



# 2024 PIPELINES & OFFSHORE COST DATA



# 1

## SECTION 1:

- 1** Introduction, General Comments and Calibration Factors:  
includes the following:  
Location (Calibration) Factors - International values compared to USA Gulf Coast. (Base of 1.00). Calibrations in this application are used to adjust the benchmark prices depicted in the following SECTIONS (1 thru 700).  
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# Major Equipment & Process Equipment

**Table 1**
**AERATOR CS, SS 304 IMPELLER C/W FIBERGLASS FLOAT, INCLUDES ELECTRIC MOTOR**

HP	\$ COST EQUIPMENT	INSTALLATION MAN HOURS	\$ COST PER HP
5.0	10,639	18	2,128
10.0	13,726	22	1,373
25.0	19,018	28	761
50.0	35,247	34	705

**Table 2**
**AGITATOR TOP ENTRY - IMPELLER, ATMOSPHERIC CS**

HP	\$ EQUIPMENT COST	\$ COST PER HP	\$ COST TO SET (EXCLUDES CIVIL, PIPING & ELECTRICAL WORK)
0.5	6,205	12,411	5% to 8% of Equipment Cost
1	10,252	10,252	5% to 8% of Equipment Cost
2	16,591	8,296	5% to 8% of Equipment Cost
3	19,289	7,716	5% to 8% of Equipment Cost
5	31,430	6,286	5% to 8% of Equipment Cost
8	41,681	5,558	5% to 8% of Equipment Cost
10	50,989	5,099	5% to 8% of Equipment Cost
13	59,622	4,770	5% to 8% of Equipment Cost
15	67,849	4,523	5% to 8% of Equipment Cost
20	82,957	4,148	5% to 8% of Equipment Cost
25	96,986	3,879	5% to 8% of Equipment Cost

**Table 3**
**AGITATOR TOP ENTRY - IMPELLER, ATMOSPHERIC SS 304**

HP	\$ EQUIPMENT COST	\$ COST PER HP	\$ COST TO SET (EXCLUDES CIVIL, PIPING & ELECTRICAL WORK)
0.5	7,606	15,212	5% to 8% of Equipment Cost
1	12,292	12,292	5% to 8% of Equipment Cost
2	19,966	9,983	5% to 8% of Equipment Cost
2.5	23,362	9,345	5% to 8% of Equipment Cost
5	38,030	7,606	5% to 8% of Equipment Cost
7.5	50,390	6,719	5% to 8% of Equipment Cost
10	61,663	6,166	5% to 8% of Equipment Cost
12.5	72,122	5,770	5% to 8% of Equipment Cost
15	81,901	5,460	5% to 8% of Equipment Cost
20	100,237	5,012	5% to 8% of Equipment Cost
25	117,214	4,689	5% to 8% of Equipment Cost

**Table 21****CENTRIFUGE SEPARATOR CS, ERECTED EXCLUDES CIVIL COSTS**

DIAMETER	\$ EQUIPMENT COST	\$ LABOR	\$ CONSTRUCTION EQUIPMENT	\$ TOTAL
12"	9,050	595	40	9,686
18"	13,625	895	61	14,580
24"	18,058	1,187	81	19,325
30"	22,548	1,482	100	24,129
36"	26,883	1,767	120	28,770

**Table 22****CENTRIFUGE SEPARATOR SS 304, ERECTED EXCLUDES CIVIL COSTS**

DIAMETER	\$ EQUIPMENT COST	\$ LABOR	\$ CONSTRUCTION EQUIPMENT	\$ TOTAL
12"	14,297	952	63	15,312
18"	21,424	1,428	94	22,946
24"	28,607	1,908	126	30,641
30"	35,748	2,383	157	38,288
36"	42,834	2,855	190	45,880

**Table 23****CHILLER CS (PACKAGED) ERECTED EXCLUDES CIVIL WORK**

TON	\$ EQUIPMENT COST	\$ LABOR	\$ CONSTRUCTION EQUIPMENT	\$ TOTAL
25	26,025	6,277	412	32,714
50	37,093	7,981	525	45,598
75	54,543	9,352	614	64,509
100	67,589	11,136	731	79,456
150	108,773	14,079	925	123,776

