Understanding the Estimate Part 2

Foreman's Development Series

What Estimate?

- **How many of you have actually seen an Estimate?**
- **How many of you have seen a monthly job cost report?**
  - **Why wouldn't the Contractor want to show you this information?**
  - **Why wouldn't the Foreman want to see this information?**

Objectives

In the 1st half of this module we're going to cover:

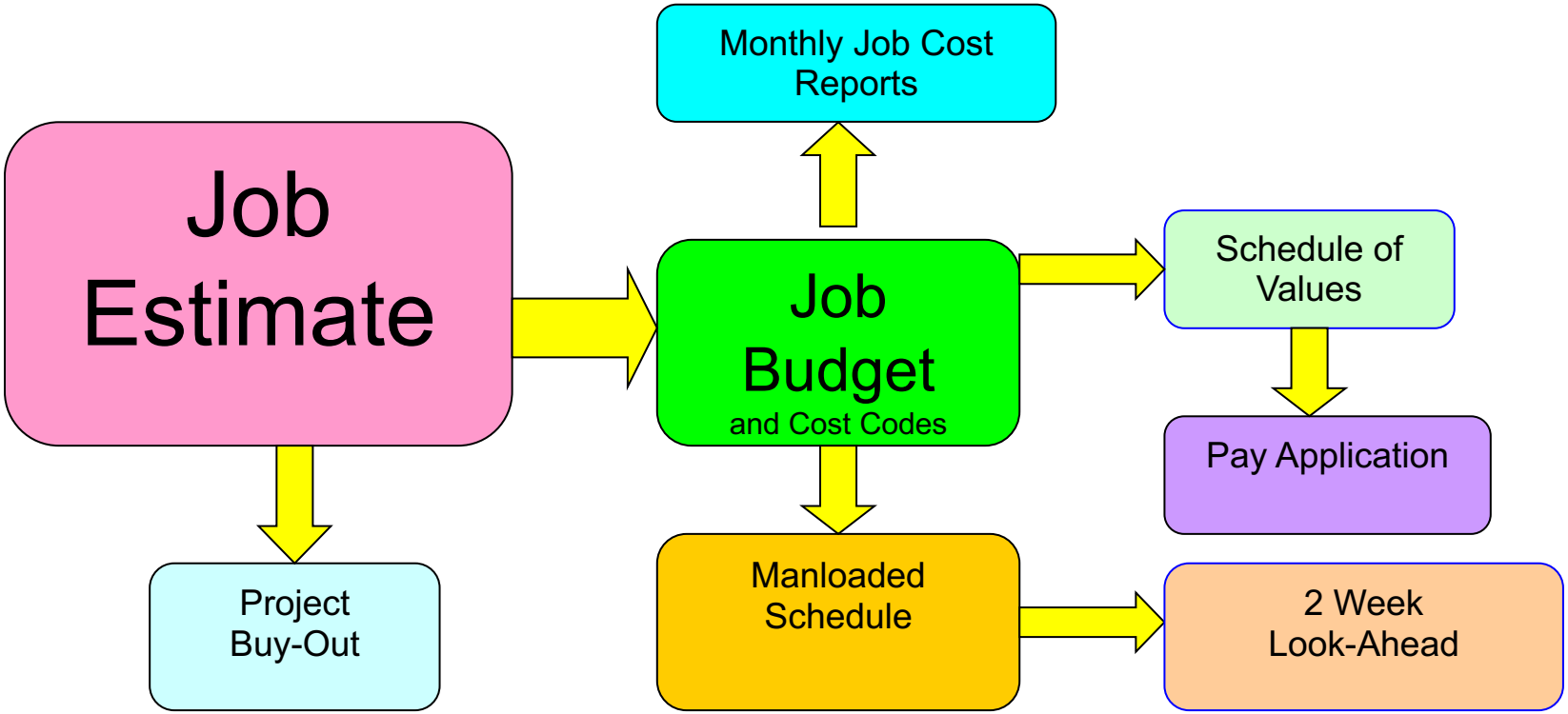
- The computerized estimating process.
- How a Contractor comes up with his Material Costs and Labor Units.

The 2nd half of this module we will look at how Labor Units give us a way to check our Install Rates:

- Are we installing our materials in the time given to us by the Job Estimate?

What's the Point?

As we've seen in other Foreman Development modules, the Job Estimate affects all other aspects of the Project:



Estimating Software??

