation

Outside Quantification Services

- Be cautious and use advisedly
- Should have experience bidding specific type of construction & knowledge of sequence of work
- Outside quantity surveyors almost never assume risk for their own mistakes

COST OF WORK

Cost Categories

- *Direct:* all elements of cost associated with specific work to be put in place. Vary with quantity & element
- *Indirect:* all elements of cost other than those associated with specific work to be put in place. Vary with time & determined after direct cost of work to be put in place is determined

Elements of Cost: Labor, Material, Construction Equipment, Subcontractors, & Services/other expenses **See Handout "Appendix 5.1 Elements of Contract Costs"**

Determining Costs

- Labor and Burden Costs
  - How work will be executed?
  - What is scope of work?
  - Who (trades, etc.) will be used?
  - How long will it take for crew to execute the work?
- Material Costs
  - Unit prices or lump sum
  - Includes sales taxes, delivery costs, warranties, patent rights, etc.
- Construction Equipment Costs
  - Ownership cost
  - Operating cost
- Subcontractor Costs
- Services and Other Items of Cost
- Determining the Unit Cost of the Work: Cost (per crew hr) / Estimated Production (per crew hr) **See Handout "Determining Unit Costs for Labor"**

Direct Costs

Direct Labor and Burden Costs

- Average prevailing cost per hour per person in each trade, including burden costs
- Level of skills prevalent among workers
- Circumstances/conditions existing during time of production
- Equipment aids
- Productivity expected from specific crews
- **See Handout "Example of Labor and Burden Rate Calculation"**
- Cost per Labor Hour: base wage & burdens (including payroll taxes, insurance, fringe benefits, safety & training)
- Considerations:
  - What is defined scope of work of each item?
  - What are details/specifications for item with cost data?
  - What conditions/circumstances affect production?
  - How accurate was accounting for cost data?
- Historical Data:
  - Recent production experiences

  - Historical production must be modified due to different conditions/circumstances
  - Some items won't be similar enough, must use alternative sources
  - Tips when using Historical data:
    - Use only from specific projects (not averaged data)
    - Use data from projects with similar circumstances/conditions
    - Identify adverse factors that kept historical production from being higher & that are expected on project being bid
    - Make % adjustment downward to historical production to "baseline production" (defined as the highest production predicted for contractor to achieve with its forces on a practical basis)
- Factors that Contractor can control:
  - Quality of supervision
  - Skill of labor
  - Tools & equipment
- Contractor cannot control:
  - Detail of work
  - Repetition & Quantity
  - Weather Condition
  - Site Conditions
  - Working Conditions
  - Owner, A/E, & Documents

Direct Material Costs

- Permanent or temporary
- Lump-sum or Unit Price
- Reuse of Temporary Materials
- Purchase Discounts & Payment Discounts
- Determining Best Supplier Prices:
  - Responsive prices
  - Determining best price, consider:
    - Meets required specs
    - Has quotes on exact materials required by contract documents
    - Able to deliver shop drawings and materials
    - Acknowledges all addenda
    - Proven financial and performance history
    - Includes all delivery/sales/taxes in quote
    - Warrants price is firm
    - Favorable purchase terms (discounts, etc.)
- Expediting quotations

Direct Construction Equipment Costs

- Ownership Costs:

  - Depreciation
  - Replacement reserve
  - Capital invested
  - Insurance-accidents, theft, vandalism
  - Storage
  - Personal property taxes
  - License & fees
  - Equipment management: labor, parts, & repair
- Operating Costs:
  - Fuel
  - Consumable items
  - Regular preventative maintenance
- Determining Equipment Costs for the Estimate
  - Determine time each piece of equipment will be on job and charge entire ownership cost for the whole project and the operating cost for the time the equipment is estimated to be working
  - Develop unit costs (which includes ownership & operating costs)