**Table 24****CLASSIFIER SIMPLEX CS, ERECTED EXCLUDES CIVIL WORK COSTS**

DIAMETER	\$ EQUIPMENT COST	\$ LABOR	\$ CONSTRUCTION EQUIPMENT	\$ TOTAL
30"	63,038	4,230	275	67,542
36"	90,613	6,082	396	97,091
42"	123,022	8,256	537	131,814
48"	160,030	10,629	699	171,359

**Table 25****CLASSIFIER DUPLEX CS, ERECTED EXCLUDES CIVIL WORK COSTS**

DIAMETER	\$ EQUIPMENT COST	\$ LABOR	\$ CONSTRUCTION EQUIPMENT	\$ TOTAL
30"	100,105	6,738	439	107,283
36"	138,970	9,354	608	148,932
42"	183,775	12,368	804	196,948
48"	231,904	15,608	1,017	248,529

**Table 35****COMPRESSOR CENTRIFUGAL**

HORSE POWER	TRANSPORTATION WEIGHT, LBS	\$ COST PER UNIT	MAN-HOURS TO INSTALL	MAN-HOURS PER HP	\$ COST PER HP
250	11,500	198,426	72	0.29	794
500	17,250	248,032	92	0.18	496
750	28,750	297,638	104	0.14	397
1,000	40,250	386,115	124	0.12	386
1,500	51,750	572,679	148	0.10	382

**Table 36****CONDENSER (PACKAGED - WATER COOLED REFRIGERATION)**

TONS	\$ MATERIAL	\$ LABOR	\$ CONSTRUCTION EQUIPMENT	\$ TOTAL	\$ COST PER TON
25	35,118	3,931	347	39,395	1,576
50	48,551	6,175	544	55,269	1,105
75	63,559	9,102	802	73,462	979
100	74,305	11,861	1,046	87,212	872

**Table 37****CONVEYOR 150' - 250' LONG, OPEN BELT 30" WIDE, 20 DEGREE INCLINE, 200 FPM, INCLUDES ALL STEEL SUPPORTS, MOTORS / DRIVES. EXCLUDES CIVIL AND ELECTRICAL HOOK UP**

SIZE / RATING	\$ MATERIAL / EQUIPMENT FOR 150'	INSTALLATION MAN-HOURS PER LF	\$ MATERIAL / EQUIPMENT FOR 250'	INSTALLATION MAN-HOURS PER LF
Minimum	96,436	0.65 - 0.80	155,510	0.65 - 0.80
Maximum	114,896	0.80 - 1.10	174,615	0.80 - 1.10

**Table 38****CONVEYOR - SCREW TYPE 100' - 200' LONG, CS 18" DI, 10 DEGREE INCLINE, 50 TPH, INCLUDES ALL STEEL SUPPORTS, MOTORS / DRIVES. EXCLUDES CIVIL AND ELECTRICAL HOOK UP**

SIZE / RATING	\$ MATERIAL / EQUIPMENT FOR 100'	INSTALLATION MAN-HOURS PER LF	\$ MATERIAL / EQUIPMENT FOR 200'	INSTALLATION MAN-HOURS PER LF
Minimum	30,740	0.65 - 0.80	57,132	0.65 - 0.80
Maximum	39,860	0.80 - 1.10	74,696	0.80 - 1.10

