



# TECHNICAL ASSISTANCE

POWERED BY THE ILLINOIS TOLLWAY

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*Equipping Businesses for Success*

# **Estimating Practices**

# **LABOR**

A detail takeoff estimate is an estimate in which each individual construction component is accounted for, or taken off.



Portland Cement Association

The estimating process begins with a review of all construction contract documents, including detail drawings, and specification books, including the general specifications, addenda, and agreement forms.



Items are entered into columns of the master bid sheet or an estimating software as the estimate progresses.

Group	Phase	Description	Takeoff Quantity	Labor Cost/Unit	Labor Price	Labor Amount	Material Price	Material Amount
2000.000		<b>SITEWORK</b>						
	2315.021	Earthw: Excav Foot/Misc						
		Excavate Footing by Hand	148.15 cy	30.00 /cy	20.00 /hr	4,444	-	-
		Excavate Footing by Hand	150.15 cy	30.00 /cy	20.00 /hr	4,500	-	-
		Excavate Footing by Hand	982.98 cy	30.00 /cy	20.00 /hr	28,889	-	-
		Excavate Footing by Machine	740.74 cy	4.00 /cy	20.00 /hr	2,963	-	-
		Excavate Footing by Machine	200.00 cy	4.00 /cy	20.00 /hr	800	-	-
		Excavate Footing by Machine	888.89 cy	4.00 /cy	20.00 /hr	3,556	-	-
	2315.070	Backfill: Foot Wall Misc						
		Backfill Footings	50.00 cy	10.00 /cy	20.00 /hr	500	3.80 /cy	180
3000.000		<b>CONCRETE</b>						
	3110.100	Forms: Footings						
		Footing Forms	106.00 sf	0.80 /sf	20.00 /hr	64	.78 /sf	85
		Footing Forms	250.00 sf	0.80 /sf	20.00 /hr	150	.78 /sf	201
		Footing Forms	200.00 sf	0.80 /sf	20.00 /hr	120	.78 /sf	161
		Footing Slaps	1.95 sf	10.00 /sf	20.00 /hr	19	3.80 /sq	7
		Footing Slaps	50.00 sf	10.00 /sf	20.00 /hr	500	3.80 /sq	185
		Keyway in Footing	150.00 sf	.40 /sf	20.00 /hr	60	0.90 /ft	130
		Keyway in Footing	150.00 sf	.40 /sf	20.00 /hr	60	0.90 /ft	130
	3111.500	Forms: Strip & Oil						
		Strip/Oil Forms-Footing	106.00 sf	.50 /sf	20.00 /hr	53	15.00 /gal	8
		Strip/Oil Forms-Footing	150.00 sf	.50 /sf	20.00 /hr	75	15.00 /gal	12
	3300.010	Misc: Set Grade Pins						
		Set Grade Pins at Footing	100.00 ft	20 /ft	20.00 /hr	20	0.34 /ft	24
4000.000		<b>MASONRY</b>						
	4080.100	Mortar: All Types						
		Sand at Mortar	20.00 cy	-	-	-	11.40 /ton	330
		Sand at Mortar	20.00 cy	-	-	-	11.40 /ton	330
	4080.100	Mortar: Grout Fill Conc						
		Grout Fill 3000 psi, 1/2" Gravel	30.00 cy	10.00 /cy	20.00 /hr	300	57.80 /cy	1,814
Grand Total - 119,275								



A scope-of-work letter provides complete information to subcontractors bidding on portions of the work.

### SCOPE OF WORK

#### INVITATION TO BID

Notice is hereby given that the Metropolitan St. Louis Sewer District, the Owner, will receive sealed Bids for Lemay Service Area Overflow Regulation System Lemay North Gate Modifications (L-09) under Contract Letting No. 96055, at its office at 2000 Hampton, St. Louis, Missouri 63139, until 2:00 p.m., local time, on the 24th day of September. All bids are to be deposited in the bid box located in the District's Engineering Department prior to the 2:00 p.m. deadline. Bids may, however, be withdrawn prior to the opening of the first bid. Bids will be publicly opened and read at 2:15 p.m. local time on the 24th day of September, at 2000 Hampton Avenue at a place to be designated.

