

Chapter 7 – Understanding Labor

Understanding labor and the factors that impact labor costs is vitally important. There are many factors that can cause a project to lose money. However, it is a proven fact that most projects that lose money, do so because of labor costs overrun. The biggest risk in construction is labor overruns.

The estimator must understand labor units, installation conditions, and factors that determine progress of the installation. Understanding the composition of the standard labor unit is vital in electrical estimating.

Labor units are determined by the project size, height, duration, and location. Once the labor unit is established, the estimator must understand project conditions in which the material will be installed. There are many factors that will affect labor productivity. The electrical estimator must understand labor column, installation labor factors, and project labor factors.

1. Labor Units

Labor units were developed through construction studies. Trade contractors through trade associations began documenting labor production. This information eventually was published in a labor unit manual. The National Electrical Contractors Association has published a Manual of Labor Units. For more information about this manual, contact the association.

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In the NECA Manual of Labor Units, the three labor unit benchmarks are as follows: Normal, Difficult, and Very Difficult. These are sometimes referred to as NECA Column 1, NECA Column 2, and NECA Column 3.

Labor column uses are:

- Normal – Residential, Commercial
- Difficult – Institutional
- Very Difficult – Industrial, Water Treatment Plants

A standard labor unit is based on the work being done by a skilled, qualified journeyman electrician. When it is known that workmen of inferior productivity will be used, a project labor factor must be applied to the project in the bid summarization.

The use of standard labor units should be the basis of the electrical estimate. The project conditions, schedule, and labor factors will determine which labor column should be applied to the project estimate.

The estimator must know which labor column to apply to the project being bid. Before computerized estimating, the estimator would commit to memory many labor units for materials. Computerized estimating brought a database that can store pricing and labor units for each item of material.

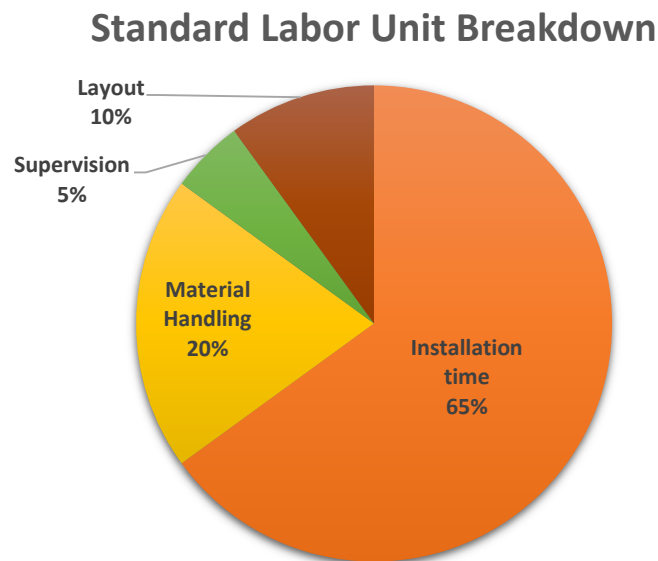
No two contractors are the same. Some labor units that work well for one contractor, may not work for another. There are many factors that impact labor production.

There are many conditions that require that the standard labor unit be adjusted. There are also labor factors that will affect labor productivity. Every estimator should know the labor productivity of their own labor forces.

2. The Standard Labor Unit

The definition of a labor unit is a unit of time for the installation of material based on project conditions. An estimator needs to understand the composition of a labor unit. A standard labor unit is 65% installation time and 35% for layout, material handling, clean up, and supervision.

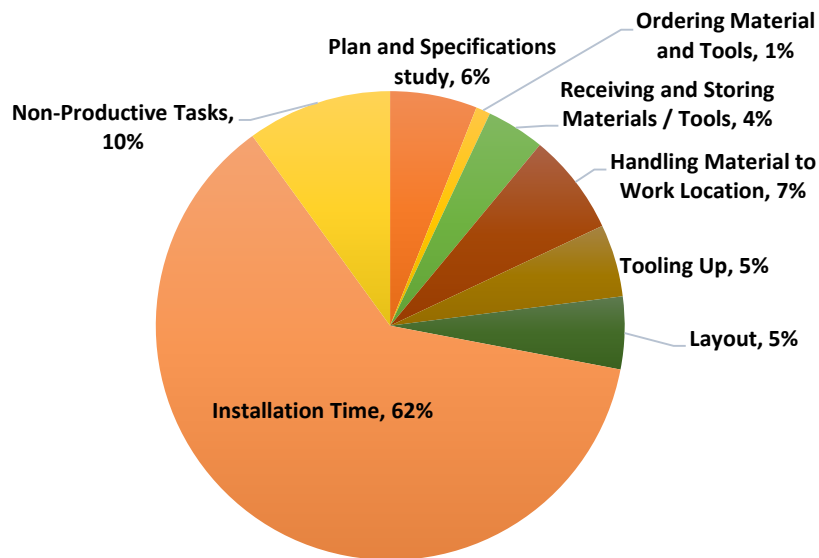
1) Standard Labor Unit – Example 1



Standard Labor Unit – 1 Hour Breakdown		
Labor Task	Percentage	Minutes
1. Material Handling	20%	12
2. Supervision	5%	3
3. Layout	10%	6
4. Installation Time	65%	39
TOTAL	100%	60

2) Standard Labor Unit – Example 2

Labor Unit Breakdown



Some labor studies have shown that field labor is distributed as shown in the table below:

Distribution of Field Time – 1 Hour Breakdown		
Labor Task	Percentage	Minutes
1. Plan and Specifications study	6%	3 ½
2. Ordering Material and Tools	1%	½
3. Receiving and Storing Materials and Tools	4%	2 ½
4. Handling Material to Work Location	7%	4
5. Tooling Up	5%	3
6. Laying Out the Work	5%	3
7. Installation Time	62%	37 ½
8. Non-Productive Tasks – i.e.: clean-up	10%	6
TOTAL	100%	60

Understanding the components of the labor unit will provide opportunity for efficiency.

