



Civil Rights Division
Small Business Development Program
DBE Supportive Services

Presents

Managing The Profitable Business Webinar Series

Session 16

How to Cost and Profitably Price Construction Equipment

TYLER
Construction Engineers, P.C.



Civil Rights Division
Small Business Development Program



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Highway, Public Works & Infrastructure Contractor

Facilitator

Victor C. Tyler, P.E., M.ASCE, NSPE

Tyler Construction Engineers, P.C.

RoadBidTemplates.com



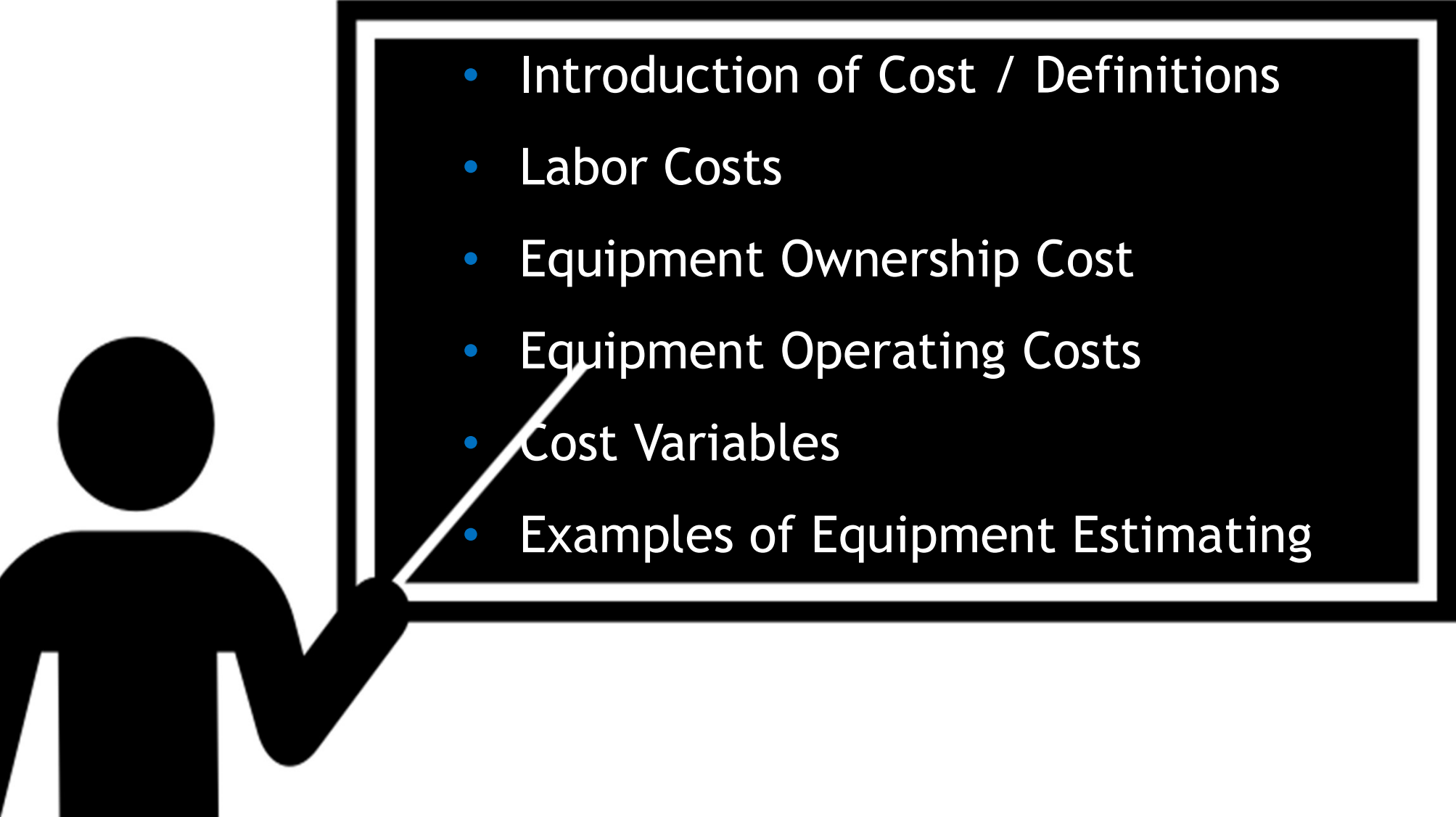
Labor & Equipment Cost Estimating

Accurately Cost & Price Your Jobs

Objective

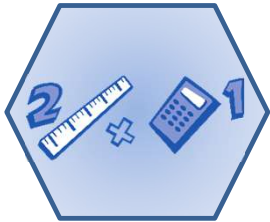
This estimating workshop guides you through an estimating procedure that will help you to better determine your equipment and trucking costs and make **more accurate** and **profitable** unit price bids.

Method presented will make you **excited again** about bidding on highway, public works and infrastructure construction jobs.

- 
- Introduction of Cost / Definitions
 - Labor Costs
 - Equipment Ownership Cost
 - Equipment Operating Costs
 - Cost Variables
 - Examples of Equipment Estimating

Project-based Business Workflow Infographic

Business
Workflow
Function



What

<ul style="list-style-type: none"> • Planning & Strategy • Relationship Building • Human Capital 	<ul style="list-style-type: none"> • Know Your Cost • Profit Planning • Human Capital 	<ul style="list-style-type: none"> • Customer Service • Project Controls • Human Capital 	<ul style="list-style-type: none"> • Accounting Policies • Invoicing • Human Capital 	<ul style="list-style-type: none"> • Working Capital/ Cash • Human Capital • Financial Analysis • Wealth Building
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Why