The Work to be performed under these Contract Documents consists of:

The construction of 3 new interceptor/outfall structures, 1 new outfall gate structure, 1 new interceptor gate structure, and modifications to 1 backflow prevention manhole within four drainage subsystems of the Lemay Service Area along the Mississippi River. The work also includes interceptor and combined sewer construction and miscellaneous instrumentation and electrical work. The Owner will procure and provide the following equipment for installation under this contract:

- Slide Gates and Actuators

All prospective bidders must prequalify and be certified prior to receiving the Bidding Documents. Prequalification forms for obtaining said certification may be obtained from the Owner at the above mentioned address. All bidders must obtain drawings and specifications in the name of the entity submitting the bid.

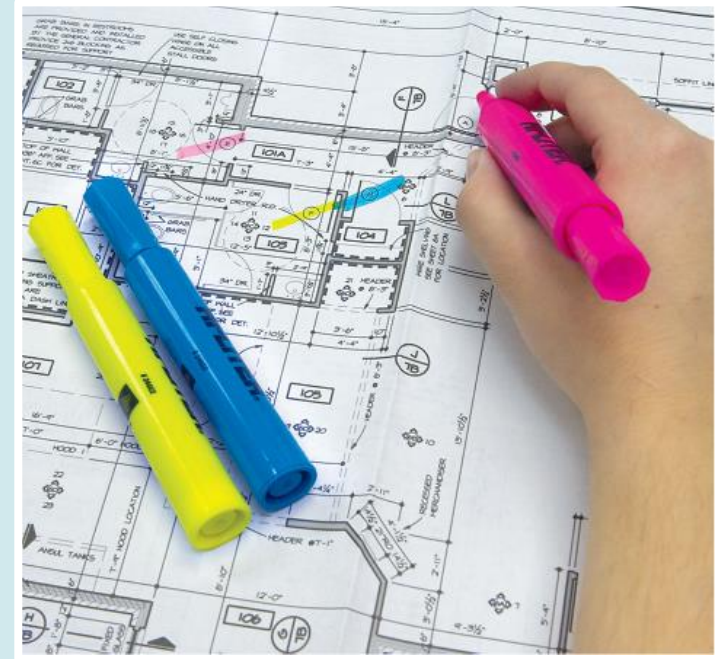
Bidding Documents may be obtained at 2000 Hampton Avenue, St. Louis, Missouri 63139 by prequalified Bidders, Subcontractors, and Suppliers at a charge of one hundred (\$100.00) dollars per each set of drawings and specifications. Separate additional copies of either the drawings or specifications are available at a charge of fifty (\$50.00) dollars per copy. There will be no refund of these charges. Plans and specifications may be reviewed at the Owners office listed above and at the office of Owner's Engineer (Black & Veatch) at 1415 Elbridge Payne Road, Suite 200, Chesterfield, Missouri 63017.

The Metropolitan St. Louis Sewer District has established a total combined goal of 25% Disadvantaged Business Enterprise (DBE) utilization for all construction contracts in the amount of \$50,000 or more. The District's DBE goal is at least 25% of the total Contract Price. Requirements are explained in the specifications.

A prebid conference will be held at the District offices at 2000 Hampton Avenue on September 10, at 2:00 p.m. local time.



Estimators commonly markup drawings and specifications to ensure that all necessary items are counted and that no items are counted twice.



## Variables Affecting the Estimate

- Project location may impact an estimate.
- Value engineering.
- Project scheduling affects an estimate.
- Labor is one of the highest risk variables in preparing an estimate.





Estimators must consider climatic requirements that may affect work scheduling and material placement.

