



Indiana Subcontractors Association

Auditing
Construction Contracts and Claims

Jack A. Lazarczyk, CPA, CCC



Why Audit Construction Contracts?

- Construction projects are complex and involve multiple relationships in several tiers.
- Construction projects carry inherent risks at each stage of the project.
- Auditing the contract will minimize risk and can result in significant savings.

Why Audit Construction Contracts?

- A 1999 study by “Internal Auditor” indicated that **most auditors reported finding *significant overcharges* during their audits.**
- 55 percent of auditors found significant overcharges on ***25 to 99 percent of their audits.***
- The error rate on ***construction contracts is found to be higher*** than on other types of audits.



Audits of Construction Contracts

- Owner's right to Audit spelled out in a contract
 - A well-drafted audit/access to records clause will give the owner a contractual right to have access, without litigation, to all of the contractor's (and subcontractors') records at all stages of construction, including their estimate work-papers, cost records and correspondence with subcontractors.
- No audit clause in the contract
 - Owners can only get access to a contractor's records after a formal litigation process has been initiated through discovery, a legal process that can be costly and take a significant amount of time.

Construction Contracts Risks (from the Owner's perspective)

- Lump Sum Contracts
 - Specified quality materials not used;
 - Specified construction method not used;
 - Specified services not provided;
 - Unapproved credit alternates implemented;
 - Contract quantities not installed

Construction Contracts Risks (from the Owner's perspective)

- Lump Sum Contracts (continued)
 - Allowances not properly adjusted;
 - Required bonds not obtained;
 - Required insurance coverage not obtained;
 - Owner provided items not credited

Construction Contracts Risks (from the Owner's perspective)

- Cost-Plus or Time and Material Contracts
 - Excess hours charged by reimbursable personnel;
 - Hours charged by non-reimbursable personnel;
 - Billing rates exceeding actual pay rates;

Construction Contracts Risks (from the Owner's perspective)

- Cost-Plus or T and M Contracts (cont'd)
 - Labor burden factors exceeding actual cost;
 - Charges for materials may be excessive;
 - Charges for subcontracted work may be excessive;
 - Equipment rental charges may be excessive.

Construction Contracts Risks (from the Owner's perspective)

- Change Orders
 - Change Orders not priced in accordance with Contract;
 - Labor rates exceeding actual pay rates;
 - Labor burden factors exceeding actual cost;
 - Material unit prices used exceeding actual cost;

Construction Contracts Risks (from the Owner's perspective)

- Change Orders (continued)
 - Quantity estimates not accurate;
 - Labor hours arbitrarily inflated

Audit v Contract Types

- Lump Sum Contract
 - Scope risk
 - Engineering emphasis in audit
- Cost-Plus Contract
 - Financial risks
 - Accounting emphasis in audit
- Recommended team approach – CPA/PE

Audit Team

- Auditors
 - Accountants, engineers
- Owner
 - Project Management
 - Finance, internal audit
- Contractor
 - Project Management
 - Project Controls, accounting

Audit Approach

- Audit performed primarily on location:
 - At Owner's headquarters
 - At Contractor's trailer
- Audit performed:
 - Continuously (every pay request)
 - Ad hoc
 - At project closeout

Audit Program Outline

- Bid Review
- Contract Review
- Risk Assessment
- Control Systems Review and Recommendations;

Audit Program Outline (continued)

- Contract Billing Tests – Progress Billings
 - Labor
 - Materials
 - Equipment (owned and rented)
 - Subcontractor charges
 - Permits and licenses
 - Miscellaneous charges
 - Overhead charges

Audit Program Outline (continued)

- Contract Billing Tests – Progress Billings (cont'd)
 - Contractor fee
 - Retainage calculation
 - Performance bond and insurance
 - Home office charges
 - Physical inspection and review of engineering reports
 - Travel

Audit Program Outline (continued)

- Change Orders Pricing Review
 - Labor and labor burden
 - Material quantity and pricing
 - Indirect cost application
 - Subcontractor “buy-outs” verification
- Delay and Disruption Claims Examination
- Control Systems Verification

