



Quantum/Damages Analysis Services: Cost-Based Engineering & Construction Claims

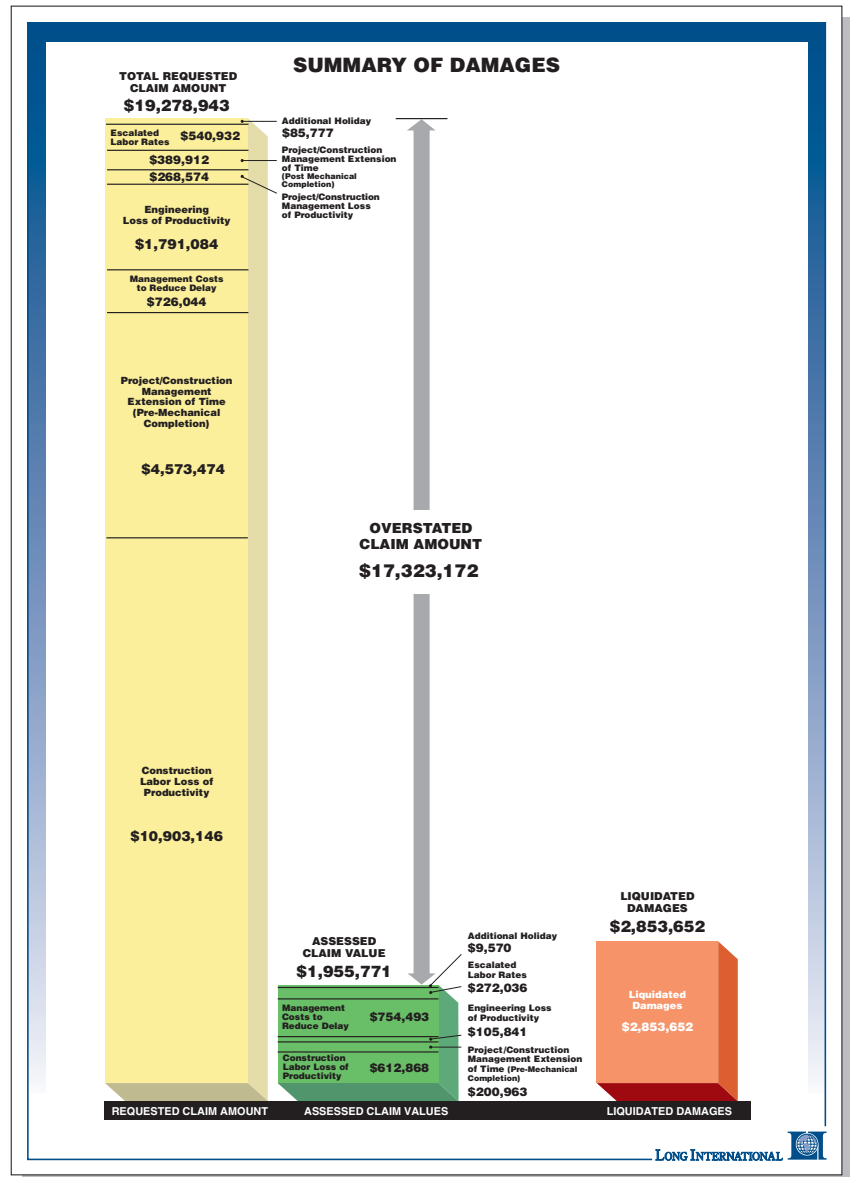
OVERVIEW

Cost-based engineering and construction claims analyses performed by Long International involve the preparation or defense of engineering and construction claims regarding the increased time and cost of performance resulting from unresolved change orders, disputed specifications, delays, loss of productivity, and other causes. In addition, we often calculate damages incurred by the Owner regarding the Contractor's defective work, decreased production capacity due to a defective design, and actual delay or liquidated damages resulting from the Contractor's delay in achieving the contractual completion date(s) for the project. In certain cases, the Owner may be the Plaintiff, seeking to recover for increased costs paid to design and construct a project due to the Contractor's mismanagement.

