Manage Labour Intensive Construction Projects

Course Exercises

QUESTIONS

Specific Outcome 2:

1. Break down the operations below into activities and then state which can be done by labour. The following is the operation: "Excavation and backfilling for road sign supports".

Specific Outcome 3:

1. How many days will a team of 5 workers take to:
   a) Complete an excavation in stony gravel, 30m long by 2m wide x 1,5m deep if the task is $3m^3$/day?
   b) Cast a concrete slab 30m long by 2m wide by 300mm deep if the task is $0,6m^3$/day?

2. What would a balanced team be for the following work:
   - Loosening rocks from hillside at a task of $1,2m^3$/man day
   - Collecting and stockpiling the rock at a task of $4,8m^3$/man day
   - Crushing the rock with a hand operated crusher at a task of $0,3m^3$/man day

3. If the output of a pedestrian roller is $48m^3$/day, how many workers will be needed to water, mix, spread and level sandy soil at a task of $6m^3$/man day

Orange Farm Sportsfield: Management Systems and Management Information Systems [Template 1]

Contract Document Framework:	
Construction Programme and Plans:	**Method Specifications/ Statements:** **MS 1 –** **MS 2 –** **MS 3 –** **MS 4 –** **MS 5 –** **Etc.**
Site Operational/ Work Plans:	**LIC Project Records:**

Orange Farm Sportsfield: NEW Work Items Balancing Tool Template [Template 2]

Work Item	Operation Description	LI	Building/ Construction Activity/ies	Quantity	Unit	Task Sizes	No. of Tasks	No. days	No. Workers	Balanced Days	Actual Workers	Group Total
1	Clear & Grub	LI	Bush clearing (medium)	20000	M^2							
		LI	Strip ground cover & grub out roots, load, haul w/b & dump nearby (medium)	20000	M^2							
2	Remove & stockpile Topsoil	LI	Excavate soft	1800	M^3							
		LI	Load in w/b	2000	M^3							
		LI	Haul & stockpile (80m)	2000	M^3							

Team Balancing Tool Example: Gravel Road Base [Template 3]

								NOT TEAM/ GROUP BALANCED		TEAM/ GROUP BALANCED		
Work Item	**Operations**	**LI**	**Construction Activities**	**Quantity (A)**	**Unit**	**Task (B)**	**No of Tasks/ Mandays C=A/B**	**No of Workers D(Est)**	**Days E=C/D**	**Balanced days F(Actual)**	**No of workers G=C/F**	**Total workers for group**
34.02	Construct 150mm Gravel Base Layer	LI	Add water		litres							
		LI	Mix water		m3							
		LI	Load		m3							
		LI	Haul		m3							
		LI	Place in shutter		m3							
		LI	Screed to level		m3							
		LI	Compaction		m3							
		LI	Move & place shutters	Daily paid - not Taskwork paid							8	
											No. of Teams	

Quantity in BoQ = 6660 compacted cubic metres

Construction programme = 60 working days

Bulking factor = 1,3

OMC = 5%

Hence, Production required/day = 144 loose m3/d

Gravel Density = 2100 kg/m3

Team Balancing Tool Example: Gravel Rural Road [Template 4]

