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March

Ministry of Transport and Roads
Of Kyrgyz Republic

Database System Manual for Road Disaster Prevention

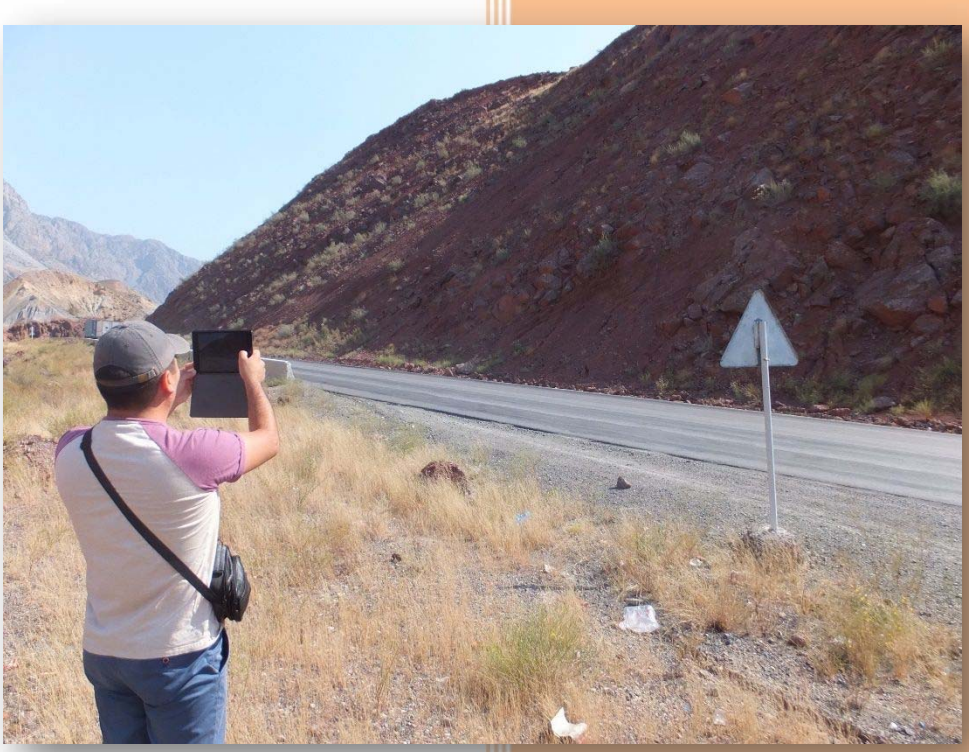


Table of Contents

List of figures

List of Tables

1 General Information

1.1 Database Operation Flow

This database system is the database for road disaster prevention management in Kyrgyz Republic. The database is operated on FileMaker software*. The data for the inspection of road disaster areas should be stored in the database and managed by Asset Management Section (hereinafter as refer to AMS) in Road Maintenance Department (hereinafter as refer to RMD).

Database operation flow is shown in Figure 1-1.

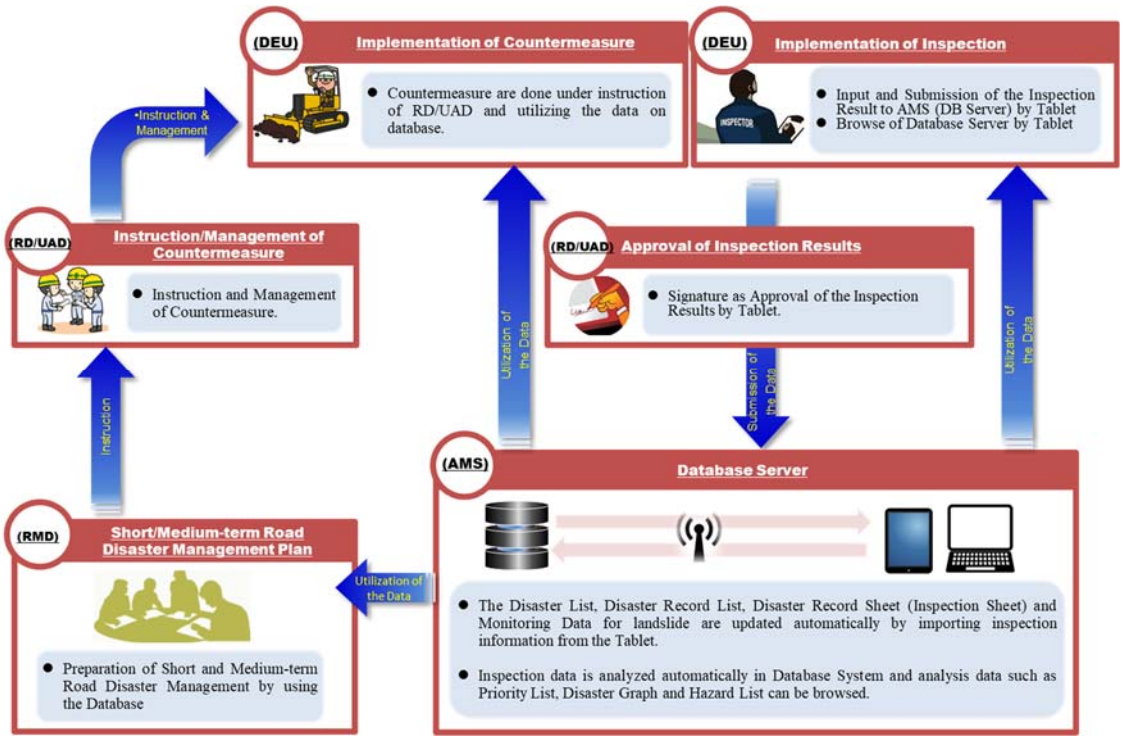


Figure 1-1 Database Operation Flow

1.2 Database Structure

1.2.1 Database Equipment

The database system consists of database server (MacBook Pro) and portable hard disk for data backup. Database equipment is shown in Photo 1-1.