Estimating Software Functions

or

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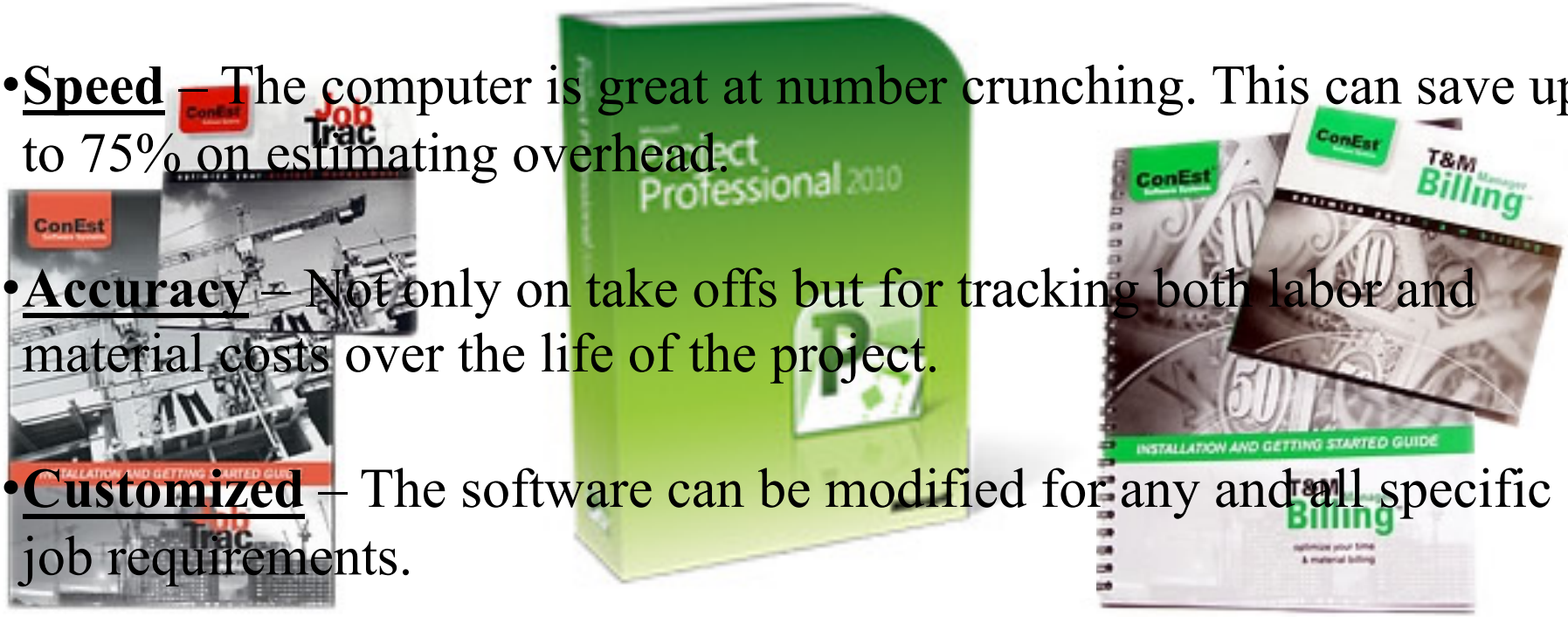
3)T ary

4)T or Recapitulation

Advantages of Estimating Software



- **Speed** – The computer is great at number crunching. This can save up to 75% on estimating overhead.
- **Accuracy** – Not only on take offs but for tracking both labor and material costs over the life of the project.
- **Customized** – The software can be modified for any and all specific job requirements.
- **Consistency** – Software enables the Estimator to use the exact same procedures each time. This provides a basis to compare estimates and actual job costs over time and adjust accordingly.

Digital Counting Software

ConEst®

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SureCount Takeoff

save time | bid more jobs | win more bids

Estimating Material Costs

- Big ticket items like Light Fixtures or Switchgear are quoted as separate packages in the Estimate.
- Getting quotes on Bulk buys will save $$$$.
- Thousands of misc. electrical parts also have to be priced as part of the Estimate.

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Software Systems

Main Floor Take Off

Bid in 12 different phases

JOB NAME - OFFICE BUILDING JOB # - GM 00-100

Date : Jul 15, 2002
Time : 12:42PM
Page : 1

	Phase	Material($)	Mat(%)	Labor Hrs	Lab(%)
1	MAIN FLOOR	112,982.86	30.82	3,435.61	14.04
2	2ND FLOOR	31,630.13	8.63	2,624.12	10.73
3	3RD FLOOR	31,630.13	8.63	2,637.12	10.78
4	4TH FLOOR	31,630.13	8.63	2,650.08	10.83
5	5TH FLOOR	31,630.13	8.63	2,663.13	10.89
6	6TH FLOOR	31,630.13	8.63	2,676.06	10.94
7	7TH FLOOR	31,630.13	8.63	2,702.04	11.04
8	8TH FLOOR	31,630.13	8.63	2,728.12	11.15
9	L-1 U/G PARKING	11,117.30	3.03	714.79	2.92
10	L-2 U/G PARKING	8,472.03	2.31	628.95	2.57
11	L-3 U/G PARKING	8,472.03	2.31	628.95	2.57
12	SITE LIGHTING	4,126.16	1.13	375.93	1.54
	Total	366,581.29	100.00	24,464.90	100.00

Accubid Pro Sample Report - Main floor

6 different systems

<MAIN FLOOR>

	System	Material($)	Mat(%)	Labor Hrs	Lab(%)
1	LIGHTING SYSTEM	5,815.44	5.15	577.40	16.81
2	WIRING DEVICES	5,593.67	4.95	99.81	2.91
3	FIRE ALARM SYSTEM	105.23	0.09	49.49	1.44
4	DISTRIBUTION	116.56	0.10	328.05	9.55
5	FEEDERS	88,257.58	78.12	811.92	23.63
6	BRANCH WIRING	13,094.38	11.59	1,568.94	45.67
	Total	112,982.86	100.00	3,435.61	100.00