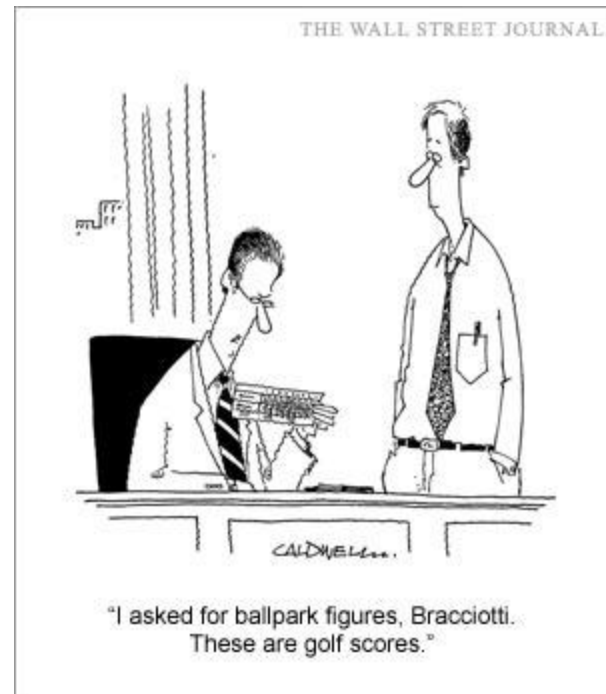
Audit Program Outline (continued)

- Financial Review
 - Control Schedules
 - Receivables
 - Payables
 - Vendors' History reports
 - Construction in Progress

Audit Techniques

- Key words:

- Sampling
- Reconciliation
- Testing
- Tracing
- Confirmation



Audit Testing

- Impossible to review every transaction
- Sampling:
 - Judgemental
 - Random
 - Stratified dollar-unit statistical basis
- Errors found often used to estimate liability

Audit – Direct Labor Example

- Objective I:
 - To ensure that all costs associated with Direct Labor are defined as reimbursable, have actually been incurred and are billed at actual cost or in accordance with the contract.
- Objective II:
 - To ensure that excess Direct Labor costs are not charged to cost-reimbursable type contracts

Audit – Labor Example

- **Process outline – Direct Labor**
 1. Reconcile several full periods of payroll charges (from progress billing) to contractor's accounting records;
 2. Review a representative sample of the contractor's daily time reports. Trace hours from time sheets to payroll reports and billing.
 3. Compare independent records (daily logs, foreman reports, timesheets) of activities at the job site to the payroll charges.
 4. Trace net pay amounts from payroll register to cancelled checks.
 5. Examine endorsements on cancelled checks.

Audit – Labor Example

- **Process outline – Labor Burden**
 1. Examine Union agreements; reconcile fringe benefit factors between agreements, payroll registers, billing
 2. Determine that the charges for FICA are appropriate. Trace a sample of workers to the quarterly FICA reports.
 3. Determine that the charges for Federal and State Unemployment Taxes (FUTA, SUTA) are appropriate. Trace a sample of workers to quarterly reports.

Audit – Other Contract Components

- Material Purchases
 - Vendor history;
 - Document trail (POs, delivery tickets, invoices, cancelled checks);
- Subcontractors
 - Document trail (bids, contracts, billing, cancelled checks)
- Rental Equipment

Audit – Contractor's Records

Documents deemed relevant:

- Progress billings;
- Project cost reports;
- Invoices;
- Bids and/or estimates;
- Invoices
- General ledger;
- Canceled checks;
- Project logs;
- Purchase orders;
- Time sheets;
- Change Orders;
- Project correspondence;
- Progress reports;
- Project schedules;
- Payroll records;
- Shipping documents;
- Meeting minutes;
- Project profit and loss statement

Challenging/Reviewing Cost Claims

- Owners are often frustrated at the end of a project when the contractor submits a disjointed omnibus claim, or a claim which contains such sparse details or support so as to be virtually “non-analyzable.” A claim submittal clause formally specifies in detail the format, content, and level of back-up documentation that the contractor’s claim must contain to be considered. If the contractor does not comply with these requirements, the owner has a contractual right to reject the claim until it meets the contract requirements

Challenging/Reviewing Cost Claims

- Contractor claims can misrepresent actual situation due to:
 - Ignorance (knowledge errors)
 - Carelessness (performance errors)
 - Negligence (performance errors)
 - Greed (intent errors)

Challenging/Reviewing Cost Claims

- Contractor should be prepared to offer detailed and specific backup documentation to support its claim;
- When the claim hits the litigation path, be aware that all contractor's records are open to scrutiny during discovery period.