### 3.7 Concrete Protection and Curing

- A. **General:** Protect freshly placed concrete from premature drying and excessive cold or hot temperatures. Comply with the recommendations of ACI 306R for cold weather protection and ACI 306R for hot weather protection during curing.
- B. **Evaporation Control:** In hot, dry, and windy weather, protect concrete from rapid moisture loss before and during finishing operations with an evaporation-control material. Apply according to manufacturer's instructions after screeding and bull floating, but before floating.
- C. **Begin curing** after finishing concrete but not after free water has disappeared from concrete surface.
- D. **Curing Methods:** Cure concrete by moisture curing, moisture-retaining-cover curing, curing compound, or a combination of these as follows:
  - 1. **Moisture Curing:** Keep surfaces continuously moist for not less than 7 days with the following materials:
    - a. Water.
    - b. Continuous water-fog spray.
    - c. Absorptive cover, water saturated, and kept continuously wet. Cover concrete surfaces and edges with a 12-inch lap over adjacent absorptive covers.
  - 2. **Moisture-Retaining-Cover Curing:** Cover concrete surfaces with moisture-retaining cover for curing concrete, placed in widest practicable width, with sides and ends lapped at least 12 inches, and sealed by waterproof tape or adhesive. Immediately repair any holes or tears during curing period using cover material and waterproof tape.
  - 3. **Curing compound:** Apply uniformly in continuous operation by power spray or roller according to manufacturer's directions. Recoat areas subjected to heavy rainfall within 3 hours after initial application. Maintain continuity of coating and repair damage during curing period.

CLIMATIC REQUIREMENTS

WEATHER-RELATED TREATMENT

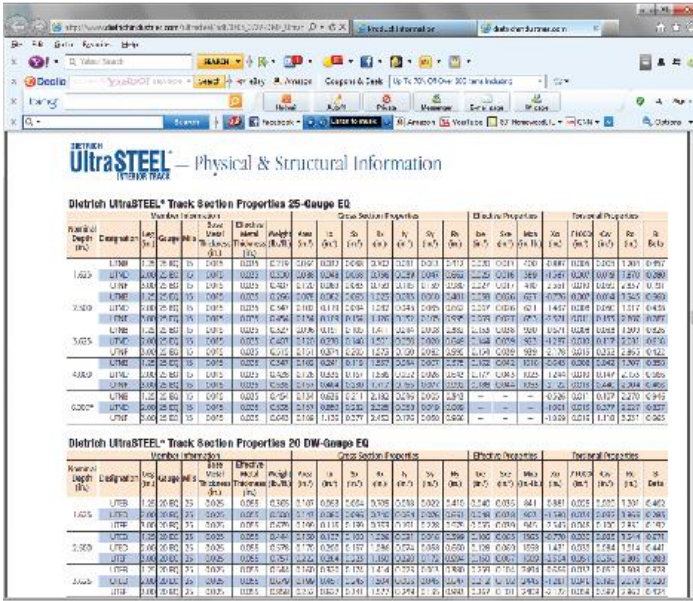


# Types of Costs In a Construction Estimate

- Direct Costs
  - Materials (Including Sales Tax)
  - **Labor**
  - Equipment
  - Subcontracts
  - Project Overhead
- Indirect Costs
  - Taxes and Insurance
  - Office Overhead
  - Profit



Websites of material and equipment suppliers provide information about the latest developments in construction materials.



The screenshot shows a web browser window displaying the UltraSTEEL website. The page title is "UltraSTEEL Physical & Structural Information". The main content area features two tables of technical data for track section properties.