Our quantum/damages calculations often employ man-hour, quantity, and cost variance analyses, where the Contractor's responsibility for bid error and performance problems is determined in addition to the Owner's responsibility for compensable problems. Often, the claimed amounts are found to be overstated, and this comprehensive approach to damages seeks to develop a supportable basis for damages derived from an analysis of problems caused by both parties, contractual risks, and actual man-hours and costs incurred.

In these cost-based claims, direct, indirect and "other" costs comprise the Contractor's claimable costs, and are determined by 1) technical analyses to isolate changes in scope, timing, sequencing, etc., to which costs are applied, and/or 2) cost variance analyses that compare the original estimate for the work with the actual cost incurred, and correlate the variances to the causes of cost growth. The combination of both methodologies, utilizing detailed engineering analyses and fact finding, combined with careful cost accounting and cost-variance analysis, produces a well supported and compensable claim or presents a strong defense against the validity of the Plaintiff's claim.

Long International's integrated engineering, accounting, and financial team combine their experience and knowledge to provide an integrated approach to construction claims analysis. We not only seek to identify the technical issues which caused growth in man-hours and costs in the Contractor's job cost reports, but also we seek to ensure that the costs represented in the job cost reports are traceable to the payroll reports, accounts paid, and general ledger. The result is a claim that has been subjected to detailed engineering analysis to help evaluate causation and entitlement, together with a proof of costs incurred arising from the cause.



Cost / Damages Matrix

(All Costs Shown in \$000)

Project Work Activities	Original Contract Value	Approved Change Orders	Current Contract Value	Pending Change Orders	Big Error (Contractor)	Contractor Caused Problems	Inaccurate P&IDs	Potential Compensable Damages				Total Actual Costs
								Issue No. 1	Issue No. 2	Issue No. 3	Issue No. 4	
ENGINEERING	\$2,500	\$400	\$2,900	—	—	\$120	\$250	\$500	—	—	—	\$3,770
EARTHWORK	\$1,000	—	\$1,000	—	—	\$200	—	—	—	—	—	\$1,200
CONCRETE	\$500	\$20	\$520	—	—	\$100	—	—	—	—	—	\$620
STRUCTURAL STEEL	\$1,000	\$100	\$1,100	—	—	—	—	—	—	—	—	\$1,100
INSTALLED EQUIPMENT	\$7,200	\$900	\$8,100	—	—	\$50	—	—	—	—	—	\$8,150
PIPING	\$2,000	\$1,055	\$3,055	\$2,500	\$500	\$750	\$1,250	\$345	—	—	—	\$2,500
Direct Labor	\$500	\$250	\$750	\$600	\$75	\$112	\$300	\$75	—	—	—	\$2,512
Labor Taxes & Burdens	\$215	\$108	\$323	\$280	\$35	\$53	\$145	\$35	—	—	—	\$1,151
Permanent Material & Equip.	\$800	\$400	\$1,200	\$950	\$200	\$300	\$475	\$100	—	—	—	\$4,175
Consumable Materials	\$50	\$25	\$75	\$50	\$10	\$15	\$40	\$5	—	—	—	\$50
Owned Construction Equip.	\$25	\$10	\$35	\$25	\$10	\$15	\$30	\$5	—	—	—	\$25
Rental Equipment	\$10	\$5	\$15	\$10	\$50	\$75	\$10	\$25	—	—	—	\$10
Subcontracts	\$400	\$257	\$657	\$585	\$120	\$180	\$250	\$100	—	—	—	\$585
TANKAGE	\$500	\$100	\$600	—	—	—	—	—	—	—	—	\$600
INSTRUMENTATION	\$800	\$200	\$1,000	\$700	—	\$600	\$1,000	—	—	—	—	\$700
ELECTRICAL	\$1,500	\$450	\$1,950	\$900	—	\$800	\$1,800	—	—	—	—	\$900
PROJECT/CONST MANAGEMENT	\$2,000	\$425	\$2,425	\$1,800	\$400	\$400	\$750	\$2,200	—	—	—	\$1,800
OTHER FIELD INDIRECTS	\$1,500	\$300	\$1,800	\$1,300	\$300	\$600	\$1,000	\$300	\$450	\$1,300	—	\$7,650
HOME OFFICE OVERHEAD	\$2,000	\$400	\$2,400	\$800	—	\$400	\$400	\$200	\$800	\$800	—	\$5,600
FEES/PROFIT	\$2,500	\$850	\$3,350	\$1,000	—	—	\$800	\$80	\$750	\$1,000	—	\$6,880
TOTAL PROJECT	\$25,000	\$5,200	\$30,200	\$9,000	\$1,200	\$4,370	\$8,700	\$925	\$2,900	\$9,000	\$66,295	