<MAIN FLOOR><LIGHTING SYSTEM>

	Description	Qty	Date	Price	U	Disc	Net	Labor	U	Total Mat($)	Total Hours	Mat. Cond.	Lab. Cond.	Price Code
1	TYPE A	214	4/18/2000	2.00	E	0.00	2.00	0.60	E	428.00	128.40	Quoted	Normal	
2	TYPE B	73	4/18/2000	0.00	E	0.00	0.00	0.50	E	0.00	36.50	Quoted	Normal	
3	TYPE C	44	4/18/2000	0.00	E	0.00	0.00	0.55	E	0.00	24.20	Quoted	Normal	
4	TYPE D	4	4/18/2000	0.00	E	0.00	0.00	0.75	E	0.00	3.00	Quoted	Normal	
5	TYPE E	14	4/18/2000	0.00	E	0.00	0.00	0.75	E	0.00	10.50	Quoted	Normal	
6	TYPE F	22	4/18/2000	0.00	E	0.00	0.00	0.40	E	0.00	8.80	Quoted	Normal	
7	TYPE G	41	4/18/2000	0.00	E	0.00	0.00	0.55	E	0.00	22.55	Quoted	Normal	
8	TYPE H	15	4/18/2000	0.00	E	0.00	0.00	0.65	E	0.00	9.75	Quoted	Normal	
9	TYPE I	6	4/18/2000	0.00	E	0.00	0.00	0.90	E	0.00	5.40	Quoted	Normal	
10	TYPE J	15	4/18/2000	0.00	E	0.00	0.00	0.90	E	0.00	13.50	Quoted	Normal	
11	1/2" STEEL LOCKNUT	22	4/18/2000	13.35	C	20.00	10.68	4.00	C	2.35	0.88	Normal	Normal	98007012001
12	1/2" CHASE NIPPLE	22	4/18/2000	42.98	C	30.00	30.09	4.00	C	6.62	0.88	Normal	Normal	98007012451
13	1/2" ALUMINUM FLEX	1,986	4/5/2000	365.60	M	20.00	292.48	30.00	M	580.87	59.58	Normal	Normal	98005002202
14	1/2" STR FLEX CONN	662	4/18/2000	74.62	C	20.00	59.70	10.00	C	395.21	66.20	Normal	Normal	78174715407
15	#12 THHN	264	5/24/2000	104.12	M	30.00	72.88	5.13	M	19.24	1.35	Normal	Normal	98010022900
16	#12 THHN SOLID	7,282	5/24/2000	94.40	M	30.00	66.08	5.40	M	481.19	39.32	Normal	Normal	98010022400
17	B1-1 YELLOW WIRE CONN	240	4/18/2000	7.51	C	20.00	6.01	5.00	C	14.42	12.00	Normal	Normal	78178945188

Accubid Job Summary

DATE: Jul 15, 2002

JOB NAME : OFFICE BUILDING
JOB # GM 00-100
JOB PATH: C:\Program Files\Accubid Data\Jobdata\Pro5\GM 00-100 .ES5
DATABASE: ACCUBID ELEC USA NECA IMP DB

Accubid Pro Sample Report
- Job Summary

ESTIMATOR : GM / JD
ENGINEER : QUALITY DESIGN ASSOCIATES
STARTING DATE : ASAP
COMPLETION DATE : 6 MONTHS
PENALTY CLAUSE : NO
BREAKOUT PRICES REQUIRED : YES
ALTERNATE PRICES REQUIRED : YES

BID TO FOLLOWING : SUPERB BUILDERS, ABC CONSTRUCTION

BUILDING SIZE : 360,000 sq ft
BUILDING SHAPE : RECTANGULAR
CIVIL WORK BY : US
EXCAVATION BY : US
BACKFILL & COMPACTION BY : US
CONTROLS BY : US

EMT FITTINGS : STEEL SET SCREW
MINIMUM CONDUIT SIZE : 1/2"
MINIMUM WIRE SIZE : #12
WIRE TYPE : THHN
CABLE TYPE : MC
ALUMINUM PERMITTED : NO
RECEPTACLES SPEC & COLOR : SPEC GRADE WHITE
SWITCHES SPEC & COLOR : SPEC GRADE WHITE
PLATES TYPE & COLOR : STAINLESS STEEL

Accubid Final Pricing

JOB NAME - OFFICE BUILDING JOB # - GM 00-100

Date : Jul 15, 2002
Time : 12:39PM
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Final Pricing	Calculated (%)	Calculated ($)	Variance (%)	Modified ($)	Modified (%)	Alarm	Code
Database Material (Extension)		362,415.43		362,415.43			
Material Escalation				-7,248.31	-2.000		
Quoted Material (Extension)		4,166.00		4,166.00			
Quoted Material		226,300.00	-0.57	225,000.00		On	
Quoted Material (QA)							
Material Tax	6.750	40,019.50	-1.44	39,442.49	6.750		99-99-900
Material Total		632,900.93	-1.44	623,775.61			
Direct Labor		761,507.95		761,507.95			
Incidental Labor		7,782.00		7,782.00			
Labor Factoring		76,154.34		76,154.34			
Labor Escalation		28,519.42		28,519.42			
Indirect Labor		168,288.00		168,288.00			
Labor Tax							99-99-910
Labor Total		1,042,251.71		1,042,251.71			
Subcontractors		29,150.00		29,150.00		On	
General Expenses		70,000.00		70,000.00		On	
Total Cost		1,774,302.64	-0.51	1,765,177.32			
Database Material Overhead	8.000	30,950.28	-2.00	30,331.27	8.000		
Quoted Material Overhead	3.000	7,380.67	-0.56	7,339.04	3.000		
Labor Overhead	25.000	260,562.93		260,562.93	25.000		
Subcontractors Overhead	6.000	1,749.00		1,749.00	6.000		
General Expenses Overhead	6.463	4,524.00		4,524.00	6.463		
Adjustment Overhead				-4,426.10	-0.251		
Total Overhead	17.199	305,166.88	-1.67	300,080.14	17.000		
Database Material Markup	4.000	16,713.15	-2.00	16,378.89	4.000		
Quoted Material Markup	2.000	5,068.06	-0.56	5,039.48	2.000		
Labor Markup	13.500	175,879.98		175,879.98	13.500		
Subcontractors Markup	4.000	1,235.96		1,235.96	4.000		
General Expenses Markup	3.000	2,235.72		2,235.72	3.000		
Adjustment Markup				-4,570.57	-0.221		
Total Markup	9.672	201,132.87	-2.45	196,199.46	9.500		
Other Expenses	1.000	22,806.02	-0.84	22,614.57	1.000		99-99-995
Financing	1.000	23,034.08	-0.84	22,840.71	1.000		99-99-996
Bonding	0.704	16,382.21	-0.60	16,284.56	0.706		99-99-997
Final Adjustment				-196.76	-0.008		99-99-998
Selling Price		2,342,824.70	-0.85	2,323,000.00			
GST							99-99-999
Final Price		2,342,824.70	-0.85	2,323,000.00			