Finding the Right Work	Bidding the Right Work	Predictive Normalcy in Your Operations	Timely & Accurate Billing for Cash Flow	Improving Financial Performance
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2. Bidding / Proposal Development

Bid / No-Bid

- Project Experience
- Project Size
- Location
- Competitors
- Competitive Advantage
- Labor Availability / Expertise
- Owner's Reputation

Estimating

- **Labor**
- Materials
- **Equipment**
- Subcontractors/ Suppliers
- Other Direct Costs
- Overhead: Job & Home Office

Profit Plan

- **Bid Markups**
- Working Capital Required
- **Profit Determination**
- Bid Negotiation Plan
- Cash Flow Scheduling
- Bid Policies & Procedures

Construction Accounting

Know Your Numbers



... Accounting ^%@&*?!

Check with your accountant for actual annual costs recorded or consult with your equipment dealer for forecasted/most likely annual costs associated with your select piece of equipment..

Equipment Considerations

1. What does it costs?
2. What do I charge?
3. What if I own it?
4. How often do I replace it?



Why you need accurate equipment cost ...

1. Estimating construction costs
2. Negotiating a contract
3. Pricing a change order
4. Pricing a force account
5. Elevate equipment replacement



Construction equipment expenses can be a significant part of construction costs.

It is important to accurately **quantify and price** equipment when preparing an estimate for a job to ensure that the bid is both competitive and profitable.

Construction Job Costs

- Material
- Labor
- **Equipment**
- Subcontractor
- Other Direct Cost
- Job Overhead



“You cannot begin to accurately price your products or services without knowing your cost.”

To achieve consistent profits you must:

- ✓ know your costs*
- ✓ understand your costs*
- ✓ control your costs*
- ✓ track your costs, and then*
- ✓ repeat processes that are profitable!*



