

GUIDE TO PLANNING RATES: EXCAVATION

Description	Rate
Excavation by hand:	
in stiff clay	3 m.hrs per cub.m.
in soft rock or gravel,(requiring picking)	5 m.hrs per cub.m.
Add for barrowing up to 15 m.	1 m.hr per cub.m.
Jack-hammering concrete	10 m.hrs per cub.m.
Trenching & pads by back-acter	0.2 to 0.15 hrs per
cub.m.	
Bulk excavation, per machine	300-500 cub.m. per day
Bulk excavation in good conditions,	up to 1100 cub.m. per
day	
Backfilling to trenches	
with D4 dozer	17 cub.m. per hr
with D8 dozer	50 cub.m. per hr
Spread & level hardfilling	
with D4 dozer	14 cub.m. per hr
with D8 dozer	51 cub.m. per hr
Trim & grade excavation	
with D4 dozer	150 sq.m. per hr
with D8 dozer	300 sq.m. per hr
Bored piles in firm clay, 400-1200 diameter	50 - 60 lin.m. per day
Frankipiles (bored & rammed), av. 10 m. deep	4 - 5 per day
Drill for, place & backfill temporary soldier piles	4 - 6 per day
Drill, place & grout ground anchors	4 per day per drill rig
(allow 5 days to cure & stress)	
Shotcrete applied to earth face - trowel finish	20 - 25 sq.m. per day
Wellpoint spears installation	30 - 40 per day
Place & consolidate hardfill 150 thick	
with 2.5 tonne roller	20 sq.m. per hr
Spread level & compact sand layer 50 - 75 thick	25 sq.m. per m.hr
Lay & tape polythene damp proof membrane	40 sq.m. per m.hr
Lay 3 layers bituminous felt tanking	1 sq.m. per m.hr
Demolishing brick or block walls	3 - 4 m.hrs per cub.m.
MACHINE EXCAVATION RATES:	
Bulk excavation with scraper and tractor : cub.m. per hr.	
Scraper size	
450m.	11
3 cub.m.	10
6 cub.m.	18
10.7 cub.m.	32
19 cub.m.	61
	58
	23
	43
	37
Haul distance (one way)	
45m.	7
90m.	6
180m.	11
270m.	20
360m.	37

MACHINE EXCAVATION RATES:

Bulk excavation with scraper and tractor : cub.m. per hr.	Haul distance (one way)	Scraper size
	45m.	450m.
	90m.	3 cub.m.
	180m.	6 cub.m.
	270m.	10.7 cub.m.
	360m.	19 cub.m.
5		11
10		21
18		32
37		61
		58
6		7
11		13
20		23
43		49
		58

Bulk excavation with dragline, loading to trucks

0.76 cub.m. bucket

1.33 cub.m. bucket

31 cub.m. per hr
40 cub.m. per hr

Excavate from spoil heaps & load to trucks with front-end loader:

0.76 cub.m. (D6)

1.14 cub.m. (Cat 955)

1.33 cub.m. (Cat 955h)

17 cub.m. per hr
25 cub.m. per hr
32 cub.m. per hr

Break up concrete slabs with hydraulic hammer

100 thick

150 thick

200 thick

300 thick

Weak mass concrete or masonry

760 sq.m. per hr
460 sq.m. per hr
280 sq.m. per hr
100 sq.m. per hr
20 cub.m. max per hr

SITE WORKS

Car park areas

Proof roll, subgrade, compact & seal:

350 sq.m. per day

Add 1 week at start

Add 1 week at finish for line marking, etc

REINFORCING STEEL PLACER

Man - hours per tonne : (by bar size)

Up to 16 diam.

20 - 25 diam

over 25 diam

Large diameters in raft footings, with

good access & no complications

Complex work in restricted space, e.g. beams

Wire wrapping to structural steel

10 - 8 man hours
50 man hours
140 man hours

Mesh

0.05 man hrs per sq.m.

Man - hours per tonne : (by type of member)

Footings

Large bars, well spaced, simple.

(Typical range 40 - 60 kg/cub.m.)

Dense, more complex

Columns

Simple, repetitive, 3m. high

Unrepetitive and/or larger

(Typical range 150 - 250 kg/cub.m.)

