

7. Examples of accident investigations, focused on the factors related to that the approaching train could not be noticed, shown in Table 4, in page 22 to 23.

(i) Bad visibility of train from once stop position at the level crossing

Case 1. Occurred at about 12:46, Tuesday, September 27, 2016 [No.22 in Table 3]

Level crossing accident where visibility of train from level crossing is limited and train passed in high speed.

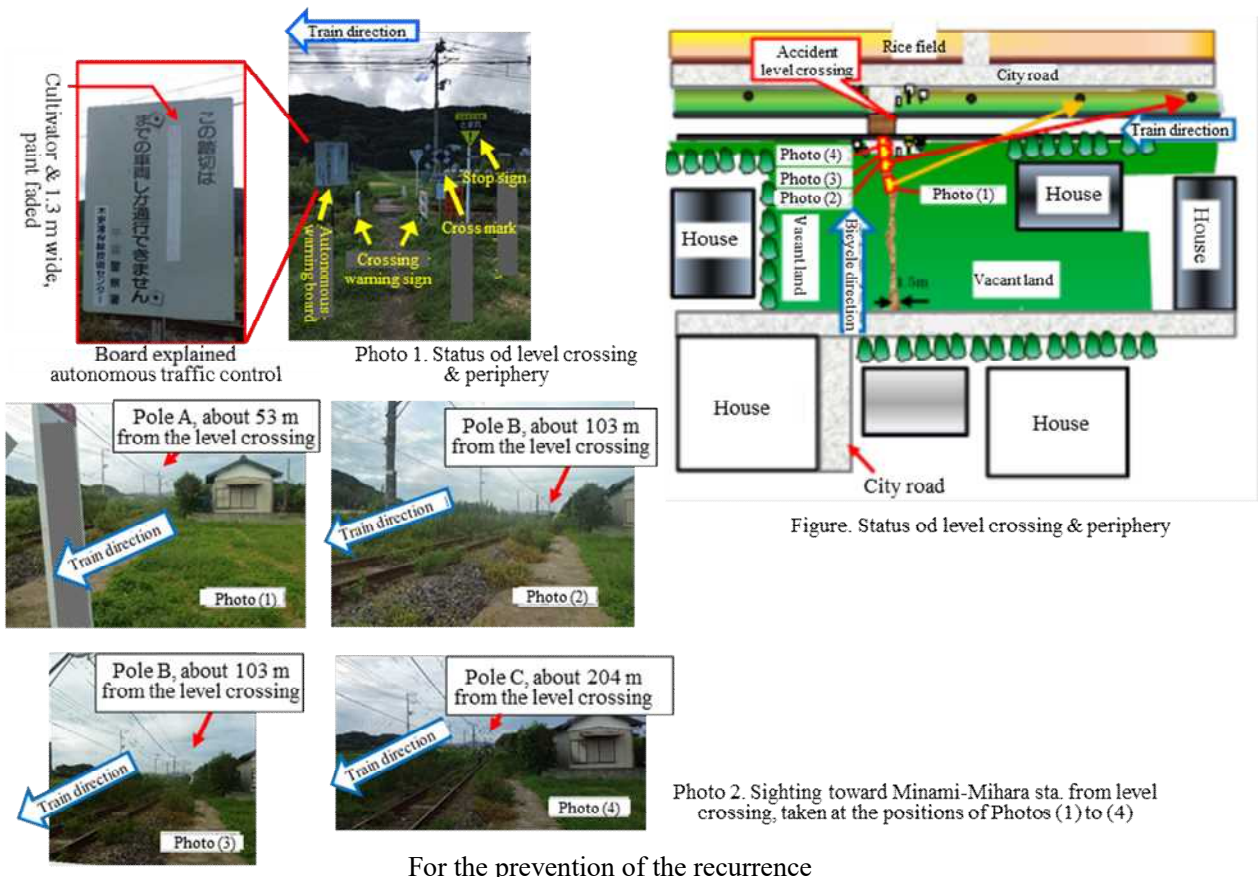
Summary : When the driver of the local train composed of four vehicles was going to sound a whistle at the place about 50 m before the level crossing, noticed a motorized bicycle entering the level crossing from left, so that, immediately sounded the whistle and applied the emergency brake, but the train collided with the motorized bicycle. The driver of the motorized bicycle was dead in this accident.