Types of Claims

- Delay
- Acceleration
- Changed or Differing Site Conditions
- Defective Plans or Specs
- Disruption
- Extra Work
- Deletions of Work

Potential Damages

- Lost Productivity/Added Labor
- Overtime Premiums
- Wage Escalation
- Excess Material & Equipment
- Price Escalation

Potential Damages

- Extended Project Management
- Extended Jobsite Overhead
- Extended Warranty
- Extended/Unabsorbed Overhead
- Interest

AACE Recommended Practice No. 25R-03

The Association for the Advancement of Cost Engineering's Recommended Practice No. 25R-03 identifies lost productivity estimating methodologies, ranks the methodologies in order of preference, defines and discusses each methodology, and identifies selected studies applicable to each methodology.

Common Causes of Lost Productivity

- Absenteeism and the Missing Man Syndrome
- Acceleration
- Adverse or Unusually Severe Weather
- Availability of Skilled labor
- Changes, Ripple Impact, Cumulative Impact of Multiple Changes and Rework
- Competition for Craft Labor
- Craft Turnover
- Crowding of Labor or Stacking of Trades

Common Causes of

Lost Productivity (con't)

- Defective Engineering, Engineering Recycle and/or Rework
- Dilution of Supervision
- Excessive Overtime
- Failure to Coordinate
- Fatigue
- Labor relations and labor management factors
- Learning Curve
- Material, Tools, and Equipment Shortages
- Over manning

Common Causes of Lost Productivity (con't)

- Poor morale of craft labor
- Project management factors
- Out of sequence work
- Rework and errors
- Schedule Compression Impacts on Productivity
- Site or work area access restrictions
- Site Conditions
- Untimely approvals or responses

Preferred Methodologies Order of Preference

1. Project Specific Studies
2. Project Comparison Studies
3. Specialty Industry Studies
4. General Industry Studies
5. Cost Basis



Project Specific Studies

Damage calculations based directly on data from the project in dispute and supported by contemporaneous documentation are most favorably received by courts and board of appeal.

Project Specific Studies

- Measured Mile Study
- Earned Value Analysis
- Work Sampling Method
- Craftsmen Questionnaire Sampling Method

Measured Mile

Unimpacted Period

Jan thru March '02

Total Hours Incurred	2,400.00
Feet of Pipe Run	10,000.00
Hours per Foot	0.24

Impacted Period

April through December

Total Hours Incurred	12,000.00
Feet of Pipe Run	30,000.00
Hours Per Foot	0.40

Excess Hours Per Foot During Impacted Period	0.16
--	------

# of Impacted Feet Run	30,000.00
Excess Labor Hours	4,800.00
Average Labor Rate	\$ 55.00

\$ 264,000.00

Earned Value Measures of Productivity

Earned Value analysis is a method for measuring project performance. It indicates how much of the budget should have been spent in view of the amount of work done so far and the baseline costs for the tasks, assignments, or resources

Most Common Measurements:

- Schedule Variance is a subjective indicator that does not reveal the critical path. A positive schedule variance is an indication that work in process is ahead of schedule.
- Cost Variance is an objective indicator stating the value of what was accomplished for the resources expended. A positive cost variance indicates that work was accomplished with less resources than planned

