

Mounting assembly for a traffic barrier and traffic barrier comprising a mounting assembly

The present invention relates to a mounting assembly for mounting a traffic barrier
5 to a surface. The invention further relates to a traffic barrier comprising such a mounting assembly.

Traffic barriers are commonly used to bound carriageways to protect traffic from
roadside obstacles or hazards or to prevent vehicles from crossing over a median
10 and striking an oncoming vehicle. To provide their function in the case of a vehicle collision, traffic barriers have to handle the forces exerted on the traffic barrier by a vehicle colliding with the traffic barrier, without larger displacement than according their specifications is allowed. For this purpose, traffic barriers of a permanent nature are commonly fixed to the ground by means of mounting assemblies that
15 typically consist of bolts or pins that are driven into the road surface. A problem may arise in the situation when one or more of the mounting assemblies break, disconnect from the traffic barrier and/or when the mounting assemblies come loose from their position due to a considerable force being exerted on the traffic barrier as a result of the impact of a vehicle onto the traffic barrier. As a result of the
20 fixation of the traffic barrier, the disconnected traffic barrier is no longer anchored enabling at least part of the traffic barrier to shift and/or to turn over, preventing a correct functioning of the traffic barrier.

It is therefore a goal of the present invention to overcome the drawbacks related to
25 the know traffic barriers by providing a mounting assembly that has enhanced functionality, both in secure positioning of the barrier as in withstanding substantial loads.

The present invention thereto provides a mounting assembly for mounting a traffic
30 barrier to a surface, comprising: an attachment base configured to be stationary connected with the traffic barrier; and a ground connecting element, configured to be stationary connected with the ground by means of fastening means, such as screws, pins or bolts; wherein the attachment base and the ground connecting element are mutually coupled by coupling means configured to allow mutual
35 movement between the attachment base and the ground connecting element in

coupled condition. A stationary connection is hereby understood as a fixed connection, wherein the connected parts are intended to retain their relative position to the ground. The mounting assembly according to the invention on the one hand effectively secures the traffic barrier to the ground (such as a road or a roadside/shoulder) by stationary connecting the ground connecting element to the ground through the use of fastening means. The fastening means and the ground connecting element prevent mutual movement in fastened condition. On the other hand, the mounting assembly allows for movement of the traffic barrier with respect to the ground/the ground connecting element up to a certain extend due to the coupling means provided on the attachment base and the ground connecting element that are configured to allow the attachment base and the ground connecting element to mutually move. This results in a traffic barrier that is anchored to the ground while able to move with the vehicle in a direction perpendicular to the longitudinal direction of the traffic barrier as a vehicle collides with the traffic barrier to a limited extend, lengthening the time over which the vehicle's momentum is changed while absorbing energy thus decreasing the maximum force of impact on both the vehicle as well as the traffic barrier. This decreased maximum force of impact reduces the risk of breakage of the mounting assembly causing an uncontrolled positioning of the traffic barrier. As a colliding vehicle is allowed to more gradually decelerate, this will also limit the physical harm to the vehicle's passengers.

In an embodiment of the mounting assembly according to the invention, the mutual movement allowed by the coupling means may be a linear movement. As the coupling means are configured to allow only a linear relative movement of the attachment base and the ground connecting element, the traffic barrier is able to move along a linear path. Bounding the movement direction of the traffic barrier leads to an increased control of the traffic barrier's displacement upon impact of a vehicle. As such, the outcome of an impact may be better predicted and the chance of tumbling over of the traffic barrier is diminished resulting in enhanced safety for the colliding vehicle's passengers as well as persons and object in the environment of the traffic barrier.

Specifically, the mutual movement allowed by the coupling means may have a direction perpendicular to the longitudinal axis of the traffic barrier. The traffic

barrier normally extends in a direction parallel to the road, thereby having its longitudinal axis parallel to said road. As a consequence, a vehicle crashing into the traffic barrier needs to be decelerated (mainly) in a direction perpendicular to the direction of travel. It is in this direction that the traffic barrier must be able to
5 limit the vehicle's movement. In order for the traffic barrier to effectively aid the gradual deceleration of the vehicle in the direction perpendicular to the longitudinal axis of the traffic barrier, the traffic barrier is likely to displace in this direction as well. As an alternative or additionally the traffic barrier may also deform while absorbing energy. Anyhow it is advantageous if the coupling means allow for
10 mutual movement in the direction perpendicular to the longitudinal axis of the traffic barrier. Alternatively, the coupling means may allow for a mutual movement of the attachment base and the ground connecting element having just a component in the direction perpendicular to the longitudinal axis of the traffic barrier.

