

Reusable Paving Slab for Temporary Road and Method for Paving Temporary Road with the Same

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Technical Field

10 The invention relates to the field of construction engineering, more specifically to a reusable paving slab for temporary road and a method for paving the temporary road with the paving slab. The invention can be widely applied in a variety of construction works, civil works and road traffic engineering for rapid formation of large-area solid grounds or simple roads.

Background

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During construction or other engineering works, it is unavoidable to build or rebuild temporary road at or around the construction site. There are two ways to build the temporary road. The first method is to level off and compact the ground simply to build a simple type of muddy road. With this method, the dust will blow on the construction site, which will pollute the surrounding areas. The other method is to make a temporary road by laying cement pavement so that people or vehicles can travel on it; after completion of such construction work, the temporary road has to be removed. Therefore, the temporary road would have to be dug up and removed, the process of which will unavoidably generate heavy dust and noise pollution. Generally speaking, the temporary road varies with different construction stages. It has to be built and removed repeatedly, which not only wastes time and energy, but terribly wastes the cement, increases the construction cost and pollutes the environment. It does not comply with current demands for building a conservation-minded society and promoting environmental protection.

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Summary

35 The invention aims to provide a reusable paving slab for temporary road and a method for paving the temporary road with the paving slab. The paving slab can be used for paving the temporary road and is reusable. It can be easily assembled, disassembled, lifted and moved, and is environment friendly. It can solve many problems, such as the tedious procedures of paving the solid cement ground, resource waste and cost increase.

In order to solve the above technical problems, the invention provides a reusable paving slab for temporary road for rapid formation of solid grounds or simple roads on a large-area construction site, comprising a modularized rectangular reinforced concrete (RC) panel, which contains therein a reinforcement mat consisting of a plurality of longitudinally extending and laterally extending steel bars linked with each other, wherein the rectangular RC panel is provided with a plurality of grooves, which are evenly distributed adjacent to edges of the rectangular RC panel in the upper surface of the rectangular RC panel, and a hook arranged in each of the grooves in a hidden manner, the hooks being anchored to the reinforcement mat and the top thereof being slightly lower than the upper surface of the rectangular RC panel.

The reusable paving slab according to the invention further includes a sector-shaped RC panel for being paved at a bend of the road, the radius of which corresponds to the width of the standard road, wherein the sector-shaped RC panel contains therein a reinforcement mat consisting of a plurality of longitudinally extending and laterally extending steel bars linked with each other, and wherein the sector-shaped RC panel is provided with a plurality of grooves evenly distributed adjacent to edges of the sector-shaped RC panel in the upper surface of the sector-shaped RC panel, and a hook arranged in each of the grooves in a hidden manner, the hooks being anchored to the reinforcement mat and the top thereof being slightly lower than the upper surface of the sector-shaped RC panel.

The modularized rectangular RC panel has a length of 3m, a width of 2.4m and a thickness of 175mm or 100mm. Four hooks are symmetrically arranged near four corners of the rectangular RC panel.

The rectangular RC panel includes two layers, i.e., an upper layer and a lower layer, of reinforcement mats linked to each other, and the four hooks near the four corners are anchored to the upper and the lower layers of the reinforcement mats respectively.

Both of the rectangular RC panel and the sector-shaped RC panel are used at the bend of the temporary road, and the gap between the two RC panels is filled and leveled up with cast-in-situ concrete.

The surface of the rectangular RC panel or the sector-shaped RC panel is rough, and the four sides of the surface are all chamfered.

5 The steel bars in the reinforcement mat of the rectangular RC panel and the sector-shaped RC panel are Ø10 ribbed steel bars and are spaced apart from each other by 300mm both longitudinally and laterally, and wherein the four hooks are Ø16 Zn-plated ribbed steel bars, and the top of the hooks is spaced away from the upper surface of the RC panels by no less than 10cm.

The invention further provides a construction method for paving temporary road with the above-mentioned reusable paving slab, comprising the following steps:

10 Step A, leveling out and compacting the foundation, laying down a layer of fine sand thereon, and setting up a drainage-facilitating cross slope according to the real landscape;

Step B, hooking the four hooks in the modularized rectangular paving slab by means of a four-jaw chain, hoisting the paving slab, and adjusting the lowering location thereof so as to locate it on the surface of the ground with fine sand;

15 Step C, hoisting another modularized rectangular paving slab, and adjusting the lowering position thereof so as to locate it in a position adjacent to the previous paving slab; and

Step D, repeating Step C to locate a next rectangular paving slab.

