
COMPARISON OF METHOD WORK IMPLEMENTATION IMPROVEMENT OF SLOPE STABILITY IN TERMS OF COST AND TIME (CASE STUDY: PROJECT MANAGEMENT ROADS SLOPE RAMPA- PORIAHA / MUNGKUR (WINRIP))

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ABSTRACT

Rampa street - Poriaha / Mungkur (WINRIP) is one location that has a slope angle on its slopes prone to landslides, causing damage to some roads. Based on these conditions, the Ministry PUPR slope handling project launched on this road. In practical improvements slope stability was conducted using three methods: manlift, hanging platforms and scaffolding. All three methods have their advantages and disadvantages in terms of both cost and time. To obtain the results of the comparison of cost and time to do the direct observation and study of literature, the comparative results obtained on the cost and time to get the method implementation in accordance with needs. From the three methods, the lowest cost and the fastest duration of the results implementation method using manlift with cost of Rp 1,557,623,470 and duration of work 29 days

Key words: manlift, hanging platforms, scaffolding, cost, time

INTRODUCTION

Slopes are the earth's surface that forms a specific tilt angle with the horizontal plane (Arief, 2007). The slope is the angle formed by the height difference of the land surface (relief), which is between the plane of the ground with the horizontal plane and is generally calculated in percent (%) [1]. Where according to the United States Soil Management System said steep slope with a slope of 25-55%, very steep > 55%. Due to the angle of inclination on the slopes of one of the problems that often occur on slopes that slope stability problems.

Slope stability problems have often occurred as in Sukabumi in January 2019, Bengkulu landslide in April 2019 and Rampa Street - Poriaha who have problems on the stability of slopes in February 2019 experienced a landslide anyway.

Rampa street - Poriaha is a road that connects the village of Rampa, District Sitahuis to the village of the District Poriaha Buts Nauli Central Tapanuli, North Sumatra. This road is one of the new roads National recently completed at the end of 2018. However, due to the slope is so steep cause damage in part of this road, so frequent occurrence of landslides, at km 8 and km 9 road Rampa - Poriaha. The occurrence of landslides is dangerous for the rider who will cross Highway Rampa - Poriaha this, therefore, the Ministry of Public Works and Public Housing Directorate General of Highways National Road Implementing Agency II Terrain Unit

Implementation of the National Road Region III North Sumatra province made the handling of the slopes on the highway Rampa - this Poriaha.

In Slope Treatment Project Highway Rampa - this Poriaha, slope dealt with several such methods are used manlift, hanging platforms and scaffolding. Therefore, the implementation of the work required an appropriate method of implementation, in terms of both cost and time. The dominant cost and time could become an option for contractors as service providers to choose the method of implementation that will be used in the field. So that researchers interested in comparing methods of implementation of the repair work slope stability in terms of cost and time Project Management case studies Slope Road Section Rampa - Poriaha / Mungkur (WINRIP).

Formulation of the problem

Based on the background of the problems that have been obtained, it can be formulated as follows:

1. What is the cost and time of use of methods of execution using a manlift, hanging platforms and scaffolding?
2. What method of execution in accordance with the needs in terms of cost and time that could be used?

Research purposes

Based on the background of the problems that have been obtained, it can be formulated as follows:

1. Knowing the cost and time of using manlift, hanging platform and scaffolding implementation methods.
2. Provide recommendations for implementation methods that are appropriate to the needs in terms of cost and time.

Review of Literature

Method of construction is a series of construction activities that follow procedures and have been designed in accordance with the standards of knowledge or tested. In the use of these methods are not apart from accelerating the process of development and use of technology as a supporter of the method. So that the implementation method can lead to development activities to run smoothly as expected and can be economical in terms of cost and faster in terms of time.

Methods of construction were made by technical means that illustrate mastery systematically completion of the work is made from start to finish covering the main work order so that it can be justified technically. Methods of construction should be in line with the implementation period (work schedule) and analysis of unit price. In preparing the implementation methods made must meet the requirements in document election at the time of tender (auction) so that there is a match between the stages of the work from beginning to end, agreement between the methods of work with major equipment offered as well as compatibility between working methods and the specifications / volume of work contained in the tender documents. [2]

Implementation Method Works Soil nailing

Preparatory work

The preparatory work consists of, mobilization, site preparation work, perapihan location as well as the preparation before the execution of the work.

Anchor Drilling Works

By using Anchore drilling anchor drilling work carried out. At the stage of this work there are several methods of execution to move from anchor to anchor one another, using either a

manlift, hanging platforms or scaffolding. When using a manlift and hanging platforms still assisted by a crane as a means of conveyance, whereas when using scaffolding conveyance assisted with the chain block. Once the tools are in a position corresponding point plan, then point the drilling pipe in accordance with the angle of the plan. In its implementation of anchors 32mm diameter with a length variation between 4m - 10m.