POTENTIAL CLAIM VALUE = \$21,525
TOTAL COST OVERRUN = \$36,095

Quantum Calculations

- Man-hour, Quantity, and Cost Variance Analyses
- Evaluation of the Reasonableness of the Contractor's Bid Estimate
- Costs of Changes in Scope
- Loss of Productivity Costs
- Delay/Prolongation Costs
- Costs Associated with Contractor Performance Problems/Rework
- Calculation of Other Costs
- Calculation of Owner Damages

Combined Methodologies...

Long International's preparation of or defense against cost-based engineering and construction claims utilizes two methodologies for the analysis of direct, indirect, and "other" costs:

- (1) Technical analyses to isolate changes in scope, timing, sequencing, work methods, site conditions, specifications, labor productivity, etc., to which costs are applied; and/or
- (2) Cost-variance analysis that compares the original estimate for the work with the actual cost incurred, and the cost variance is correlated to causes of the cost growth.

Ideally, the analytical results of (1) and (2) will equal the same claimable amount, but generally they do not. Differing results arise because the sum of the cost components of separately priced claimable events may differ from the actual increased costs incurred if the actual costs are compared to the control budget or contract values for each cost component.

The combination of both methods, utilizing detailed technical analyses and fact-finding, combined with careful cost accounting and cost variance analysis, produces a more supportable claim analysis. Long International's use of combined technical and cost-variance methodologies for claim analysis subjects the Plaintiff's claim to strong scrutiny, can help support the validity of the Plaintiff's claim, or can present a strong defense against the validity of the Plaintiff's claim.

Using an Integrated Engineering and Accounting Approach...

Construction cost-based claims are often prepared and/or reviewed by engineering and accounting professionals. The engineers may focus on man-hours, quantities installed, and costs recorded in the project job cost reports. Page 4 provides a graphic example of a loss of productivity analysis caused by late engineering, RFIs, and field changes. The analysis depicts productivity loss using a "measured mile" analysis.

Likewise, accountants can focus on the man-hours and costs recorded in the project cost ledger and general ledger. Page 3 highlights labor cost reporting that provides the basis for labor cost variance analyses. In combination with the loss of productivity analyses on page 4, the causes of loss of productivity and actual labor costs can be evaluated together to derive the support for the compensable claim amount.

When presenting construction claims in mediation, arbitration, or litigation, testifying fact and expert witnesses may offer evidence as to the quantum of damages from (1) project job cost

reports, and (2) project cost/general ledgers. If the presentation of the claim is performed without regard to the data in the other set of reports or records, the basis of the claim is not as strong as it could be when an integrated engineering and accounting analysis approach is presented.

When labor is at issue, we understand that the project job man-hours and costs in the project job cost reports and the man-hours and costs in the accounting ledgers need to correspond, or reconcile. Further, this same approach is necessary to reconcile other project costs, such as permanent equipment and materials, owned or rented construction equipment, subcontracts, engineering, project/construction management, and other cost accounts.

Our engineers and financial professionals combine their experience and knowledge to provide an *integrated* approach to construction claims analysis. The result is a claim that has been subjected to detailed engineering analysis to help evaluate causation and entitlement, together with a proof of costs incurred arising from the cause.

Based on Costs that Count...

Proof of costs incurred that arise from the cause takes more than assertion. In addition to proof of cause through detailed engineering analysis, the propriety of those costs must be established. Costs should be clearly identified by type of cost, with labor categorized as to the specific job number, work package, trade, and activity. While some contracts allow for a specified labor rate, disputed change orders may need to reflect the actual labor required to perform the work. Also, the labor rate used in the project job cost report may not be the actual cost for that labor because of the timing of payroll taxes, and the actual benefits and overtime paid. Payroll taxes may have reached a maximum amount for an individual depending on the time of the year in which the work was performed. Benefits may vary by trade. Claimed overtime costs for certain individuals may not actually have been paid for overtime if their compensation is based on a monthly salary.