15 In an alternative embodiment of the mounting assembly according to the invention, the coupling means comprise a protrusion and a receiving space for receiving the protrusion therein and thereby coupling the attachment base and the ground connecting element. Specifically it may be that one of the attachment base and the ground connecting element comprises the protrusion and the other of the
20 attachment base and the ground connecting element comprises the receiving space, for example constituted by a recess. Given that the receiving space is dimensioned larger than the protrusion in that the circumference of the inner peripheral wall of the receiving space exceeds the circumference of the outer peripheral wall of protrusion, mutual movement between the attachment base and
25 the ground connecting element is allowed in coupled condition.

By means of varying the respective sizes and shapes of the protrusion and receiving space, the allowed mutual movement may be effectively influenced. The receiving space may be elongated in a direction of mutual movement of the
30 attachment base and the ground connecting element. To further guarantee the effective guidance of the mutual movement of the attachment base and the ground connecting element, the protrusion may be elongated in the longitudinal direction of the receiving space. The protrusion may furthermore have a width substantially equal to the width of the receiving space, thereby connecting to the opposing

longitudinal sides of the receiving space to limit the mutual movement in the longitudinal direction of the receiving space.

In a further embodiment of the mounting assembly according to the invention, at least one of the protrusion and the receiving space is configured to at least partially plastically deform upon mutual movement. At least part of the kinetic energy of the colliding vehicle is hereby dissipated through the plastically deformation of one of the protrusion and the receiving space, causing the vehicle to more gradually decelerate to minimize the deceleration experienced by the passengers as well as minimizing damage to the vehicle.

In a specific embodiment of the coupling means, the receiving space is configured to tear upon movement relative to the protrusion. The receiving space for receiving the protrusion may for this purpose be a substantially longitudinal aperture with a narrowing width. The narrowing width of the aperture hereby acts as a constricting portion for the protrusion moving along the aperture. As the protrusion moves along a narrowing receiving space with the mutual movement between the attachment base and the ground connecting element, the width of the protrusion exceeds the width of the receiving space upon which the receiving space will deform to accommodate the protrusion. The aperture may be progressively narrowing towards its longitudinal end sides to increase the amount of deformation necessary to continue the relative movement of the protrusion and the receiving space. As a consequence, the experienced resistance as well as the amount of energy dissipated during this movement will progressively increase. The narrowing width of the aperture may be formed by a continuous narrowing (or a taper in the case of a progressive narrowing) of the aperture in elongate direction. It is however equally possible that the narrowing width of the aperture is achieved by one or more protrusions situated along the peripheral edge of the aperture. These protrusions may increase in size towards the longitudinal end sides of the aperture to achieve a progressive narrowing of the aperture.

In yet a further embodiment of the mounting assembly according to the invention, the attachment base and the ground connecting element are provided with cooperating abutments for limitation of the maximal mutual displacement of the attachment base and the ground connecting element. This limitation of maximal

mutual displacement prevents for instance the traffic barrier from shifting so far as to cross onto a parallel lane of traffic or allow a colliding vehicle to hit a roadside obstacle or oncoming traffic. The moment the abutments contact each other, the traffic barrier is commonly at a position of maximum allowable displacement. Any subsequent force acting upon the traffic barrier in the same direction will then deform the traffic barrier, the colliding vehicle, or a combination thereof to stop the vehicle's momentum. The abutments may allow for the mutual displacement of the attachment base and the ground connecting element up to a point where the coupling means reach a mutual extreme position, wherein the protrusion of the coupling means typically reaches an end of aperture receiving said protrusion.

It is possible that the abutments are facing edges of respectively the attachment base and the ground connecting element. As the abutments form an integral part of the attachment base and the ground connecting element, no additional parts are needed to limit the mutual displacement of the attachment base and the ground connecting element. As such, there is no risk of breaking off any such parts due to which the attachment base and the ground connecting element could continue their relative movement past a maximum predefined deflection. In a possible embodiment of the abutments, the facing edges of the attachment base and the ground connecting element are provided with complementary profiles (e.g. castellations) that engage each other, increasing the contact surface of the abutment surfaces, thereby further preventing that the attachment base and the ground connecting element move up past the abutments.