Equipment Types

Heavy Equipment Cost

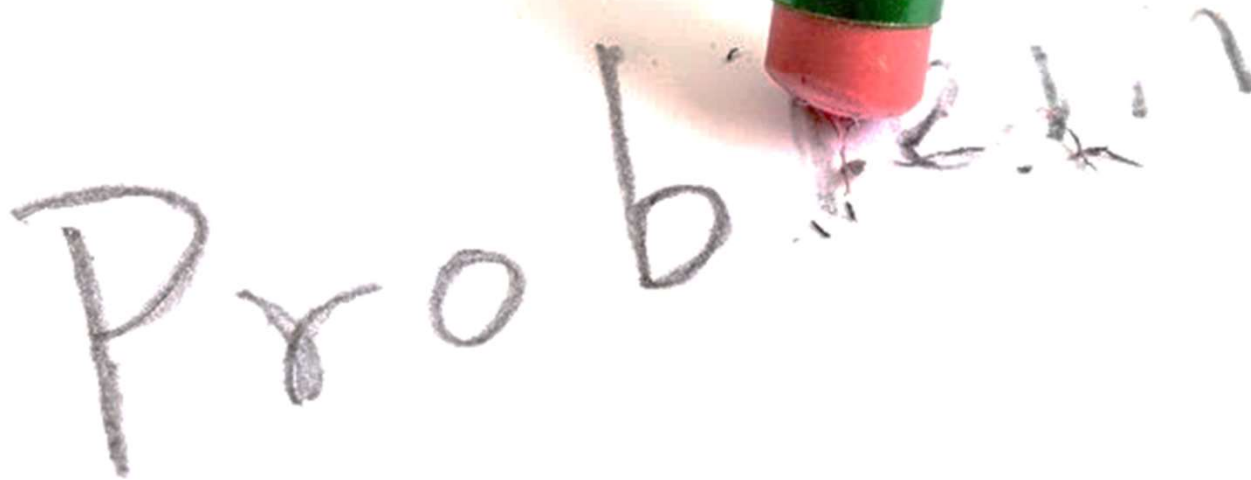
Fleet

Mid-size Equipment

Small Tools



Practice Problem #1 – Renting Equipment



Problem

EXAMPLE: Estimating Direct Rental Cost



A construction foreman **rents** a mini excavator at a rate of \$1,600.00 per week. The owner of the backhoe wants a payment for delivering the backhoe to and from the site at a rate of \$300.00. Reviewing past in-house records you found that operating this backhoe including fuel, oil, and lubricant expenses equaled a rate of \$4.00 per hour on average.

What is the hourly cost to rent and use this Backhoe for 8 hours per day for 2 weeks? Assume a 5-day work-week.

Calculating Owned Equipment Costs



Equipment Cost = Annual **Ownership** Cost + Annual **Operating** Costs

Hourly Costs = Annual Equipment Cost \div Operating Hours per year

The objective in developing equipment rates should be to arrive at a figure that, as nearly as possible, represents the cost of the work done under the operating conditions encountered and the accounting system in use.



The cost of owning and operating equipment will serve as the basis of equipment rates.

Our Goal for Equipment Pricing
is to Reach Full Cost Recovery

Thus, your top priority is to collect accurate job cost data from your accounting system.

Classification of Costs

The equipment rate is usually, but not always, divided into:

- **Ownership (Fixed) Cost** *(this cost do not stop when the work stops and must be spread over the hours of work during the year.)*
- **Operating Cost** *(Operating costs vary directly with the rate of work)*
- **Labor Cost** *(added separately labor may sometimes work different hours than the equipment)*

Ownership (Fixed) costs



- Equipment depreciation $D = (P' - S)/N$
- Interest The cost of using funds over a period of time. Investment funds may be borrowed or taken from savings or equity.
- Insurance The cost of using funds over a period of time. Investment funds may be borrowed or taken from savings or equity.
- Taxes Many equipment owners must pay property taxes or some type of usage tax on equipment.
- Permits Costs for equipment permits, even storage are fixed costs.

Operating costs

Operating costs, unlike fixed costs, change in proportion to hours of operation or use.

- Fuel
- Filters, Oil, and Grease (FOG)
- Wear parts
- Tire Replacement
- Maintenance & Repairs
- Operator's wage



Operating Costs

Preventive maintenance costs can be figured up front:

- oil and filter changes
- hydraulic oil, engine oil, engine coolant, and drive oil
- cab and engine air filters
- anticipated repair and PM hourly labor cost with your dealer.
- factor in any dealer PM service agreements and/or Telematics.

Operating Costs cont'd

Wear Parts items

- track replacement
- drive sprockets
- bucket teeth or cutting edges
- auger bits, broom bristles
- teeth on trenchers, cold planners and wheel saws
- undercarriage's idler/roller wheels



Practice Problem #2 - Ownership & Operating Costs



Estimating & Bidding Workshop Exercises

EQUIPMENT OWNERSHIP & OPERATION

DUMP TRUCK



Your company has just purchased a 3-axle, 16-cubic yard capacity, dump truck. The delivered price was \$105,000. The estimated useful life of the truck is five years. Determine the probable price per hour for owning and operating this truck. The following information is the manufacturer's data.

