



## 0

### 01 INTRODUCTION AND CALIBRATION FACTORS

Includes the following:

- The Estimating Process.
- 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.
- 280 # USA Location (Calibration) Factors.
- Detailed Design / Engineering / Architectural and CM Fees 51 # Facility Types.
- Merit Shop Labor Costs.
- USA and Canada State & Province Sales Tax / GST.
- Inflation Cost Indexes.

## 00

### 27 COST MODELS / COST BENCHMARKS

Includes cost and quantity data on the following:

- Highways / Roads
- Bridges / Overpasses
- Tunnels / Underground Transit
- Railway Benchmarks
- Airports / EPC Metrics
- Home Office Engineering Costs
- General Civil related Benchmarks

# 1

## 61 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

# 2

## 85 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

- 115**      **3**  
**CONCRETE WORK**  
includes schedule of rates for:
- Concrete
  - Formwork
  - Reinforcement
  - Precast Concrete
  - Grouting

- 145**      **4**  
**MASONRY**  
Includes schedule of rates for:
- Brickwork / Masonry

- 159**      **5**  
**METALS**  
Includes schedule of rates for:
- Structural Steel
  - Metal Joists
  - Metal Framing
  - Miscellaneous Iron
  - Metal Decking

- 169**      **6**  
**WOOD AND PLASTICS**  
Includes schedule of rates for:
- Rough Carpentry
  - Finish Carpentry
  - Carpentry Specialties

SAMPLE

## 7

### 175 THERMAL AND MOISTURE PROTECTION

includes schedule of rates for:

- Concrete
- Formwork
- Reinforcement
- Precast Concrete
- Grouting

## 8

### 175 DOORS AND WINDOWS

Includes schedule of rates for:

- Wood and Plastic Doors
- Metal Doors and Frames
- Windows / Glazing

## 9

### 181 FINISHES

Includes schedule of rates for:

- Painting and Coatings

185

## 10

### SPECIALTIES

Includes schedule of rates for:

- Miscellaneous Facility Specialties

SAMPLE

## 11

### 189 **EQUIPMENT**

Includes schedule of rates for:

- Maintenance Equipment
- Loading Dock Equipment
- Industrial and Process Equipment
- Laboratory Equipment
- Material Handling Equipment

## 12

### 191 **FURNISHINGS**

Includes schedule of rates for:

- Furniture
- Manufactured Items

## 13

### 193 **SPECIAL CONSTRUCTION**

Includes schedule of rates for:

- Pre-Engineered Buildings & Structures
- Radiation Protection
- Storage Tanks
- Security Access and Surveillance

197

## 14

### **CONVEYING SYSTEMS**

Includes schedule of rates for:

- Elevators
- Escalators and Moving Walks
- Hoists and Cranes

## 15

### 205 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

### 235 ELECTRICAL WORK

Includes schedule of rates for:

- Electrical Equipment / Transformers
- Cable / Control wire
- Conduit / Cable tray
- Communications
- Instrumentation and Controls
- Traffic Control

### 263 ABOUT THE FIRM

## DETAILED DESIGN / CIVIL ENGINEERING AND CONSTRUCTION MANAGEMENT FEES (D.D.C.E & C.M.)

The tables below are representative D.D.C.E and C.M. percentage fees by project size, for professional services, these fees include Civil, Structural, Utility Services, together with drafting / CAD and H.O. usual reports, the percentages indicated include EPC / Construction Management services. D.D.C.E and C.M. fees may possibly fluctuate from those indicated depending on the following notes 1 –10 listed below.

These percentages exclude Front End Studies, Owner Engineering, Owner Project Management / Owner Construction Management services. Home Office Procurement, Home Office Project Control activities (this could range from 0.25% – 1.00% for a full blown project control effort during the EPC effort). The C.M. percentages include site purchasing and site cost control / planning.

## GENERAL NOTES / CONSIDERATIONS:

**When selecting the appropriate Detailed Design / Civil Engineering / Construction Management value or percentage.**

1. Type and size of project (a complex project would trend towards higher percentage values).
2. Local or Federal Government contracts (Complex Contracts together with rigid Terms and Conditions) would trend towards mid to higher percentage values.
3. Repeat work could tend to optimize percentage values indicated below.
4. Location: (Domestic or Foreign) - distance from various Home Office(s) could have an impact on the selected percentages indicated for items such as travel cost / temporary lodging and associated expenses.
5. Revamp / Upgrade / Alteration work could translate into more detailed design activities, depending on availability of current / existing facility drawings.