In an advantageous embodiment of the mounting assembly according to the invention, the attachment base at least partially encloses the ground connecting element. Possible movement of the ground connecting element with respect to the attachment base is hereby effectively restricted by the enclosing attachment base, even in case the coupling means mutually coupling the attachment base and the ground connecting element would fail.

To further secure a limited direction of movement of the enclosed ground connecting element, the attachment base may be embodied as a substantially elongated channel. The channel may have a direction of elongation equal to the direction of mutual movement allowed by the coupling means. More specific, this

may be the direction perpendicular to the longitudinal axis of the traffic barrier. For optimal cooperation with the enclosing attachment base, the ground connecting element may further have a longitudinal central body part that is at least partially enclosed by the attachment base. The longitudinal axis of the central body hereby
5 may run parallel to, or more specific may coincide with the longitudinal axis of the elongated channel that may make up the attachment base.

The ground connecting element may be provided with apertures on opposite sides for cooperating with the fastening means to stationary connect the ground
10 connecting element to the ground. As the apertures may be provided on opposing sides of the ground connecting element, the apertures are easily accessible from an outside of the traffic barrier, allowing for quick fixation of the ground connecting element and therefore the traffic barrier to the ground. Furthermore a larger distance between cooperating fastening means enhances the stability of the
15 fixation of the traffic barrier, e.g. the stability against turning over (toppling) of the traffic barrier.

To increase the structural integrity of the mounting assembly, the attachment base may be an integrated part of a traffic barrier. By being integrated into the traffic
20 barrier, a solid connection between the traffic barrier and the attachment base - and therewith the mounting assembly - is obtained. This minimises the chance that the traffic barrier breaks off the mounting assembly in case of a substantial impact.

The invention also relates to a traffic barrier comprising a mounting assembly
25 according to any of the above described embodiments or any combination thereof. Commonly, the traffic barrier may comprise a plurality of such mounting assemblies to guarantee a proper and secure connection between the traffic barrier and the ground. The number of mounting assemblies hereby typically depends on the length of the traffic barrier.

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In a further embodiment of the traffic barrier according to the invention, the attachment base may be an integrated part of the traffic barrier and the longitudinal
may be direction of the attachment base is perpendicular to the longitudinal
direction of the traffic barrier. As is mentioned earlier, by letting the attachment
35 base constitute an integrated part of the traffic barrier a solid connection between

the traffic barrier and the attachment base and therewith the mounting assembly is obtained, minimising the occurrence that the traffic barrier breaks off the mounting assembly in case of a substantial impact (like a collision). By letting the longitudinal direction of the attachment base run perpendicular to the longitudinal direction of the traffic barrier, the attachment base may be oriented in the direction of preferred mutual movement between the attachment base and the ground connecting element. Especially in the case where the attachment base at least partially encloses the ground connecting element, the possible movement of the ground connecting element with respect to the attachment base is hereby effectively restricted in the direction of preferred movement by the enclosing attachment base.

The invention will now be elucidated into more detail with reference to non-limitative exemplary embodiments shown in the following figures. Corresponding elements are indicated with corresponding numbers in the figures. In the figures:

- figure 1 shows a perspective view of a traffic barrier comprising a mounting assembly according to the invention,
- figure 2 shows a detailed view on the mounting assembly of the traffic barrier shown in figure 1,
- figure 3a-b show a perspective view of respectively the top side and the bottom side of a ground connecting element of a mounting assembly according to the invention,
- figure 4 shows a perspective view of an attachment base of a mounting assembly according to the invention, and
- figure 5 shows a top view of the attachment base shown in figure 4.