Flushing jobs

Once drilling is completed the drill hole is washed using water pump is inserted into the borehole through a pipe diameter of $\frac{3}{4}$ ". With the aim of all the residual drilling mud out of the hole that facilitate the next phase of work.



Picture 1 Anchor installation using Transport Equipment Manlift
 Source: Documentation Project, 2020



Picture 2 Anchor installation using pipe Scaffolding
 Source: Documentation Project, 2020

Entered Reinforcing Steel Threaded (Nail / Anchor)

"Nail" used ie rebars D32 BJTS50. In the reinforcing steel is equipped with a centralizer and drat. Centralizer serves to establish a position in order to remain in the middle - the middle of the borehole, and to serve as a point of attachment of threaded steel plate and the locking bolt at the end of the job later. Nail mounted centralizer with the amount varying according to the nail length that varies between 2-5 centralizer.

Work Grouting

grouting isfilling liquid concrete into the hole that has been drilled. In the execution carried outmixing between water and cement with a weight ratio of 1: 2 to produce concrete K225, also added Additive conbex 100 added as much as 0.5% by weight of cement to accelerate the process of hardening of the mortar. On the bottom side of the hole section included first concrete mold semicircle. The concrete work included such as flushing with PVC media. In a

mixture of water and cement the shrinkage is inevitable, therefore, repetition of cement water charging continues until the next two days,

Installation Work Wire Mesh and Matras

On This work overlaid with the hooking wire mesh wire on each - each anchor that has been installed and locked by the spike plate, as an avalanche barrier material prior to execution of work hydroseeding.



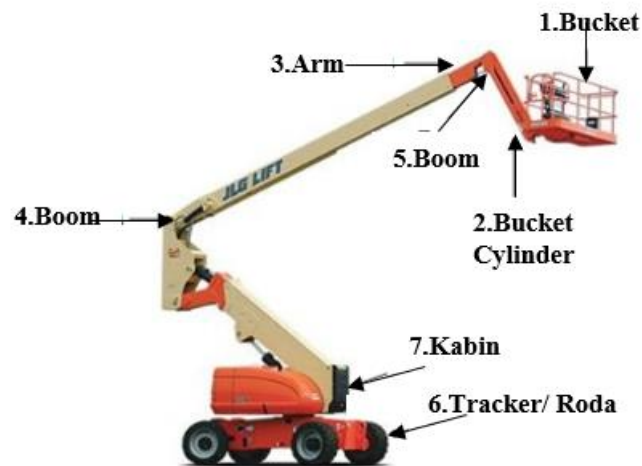
Picture 3 Installation Work Wire Mesh
 Source: *Documentation Project, 2020*

Implementation of Test Pull Out

Pull-out test is a test of whether the nail is able to withstand tensile force in accordance with the capacity plan. This test is performed after the concrete grout has reached the age of the plan. Its implementation on some random nail was considered critical.

Manlift

Manlift is the best kind of heavy equipment lifting / lifting that has a function to transport humans. Several variations of this manlift among which straight boom, articulating booms, scissor lifts, mechanical lifts and pedestal mounted aerial lifts. Manlift has several components as in Fig.



Picture 4 components Manlift
 Source: *Revelation Choirul Boediono Mulyatno (slideplayer), 2019*

Hanging platform

Platform hanging is one particular type of platform used for the construction of vertical structures. Hanging platform can be seen in Fig.



Picture 5 Hanging platform

Source: *Documentation Project, 2019*

The use of hanging platform used in the construction of the slope reinforcement, finishing work on building projects, as well as the maintenance or building maintenance. Hanging platform operated by skilled manpower in the field of rock climbing that is usually on projects that require workers in the field using a platform hanging heights and required proof in the form of certificates of expertise in the field pajat or mountain climbing.

Platform hanging, consists of several components such as: platform, cross, hook, as well as full body Hornest equipment. The use of hanging platform can be used in handling projects slope as in Fig.



Picture 6 Slope Treatment Works uses Hanging Platform

Source: *Documentation Project, 2019*

scaffolding

scaffolding is a proponent of temporary construction used in the work at height to support the equipment, labor, and other materials as long as the work progresses. Scaffolding is often used on the job - a job with a large scale, especially in positions of buildings - buildings.

frame Scaffolding

frame scaffolding is scaffolding which consists of a frame or frame iron pipe. One advantage of this type is the ease of installation and dismantling. Frame scaffolding can be seen in Figure 2.