Probable causes : It is highly probable that the accident occurred as the train collided with a motorized bicycle, because the motorized bicycle entered class four level crossing without crossing gate nor road warning device, in the situation that the train was approaching . As it is somewhat likely that the motorized bicycle entered the level crossing where the train was approaching, related with the restricted visibility of the track by houses, hedges and overgrown weeds, but it could not be determined the precise situations because the driver of the motorized bicycle was dead.

Analysis on the improvement of safety in the accident level crossing :

The sight distance of the train was about 103 m from the central position of the level crossing caution fences, *i.e.*, center of the level crossing fence apart about 2.0 m from left rail, restricted by houses, hedges and overgrown weeds, and it takes about 4 seconds when train runs this distance at the velocity of about 95 km/h. It is somewhat likely that the passerby started to cross level crossing after confirmed that there was no train in the visible distance, cannot finish crossing the level crossing in this time.

It is expected for the railway operator to secure always the maximum sighting distance as possible, by implementing properly the weeding in the periphery so as to increase sighting distance even a little for the passersby of the accident level crossing, because the safety of class four level crossing is secured by the precondition that the passersby can confirm the safety in left and right directions sufficiently.



Matters expected to prevent recurrence :

It is necessary for the railway operator and the municipality to cooperate to implement continuously the discussions for the integration and abolishment of class four level crossing, considering the high speed, about 95 km/h, of the trains passing the accident level crossing, even though class four level crossing is secured its safety by the precondition that the passersby can confirm the safety in left and right directions sufficiently.

It is expected to take the following measures for the accident level crossing till to complete integration and abolishment of the level crossing or the preparation of the level crossing protection devices.

- (1) To secure the maximum sighting distance as possible for the passersby, by implementing properly the weeding in the periphery, etc., for the accident level crossing.
- (2) Railway operator shall study on the measures to sound a whistle at the proper position, in order to let the passersby using the accident level crossing notice the approaching train.

The accident in the level crossing where driver seated in the automobile is hard to see approaching train

Summary : The driver of the local train, composed of one vehicle, noticed an automobile entering level crossing from right at about 30 m before the level crossing and applied the emergency brake and sounded a whistle immediately, but the train collided with the automobile. The driver of the automobile was dead in this accident.

Probable causes : It is highly probable that the accident occurred as the train collided with an automobile because the automobile entered class four level crossing without crossing gate nor road warning device, in the situation that the train was approaching.

It is somewhat likely that the automobile entered to the level crossing in the situation that the train was approaching related to that the driver seated in the automobile was hard to see the approaching train. However it could not be determined precise situations because the driver of the automobile was dead.

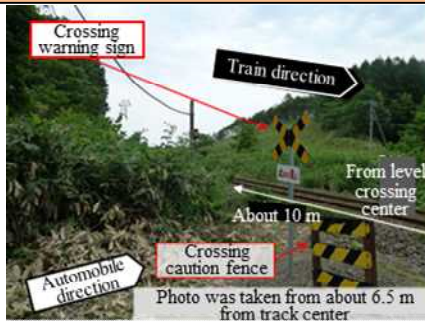
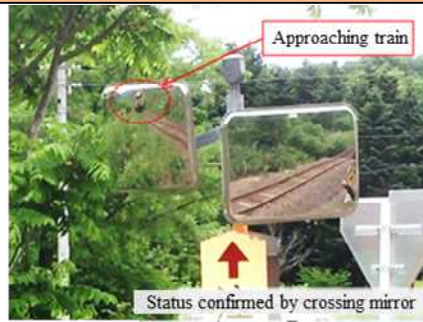


Photo 1. Sight of train viewed from the driver of bicycle



Confirmed by the train operated at the same time as the accident train in the next day of this accident.