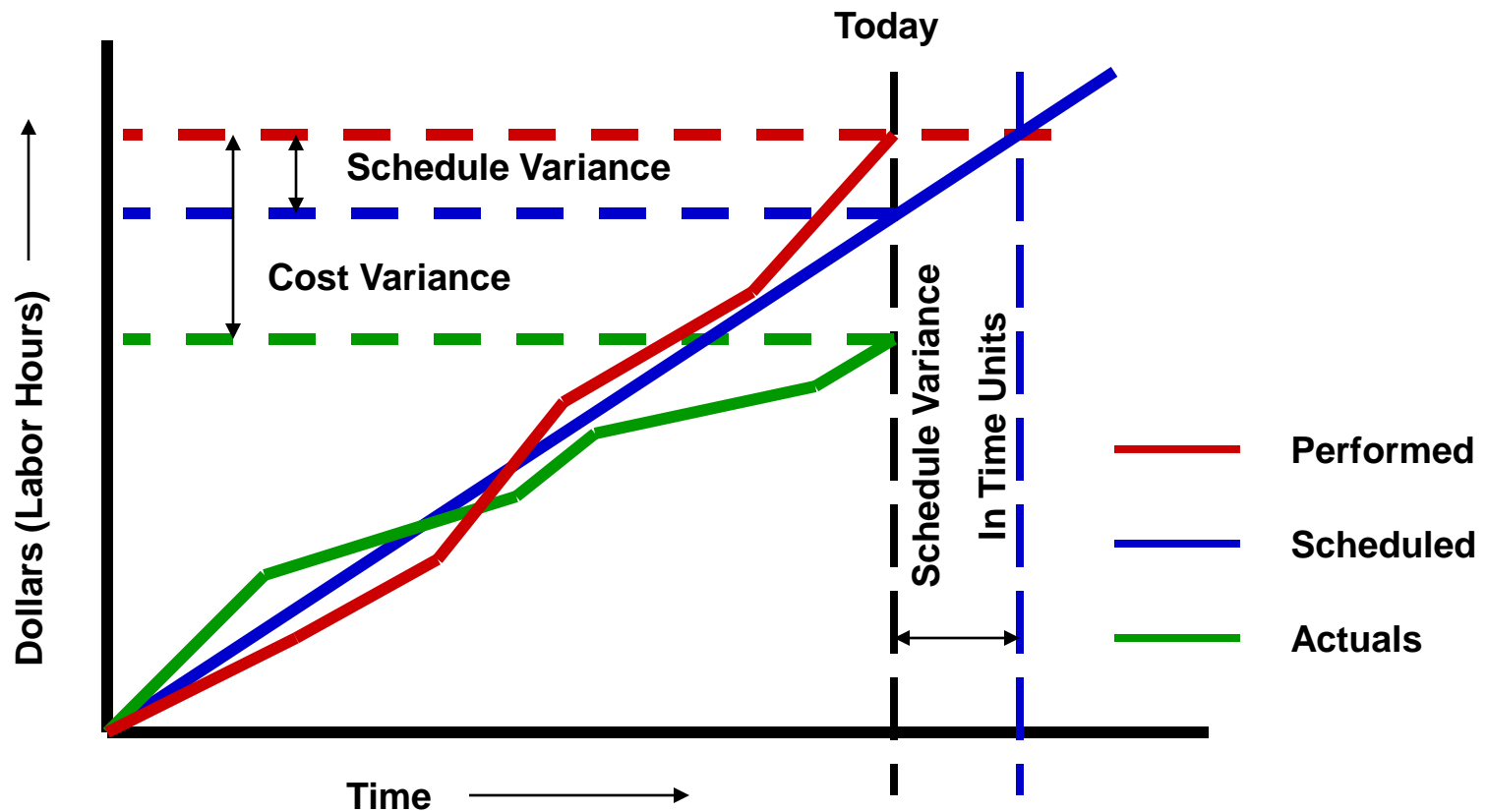
Most Common Measurements:

- Cost Variance:
 $CV = \text{Budget Cost of Work Performed (BCWP)} - \text{Actual Cost of Work Performed (ACWP)}$
- Cost Performance Index:
 $CPI = BCWP / ACWP$
- Cost Variance Percentage:
 $CV\% = (BCWP - ACWP) / BCWP$

Most Common Measurements:

- Schedule Variance:
 $SV = \text{Budget Cost of Work Performed (BCWP)} - \text{Budget Cost of Work Scheduled (BCWS)}$
- Schedule Performance Index:
 $SPI = BCWP/BCWS$
- Schedule Variance Percentage:
 $SV\% = (BCWP - BCWS) / BCWS$