Final Pricing Sheet

DJE / Direct Job Expense or the actual cost to build the building

Total Overhead

Total Markup

Grand Total

Using different percentages for O.H. & Markup on each item

Accubid Recap

JOB NAME - OFFICE BUILDING JOB # - GM 00-100

Date : Jul 15, 2002
Time : 12:39PM
Page : 10

Price Summary	Value	%	Alarm
Database Material	355,167.12	15.289	
Quoted Material	229,166.00	9.865	On
Material Tax	39,442.49	1.698	
Material Total	623,775.61	26.852	
Direct Labor	604,204.37	26.010	
Direct Labor Burden & Fringes	269,759.34	11.613	
Indirect Labor	115,920.00	4.990	
Indirect Labor Burden & Fringes	52,368.00	2.254	
Labor Tax			
Labor Total	1,042,251.71	44.867	
Subcontractors	29,150.00	1.255	On
General Expenses	131,739.84	5.671	On
Prime Cost	1,826,917.16	78.645	
Total Overhead	300,080.14	12.918	
Net Cost	2,126,997.30	91.563	
Total Profit	196,002.70	8.437	
Selling Price	2,323,000.00	100.000	
GST			
Final Price	2,323,000.00	100.000	
Labor Risk Ratio %	18.8057		
Area	360,000.00		
Price Per Unit Area	6.45		
Total Labor Hours	31,481.35		
Labor Hours Per Unit Area	0.0874		
Average Labor Cost Per Hour	33.11		
General Expenses Per Hour	4.1847		

Price Summary Sheet or Recap

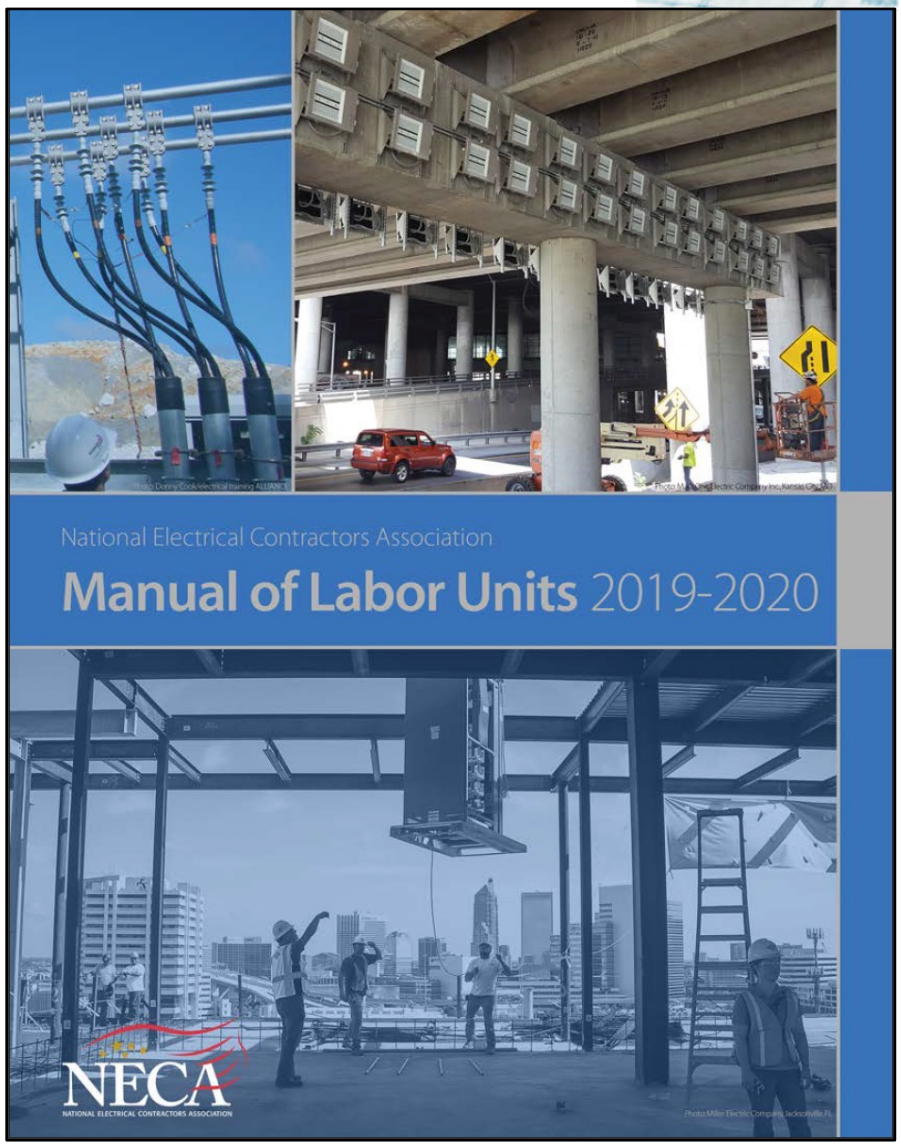
If labor goes over because problems or overruns you can use 18% extra labor before the profit is gone. 18% margin of error (20% range is common).

$$LRR = \frac{\text{Profit}}{\text{Labor}} = \frac{\$196,002}{\$1,042,251} = 18.8\%$$