**Table 1: Dietrich UltraSTEEL® Track Section Properties 25-Gauge EQ**

Nominal Depth (in.)	Designation	Mechanical Properties										Cross Section Properties										Flexural Properties					Torsional Properties				
		Yield (ksi)	Tensile (ksi)	Elong. (%)	Mod. (ksi-in.)	Wt. (lb/ft)	Area (in. <sup>2</sup> )	I <sub>x</sub> (in. <sup>4</sup> )	I <sub>y</sub> (in. <sup>4</sup> )	J (in. <sup>4</sup> )	R <sub>x</sub> (in.)	R <sub>y</sub> (in.)	S <sub>x</sub> (in. <sup>3</sup> )	S <sub>y</sub> (in. <sup>3</sup> )	Z <sub>x</sub> (in.)	Z <sub>y</sub> (in.)	X <sub>c</sub> (in.)	Y <sub>c</sub> (in.)	I <sub>p</sub> (in. <sup>4</sup> )	J <sub>c</sub> (in. <sup>4</sup> )	R <sub>p</sub> (in.)	R <sub>s</sub> (in.)	R <sub>x</sub> (in.)	R <sub>y</sub> (in.)							
1.625	UT5C	33.0	45.0	15	20000	0.023	0.328	2.038	0.248	0.038	0.032	0.142	0.021	0.172	2.281	0.021	0.06	0.084	0.028	0.025	1.301	0.997	0.297	0.200	0.019	0.010	0.009	0.010	0.009		
	UT5D	33.0	45.0	15	20000	0.023	0.328	2.038	0.248	0.038	0.032	0.142	0.021	0.172	2.281	0.021	0.06	0.084	0.028	0.025	1.301	0.997	0.297	0.200	0.019	0.010	0.009	0.010	0.009		
	UT5E	33.0	45.0	15	20000	0.023	0.328	2.038	0.248	0.038	0.032	0.142	0.021	0.172	2.281	0.021	0.06	0.084	0.028	0.025	1.301	0.997	0.297	0.200	0.019	0.010	0.009	0.010	0.009		
2.500	UT6D	33.0	45.0	15	20000	0.023	0.328	2.038	0.248	0.038	0.032	0.142	0.021	0.172	2.281	0.021	0.06	0.084	0.028	0.025	1.301	0.997	0.297	0.200	0.019	0.010	0.009	0.010	0.009		
	UT6E	33.0	45.0	15	20000	0.023	0.328	2.038	0.248	0.038	0.032	0.142	0.021	0.172	2.281	0.021	0.06	0.084	0.028	0.025	1.301	0.997	0.297	0.200	0.019	0.010	0.009	0.010	0.009		
	UT6F	33.0	45.0	15	20000	0.023	0.328	2.038	0.248	0.038	0.032	0.142	0.021	0.172	2.281	0.021	0.06	0.084	0.028	0.025	1.301	0.997	0.297	0.200	0.019	0.010	0.009	0.010	0.009		
3.000	UT7D	33.0	45.0	15	20000	0.023	0.328	2.038	0.248	0.038	0.032	0.142	0.021	0.172	2.281	0.021	0.06	0.084	0.028	0.025	1.301	0.997	0.297	0.200	0.019	0.010	0.009	0.010	0.009		
	UT7E	33.0	45.0	15	20000	0.023	0.328	2.038	0.248	0.038	0.032	0.142	0.021	0.172	2.281	0.021	0.06	0.084	0.028	0.025	1.301	0.997	0.297	0.200	0.019	0.010	0.009	0.010	0.009		
	UT7F	33.0	45.0	15	20000	0.023	0.328	2.038	0.248	0.038	0.032	0.142	0.021	0.172	2.281	0.021	0.06	0.084	0.028	0.025	1.301	0.997	0.297	0.200	0.019	0.010	0.009	0.010	0.009		
4.000	UT8D	33.0	45.0	15	20000	0.023	0.328	2.038	0.248	0.038	0.032	0.142	0.021	0.172	2.281	0.021	0.06	0.084	0.028	0.025	1.301	0.997	0.297	0.200	0.019	0.010	0.009	0.010	0.009		
	UT8E	33.0	45.0	15	20000	0.023	0.328	2.038	0.248	0.038	0.032	0.142	0.021	0.172	2.281	0.021	0.06	0.084	0.028	0.025	1.301	0.997	0.297	0.200	0.019	0.010	0.009	0.010	0.009		
	UT8F	33.0	45.0	15	20000	0.023	0.328	2.038	0.248	0.038	0.032	0.142	0.021	0.172	2.281	0.021	0.06	0.084	0.028	0.025	1.301	0.997	0.297	0.200	0.019	0.010	0.009	0.010	0.009		
6.000	UT9D	33.0	45.0	15	20000	0.023	0.328	2.038	0.248	0.038	0.032	0.142	0.021	0.172	2.281	0.021	0.06	0.084	0.028	0.025	1.301	0.997	0.297	0.200	0.019	0.010	0.009	0.010	0.009		
	UT9E	33.0	45.0	15	20000	0.023	0.328	2.038	0.248	0.038	0.032	0.142	0.021	0.172	2.281	0.021	0.06	0.084	0.028	0.025	1.301	0.997	0.297	0.200	0.019	0.010	0.009	0.010	0.009		
	UT9F	33.0	45.0	15	20000	0.023	0.328	2.038	0.248	0.038	0.032	0.142	0.021	0.172	2.281	0.021	0.06	0.084	0.028	0.025	1.301	0.997	0.297	0.200	0.019	0.010	0.009	0.010	0.009		