Wall steel

Simple, repetitive

(Typical range 35 - 45 kg/cub.m. unless acting

as column, then 150 - 200)

(Retaining walls 100 - 130)

Beam steel

Repetitive, pre-fabbed

(Typical range 150 - 230 kg/cub. m, based on

overall depth of beam)

Unrepetitive

(Pre-

60 man hours
2fabbing accounts for 65% of time)

CONCRETE PLACING

DELIVERY RATES :

By hand, using barrows
 By mobile crane with two 1 cub.m. skips
 By tower crane with two 2 cub.m. skips
 By concrete pump (to any height)
 Direct pour from truck, per discharge point
 up to 9 cub.m. per hr
 up to 15 cub.m. per hr
 up to 25 cub.m. per hr
 up to 30 cub.m. per hr
 up to 60 cub.m. per hr

PLACING LABOUR RATES :

Strip footings
 Mass concrete in ground
 Floor slabs (excluding finishing)
 Power floating
 Shovel finish
 Screeds & toppings 50 - 75 mm
 (excl. finishing)
 Columns
 Walls
 Beams
 1.5 man hrs per cub.m.
 0.25 - 1.0 man hrs per cub.m.
 0.33 - 1.25 m.hrs per cub.m.
 0.07 man hrs per sq.m.
 0.25 man hrs per sq.m.
 0.12 - 0.15 m.hrs per sq.m.
 4 - 10 man hrs per cub.m.
 2 - 5 man hrs per cub.m.
 2.5 - 8 man hrs per cub.m.

NOTE: The lowest rates only apply to well-organised, repetitive pours with uninterrupted supply and clear access. The highest rates will apply to one-off cases, or where members are small, or access is restricted. Un-productive time varies greatly, depending on duration and timing of pour. Plan for early starts to slab pours to allow finishing in daylight hours.

FORMWORK

FABRICATION

Ply on timber framing, nailed
 ditto, screwed
 Radused forms

FORMWORK TO GROUND WORKS

Underpinning
 Rough footings formwork
 Pilecaps, pads, pits, bases
 Ground beams
 Large machine bases
 Small machine bases
 Road forms : up to 150 high
 150 - 225 high
 225 - 300 high
 Edge forms to ground slabs up to 150 high

1.0 man hr per sq.m.
 1.2 man hrs per sq.m.
 3.5 man hrs per sq.m.
 FIX
 STRIP
 (man hours per sq.m.)
 1.9
 0.6
 0.1
 0.4
 1.15
 1.3
 1.5
 2.25
 0.75
 (man hours per lin.m.)
 0.11
 0.04
 0.05
 0.15
 0.25
 0.10
 0.23
 0.07

Slab steel
 Two - way slab, 70 - 90 kg/cub.m.
 (One - way slabs 60 - 80, waffle slabs 100 - 120)
 0.2 m.hrs per sq.m.

Form stairs, per sq. m. on plan

4.5 m.hrs per sq.m.

STRIPPING FORMWORK

Generally accounts for 25% - 33% of total time

ALL-UP FORMWORK ACHIEVED RATES

ACHIEVED RATES ON MULTI-STORY PROJECTS OVER TYPICAL FLOORS

(DELAYS EXCLUDED - ONLY DAYS WORKED COUNTED)

Riverside, Brisbane: 32 typical floors, 1866 sq.m. gross.

Crane, Slipform core, Folding table forms with formwork hoists.

36 sub-contract formworkers + 22 C&C

4 day cycle achieved on 6 consecutive floors = 466 sq.m. plan

Overall productivity : 8.0 sq.m. plan area/day/man

National Australia Bank, Sydney: 27 typical floors, 1750 sq.m. gross.

Crane, Supershifter type core, Folding table forms with formwork

hoists

64 sub-contract crew average

4.5 day av. cycle achieved = 389 sq.m. plan area/day
Overall productivity : 6.1 sq.m. plan area/day/man

State Bank, Sydney: 24 typical floors, 1312 sq.m. gross

Crane, Supershifter & climbing wall core system, crane-handled

table

forms to 33% + Kwikform (hoist lifted)

40 C&C formwork crew average

6 day cycle achieved = 219 sq.m. plan area/day

Overall productivity : 5.5 sq.m./man/day

Connaught Apartments, Sydney: 17 typical + 10 near-typical, 1150 sq.m. gross

(Concrete walls increase to equivalent of 1720 sq.m. gross)

Crane, Supershifters, Climbing beam & wall forms, Speedform soffits

using formwork hoists.