Electrical Assemblies

Assenbly #	Assembly Name	Material $'s	Labor Hours	Unit Price 1
	Item # Item Name	Price	Bid lbr	qty
60,034	DPLX 20/3 SS	$10.33	0.950	$22.18
60,061	SP WP GRC	$33.20	1.163	$46.66
	14,486 DPLX 3-20 NM spec IV	$38.80 C	3.00 C	1.0000
	14,265 SP TOGGLE SW, 20A 1P	$105.00 C	6.25 C	1.0000
	14,669 4/S BOX 1-1/2 DEEP	$60.00 E	10.00 C	1.0000
	14,973 3/4 FD BOX 1 GANG	$19.00 E	30.00 C	1.0000
	14,674 4/S SG MUD RING 5/8" DP	$30.00 E	6.25 C	1.0000
	15,034 1G SWITCH PLATE LEVER	$0.00 E	10.00 C	1.0000
	3,891 BOX SUPPORTS - CUP-O	$42.46 C	7.50 C	1.0000
	4,009 1/4" SS CONCR INSERT	$80.00 C	6.25 C	2.0000
	5,574 YELLOW 3M WIRE NUT	$40.00 C	0.03 E	3.0000
	4,006 1/4" SS HH BOLT	$25.00 C	3.75 C	2.0000
	16,590 J-BOX ID TAG	$0.25 E	0.04 E	1.0000
	5,574 YELLOW 3M WIRE NUT	$40.00 C	0.03 E	3.0000
	16,591 DEVICE ID TAG	$0.50 E	0.04 E	1.0000
	16,590 J-BOX ID TAG	$0.25 E	0.04 E	1.0000
	16,592 WIRE ID TAG	$0.25 E	0.04 E	3.0000
	16,591 DEVICE ID TAG	$0.50 E	0.04 E	1.0000
	15,354 GROUND SCREW / #12 PI	$22.00 C	7.50 C	1.0000
	16,592 WIRE ID TAG	$0.25 E	0.04 E	3.0000
	60,040 DEVICE TEST	$0.00 X	0.07 E	1.0000
	15,354 GROUND SCREW / #12 PI	$22.00 C	7.50 C	1.0000

Part 2 – Estimating Labor



Labor Units - Method #2

Labor Units are expressed in man-hours for the installation of:

- E = One or per each item
- C = Per one hundred items
- C = Per one hundred linear feet of the item
- M = Per one thousand linear feet of the item
- LF = Per linear foot

Labor Units vary by Jobsite conditions:

- Normal
- Difficult
- Very Difficult

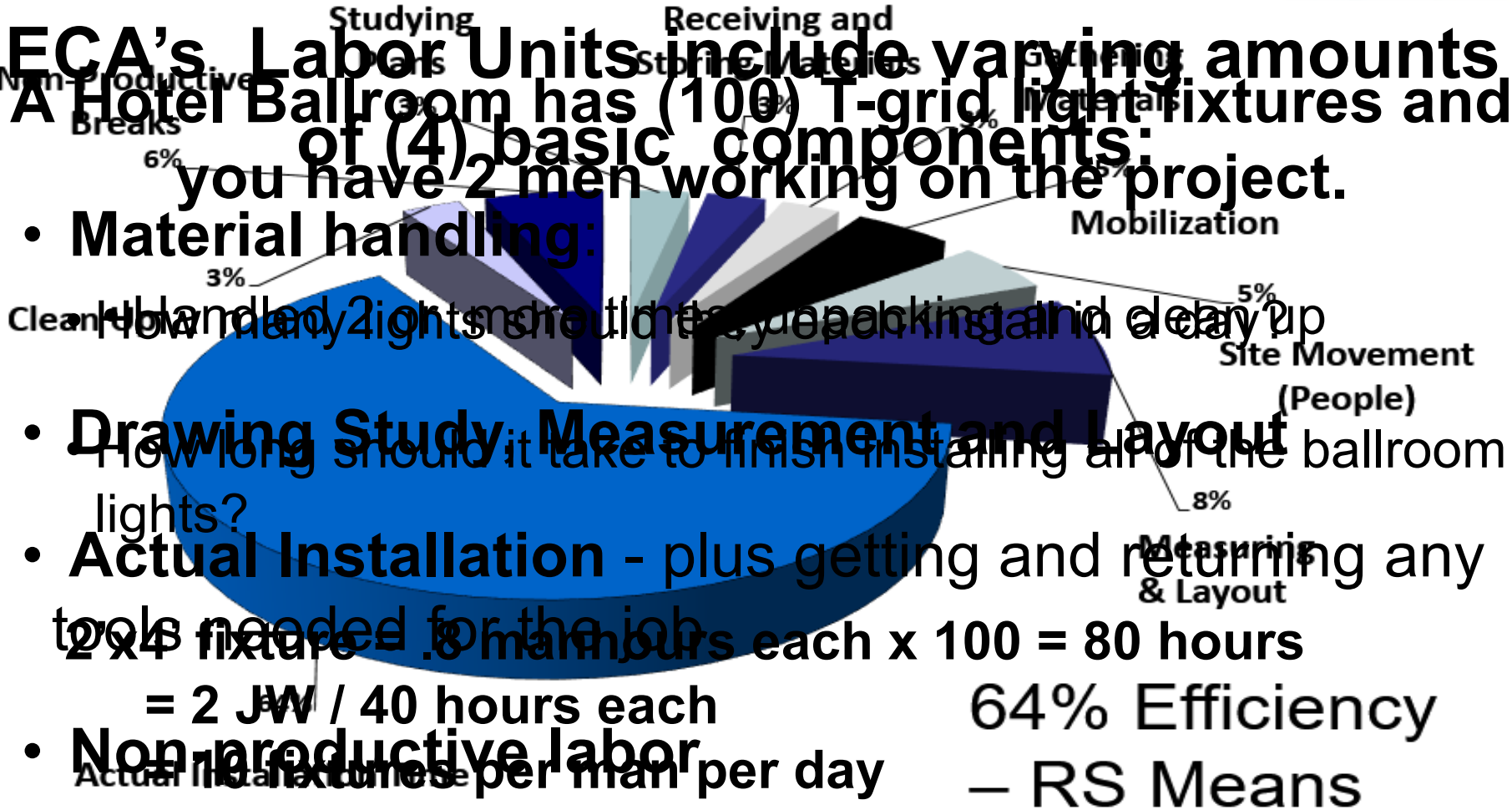
What's Included?