Direct Subcontractor Costs

- Considerations when determining responsive proposals:
  - Quoted complete division/subdivision of work
  - Clearly defined scope of work
  - Qualified supervision/manpower
  - Ability to deliver shop drawings & materials on schedule
  - Committed to execute according to contractor's schedule
  - Acknowledged receipt of all addenda
  - Proven performance history
  - Quote meets all requirements/specifications with no exceptions to bidding documents
  - Includes cost of Performance & Payment Bond

Direct Services and Other Expenses

- Water tap fee
- Sewer permit fee
- Air balancing
- Inspection fees
- Surety Payment & Performance Bond
- Builder's Risk insurance
- Engineering services

Indirect Costs – determined by time of the job

- Indirect Labor and Burden Costs: Project management, supervision, layout, & administration
- Indirect Material Costs: Plant, temporary facilities, final cleaning

- Indirect Equipment Costs: Installing a temporary road, installing/removing crane or hoist, etc.
- Indirect Subcontractor Costs – for temporary items (fence, road, etc.)
- Indirect Services and Other Expenses
- Minor services, insurance, permits, fees, supplies, etc.
- Checklist of Indirect Costs – **See Handout "Appendix 5-8 Indirect Cost Checklist"**

Finalizing and Submitting the Bid

Use good procedures to Finalize the estimate

- Checking
- Management Reviews

Handling Last Minute Quotes

Determining the Bid Price

- Final Check of Recap
- Cut/Add Sheet
- Final Assessment of Risks
- Determining the Markup

Submitting the Bid

- Checking the Bid Form
- Delivering the Bid
- Bid Security
- Performance and Payment Bonds

POST BID FOLLOW-UP AND USING THE CONSTRUCTION ESTIMATE

Post Bid Follow-Up

- Includes preparation of budget and transfer of knowledge of project from estimating to construction team
- Organizing estimating files and extraction of valuable info for future estimates

Follow-up Immediately After Turning in the Bid

- Clean up bid files
- Correct recap form with cut/add final bid best prices
- Sort papers/tidy bid room

Post Bid Follow-up-When Low, Items Possibly Required Before or Soon After:

- Executed P&B Bonds
- Proof of insurance
- Revised list of unit prices
- Detailed contract schedule
- Breakdown of bid price for payment purposes
- List of subs/suppliers
- Schedule of values
- CPM Schedule

Transition from Bid Team to Construction Team

- Transition after Notice of Award and before work order
- Confirm assumptions made during bid prep regarding plan & schedule
- Request the following info ASAP:
  - Time req'd for preparing shop drawings
  - Time req'd for delivery of materials
  - Special concerns involving any activity
  - Time req'd for execution of each activity
  - Specific methods to be employed on each activity

Establishing a Project Control Budget, two basic classifications

- Monitor production costs- labor, equipment, materials, and services
- Monitoring partial payments- subcontracts and purchase orders
- The labor budget (provided in dollars and labor hours):
  - Aid project management in planning manpower needs
  - Monitor production costs
  - Provide basic periodic forecasts
  - Motivate better labor production

