



Republic of the Philippines  
DEPARTMENT OF PUBLIC WORKS AND HIGHWAYS  
**OFFICE OF THE SECRETARY**  
Manila

897.13 PPAH  
01-16-2020

JAN 14 2020

DEPARTMENT ORDER )

15 )

NO. )  
Series of 2020 )

**SUBJECT: Amendment to D.O. No. 112, s. 2019 re:  
"Revised Design Standards for Tourism  
and Farm to Market Roads"**

For consistency, and to further provide specific guidelines in the design standards for tourism and farm to market road projects, the following modifications in the hereunder specified design elements and requirements for tourism and farm to market roads per D.O. No. 112, s. 2019 are hereby prescribed:

Design Elements	Farm to Market Road	
	Per D.O. 112, s. 2019	This Amendment
Pavement Width	Minimum of 6.1m for two-lanes • Average daily traffic between 200 - 400	Minimum of 6.1m for two-lanes • <b>Average daily traffic of 200 and above</b>
Bridges Carriageway Width	• 4.60m (for 4.0m roadway width) • 5.60m (for 5.0m roadway width)	• <b>5.60m (for 5.0m roadway width)</b> • <b>6.70m (for 6.1m roadway width)</b>
	Tourism and Farm to Market Roads	
	Per D.O. 112, s. 2019	This Amendment
Slope Protection	As needed	Requirement and selection of type as per attached " <b>Annex A</b> "

All the other design standards specified in Department Order No. 112, s. 2019 shall remain enforced until such future amendments or revision relative thereto is issued.

This Order shall take effect immediately.

**MARK A. VILLAR**  
Secretary

5.1 DLB/ECM/AMD

Department of Public Works and Highways  
Office of the Secretary



WIN0R01523

## Selection of Slope Failure Countermeasures

Classification	Principal Goal	Work Category	Work Sub-category	Purpose or Details of the Work	Application Range and Special Features	
Control works Control works (1)	Protecting the slope from the action of rain	Drainage works	Surface water drainage work	Preventing surface water from flowing on the slope by rapidly collecting and draining surface water outside the slope. It includes drainage channels at the top of the slope, berm drainage works, slope toe drainage channels, longitudinal drainage channels, permeation prevention work, and check dams	One of the most basic methods, it is rarely used alone, but almost always with another method.	It is used in almost all works. Its cost is low and it is very cost-effective. This method includes drainage channels that drain the collected water out of the slope area.
			Underground water drainage work	Stabilizing the slope by draining the underground water seepage to lower the pore water pressure. It includes culvert work, impervious wall works, collection well, etc.		It is used at locations where landslide type failure is predicted or where there is a lot of underground water. It is often used for work smaller than landslide prevention work.
	Protecting the slope from the action of rain	Slope Protection work using vegetation	Sodding work	It includes spreading seeds, soil dressing, thick layer spraying method, vegetation network, sand bag works, sodding, vegetation pots, and transplanting. It is done to prevent rainwater erosion, reduce surface temperature and beautify slopes by reforestation.	When the principal method is vegetation, it is a cut slope with little spring water, where in principle, a standard slope gradient can be guaranteed.	
			Spraying	Preventing erosion of the slope along with weathering of the slope and a decline in the strength of the ground that forms the slopes by blocking it from the atmosphere, rainwater, etc.	It is superior because it harmonizes the slope with its surrounding environment.	
		Pitching Work	Stone pitching, block pitching, concrete slab pitching	Preventing weathering, erosion, and fine separation or failure etc. of slopes.	It is suitable for rock with little spring water, which has only a few cracks, and where a large failure has not occurred. Its use is premised on a full study of its durability and of its impact on the environment.	
			Concrete pitching			Stone pitching or block pitching is pitching is used on slopes with a gradient less than 1:1.0 that are suitable for vegetation work, and on slopes of non-cohesive sand or hard plan pan and fragile clay. Concrete pitching is used on rock slopes or slopes of compacted soil with developed joints and a steep gradient greater than 1:1.0 that would presumably be unstable with spraying or pre-cast grating crib works.
		Grating Crib works	Pre-cast grating crib works	Cast-in-place concrete or pre-cast grating crib works are assembled on the slope and either vegetation is planted or concrete poured inside them to prevent weathering/erosion of the slope. Pre-cast grating crib works that have been developed provide preventive effects.		Pre-cast crib works are used on slopes with a gradient gentler than 1:1.0 and cast-in-place grating crib works are used on steep slopes. The vertical height of pre-cast grating crib works is, in principle, no higher than 5 m, and if it is greater than this, separation walls are installed at intervals of 10 m in the vertical direction. But where berms cannot be formed, the cast-in-place method is used.
			Cast-in-place concrete grating crib works	Cast-in-place concrete grating crib works also have a preventive effect. The cast-in-place grating crib work methods include spraying crib works		