What is and isn't included in the Labor Unit?

- **Scope**
- **Work Operations NOT included**
- **Application Instructions**

What is in a Labor Unit?

NECA's Labor Units include varying amounts of (4) basic components:



- **Material handling:**
  - Handled 2 or more times unpacking and clean up
- **Drawing Study, Measurement and Layout**
  - How long should it take to finish installing all of the ballroom lights?
- **Actual Installation** - plus getting and returning any tools needed for the job
- **Non-productive labor**
  - Normal Breaks, walking, getting water, etc.

A Hotel Ballroom has (100) T-grid light fixtures and you have 2 men working on the project.

How many lights should they each install in a day?

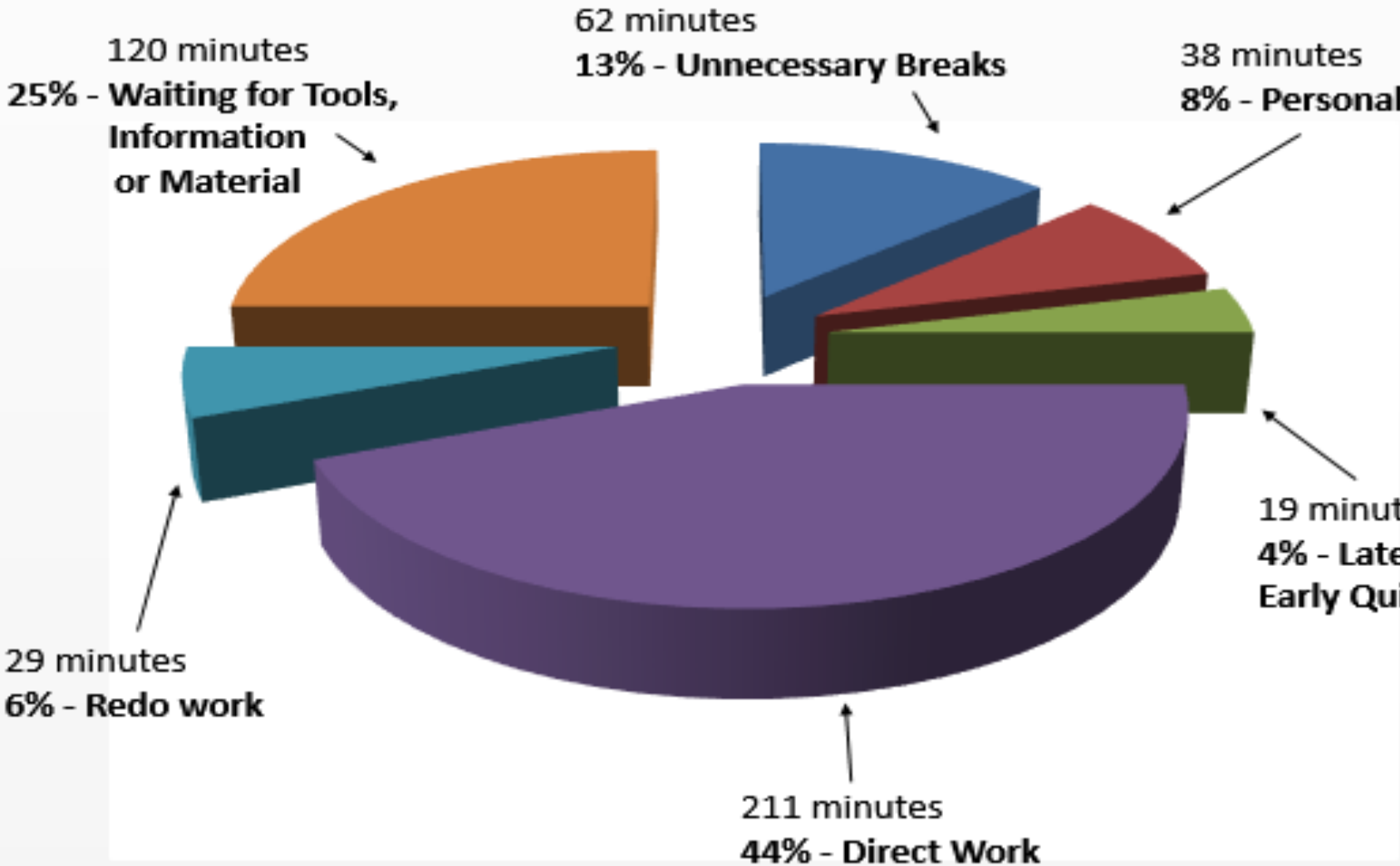
2 x 4 fixture = .8 manhours each x 100 = 80 hours

= 2 JW / 40 hours each

= 10 fixtures per man per day

64% Efficiency – RS Means

Managing Production



Typical Labor Units

Our 60’ x 60’ Ballroom has 30 duplex receptacles – how long should it take to trim out?

Duplex Receptacle = 30 man hours / C
SS trim plates = 6.25 man hours / C

30/100 = .3 x 30 = 9 man hours
6.25/100 = .0625 x 30 = 1.87 man hours
per NECA = **11 manhours Total**

RS Means: 11 hours x 64% efficiency
= 7 man hours actual time spent installing

What are your Labor Units?

- Your company had specific Labor Units that they used when they bid your job.
- Did your crew make the Estimate when they installed that big rack of 4” EMT conduits?
- The material has to be installed in the time allotted by the estimator.