# Insulation

## Insulation

### DATA TABLE

#	DESCRIPTION	U OF M	MATERIAL	LABOR	C.E.	TOTAL
1	For work between 12' and 25' add 2.5% - 5% to labor and construct Equipment					
2	For work between 25' and 50' add 5% - 8% to labor and construct Equipment					
3	For work between 50' and 100' add 8% - 15% to labor and construct Equipment					
4	Add an additional 3 LF / 1 M to quantity take-off for each fitting and flanged joint	N/A				
5	Equipment insulation 2" calcium silicate with 1/2" thick cement on wire mesh (Maximum)	SF	12.04	28.80	2.34	43.18
6	Equipment insulation 2" calcium silicate with 1/2" thick cement on wire mesh (Minimum)	SF	7.22	16.47	1.34	25.02
7	Insulation 1 1/2 " thick calcium silicate with sail cloth glossed finish to various equipment	SF	6.83	12.35	1.00	20.19
8	Ditto 2" thick	SF	10.61	13.82	1.12	25.55
9	Ditto 3" thick	SF	13.48	16.47	1.34	31.29
10	2" thick Cal-sil to equipment no cover	SF	5.38	0.25 m-h		5.38
11	Ditto 2.50" thick ditto	SF	6.27	0.30 m-h		6.27
12	Ditto 3" thick ditto	SF	6.86	0.35 m-h		6.86
13	Ditto 3.50" thick ditto	SF	8.04	0.37 m-h		8.04
14	Ditto 4" thick ditto	SF	9.96	0.40 m-h		9.96
15	Ditto 5" thick ditto	SF	13.06	0.42 m-h		13.06
16	Ditto 6" thick ditto	SF	16.23	0.46 m-h		16.23
17	Fiber Glass steam pipe insulation 1" thick for 1" dia steel pipe, c/w factory applied alum jacket with white smooth textile reinforced vapor retarder	LF	2.88	0.05 - 0.08 m-h		2.88
18	Ditto 1.5" dia	LF	3.87	0.05 - 0.09 m-h		3.87
19	Ditto 2" dia	LF	4.22	0.05 - 0.10 m-h		4.22
20	Ditto 3" dia	LF	5.12	0.07 - 0.11 m-h		5.12
21	Ditto 4" dia	LF	6.86	0.08 - 0.12 m-h		6.86
22	Ditto 6" dia	LF	8.51	0.09 - 0.13 m-h		8.51
23	Rigid - pre-formed fiberglass steel pipe insulation, 1" thick to 1" dia steel pipe, no jacket	LF	1.42	0.06 - 0.08 m-h		1.42
24	Ditto 2" dia	LF	2.18	0.06 - 0.08 m-h		2.18
25	Ditto 4" dia	LF	3.27	0.06 - 0.10 m-h		3.27
26	Ditto 6" dia	LF	5.37	0.06 - 0.10 m-h		5.37
27	Elastomeric steel pipe insulation, 1" thick to 1" dia pipe	LF	3.93	0.06 - 0.08 m-h		3.93
28	Ditto 2" dia	LF	7.41	0.06 - 0.08 m-h		7.41
29	Fiberglass duct insulation c/w foil backing (batt) 1" thick	SF	1.65	0.07 - 0.10 m-h		1.65



# Offshore and Onshore Construction Cost Data / Benchmarks

**T**he following data portrays Offshore & Onshore Construction cost data specific to the construction / fabrication of Steel Jacketed Platforms, Modules, Pre-Assemblies, Topside Structures, Concrete Gravity Base Structures (GBS), Tension Leg Platform (TLP), Floating Production, Single Point Moorings (SPM), Storage and Offloading Systems (FPSO) and similar facilities.

The cost data is primarily applicable to offshore facilities / installations even though reference is made to onshore construction / fabrication activities also.

This cost data is best used at the front end / early stages of a project(s) lifecycle or a tool to check contractor's budget submissions or cost estimates.

The historical cost estimating database is based on a dozen or more projects worldwide projects that have been executed within the last five years.

It is a well-known fact that the weight of an offshore platform's topsides (i.e. modules and pre-assemblies) influences the total finances of the project being considered.

Engineering and fabricating the topside scope in a way that reduces the number of modules and pre-assemblies needed, that translates into less topside weight is an established methodology to reduce high-priced offshore fabrication work, integration / hookup and commissioning of the new offshore facility. There is a new class of heavy lift ocean going vessels / cranes that can perform lifts

of over 10,000 Tons; usually we see modules / pre-assemblies weighing between 250 and 2,500 Tons. The consensus in the industry is that the larger the module / pre-assembly tonnage will typically optimize the integration / hookup and commissioning activities need at the offshore location.