Classification	Principal Goal	Work Category	Work Sub-category	Purpose or Details of the Work	Application Range and Special Features
Restraint works	Control works (2)	Others	Other slope protection works	These include plastic soil cement works, net works, fluid synthetic resin spray works, mat-covering works, asphalt slope works, etc., and are intended to prevent erosion.	Because of their durability and environmental properties, these are not appropriate for steep slope failure countermeasures, and are rarely used for these purposes. But they are used for temporary works or partial use.
		Cutting unstable soil mass	Cutting work (A)	Overhangs are cut, unstable surface soil layers are cut, and unfixed stones removed, to eliminate soil layers or rock mass at risk of collapse.	One of the most basic countermeasures, it is also one of the most reliable if it is thoroughly implemented. It is often used along with drainage works, vegetation works, and structural protection works using structures.
		Cutting work that improves the shape of the slope.	Cutting works (B)	Cutting the slope to a gradient or height necessary to maintain its safety even under the action of rainfall	It is one of the most basic countermeasures, and one of the most reliable methods when it is executed safely. It is often combined with drainage works, vegetation works, or slope protection works based on structures. It is often impossible to execute it completely, when homes are constructed close to the top or bottom of the slope or when the volume of cut soil would be huge, so it is often combined with another method (retaining wall, etc.).
	Retaining wall	Retaining wall	Stone masonry or block masonry retaining wall	Preventing small failure at the bottom of the slope.	When it is a soil slope with gradient steeper than 1:1.0 (normally 0.3:1 to 0.5:1), and the earth pressure is low because the ground behind it is firm.
			Leaning concrete wall	In addition to directly preventing failure, effectively protects the slope from erosion and weathering.	It can be used on ground with inadequate solidity: less than of gravelly ground. Even in a narrow space, it is compatible with changing topography without taking space.
			Gravity concrete retaining wall	Directly preventing failure, stabilizing counterweight fill, and providing a foundation for slope protection works.	It is used to stabilize the bottom (toe) of slopes, and to prevent failure. It is used in the middle parts of slopes.
		Anchor works	Concrete crib retaining wall	Preventing small failures and stabilizing slopes with a lot of spring water and relatively soft ground.	Because of its good permeability and its flexibility, it is suited for places where there is a lot of spring water and the ground is soft, or to prevent landslide type failure.
			Ground anchor work and rock bolt work	It is used along with cast-in-place concrete grating crib work, concrete retaining wall work, concrete pitching work, or other countermeasures to stabilize these works in order to prevent failure and sliding of severely weathered rock, rock with many cracks, and surface soil. It also anchors rock that is cracked, has joints, or bedding stratification to rock that is internally stable to prevent its failure and separation.	It is appropriate for cases where there are dwellings at the top or bottom of the slope, if cutting work, passive retaining wall work, etc. cannot be done, if the slope gradient is steep and the slope is long, and cast-in-place grating crib work, concrete grating crib work, concrete pitching work, etc. are not stable enough. It is particularly appropriate when the ground or rock to which the anchor is fixed is relatively solid and shallower than the slope surface.

Classification	Principal Goal	Work Category	Work Sub-category	Purpose or Details of the Work	Application Range and Special Features	
Others	Preventing falling rocks	Pile works	Pile work	Installing piles in a slope so that the bending moment and shear resistance of the piles resist sliding force to improve the stability of the slope.	It is used in special cases of steep slope failure prevention work. It is used to prevent failure of slopes where landslide type failure is predicted and of bedrock slopes that act as dip slopes.	
		Counterweight fill work	Counterweight fill work	Forming an embankment at the bottom of a place where failure is predicted to stabilize it by resisting sliding force.	It is rarely executed by itself, because there is little room for execution on a steep slope. It is executed along with a gravity retaining wall.	
		Rock fall countermeasure work	Rock fall protection work	Work intended to prevent rocks from falling. It includes rock removal and foot protection works.	Cutting work, drainage work, grating crib work, spraying work and pitching work are also used to prevent rocks from falling.	Usually provided as a supplementary measure with failure prevention work.
Methods that combine the functions of control work and prevention work		Fence work	Earth retaining fence work	Method of protecting dwellings etc. from falling rocks. It includes preventive network, preventive fence work and preventive retaining wall work.	Its foundation is often made by combining it with retaining wall work.	
			Wicker work	Used to prevent failure in cases of relatively gentle slope with a thin surface soil layer and prevent such failure from spreading.	It is appropriate for relatively large slopes. It can be executed while preserving existing vegetation on the slope.	
			Gabion work	Used as supplement to vegetation work in order to prevent erosion of the surface soil of the slope by rain and surface water.	It is used along with vegetation work and slope grating crib work on relatively gentle slopes where cutting work has been done.	
Work methods that prevent damage when failure occurs		Passive work	Passive concrete retaining wall work	Preventing slope erosion and acting as counterweight fill work.	As a steep slope failure prevention work method, it should not be used to completely cover the slope. There are cases where it is used as a provisional method in a transitional area with adjoining natural ground.	
Protective work used during execution of prevention work		Temporary protective work	Temporary protective fence work	In cases where it would be difficult to directly prevent failure of a slope, a gravity retaining wall is constructed at a distance from the bottom (toe) of the slope to halt the soil produced by a failure.	It should be used along with methods executed to improve slope conditions as much as possible. It is often used on large slopes. It is effective when it is necessary to preserve the existing vegetation as much as possible.	
				Protecting lives and properties from collapsed soil and falling rocks during the construction of failure prevention work.	The installation of temporary protective fence work is required when executing steep slope failure prevention work.	

Note: Actual application is subject to slope stability analysis using actual parameters

Source : DPWH Design Guidelines, Criteria and Standards 2015, Volume 4 - Highway Design