Post Bid Follow-up-When Not Low

- Follow up with suppliers/subs
- Determine where high/low

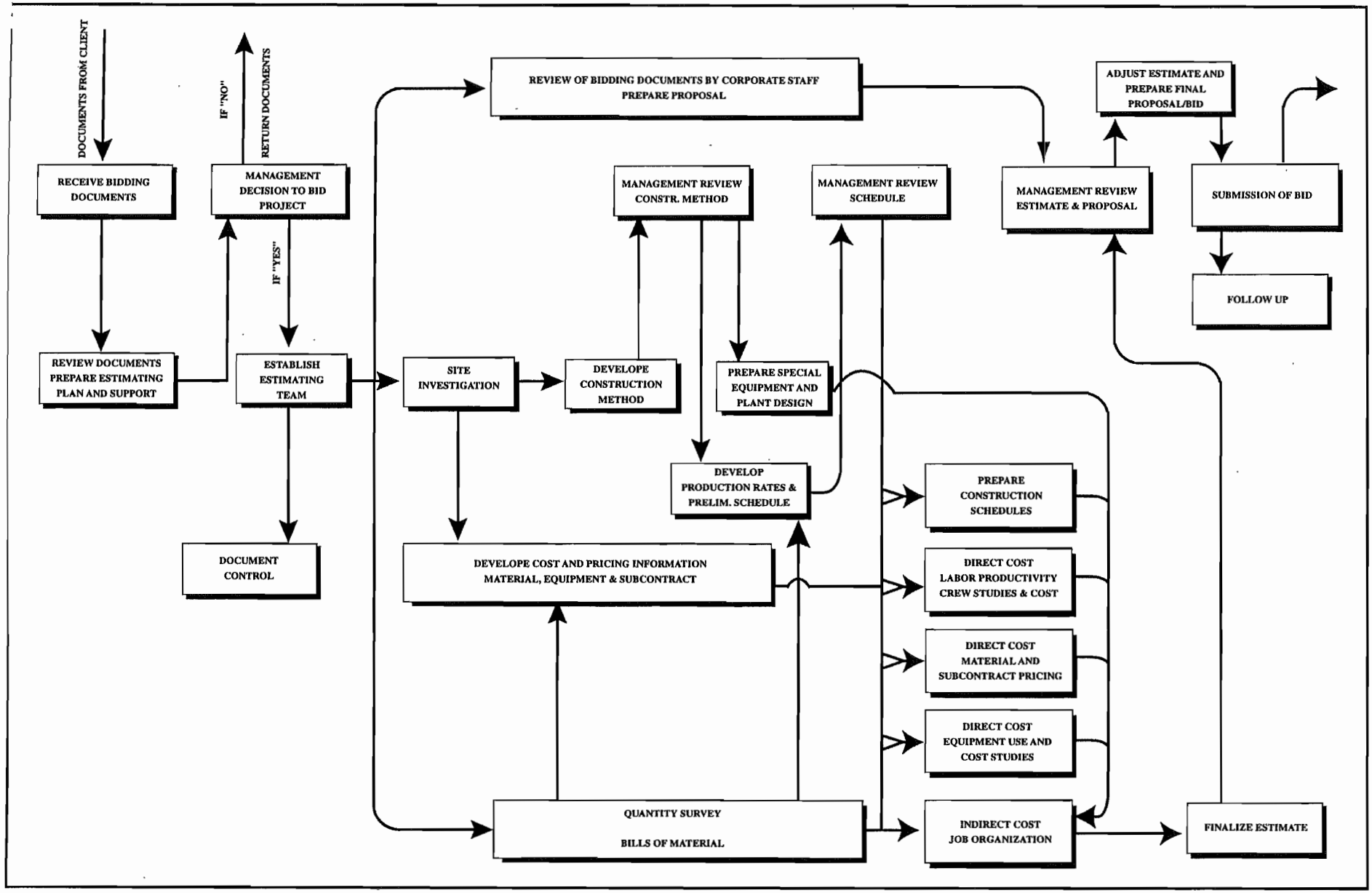
- Save valuable bid info

Other Uses for a Detailed Estimate

- Procurement
- Schedule of Resources
- Shop Drawing Submittal Schedule

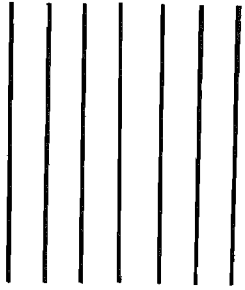
THE BIDDING PROCESS

From Receipt of Documents to Submission of Bid



OUTLINE FOR REPORTS OF SITE INVESTIGATIONS

HEAVY & UTILITIES CONSTRUCTION



Site investigations are essential in planning construction operations. The following outline for reports on site investigations is recommended as a planning guide starting with the first review of the work site to beginning the mobilization phase.