Likewise, the costs of materials should be based on the actual purchased cost of installed or used materials, which can vary over time depending on when certain materials were actually purchased, i.e., previously purchased warehoused materials or materials purchased specifically for the project. While overhead or indirect costs may be charged to a job based on some standard rate, the actual costs for such overhead and indirect costs should be evaluated during the cost review. Actual percentages for overhead often vary, and an assumed percentage used for a given project may not be the actual overhead cost on a project for which a claim is being analyzed.

In summary, total project job costs, including material, labor, subcontract, and overhead costs, are included in the general ledger and financial statements as "Jobs-in-Process." However, unless job costs recorded in project job cost reports are traced to general ledger costs, proof of cost incurrence per the company's full books and records has not been established for cost-based claims.

Including Cost Verification...

Challenges in preparing or evaluating the validity of a cost-based claim include (1) identifying the specific costs incurred on a project, and (2) determining that the "costs" were actually incurred by the Contractor. Specific job costs are most easily identified in "job cost ledgers" or "job cost reports." These reports typically contain direct, indirect, and "other" costs related to the activities on the project either over time or at points in time, e.g., labor, material, equipment, support labor, small tools, temporary utilities, and mobilization and demobilization costs, to name a few.

The verification of costs is a vital step in preparing or evaluating cost-based claims. If cost records can be made available, we undertake cost verification by first understanding the Contractor's job cost system and records for recording job costs in the "job cost reports" and the company's general ledger financial reporting system. The common records used to verify costs include:

- Labor
 - Time sheets
 - Labor contracts
 - Payroll reports
 - Hourly rate calculations
 - Salary/bonus reports
- Material
 - Invoices
 - Purchase orders
 - Requisition forms
 - Bills of lading
- Subcontractor
 - Contracts
 - Payment requests
 - Change orders
- Rental Equipment
 - Rental agreements
 - Equipment utilization reports
 - Invoices
- Home-office Overhead
 - Audited cost pools
 - Overhead calculation/rates
- Owned Equipment
 - Equipment and small tools schedule
 - Equipment depreciation schedule
 - Equipment rate schedule

A critical step that is often overlooked in the verification of cost-based claims is determining