Topsides (modules and pre-assemblies) for the most part are constructed / fabricated onshore in shipyards or in fabrication facilities with access to a river or the ocean. Once they have been "built" they are rolled out or lifted onto special barges and towed to the offshore platform location and then lifted into position, next to or on top of another module, this integration or joining modules and pre-assemblies together

is known in the trade as "hook-up" work. The hook-up work is extremely expensive compared to work performed on shore, this is because the pipefitters, ironworkers, welders, electrician and other construction workers have to be transported offshore perhaps 50 or 500 miles, productivity suffers significantly, logistics are a challenge, transportation costs are expensive (helicopters or special work boats), the hook-up workforce may need to be housed in a floatel (an offshore accommodation ship or barge) for a couple of weeks or longer.

## OFFSHORE PRODUCTION FACILITY FABRICATION / MODULE COSTS

Structural steel construction and the related fabrication man-hours and subsequent costs for the offshore oil and gas production facilities fluctuate

*This cost data is best used at the front end / early stages of a project(s) lifecycle or a tool to check contractor's budget submissions or cost estimates.*

#	DESCRIPTION	\$ MIN. COST PER DAY	\$ MAX. COST PER DAY	REMARKS
<b>CONTINUED</b>				
44	Derrick Barge c/w 45 to 55 person crew, 8 point mooring system, 750 ton main lift crane & a 50 ton supplemental crane	\$363,111	\$478,240	
45	Remotely operated vessel (ROV) c/w 10 to 15 person crew	\$59,827	\$93,285	
46	Drillship less than 1,000' water depth	\$191,483	\$279,385	
47	Drillship 1,000' to 2,500' water depth	\$331,315	\$571,070	
48	Semi-submersible n/e 1,500' water depth	\$199,672	\$345,236	
49	Tender Vessel / Support Vessel (up to 15 crew members)	\$99,028	\$139,694	
50	Drill barge n/e 150' water depth	\$165,796	\$211,370	
51	FPSO 100,000 - 150,00 BD per day	\$303,221	\$460,887	
52	Jack up rig 250' water	\$119,461	\$174,924	
53	Jack up rig 500' water	\$165,669	\$269,888	
54	Side Scan Sonar / Radar Vessel c/w 8 to 12 person crew	\$38,584	\$52,274	
55	Shear legs 750 ton to 850 ton lift, 8 point mooring	\$152,907	\$207,625	
56	Diving Support Vessel (DSV) c/w 6 to 10 person crew & 4 divers	\$62,514	\$99,915	

## Offshore Equipment

OFFSHORE JACKETS / FACILITY / MODULE(S) / PRE-ASSEMBLY FABRICATION SINGLE POINT MOORINGS (SPM) & SPAR MAN HOUR BENCHMARKS

#	DESCRIPTION	MIN. MAN HOURS PER TON	MAX. MAN HOURS PER TON
1	Modules	250	350
2	Transition / Rings	175	225
3	SPM / SPAR Head	250	350
4	Column / Base	135	175
5	Major Equipment Installation into a partially completed module	70	100

## Concrete Gravity Base Structure – GBS

(MATERIAL & MAN HOUR BENCHMARKS) GBS IS THE AVERAGE OF GBS'S CONSTRUCTED IN UK, CANADA & NORWAY.

#	DESCRIPTION	\$ COST PER M3 MIN COST PER M3	\$ COST PER M3 MAX COST PER M3
1	Concrete	2,866	3,753
2	Labor Cost	10,220	13,173
<b>NOTES:</b> <ul style="list-style-type: none"> <li>• Concrete cost includes, concrete, rebar, post tensioning, formwork, slip forms, steel skirt and anodes.</li> <li>• Labor includes, labor, supervision, plant and equipment, 24 hour shift work</li> </ul>			

## Typical Pipe Installation Crew

(APPLICABLE FOR MIDDLE EAST WORK (SAUDI ARABIA, KUWAIT, QATAR, IRAQ, UAE): (2024 BASIS)

