

A COVERED WALKWAY AND A CONSTRUCTION METHOD THEREOF

5 Technical Field

The present invention relates to a building structure and a construction method thereof. In particular, the present invention relates to a covered walkway, especially one suitable for outdoor areas such as residential areas or parks, and a construction
10 method thereof.

Technical Background

At outdoor areas like residential areas or parks, covered walkways are generally
15 provided so that in hot summer or rainy days pedestrians will not suffer sun burns or rain showers. In addition, green plants can be planted on the cover of the covered walkway so as to increase green space. Generally speaking, for the construction of a covered walkway, the base, pillars, beams and cover, each having a concrete structure, will be cast in situ at the construction site. However, this kind of cast-in-situ
20 construction method requires complicated procedures and long working period.

To this end, CN 102979026B discloses a covered walkway and a method for building the same. Said walkway comprises a prefabricated, one-piece concrete supporting frame unit, which is formed by two pillars and a bearing beam bridging
25 over the tops of the two pillars. The bottoms of the two pillars are cast with a cast-in-situ concrete base. The top of the supporting frame unit is provided with a plurality of semi-prefabricated base slab units, which are connected with each other through in-situ casting concrete thereon.

30 However, the above covered walkway has the following disadvantages. First, the

semi-prefabricated base slab unit of the cover is relatively thin and thus its strength may be insufficient. Therefore, during construction a truss or a scaffold has to be arranged at the bottom of the semi-prefabricated base slab unit to support the semi-prefabricated base slab unit, so that concrete can be cast thereon. This will not only require a large area of footprint, but also a high construction cost. In addition, the supporting frame unit is relatively heavy and large, so that a complicated and strong support structure is necessary when the pillar is connected with the cast-in-situ concrete base through casting. This connection is not secure and stable, and requires a long construction period and a large amount of building materials. Moreover, the cover is of a semi-prefabricated structure, so that concrete has to be poured on the cover. Therefore, many construction procedures are necessary.

Summary of the Invention

In view of the defects existing in the prior arts, this invention provides a covered walkway, which can be conveniently built at a reduced cost with a shortened working period and no scaffolds. It also provides a method for constructing the covered walkway.

To this end, the present invention adopts a technical solution as follows. That is, the present invention proposes a covered walkway, comprising a base, two pillars which are fixedly connected to the base from a right side and a left side, a bearing beam bridging over the tops of the two pillars, and a cover secured on the bearing beam.

The pillar, the bearing beam, and the cover are each formed by a complete-prefabricated member. The pillar is provided at its top with a bearing recess, and a reserved, exposed reinforcing bar extending along the bearing recess upwardly to the cover. The bearing beam is in engagement with the bearing recess at an end thereof, and provided with reserved, exposed reinforcing bars at the end and the top

thereof respectively, wherein the reserved, exposed reinforcing bar arranged at the end of the pillar is bound with that arranged at the end of the bearing beam. The cover includes a plurality of complete-prefabricated plate units, wherein each complete-prefabricated plate unit is in engagement with the bearing beam and with the pillar at respective ends thereof, and is provided with reserved, exposed reinforcing bars connected with the reserved, exposed reinforcing bars of the bearing beam and of the pillar, respectively.

The pillar, the bearing beam and the complete-prefabricated plate units are connected together through cast-in-situ concrete in the bearing recess and at regions where the complete-prefabricated plate units are connected with the bearing beam and with the pillar respectively.

The pillar is provided at its bottom with an inner grouting chamber in communication with a bottom surface of the pillar, and a grouting channel and a discharging channel, which both connect the inner grouting chamber with a side surface of the pillar. The base is provided with a reinforcing bar extending upwardly to the inner grouting chamber, and the base and the pillar are connected with each other through concrete poured into the inner grouting chamber.