55 average crew

6 day cycle achieved = 192 sq.m. plan area/day

Overall productivity : 5.2 sq.m./man/day (3.2 sq.m. of plan area only)

Regent hotel, Sydney: 28 typical floors, 1003 sq.m. gross

Crane, Supershifter & climbing wall core, climbing perimeter forms

and Kwikform soffits using hoist.

36 average crew

5.5 day average cycle achieved = 182 sq.m. plan area/day

Overall productivity : 5.1 sq.m./man/day

Sheraton hotel, Darwin: 9 typical floors, 1070 sq.m. gross

Crane, timber conventional formwork by sub-contractor

20 average crew

10 day cycle achieved = 107 sq.m./day

Overall productivity : 5.35 sq.m./man/day

Gas & Fuel, St Kilda Rd, Melbourne: 11 typical floors, 1848 sq.m. gross
Crane-handled
Stable forms incorporating edge beams,

Super-shaft core
8 day cycle achieved = 231 sq.m./day
Overall productivity : 5.8 sq.m./man/day

441 St. Kilda Rd, Melbourne: 4 typical floors, 3000 sq.m. gross (av)
Crane, table forms, perimeter wallform
41 C&C crew
10 day cycle achieved = 300 sq.m./day
Overall productivity : 7.3 sq.m./man/day

SCAFFOLDING

Kwikstage type: erect one lift including guard rail
0.22 man hrs per lin.m.
0.44 man hrs per lin.m.
0.06 man hrs per lin.m.
0.04 man hrs per lin.m.
Remove boards
Tube & fitting type: erect independent
scaffold, including board out, per sq.m.
measured on wall face
Dismantle ditto
Erect birdcage scaffold, standards @ 2700
centres, 1800 high lifts
Board out to area
Dismantle birdcage scaffold

0.27 man hrs per sq.m.
0.14 man hrs per sq.m.
0.045 man hrs per cub.m.
0.045 man hrs per sq.m.
0.022 man hrs per cub.m.

MULTI-STORY ERECTION

Erect 3-storey columns
Erect primary beams
Erect secondary & smaller beams
Lay Bondek & screw down
Shear studs, resistance welded
0.5 hr each
0.33 hr each + bolt up
0.17 - 0.25 hr ea + bolt up
0.1 man-hr per sq.m.
120 per man hour

PRECAST ERECTION

Place precast floor units e.g. Transfloor panels
Crane & crew: up to 7000 long
12.5 sq.m. per hour
20.0 sq.m. per hour
Erect tilt-up wall panels
Erect spandrel panels
(allow additional time for align & fixing)
1 panel per hour
6 - 8 panels per day

ROOFER

Metal deck roofing
Corrugated a.c. incl. safety mesh
Translucent sheeting (roof lights)
Wall cladding
Overall rate for metal deck roofing :

0.20 man hr per sq.m.
0.16 man hr per sq.m.
0.36 man hr per sq.m.
0.28 man hr per sq.m.
200 sq.m./gang/day

STRUCTURAL STEEL ERECTION

Columns

6

1 hr each

Portal frames, joined on ground, lifted & bolted
Braces and ties
Purlins
1-2 hrs each
0.25 hr each
100 lin. m. / man / day

SANDWICH WALL PANEL ERECTION

Erect panels 7m.x1.2m.
Erect ceiling panels
Covered concrete kerbing
12 panels / gang / day
10 panels / gang / day
10 lin. m. / gang / day

BRICKWORK & BLOCKWORK

BLOCKS : (LxWxH)		No. per sq.m.		Bricklayer only	
390 x 190 x 90	hollow	25	0.80	man hrs per sq.m.	
390 x 190 x 90	solid	25	0.90		
390 x 90 x 190	hollow	12.5	0.725		
390 x 90 x 190	solid	12.5	0.78		
390 x 140 x 190	hollow	12.5	0.78		
390 x 140 x 190	solid	12.5	0.86		
390 x 190 x 190	hollow	12.5	0.92		
390 x 190 x 190	solid	12.5	0.97		
390 x 90 x 90 ("modular")		25	1.00		
230 x 110 x 76 (standard)		50	1.25		

ALTERNATIVELY:

250 standard bricks per day (normal output) =	1.60	man hrs / sq.m.
300 ditto	1.33	
400 ditto	1.00	
100 concrete blocks per day =	1.00	man hrs per sq.m.
120 concrete blocks per day (normally achieved on straightforward work) =	0.83	man hrs per sq.m.