#	SKILL	NO. REQUIRED	\$ COST PER HOUR	\$ TOTAL COST FOR 8.5 HOUR DAY
1	Forman (Western Expat) includes \$120 per day per diem	1	\$191	\$1,624
2	Local Forman / Charge Hand	1	\$34	\$287
3	Local Machine Operators	2	\$61	\$516
4	Local Truck Driver	1	\$30	\$258
5	Local Welder	5	\$152	\$1,289
6	Local Welder Helper	5	\$140	\$1,194
<b>TOTAL CREW COST PER DAY</b>				<b>\$5,167</b>

### NOTES

- Camp costs in Middle East range between \$15 - \$25 per day for each worker:
- 3 man survey crew \$12,500 - \$15,000 per week

## Pipeline Installation Engineering / Supervision / Labor Crew

(APPLICABLE FOR USA AND CANADA) (2023 BASIS)

#	SKILL	\$ PER DIEM WHEN ASSIGNED TO PROJECT (7 DAYS PER WEEK)	\$ COST PER HOUR (EXCLUDING PER DIEM)
1	Senior Project Manager	161	193
2	Project Manager	161	182
3	Project / Site Engineer	161	134
4	Home Office Safety Coordinator	161	134
5	Senior Estimator / Planner	na	155
6	Estimator / Planner	na	144
7	Home Office Purchasing Agent	na	155
8	Home Office Cost Controller / Material Coordinator	na	150
9	Senior Superintendent	161	155
10	Superintendent	118	128
11	Forman	80	112
12	Field Purchasing Agent	80	134
13	Field Safety Coordinator	80	123
14	Field Cost Controller / Material Coordinator	80	128
15	Charge Hand / Straw Boss	80	107
16	Warehouse man	80	91
17	Heavy Equipment Operator (1)	80	91
18	Heavy Equipment Operator (2)	80	86
19	Truck / Bus Driver	80	80
20	Welding Forman	80	96
21	Welder	80	86
22	Spacer	80	86
23	Equipment Mechanic	80	86
24	Stabber	80	86
25	Laborer	na	75
26	Watchman / Sign Man / Runner / Timekeeper	na	59

## PRODUCTION RATES TABLES & BENCHMARKS

**Clear, grub up trees and bushes for 50' wide Right of Way (ROW) for cross country buried steel pipeline sized between 12" and 36" diameter in USA**

The following table is crew size / man-hours (crew works 9 hours per day) for the completion of 1 mile of work out of a project that is 100 – 200 miles in length.

**Clear, grub up trees and bushes for 100' wide Right of Way (ROW) for cross country buried steel pipeline sized between 12" and 36" diameter in USA**

The following table on the next page is crew size / man-hours (crew works 9 hours per day) for the completion of 1 mile of work out of a project that is 100 – 200 miles in length.

## Crew Size / Man-Hours

**FOR THE COMPLETION OF 1 MILE OF WORK OUT OF A PROJECT THAT IS 100 – 200 MILES IN LENGTH (50' WIDE).**

SKILL	# OF CREW	EASY WORK	# OF CREW	AVERAGE WORK	# OF CREW	DIFFICULT WORK	# OF CREW	VERY DIFFICULT WORK BOULDERS
Forman	1	9	1	9	2	18	2	18
Equipment Operator / Chipper	1	9	2	18	3	27	4	36
Oiler / Mechanic	1	9	1	9	1	9	1	9
Truck Driver	2	18	3	27	3	27	4	36
Labor	8	72	12	108	18	162	24	216
<b>Total Man - Hours</b>		<b>117</b>		<b>171</b>		<b>243</b>		<b>315</b>
<b>Man – Hours per LF</b>		<b>0.022</b>		<b>0.032</b>		<b>0.046</b>		<b>0.060</b>
<b>LF in 1 Mile</b>		<b>5,280 LF</b>		<b>5,280 LF</b>		<b>5,280 LF</b>		<b>5,280 LF</b>