This outline has been planned as a work book. Complete the checklist in this book for a permanent record in the project file. Additional copies may be obtained from the Associated General Contractors of America, 1957 E Street, N.W., Washington, D. C. 20006.

1. Name of project _____

   Owner _____

   Location of project _____

2. Date of visit _____

3. Distance to closest towns or cities _____

   Sizes of closest towns or cities _____

4. Highways:

   a. Type and surface condition _____

   b. Capacities of bridges or load restrictions _____

   _____

5. Railroad facilities:

   a. At site _____

   b. At railhead _____

6. Nearest commercial airport _____

7. Barge lines and river conditions:

   a. C.F.S. flow in river _____

   b. River forecast office _____

   _____

   c. Scour conditions in river _____

   d. Barge traffic; channel depth; lock dimensions _____

   _____

e. Commercial carriers (if any) _____

_____

f. Barge season _____

g. Flood hazard _____

8. Haul roads, distance and condition:

a. From railhead _____

b. From barge dock facility _____

c. From various material sources _____

_____

_____

9. Power connections:

a. Name and address of supplier _____

_____

b. Closest installation and capacity description _____

_____

c. Cost of extension or installation on job _____

d. Secure copy of rate schedule Check when completed ☐

10. Telephone communications:

a. Name and address of supplier _____

_____

11. Land rental, ownership and availability if Owner does not supply adequate working area:

a. At railhead _____

_____

b. At project _____

_____

12. Determine extreme weather and length of working season _____

_____

13. Contact local AGC:

List names _____

Addresses _____

_____

Telephone numbers _____

a. Question for any unusual working conditions Check when completed ☐

b. Unions and hiring hall locations _____

_____

_____

c. Health, welfare, pension, vacation funds _____

_____

d. Travel pay and dispatch points _____

_____

e. Secure copies of current contracts with pay schedules Check when completed ☐

f. Supply of common and skilled labor in area _____

_____

_____

g. Predominant industry; agriculture, timber, mfg., mining, etc. _____

_____

14. Housing: availability; adequacy; location with reference to job site _____

_____

_____

_____

15. Trailer facilities: location; adequacy; availability _____

_____

_____

16. Local subcontractors or suppliers:

a. Adequacy of plant; method of delivery; reputation

Aggregate _____

_____

Rock and riprap materials _____

_____

Clearing _____

_____

Painting _____

_____

Mechanical _____

_____

Electrical _____

_____

Ready-mix plants _____

_____

Rental haul trucks _____

_____

Grouting _____

_____

Seeding and sodding _____

_____

Bituminous surfacing and roadwork _____

_____

Well drillers _____

_____

b. Secure copy of local telephone directory Check when completed ☐

17. Visit owner's office:

a. List names and titles; telephone numbers of persons contacted

Name _____

Title _____ Phone _____

Name _____

Title _____ Phone _____

Name _____

Title _____ Phone _____

Name _____

Title _____ Phone _____

Name _____

Title _____ Phone _____

b. Discuss general job requirements Check when completed ☐

c. Clarify questioned items in specifications Check when completed ☐

d. Discuss specifics: stream pollution regulations, safety requirements, construction easements, landmarks, as needed Check when completed ☐

e. Examine special reports, etc. Secure copy if possible; otherwise make extracts of pertinent features Check when completed ☐

f. Secure pictures from owner as available Check when completed ☐

g. Request conducted tour of proposed work Check when completed ☐

h. Secure weather and streamflow information Check when completed ☐

i. Determine acceptance of streamflow for mix and cure purposes Check when completed ☐

j. Examine all cores and logs of test holes available Check when completed ☐

k. General discussion of geology Check when completed ☐

18. Describe site: Take photographs of all borrow areas; plant area; general construction areas; extent of clearing and grubbing required