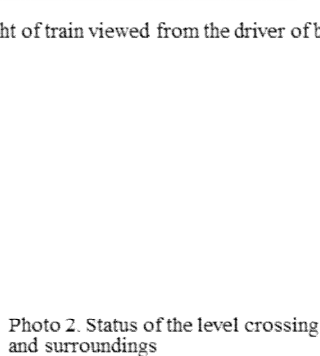
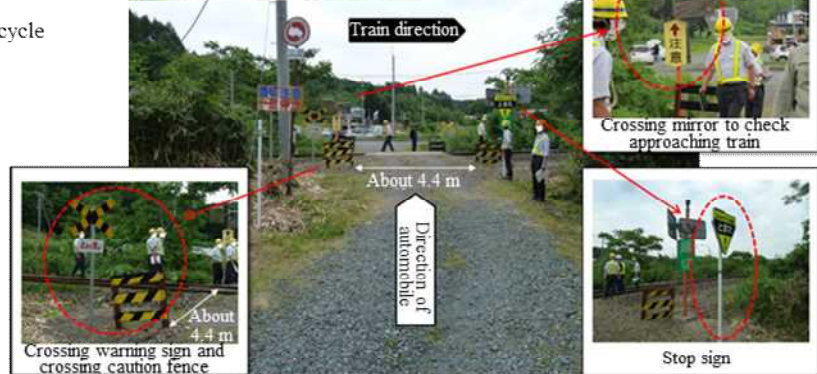


Photo 2. Status of the level crossing and surroundings



For the prevention of the recurrence

Matters expected to prevent recurrence :

Railway operator has studied various measures to prevent accident in class four level crossing such as to install the level crossing mirror and the stop sign, etc., since the occurrence of this accident, and promoted by established the full-time system from April 2017. It is desirable to attempt to improve safety by promoting these measures continuously.

Furthermore, considering that the level crossing accident in which the driver of automobile crossing the accident level crossing was dead had occurred in the past, it is expected for the relevant parties such as the local relevant persons and the railway operator, etc., to restart the discussion in early stage and study on the abolishment, etc., and implement measures. It is considered as a measure to improve safety by prohibiting the passage of automobiles through a year, till to complete the above measures.

Matters expected to prevent accident of automobile in class four level crossing, extracted

It is probable that there is the characteristic that the driver of automobile is hard to confirm the train compared to the pedestrian because the driver confirmed the approaching train from the position of the driver's seat, although the circumferences of level crossings, where the accident with automobile had occurred, are not uniform.

Therefore, from the view point to improve safety of the traffic circumference still more by guiding the passersby driving automobiles to the neighboring two-layer crossing or class one level crossing where they can detour safely, it is considered as effective to prevent accident by taking the traffic control positively such as to close for automobiles till to "abolish class four level crossing or to prepare the level crossing protection devices when remained as the level crossing". It is desirable for the railway operators, the road administrators and individual relevant administrative organization to attempt to promote these measures.

It was found that there were the cases that the contents of regulation in the plural traffic control signs installed in level crossings are inconsistent, and that the understandings in the relevant parties on the traffic control were inconsistent, in the past accident investigations. Therefore, it is expected to pay attention as to comprehend the actual status of the facilities and revise if necessary, in order to let the contents of the traffic control known properly to the passersby of level crossing.

(ii) Passerby of level crossing, cars, etc., did not stop before the level crossing.

Case 3.

Occurred at about 14:35, Monday, March 6, 2017 [No.28 in Table 3]

Accident considered as passerby of level crossing, bicycle, did not stop once at just before the level crossing

Summary : The driver of the local train, composed of one vehicle, noticed a passerby riding bicycle about 20 to 30 m before the level crossing, and applied the emergency brake, but the train collided with the passerby. The passerby was dead in this accident.

Probable causes : It is highly probable that the accident occurred as the train collided with a passerby riding bicycle, because the passerby riding bicycle entered the level crossing in the situation that the train was approaching to class four level crossing without crossing gate nor road warning device.

It is probable that the passerby did not stop just before the level crossing in the situation that the train was approaching, and entered the level crossing without confirming the approaching train well. However, it could not be determined the reason why the passerby entered the level crossing, because the passerby was dead.



Photo 1. Status of level crossing viewed from the entered bicycle



Photo 2. Sight in around the place of fence in the entered side of the bicycle



Photo 3. Image in the image recording device of the accident train, before about 100 m

For the prevention of the recurrence

Matters expected to prevent recurrence :

Class four level crossing without crossing gate nor road warning device should be abolished or prepared the level crossing protection devices. It is desirable to implement continuously the study on the abolishment or the change to class one level crossing, for this accident level crossing.