## Typical Equipment

**(OBTAIN DAY RATES FROM ABOVE PIPE LINE AND OFFSHORE CONSTRUCTION RATES ABOVE)**

#	NUMBER REQUIRED	CONSTRUCTION EQUIPMENT
1	3	Brush chipper North Star 35 HP Briggs & Stratton
2	2	Massey Ferguson 1552 Tractor and trailer
3	1	D4 Dozer (Low Ground Pressure)
4	1	1 Ton Crew Cab Truck
5	2	2.5 Ton Winch Truck
6	1	15 Ton Boom Truck / Picker

## USA Mid-West Pipeline

27 MILE 12" / 18" DIA PIPELINE MID-WEST USA 16 MILES 12" DIA - 11 MILES 18" DIA.

2019 COST BASIS:

#	DESCRIPTION	\$ COST	COMMENTS
1	ROW (Clearing)	687,970	
2	Material (Pipe / Stone / Concrete)	4,178,670	
3	Construction (Labor)	3,295,760	
4	Construction (Construction Equipment)	3,015,761	
5	Construction (General Conditions)	654,334	
6	Supervision / Construction Mgmt	945,500	
7	Road Crossing (3)	93,667	3 #
8	Railroad crossing (1)	76,665	1 #
9	Engineering	1,314,600	12,700 hours
10	Freight	614,660	
11	Inspection	605,000	6,250 hours
13	<b>TOTAL COST</b>	<b>15,482,587</b>	
12	<b>COST PER MILE</b>	<b>573,429</b>	
13	<b>TYPICAL COST RANGE PER MILE (LOW) - 15%</b>	<b>487,500</b>	
14	<b>TYPICAL COST RANGE PER MILE (HIGH) + 15%</b>	<b>659,500</b>	

## West VA to PA, USA 2020 Cost Model

48.6 MILES 18" & 20" DIA, GAS OVERLAND PIPELINE: AVERAGE 5' BURIED PIPELINE  
18" DIAMETER 43.8 MILES WITH 4.8 MILES 20" DIAMETER

#	DESCRIPTION	\$ MILLIONS	%
1	Site Offices / Laydown Area / Supervision (2 Locations)	1.21	1.2%
2	ROW / Survey / Clearing / Excavation / Backfill / Road Repairs / Demolition	7.87	8.0%
3	Materials (Pipe / Stone / Concrete / Wrapping / Thrust Blocks)	18.02	18.2%
4	Valves, Fittings, Manifold & Sleeves	2.96	3.0%
5	Slurry Wall / Overhead Section	2.66	2.7%
6	Installation Labor (Average \$72 hour)	29.03	29.3%
7	Construction Equipment	8.55	8.6%
8	River Crossing including barge work	3.77	3.8%
9	Road / Railroad Crossings (10) / Traffic Control	2.9	2.9%
10	Compressor Pumping Stations (3) 2,000, 2,500 & 3,500 HP	8.32	8.4%
11	Miscellaneous Items / SCADA / Communications / Control - Admin Building / Fencing / Security CCTV	13.62	13.8%
12	<b>S/T</b>	<b>98.91</b>	<b>100.0%</b>
13	Detailed Design / Project Mgmt - Control / Procurement Activities	8.23	8.3%
14	Construction Management / Inspection	4.15	4.2%
15	Fees / Profit / Permits	3.73	3.8%
16	<b>TOTAL COST</b>	<b>115.02</b>	
17	<b>COST PER MILE</b>	<b>2.37</b>	
18	<b>TYPICAL RANGE (LOW)</b>	<b>1.89</b>	
19	<b>TYPICAL RANGE (HIGH)</b>	<b>2.84</b>	