Figure 1 shows a perspective view of a traffic barrier 1 comprising a mounting assembly 3 according to the invention. The traffic barrier 1 has an elongated shape and is at a bottom side along its length provided with multiple attachment bases 5 that may each form part of a separate mounting assembly 3. The shown mounting assembly 3 comprises an attachment base 5, as well as a ground connecting element 7. The attachment base 5 in the embodiment shown is an integrated part of the traffic barrier 1 and is therefore inherently a stationary part of the traffic barrier 1. It may however be possible that the attachment base 5 constitutes a separate part that is stationary but detachably connected to the traffic barrier 1. The attachment base 5 comprises a longitudinal channel 9, having its longitudinal axis

oriented perpendicular to the longitudinal direction 11 of the traffic barrier 1. The channel 9 encloses a longitudinal central body part 13 (see figure 2) of the ground connecting element 7. The attachment base 5 and the ground connecting element 7 are mutually coupled by co-operating coupling means provided on the ground
 5 connecting element 7 and the attachment base 5 which will be shown in the following figures in more detail. The ground connecting element 7 is provided with apertures 15 (see figure 2) on opposite sides for cooperating with fastening means, such as for instance screws, bolts and/or nails, to stationary connect the ground
 10 connecting element 7 to the ground. The ground may for example be a roadbed or another artificial construction like for instance a bridge or a ramp.

Figure 2 shows a detailed view on the mounting assembly 3 of the traffic barrier 1 shown in figure 1, denoted as "D" in figure 1. The attachment base 5 of the mounting assembly, here provided with a longitudinal channel 9, forms a support
 15 for the traffic barrier 1. The ground connecting element 7 is coupled to the attachment base 5 such that mutual movement between the attachment base 5 and the ground connecting element 7 is allowed. Opposing sides of the ground connecting element 7 are provided with apertures 15 for passing through fastening means and stationary connecting the ground connecting element 7 to the ground.

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Figure 3a shows a perspective view of the top side of a ground connecting element 17 of a mounting assembly according to the invention. The ground connecting element 17 is at a bottom side provided with elongated protrusions 19 that constitute part of coupling means that are configured to couple the ground
 25 connecting element 17 to an attachment base and at the same time allow limited and controlled mutual movement between the attachment base and the ground connecting element 17. The protrusions 19 are configured to be received in a corresponding receiving space (see figures 4 and 5) provided on an attachment base. Note that although the shown ground connecting element 17 is provided with
 30 multiple protrusions 19, as an alternative it also possible to use a only a single protrusion 19. It is moreover equally possible that the ground connecting element 17 is provided with one or more receiving spaces for receiving corresponding one or more protrusions provided on an attachment base. The protrusions 19 are elongated in the direction of elongation 21 of the longitudinal central body part 23 of
 35 the ground connecting element 17, the latter being configured to be enclosed by a

longitudinal channel of an attachment base. The elongated shape allows a protrusion 19 to perform a linear movement relative to a receiving space having a width substantially equal to the width of the protrusion 25. In order to increase the structural rigidity, and specifically the stiffness of the ground connecting element

5 17, the ground connecting element is formed as a hollow beam-like element. It can furthermore be again seen that opposing sides of the ground connecting element are provided with apertures 27 for passing through fastening means (not shown) and stationary connecting the ground connecting element 17 to the ground.

10 Figure 3b shows a perspective view of the bottom side of a ground connecting element 17 of a mounting assembly according to the invention. Again, the above-discussed protrusions 19 are shown, that co-operate with form-fitting receiving spaces for coupling the ground connecting element 17 to an attachment base and at the same time allowing mutual movement between said attachment base and the

15 ground connecting element 17. Opposing edges 29 on the bottom side of the ground connecting element 17 form abutments for co-operating abutments provided on an attachment base and function to limit the mutual displacement of the attachment base and the ground connecting element 17. The edges 29 of the ground connecting element 17 are provided with profiles complementary to the

20 profile of an abutment provided on an attachment base to increase the contact surface between cooperating abutments. Although the shown profile is formed by castellations 31, the application of any other profile that is complementary to the profile of an abutment provided on an attachment base is possible as well.

25 Figure 4 shows a perspective view of an attachment base 33 of a mounting assembly according to the invention, wherein the attachment base 33 is an integral part of a support structure 35 of a traffic barrier (not shown in this figure). The attachment base 33 shown is formed as an elongated channel 37 for enclosing a corresponding ground connecting element. The channel's longitudinal direction 39

30 is hereby perpendicular to the longitudinal direction of the traffic barrier. The end sides 41 of the channel 37 form abutments that are configured to cooperate with abutments provided on a ground connecting element. The edges of the attachment base 33 are herewith provided with profiles (castellations 43) complementary to the profile of an abutment provided on a ground connecting element to increase the

35 contact surface between cooperating abutments. The attachment base 33 is

moreover provided with receiving spaces 45, which are discussed in more detail in the following figure (figure 5).

