



0

1 DIVISION 0:

Introduction and Calibration Factors, includes the following:

General introduction and retrofit and repair considerations.

Location (Calibration) Factors - International values compared to Washington D.C. (Base of 1.00). Calibrations in this application are used to adjust the unit prices / schedule of rates depicted in the following Divisions 1 – 17.

188 # International Cities Location / Calibration Factors.

General Conversion Values - Imperial to Metric Units.

Import Duties General Sales Tax / Value. Added Tax / Consumption Tax.

284 # USA Location (Calibration) Factors.

Detailed Design / Engineering / Architectural and CM Fees 51 # Facility Types.

Union Labor Costs.

USA and Canada State & Province Sales Tax / GST.

Inflation Cost Indexes.

(16) Calibration Tables

Examples

00

49 DIVISION 00:

Cost Models / Cost Benchmarks (24 Number)

includes cost and quantity data on the following:

Retrofit – Upgrade Isotope / Radiation – Chemo Therapy Formulation Suite.

Retrofit and upgrade 333 # Apartments.

UK (Scotland) Facility - Refurbish existing laboratory in existing manufacturing campus.

Major Construction Activities.

Estimating Assessment Sheet.

Petro – Chemical Cost Model.

High Rise Apartment Building Cost Model.

Beverage / Candy Production Facility Cost Model.

Consumer Products Facility.

Crude Oil Distillation Complex.

EPCM Home Office Billing Rate Sheet

Power Station Cost Model.

Steel Production Cost Model.

Waste Water Treatment Cost Model.
78 # Engineering / Construction Cost Benchmarks.
Class A Office Building
UK Pharmaceutical Facility
Vaccine Facility Expansion and Modification
Food and Beverage Production Facilities
Refurbishment of Shopping Center
Revamp of Shale Gas Facility
Pet Food Production Facility
Office Admin. Building
Rural Highway and Bridge Upgrade

01

99

DIVISION 01:

**General Requirements / General Conditions / Preliminaries:
includes cost data on the following:**

Rules of thumb
Insurance Costs
Protection of Completed Work
Scaffolding
Temporary Utilities, Structures & Fences
Permits
Testing / Inspection
Surveys
Bonds
Site Staff / Field Personnel
Construction Equipment Costs / Rental
Temporary Construction Items

02

131

DIVISION 02:

Site Construction: includes schedule of rates for:

Demolition (including asbestos)
Excavation
Rock removal
Hardcore / Stone
Shoring
Planking & Strutting / Sheet Piling
Foundation Piling
Utilities
Miscellaneous Site Improvements

Paving
Concrete Curbing
Fencing
Site Lighting
Marine Work
Underground Storage Tanks

03

159

DIVISION 03

Concrete Work: includes schedule of rates for:

Concrete
Formwork
Reinforcement
Precast Concrete
Grouting

04

193

DIVISION 04

Masonry: includes schedule of rates for:

Brickwork
Masonry
Refractory

05

209

DIVISION 05

Metals: includes schedule of rates for:

Structural Steel
Metal Joists
Metal Framing
Miscellaneous Iron
Metal Decking

06

233

DIVISION 06

Wood and Plastics: includes schedule of rates for:

Rough Carpentry
Finish Carpentry
Carpentry Specialties

07

- 247 **DIVISION 07**
Thermal and Moisture Protection: includes schedule of rates for:
Damp proofing and Waterproofing
Thermal Protection
Roofing Systems
Caulking & Sealants

08

- 269 **DIVISION 08**
Doors and Windows: includes schedule of rates for:
Wood and Plastic Doors
Metal Doors and Frames
Windows
Glazing / Glazed Curtain Walls
Hardware

09

- 285 **DIVISION 09**
Finishes: includes schedule of rates for:
Plaster and Gypsum Board
Tile
Terrazzo
Ceilings
Flooring
Wall Finishes
Acoustical Treatment
Painting and Coatings
Other items

10

- 305 **DIVISION 10**
Specialties: includes schedule of rates for:
Visual Display Boards
Compartments and Cubicles
Louvers and Vents
Wall and Corner Guards
Miscellaneous Facility Specialties