## Detailed Design / Civil Engineering and Construction Management Fees

### BY PROJECT SIZE

#	D.D.C.E. & C. M. SERVICES INFRASTRUCTURE TYPE FACILITIES	TOTAL INSTALLED COST (TIC) \$5 - \$450 MILLION + PERCENTAGE OF TIC RANGE
<b>INFRASTRUCTURE - CIVIL PROJECTS</b>		
1	Airport runways and utilities	7% - 11%
2	Railway trackwork (passenger & freight).	5.5% - 10.5%
3	Railway / Subway passenger station	7% - 9.5%
4	Electrical transmission system.	7% - 11%
5	Bridge (rail or vehicle).	6% - 11.5%
6	Major Road (excludes bridges).	5.5% - 8.5%
7	Tunnel	6% - 10.5%
8	Jetty / Wharf 500' – 1,000' with rail, loading cranes and oil, water and electrical supplies / services.	7% - 12%
9	Port Facility	6% - 9%
10	For Re-vamp / Upgrade / Alteration applications consider adding possibly 20% - 50% to new work percentage value.	
11	<b>CONSTRUCTION MGMT* on above facilities.</b>	<b>5.5% - 8.5%</b>

## (G) New 7.3 Mile Highway c/w 6' central divide: US – MID WEST 2023 COST BASIS:

#	DESCRIPTION	QTY	UOM	\$ COST/ MILE	\$ COST TOTAL	REMARKS
1	Construction Cost of highway described above per mile	7.3	Mile	3,466,550	25,305,815	9" Stone & 2.75" Asphalt paving / wearing course
2	Roundabout tie-in to existing road system	1	Each	278,500	278,500	
3	Signs / Road markings	7.3	Mile	65,200	475,960	
4	Re-route existing utilities	1	Each	173,530	173,530	
5	Engineering / Detailed Design	7.3	Mile	232,100	1,694,330	5.9% of construction cost
6	Construction Management	7.3	Mile	83,440	609,112	2.1% of construction cost
7	Inspection Services	7.3	Mile	48,340	352,882	1.2% of construction cost
8	<b>TOTAL COST</b>	<b>7.3</b>	<b>MILE</b>	<b>4,297,690</b>	<b>28,890,129</b>	
Accuracy +/- 20%						

## (H) 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.

## (H) Rural Highway US South East Location 1.98 MILES IN LENGTH - 2023 COST BASIS: & EXTEND EXISTING BRIDGE OVER NEW HIGHWAY:

#	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	<b>TOTAL COST</b>	<b>\$9,595,767</b>	<b>\$4,846,347</b>	<b>\$3,010,153</b>
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



## (B) Rail Road Engineering & Construction Cost Benchmarks

### USA LOCATION - 2023 COST BASIS:

#	NEW RAIL ROAD COSTS:	\$ LOW COST PER MILE	\$ HIGH COST PER MILE	\$ LOW COST PER KM	\$ HIGH COST PER KM
1	High speed single track on new stone rail road stone bed	1,929,950	2,196,150	1,206,219	1,372,594
2	High speed single track on existing stone rail road stone bed	1,530,650	1,796,850	956,657	1,123,032
3	High speed double track on new stone rail road stone bed	2,795,100	3,194,400	1,746,938	1,996,500
4	High speed double track on existing stone rail road stone bed	2,662,000	3,061,300	1,663,750	1,913,313
5	Install a Centralized traffic control system - single track	299,475	366,025	187,169	228,769
6	Install a Centralized traffic control system - double track	432,575	499,125	270,375	311,969
<b>7</b>	<b>TRACK REPAIRS / IMPROVEMENTS</b>				
8	25% replace timber railroad ties & stone	266,200	399,300	166,375	249,563
9	50% replace timber railroad ties & stone	399,300	532,400	249,563	332,750
10	75% replace timber railroad ties & stone	532,400	665,500	332,750	415,938
11	25% replace PCC railroad ties & stone	332,750	465,850	207,969	291,157
12	50% replace PCC railroad ties & stone	465,850	598,950	291,157	374,344
13	75% replace PCC railroad ties & stone	598,950	732,050	374,344	457,532
14	Chain link fencing 8' high (includes both sides)	199,650	266,200	124,782	166,375
<b>15</b>	<b>INDIVIDUAL ITEMS</b>				
16	High speed turnout - Each	732,050	1,026,988		
17	Freight / Passenger siding 1 to 2.5 miles in length - Each	1,996,500	4,144,250		
18	Signals - Each	3,570	10,698		
19	Crossing barrier / gate - Each	13,310	27,225		
20	Road bed stone ballast 1" to 1.50" cost per ton (supply only) - Ton	36.58	51.15		
21	Rail 100 pound LF (supply only) - Lin Ft	40.10	47.58		
22	Pre-Cast Concrete (PCC) ties, 8'6" long x 15" wide x 10" deep -each (supply only) - Each	223.85	284.35		
23	Timber rail road ties, pressured treated 8'6" x 8" x 6" (supply only) - each	89.95	119.35		
24	Tie plates - each (supply only)	13.05	17.33		
25	Track bolts - each (supply only)	4.29	6.33		
26	Rail spikes - each (supply only)	1.27	1.76		
27	Rail stop - each (supply only)	1,150	1,815		
28	Resurface & re-align existing single line track - LF	23.38	34.27		
29	Siding switch controller c/w cable & conduit	38,880	51,535		