19. Determine availability of potable water

a. Secure approximate costs of drilling and casing well

20. Work camp (if required):

a. Recommend location

b. Nearest utilities to area

c. Distance from worksite

21. Recommend location of contractor's worksite:

a. Locate office, shops and sheds

b. Estimate work required to prepare site

c. Locate batch plant and aggregate area

(1) Estimate site preparation

(2) Determine foundation conditions

d. Locate storage areas for materials

e. Recommend temporary roads

f. Is local road surfacing material pit available Yes ☐ No ☐

22. Investigate ground-water conditions, natural drainage areas and features which may be revised or relocated to assist in maintaining dewatered operation

23. Recommend best location and type of cofferdam to fit the job situation

24. Determine if terrain and working conditions will allow or require specialized equipment

Underlying Studies

COMPARATIVE COST CALCULATION

The calculations below show the comparison made, for an estimate, between the cost of equipment at the job site of smaller than the desired capacity and the cost of bringing in new properly sized equipment for the work. In this case, the project was one of dredging hard material after it had been shot.

COMPARATIVE COST CALCULATION	CASE A			CASE B		
	BARGE W/ 3 ½ CY CLAM			BARGE W/ 5 CY CLAM		
PRODUCTION						
Cycles/Hour	30.0 cycles/hr			35.0 cycles/hr		
Bucket Size	3.5 Cubic Yards			5.0 Cubic Yards		
Assumed Efficiency	25.0%			25.0%		
Operating Hrs/Day	17.0 Hours			17.0 Hours		
Cubic Yards/Day	450.0 CY/Day			750.0 CY/Day		
SCHEDULE						
90,000 Cubic Yards	200 Work Days			120 Work Days		
OPERATING COST PER DAY						
Crew Labor	$1,200.00			$1,200.00		
Burden	960.00			960.00		
Fuel & Maintenance	650.00			800.00		
TOTAL	$2,810.00			$2,960.00		
COMPARATIVE ESTIMATE						
ITEM	**QUAN**	**UNIT**	**TOTAL**	**QUAN**	**UNIT**	**TOTAL**
Mobilization & Freight	NA	-0-	-0-	LS	-	$100,000
Ownership Cost -Crane	9 mo	$11,500	$103,500	10 mo	$15,000	150,000
Barge	9 mo	7,500	67,500	6 mo	7,500	45,000
Purchase New Buckets	1 ea	48,500	48,500	2 ea	53,000	106,000
Rehabilitate Barge	LS	-	20,000	LS	20,000	20,000
Operating Cost - Dredge	200 D	2,810	562,000	120 D	2,960	355,200
- Tug	200 D	1,000	200,000	120 D	1,000	120,000
- Mat'l Barges	200 D	500	100,000	120 D	500	60,000
- Misc	200 D	500	100,000	120 D	500	60,000
Supervision	200 D	400	80,000	120 D	400	48,000
TOTAL			**1,281,500**			**1,064,200**
CONCLUSION	**USING THE 5 CY CLAM SAVES $217,300 OR 20%**					

Form 1

Q U A N T I T Y   S H E E T

Sheet ___of___

PROECT:____________________________ DIV. NO. _____ ITEMS:______________________________ BID DATE:________ QUANTIFIER:_____________ Date Posted ______

LOCATION: _____________________ A/E ___________________ OWNER: ________________ Extended by: ______ Date:_______ Ck by:: ______ Date: _______

			DIMENSIONS														
SPEC	DESCRIPTION	NO	L	W	D (HT)	QUAN	UNIT	QUAN	UNIT	QUAN	UNIT	QUAN	UNIT	QUAN	UNIT	QUAN	UNIT

Sample of a typical Quantity Sheet, used for posting information from plans & calculating quantities.