11

- 315** **DIVISION 11**
Equipment: includes schedule of rates for:
Maintenance Equipment
Loading Dock Equipment
Industrial and Process Equipment
Laboratory Equipment
Material Handling Equipment

12

- 333** **DIVISION 12**
Furnishings: includes schedule of rates for:
Furniture
Manufactured Casework

13

- 343** **DIVISION 13**
Special Construction: includes schedule of rates for:
Pre-Engineered Buildings & Structures
Radiation Protection
Storage Tanks
Security Access and Surveillance

14

- 357** **DIVISION 14**
Conveying Systems: includes schedule of rates for:
Elevators
Escalators and Moving Walks
Hoists and Cranes

15

- 373** **DIVISION 15**
Mechanical Work: includes schedule of rates for:
 - Building Services Piping
 - Plumbing Fixtures
 - Process Piping
 - Fire Protection Piping
 - Heating, Ventilating & Air Conditioning Equipment
 - Ductwork
 - Insulation

16

- 481** **DIVISION 16**
Electrical Work: includes schedule of rates for:
 - Electrical Equipment / Transformers
 - Cable / Control wire
 - Conduit
 - Cable tray
 - Communications
 - Instrumentation and Controls

17

- 533** **DIVISION 17**
Process Equipment / Major Equipment: includes schedule of rates for:
 - Agitators
 - Air Handlers
 - Boilers
 - Chillers
 - Compressors
 - Condensers
 - Conveyors
 - Cooling Towers
 - Ductwork
 - Heat Exchangers
 - Pumps
 - Tanks

- 587** **ABOUT THE FIRM**

Table 1

CSI DIVISION #	DESCRIPTION
0*	Introduction and Calibration Factors
00*	Cost Models / Cost Benchmarks
1	General Requirements / General Conditions / Preliminaries
2	Site Construction
3	Concrete Work
4	Masonry / Brickwork
5	Structural Steel - Metals - Platforms
6	Wood and Plastics
7	Thermal and Moisture Protection – Roofing Systems
8	Doors, Windows and Glazing
9	Finishes
10	Specialties – Louvers – Minor Facility items
11	Equipment (Facility – Minor items)
12	Furnishings
13	Special Construction Pre Engineered Buildings – Storage Tanks – Security items
14	Conveying Systems / Elevators / O-H Cranes
15	Mechanical - Piping – HVAC Systems
16	Electrical – Instrumentation Systems
17*	Process Equipment – Major Equipment
	* Not a specified / typical CSI Division:

average less than 25 miles – adjust values for distances exceeding 25 miles), unionized labor, construction equipment, workers compensation insurance, burdens and benefits, overhead and profit (we have utilized a value of between 5% – 10% for profit – i.e. 7.5%). The basic premise for these unit prices / schedule of rates is that the construction project is above \$0.25 million in value and a 40 hour work week is utilized, using a unionized labor force or specialized union sub-contractors.

The Retrofit, Repair or Maintenance Construction unit costs depicted in this publication are based on 100+ industrial and commercial construction projects valued between \$0.25 million – \$150 million that were completed between the period 2001 and 2022; the unit prices / schedule of rates have been calibrated to the Washington DC area and are applicable for 2023 (the mid point of 2023 to be exact).

The Retrofit, Repair or Maintenance Construction unit prices of the various division items are displayed in five columns:

(1) Unit or Unit of Measure (UOM) Column:

this column states the unit of measure the cost estimating data is based upon, i.e. Square Feet (SF), Lineal Feet (LF), or Cubic Yards (CY) see list of abbreviations for specific units of measure.