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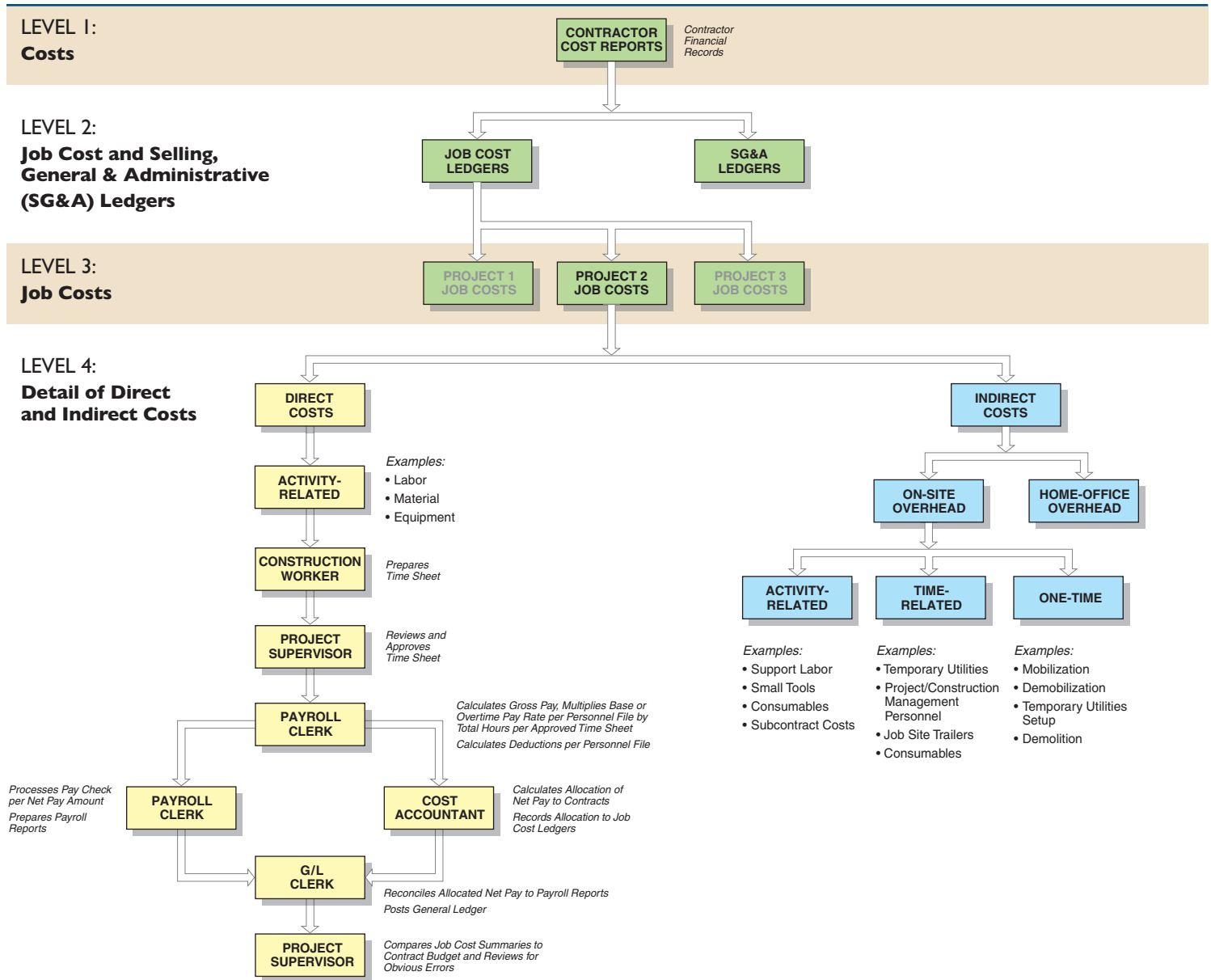
that costs recorded in job cost ledgers reflect amounts actually paid by the Contractor. Amounts recorded as costs of completed work do not necessarily mean that the costs were paid. A Prime Contractor may dispute a cost with a Subcontractor, even though that Subcontractor's cost is recorded in the job cost report. When costs can not be shown to actually have been incurred and paid in a cost-based claim, they may be disallowed and excluded in the recovery. Therefore, costs per the job cost ledger need to be compared to the

cash and accounts payable ledgers of the Contractor and reconciled.

Job cost and financial reporting systems vary by Contractor. Longer contract performance durations, more use of Subcontractors, and more complex projects require more demanding and complicated preparation of or defense against cost-based claims. If joint-venture partners are involved, the project cost reporting can become even more complicated. Long International's integrated

engineering, accounting, and financial team has the experience and knowhow to prepare or defend against the most demanding cost-based claims.

Leads to Supportable Results. Entitlement. Causation. Cost Verification. Long International integrates the perspectives and experience of its engineers, financial, and accounting professionals to prepare or defend against cost-based engineering and construction claims.



Labor Cost Verification Steps

1. Substantiate period labor costs from the job cost report to the monthly job status report and weekly/daily labor job cost reports by work package.
2. Trace weekly/daily labor job cost report to daily timesheets by worker.

3. Determine the propriety of labor rates for labor operations by labor class compared to the labor bid rate.
4. Compare labor hours expended to the original estimates for the work performed.
5. Determine labor rates and labor hour variance from the estimate and compare to change orders, if any.

In summary, trace from labor job cost ledgers to underlying labor timesheets, labor rate agreements and payroll reports showing gross pay, payroll taxes, fringe benefits, and other deductions that document labor payments for payroll.