Schedule and Cost Variances



Earned Value Measurement of Lost Labor Productivity:

- Impacted Period Sample Data:
 - Budgeted Cost of Work Scheduled= \$160,000
 - Budgeted Cost of Work Performed = \$150,000
 - Actual Cost of Work Performed = \$180,000
- Schedule Performance Index:
 - $SPI = \$150,000 / \$160,000 = 0.94$ (behind schedule)
- Labor Cost Performance Index:
 - $CPI = \$150,000 / \$180,000 = 0.83$

Earned Value Measurement of Lost Labor Productivity:

- Unimpacted versus Impacted Period Comparison:

Unimpacted Cost Performance Index = 1.02

Less

Impacted Cost Performance Index = 0.83

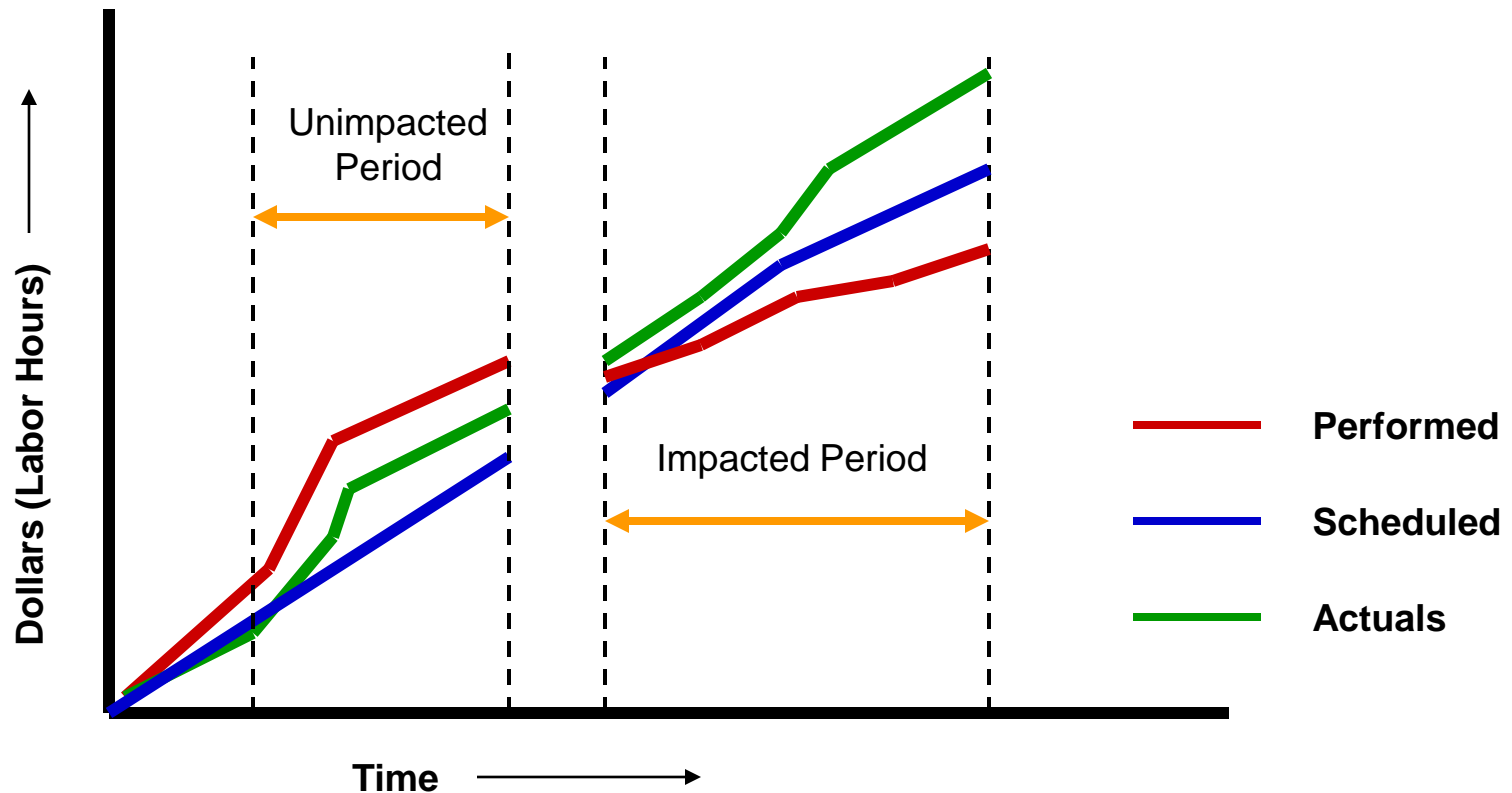
Lost Productivity 0.19

- Lost Labor Productivity Cost:
 $0.19 \times \$180,000 = \$34,200$

Earned Value Measurement of Lost Labor Productivity:

- Unimpacted Period Sample Data:
 - Budgeted Cost of Work Scheduled = \$80,000
 - Budgeted Cost of Work Performed = \$92,000
 - Actual Cost of Work Performed = \$90,000
- Schedule Performance Index:
 - $SPI = \$92,000 / \$80,000 = 1.15$ (ahead of schedule)
- Labor Cost Performance Index:
 - $CPI = \$92,000 / \$90,000 = 1.02$

Labor Productivity Measurement



Work Sampling Method

The work sampling method involves the claims analyst making numerous direct observations of work activities.

Statistically valid sampling techniques are used to determine how much time is spent between direct work, support work and delays/disruptions.

Craftsmen Questionnaire Sampling Method

This method involves preparing a questionnaire and providing it to the craftsmen in the field during the lost productivity period.

The questionnaire allows the craftsmen to estimate the amount of lost productivity on a daily or weekly basis, identifying the causes of the lost time.

Project Comparison Studies

When there is insufficient contemporaneous project documentation available to support a *Project Specific Study*, AACE recommends a *Project Comparison* study as the next best alternative.

Project Comparison Studies

Comparable Work Study

