VOLUME 20 | NUMBER 01 | JULY 2020
https://ejournal.worldconference.id/index.php/neutron
E-ISSN: 2685-3272 | P-ISSN 1412-0860

COMPARISON OF CONVENTIONAL SLAB AND METAL DECK COMPOSITE SLAB METHOD TO TIME AND COST IN TRANSPARK CIBUBUR PROJECT

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ABSTRACT

in the implementation of the Transpark Cibubur project, especially in Tower C Apartment there are several problems in conventional slab methods including the need for a longer construction time. With some thoughts and considerations, the work method of floor slab was changed from conventional method to metal deck composite slab method. In this research, a comparative of conventional slab and metal deck composite slab method in Tower C of the Cibubur Transpark Project is the object of research to compare the two methods to speed of implementation and cost requirements. The analysis results show in Tower C 16th to 19th floor for metal deck composite slab method is more expensive than conventional slab method with a cost difference Rp. 137.252.215,54. While in terms of work time, conventional slab method are longer than metal deck composite slab method with a time difference for 25 days.

keywords *: Conventional Slab, Metal Deck Composite Slab, Time, Cost.*

INTRODUCTION

Based on direct observations and information in the field, in the implementation of the Transpark Cibubur project, especially in Tower C Apartment using conventional floor slab method. With some thoughts and considerations, the work method of floor slab was changed from conventional method to metal deck composite slab method.

Floordeck is a galvanized material that is shaped like a zinc wave but does not function as a roof covering material. Floordeck is a coating material under cast concrete floor plates instead of wooden formwork (multiplex). Floordeck is also designed to convert the use of iron diameter and convert the thickness of concrete cast. The buckling system (plate wave) is designed to help the strength of the concrete floor cast structure.

Floordeck can reduce the volume of cast concrete by 15% to 25% and reduce the amount of steel reinforcement for concrete casts because the extent of tensile reinforcement needs to be converted with the use of bond plates.

RESEARCH METHODOLOGY

The analysis in this research was based on secondary data supported by primary data taken from the study site, the Cibubur Transpark Project, with an emphasis on cost and time for floor slab work

To make an analysis of the cost of the work required, it must first calculate the volume of floor slab work consisting of formwork, construction, and concrete. After getting the volume of each job, it is multiplied by the unit price of each job.

Analysis of the work time of conventional slab and metal deck composite slab is obtained from the plan for completion of work volume per day. Followed by calculating the volume of each work divided by the plan to complete the volume of work per day [5].

Table 1. Working Time Calculation Format

No	Description	Vol.	Unit	Man power	Index	Productivity per Day	Number of days completed work for 1 worker	Total Man power	Workday Plan
		(a)			(b)	(c)	(d)	(e)	(f)
	Floor Slab								
1	Description x	-	m2	Worker	-	1/b	a/c	-	d/e

Source: Andriansyah, 2014 [4]

RESULTS AND DISCUSSIONS

Cost Analysis of Conventional Slab Method and Metal Deck Composite Slab Method

After getting the volume of each job, then an analysis of the price of the work unit is made so that the unit price of the work is obtained and then multiplied by the total volume of work to get the cost of the work.

Table 2. Cost of Conventional Slab

No.	Work Item	Unit	Volume	Unit Price (Rp)	Total (Rp)
	16th Floor				
1	Formwork	m^2	1.319,37	412.215,40	543.865.446,42
2	Reinforcement	kg	12.200,59	13.219,28	161.283.008,60
3	Concrete K-350	m^3	171,52	1.105.362,75	189.590.002,49
16th Floor Cost					894.738.457,52
	17th – 19th Floor				
1	Formwork	m^2	3.958,12	110.700,40	438.165.016,14
2	Reinforcement	kg	36.601,77	13.219,28	483.849.025,81
3	Concrete K-350	m^3	514,56	1.105.362,75	568.770.007,48
17th – 19th Floor Cost					1.490.784.049,43
16th – 19th Floor Total Cost					**2.385.522.506,95**

Source: Author's Processed Data, 2019

Table 3. Cost of Metal Deck Composite Slab

No.	Work Item	Unit	Volume	Unit Price (Rp)	Total (Rp)
	16th Floor				
1	Formwork	m^2	1.319,37	414.821,10	547.303.333,98
2	Reinforcement	kg	6.100,29	13.219,28	80.641.504,30
3	Concrete K-350	m^3	138,93	1.105.362,75	153.567.902,02
16th Floor Cost					781.512.740,30
	17th – 19th Floor				
1	Formwork	m^2	3.958,12	262.406,10	1.038.633.763,23
2	Reinforcement	kg	18.300,88	13.219,28	241.924.512,90
3	Concrete K-350	m^3	416,79	1.105.362,75	460.703.706,06
17th – 19th Floor Cost					1.741.261.982,19
16th – 19th Floor Total Cost					**2.522.774.722,49**

Source: Author's Processed Data, 2019

From the analysis of tables 2 and 3, the comparison between conventional slab and metal deck composite slab is as follows:

Table 4. Cost Comparison of Conventional Slab and Metal Deck Composite Slab

No.	Work Item	Unit	Volume	Total Cost (Rp)
16th – 19th Floor Conventional Slab				
1	Formwork	m^2	1.319,37	982.030.462,57
2	Reinforcement	kg	12.200,59	645.132.034,41
3	Concrete K-350	m^3	171,52	758.360.009,97
	Total			**2.385.522.506,95**
16th – 19th Floor Metal Deck Composite Slab				
1	Formwork	m^2	1.319,37	1.585.937.097,21
2	Reinforcement	kg	6.100,29	322.566.017,20
3	Concrete K-350	m^3	138,93	614.271.608,08
	Total			**2.522.774.722,49**
Cost efficiency of metal deck slab over conventional slab				
1	Formwork			603.906.634,64
2	Reinforcement			322.566.017,20
3	Concrete K-350			144.088.401,89
	Total			**137.252.215,54**

Source: Author's Processed Data, 2019

From the table 4, it is obtained that the total estimated cost of conventional slab and composite metal deck has a cost difference of Rp. 137.252.215,54 and conclude that the work of metal deck composite slab is more expensive when compared to conventional slab.