Manufacturer's Cost Data:

350 hp, diesel

Operating factor, 0.60

Engine consumes approx. 0.033 gal of fuel for each hp-hour

Fuel consumed per hour, $0.60 \times 350 \text{ hp} \times 0.033 \text{ gal / hp-hr} = 7.0 \text{ gal / hr}$

Oil and grease cost, 25% of fuel cost

Useful hours per year, 2,000 hr (10,000 hrs life of vehicle)

Life of tires, 5,000 hr

Repairs to tires, 15% of tire depreciation

Maintenance and Repair cost, 50% of depreciation

Interest, Taxes, and Insurance, 9.0 % depreciation



Cost to owner:

Delivered Price (total cost)	\$ 95,000
Less cost of tires (10 tires @ \$500 each)	<u>- 5,000</u>
Net value	\$ 90,000

Annual Ownership Cost:

Depreciation(Straight-line):	$90,000 \div 5\text{years} =$	\$ 18,000
Maintenance and repairs:	$50\% \times \$18,000 =$	9,000
Interest, Taxes, Insurance Expense:	$(9\% \times \$90,000)=$	<u>8,100</u>
Total annual fixed cost:		\$ 35,100



Hourly Cost:

$$\text{Fixed cost: } \$35,100 \div 2,000 \text{ hours} = \$ 17.55$$

Operating cost:

Tire Depreciation:	$\$ 5,000 / 5000 \text{ hrs} =$	\$ 1.00
Tire Repairs:	$15\% \times \$ 1.00 =$	0.15
Fuel Cost:	$7 \text{ gal/hour} \times \$ 2.50 =$	17.50
Oil and Lubricants:	$20\% \times \$17.50 =$	<u>3.50</u>
Total cost per hour, excluding labor :		\$ 39.70

Hourly Bid Rate



Based on information from the previous problem, the approximate hourly bid rate for this truck (based the manufacturers data) including cost for the truck driver, general and administrative expense, and profit.

Hourly Truck Ownership and Operating Cost	\$ 39.70
Truck Driver Base pay	12.00
Labor Burden, Worker Comp, Insurance @ 25.93 %	<u>3.11</u>
=	
	Subtotal: \$ 54.81
General & Administrative Expenses @ 7.81 %	<u>4.28</u>
	Subtotal: \$ 59.09
	Profit @ 5.0 % <u>2.95</u>
	Hourly Bid Rate: \$ 62.04

TRUCK HAULING RATE



The following example illustrates a method of determining probable cost of hauling excavated material offsite for disposal. This will be typical of a roadway/public works improvement projects.

Our task will be to calculate a truck haul rate in per load and per cubic yards.

Project Detail:

Based on review of the plans estimated quantity sheet and a site visit of the project you record the follow data:

- Hauling of common earth material
- Project site quantity: 20,000 CY
- One way haul distance: 11 miles
- City streets travel: 5 miles at an average speed of 35 miles per hour
- Highway travel: 6 miles at an average speed of 60 miles per hour
- Average Truck Loading time: 7 minutes
- Average Trucking Dumping (including waiting): 5 minutes
- Assume 50 minute production rate per 60 minute (refueling, repairs and driver breaks, etc.)
- Cubic yard per truck load: 14 cy
- Excavation contractor's plan production rate is 145 cy per hour
- Shift: 10 hour per day



2. Calculate Average Truck Speed:

$$[(5 \text{ miles} \times 35 \text{ mph}) + (6 \text{ miles} \times 60 \text{ mph})] \div 11 \text{ miles} = 48.6 \text{ mph}$$

3. Calculate Average Truck Road Travel Time:

$$11 \text{ miles} \div 48.6 \text{ mph} = 0.226 \text{ hours}$$

Or

$$0.226 \text{ hours} \times 60 \text{ minutes/hour} = 13.5 \text{ minutes}$$

4. Calculate Total Truck and Site Time:

Loading + Travel to Site + Dumping at site + Return Travel

$$7 + 13.5 + 5 + 13.5 = 39 \text{ minutes Haul Time / Round Trip}$$

5. Calculate number of round trip loads per (usable) hour per truck:

Assume: truck is productive 50 minutes out of every 60 minutes,

$$50 \text{ min. /hour} \div 39 \text{ min. /round trip/truck} = 1.28 \text{ round trip loads per hour}$$