Compares productivity of one work activity to a similar work activity on the *same* project.

Comparable Project Study

Compares productivity on one project to productivity achieved on a *similar* project.

Specialty Industry Studies

When there is insufficient contemporaneous project documentation to allow for use of a Project Specific or Project Comparison study, AACE recommends use of an appropriate Specialty Industry study.

The primary differences between Specialty Industry Studies and General Industry studies are the Specialty studies are subject specific, limited to a specific industry, and based upon a small number of specific projects rather than a generalized survey of the industry.

Specialty Industry Studies

- Acceleration

- Construction Industry Institute, CII Research Summary RS 41-1, *Schedule Reduction Executive Summary*, Austin, Texas, April 1995
- NECA, *Electrical Construction Peak Workforce Report*, 2nd Edition, Washington D.C., 1987

- Changes, Cumulative Impact and Rework

- Leonard, Charles A., *The Effects of Change Orders on Productivity*, Concordia University, Montreal, Quebec, April 14, 1987
- Mechanical Contractors Association of America, *Change Orders, Overtime and Productivity*, Publication M3, Rockville, MD., 1968

- Learning Curve

- Cass, Donald J., *Labor Productivity Impact of Varying Crew Levels*, C.2.1, AACEI Transactions, 1992
- Emir, Zey, *Learning Curve in Construction*, Revay Reports, Vol. 18, No. 3, October 1999.

Specialty Industry Studies

- **Overtime and Shift Work**
 - Adrian, James J., *Construction Productivity Improvement*, Elsevier Science Publishing, New York, 1987.
 - Business Roundtable, *Effect of Scheduled Overtime on Construction Projects-coming to Grips with Some Major Problems in the Construction Industry*, New York, 1974.
- **Project Characteristics**
 - Construction Industry Institute, *Engineering Productivity Measurement*, CII Research Summary RS156-1, Austin, TX, December 2001.
 - Merrow, Edward W., *Understanding the Outcome of Mega Projects: A Quantitative Analysis of Very Large Civil Projects*, March 1988.

