Technical Development to Popularize Physical Devices Contributing to the Formation of Safe and Secure Residential Streets

(Research period: FY2019–)

Road Safety Division, Road Traffic Department

IKEDATakeshi Senior Researcher (Ph.D.Engineering) HIRAKAWA Takashi Guest Research Engineer MORI Fumika Guest Research Engineer

MURAKAMI Maho Researcher KOBAYASHI Hiroshi Head (Ph.D.Engineering)

(Keywords) Residential streets, traffic safety measures, physical devices

1. Introduction

Traffic safety measures in residential streets basically consist of appropriately combining traffic regulations, such as speed restrictions, and physical device installations with the aim of suppressing vehicle speeds and through traffic (fig. 1).

Physical devices include road humps, where the road surface is raised, narrowing, where the section vehicles pass through is made narrower, and doglegs and chicanes, which cause vehicles to follow lines that zig-zag or deflect horizontally. While these have the effect of encouraging drivers to slow down, road administrators may hesitate to install them because of concerns about reaching agreement on them or their construction and maintenance. Therefore, NILIM has conducted technical development to resolve these concerns and ensure their popularization.

This paper reports on construction methods for asphalt-paved road humps and examples of managing physical devices in winter in snowy areas, which road administrators in particular often inquire about.

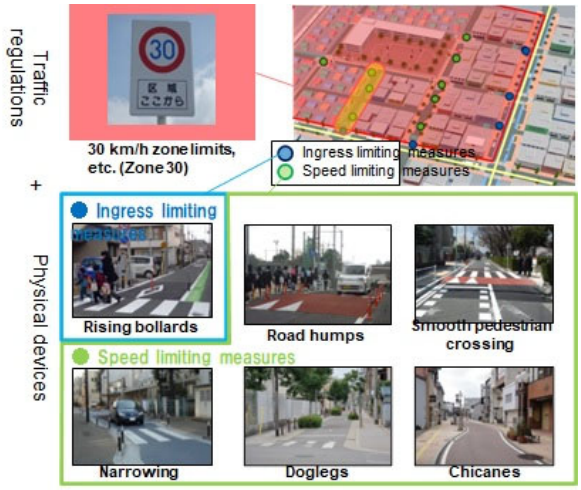

Fig. 1. Images of safety measures for traffic in residential streets

2. Construction method for asphalt-paved road humps

For the sloped portion of road humps, a sine wave shape is supposed to be preferable to limit noise and vibration. This shape is not formed by merely smoothing off both edges of the slopes, but rather as a continuously changing curved surface (fig. 2), but the formation method has not been shown and we receive many inquiries from road administrators. In addition, upon investigating the height of the road centerline in existing road humps using the Mobile Mapping System (MMS), we confirmed that differences from the sine wave shape arise in some cases (fig. 3).

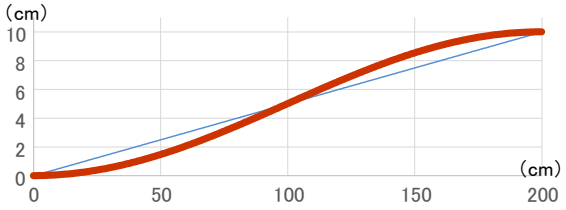

Fig. 2. Shape of the sloped portions of a road hump (sine wave shape)

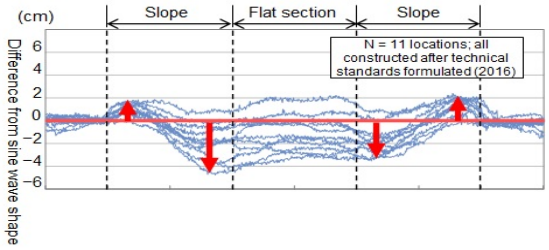

Fig. 3. Differences between existing road humps and the sine wave shape

Given this, we looked at ways to construct road humps through test construction on NILIM's test track. As a result, we were able to verify that a shape close to a sine wave can be made by constructing the sloped portions using sine wave-shaped forms (photo) and then adding innovations for the smoothed portion of the existing road surface, such as cutting part of the existing road surface to secure the pavement thickness. (The construction procedure for the sloped portion is shown in fig. 4.) The *Reference Materials on Construction of Road Humps (draft)*, which summarize these outcomes, have been published on the NILIM website, together with data on sine wave shapes (CAD, PDF).

Photo. Forms for sine wave shapes

(Can be manufactured at woodworking shops using CAD/PDF data)

Fig. 4. Construction procedure for sloped portions of road humps

3. Examples of managing physical devices in snowy areas

Many express hesitancy about installing physical devices due to concerns about winter management, but there are numerous examples of installation in snowy areas as well. We have investigated examples of managing locations like these during winter through on-site investigations and interviews with road administrators and snow removers (table).

Among the surveyed locations, Hokkaido used mechanical snow removal (snow removal by snow grader and snow transportation and clearing by rotary plow and dump truck). We found that snow could be cleared smoothly by raising the blade (fig. 5) where the road humps are installed and that poles or the like would preferably be installed at the positions of the road humps as a marker for this operation.

On the other hand, in surveyed locations in Hokuriku, snow was melted by installing snow-melting pipes and spreading water. In examples of road humps here, innovations were introduced by installing water nozzles running across the road on the flat sections of the road humps, where they would normally be installed along the length of the road (fig. 6).

We are still investigating traffic (speed reduction) conditions in winter, the conduct of mechanical snow removal, and thoughts about snow-melting pipe designs, among other topics, and we intend to create technical notes summarizing these outcomes in the future.

Table. Outline of investigation results

	Area	Physical device	Install date	Arrangement, etc.	Characteristics of winter management
Left in place during winter	Hokkaido	Road humps	1987	Several road humps on same route	Mechanical snow removal
		Road humps	c. 1999	Several road humps on same route	Mechanical snow removal
		Road humps	c. 2003–09	Several road humps in the area	Mechanical snow removal
	Hokuriku	Road humps	1987	Several road humps on same route	Snow-melting pipes (newly installed)
		Narrowing	2017	Several narrowings on same route	Snow-melting pipes (existing)
Removed during winter	Hokkaido	Narrowing	c. 2013	Several narrowings on same route	Narrowings (rubber poles) removed (mechanical snow removal)
	Hokuriku	Road humps	2017	One road hump location at village entrance	road humps (movable) removed (mechanical snow removal)

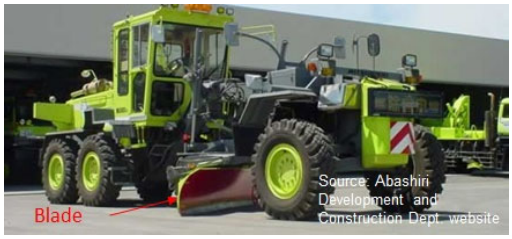

Fig. 5. Example of blade of snow grader

Fig. 6. Example of snow-melting pipe installation

4. Conclusion

This paper presented some of NILIM's efforts in technical development, etc. that support safety measures for traffic in residential streets.

We hope to work aggressively on technical support for local government, which is responsible for evaluating and implementing control measures in line with future policy enactment, and to continue working on the technical development necessary for that, incorporating comments from the field.

☞See here for detailed information

1) (NILIM) *Introduction of safety measures for residential streets*
http://www.nilim.go.jp/lab/geg/seikatsu.htm