At least two complete-prefabricated plate units are arranged between two adjacent bearing beams. A bridging portion is provided at a region where the complete-prefabricated plate unit is connected with an adjacent complete-prefabricated plate unit, at a region where the complete-prefabricated plate unit is connected with the pillar, and at a region where the complete-prefabricated plate unit is connected with the bearing beam. The bridging portion has a smaller thickness and a lower top surface compared with a middle portion of the complete-prefabricated plate unit. The bridging portion is provided with a reserved, exposed reinforcing bar, which is spliced with a corresponding reserved, exposed reinforcing bar of an adjacent member, and said at least two complete-prefabricated

plate units are connected with the pillar and the bearing beam together through in-situ casting concrete at the bridging portion.

The cover further includes two vertical railing plates, which are prefabricated on the complete-prefabricated plate unit and formed into one piece therewith.

The present invention further proposes a construction method for the covered walkway as mentioned above, comprising the following steps: Step A, securing two prefabricated pillars on the base; Step B, hoisting the prefabricated bearing beam and placing it at the bearing recess arranged a top of each of the pillars, and binding the reserved, exposed reinforcing bars located at the end of the bearing beam with that located at the top of the pillar; Step C, hoisting the complete-prefabricated plate unit to a position between two adjacent bearing beams, and binding the reserved, exposed reinforcing bars located at both ends of the complete-prefabricated plate unit with those located at the tops of the bearing beam and the pillar; and Step D, pouring concrete in the bearing recess and in the regions where the complete-prefabricated plate unit is connected with the bearing beam and with the pillar, so that the pillar, the bearing beam and the complete-prefabricated plate unit are connected together.

The pillar is provided at its bottom with an inner grouting chamber in communication with a bottom surface of the pillar, and a grouting channel and a discharging channel, which both connect the inner grouting chamber with a side surface of the pillar. In Step A, a reinforcing bar protruding upwardly from the base is provided, and the prefabricated pillar is hoisted to the base in alignment with the protruding reinforcing bar, so that the protruding reinforcing bar is inserted into the inner grouting chamber of the pillar, and then concrete is poured into the inner grouting chamber through the grouting channel, until concrete slurry is discharged from the discharging channel, with the pillar being supported by slanting braces finally.

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In Step C, at least two complete-prefabricated plate units are arranged between every two adjacent bearing beams. A thin and low bridging portion is provided at a region where a complete-prefabricated plate unit is connected with an adjacent complete-prefabricated plate unit, at a region where the complete-prefabricated plate unit is connected with the pillar, and at a region where the complete-prefabricated plate unit is connected with the bearing beam, wherein the bridging portion is provided with a reserved, exposed reinforcing bar, which is spliced with a corresponding reserved, exposed reinforcing bar of an adjacent member. In Step D, the complete-prefabricated plate units are connected with the bearing beam and the pillar together through in-situ casting concrete at the bridging portion.

Prior to the Step A, a metal support for supporting the bearing beam is arranged on an inner top end of the prefabricated pillar, and multiple metal supports for supporting the complete-prefabricated plate unit are arranged on each of both side surfaces of the bearing beam.

Compared with the prior arts, the covered walkway according to the present invention and the construction method thereof mainly have the following advantages. At the outset, the cover is made of complete-prefabricated plates, so that it is no longer necessary to cast concrete in-situ thereon. The cover has sufficient strength, and no scaffolds should be established under the cover during construction. Moreover, the cover has a small footprint, and a low cost. Further, there is no step of plastering, so that the construction procedure is simplified and the construction period is greatly shortened.

Moreover, since the pillar is connected with the base through grouting, the connection is more stable. During construction, the pillar can be supported by simple slanting braces only. Accordingly, the construction is convenient and safe, and the working period and material are both saved.

Furthermore, the bearing beam is arranged at the bearing recess of the top of the pillar, and concrete is poured therein. Accordingly, such a connection is more stable.