Form 1

Form 2

COST EXTENSION SHEET

Sheet ___of___

PROJECT ______________________ DIV. OF WORK________ DESCRIPTION ________________ BID DATE: _______

LOCATION______________________ OWNER _______________ A/E ____________________ QUANTIFIER ________ COST EST. _______

SPEC	DESCRIPTION	QUANTITY	UNIT	UP	LABOR	UP	MATERIALS	UP	EQUIPMENT	TOTAL

Sample Cost Extension Sheet—used for posting quantities from Quantity Sheets, inserting Unit Costs, and extending to determine cost of category of work.

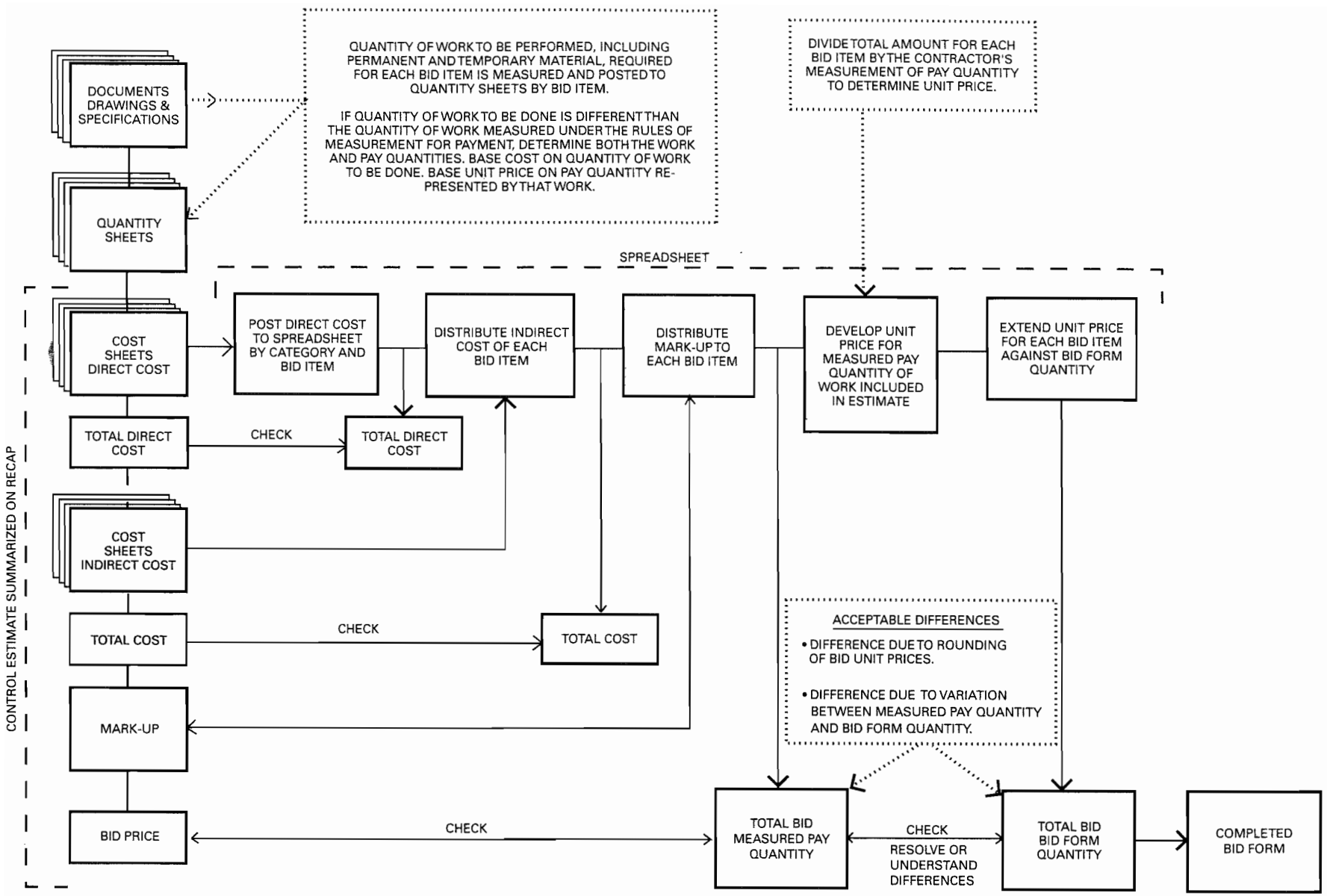
Form 2

Form 3 R E C A P (Estimate Summary Sheet)