The investigation report of this case is published in the home page of the JTSB, published on January 25, 2018, <http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2018-1-3.pdf>

(iii) Affected by the restriction of physical functions of the passerby of level crossing.

Case 4.

Occurred at about 11:04, Thursday, March 23, 2017 [No.4 in Table 3]

Accident considered as affected by the status of physical function of the passerby in class three level crossing

Summary : The driver of the local train, composed of one vehicle, noticed a pedestrian went up the side walk at the place about 70 m before level crossing, and sounded a whistle once to call attention, but the pedestrian did not stop. The driver noticed the pedestrian entering the level crossing from right although the red flashing lamp was operating, at the place about 50 m before the level crossing, so that, continued to sound a whistle and applied the emergency brake, but the train contacted with the pedestrian. The pedestrian was dead in this accident.

Probable causes : It is probable that the accident occurred as the train contacted with a pedestrian because the pedestrian entered class three level crossing equipped with road warning device, in the situation that the road warning device was operating according to the approaching train.

It is somewhat likely that the pedestrian entered the level crossing in the situation that the road warning device was operating responded to approaching train, related with the situation that the pedestrian had been lost hearing sense. Also, it is somewhat likely that the pedestrian could not recognize red flashing lights when the pedestrian entered the level crossing, but the precise situation could not be determined because the pedestrian was dead.

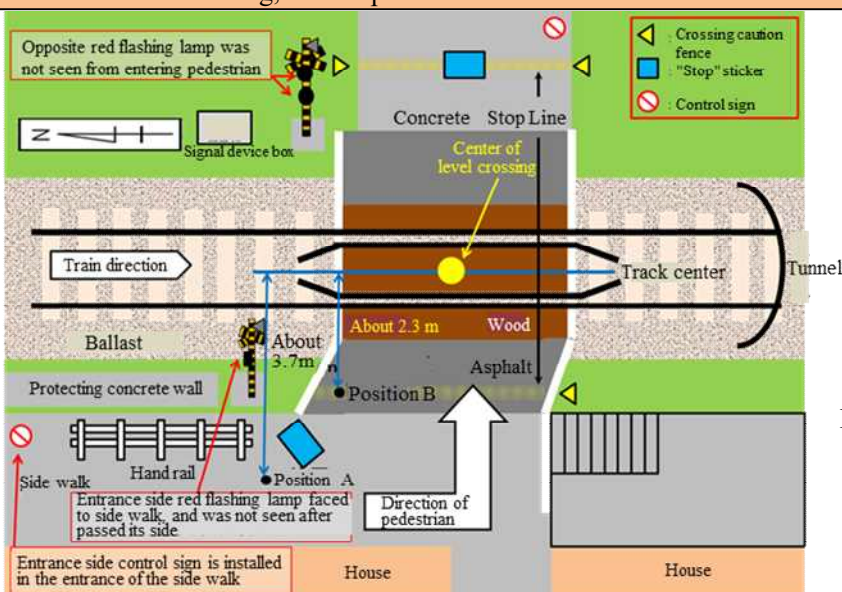


Figure. Status of level crossing and periphery and layout of level crossing protection devices, etc.

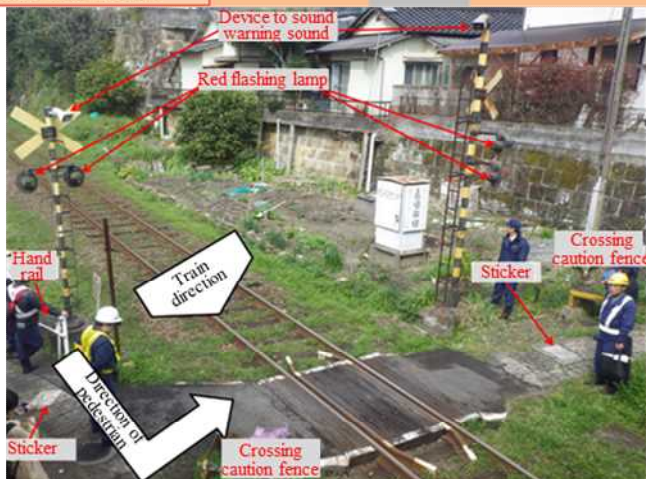


Photo. Status of level crossing and periphery

For the prevention of the recurrence

Matters expected to prevent recurrence :

The accident level crossing was class three level crossing equipped with road warning device, however, it is desirable to install omnidirectional red flashing lamp, to enable the passersby certainly recognize the operation of road warning device accompanied to the approaching train. Furthermore, it is expected for the relevant parties to cooperate with each other to improve the safety from the present status, as to install crossing gate in addition to road warning device, to deter the passersby from mistaking to enter the level crossing, In addition, it is desirable to maintain the measures applied to the accident level crossing in the proper status.