Installation Rates? – Method #3

Installation Rate = Quantity installed (conduit, receptacles, etc.) within a certain amount of time.

- By using the Labor Units from the Estimate you and your Project Manager can add up the total labor man-hours for a specific task, a project, or a small area.
- This gives you an installation rate of quantity and man-hours for an overhead conduit rack, installing your Ballroom light fixtures or trimming out the duplex receptacles.

Figure your Install Rate

A 2-person crew was told to install 2,000 feet of 4" EMT. The NECA Labor Units for this material under normal conditions is 16 Labor Units per 100' of conduit.

1. **How many feet of conduit should one person install in an hour?**

   6.25 feet per man hour

2. **How long should this entire task take?**

   320 hours

3. **How much conduit should be installed by your 2-man crew at the end of 5 days?**

   500 feet

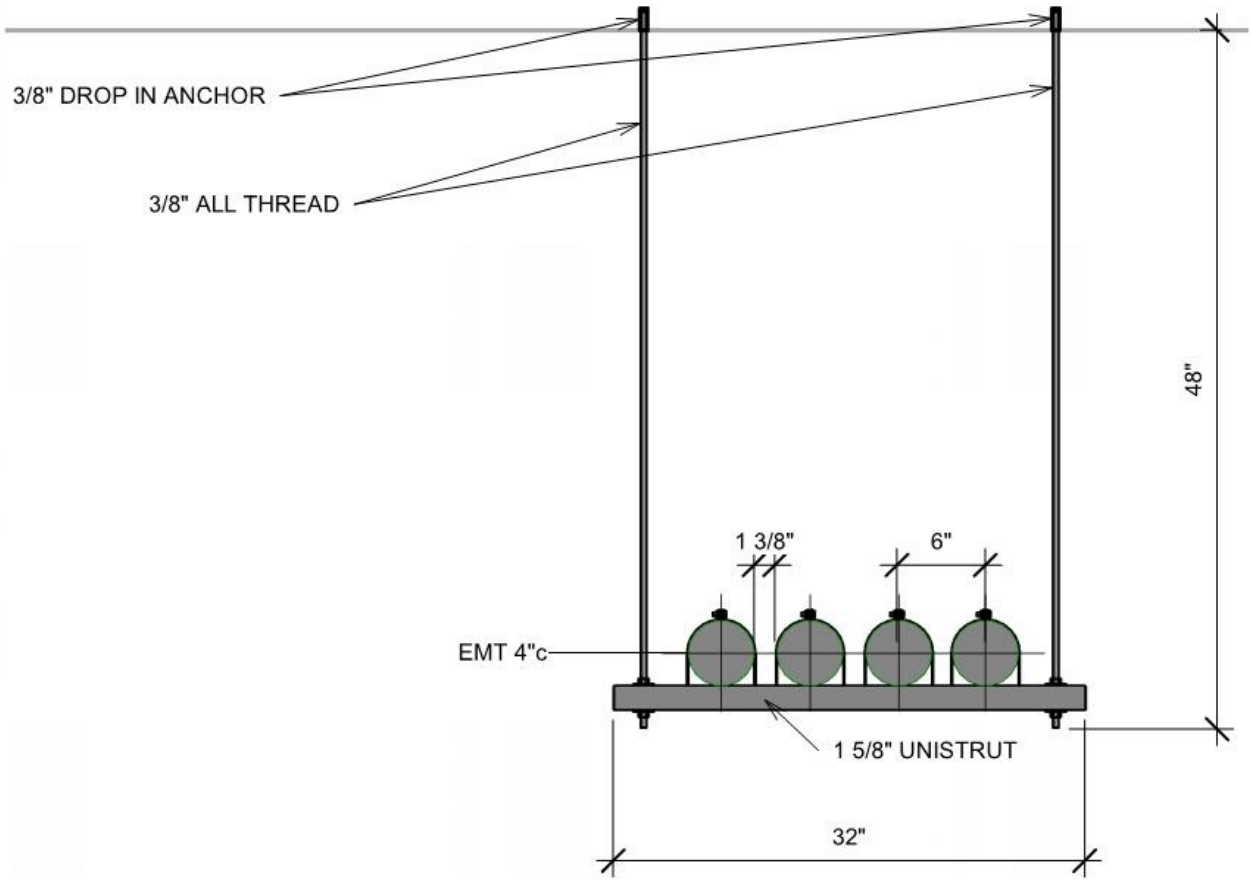
4. **One day I had 4 people running conduit. How many feet of conduit should they have put in?**

   200 feet

An Install Rate Example

Items+ByProducts

Item #	Item Name	Quantity	Price 1	Ext Price 1	Bld Lbr	Bld Lbr Ext	CCode
Category: CCode = Feeder Rough							



- A 500’ long conduit rack with (4) 4” EMT conduits
- Supports every 8’= 63 racks

.2115 x 100 = Install rate of 21.15MH/C

Extended Costs – Method #4

Extended Material and Labor Costs

Description / Size	Quantity	Unit	Material Units Cost	Material Result	Labor Units (in Manhours)	Labor Result (in Manhours)
EMT 1/2"	4330	ft.	0.5788	$2,506.20	0.045	194.85
EMT 3/4"	4715	ft.	1.0183	$4,801.28	0.05	235.75
EMT 1 1/2"	155	ft.	3.4455	$534.05	0.07	10.85
EMT 4"	350	ft.	10.5319	$3,686.17	0.16	56
EMT-90 1 1/2"	5	ea.	10.7729	$53.86	0.4	2
EMT-90 4"	3	ea.	80.0386	$240.12	1	3
PVC 3/4"	80	ft.	0.7933	$63.46	0.045	3.6
PVC 1"	120	ft.	1.2801	$153.61	0.0525	6.3
PVC 1 1/2"	60	ft.	1.9425	$116.55	0.07	4.2
GRC-90 1/2"	32	ea.	7.6672	$245.35	0.35	11.2
GRC-90 1"	44	ea.	12.7802	$562.33	0.5	22
GRC-90 1 1/2"	8	ea.	21.2872	$170.30	0.75	6
Total				$13,133.29		555.75
0.5788 Unit Cost						
.05 Manhours						

Material Prices updated 11/06/23 - Graybar
NECA Normal - 2010

Job Cost Accounting – Method #5

01 / Mobilization – Job site set up & removal: trailers, office, gang boxes, materials, etc.