**Table 2: Dietrich UltraSTEEL® Track Section Properties 20 DW-Gauge EQ**

Nominal Depth (in.)	Designation	Mechanical Properties										Cross Section Properties										Flexural Properties					Torsional Properties				
		Yield (ksi)	Tensile (ksi)	Elong. (%)	Mod. (ksi-in.)	Wt. (lb/ft)	Area (in. <sup>2</sup> )	I <sub>x</sub> (in. <sup>4</sup> )	I <sub>y</sub> (in. <sup>4</sup> )	J (in. <sup>4</sup> )	R <sub>x</sub> (in.)	R <sub>y</sub> (in.)	S <sub>x</sub> (in. <sup>3</sup> )	S <sub>y</sub> (in. <sup>3</sup> )	Z <sub>x</sub> (in.)	Z <sub>y</sub> (in.)	X <sub>c</sub> (in.)	Y <sub>c</sub> (in.)	I <sub>p</sub> (in. <sup>4</sup> )	J <sub>c</sub> (in. <sup>4</sup> )	R <sub>p</sub> (in.)	R <sub>s</sub> (in.)	R <sub>x</sub> (in.)	R <sub>y</sub> (in.)							
1.000	UT5B	33.0	45.0	15	20000	0.023	0.328	2.038	0.248	0.038	0.032	0.142	0.021	0.172	2.281	0.021	0.06	0.084	0.028	0.025	1.301	0.997	0.297	0.200	0.019	0.010	0.009	0.010	0.009		
	UT5C	33.0	45.0	15	20000	0.023	0.328	2.038	0.248	0.038	0.032	0.142	0.021	0.172	2.281	0.021	0.06	0.084	0.028	0.025	1.301	0.997	0.297	0.200	0.019	0.010	0.009	0.010	0.009		
	UT5D	33.0	45.0	15	20000	0.023	0.328	2.038	0.248	0.038	0.032	0.142	0.021	0.172	2.281	0.021	0.06	0.084	0.028	0.025	1.301	0.997	0.297	0.200	0.019	0.010	0.009	0.010	0.009		
1.500	UT6B	33.0	45.0	15	20000	0.023	0.328	2.038	0.248	0.038	0.032	0.142	0.021	0.172	2.281	0.021	0.06	0.084	0.028	0.025	1.301	0.997	0.297	0.200	0.019	0.010	0.009	0.010	0.009		
	UT6C	33.0	45.0	15	20000	0.023	0.328	2.038	0.248	0.038	0.032	0.142	0.021	0.172	2.281	0.021	0.06	0.084	0.028	0.025	1.301	0.997	0.297	0.200	0.019	0.010	0.009	0.010	0.009		
	UT6D	33.0	45.0	15	20000	0.023	0.328	2.038	0.248	0.038	0.032	0.142	0.021	0.172	2.281	0.021	0.06	0.084	0.028	0.025	1.301	0.997	0.297	0.200	0.019	0.010	0.009	0.010	0.009		
2.500	UT7B	33.0	45.0	15	20000	0.023	0.328	2.038	0.248	0.038	0.032	0.142	0.021	0.172	2.281	0.021	0.06	0.084	0.028	0.025	1.301	0.997	0.297	0.200	0.019	0.010	0.009	0.010	0.009		
	UT7C	33.0	45.0	15	20000	0.023	0.328	2.038	0.248	0.038	0.032	0.142	0.021	0.172	2.281	0.021	0.06	0.084	0.028	0.025	1.301	0.997	0.297	0.200	0.019	0.010	0.009	0.010	0.009		
	UT7D	33.0	45.0	15	20000	0.023	0.328	2.038	0.248	0.038	0.032	0.142	0.021	0.172	2.281	0.021	0.06	0.084	0.028	0.025	1.301	0.997	0.297	0.200	0.019	0.010	0.009	0.010	0.009		
3.000	UT8B	33.0	45.0	15	20000	0.023	0.328	2.038	0.248	0.038	0.032	0.142	0.021	0.172	2.281	0.021	0.06	0.084	0.028	0.025	1.301	0.997	0.297	0.200	0.019	0.010	0.009	0.010	0.009		
	UT8C	33.0	45.0	15	20000	0.023	0.328	2.038	0.248	0.038	0.032	0.142	0.021	0.172	2.281	0.021	0.06	0.084	0.028	0.025	1.301	0.997	0.297	0.200	0.019	0.010	0.009	0.010	0.009		
	UT8D	33.0	45.0	15	20000	0.023	0.328	2.038	0.248	0.038	0.032	0.142	0.021	0.172	2.281	0.021	0.06	0.084	0.028	0.025	1.301	0.997	0.297	0.200	0.019	0.010	0.009	0.010	0.009		