The investigation report of this case is published in the home page of the JTSB, published on September 28, 2017, <http://www.mlit.go.jp/jtsb/railway/rep-acci/RA2017-7-1.pdf>

[Reference] Table 3. List of accidents with fatality occurred in class three and class four level crossings after April 2014, accidents that investigation reports had been published.

[Class three level crossing]

No.	Date	Passerby	Age of passerby or driver	Train speed when noticed passerby	Traffic control	Major measures implemented after accident	Remarks
1	Oct. 3, 2014	Pedestrian	71	64	Closed for automobile except for two wheeled vehicle		Passerby is hearing impairment
2	June 10, 2016	Subcompact car	73	63	No traffic control	Logged bushes, repaint crossing caution fence, indicated once stop line, install reflecting mirror, enlightened by information bulletin	
3	Nov. 10, 2016	Pedestrian	81	61	Closed for automobile except for two wheeled vehicle	Trimmed garden trees, installed omnidirectional red flashing lamp	Passerby is hearing impairment
4	Mar. 23, 2017	Pedestrian	67	55	Closed for automobile except for two wheeled vehicle	Repainted stop line, planted board, installed omnidirectional red flashing lamp	Passerby is hearing impairment
5	Sept. 18, 2017	Bicycle	18	50	Closed for automobile except for two wheeled vehicle, excluded subcompact car & small sized special vehicle	Added car stop, installed omnidirectional red flashing lamp, paint "stop" on road surface, indicated stop line, enlightening activity, asked principal of elementary and junior high school in the city to guide to prevent accident, distributed leaflet in stations	
6	Apr. 11, 2018	Pedestrian	29	81	Closed for automobile except for two wheeled vehicle, excluded small sized special vehicle		Passerby was laid in level crossing

[Class four level crossing]

No.	Date	Passerby	Age of passerby or driver	Train speed when noticed passerby	Traffic control	Major measures implemented after accident	Remarks
7	Apr. 12, 2014	Small sized special vehicle	77	64	Closed for automobile except for two wheeled vehicle	Installed metal piles as automobiles except for two wheeled vehicle cannot pass	
8	June 9, 2014	Compact sedan	25	80	No traffic control		
9	July 11, 2014	Standard sized automobile	70	50	No traffic control		Train derailment accident accompanied to level crossing accident
10	Oct. 27, 2014	Motorized bicycle	18	75	No traffic control		
11	June 19, 2015	Pedestrian	83	60	Closed for automobile except for two wheeled vehicle, excluded small sized special vehicle	Installed whistle sounding sign in 32 places in 21 level crossing, replaced other whistle sounding signs in 32 places in 22 level crossings	Passerby : disabled one leg, hard to hear in one ear
12	Aug. 26, 2015	Subcompact car	79	73	Closed for automobile except for two wheeled vehicle, excluded subcompact car, & small sized special vehicle	Logged treed and plants, removed caution board, rebuild crossing caution fence	
13	Nov. 14, 2015	Subcompact car	82	68	Closed for large sized vehicle	Installed whistle sounding sign	
14	Mar. 3, 2016	Pedestrian	46	65 - 70	No traffic control		
15	Mar. 20, 2016	Pedestrian	91	52 - 53	Closed for entire automobiles		passerby was hard of hearing
16	June 17, 2016	Pedestrian	32	75	Closed for entire automobiles	Abolished level crossing	Passerby wore earphone
17	July 7, 2016	Pedestrian	73	120	Closed for entire automobiles		Passerby, brain lost function, left eye could see faintly