(2) Materials Column. This column contains the material cost(s) for each item that is appropriate for each line item. They are based on what a General Contractor or / Specialty Sub-Contractor will purchase this material(s) for - delivered to the construction site. The unit cost(s) includes delivery to the site, state sale taxes were appropriate for the USA, off-loading the material at site and any temporary storage or protection, 1%- 2.75% breakage of material or damage in transit, a profit mark-up to the contractor furnished materials - we have used a value of between 4.5% and 8.5% (this is dependent on workload and market activity). We have assumed good size quantities – a full truck load of bricks, a full truck load of ready mixed concrete. We have recognized that we will have waste, typically 1.25% to 3.25%, we have

Table #4

IMPORT DUTIES GENERAL SALES TAX / VALUE ADDED TAX / CONSUMPTION TAX

COUNTRY	DUTIES ON IMPORTED EQUIPMENT & MATERIALS	GENERAL SALES TAX / VALUE ADDED TAX / CONSUMPTION TAX	GENERAL NOTES
Afghanistan	In the order of 2.5% - 35%	2% - 10% Sales tax	Refer to Government website for additional information: 5% tax on fuel
Akrotiri	In the order of 1% - 10%	9%	Refer to Government website for additional information: Cyprus / UK possession
Albania	In the order of 1% - 12% of CIF value	20%	Refer to Govt website for additional info
Algeria	In the order of 1% - 15%	7% and 19%	Refer to Govt website for additional info
Andorra	In the order of 1% - 10%	4.5%	Refer to Govt website for additional info
Angola	In the order of 2.5% - 12%	14%	Refer to Govt website for additional info
Antigua & Barbuda	In the order of 1% - 10%	15%	Refer to Govt website for additional info
Argentina	In the order of 1% - 17%	21%	Refer to Govt website for additional info
Armenia	In the order of 1% - 10%	20%	Refer to Govt website for additional info
Ashmore & Cartier Islands	In the order of 0.5% - 10%	10%	Refer to Govt website for additional info
Australia	In the order of 2.5% - 17.5%	10% GST	Refer to Govt website for additional info
Austria	In the order of 2.5% - 20% of CIF value	20%	Refer to Govt website for additional info
Azerbaijan	In the order of 0% - 10%	18%	Refer to Govt website for additional info
Bahamas	In the order of 0% - 10%	8%	Refer to Govt website for additional info
Bahrain	In the order of 0% - 10%	5%	Refer to Govt website for additional info
Bangladesh	In the order of 0% - 10%	15%	Refer to Govt website for additional info
Barbados	In the order of 0% - 10%	15%	Refer to Govt website for additional info
Belarus	In the order of 10% - 50%	10% and 20%	Refer to Govt website for additional info
Belgium	In the order of 2.5% - 20%	21%	Refer to Govt website for additional info
Belize	In the order of 0% - 10%	12.5% VAT / GST	Refer to Govt website for additional info
Benin	In the order of 0% - 10%	18%	Refer to Govt website for additional info
Bermuda	In the order of 0% - 10%	zero	Refer to Govt website for additional info
Bhutan	In the order of 0% - 10%	10% and 15%	Refer to Government website for additional information: Sales tax
Bolivia	In the order of 0% - 10% of CIF value	10% and 13% (14.94% effective rate)	Refer to Govt website for additional info
Bosnia & Herzegovina	In the order of 0% - 10%	17%	Refer to Govt website for additional info
Botswana	In the order of 0% - 10%	12%	Refer to Govt website for additional info
Brazil	In the order of 0% - 35% Aver 17.5%	12% to 25% 1CMS / IPI Aver 17% 19% in Rio de Janerio	IPI / ICMS similar to VAT: Refer to Govt website for additional info
Bulgaria	In the order of 2.5% - 50%	7% and 20%	Refer to Govt website for additional info
Burkina Faso	In the order of 0% - 10%	18%	Refer to Govt website for additional info
Burundi	In the order of 0% - 10%	17%	Refer to Govt website for additional info
Cameroon	In the order of 0% - 10%	19.25%	Refer to Govt website for additional info
Cambodia	In the order of 0% - 10%	10%	Refer to Govt website for additional info

CONSTRUCTION CATEGORY	QTY	U/M	MATERIAL	HOURS	\$ RATE	LABOR	TOTAL
CONTINUED							
Owner travel / expenses.							87,740
Sales tax 5.5%							1,518,500
BAR Insurance / Bonds.							238,600
Owner Start up assistance / commissioning.							174,300
Early Engineering studies.							570,000
Other Project Related Costs Sub Total							4,546,840
Total Project Cost							56,744,404

NOTES:

A. Field Labor unskilled rate = \$29.85 x 1.68% \$50.15 Laborer.

B. Field Labor semi-skilled rates = \$35.80 x 1.68% \$60.14 Painters / Insulation workers.

C. Field Labor skilled rates = \$41.75 x 1.68% \$70.14 Millwrights / Pipefitters / Electricians.

68% = Fringes, WCI, FICA, Unemployment Insurance, OH & P.