Figure 5 shows a top view of the attachment base 33 shown in figure 4. The end
5 sides 41 of the channel 37 form abutments for corresponding abutments provided on a ground connecting element. Also shown are four receiving spaces, formed by longitudinal apertures 45, having a narrowing width at the longitudinal end sides 47 thereof. The apertures 45 are configured to receive corresponding protrusions of the same coupling means. The maximum width 49 of the apertures 45 is therefore
10 preferably chosen to correspond to the width of the protrusions of said same coupling means. The apertures 45 shown in this embodiment of the coupling means are continuous and progressively narrowing (tapered) towards their longitudinal end sides 47. As a result, upon relative movement of the aperture 45 and the protrusion, the width of the protrusion will at an end side 47 of the aperture
15 45 exceed the width of the aperture upon which the aperture may - in case of substantial impact onto the traffic barrier - deform to accommodate the protrusion. As a consequence of the progressive narrowing, the experienced resistance as well as the amount of energy dissipated during the mutual movement will progressively increase. Note that although the shown apertures 45 are continuous and
20 progressively narrowing towards their longitudinal end sides 47, it is also possible that the narrowing may not be progressive but has a constant width smaller than the width of a corresponding protrusion being received therein. Moreover, the narrowing width of the aperture 45 may be achieved by one or more protrusions situated along the peripheral edge of the aperture 45. These protrusion may
25 increase in size towards the longitudinal end sides 47 of the aperture 45 to achieve a progressive narrowing of the aperture.

It will be apparent that the invention is not limited to the exemplary embodiments shown and described here, but that within the scope of the appended claims
30 numerous variants are possible which will be self-evident to the skilled person in this field. It is possible here to envisage that different inventive concepts and/or technical measures of the above described embodiment variants can be wholly or partially combined without departing from the inventive concept described in the appended claims.

Claims

1. Mounting assembly for mounting a traffic barrier to a surface, comprising:

- an attachment base configured to be connected with the traffic barrier such that it is stationary relative thereto; and
- a ground connecting element, configured to be connected with the ground such that it is stationary relative thereto, by means of fastening means, such as screws, pins or bolts;

wherein the attachment base and the ground connecting element are mutually coupled by coupling means configured to allow mutual movement between the attachment base and the ground connecting element while coupled, wherein the coupling means comprises a protrusion and a receiving space for receiving the protrusion therein and thereby couple the attachment base and the ground connecting element, at least one of the protrusion and the receiving space is configured to at least partially plastically deform upon mutual movement and the receiving space for receiving the protrusion is a substantially longitudinal aperture with a narrowing width.

2. Mounting assembly according to claim 1, wherein the mutual movement allowed by the coupling means is a linear movement.

3. Mounting assembly according to claim 1 or claim 2, wherein the mutual movement allowed by the coupling means has a direction perpendicular to a longitudinal axis of the traffic barrier.

4. Mounting assembly according to any one of the preceding claims, wherein the attachment base and the ground connecting element are provided with cooperating abutments for limiting the mutual displacement of the attachment base and the ground connecting element.

5. Mounting assembly according to claim 4, wherein the abutments are facing edges.

6. Mounting assembly according to any one of the preceding claims, wherein the attachment base at least partially encloses the ground connecting element.

7. Mounting assembly according to claim 8, wherein the attachment base includes a substantially elongated channel.

8. Mounting assembly according to claim 6 or claim 7, wherein the ground connecting element has a longitudinal central body part that is at least partially enclosed by the attachment base.

9. Mounting assembly according to any one of the preceding claims, wherein the ground connecting element defines apertures on opposite sides for cooperating with the fastening means to connect the ground connecting element to the ground.

10. Mounting assembly according to any one of the preceding claims, wherein the attachment base is an integrated part of a traffic barrier.

11. Traffic barrier comprising a mounting assembly according to any one of the preceding claims.

12. Traffic barrier according to claim 11, wherein the traffic barrier comprises plural mounting assemblies according to any one of claims 1 to 11.

13. Traffic barrier according to claim 11 or claim 12, wherein the attachment base is an integrated part of a traffic barrier and a longitudinal direction of the attachment base is perpendicular to a longitudinal direction of the traffic barrier.