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PRODUCTIVITY LOSS DAMAGES

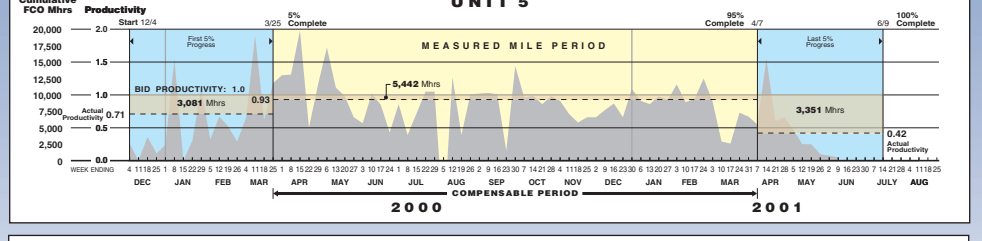
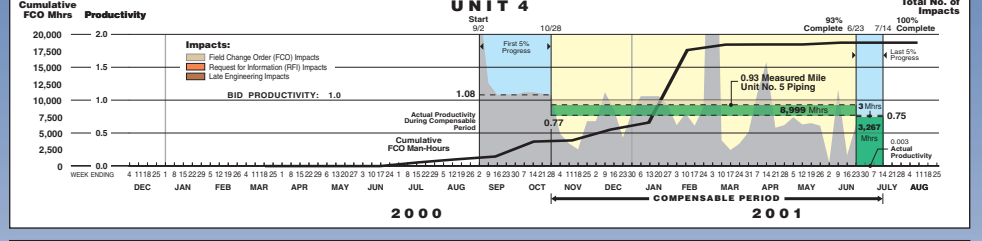
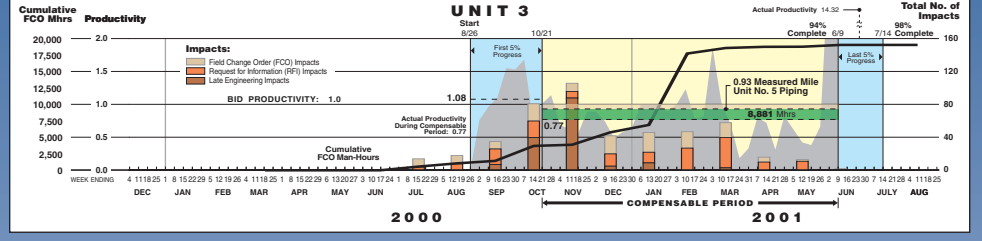
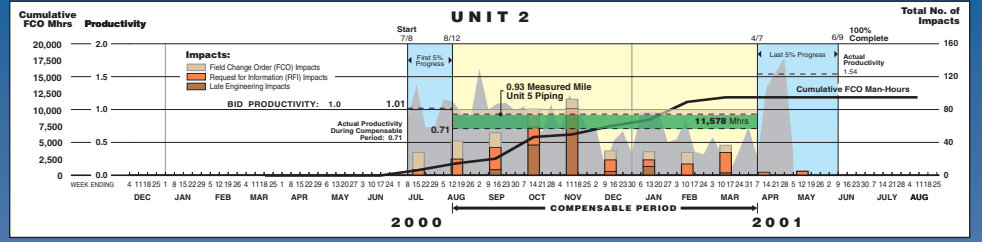
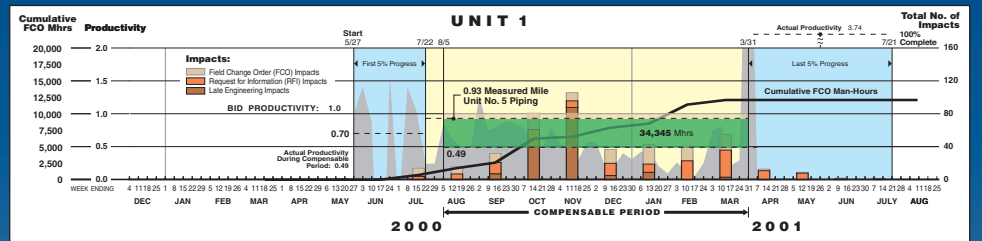
Long International employs numerous methods to analyze, demonstrate or disprove a Contractor's entitlement to recovery of increased costs as a result of engineering and/or construction labor productivity loss caused by delays and impacting events for which the Owner and/or the Contractor may be responsible. Delays and impacting events often cause the Contractor to work overtime, perform work out of its planned sequence or in parallel rather than in series, work in weather conditions that are less favorable than it reasonably planned, work in crowded conditions, employ multiple shifts, etc., all in an effort to make up time to mitigate delay. When there are multiple changes and impacting events on a project and they act in sequence or concurrently, there may be a cumulative effect of the individual changes and impacting events that is much greater than a sum of the individual parts. Multiple change orders and other types of Owner-caused delays and disruption, as well as Contractor-caused and *force majeure* delays and disruption, can negatively impact the Contractor's performance of unchanged work such that a Contractor expends additional time, man-hours and costs in completing its "unchanged" base scope work. To determine the Contractor's entitlement to construction labor productivity loss claims, a detailed assessment of contemporaneous man-hours and installed quantities, the timing of changes and impacting events, and an allocation of responsibility for the various causes of delay and disruption is often necessary.