Contingency / Escalation pro -rated and included above.

(11) HOME OFFICE - ENGINEERING, PROCUREMENT AND CONSTRUCTION (EPC):

Typical Hourly Rates: Charged to Owners by EPC firms working on major US domestic and overseas Refinery / Chemical / Manufacturing CAPEX Projects - ranging in value from \$25 million - \$500+ million. (Note these are 2023 bill-out rates for US based staff, CAD machine costs are not included in rates. Xerox copies, express mail, long distance telephone calls are not included in rates and would be additional to the rates indicated below (this value could range between \$4.50 - \$7.50). Rates include salaries

of staff, fringe benefits, and rent or leasing costs of office accommodation, electricity, heating / air conditioning, maintaining office (cleaning); support staff such a HR department / security services, the rates include a profit margin of 7.5% - 10% (Note these rates correspond to a multiplier of 1.8 - 2.6 of W2 salaries). The day rates are based on 8 hours per day, many projects work 5 -10 hour days and 4 -10 hour days the following week, for an average of 45 hours per week; adjust day rates if this is the situation.

Table 11

#	STAFFING DESCRIPTION / CLASSIFICATION	MINIMUM MAN-HOUR HOURLY / RATE IN US \$	MINIMUM DAY RATE IN US \$	MAXIMUM MAN-HOUR HOURLY / RATE IN US \$	MAXIMUM DAY RATE IN US \$
1	Project Director / Project Manager	\$211	\$1,685	\$296	\$2,366
2	Deputy Project Director / Project Manager	\$195	\$1,564	\$266	\$2,128
3	Engineering Manager	\$195	\$1,564	\$259	\$2,070
4	Business Manager (Contracts / Procurement / Project Controls / Administration)	\$195	\$1,564	\$259	\$2,070
5	Deputy Business Manager	\$187	\$1,499	\$229	\$1,832
6	Lead Discipline Engineer*	\$168	\$1,340	\$215	\$1,717
7	Senior Discipline Engineer*	\$154	\$1,229	\$199	\$1,593
8	Discipline Engineer*	\$140	\$1,117	\$179	\$1,431
9	Project Controls Manager	\$182	\$1,452	\$223	\$1,784

(24) RURAL HIGHWAY US SOUTH EAST LOCATION 1.98 MILES IN LENGTH - 2023 COST BASIS:& EXTEND EXISTING BRIDGE OVER NEW HIGHWAY:

- Convert existing 2 lane undivided highway 12’ wide each direction complete with 60” wide paved breakdown / bike lane on each shoulder:
- New scope includes 2 # 12’ wide road lanes complete with 72” wide paved breakdown / bike lanes on each shoulder & 18’ wide median drainage swale:

- Scope includes: Milling & removal of exiting asphalt, augment existing stone / sub-base, stabilization, sediment barrier, clearing & grubbing, excavation, new asphalt paving, manholes, concrete catch pits, miscellaneous concrete foundations & pads, concrete pipe, corrugated pipe, fencing, turf, seeding, roadway striping painting, all necessary roadway signs & tie-into existing road system.

Table 24

#	DESCRIPTION	TOTAL \$ COST	\$ COST PER MILE	\$ COST PER KM
1	Total Construction Cost for 1.98 miles	\$9,222,235	\$4,657,694	\$2,892,978
2	Design / Engineering	\$276,667	\$139,731	\$86,789
3	Inspection Services	\$96,865	\$48,922	\$30,386
4	TOTAL COST	\$9,595,767	\$4,846,347	\$3,010,153
5	Low cost range -20%	\$7,676,614	\$3,877,078	\$2,408,123
6	High cost range + 20%	\$11,514,920	\$5,815,616	\$3,612,184