LABOURERS TIME ADDITIONAL TO ABOVE

Allow 1 labourer to 2.5 bricklayers

HANDLING

By crane, with stillages & cage, crew of 4 men :
90 mm wide blocks 400 per hour
140 mm wide blocks 240 per hour
190 mm wide blocks 180 per hour
Bricks
1670 per hour
By hoist & barrows
Bricks
1000 per hour
By hoist & pallet trolleys or brick packs,
2500 per hour

MORTAR

100 bricks require 1/2 bag cement, 7.5 kg lime, 160 kg (=0.1 cub.m.) sand
125 blocks (10 sq.m.) (200 wide) require 1 bag cement (40 kg), 0.15 cub.m. sand

PLASTERER & PAVIOR

Granolithic paving	19 mm thick	0.80	man hrs per sq.m.
Cement & sand screed	19 mm thick	1.30	man hrs per sq.m.
	25 - 37 mm thick	0.40	man hrs per sq.m.
	25 - 37 mm thick	0.45	man hrs per sq.m.
	37 - 50 mm thick	0.55	man hrs per sq.m.

Slate or natural stone paving:	lay, bed, point up	8 sq.m. / man / day
Portido paving:	lay, bed, point up	10 sq.m. / man / day
Bluestone paving:	lay, bed, point up	12 sq.m. / man / day
Precast slabs:	lay, bed, point up	15 sq.m. / man / day

Sprayed acoustic plaster:	2 coats complete	0.25 - 0.33	man hrs / sq.m.
Render internal walls:	2 coats complete	1.2	man hrs per sq.m.
Set coat to ceilings		0.6	man hrs per sq.m.
Set coat to walls		0.25	man hrs per sq.m.

Render narrow widths e.g. sills, reveals		1.00	man hr per lin.m.
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Riv-o-land render to vertical surfaces		2.0	man hrs per sq.m.
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Plasterboard:	fix & stop to walls	0.32	man hrs per sq.m.
	fix only to walls	0.20	man hrs per sq.m.
	fix & stop to ceilings	0.43	man hrs per sq.m.

Fibrous plaster:	fix & stop to walls	0.32	man hrs per sq.m.
	fix & stop to ceilings incl. cornices	0.60	man hrs per sq.m.

Vilaboard fix to walls as backing to tiles		1.3	man hrs per sq.m.
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Ceiling grids & hangers, two-way grid		0.20	man hrs per sq.m.
Ceiling tiles		0.10	man hrs per sq.m.
(allow additional time for perimeter trims prior to start of gridding, and for fixing tiles at sprinkler heads, grilles, etc)			

CARPENTRY

TIMBER FRAMING

Stud walls, overall rate, (softwood)		0.45	man hr per sq.m.
	(hardwood)	0.54	man hr per sq.m.

Wall framing, detail rate:		0.20	man hr per lin.m.
	up to 100 x 50	0.25	man hr per lin.m.
	200 x 50	0.33	man hr per lin.m.
	300 x 50	1.00	man hr per sq.m.
Roof framing (residential type, inclusive rate per sq. m. on plan)		0.67	man hr per sq.m.
Strapping to walls, 37 x 50, packed to alignment		0.40	man hr per sq.m.
		0.50	man hr per sq.m.

Floor framing		8
Ceiling framing		

STEEL STUD PARTITIONS

Fix studs & plates
Line with plasterboard (per side per layer) 0.25 man hr per sq.m.
Stopping (per side) 0.125 man hr per sq.m.
Overall, for 3600 high wall lined both sides to 2800 high 3.0 man hrs per lin.m.
Add up to 50% for short lengths / confined areas, e.g. bathrooms, en-suites.