No.	Date	Passerby	Age of passerby or driver	Train speed when noticed passerby	Traffic control	Major measures implemented after accident	Remarks
18	July 29, 2016	Bicycle	64	85	Closed for automobile except for two wheeled vehicle	Study to advance period to abolish level crossing scheduled in 2018 to 2019 FY.	
19	Aug. 22, 2016	Subcompact car	71	44	No traffic control	Remove trees and plants	
20	Sept. 6, 2016	Subcompact car	70	60	No traffic control	Logged bushes, remove weeds, road construction to relax gradient, installed cross mark & crossing caution board.	
21	Sept. 12, 2016	Bicycle	9	65	Closed for all automobiles	Logged bushes, installed control piles, <i>i.e.</i> , car stop, abolished level crossing	
22	Sept. 27, 2016	Motorized bicycle	26	84	Closed for vehicles excluded cultivator and the vehicle of less than 1.3 m wide	Remove weeds, installed whistle sounding sign	
23	Oct. 8, 2016	Subcompact car	36	80	Closed for automobile except for two wheeled vehicle, excluded subcompact car & small sized special vehicle	Weeded, installed weed resist seats, enlightened by local information bulletin	
24	Oct. 16, 2016	Standard sized automobile	30	35	No traffic control	Yellow painted level crossing road surface, reconstruct stop lines, enlarged reflecting mirror, installed no entry board	
25	Nov. 2, 2016	Motorized bicycle	73	61	Closed for automobile except for two wheeled vehicle, excluded small sized special vehicle, & closed for all traffic in the period of snowfall in winter	Logged weeds, installed reflecting mirror, installed whistle sounding sign	
26	Nov. 6, 2016	Subcompact car	82	85	Closed for automobile except for two wheeled vehicle, excluded subcompact car, small sized special vehicle	Abolished level crossing	
27	Jan. 8, 2017	Pedestrian	73	57	Closed for automobile except for two wheeled vehicle, excluded subcompact car, small sized special vehicle		
28	Mar. 6, 2017	Bicycle	83	77	Closed for automobile except for two wheeled vehicle, excluded small sized special vehicle	Changed paint on road edge to reflecting orange color, enlightened by the disaster administrative radio	
29	June 20, 2017	Standard sized automobile	33	73	Closed for large sized automobile	Mowed, installed whistle sounding sign	Proposed against traffic control for automobiles
30	June 27, 2017	Pedestrian	30	78	Closed for automobile except for two wheeled vehicle	Scheduled to abolish level crossing	
31	Sept. 7, 2017	Motorized bicycle	26	70	Closed for automobile except for two wheeled vehicle	Repaired control piles, changed crossing warning sign, repair crossing caution fences, repaved city road, indicated "caution to cross"	
32	Jan. 16, 2018	Motorized bicycle	50	82	No traffic control	Logged bamboos, scatter weed killers to base surface of construction	
33	Feb. 27, 2018	Pedestrian	44	77	Closed for automobile except for two wheeled vehicle		
34	July 10, 2018	Pedestrian	74	83	Closed for vehicles, excluded bicycle		

* "Train speed when noticed passerby" was indicated in the unit "km/h".

* "Traffic control" is at the time of occurrence of the accident.

* "Major measures implemented after accident" is the major measures described in individual reports.

[Reference] Table 4. Related factors in the column of probable causes, extracted from individual report

(i) Bad visibility of the train from the once stop position of level crossing

- It is probable that the driver of the subcompact truck drove the subcompact truck into level crossing where train was approaching, because the driver of the subcompact truck did not recognize the approaching train correctly, although it is considered that the driver of the subcompact truck had stopped once the subcompact truck before the level crossing and confirmed the train.

It is somewhat likely that the driver of subcompact truck did not recognize the approaching train correctly affected by that it was hard to confirm the approaching train from the once stop position of level crossing due to the bushes and the signboard, etc. [12]

- It is somewhat likely that a pedestrian entered a level crossing in the status as the train was approaching because the pedestrian did not notice the approaching train.