6. Calculate Average loads per Day (10 hour-workday):

$$20,000 \text{ cy} \div 145 \text{ cy per hour} = 137.93 \text{ Total Hours}$$

$$\text{CY moved per day} = 145 \text{ cy per hour} \times 10 \text{ hour per day} = 1,450 \text{ cy per day}$$



7. Calculate numbers of trucks needed on job:

1.28 loads per hour x 10 hours per day x 14 cy = 179.2 cy per day per truck

Production of 1,450 cy per day \div 179.2 cy per day per truck = 8.09 Trucks

Use 8 trucks



Total Hauling Cost:

Truck hourly cost is taken from EQUIP OWN & OPER Calculator.

\$ 110.00 per hour x 8 Trucks x 137.93 hours = **\$ 121,378.40**

Cost per Cubic Yard:

\$ 121,378.40 \div 20,000 CY = **\$ 6.029 Per Cubic Yard**

Cost per Truck Load:

\$ 6.029 per cy x 14 cy per truck = **\$ 84.964 per load**

Use spreadsheet templates to
calculate your company's
internal equipment rental rates
for equipment you own/lease.



EQUIPMENT OWNERSHIP & OPERATING COST CALCULATOR

Equipment Description : **Tri-Axle Dump Truck (16 CY)**

NOTE: Shaded cells are calculated cells, all other cells are user inputs based on your equipment requirements.

Ownership Cost Per Hour	Your Data	Input Equipment
Operating Hours (per year)		2000.00
Tire/Track Lifetime (hours)		1800.00
Depreciation Time Frame (hours)		7.00
Equipment Purchase Price	\$	175,000.00
Salvage Value	\$	100,000.00
Depreciation Cost (year)	\$	10,714.29
Interest % Rate (year)		10.00%
Interest Cost	\$	17,500.00
Insurance Cost (year)	\$	12,000.00
Property Tax (per year)	\$	2,750.00
Ownership Cost (Annual)	\$	42,964.29



Ownership Cost Per Hour : \$ **21.48**

Operating Cost Per Hour	Your Data	Input Equipment
Fuel Cost (per gal)	\$	4.00
Fuel Consumption (gals per hour)		5.00
Fuel Cost (per year)	\$	40,000.00
Tire/ Track Cost (per set)	\$	8,900.00
Tire/ Track Cost (per year)	\$	9,888.89
Preventive Maint & Repair (per year)	\$	3,500.00
Operating Cost (Annual)	\$	53,388.89



Operating Cost Per Hour : \$ **26.69**

Total Owning & Operating Cost : \$ **48.18**

Operator Base Wage Rate Per Hour : \$ **25.00**

Company Overhead & Profit	Your Inputs
Benefits	30.00%
Home Office Overhead Rate	15.00%
Proposed Company Profit Rate	5.00%

Rate Per Hour : \$ **97.42**

TRUCKING HAUL RATE CALCULATOR

Location and to and from Haul : **10 mile haul from project location to dump site**

NOTE: Shaded cells are calculated cells, all other cells are user inputs based on your project equipment requirements.

Your Data (Input Your Project Values)

Estimated Values



Project Quantity (Tons or Cu Yd.)	20000.00	Unit	
Estimated Load Production	145.00	Unit/Hour	137.93 Total Production Hours
Hours / Shift	10.00	Hours	13.79 Total Shifts
			1450.00 Est. Units of Material Moved Per Shift
City Road Miles	5.00	Miles	
Highway Road Miles	6.00	Miles	
Average City Travel Speed	35.00	mph	
Average Highway Travel Speed	60.00	mph	
Average Loading Time	7.00	Minutes	
Average Dump Time	5.00	Minutes	39.1 Total Time - Round Trip (mins)
Useable Minutes per Hour	50.00	Minutes	1.28 Round Trip Loads / Hour / Truck
Haul Capacity (Tons or Cu. Yd.)	14.00	Units	1428.57 Total Truck Loads
Recommended Number of Trucks :	8.00	Trucks	8.11 Estimated Number of Trucks Required (Calculated)
			1103.45 Total Truck Hours
			31428.57 Total Truck Miles Traveled
	\$	100.00	Input Your Loaded Truck & Driver Hourly Rate
	\$	110,344.83	Calculated Total Haul Quote
	\$	77.24	Calculated Material Haul Rate Per Truck Load
	\$	5.52	Calculated Material Haul Rate Per Unit Measure
	\$	3.51	Calculated Haul Rate Per Mile