- 1) **Plan and Specifications study** – Drawing quality will vary this percentage, depending on the complexity of the project. Detailed circuiting and identification will benefit the contractor. Organized plans by the foreman will provide reduced non-productive time.
- 2) **Ordering Material and Tools** – Materials cannot be installed unless they are on the project site. Proper tools must be provided to field workers for the most efficient installation possible. The best foremen are those who preplan material deliveries well in advance to meet the best labor production possible.
- 3) **Receiving and Storing Materials and Tools** – Having proper accessible storage for materials on site is paramount. Much labor is wasted when materials are not properly stored. It is unwise to have too much material onsite, but it is also unwise to have too little material onsite. It is a great waster of labor costs to have electricians waiting for materials to be delivered to the job site.
- 4) **Handling Material to Work Location** – The materials must be stored as close as possible to the installation area. Moving materials multiple times, is costly. This labor can be minimized by use of the following:
 - Tote boxes for materials and tools
 - Four-wheel carts with shelves
 - Portable storage boxes
 - Additional gang boxes
- 5) **Tooling Up** – Tools are required. For some tasks, the tooling up time will be more due to the intensity of the labor required. For example, setting up for a large wire pull may be a larger percentage than setting up for threading conduit. Temporary power is an important aspect of tooling up. Depending on the project, a temporary generator may be required.
- 6) **Laying Out the Work** – Electricians must study the installation drawings in order to properly install the work. The more time spend, the less productive your labor unit. Poor drawing quality is detrimental to productivity. Obtaining missing information before the drawings are sent to the project site, will save the contractor labor, thus saving money. A set of prepared layout drawings is valuable on most projects.

These drawings should include, but not limited to the following:

- Branch circuits and combined home runs
 - Feeder layouts and conduits racks
 - Schedule of device and plates colors and finishes
 - Architectural information – ceiling heights, wall types, etc.
 - Mechanical equipment locations
- 7) **Installation Time** – This is the actual time that is required to install each piece of material and all its components. The installation time will vary between each workman and each project site.

The following are factors that affect the value of a labor unit:

- Efficiency rate of installing worker
- Concentration of the work
- Building height and size
- Crew size
- Mounting height
- Weight of an item
- Amount of assembly required
- Cleanliness of the site
- Product packing and boxing

8) **Non-Productive Tasks** – Clean up is part of the labor unit.

Non-productive labor tasks would include, but not limited to:

- Restroom breaks
- Water breaks
- Personal phone calls by workers
- Talking with co-workers and other tradesmen
- Going to electrical supply for materials
- Waiting for elevators
- Climbing scaffolding
- Cleaning an area so work may be performed
- Safety meetings, toolbox talks, and project meetings
- Waiting for instructions, tools, or materials

The standard labor unit does not include non-productive supervision time. Additional non-working supervision labor hours should be added during the summarization of the bid.

3. Labor Columns

The NECA Manual of Labor Units applies labor according to the following three conditions. Each of these conditions have a different percentage of installation labor for each item.

NECA 1 – Normal Installation Conditions – When all the conditions associated with the installation of an item will permit the maximum productivity of the electricians on a project, these “normal” column labor units are applicable.

NECA 2 – Difficult Installation Conditions – When one or more of the conditions associated with the installation of an item will permit less than maximum productivity of the electricians on a typical project, these “difficult” column labor units are applicable.

NECA 3 – Very Difficult Installation Conditions – When one or more of the conditions associated with the installation of an item will permit substantially less than maximum productivity of the electricians on a typical project, these “very difficult” column labor units are applicable.

Description of Typical Project – NECA 1 Labor Column

Labor units are applied based on the project size, floors, square feet, and conditions.

The following is a general description of a typical project for estimating purposes:

Building Size & Shape

- Up to 3 floors above street level
- 20,000 to 100,000 square feet per floor
- A rectangular or square floor plan

Location

- In or near a metropolitan area
- Outside of a controlled access area
- A single building or facility

Construction & Work Schedule

- 8 hours per workday
- 40-hour work week
- All work on one daytime shift
- Enough time to eliminate scheduled overtime

Electrical & Communications Systems

- Up to 600-volt power distribution
- Local utility company
- Standard UL listed materials
- All systems installed 16 feet or less above a solid floor

Typical Site Conditions

- Good engineering and design
- Complete drawings and specifications
- Realistic schedule
- Electrical material furnished by electrical contractor
- Sufficient supply of qualified journeyman electricians
- All new materials
- No interruptions or delays or jurisdictional disputes
- No harsh weather elements – temperature between 35 F and 88 F degrees and with 50% or lower relative humidity.

When project is not characterized as noted above, then the estimator must select an appropriate labor unit taking into consideration any labor factors.

Source: NECA Manual of Labor Units