02 / Demolition – Removals and demolition

03 / Site work – Underground, pole lights, temporary power, etc.

04 / Branch – conduit, boxes and wire; up to 1”

05 / Feeders – conduit, boxes and wire; 1 ¼” and above

06 / Gear – Switchgear, transformers, starters, disconnects, contactors, etc.

07 / Fixtures – receiving and installing any and all fixtures

08 / Special Systems – Security, fire alarm, PA, etc., including all conduit and wire
- does not include sub contractor’s work

09 / Devices – plugs and switches, trim plates, etc.

10 / Warranty Work

Tracking Labor Estimates by Area

- Some Contractors will break their Estimate into small areas or phases.
  - So their take-offs will show the total labor and materials quantities used in each of these small areas.

- This method gives the Foreman in the field a simpler way to track their labor in small, quantifiable work areas.

Labor Tracking

COLUMNS IN GREEN ARE INPUT | COLUMNS IN BLUE CONTAIN FORMULAS

Sweetheart Electric

THE "MANUAL HRS TO COMPLETE" COLUMN DEFAULT IS CALCULATED AT REMAINING VALUE & MUST BE UPDATED TO PROJECTED VALUES

YOU MUST ENTER EITHER A PERCENT TO COMPLETE VALUE OR A MANUAL HRS TO COMPLETE VALUE, BUT NOT BOTH. WHEN PHASES ARE COMPLETE ENTER 100% IN THE PERCENT COMPLETE COLUMN & DELETE ANY VALUES IN THE MANUAL HRS TO COMPLETE CELL

JOB NAME:Trinity Office Towers

DATE:11.20.2019

Labor Hours have been exceeded or the Estimate was short on Labor Hours

			HOURS						
PHASE	CT	DESCRIPTION	BUDGET	JTD	REMAINING	PERCENT COMPLETE	MANUAL HRS TO COMPLETE	HOURS TO COMPLETE =SUM(J - E)	HOURS AT COMPLETION
0000-1300-00		**MISC.LABOR**							
0000-1301-00	1	GENERAL FOREMAN	2890	**1497**	1393	0	1393	1393	2890
0000-3400-00	1	PREFAB	330	**439.5**	0	100	0	0	440
0010-0000-00		**CONSTRUCTION TEMPORARY POWER & LIGHTING**							
0010-2100-00	1	UNDERGROUND ROUGH IN	59	**61**	-2	90	24	24	85
0010-3100-00	1	ABOVE GROUND ROUGH IN	46	**226.5**	-180.5	15	180	180	407
0010-4100-00	1	DISTRIBUTION	293	**333**	-40	80	30	30	363
0010-5300-00	1	FEEDER WIRE	231	**291**	-60	80	40	40	331
0010-5400-00	1	BRANCH WIRE	296	**583**	-287	50	350	350	933
0010-6100-00	1	FIXTURES	96	**290**	-194	50	100	100	390
0020-0000-00		**SOG & SITE FEEDERS**							
0020-2100-00	1	UNDERGROUND ROUGH IN	1546	**1119**	427		420	420	1539
0020-3100-00	1	ABOVE GROUND ROUGH IN	117	**40**	77		77	77	117
0020-5200-00	1	GROUNDING	93	**8**	85		85	85	93
0020-5300-00	1	FEEDER WIRE	759	**0**	759		759	759	759
0030-0000-00		**COMMUNICATION SITE SLAB**							
0030-2100-00	1	UNDERGROUND ROUGH IN	3657	**1780**	1877	15	1877	1877	3657
0030-3100-00	1	ABOVE GROUND ROUGH IN	519	**230.5**	288.5		288.5	289	519
0030-5300-00	1	FEEDER WIRE	60	**40.5**	19.5	80	16	16	57
0030-5400-00	1	BRANCH WIRE	9	**0**	9		9	9	9
0040-0000-00		**GROUNDING**							
0040-2100-00	1	UNDERGROUND ROUGH IN	377	**36**	341		341	341	377
0040-3100-00	1	ABOVE GROUND ROUGH IN	332	**117**	215		215	215	332
0040-5200-00	1	GROUNDING	146	**0**	146		146	146	146
0040-5300-00	1	FEEDER WIRE	102	**0**	102		102	102	102
0040-5400-00	1	BRANCH WIRE	49	**0**	49		49	49	49
0040-7100-00	1	TRIM	5	**0**	5		5	5	5

Daily Labor Tracking

- Each activity has an individual ID number that corresponds to the electrical sheet and phase of work - just as they were taken off in the Estimating software.

- The company will use a cost coding system that matches these ID numbers.

- The Foreman will enter all of the hours on a digital time card every day
  - Every hour is cost coded to match what each worker was doing.

Production?

We've looked at various ways to track your installation rates:

1) The "Seat of your Pants"
2) Using NECA Labor Units
3) Using the Estimate's Installation rates
4) Extended Costs by Area
5) Cost Codes and Labor Tracking

Are you making your Labor Installation Rates??

Summary

Anyone want to be an Estimator?

- Well, maybe not, but at least we have a better understanding of how they do their work.
- We need to be more competitive!
  - In order to do that we need to be more productive.
  - System Productivity and checking our Labor Install Rates are tools we can use to help us do that.