Work Item	Description	LI	Activity	Qnty (A)	Unit	Task (B)	No. of Tasks (C=A/B)	No. of Workers [D] (estimate)	Days (E=C/D)	Balance Days F (actual)	Actual No. Workers (G=C/F)	Total Workers for Group	Comments/ Assumptions *
2.1.1	Clearing and Grubbing in Road Reserve	LI	Bush clearing	220000	m^2	300							No Trees in Road reserve therefore only grass allowed for
		LI	Load and Stockpile	220000	m^2	300							Collection point 100m radius from working area and task rate assumed
2.1.2	Strip 100mm topsoil, of road reserve only, to stockpile and maintain	LI	Excavate to stockpile	11000	m^3	4							
		LI	Load to wheelbarrow	11000	m^3	8							
		LI	Haul to stockpile	11000	m^3	5							Haul distance is maximum of 100m.
2.2.2	Minimum of 93% Mod. AASHTO density to a depth of 150mm	LI	Ripping to depth of 150mm	13050	m^3	10							Ripping in soft material
		LI	Water, mix and level	13050	m^3	10							
		C	Compact	13050	m^3								Use conventional compaction plant
2.3.1	I) Excavation in Road Prism	LI	Excavate to stockpile	39000	m^3	4							
		LI	Load	39000	m^3	15							3 x Animal drawn carts available locally
		LI	Haul & dump	39000	m^3	15							
2.4.1	a) Soft and Intermediate Excavation	LI	Excavate to stockpile	19050	m^3	4							
		LI	Load	19050	m^3	15							3 x Animal drawn carts available locally
		LI	Haul & dump	19050	m^3	15							
2.4.3	c) Removal of unsuitable material in roadbed	LI	Excavate to stockpile	3800	m^3	4							
		LI	Load	3800	m^3	15							3 x Animal drawn carts available locally
		LI	Haul & dump	3800	m^3	15							Haul distance based on 100m radius
2.6.1	100mm Topsoiling, from stockpile	LI	Load	11000	m^3	8							
		LI	Haul & dump	11000	m^3	5							Haul distance based on 100m radius for wheelbarrow
		LI	Spread piled material	11000	m^3	12							
2.7.1	100mm thick G5 GWC compacted to 95% Mod AASHTO (from commercial source)	LI	Spread from stockpile	12800	m^3	10							GWC loads dumped at very close intervals as per required to achieve thickness therefore no hauling reqd.
		C	Relevel and compact	12800	m^3								Use conventional compaction plant

Team Balancing Tool Example: Guide Blocks [Template 5]

No	ACTIVITY	QUANTITY Q	TASK SIZE t	Task units	MAN-DAYS M	No of WORKERS P	DAYS D	Balance DAYS Db	Actual No of WORKERS Pact	Worker group subtotal
1	Make up reinforcing "cages"	400		Blocks/m-d						
2	Strip formwork, stack blocks in curing tank, clean and oil formwork, fix reinforcing cage into formwork.	400		Blocks/m-d						
3	Measure, mix and place concrete, compact and finish off	400		Blocks/m-d						
4	Set out guide blocks	400		Blocks/day by 2 people						
5	Excavate for guide blocks	400		Holes/m-d						
6	Transport guide blocks to site, place blocks, backfill and compact, clean-up	400		Blocks/day by driver & 2 people						
7	Paint guide blocks	400		Blocks/day by driver & 2 people						

	Activities	Task Sizes
1	Make up reinforcing "cages"	20 cages per man-day
2	Strip formwork, stack blocks in curing tank, clean and oil formwork, fix reinforcing cage into formwork.	10 blocks per man-day
3	Measure, mix and place concrete, compact and finish off	10 blocks per man-day
4	Set out guide blocks	100 blocks per day by two people
5	Excavate for guide blocks	25 holes per man-day
6	Transport guide blocks to site, place blocks, backfill, compact and clean-up.	50 blocks per day by driver and two people
7	Paint guide blocks	100 blocks per day by driver and two people

Team Balancing Tool Example: Construct stormwater channel & line with grouted stone pitching [Template 6]

No	ACTIVITY	QUANTITY Q	TASK RATE t	Task units	MAN-DAYS M	No of WORKERS P	DAYS D	Balance DAYS Db	Actual No of WORKERS Pact	Worker group subtotal
1	Excavate topsoil and grass to stockpile	105	5	m3/m-d						
2	Excavate channel in firm soil	450	3	m3/m-d						
3	Load loose soil into wheelbarrows	720	12	m3/m-d						
4	Haul soil average 80m to donga and tip	720	2	m3/m-d						
5	Water, mix and spread loose soil in donga	720	4	m3/m-d						
6	Compact soil in donga by pedestrian roller	600	100	m3/m-d						
7	Collect loose rock from hillside and stockpile within 40m	190	2	m3/m-d						
8	Load rock into dumpers	190	8	m3/m-d						
9	Transport rock by dumpers to site	190	12	m3/m-d						
10	Lay grouted stone pitching 200mm thick	190	8	m3/m-d						
11	Clean up site	200	20	m2/m-d						