Brief Description of the Drawings

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Fig. 1 shows a cross-sectional view of a covered walkway according to the present invention along a direction perpendicular to the extent of the walkway;

Fig. 2 shows the structure of a pillar;

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Fig. 3 schematically shows the structure of a connection between a bottom of the pillar and a base;

Fig. 4 schematically shows the structure of a connection between a top of the pillar and a bearing beam;

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Fig. 5 schematically shows a longitudinal cross-sectional view of a region where a complete-prefabricated unit, the pillar and the bearing beam are connected together;

Fig. 6 schematically shows a transverse, cross-sectional view of a region where a complete-prefabricated unit, the pillar and the bearing beam are connected together; and

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Fig. 7 schematically shows a planar structure of a portion of a cover of the walkway.

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Specific Embodiments of the Invention

In the following the embodiments of the present invention will be explained in detail with reference to the attached drawings.

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As shown in Fig. 1, the covered walkway according to the present invention comprises: a base 1, at least two pillars 2, at least one bearing beam 3, and a cover 5. The pillars 2 are fixedly connected to the base 1, and arranged in two columns each at one side of the walkway. Each column of the pillars 2 includes several pillars spaced from each other along a lengthwise direction of the walkway. A bearing beam 3 bridges over a top of a pillar 2 in one column and that of a corresponding pillar 2 in the other column. The cover 5 is secured on the bearing beams, so as to cover the walkway from above.

The pillars 2, the bearing beams 3, and the cover 5 are each formed by a complete-prefabricated member. The base 1 can be formed with a cast-in-situ structure or a prefabricated structure. As shown in Fig. 3, a reinforcing bar 62 extending upwardly from the base 1 is provided at a position corresponding to the pillar 2.

As shown in Fig. 2, the pillar 2 is integrally prefabricated with a bearing recess 21 at its top. The bearing recess 21 is shaped as a rectangle, and opened to the inner side and the top side. As shown in Fig. 4, the top of the pillar 2 is provided with a reserved, exposed reinforcing bar 61, which passes through the bearing recess 21 to further extend upwardly to the cover 5. As shown in Fig. 3, during prefabrication the pillar 2 is provided at its bottom with an inner grouting chamber 22 in communication with a bottom surface of the pillar 2, and a grouting channel 23 and a discharging channel 24, which both connect the inner grouting chamber 22 with a side surface of the pillar 2. The extending reinforcing bar 62 of the base 1 protrudes into the inner grouting chamber 22. Concrete can be poured into the inner grouting chamber 22 through the grouting channel 23, so that the base 1 and the pillar 2 can be fixedly connected with each other. This connection between the base 1 and the pillar 2 is more stable and reliable. Before the concrete in the grouting chamber 22 reaches necessary strength, each individual pillar 2 can be supported by two or three slanting

braces only. Therefore, the construction is convenient, and only requires a small footprint.

The bearing beam 3 is provided with reserved, exposed reinforcing bars, which
5 extend outwardly, at its both ends and its top respectively. As shown in Figs. 1, 4, 6
and 7, the end of the bearing beam 3 is in engagement with the bearing recess 21 of
the pillar 2, and the reserved, exposed reinforcing bar at the end of the bearing beam 3
is bound with the reserved, exposed reinforcing bar at the top of the pillar 2 in the
bearing recess 21. The pillar 2 and the bearing beam 3 are connected together through
10 pouring concrete 25 in the bearing recess 21.

As shown in Fig. 7, the cover 5 is mainly formed by splicing several
complete-prefabricated plate units 51 together. The complete-prefabricated plate unit
51 cannot be excessively large; otherwise, the transportation and hoisting thereof will
15 be extremely inconvenient, and also dangerous. In the present embodiment, two
complete-prefabricated plate units 51, a right one and a left one, are arranged between
two adjacent bearing beams 3. In this manner, an individual complete-prefabricated
plate unit 51 will not be excessively large, rendering the transportation and hoisting
thereof convenient. Of course, if the walkway is relatively wide, three or more
20 complete-prefabricated plate units 51 can be arranged between every two adjacent
bearing beams 3.