Specialty Industry Studies

- Project Management

- Chitester, David D., *A Model for Analyzing Jobsite Productivity*, C.3.1, AACEI Transactions, 1992.
- Thomas, H. Randolph, Jr., Victor E. Sanvido and Steve R. Sanders, *Impact of Materials Management on Productivity*, Journal of Construction Engineering and Management, Vol.115, No. 3, Sep 1989.

- Weather

- U.S. Army Cold region Research and Engineering Laboratory, *Impact of Climatic Conditions on Productivity*, Hanover, N.H., 1987.
- National Electrical Contractors Association, *The Effect of Temperature on Productivity*, Washington, D.C. 1974

General Industry Studies

In situations where there is insufficient contemporaneous documentation to support either a project specific or project comparison study and the lost productivity stems from numerous or non-specific factors, the AACE recommended practice is to utilize an appropriate General Industry Study.

General Industry Studies

- U.S. Army Corps of Engineers, *Modification Impact Evaluation Guide*, EP 415-1-3, Department of the Army, Office of Chief of Engineers, Washington, D.C., July 1979
- Mechanical Contractor's Association of America (MCAA), *Labor Estimating Manual: Appendix B, Factors Effecting Productivity*, Rockville, MD., August 1988.
- National Electrical Contractor's Association (NECA), *Manual of Labor Units*, Bethesda, MD., 1976 and 2003.

Industry Studies

Month	Hours	Inefficiency % ¹	Excess Hours
Jan '02	200	5%	10.0
Feb '02	250	5%	12.5
Mar '02	400	10%	40.0
Apr '02	480	20%	96.0
May '02	460	20%	92.0
June '02	500	25%	125.0
Total Excess Hours			375.5
Average Rate			\$ 60.00
Total Claimed			\$ 22,530.00

¹ Per XYZ Association Study, Stacking of Trades typically results in inefficiencies in the range of 5% to 25%

Cost Basis

When there is insufficient documentation to support any of the previously discussed techniques, the AACE recommends employing one of the Cost Basis Methods.

However, contractors should bear in mind that there are significant legal hurdles to overcome for use of a cost basis methodology.

Cost Basis

To use a Cost Basis, the courts generally require that:

1. The nature of the losses make it impractical, if not impossible, to determine damages in a more particular manner.
2. The contractor's estimate was reasonable.
3. The contractor's actual costs were reasonable.
4. The contractor was not responsible for any of the events leading to the loss of productivity.

Cost Basis

- Total Unit Cost Method
- Modified Total Labor Cost Method
- Total Labor Cost Method

Total Cost Method

Total Hours Incurred			4,688
Less Hours Estimated			(3,600)
Excess Hours			1,088
Average Labor Rate			\$ 50
Total Claimed			\$ 54,400

Modified Total Cost

Total Hour Incurred	4,688
Less Hours Estimated	<u>(3,600)</u>
Excess Hours	1,088
Less: Change Orders	(100)
Hours Under Bid	(150)
Less XYZ's Errors	<u>(75)</u>
Net Excess Hours	763
Average Labor Rate	<u>\$ 50</u>
Total Claimed	<u>\$ 38,150</u>

Total Cost – Claim's Ceiling!

Real Life Subcontractor's Claim:

1.	\$272,915	Productivity impact due to Change Orders
2.	\$ 14,142	Early project delays
3.	\$ 23,631	Interest on all amounts past due
4.	\$ 95,355	Delay charges on new construction
5.	\$ 65,850	Lost OH&P on base contract
6.	<u>\$155,320</u>	Invoice amounts still open
	\$627,213	

Total Cost – Claim's Ceiling!

Audit of Subcontractor's Documents reveals:

Total Cost Incurred	\$ 892,450
Overhead @ 10%	<u>\$ 89,245</u>
Subtotal Cost and Overhead	\$ 981,695
Mark-up @ 5%	<u>\$ 49,085</u>
Total Selling Price subcontractor could expect	\$1,030,780
Less: amount received by the subcontractor	<u>\$ 637,477</u>
Claimable amount	<u>\$ 393,303</u>

Total Cost – Claim's Ceiling!

Subcontractor's claim of \$627,213 exceeded their fully marked-up cost overrun of \$393,303 by \$233,910!

The case settled out of court for approximately \$170,000 (including \$155,320 in past due invoices)