COMPANY OWNED EQUIPMENT RENTAL RATES

Equipment Profit Center Concept

Total Maint & Repairs	Total Insur & Interest	Total Fuel
\$ 60,000	\$ 25,000	\$ 75,000
800	Avg. Hours used	
7	years average useful life	

Profit Markup
40.0%

Description	Model	Date Acquired	Cost	Ownership Hourly Rate	Maintenance Hourly Rate	interest Hourly Rate	Fuel Hourly Rate	Base Rate per Hour	Markup	Company Rental Rate
<u>HEAVY DUTY TRUCKS</u>										
2010 Dump	VH22	1/2/2010	\$ 120,000.00	21.43	12.69	5.29	15.87	55.28	22.11	\$ 77.40
2005 Dump		1/2/2005	\$ 90,000.00	16.07	9.52	3.97	11.90	41.46	16.58	\$ 58.00
<u>EQUIPMENT</u>										
2007 Loader/ Backhoe		11/18/2007	\$ 70,000.00	12.50	7.40	3.09	9.26	32.25	12.90	\$ 45.10
2007 Dozer / Crawler		12/4/2008	\$ 110,000.00	19.64	11.64	4.85	14.55	50.67	20.27	\$ 70.90
2006 Compactor		12/4/2006	\$ 55,000.00	9.82	5.82	2.42	7.27	25.34	10.13	\$ 35.50
2005 Trackhoe		10/5/2005	\$ 180,000.00	32.14	19.04	7.93	23.80	82.92	33.17	\$116.10
2005 Motorgrader		12/16/2005	\$ 75,000.00	13.39	7.93	3.31	9.92	34.55	13.82	\$ 48.40
2002 Farm Tractor		4/20/2002	\$ 9,000.00	1.61	0.95	0.40	1.19	4.15	1.66	\$ 5.80
Total Cost of Equipment:			\$ 709,000.00							

POP

QUIZ!

Why Should You Perform These Exercises?



- Less money left on the table
- Getting more of the work that your company does well
- Change Orders or claims are more profitable
- Performance is more easily measured
- Better able to repeat the profitable results
- To determine what amount to bill
- Financial performance (banker, surety, etc.)

Any Questions?



Managing The Profitable Business Webinar Series

~~**Session 12: Markup, Overhead & Profit (*Bidding*)**~~

~~Wednesday, January 10, 2024, 10 am (CT)~~

~~**Session 13: Introduction to Developing Your Indirect Cost Rates for Consultants**~~

~~Wednesday, January 17, 2024, 10 am (CT).~~

~~**Session 14: Have You Completed Your Planning for the New Year**~~

~~Wednesday, Wednesday, January 24, 2024, 10 am (CT)~~

~~**Session 15: Developing A Strategic Business Action Plan**~~

~~Wednesday, January 31, 2024, 10 am (CT)~~

~~**Session 16: Dump Truck & Equipment Pricing (*Bidding*)**~~

~~Wednesday, February 7, 2024, 10 am (CT)~~

Session 17: Pre & Post Award and Contract Close-out Preparation

Facilitator: **Gerry George, Relevant Workforce, Inc**

Wednesday, February 14, 2024, 10 am (CT)

Session 18: Small Business Taxes: What to Expect in 2024

Facilitator: **Jay B Mercer, EA, J. Mercer & Associates, Inc.**

Wednesday, February 21, 2024, 10 am (CT)

Session 19: Proven Steps to Increase Bonding Capacity for Government and Commercial Contracts

Facilitator: **Chris Smith, Senior Surety Broker & Advisor
Anderson & Catania**

Wednesday, February 28, 2023, 10 am (CT)

Session 20: Wrap Up: Ask the Experts Roundtable

Wednesday, March 6, 2024, 10 am (CT)



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