20 The construction method further comprises the following steps for pavement at a bend of the road: Step E, paving the sector-shaped paving slab followed by the rectangular paving slab at the bend of the road; and Step F, filling the gap between the two adjacent paving slabs and leveling up it with cast-in-situ concrete layer.

25 In Step A, after leveling out and compacting the foundation, a layer of fine sand with a thickness of 30mm is laid down on the foundation.

30 The invention has the following technical advantages: it is clean and pollution free; it will not produce waste from the construction process; it never occupies the construction site; it is reusable and saves resources. Due to use of modular and standard design, the paving slab matches the standard road in respect of size and shape. Prefabricated paving slab can be assembled, adjusted and varied at will so as to meet requirements at different construction stages. At the early stage of the work, a simple road above the earth can be made rapidly so as to enable construction vehicles
35 to enter into and move around the site. When the ground surface work and the underground work are undergoing, the scope of the solid ground can be changed at will. After the construction is completed, the prefabricated paving slabs can be moved to other construction sites for reuse, thus meeting the requirement for environmental

protection. With the hooks arranged in grooves in a hidden manner, the prefabricated paving slab can be hoisted conveniently. The intensity of labor is low, assembly is fast and the technology is simple.

5 **Brief Description of Drawings**

Fig. 1 shows the reusable paving slab for temporary road according to the invention.

Fig. 2 shows the horizontal sectional view of the paving slab of Fig. 1.

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Fig. 3 shows the vertical sectional view of the paving slab of Fig. 1.

Fig. 4a shows the horizontal sectional view of the hook arranged in the groove according an embodiment of the invention.

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Fig. 4b shows the vertical sectional view of the hook arranged in the groove according an embodiment of the invention.

Fig. 5 shows the groove located adjacent to edges of the RC panel according an embodiment of the invention.

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Fig. 6 shows the construction method of paving the road bend with the reusable paving slab of temporary road according an embodiment of the invention.

Fig. 7 shows the relationship among the RC panel, fine sand and foundation when paving the road bend with the reusable paving slab of temporary road according an embodiment of the invention.

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Preferred Embodiments of the Invention

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In the following the invention will be discussed in details with reference to the attached drawings and embodiments so that the objective, technical solution and advantages of the invention are more distinct. It should be understood that the particular embodiments as set forth herewith are intended to be illustrative only, not limiting the scope of the invention in any way.

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As shown in Figs. 1 and 2, the reusable paving slab for temporary road according to the invention comprises a modularized rectangular RC panel 1. The rectangular RC

panel 1 has a rough surface, and has a size and a shape corresponding to those of the standard road. The rectangular RC panel 1 contains a reinforcement mat 13 therein, which is made up of a plurality of longitudinally extending and laterally extending steel bars that are linked with each other. The reinforcement mat 13 is pre-buried within the concrete of the RC panel 1. The grade of the concrete is C35, so that the reusable paving slab for temporary road according to the invention can be used for paving the temporary road where trucks can pass safely.

The size of the rectangular RC pane 1 can be designed as needed. In an embodiment of the invention, the rectangular RC panel 1 has a length of 2m, a width of 2.4m, and a thickness of 175mm or 100mm. All of four edges of the RC pane 1 are chamfered. The 175mm thick rectangular RC panel 1 can be used for paving the road for heavy trucks, while the 100mm thick rectangular RC panel 1 can be used for paving the solid road, such as the passenger lane or the stock aisle.

As shown in Fig. 1, in order to hoist and move the paving slab to the destination site for pavement easily, the rectangular RC panel 1 is provided with several grooves 11 evenly distributed near edges thereof in the upper surface of the rectangular RC panel 1. In each of the grooves 11, a hook 12 anchored to the reinforcement mat 13 is arranged therein in a hidden manner. During pavement of the temporary road, the rectangular RC panel 1 can be easily hoisted by means of a four-claw chain 5, and thus can be moved to the construction site for paving the temporary road. The top of the hook 12 is slightly lower than the upper surface of the rectangular RC panel 1, so that trucks or passengers can travel safely on the temporary road formed according to the invention without colliding with the hooks.