Highly trained labor can reduce construction costs and time and improve the quality of the work.



Printed references contain charts that provide information covering material, equipment, and labor costs.

### Printed References

SWITCH AND RECEPTACLE PLATES					
Material	Craft @ Hr	Unit	Material	Labor	Total
Combination Decorator and Three Standard Switch Plates					
4 gang brown	L1 @ 0.20	Ea	5.62	6.77	12.39
4 gang ivory	L1 @ 0.20	Ea	5.62	6.77	12.39
4 gang white	L1 @ 0.20	Ea	5.62	6.77	12.39
Semi-Jumbo Switch Plates					
1 gang brown	L1 @ 0.05	Ea	1.15	1.69	2.84
1 gang ivory	L1 @ 0.05	Ea	1.03	1.69	2.72
1 gang white	L1 @ 0.05	Ea	1.15	1.69	2.84
1 gang gray	L1 @ 0.05	Ea	1.15	1.69	2.84
2 gang brown	L1 @ 0.10	Ea	2.55	3.39	5.94
2 gang ivory	L1 @ 0.10	Ea	2.55	3.39	5.94

PRE-ENGINEERED STEEL BUILDINGS*						
	Craft @ Hr	Unit	Material	Labor	Equipment	Total
<b>40' x 100' (4000 SF)</b>						
14' eave height	H5 @ 0.074	SF	3.83	3.42	1.02	8.27
16' eave height	H5 @ 0.081	SF	4.31	3.74	1.11	9.16
20' eave height	H5 @ 0.093	SF	4.87	4.29	1.28	10.44
<b>60' x 100' (6000 SF)</b>						
14' eave height	H5 @ 0.069	SF	3.72	3.19	0.95	7.86
16' eave height	H5 @ 0.071	SF	3.79	3.28	0.98	8.05
<b>80' x 100' (8000 SF)</b>						
14' eave height	H5 @ 0.065	SF	3.10	3.00	0.89	6.99
16' eave height	H5 @ 0.069	SF	3.28	3.19	0.95	7.42
20' eave height	H5 @ 0.074	SF	3.65	3.42	1.02	8.09
<b>100' x 200' (20,000 SF)</b>						
14' eave height	H5 @ 0.063	SF	3.02	2.19	0.87	6.80
16' eave height	H5 @ 0.066	SF	3.16	3.05	0.91	7.12
20' eave height	H5 @ 0.071	SF	3.40	3.28	0.98	7.66

\* 26 gauge colored galvanized steel roof and siding with 4 in 12 (20 lb live load) roof. Cost per square foot of floor area. Costs do not include foundation or floor slab. Add delivery cost to site. Equipment is a 15-ton truck crane and a 2-ton truck.



Reference tables and databases containing material, equipment, and labor costs can be purchased and integrated into various estimating software packages or spreadsheets.