A front end and a rear end of the complete-prefabricated plate unit 51 are
connected with the bearing beam 3 and the pillar 2 respectively. The
25 complete-prefabricated plate unit 51 is further provided at both ends thereof with
reserved, exposed reinforcing bars, which are bound with the reserved, exposed
reinforcing bars of the bearing beam 3 and of the pillar 2 respectively. In addition, a
bridging portion 511 is provided at a region where a complete-prefabricated plate unit
51 is connected with an adjacent complete-prefabricated plate unit 51, a region where
30 the complete-prefabricated plate unit 51 is connected with the pillar 2, and a region

where the complete-prefabricated plate unit 51 is connected with the bearing beam 3. As shown in Fig. 5, the bridging portion 511 has a smaller thickness and a lower top surface compared with a middle portion of the complete-prefabricated plate unit 51. The bridging portion 511 is also provided with reserved, exposed reinforcing bars, which are spliced with corresponding reserved, exposed reinforcing bars of the adjacent pillar 2, the bearing beam 3 and the complete-prefabricated plate unit 51, respectively. The right and left complete-prefabricated plate units 51 are connected with the bearing beam 3 and the pillar 2 together through in-situ casting concrete 53 at the bridging portion 511. The concrete 53 cast in-situ on the bridging portion 511 is flush with the top surface of the middle portion of the complete-prefabricated plate unit 51.

As shown in Fig. 1, the cover 5 further includes two vertical railing plates 52, which are prefabricated on the complete-prefabricated plate unit 51 from both side and formed into one piece therewith. Thus a space for planting green plants can be formed on the cover 5.

The construction method for the covered walkway according to the present invention comprises the following steps.

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First, the base 1 is installed, and the reinforcing bar 62 extending upwardly from the base 1 is arranged at the region where the pillar is to be installed.

Then, a metal support, such as a foot angle, for supporting the bearing beam 3 is arranged on an inner top end of the prefabricated pillar 2, and multiple metal supports, such as T-profiles, for supporting the complete-prefabricated plate unit 51 are arranged on each of both side surfaces of the bearing beam 3. Mounting holes and mounting elements can be provided in advance in the prefabricated pillar 2 and bearing beam 3, so as to facilitate the installment of the metal supports.

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Subsequently, the prefabricated pillar 2 is hoisted on the base 1 in alignment with the protruding reinforcing bar 62, so that the protruding reinforcing bar 62 can be inserted into the inner grouting chamber 22 of the pillar 2. Then, concrete is poured into the inner grouting chamber 22 through the grouting channel 23, until concrete
5 slurry is discharged from the discharging channel 24. The pillar 2 is supported by slanting braces after its installment is completed.

After that, the prefabricated bearing beam 3 is hoisted and placed in the bearing recess 21 located at the tops of the right and left pillars 2 and in the metal support. In
10 addition, the reserved, exposed reinforcing bars located at both ends of the bearing beam 3 are bound with corresponding reserved, exposed reinforcing bars 61 located at the top of the pillars 2 in the bearing recess 21.

In the following, two or more complete-prefabricated plate units 51 are hoisted to
15 a position between two adjacent bearing beams 3, dependent on the width of the cover 5. The ends of the complete-prefabricated plate unit 51 are in engagement with the bearing beam 3 and the pillar 2 respectively, and supported by the metal supports arranged at the side surfaces of the bearing beam 3. Then, the reserved, exposed reinforcing bars located at the ends of the complete-prefabricated plate unit 51 are
20 bound with corresponding reserved, exposed reinforcing bars located at the tops of the bearing beam 3 and the pillar 2 respectively. In addition, the reserved, exposed reinforcing bars located at the bridging portions 511 of the complete-prefabricated plate units 51 are spliced with corresponding reserved, exposed reinforcing bars of the adjacent pillar 2, the bearing beam 3 and the complete-prefabricated plate unit 51,
25 respectively.