## 24" Diameter Pipeline X-60

US MID-WEST 2024 COST BASIS: 284,460 LF - 53.9 MILES

663,300 CONSTRUCTION MAN-HOURS 7,116 WELDS

2.33 MAN-HOURS PER LF

3 ROAD CROSSINGS / 1 RAIL CROSSING

COST PER MILE \$1,393,961

#	DESCRIPTION	\$ COST	% OF TIC
1	Welding work	1,939,245	2.8%
2	Construction Labor	21,194,358	30.5%
3	Per Diem / Expenses	420,765	0.6%
4	Rental Equip In- House	4,917,016	7.1%
5	3rd Party Plant Hire	10,842,373	15.6%
6	Diesel / Fuel	1,099,455	1.6%
7	Specialist S/C Scope	487,494	0.7%
8	Materials (Pipe, Stone, Concrete etc)	8,456,983	12.2%
9	Minor Scope Items	521,704	0.8%
10	S/T	49,879,395	71.8%
11	Contractors Overhead	7,481,684	10.8%
12	Contractors Profit	10,122,276	14.6%
13	Project Insurance	1,995,154	2.9%
14	TOTAL	69,478,510	100.0%
15	Detailed Design / CM & Inspection	5,656,000	8.1%
16	TOTAL INSTALLED COSTS (TIC)	75,134,510	
17	LOW COST RANGE - 20%	60,107,608	
18	HIGH COST RANGE + 20%	90,161,412	

## Water Injection / Transfer / Main Oil Line - Pipelines 6" / 12" / 14" / 16" / 18" dia CS

WATER & GAS INJECTION PIPELINES

MIDDLE EAST LOCATION 2024 COST BASIS

#	DIAMETER	LF	MATERIAL	CONSTRUCTION / EQUIPMENT	INSPECTION / X RAY	SURVEY	ENGINEERING	TOTAL	\$ COST PER LF
1	6" dia	10,310	61,550	449,560	30,230	80,340	73,450	695,130	67
2	12" dia	10,150	72,430	496,700	34,580	87,550	78,730	697,560	69
3	14" dia	11,930	83,445	638,600	41,400	96,700	83,550	943,695	79
4	16" dia	24,755	222,370	1,427,660	103,485	202,665	348,340	2,304,520	93
5	18" dia	7,750	83,370	576,730	43,330	82,165	109,340	894,935	115

## Cost Model #5

**GOLD & COPPER MINE OPEN CAST MINE - WESTERN CANADA**

**2019 COST BASIS: 20 YEAR LIFECYCLE**

**65,000 TO 70,000 TONS OF ORE PER DAY (TOTAL REMOVAL) 400 - 500 MILLION TONS**

**1.3 MILLION TONS OF COPPER, 2.4 MILLION OUNCES OF GOLD, 200 PERMANENT OPERATORS / STAFF**

ITEM	CAPEX COSTS	C\$ MATERIAL IN MILLIONS	C\$ LABOR IN MILLIONS	C\$ TOTAL IN MILLIONS
1	Initial site works & incoming utilities	8	3	11
2	Temporary road (22 miles)	5.5	3.5	9
3	Temporary construction camp for 150 workers / RV parking area	5	6	11
4	Mine initial trees & overburden removal	12	15	27
5	Mining equipment - conveyors - supply & erect	28	6	34
6	Mining equipment - excavators - supply	28	2	30
7	Mining equipment - drilling equipment - supply	19	4	23
8	Main Crushing Plant / hammermills supply & erect	97	30	127
9	Ore concentrator supply & erect	80	30	110
10	Chemical process unit / modules	32	5	37
11	Storage tanks / Tank farm	7.6	2.4	10
12	Tailings storage area / monitoring	75	12	87
13	Site permanent roads & utilities	16	3	19
14	Fire engine / equipment	1.7	0.3	2
15	Buildings (offices, warehouse, maintenance, operator facilities, medical facility)	5	4	9
16	Helicopter purchase & pad / hangar	5	0.7	5.7
17	Water collection ponds, wells & pipeline	9	7	16
18	Miscl items	2	3	5
<b>19</b>	<b>TOTAL DIRECT INITIAL CAPITAL</b>	<b>435.8</b>	<b>136.9</b>	<b>572.7</b>
20	Site Establishment (offices / trailers)			11
21	Field In-Directs (Fringes / Construction Equipment)			111
22	Construction Supervision			12
23	Detailed Design			35
24	HO Support			6
25	Construction Management			12
26	Owner Oversight			5
27	Miscl items			7
<b>28</b>	<b>TOTAL IN-DIRECTS</b>			<b>199</b>
29	Profit & Fees (C\$16.7 million) / Contingency / Management Reserve C\$60 million			76.7
<b>30</b>	<b>TOTAL CAPEX COST</b>			<b>848.4</b>
<b>31</b>	<b>OPEX COSTS per year</b>			
32	20 F/T staff			2.6
33	150 - 200 operators			16.7
34	Equipment replacement (Ranges from C\$5 - C\$7.5 per year			6.8
35	Maintenance / Repairs / Tyres			2.2
36	Fuel / Oil			1.2
37	Catalysts / Chemicals / Other items			1.9
38	Other Costs (Utilities / Insurance / Office / Guards / Miscl)			1.8
<b>39</b>	<b>TOTAL OPEX COST</b>			<b>33.2</b>