2023 - Division 1 - General Requirements / Preliminaries - Union Site	Unit	Factor # 1 Material Uplift M+5 (1.05)	Factor # 1 Labor Uplift L+30 (1.30)	Factor # 1 CE Uplift	Total Factor # 1	Factor # 2 Material Uplift M+20 (1.20)	Factor # 2 Labor Uplift L+65 (1.65)	Factor # 2 CE Uplift	Total Factor # 2
83 Trade Foreman	MONTH		8,479		8,479		9,115		9,115
84 Civil Engineer / Field Engineer	MONTH		8,753		8,753		9,409		9,409
85 Cost Engineer / Estimator / Planner	MONTH		9,163		9,163		9,850		9,850
86 Purchaser / Expediter	MONTH		7,932		7,932		8,527		8,527
87 Office Engineer / QA - QC Engineer	MONTH		11,761		11,761		12,644		12,644
88 Field Inspector	MONTH		9,163		9,163		9,850		9,850
89 Safety Manager	MONTH		7,795		7,795		8,380		8,380
90 General Laborer / Runner / Clean up	MONTH		3,501		3,501		3,764		3,764
91 Security / Watchman	MONTH		4,787		4,787		5,146		5,146
92 Administrator / Secretary / Document Control	MONTH		4,103		4,103		4,411		4,411
Equipment Mob - Demob Travel and set up costs (On to Site - Off Site) - 2 Events Order of Magnitude Costs									
93 Bulldozer / Scraper / Front End Loader (Minimum)	EACH			363	363			391	391
94 Bulldozer / Scraper / Front End Loader (Maximum)	EACH			965	965			1,038	1,038
95 Back Hoe / JCB (Minimum)	EACH			141	141			151	151
96 Back Hoe / JCB (Maximum)	EACH			353	353			380	380
97 Crane 100 Ton Crawler (Minimum)	EACH			4,072	4,072			4,378	4,378
98 Crane 100 Ton Crawler (Maximum)	EACH			10,120	10,120			10,879	10,879
99 Tower Crane 250' high (Minimum)	EACH			20,256	20,256			21,776	21,776
100 Tower Crane 250' high (Maximum)	EACH			34,101	34,101			36,659	36,659
101 500 Ton Heavy Lift Crane (Minimum)	EACH			36,067	36,067			38,772	38,772
102 500 Ton Heavy Lift Crane (Maximum)	EACH			95,991	95,991			103,191	103,191
Construction Equipment / Plant Hire (excludes fueling and maintenance)									
103 0.5 Ton Pickup truck	HOUR		Excl Oper	8.91	8.91		Excl Oper	8.91	8.91
104 1 Ton Pickup truck	HOUR		Excl Oper	12.21	12.21		Excl Oper	12.21	12.21
105 1.5 Ton Flatbed truck	HOUR		Excl Oper	20.93	20.93		Excl Oper	20.93	20.93