Cost Analysis of Conventional Slab Method and Metal Deck Composite Slab Method

Work time for conventional floor slab and metal deck composite floor slab is obtained from the planned work volume completion per day. As for the completion of the volume of work per day it is assumed as follows:

Table 5. Manpower Plan

No	Description	Tenaga Kerja	Index	Productivity per Day	Total Man power
			a	b=1/a	c
1	Conventional	Worker	0,660	1,52	66
	Formwork	Carpenter	0,330	3,03	33
		Head Worker	0,033	30,30	3
		Foreman	0,033	30,30	3
2	Reinforcement	Worker	0,070	14,29	70
		Reinforcement Worker	0,070	14,29	70
		Head Worker	0,007	142,86	7
		Foreman	0,004	250,00	4
3	Concrete K-350	Worker	0,438	2,29	14
		Foreman	0,031	32,00	1
4	Metal Deck	Worker	0,440	2,27	66
		Carpenter	0,220	4,55	33
		Head Worker	0,022	45,45	3
		Foreman	0,022	45,45	3

Source: SNI 7394:2008 No.6.24 [3] and Author's Processed Data

From table 11, it is continued by calculating the volume of each work divided by the planned volume of work completion per day. From the results of these calculations obtained work plan for each work as follows:

Table 6. Work Time Calculation of Conventional Slab

No	Description	Vol.	Unit	Man power	Index	Productivity per Day	Number of days completed work for 1 worker	Total Man power	Workday Plan
		a			b	c=1/b	d=a/b	e	f=e/d
	16th – 19th Floor								
1	Conventional	5277,49	m2	Worker	0,660	1,52	3483,14	66	52,77
	Formwork			Carpenter	0,330	3,03	1741,57	33	52,77
				Head Worker	0,033	30,30	174,16	3	52,77
				Foreman	0,033	30,30	174,16	3	52,77
2	Reinforcement	48.802,36	kg	Worker	0,070	14,29	341,62	70	4,88
				Reinforce Ment Worker	0,070	14,29	341,62	70	4,88
				Head Worker	0,007	142,86	34,16	7	4,88
				Foreman	0,004	250,00	19,52	4	4,88
3	Concrete	686,07	m3	Worker	0,438	2,29	300,16	14	21,44
				Foreman	0,031	32,00	21,44	1	21,44
	Formwork								**52,77**
	Reinforcement								**4,88**
	Concrete								**21,44**
	Total								**80**

Source: Author's Processed Data, 2019

Table 7. Work Time Calculation of Metal Deck Composite Slab

No	Description	Vol.	Unit	Man power	Index	Productivity per Day	Number of days completed work for 1 worker	Total Man power	Workday Plan
		a			b	c=1/b	d=a/b	e	f=e/d
	16th – 19th Floor								
1	Metal Deck	5277,49	m2	Worker	0,440	2,27	2322,09	66	35,18
				Carpenter	0,220	4,55	1161,05	33	35,18
				Head Worker	0,022	45,45	116,10	3	35,18
				Foreman	0,022	45,45	116,10	3	35,18
2	Reinforcement	24.401,18	kg	Worker	0,070	14,29	170,81	70	2,44
				Reinforce ment Worker	0,070	14,29	170,81	70	2,44

				Head Worker	0,007	142,86	17,08	7	2,44
				Foreman	0,004	250,00	9,76	4	2,44
3	Concrete	555,72	m3	Worker	0,438	2,29	243,13	14	17,37
				Foreman	0,031	32,00	17,37	1	17,37
	Metal deck								**35,18**
	Reinforcement								**2,44**
	Concrete								**17,37**
	Total								**55**

Source: Author's Processed Data, 2019

From the results of the calculation of the work time above, there are difference time. For conventional floor slab takes 80 days, whereas for metal deck composite floor slab work takes 55 days. Therfore metal deck composite slab method is 25 days faster than conventional slab method.

CONCLUSIONS

Table 8. Cost and Time Comparison

No	Description	16th – 19th Floor Conventional Slab	16th – 19th Floor Metal Deck Slab	Cost and Time Efficiency
1	Total Cost	Rp2.385.522.507	Rp2.522.774.722	Rp137.252.216
2	Work Time	80 days	55 days	25 days

Source: Author's Processed Data, 2019

Based on Table 8 and from the analysis and discussion in the previous chapter, we get the following conclusions

1) In the Cibubur Transpark Project Tower C area for metal deck composite floor slab method is more expensive than conventional floor slab method with a difference of Rp. 137.252.215,54.

2) In the Cibubur Transpark Project Tower C area, the work time of metal deck composite floor slab is faster than conventional floor slab with a work time difference of 25 days.

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