PROJECT _____ A/E _____ BID DATE _____ TIME _____ PLACE _____
OWNER _____ Quantifier _____ Cost Est _____ Exten By _____ Ck by _____ Date _____

SPEC	DESCRIPTION	WHO?	TOTAL	Notes/Adjustments

Example of a RECAP format with a Single Cost Column.



FLOW OF COST INFORMATION FROM BID DOCUMENTS TO BID FORM
FOR A UNIT PRICE BID

APPENDIX 5-1

ELEMENTS OF CONTRACT COSTS

	LABOR AND BURDENS	MATERIAL Incl. Taxes & Del. Costs	EQUIPMENT	SPECIALTY CONTRACTOR	SERVICES AND OTHER ITEMS OF COST
DIRECT	GROSS WAGES, including all payroll burdens: as may be required to install: Permanent Materials or Temporary Materials (which are required for the installation of permanent materials).	PERMANENT (left in place) TEMPORARY (required for the installation of work left in place, but removed afterwards i.e., scaffolding, etc.)	COMPANY OWNED and/or LEASED when used for installing permanent work	SUBCONTRACTED WORK for permanently installed items of work	ITEMS such as: Sewer Tap Fees Electrical Inspection Fees Patent Exemptions Fuel Other costs related to installations of work in place and not otherwise classified.
INDIRECT (General Requirements)	GROSS WAGES, including all payroll burdens, as may be required for items such as: Supervision Layout Final Cleaning Installation and/or removal of temporary items not required for the installation of any specific item of permanent work.	TEMPORARY only, such as: Temporary Electric Other Temp. Utilities Temporary Buildings Site Barricades Temporary Ladders Temporary Railing ETC.	COMPANY OWNED and/or LEASED when used for temporary or other work not associated with a specific item of work, such as: Trailer Officers General Hoisting, Incl. Cranes or Hoists. Equipment to install and/or remove Temporary Roads Other similar items	SUBCONTRACTED WORK for temporary items of work, such as: Temporary Wiring Temporary Plumbing Temporary Road Other Temporary Work.	ITEMS not classified as material, and not directly related to installed work, including: Insurance Surety Bonds Building Permits Corporate License Fees Temporary Util. Bills Telephone Service Other similar items of cost which are not related to specific items of work and are not otherwise classified.

DETERMINING UNIT COSTS FOR LABOR

When historical production rates have been adjusted for expectations on the project being estimated, the calculations of Unit Costs is a simple mathematical calculation:

Unit Cost = Cost (per crew hr) / Production (per crew hr)

Two examples follow for placing concrete under different circumstances:

PLACING CONCRETE—SLABS ON GRADE:

Crew: (4) laborers and (1) foreman. (Use Ch.5, Table 1 for laborer costs—add 15% for foreman)

Method/Equipment: Georgia (unpowered) buggies.

Production: Eight (8) cubic yards per hour.