Referring to Figs. 1 and 2 again, as a preferred embodiment of the invention, four grooves 11 are arranged in a symmetrical manner near four corners of the rectangular RC panel 1. Each groove 11 has a hook 12 arranged therein, which is anchored to the reinforcement mat 13. That is, there are four hooks in the rectangular RC panel 1. The top of the hook 12 is no less than 10cm away from the upper surface of the RC panel 1. As shown in Fig. 3, the rectangular RC panel 1 has two layers, i.e., an upper layer and a lower layer, of reinforcement mats 13 linked to each other. The reinforcement mat 13 is made up of a plurality of longitudinally extending and laterally extending steel bars that are linked to each other. The steel bars, in an example being Ø10 ribbed steel bars, are spaced apart from each other by 300mm both longitudinally and laterally. As shown in Fig. 5, the groove 11 is wide at the top and narrow at the bottom, so that the four-claw chain 5 can extend into the groove 11 and then catch on the

hooks. Then, the paving slab can be hoisted and moved to the place where the temporary road is required to be built.

As shown in Fig. 6, the reusable paving slab for the temporary road according to the invention further comprises a sector-shaped RC panel 2 used for paving the bend of the road. The surface of the sector-shaped RC panel 2 is rough, and the radius thereof corresponds to the width of the standard road. All of four edges of the sector-shaped RC panel 2 are chamfered. The curvature of the sector-shaped RC panel 2 can be designed as needed.

The sector-shaped RC panel 2 is provided therein with a reinforcement mat, which is made up of a plurality of longitudinally extending and laterally extending steel bars that are linked to each other. The reinforcing steel bars are Ø10 ribbed steel bars, and are spaced from each other by 300mm both longitudinally and laterally.

In order to hoist and move the sector-shaped RC panel 2 easily, the sector-shaped RC panel 2 is provided with several grooves (not shown) evenly distributed near edges thereof. In each of the grooves 11, a hook 12 anchored to the reinforcement mat is arranged therein in a hidden manner. The top of the hook is slightly lower than, e.g., at least 10 cm away from, the upper surface of the sector-shaped RC panel 2, so that trucks or passengers can travel safely on the temporary road formed according to the invention without colliding the hooks. As a preferred embodiment, the sector-shaped RC panel 2 is provided with four grooves located adjacent to the edges thereof, one hook being arranged in each groove. Therefore, there are four hooks 12 in total, which can be of Ø16 Zn-plated ribbed steel bars.

The design of the reusable paving slab for temporary road according to the invention is modularized and standardized. The paving slab matches the standard road in respect of size and shape. Moreover, the paving slab comprises the rectangular and the sector-shaped RC panels, and a reinforcement mat comprising many longitudinally and laterally extending steel bars linked to each other. Therefore, by assembling, adjusting and tiling the paving slab of the invention, a temporary road can be formed rapidly and both pedestrians and trucks can travel on it.

In addition, when forming temporary road according to the invention, no traditional method such as hardening the cement is applied. Rather, the four-jaw chain 5 catches on the hooks 12 in the paving slab and then the paving slab can be moved to the required area. When it is necessary to remove the temporary road, the paving slab of

the invention can be carried away for reuse. Therefore, the invention not only solves such problems as the tedious procedures of laying the solid cement ground, resource waste and cost increase, but also realizes reutilization of the paving slab, environmental economy and resources conservation.

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The invention further discloses a construction method for paving temporary road with the above-mentioned reusable paving slabs, comprising the following steps:

10 Step A: leveling out and compacting the foundation 3, laying down a layer of fine sand 4 and setting up a drainage-facilitating cross slope according to the real landscape, the gradient of the cross slope preferably being 1%;

15 Step B: hooking the four hooks on the modularized rectangular paving slab of the invention by a four-jaw chain 5, hoisting the paving slab, and adjusting the lowering location thereof so as to locate it on the surface of the ground with fine sand 4;

20 Step C: hoisting another modularized rectangular paving slab, and adjusting the lowering position thereof so as to locate it in a position adjacent to the previous paving slab; and

Step D: repeating Step C to locate a next rectangular paving slab in position.

25 With putting the modularized rectangular paving slabs one after another on a straight road through Step A to Step D, a straight and simple temporary road can be formed. When there is a bend in the road, the sector-shaped paving slab (as shown in Fig. 6) is used. Detailed steps are as follows:

30 Step E: Paving the sector-shaped paving slab followed by the rectangular paving slab at the road bend; and

Step F: Filling the gap between the two adjacent paving slabs and leveling up it with cast-in-situ concrete layer.

35 In order to ensure the road paved being standard and safe, it is preferred to lay down a 30mm thick layer of fine sand 4 after leveling out and compacting the foundation 3 in Step A.

Fig. 7 shows the relationship among the paving slab, fine sand and the foundation

when paving the temporary road with the reusable paving slab. After completing the pavement of the road, the temporary road may have one or two lanes, each being 3m wide.