Picture 7 frame Scaffolding

Source: *Documentation Researcher, 2018*

Tube and Coupler Scaffold (Scaffolding Pipe)

Tube and Coupler Scaffold is a scaffolding composed of rods - rods interconnected pipe with clamps and bolts as shown in Fig. The advantage of this type is of the form that can be assembled and adjusted easily adapts to the needs.

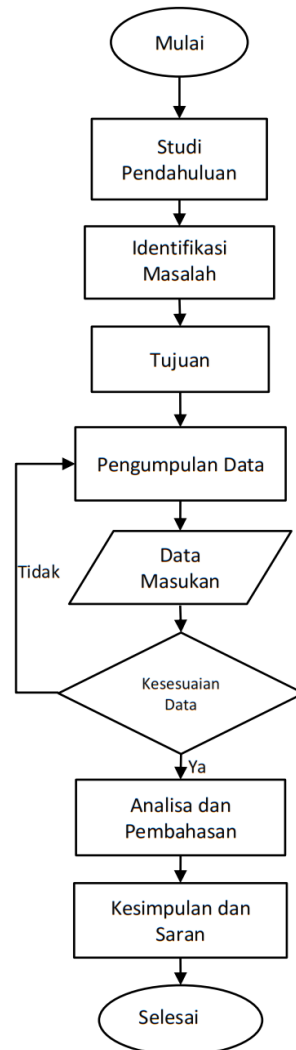


Picture 8 scaffolding Pipes

Source: *Documentation Researcher, 2019*

RESEARCH METHODOLOGY

To achieve the objectives of this research, the study is divided into several stages, including:



Picture 9, Flow Diagram research
 Source: *Processed Data Researcher, 2019*

The method used in this research is data collecting samples by direct observation to get a comparison of the time, and it requires a literature study by sulking on the list of unit price to get a cost comparison. Instruments in the study itself using Microsoft Excel software assistance.

RESULTS AND DISCUSSIONS

On this slope stability improvement works sampled the entire length of the anchor on the amount of repair work surface slope stability in zone 1 with the amount of depth is 2730 m '.

Cost

In the cost analysis calculation consists of direct and indirect costs to make a cost comparison on each individual - each tool as well as a job. Time work affects the indirect costs of work.

Table1 Recap Employment Cost Method Handling Slopes use Manlift

No.	commentary	Unit	Volume	Unit price	Total
1	Direct cost	month	1	1,192,052,814.86	1,192,052,815
2	Indirect Costs	ls	1	259,600,000	259,600,000
		amount			1,451,652,815
		SCF (4.3%)			62,421,071
		Income tax (3%)			43,549,584
		Total number			1,557,623,470

Source: Processed Researcher, 2019

Table2 Recap Handling Employment Cost Slope using Method Scaffolding

No.	commentary	Unit	Volume	Unit price	Total
1	Direct cost	month	1	2,044,750,964.86	20,44,750,965
2	Indirect Costs	ls	1	472,300,000	472,300,000
		amount			2,517,050,965
		SCF (4.3%)			108,233,191
		Income tax (3%)			75,511,529
		Total number			2,700,795,685

Source: Processed Researcher, 2019

Table3 Recap Employment Cost Management Platform Slope using Method Hanging

No.	commentary	Unit	Volume	Unit price	Total
1	Direct cost	month	1	1,450,045,814.86	1450,,045,815
2	Indirect Costs	ls	1	477,200,000	477,200,000
		amount			1,927,245,815
		SCF (4.3%)			82,871,570
		Income tax (3%)			57,817,374
		Total number			2,067,934,759

Source: Processed Researcher, 2019

Time

From the results of direct observation at the time was no difference in execution of work is more focused on setting tool and a long time of preparation. So getting results for the execution time by using methods of implementation manlift 29 days, 47 days hanging platforms, and scaffolding 74 days.

Recap Analysis of Cost and Time

Having obtained the cost and time of implementation of the work on each - each method of implementation are obtained recapitulation of the analysis are:

Table4 Recap of Costs and Time Management Implementation Method Slope

commentary	methods of Implementation		
	Manlift	Hanging platform	Scaffolding
Time (days)	29	46	73
Cost (Rp)	1,557,623,470	2,067,934,759	2,700,795,685

Source: Processed Researcher, 2019

CONCLUSION

After observation and analysis concluded things - matters relating to the implementation of the method of handling such slopes as follows:

1. The results obtained after analysis is the cost and time of implementation slope treatments using methods manlift Rp 1,557,623,470 with a construction period for 29 days, using a hanging platform that is Rp 2,067,934,759, - the time of execution for 46 days, and the use of scaffolding USD Rp 2,700,795,685 with implementation duration is 73 days.
2. From the analysis results obtained slope treatments execution method in accordance with the needs in terms of cost and time is the method of execution using a manlift.

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