2023 - Division 3 - Concrete - Union Site		Unit	Factor # 1 Material Uplift M+5 (1.05)	Factor # 1 Labor Uplift L+30 (1.30)	Factor # 1 CE Uplift	Total Factor # 1	Factor # 2 Material Uplift M+20 (1.20)	Factor # 2 Labor Uplift L+65 (1.65)	Factor # 2 CE Uplift	Total Factor # 2
225	Elevated Pan / Waffle Concrete work with 150 - 250 pounds of rebar per CY (Minimum)	CY		69.02	32.24	101.26		87.60	40.92	128.53
226	Slab on grade 6" thick (Maximum)	CY		35.15	7.38	42.53		44.62	9.37	53.99
227	Slab on grade 6" thick (Minimum)	CY		25.51	5.36	30.87		32.38	6.80	39.18
228	18" dia and square columns (Maximum)	CY		57.45	22.16	79.61		72.92	28.13	101.04
229	18" dia and square columns (Minimum)	CY		39.09	15.08	54.17		49.61	19.14	68.75
230	Elevated beams highly reinforced (Maximum)	CY		77.25	32.12	109.37		98.05	40.76	138.82
231	Elevated beams highly reinforced (Minimum)	CY		53.87	22.40	76.27		68.38	28.43	96.80
Excavation & Backfill Foundations (remove surplus to onsite spoil heap)										
232	Ground beams n/e 5' deep	CY	3.59	20.99	3.15	27.72	4.10	26.64	4.00	34.73
233	Ground beams n/e 10' deep	CY	3.91	23.59	3.54	31.04	4.47	29.94	4.49	38.90
234	Ground beams n/e 15' deep	CY	4.06	25.69	3.85	33.60	4.64	32.60	4.89	42.13
235	Spread footings / trenching n/e 5' deep	CY	3.80	23.42	3.51	30.73	4.34	29.73	4.46	38.53
236	Spread footings / trenching n/e 10' deep	CY	3.77	29.83	4.47	38.07	4.31	37.86	5.68	47.84
237	Isolated foundations, n/e 5' deep	CY	5.31	22.08	3.31	30.70	6.06	28.03	4.20	38.29
238	Isolated foundations, n/e 10' deep	CY	5.31	26.34	3.95	35.60	6.06	33.44	5.02	44.51
239	Isolated foundations, n/e 15' deep	CY	6.19	31.68	4.75	42.63	7.08	40.21	6.03	53.32
240	Backfill by machine & consolidate	CY	5.74	34.05	5.11	44.90	6.56	43.22	6.48	56.27
241	Backfill by hand / machine & consolidate	CY	5.74	41.02	6.15	52.92	6.56	52.07	7.81	66.44
242	Pea gravel / stone 1/2" - 3/4" under concrete slab	CY	33.85	52.65	7.90	94.40	38.69	66.83	10.02	115.54
243	Pea gravel / stone 1/2" - 3/4" under concrete slab in quantities less than 100 CY	CY	36.51	74.64	11.20	122.35	41.73	94.73	14.21	150.67
244	Crushed stone delivered to site and deposited in heaps (note 1 CY = 1.375 Ton - Maximum)	CY		71.68		71.68		89.76	0.00	89.76

2023 Division 17 - Major Equipment:										
Union	Unit	Factor # 1 Material Uplift M+5 (1.05)	Factor # 1 Labor Uplift L+30 (1.30)	Factor # 1 CE Uplift	Total Factor # 1	Factor # 2 Material Uplift M+20 (1.20)	Factor # 2 Labor Uplift L+65 (1.65)	Factor # 2 CE Uplift	Total Factor # 2	
211	Compressor hermetic 5 Ton c/w controls and electrical / piping hook up	EACH	2,582.65	311.74	20.11	2,914.51	2,962.71	395.67	25.53	3,363.91
212	Compressor hermetic 10 Ton c/w controls and electrical / piping hook up	EACH	4,837.93	583.97	37.68	5,459.57	5,549.86	741.19	47.82	6,338.86
213	Compressor hermetic 25 Ton c/w controls and electrical / piping hook up	EACH	11,669.23	1,408.54	90.87	13,168.64	13,386.42	1,787.77	115.34	15,289.53
214	Compressor hermetic 50 Ton c/w controls and electrical / piping hook up	EACH	21,330.53	2,574.72	166.11	24,071.36	24,469.45	3,267.91	210.83	27,948.20
Condensers										
215	Condenser - refrig / air cooled - 25 Ton c/w controls and electrical / piping hook ups - excludes foundations and incomming piping and electrical services	EACH	9,949.36	1,200.95	77.48	11,227.79	11,413.47	1,524.28	98.34	13,036.09
216	Condenser - refrig / air cooled - 50 Ton c/w controls and electrical / piping hook ups - excludes foundations and incomming piping and electrical services	EACH	18,664.13	2,252.87	145.35	21,062.35	21,410.67	2,859.41	184.48	24,454.56
217	Condenser - refrig / air cooled - 100 Ton c/w controls and electrical / piping hook ups - excludes foundations and incomming piping and electrical services	EACH	35,512.68	4,286.59	276.56	40,075.83	40,738.59	5,440.67	351.01	46,530.27
218	Condenser - refrig / air cooled - 250 Ton c/w controls and electrical / piping hook ups - excludes foundations and incomming piping and electrical services	EACH	78,215.05	9,441.01	609.10	88,265.16	89,724.87	11,982.83	773.09	102,480.79