# Open Shop Mechanical / Industrial Construction Rates

**S**pecific construction wage rates, benefits and mark-ups (for additional information refer to previous information in Section (1). Rates are appropriate for Open Shop Mechanical / Industrial (South East / South West USA) construction work in the following states Ala-

bama, Arkansas, Florida, Georgia, Louisiana, South Carolina and Texas. , these rates have been compiled in a slightly different format than the rates indicated in Section (1) previously which are Union Construction Rates

## "All In" Non-Union Labor Rates (2024)

#	SKILL	A BASE HOURLY RATE	B FRINGE BENEFITS AVER 3.25%	C WCI AVER 13.33%	D INSURANCE AVER 17.5%	E S T / C \$3.85	F SUB TOTAL	G O/H & P 15%	H TOTAL (W/O) PER DIEM)
1	Boilermakers (Forman)	41.45	1.35	5.52	7.25	3.85	59.42	8.91	68.34
2	Boilermakers (Journeyman)	37.24	1.21	4.96	6.52	3.85	53.78	8.07	61.85
3	Boilermakers Helper	30.63	1.00	4.08	5.36	3.85	44.92	6.74	51.65
4	Carpenter (Forman)	39.84	1.29	5.31	6.97	3.85	57.27	8.59	65.86
5	Carpenter (Journeyman)	35.48	1.15	4.73	6.21	3.85	51.42	7.71	59.13
6	Carpenters Helper	28.88	0.94	3.85	5.05	3.85	42.57	6.39	48.95
7	Cement Mason (Forman)	39.34	1.28	5.24	6.89	3.85	56.60	8.49	65.09
8	Cement Mason (Journeyman)	35.27	1.15	4.70	6.17	3.85	51.14	7.67	58.81
9	Cement Mason Helper	28.54	0.93	3.80	4.99	3.85	42.11	6.32	48.43
10	Concrete Finisher	26.95	0.88	3.59	4.72	3.85	39.99	6.00	45.99
11	Equipment Operator (Heavy Crawlers / Cranes)	35.93	1.17	4.79	6.29	3.85	52.02	7.80	59.82
12	Equipment Operator (Medium Crawlers / Cranes)	34.97	1.14	4.66	6.12	3.85	50.74	7.61	58.35
13	Electrician (Forman)	41.85	1.36	5.58	7.32	3.85	59.97	8.99	68.96
14	Electrician	37.44	1.22	4.99	6.55	3.85	54.05	8.11	62.16
15	Electrician Helper	30.83	1.00	4.11	5.39	3.85	45.18	6.78	51.96
16	Instrumentation (Forman)	42.17	1.37	5.62	7.38	3.85	60.40	9.06	69.46
17	Instrumentation (Journeyman)	37.69	1.23	5.02	6.60	3.85	54.39	8.16	62.55
18	Instrumentation Helper	31.13	1.01	4.15	5.45	3.85	45.59	6.84	52.43
19	Insulation (Forman)	37.08	1.21	4.94	6.49	3.85	53.57	8.04	61.60
20	Insulator	33.71	1.10	4.49	5.90	3.85	49.05	7.36	56.41
21	Ironworker (Forman)	40.37	1.31	5.38	7.06	3.85	57.98	8.70	66.67
22	Ironworker (Journeyman)	35.86	1.17	4.78	6.27	3.85	51.93	7.79	59.72
23	Ironworker Helper	28.92	0.94	3.86	5.06	3.85	42.63	6.39	49.02