Database Item

Phase: 2316.021      Esth/wic: Excav Foot/Misc  
Item: 20  
Description: Excavate Footing By Machine

Takeoff unit: cy      Formula: CY L x W x D / 27  
Waste factor: %      Crew:

Pricing    Rounding    Links    Subcategory

Category	Price	Date	Conversion/Productivity
Labor	20.000 / hr	12/1/2003	5.00000 cy / 1 hr
Equipment	36.000 / hour	12/1/2003	25.00000 cy / 1 ho

QUANTITY UNITS

PRICING

PRODUCTIVITY

Buttons: Add, Delete, Renumber, Edit, BOM, Price Code, Note...

Cancel    Help



In crew-based pricing, material and labor costs for items like concrete flatwork are calculated based on the square feet of work to be performed.



*Portland Cement Association*

## Labor Cost

Must figure both wage rate and worker productivity

- Wage Rate
  - Terms of Union Agreements
  - Overtime/Wage Premiums
- Worker Productivity
  - Worker Skill
  - Site Weather and Work Conditions
  - Job Schedule





# Total Burden – Per Working Hour

1 BASE RATE (ANNUAL / HOURLY)

\$ 85,000 \$ 40.87

<i>PAYROLL TAXES (EMPLOYER PAID)</i>		<i>LIMIT</i>	<i>%</i>	<i>AMOUNT</i>	<i>% BASE</i>
12	SUBTOTAL			\$ 3.33	8.16%
<i>LABOR-DRIVEN INSURANCES</i>		<i>WC CODE</i>	<i>%</i>		
15	SUBTOTAL			\$ 0.71	1.74%
<i>EMPLOYER PAID BENEFITS (ANNUAL BENEFIT VALUE / REGULAR HOURS LINE 8)</i>					
20	SUBTOTAL			\$ 14.09	34.48%
<i>OTHER LABOR-DRIVEN BURDENS</i>					
25	SUBTOTAL			\$ 8.64	21.14%
26	TOTAL BURDEN (Per Actual Working Hour)			\$ 26.77	65.52%
27	TOTAL BASE + BURDEN			\$ 67.64	

- If there are regular annual bonuses or production bonuses paid those should be included in the calculation
- **GOAL:** Get to an ACCURATE cost per working hour

## Productivity

- What is Productivity?

$$\text{Productivity} = \frac{\text{Production Output}}{\text{Resource Input}}$$

$$\text{Example: Productivity} = \frac{1\text{m}^3 \text{ of M25 concrete}}{\text{labor-hour}}$$



- Productivity Index =  $\frac{\text{Actual Productivity}}{\text{Planned Productivity}}$

$$\text{Example: Productivity Index} = \frac{1\text{m}^3 \text{ of M25 concrete per 1hr}}{2\text{m}^3 \text{ of M25 concrete per 1hr}} = 0.5$$

## Importance of Productivity (Continued...)

### Hypothetical Project

Head	Cost Component	Cost Component (%)
Labor	\$1,600,000	40%  45%
Materials	\$1,600,000	40%
Indirect Costs	\$400,000	10%
Overhead	\$200,000	5%
Profit	\$200,000	5%  0%
<b>Total</b>	<b>\$4,000,000</b>	<b>100%</b>

## Factors Affecting Productivity

<b>Absenteeism of Workers</b>	<b>Dilution of Supervision</b>
<b>Acceleration of Work</b>	<b>Disruption in Workflow</b>
<b>Weather Conditions</b>	<b>Concurrent Operations</b>
<b>Availability of Skilled Labor</b>	<b>Site Conditions</b>
<b>Changes/ Rework</b>	<b>Access to Work</b>
<b>Crowding</b>	<b>Overstaffing</b>
<b>Defective Tools and Machinery</b>	<b>Coordination Amongst Workers</b>
<b>Morale of Workers</b>	<b>QA/QC</b>

## Difficulties in Measuring Lost Productivity

- Unavailability of sufficient and accurate input and output data
- Lack of proof for cause
- Different methodologies for productivity loss calculations
- Failure to understand methodologies



# Tracking Your Productivity

1. Project Job Cost Accounting
2. Labor Daily Logs/ Time Sheets
  - Task Codes
  - Quantity Completed
  - Quality

**Objective:** To determine how much time is required on average by **YOUR** people to complete the **WORK** assigned with minimal call backs.





# TECHNICAL ASSISTANCE

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THANK YOU