Cost per crew hour = (4 × 25.15/hr) + (1.15 × 25.15) = 129.53/hr

Unit Cost = 129.53/8 = *$16.20/c.y.*

[TABLE #1]

EXAMPLE OF LABOR AND BURDEN RATE CALCULATION

	Carpenter	Laborer	Cement Finisher
Base Hourly Wage	$25.50	$20.25	$23.55
Vacation (when applicable)	1.35	1.25	1.40
Totals to which burdens apply	$26.85	$21.50	$24.95
PAYROLL BURDENS			
—Payroll Taxes:			
Social Security (maximum)	6.20%	6.20%	6.20%
Medicare	1.45%	1.45%	1.45%
Unemployment Compensation—State	8.95%	8.95%	8.95%
Federal UC	0.80%	0.80%	0.80%
Total Payroll Taxes	17.40%	17.40%	17.40%
—Fringe Benefits (As a percentage of base wage):			
Welfare	18.37%	17.15%	19.77%
Pension	15.02%	9.41%	14.39%
Apprentice and Training	1.61%	1.40%	1.63%
Total Fringes	35.00%	27.96%	35.79%
—Safety (As a percentage of base wage):			
Salaries, training, materials and supplies, Inspections and Other	2.86%	2.86%	2.86%
TOTAL BURDEN %	**55.26%**	**48.22%**	**56.05%**
TOTAL COST PER HOUR BEFORE INSURANCE:	**$41.69**	**$31.87**	**$38.93**

The workers compensation and general liability insurance would be calculated based upon the work being performed. The example that follows assumes the insurance rates to be based upon the carpentry and cement finishing work.

(continued)

DESCRIPTION OF INDIRECT COST	QUAN.	LABOR	MAT'L.	EQUIP.	SUBS	SERVICES /OTHER
PROJECT ADMINISTRATION						
Project Management	Weeks	X				
Project Supervisor	Weeks	X				
Project Administrator	Weeks	X				
Project Safety and Environment	Weeks	X				
Project Superintendent	Weeks	X				
Project Engineering	Weeks	X				
Clerks/Timekeepers	Weeks	X				
Computer Operator	Weeks	X		X	X	
Secretarial/Office	Weeks	X				X
HOISTING-GENERAL						
Building Mat'l/Personnel Hoist	Months			X		X
Hoist Operator	Weeks	X				
Crane (general hoisting)	Months			X		X
Crane Operator	Weeks	X				
Install & Remove Crane & Hoist	L.S.	X	X	X	X	
SMALL TOOLS &SUPPLIES						
Pickup Truck (supt & engr - 1, 2, etc. ea)	Weeks			X		X
Small Power Tools—General	Weeks			X		
Supplies, Small Hand Tools, Bits, etc. (% Trade Lab)	% Lab	X				
TEMPORARY INSTALLATIONS/SERVICES						
Drinking Water—ice	Weeks	X				X
Temporary Toilets (2 ea)	Weeks					X
Install Temporary Electric Service	L.S.				X	X
Temporary Electric Bills	Months					X
Install Temporary Water Service	L.S.				X	
Temporary Water Bills	Months					X
Install & maintain Temp. Roads	L.S.	X	X	X		
Install Site Fence/gates & Remove.	L.F.	X	X			
Barricades in structure	L.S.	X	X			
Temporary stairs & rails	L.S.	X	X			
Temporary Protection	L.S.	X	X			
Temporary Heat—Lab/fuel/Equip	L.S.	X		X		X
PERMITS, FEES, ETC.						
General building permit	L.S.					X
Site parking lot permit	S.Y.					X
Curb cuts permit	L.S.					X
Signs, barricades, etc.	L.S.	X				
Water tap permit/fees (if not with FP or Mech)	L.S.	X				X
Plumbing permit (if not with Plbg.)	L.S.			X		
Electrical Inspect. (if not with Elect)	L.S.			X		
SAFETY & ENVIRONMENTAL						
Safety Equipment, Tool Box talks, etc.	L.S.	X		X		X
Clean city streets	Weeks	X		X		X
Flagman	Weeks	X				
Other environmental items	Weeks	X		X		X
FINAL CLEANING—CLOSEOUT COSTS						
Final general cleaning	L.S.	X		X		X
Cleaning glass	L.S.	X		X		X
Spec closing costs-(training, air balance, etc.)	L.S.	X		X	X	