## (C) General Benchmarks

TO BE REVIEWED AND ADDED TO THE PREVIOUS COST MODELS IF APPROPRIATE

#	DESCRIPTION	RANGE	COMMENTS
1	Fringe Benefits (vacations, holidays & sick days)	22% - 30% of base wage rate	
2	Worker Compensation Insurance	10% - 17.5% of base wage rate	
3	Inspections / QA-QC services	0.35% - 1.05% of TIC	Total Installed Cost (TIC)
4	Front End Studies / Scoping study / BOD	0.5 - 2.25% of TIC	Total Installed Cost (TIC)
5	Builders all risk insurance (BAR)	0.15% - 0.60%	Total Installed Cost (TIC)
6	Contractors O/H (Supporting construction / field activities)	4.50% - 15.00%	The larger the TIC value of the project, the lower the % typically is.
7	Profit	3.5% - 12.5%	Typically on a \$20 million new infrastructure a profit margin between 5% - 8.5% can be realized dependent on economic climate and number of bidders - 5 + or more bidders generally translates to lower profit margins.
8	Performance Bond	0.25% - 1.25% of TIC	Total Installed Cost (TIC)
9	Procurement activities	0.50% - 1.00% of TIC	Purchase orders, contracts & administration
10	Engineering support	0.50% - 0.75% of TIC	Field questions & answers to RFI
11	H.O & Site Based Project Controls	0.50% - 1.25% of TIC	Estimating, cost engineering and planning activities
12	General Conditions / Preliminaries	5% - 8% of TIC	Total Installed Cost (TIC)
13	Small Tools	1.5% - 5% of Direct - S/C Labor	Hand tools / typically valued less than \$100 per item Typically \$2.50 - \$4.00 per add-on to construction man-hour rate
14	Consumables	1.25% - 3.5% of Direct - S/C Labor	(Gasses, welding rods, grease, etc.)
15	Temporary Services	0.75% - 1.50% of Direct - S/C Labor	
16	Field Supervision	2.5% - 12.5% of Direct - S/C Labor	
17	Construction Equipment	2% - 7% of Direct - or S/C Labor	
18	Protection materials	0.20% - 0.40% of Direct or S/C Labor	Tarpaulins / temporary screens / worker rain gear.