It is somewhat likely that the pedestrian did not notice the approaching train affected by the disturbed visibility due to the existence of hedges, etc., although pedestrians can confirm direction of the train directly unless to enter the level crossing. [15]

- It is somewhat likely that the bad visibility to the direction of approaching train due to the thickly wooded area, etc., in the track side had related to disturb the driver of the subcompact car to confirm safety in left and right directions sufficiently at before the level crossing, and the rainy weather at the time of the accident and the farm road was winding to right and steep upgrade gradient at just before the level crossing were related to cause the factor to reduce attentiveness of the driver against approaching train. [20]

- It is somewhat likely that the passerby riding bicycle entered level crossing in the situation that the train was approaching, related by the situation that the approaching train could not be sighted by the miscellaneous trees unless the passerby got closer to around the prop of the cross mark. [21]

- It is somewhat likely that the motorized bicycle entered the level crossing in the situation that the train was approaching related by that the visibility of the railway track was restricted by houses, hedges, and dense weeds. [22]

- It is somewhat likely that the driver of automobile drove the automobile into level crossing in the situation that the train was approaching, related to that the visibility of the train was bad. [24]

- It is somewhat likely that the motorized bicycle entered the level crossing in the situation that the train was approaching to the level crossing, related by the situation that the driver of the motorized bicycle was hard to see the train by the dense weeds unless to get closer to the level crossing from the location of the crossing caution fence. [25]

- It is somewhat likely that automobile entered level crossing in the situation that the train was approaching, related by that the driver of the automobile was hard to see the approaching train in the status as boarding on the automobile. [29]

(ii) Passerby of level crossing, vehicle, etc., did not stop before the level crossing

- It is probable that the accident occurred because the motorized bicycle entered the level crossing without stopped, although train was approaching to the level crossing, and collided with the train. [10]

- It is probable that the passerby riding bicycle entered the level crossing as did not confirm the approaching train sufficiently without stopped once before the level crossing, in the status that the train was approaching. [28]

- It is probable that the driver of the motorized bicycle entered the level crossing because the driver did not confirm the status the the train was approaching sufficiently, unless stopped once just before the level crossing, in the situation that the train was approaching. [31]

(iii) The restriction by physical function of the passerby of level crossing was affected

- It is highly probable that the pedestrian entered the level crossing while warning sound of the road warning device was sounding and did not notice the whistle of train because the pedestrian could not hear the warning sound and the whistle because the pedestrian was a deaf person.
It is somewhat likely that the pedestrian entered the level crossing while the red flashing lamp was flashing, affected by the following situations.
 - (1) The pedestrian was in the situation as hard to see the flashing of the red flashing lamps because the field of vision became narrow due to the parasol and the wide brim hat.
 - (2) The flashing of the red flashing light was in the status as hard to be seen by reflection of the sun light. [1]
- It is somewhat likely that the pedestrian entered the level crossing in the situation that the road warning device was operating, related by that the hearing ability of both ears of the pedestrian were deteriorated. Furthermore, it is somewhat likely that the pedestrian could not confirm the red flashing lamp when entered the level crossing. [3]
- It is somewhat likely that the pedestrian entered the level crossing in the status that the road warning device was operating responded to the approaching train, related by that the pedestrian had lost hearing sense. Furthermore, it is somewhat likely that the pedestrian could not recognize the red flashing lamp when entered the level crossing. [4]

* Numbers in [] in the above table were the numbers in the "No." column in Table 3, page 20 - 21.

[Reference] Support systems on the preparation of level crossing protection devices

The national support system can be utilized to prepare the level crossing protection devices.

Support for working expense for general safety measures of railway facilities

Assist a part of expense of the preparation for the purpose to contribute to the prevention of accidents and the smooth traffic by preparation of the level crossing protection devices, based on the "Act on the promotion of improvement of level crossing".

1. Contents of the project

Installation of the level crossing protecting device, such as the crossing gate, the road warning device, etc.

2. The target of the support

(1) Railway and tramway operators other than the regional public bodies

The operators who meet one of the followings,

- the deficit
- the operating loss
- the fixed assets for business is less than 7 % of the operating profit rate

in the railway and tramway business, and at the same time,

the operators who meet one of the followings,

- the deficit
- the operating loss
- the fixed assets for business is less than 10 % of the operating profit rate

in the whole business.

(2) Railway operators who are the regional public body

The operator generated the deficit in the railway and tramway business.

3. Rate of support

Within a half of the expense to be supported, or within one third of the expense to be supported if generated the ordinary profit in the railway and tramway business.