- 5 In summary, when the reusable paving slab according to the invention is used for paving temporary road, it can be easily hoisted and moved, causing a simple and environment-friendly construction. A simple temporary road will be formed simply by joining the paving slabs one by one. When it is necessary to remove the temporary road, it is just required to use the four-jaw chain to catch on the hooks; in this case,
10 the paving slab of the invention can be delivered to other required areas. Therefore, the paving slab according to the invention can be reusable and will not pollute the environment.

- 15 While the invention has been described in conjunction with the preferred embodiments outlined above, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art. Various changes may be made without departing from the spirit and scope of the invention as defined in the following claims.

Claims

1. A reusable paving slab for temporary road for rapid formation of solid grounds or simple roads on a large-area construction site, comprising a modularized rectangular RC panel (1), which contains therein a reinforcement mat (13) consisting of a plurality of longitudinally extending and laterally extending steel bars linked with each other, wherein the rectangular RC panel (1) is provided with a plurality of grooves (11), which are evenly distributed adjacent to edges of the rectangular RC panel in the upper surface of the rectangular RC panel, and a hook (12) arranged in each of the grooves in a hidden manner, the hooks (12) being anchored to the reinforcement mat and the top thereof being slightly lower than the upper surface of the rectangular RC panel (1).

2. The reusable paving slab according to claim 1, wherein further including a sector-shaped RC panel (2) for being paved at a bend of the road, the radius of which corresponds to the width of standard road, wherein the sector-shaped RC panel (2) contains therein a reinforcement mat consisting of a plurality of longitudinally extending and laterally extending steel bars linked with each other, and wherein the sector-shaped RC panel (2) is provided with a plurality of grooves (11) evenly distributed adjacent to edges of the sector-shaped RC panel in the upper surface of the sector-shaped RC panel, and a hook (12) arranged in each of the grooves in a hidden manner, the hooks (12) being anchored to the reinforcement mat and the top thereof being slightly lower than the upper surface of the sector-shaped RC panel (2).

3. The reusable paving slab according to claim 1, wherein the modularized rectangular RC panel has a length of 3m, a width of 2.4m and a thickness of 175mm or 100mm, and wherein four hooks (12) are symmetrically arranged near the four corners of the rectangular RC panel.

4. The reusable paving slab according to claim 3, wherein the rectangular RC panel (1) includes two layers, i.e., an upper layer and a lower layer, of reinforcement mats (13) linked to each other, and the four hooks (12) near the four corners are anchored to the upper and the lower layers of the reinforcement mats respectively.

5. The reusable paving slab according to claim 2, wherein both of the rectangular RC panel (1) and the sector-shaped RC panel (2) are used at the bend of the temporary road, and the gap between the two RC panels (1, 2) is filled and leveled up with cast-in-situ concrete.

6. The reusable paving slab according to claim 5, wherein the surface of the rectangular RC panel (1) or the sector-shaped RC panel (2) is rough, and the four sides of the surface are all chamfered.

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7. The reusable paving slab according to claim 5, wherein the steel bars in the reinforcement mats (13) of the rectangular RC panel (1) and the sector-shaped RC panel (2) are Ø10 ribbed steel bars and are spaced apart from each other by 300mm both longitudinally and laterally, and wherein the four hooks (12) are Ø16 Zn-plated
10 ribbed steel bars, and the top of the hooks (12) is spaced away from the upper surface of the RC panels by no less than 10cm.

8. A construction method for paving temporary road with the reusable paving slab according to any one of claims 1 to 7, comprising the following steps:

15 Step A: leveling out and compacting the foundation, laying down a layer of fine sand thereon, and setting up a drainage-facilitating cross slope based on the real landscape;

20 Step B: hooking the four hooks in the modularized rectangular paving slab by means of a four-jaw chain, hoisting the paving slab, and adjusting the lowering location thereof so as to locate it on the surface of the ground with fine sand;

Step C: hoisting another modularized rectangular paving slab, and adjusting the lowering position thereof so as to locate it in a position adjacent to the previous paving slab; and

Step D: repeating Step C to locate a next rectangular paving slab.

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9. The construction method according to claim 8, where further comprising the following steps for pavement at a bend of the road:

Step E: paving the sector-shaped paving slab followed by the rectangular paving slab at the bend of the road; and

30 Step F: filling the gap between the two adjacent paving slabs and leveling up it with cast-in-situ concrete layer.

10. The construction method according to claim 8 or 9, wherein in Step A after leveling out and compacting the foundation (3), laying down a layer of fine sand (4)
35 with a thickness of 30mm on the foundation (3).