Loss of Productivity Analyses

- Measured Mile Analysis
- Corroboration with Industry Studies
- Reasonableness of Bid Productivity
- Actual Productivity/Earned Value Calculations
- Timing of Impacting Events
- Cumulative Impacts

Once the Contractor's various heads of damages are identified, evaluated for entitlement, and quantified, Long International may utilize various methods of presenting such damages, depending on the contract terms, legal issues, and availability of data and documentation.

Measured Mile Productivity Analysis Piping Man-hours - Unit Nos. 1, 2, 3, 4 and 5



Unit No. 1 - Piping Impacts					Unit No. 2 - Piping Impacts					Unit No. 3 - Piping Impacts					Unit No. 4 - Piping Impacts				
Date	Late Engineering	RFIs	FCOs	Cumulative FCO Mhrs	Date	Late Engineering	RFIs	FCOs	Cumulative FCO Mhrs	Date	Late Engineering	RFIs	FCOs	Cumulative FCO Mhrs	Date	Late Engineering	RFIs	FCOs	Cumulative FCO Mhrs
Mar 00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Apr 00	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
May 00	0	1	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0
Jun 00	0	4	1	3	0	0	1	0	0	0	0	1	0	0	0	0	0	0	0
Jul 00	0	3	11	717	720	0	7	21	832	832	0	4	10	567	567	0	4	10	567
Aug 00	0	19	21	1,647	1,767	0	20	22	1,025	1,857	0	8	10	490	1,057	0	7	14	1,057
Sep 00	7	33	19	832	2,599	7	27	18	694	2,551	7	19	9	378	1,435	7	14	11	418
Oct 00	27	35	21	3,649	6,248	37	22	22	3,309	5,860	40	20	21	2,275	3,710	40	21	20	2,275
Nov 00	74	13	14	290	6,538	74	7	12	389	6,249	88	9	10	179	3,889	88	9	10	179
Dec 00	5	18	13	1,379	7,917	5	14	11	1,268	7,517	5	15	22	1,898	5,785	5	15	17	1,844
Jan 01	11	14	9	1,412	9,329	11	8	10	945	8,462	9	13	24	1,121	6,906	9	10	24	1,075
Feb 01	0	16	14	2,900	11,433	0	14	14	2,739	11,201	0	27	20	10,864	17,770	0	23	18	11,028
Mar 01	3	26	10	699	12,132	3	25	8	699	11,900	3	37	18	842	18,612	3	33	19	833
Apr 01	0	4	0	0	12,132	0	4	0	0	11,900	0	10	6	180	18,792	0	11	2	23
May 01	0	5	1	0	12,132	0	5	1	0	11,900	0	11	2	17	18,809	0	8	1	0
Jun 01	0	0	0	0	12,132	0	0	0	0	11,900	0	1	10	275	19,084	0	1	3	275
Jul 01	0	0	0	0	12,132	0	0	0	0	11,900	0	0	0	0	19,084	0	0	0	0
Aug 01	0	0	0	0	12,132	0	0	0	0	11,900	0	0	0	0	19,084	0	0	0	0
Total	137	191	134	12,132	12,132	137	155	140	11,900	11,900	152	175	153	16,084	16,084	152	158	142	18,789

LONG INTERNATIONAL

Methods of Presenting Damages

- Total Cost
- Modified Total Cost
- "A" / "B" Estimates
- Jury Verdict
- Delta Estimates
- Specific Damages Analysis
- Quantum Meruit
- Quantum/Damages Graphics