Finally, concrete is poured in the bearing recess 21, in the regions where the complete-prefabricated plate unit 51 is connected with the bearing beam 3 and with the pillar 2, and in the bridging portion 511, so that the pillar 2, the bearing beam 3
30 and the complete-prefabricated plate unit 51 are connected together.

With the above-mentioned construction method, the covered walkway according to the present invention can be built in a rapid and convenient manner. After the cast-in-situ concrete reaches sufficient strength, the metal supports arranged on the pillar 2 and the bearing beam 3 can be removed, and then reused for construction of other walkways.

Compared with the prior arts, the connection between the pillar and the base in the covered walkway according to the present invention is more secured and reliable. In particular, only several slanting braces have to be used to support the pillar, with no complicated trusses and scaffolds necessary. In addition, the connection between the pillar and the bearing beam is more stable. Moreover, the cover is formed by splicing several complete-prefabricated plate units together. Therefore, the cover has sufficient strength, so that operators can stand on the cover directly to perform operations such as bar binding, concrete casting, or the like. Accordingly, it is unnecessary to establish trusses and scaffolds under the cover, and in the meantime the area of the cover that should be cast with concrete is significantly reduced. Thus it can be seen that no trusses and scaffolds are necessary during the whole construction process of the whole covered walkway. Moreover, the construction can be performed in a simple and convenient manner, which can not only greatly reduce the construction cost, but also significantly save the construction period. Further, the structure of the covered walkway is more secured, and has a high security coefficient.

It should be noted that the above-mentioned embodiment shows particularly preferred one but that this is not restricted thereto. Any amendments, equivalents or improvements made under the spirit and principle of the present invention shall be included in the protection scope of the present invention.

CLAIMS

1. A covered walkway, comprising a base (1), two pillars (2) which are fixedly connected to the base (1), a bearing beam (3) bridging over tops of the two pillars (2),
5 and a cover (5) secured on the bearing beam (3),

characterized in that the pillar (2), the bearing beam (3), and the cover (5) are each formed by a complete-prefabricated member;

the pillar (2) is provided at its top with a bearing recess (21), and a reserved, exposed reinforcing bar extending along the bearing recess (21) upwardly to the cover
10 (5);

the bearing beam (3) is in engagement with the bearing recess (21) at an end thereof, and provided with reserved, exposed reinforcing bars at the end and the top thereof respectively, wherein the reserved, exposed reinforcing bar arranged at the end of the pillar (2) is bound with that arranged at the end of the bearing beam (3);

15 the cover (5) includes a plurality of complete-prefabricated plate units (51), wherein each complete-prefabricated plate unit (51) is in engagement with the bearing beam (3) and with the pillar (2) at respective ends thereof, and is provided with reserved, exposed reinforcing bars connected with the reserved, exposed reinforcing bars of the bearing beam (3) and of the pillar (2), respectively; and

20 the pillar (2), the bearing beam (3) and the complete-prefabricated plate units (51) are connected together through cast-in-situ concrete in the bearing recess (21) and at regions where the complete-prefabricated plate units (51) are connected with the bearing beam (3) and the pillar (2) respectively.

25 2. The covered walkway according to claim 1, characterized in that each pillar (2) is provided at its bottom with an inner grouting chamber (22) in communication with a bottom surface of the pillar (2), and a grouting channel (23) and a discharging channel (24), which both connect the inner grouting chamber (22) with a side surface of the pillar (2); and

30 the base (1) is provided with a reinforcing bar extending upwardly to the inner

grouting chamber (22), and the base (1) and the pillar (2) are connected with each other through concrete poured into the inner grouting chamber (22).