STEEL DOOR FRAMES

Erect & plumb, using jig for repetitive work 1.00 man hr each
without jig 2.00 man hrs each

HANGING DOORS, INCLUDING LOCKSET & ADJUST

Plain flush door 2.0 - 2.5 man hrs each
Larger double doors 8.0 man hrs per pair
Additional for overhead door closers 2.0 man hrs each
Additional for floor springs 8.0 man hrs each

LININGS

Particle board flooring on timber joists 0.31 man hr per sq.m.
Ship-lap linings ex 150 x 50 to walls, fascias 1.50 man hrs per sq.m.
Hardboard (Masonite) to walls 0.65 man hrs per sq.m.
Particle board to walls 0.65 man hrs per sq.m.
Laminex linings incl. jointer strips 1.60 man hrs per sq.m.
Allow up to 50% extra for small areas

TILER, FLOOR FINISHES

CERAMIC TILES

100 x 100 wall tiles in small areas 2.70 man hrs per sq.m.
150 x 150 wall tiles in small areas 2.40 man hrs per sq.m.
150 x 150 wall tiles in large areas 1.50 man hrs per sq.m.
Note : max. 1 man per 5 sq.m. available floor area !

100 x 100 floor tiles in small areas 1.40 man hrs per sq.m.
Quarry floor tiles in small areas 1.20 man hrs per sq.m.
Quarry floor tiles in large areas 1.00 man hr per sq.m.
Ceramic tiles on membrane e.g. "Metz", adhesive fixed, 5 sq.m./man/day
Mosaic floor tiles in small areas 2.30 man hrs per sq.m.
Polished precast tiles e.g. in shopping malls 10 sq.m./man/day

Terrazzo flooring:

Mix, lay and trowel
Grinding (after min. 2 days) 9
2.0 man hrs per sq.m.
0.45 man hrs per sq.m.

Vinyl floor tiles
Large areas, eg supermarket
0.35 man hr per sq.m.
600 - 700 sq.m. per day

PAINTER

3 coats PVA to general surfaces
3 coats polyurethane or enamel
Vinyl spray finish, per coat
Vinyl fabric to walls
0.29 man hr per sq.m.
0.36 man hr per sq. m.
0.11 man hr per sq.m.
0.43 man hr per sq.m.

AIR CONDITIONING

Rough in:
Multi-storey hotel, 1000 sq.m. gross area per floor, 23 rooms +
corridors
Induction units, ductwork, flow & return pipework, lagging ducts &
pipe
Pipework:
Ductwork:
Induction units:
Lagging:
= 8.9 man hrs per unit
1 man x 1.5 days per floor
4 men x 4 days per floor
1 man x 2 days per floor
2 men x 3 days per floor
= 0.2 man hrs per sq.m. gross plan area
Multi-storey office
Ductwork: per sq.m. gross plan area
(includes risers)
Induction units
Pipe connections to units, including testing & lagging:
0.66 man hrs each
4 man hrs each

SPRINKLERS

Multi-storey hotel as above:
Rough-in:
2 men x 6 days per floor
= 4.2 man hrs per unit
= 0.1 man hrs per sq.m. gross floor area
Install sprinklers complete and test in false
ceiling, set out to co-ordinate with ceiling grid:
3 man hrs per sprinkler head
Ditto with no false ceiling, open areas with easy
fixing:
2 man hrs per head
ELECTRICAL SERVICES
Multi-storey hotel as above
Chasing out 2 men + Wiring 3 men
6 days per floor
= 10.5 man hrs per unit
= 0.24 man hrs per sq.m. gross
floor area
Multi-storey office
Conduit in slab (where all wiring is in slab) 0.25 man hrs per sq.m.
Ditto, per lin.m. of conduit:
0.10 man hrs

Connection of Sub-board via rising mains in ducts
to main switchboard:
40 man hrs per floor

PLUMBING

Multi-storey hotel as above (12 No. stacks)
Risers, stacks, branch wastes
6 men x 6 days per floor
Hot & cold water risers: chasing, prefab & install
4 men x 6 days per floor
Insulate & fill core holes
1 man x 6 days per floor
Total 11 men x 6 days per floor
= 23 man hrs per bathroom

Alternatively:

Hotel bathroom (shower basin & W.C.) Rough in: 1 man day each
Fit off: 1 man day each
W.C. Pans
Rough in: 3 per man day
Fit off: 3 per man day
Basins or vanity units
Rough in: 4 per man day
Fit off: 3 per man day
Urinals
1 man day per 2 stalls
Multi storey office, 1200 - 1500 sq.m. gross floor area

TYPICAL LEAD TIMES (1995)

Mechanical plant (air conditioning)
16 weeks
Lifts
22 weeks

Fire Indicator Panel - custom made
8 - 12 weeks

Structural steel
(incl. approval of shop drawings)
8 weeks

Curtain wall
16 weeks

Glulam timber beams
6 weeks

Carpet - commercial grade
22 weeks