	<b>2023 Division 1 - General Requirements / Preliminaries - Merit Shop Labor</b>	<b>Unit</b>	<b>Material</b>	<b>Labor</b>	<b>Construction Equipment</b>	<b>Total</b>
11	Utilities, Mechanical, Electrical and Plumbing (MEP) will typically range between 10% - 20%	%				10 - 20 of above
12	Construction Management Fees will typically range between 40% - 60% of above Civil related fees	%				40 - 60 of above
	<b>Project Overhead (Home Office Support, i.e. - Estimating, Accounting, Procurement, Payroll, Safety Audits, Office Rent and Utilities) - review tables in Division 0 &amp; 00 for additional</b>					
	<b>\$1 million project</b>					
13	Minimum - Maximum percentage of total project cost	%				7.5 - 20
14	Average percentage of total project cost	%				12
	<b>\$1 - \$5 million project</b>					
15	Minimum - Maximum percentage of total project cost	%				7.5 - 15
16	Average percentage of total project cost	%				10
	<b>\$5 - \$50 million project</b>					
17	Minimum - Maximum percentage of total project cost	%				4 - 10
18	Average percentage of total project cost	%				6.5
	<b>\$50 - \$500 million project</b>					
19	Minimum - Maximum percentage of total project cost	%				4 - 8
20	Average percentage of total project cost	%				4.5
	<b>Profit \$1 million project</b>					
21	Minimum - Maximum percentage of total project cost	%				7.5 - 20
22	Average percentage of total project cost	%				15
	<b>Profit \$1 - \$5 million project</b>					
23	Minimum - Maximum percentage of total project cost	%				7.5 - 15
24	Average percentage of total project cost	%				12.5
	<b>Profit \$5 - \$50 million project</b>					
25	Minimum - Maximum percentage of total project cost	%				5 - 8
26	Average percentage of total project cost	%				6.5
	<b>Profit \$50 - \$500 million project</b>					

	2023 Division 15 - Mechanical Work - Merit Shop	Unit of Measure	Material	Labor	Construction Equipment	Total
430	Ditto 4" dia	EACH	17.50	45.31	3.68	66.48
431	Ditto 6" dia	EACH	51.90	75.52	6.13	133.55
432	PVC sch 40 - 45 degree elbow white with socket joints 1/2" dia	EACH	0.80	19.82	1.61	22.24
433	Ditto 3/4" dia	EACH	1.20	19.82	1.61	22.64
434	Ditto 1" dia	EACH	1.42	19.82	1.61	22.85
435	Ditto 2" dia	EACH	2.41	28.95	2.35	33.71
436	Ditto 4" dia	EACH	22.61	45.31	3.68	71.59
437	Ditto 6" dia	EACH	56.18	75.52	6.13	137.83
438	PVC sch 40 - Tee white with socket joints 1/2" dia	EACH	0.59	28.32	2.30	31.21
439	Ditto 3/4" dia	EACH	0.68	28.32	2.30	31.30
440	Ditto 1" dia	EACH	1.36	35.56	2.89	39.81
441	Ditto 2" dia	EACH	3.56	44.68	3.63	51.87
442	Ditto 4" dia	EACH	30.63	62.30	5.06	97.99
443	Ditto 6" dia	EACH	82.93	129.01	10.47	222.42
444	PVC sch 40 - Coupling white with socket joints 1/2" dia	EACH	0.35	19.82	1.61	21.78
445	Ditto 3/4" dia	EACH	0.45	19.82	1.61	21.89
446	Ditto 1" dia	EACH	0.83	25.49	2.07	28.39
447	Ditto 2" dia	EACH	1.77	30.84	2.50	35.11
448	Ditto 4" dia	EACH	8.61	50.34	4.09	63.05
449	Ditto 6" dia	EACH	27.82	75.52	6.13	109.47
450	PVC / DWV sch 40 - 90 degree bend 2" dia	EACH	4.31	32.72	2.66	39.69
451	Ditto 4" dia	EACH	22.20	45.31	3.68	71.19
452	Ditto 6" dia	EACH	51.90	61.04	4.96	117.90
453	HDPE 90 degree elbow 2" dia	EACH	8.29	19.82	1.61	29.73
454	Ditto 3" diameter	EACH	17.12	26.43	2.15	45.70
455	Ditto 4" diameter	EACH	23.01	35.24	2.86	61.11
456	Ditto 6" diameter	EACH	51.63	45.31	3.68	100.62
457	Piping / Victaulic coupling - 2" dia	EACH	24.58	19.82	1.27	45.67
458	Ditto 3" dia	EACH	33.23	19.82	1.27	54.33
459	Ditto 4" dia	EACH	46.81	19.82	1.27	67.90
460	Ditto 6" dia	EACH	81.23	26.27	1.68	109.18
461	Ditto 8" dia	EACH	127.98	26.27	1.68	155.94
462	Ditto 10" dia	EACH	195.98	37.76	2.42	236.16
463	Ditto 12" dia	EACH	223.97	37.76	2.42	264.15
464	Pipe CPVC - 1/2" diameter includes fittings and hangars, excludes valves and painting (Minimum - Outside Battery Limits - assume high percentage of straight runs)	LF	8.10	53.33	3.37	64.79