3. The covered walkway according to claim 2, characterized in that at least two
5 complete-prefabricated plate units (51) are arranged between two adjacent bearing beams (3);

a bridging portion (511) is provided at a region where the complete-prefabricated plate unit (51) is connected with an adjacent complete-prefabricated plate unit (51), at a region where the complete-prefabricated plate unit (51) is connected with the pillar
10 (2), and at a region where the complete-prefabricated plate unit (51) is connected with the bearing beam (3);

the bridging portion (511) has a smaller thickness and a lower top surface compared with a middle portion of the complete-prefabricated plate unit (51); and

the bridging portion (511) is provided with a reserved, exposed reinforcing bar,
15 which is spliced with a corresponding reserved, exposed reinforcing bar of an adjacent member, and said at least two complete-prefabricated plate units (51) are connected with the pillar (2) and the bearing beam (3) together through in-situ casting concrete at the bridging portion (511).

20 4. The covered walkway according to any one of claims 1 to 3, characterized in that the cover (5) further includes two vertical railing plates (52), which are prefabricated on the complete-prefabricated plate unit (51) and formed into one piece therewith.

25 5. A construction method for the covered walkway of claim 1, characterized in that the method comprises the following steps:

Step A, securing two prefabricated pillars (2) on the base (1);

Step B, hoisting the prefabricated bearing beam (3) and placing it at the bearing recess (21) arranged a top of each of the pillars (2), and binding the reserved, exposed
30 reinforcing bars located at the end of the bearing beam (3) with that located at the top

of the pillar (2);

Step C, hoisting the complete-prefabricated plate unit (51) to a position between two adjacent bearing beams (3), and binding the reserved, exposed reinforcing bars located at both ends of the complete-prefabricated plate unit (51) with those located at the tops of the bearing beam (3) and the pillar (2); and

Step D, pouring concrete in the bearing recess (21) and in the regions where the complete-prefabricated plate unit (51) is connected with the bearing beam (3) and with the pillar (2), so that the pillar (2), the bearing beam (3) and the complete-prefabricated plate unit (51) are connected together.

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6. The construction method for the covered walkway according to claim 5, characterized in that the pillar (2) is provided at its bottom with an inner grouting chamber (22) in communication with a bottom surface of the pillar (2), and a grouting channel (23) and a discharging channel (24), which both connect the inner grouting chamber (22) with a side surface of the pillar (2);

in Step A, a reinforcing bar protruding upwardly from the base (1) is provided, and the prefabricated pillar (2) is hoisted to the base (1) in alignment with the protruding reinforcing bar, so that the protruding reinforcing bar is inserted into the inner grouting chamber (22) of the pillar (2), and then concrete is poured into the inner grouting chamber (22) through the grouting channel (23), until concrete slurry is discharged from the discharging channel (24), with the pillar (2) being supported by slanting braces finally.

7. The construction method for the covered walkway according to claim 6, characterized in that

in Step C,

at least two complete-prefabricated plate units (51) are arranged between every two adjacent bearing beams (3); and

a thin and low bridging portion (511) is provided at a region where a complete-prefabricated plate unit (51) is connected with an adjacent

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complete-prefabricated plate unit (51), at a region where the complete-prefabricated plate unit (51) is connected with the pillar (2), and at a region where the complete-prefabricated plate unit (51) is connected with the bearing beam (3), wherein the bridging portion (511) is provided with a reserved, exposed reinforcing bar, which is spliced with a corresponding reserved, exposed reinforcing bar of an adjacent member, and

in Step D, the complete-prefabricated plate units (51) are connected with the bearing beam (3) and the pillar (2) together through in-situ casting concrete at the bridging portion (511).

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8. The construction method for the covered walkway according to any one of claims 5 to 7, characterized in that prior to the Step A, a metal support for supporting the bearing beam (3) is arranged on an inner top end of the prefabricated pillar (2), and multiple metal supports for supporting the complete-prefabricated plate unit (51) are arranged on each of both side surfaces of the bearing beam (3).

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