Photo 1-1 Database System Equipment

(1) Database Server

The database server is MacBook Pro which is placed on the left in Photo 1-1. The software for database "FileMaker Server" is installed in this computer. This software can run only on two operating systems, Windows Server and Mac OS X. Windows Server is not popular in operating systems. Therefore, OS X is selected as an operating system for this database system.
The original database file should be stored in the database server. The location where original file should be stored is the folder which name is "Databases alias" on desktop.

(2) Operating Computer

The database server is a device just to store the original data file and the data files in it cannot be operated by MacBook PRo (database server computer). To manipulate the data files on the database server, an operating computer is needed.
The operating computer is Windows PC of Dell. A database software, FileMaker Pro, should be installed to the operating computer because the software is necessary to access the database server and operate the database files.

(3) Storage for Data Backup

The database system has two external HDDs for data backup and automatically backs up the all data stored in the database server daily. The frequency of data backup can be changed, for example every 2days, weekly, or monthly. Initial setting is daily.

1.2.2 Access Equipment from Outside

The database system can accept 5 connections from iOS device, iPhone and/or iPad, in outside of the database system.

To access to the database system by iOS device, application software FileMaker Go should be installed into the devices. FileMaker Go can be downloaded for free from App Store which is preinstalled application in iOS device.

1.2.3 Installation Software

The software used in the database system is of FileMaker series, and three software shown below is necessary to use the database system.

(1) FileMaker server

This is software for database server. Detail information refers to URL below.
http://www.filemaker.com/products/filemaker-server/

(2) FileMaker Pro

This is software for database operation. Detail information refers to URL below.
http://www.filemaker.com/products/filemaker-pro/
Trial version of FileMaker Pro is prepared on the web site. it is possible to download from URL below.
http://info2.filemaker.com/FileMaker_Platform_Trial_Request.html

(3) FileMaker Go

This is an application for database operation from iOS device. Detail information refers to URL below.
http://www.filemaker.com/products/filemaker-go/

1.3 Database System

Database system for road disaster prevention management divided into two main functions which are Inspection and Analysis as shown in Figure 1-2. Function of inspection consists of Disaster Hazard List, Disaster Record List, Disaster Record Sheet and Monitoring for Landslide. Function of Analysis consists of Priority List, Priority Graph, Disaster Graph and Map Information. Responsibility for preparation of each information are shown in Table 1-1.

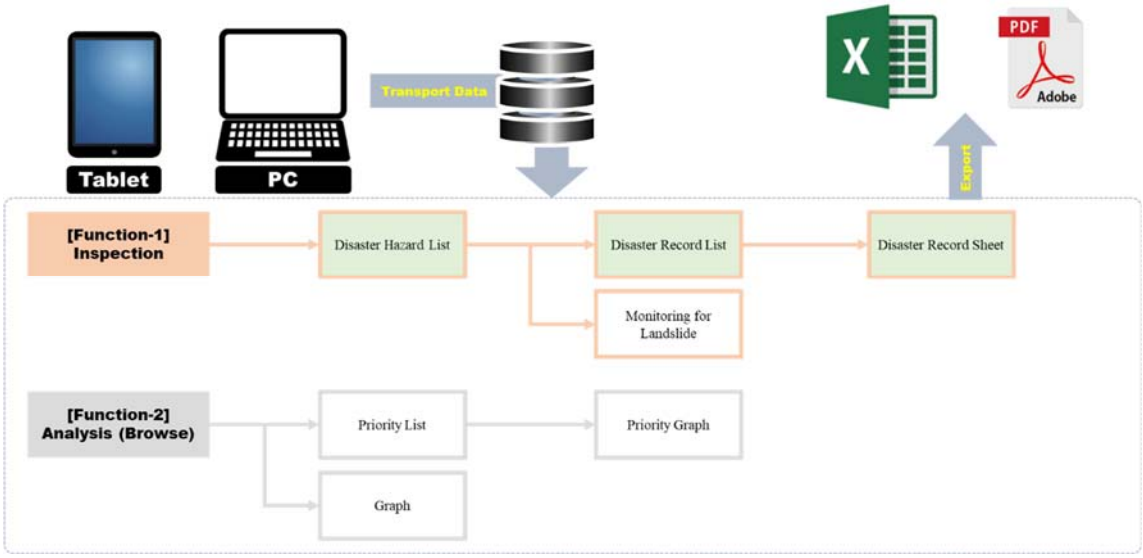


Figure 1-2 Framework of the Database

Table 1-1 Responsibility for Preparation of Each Information

Institutions	Role
RMD	● To prepare the Short and Medium-term Road Management Plan by utilizing the Database.
AMS	● To manage the Database System ● To update the Database System as necessary ● To provide the information on Database
RD/UAD	● To approve the inspection results by signature ● To manage data collection activities by DEU
DEU	● To carry out the inspection and input the disaster data

1.4 Main Menu

Main Menu is shown in Figure 1-3. On the main menu of the database system, it can be approach or inputted to the following function and items as shown in Table 1-2.

Figure 1-3 Main Manu

Table 1-2 Function of Main Menu

No.*	Function	Remarks
1	Regional Department, UADs and DEU that the user wants to input or browse the data can be selected.	
2	Language of the system can be selected.	
3	Disaster Hazard List can be opened. (Inspection function can be accessed from this button)	Details are described in Chapter2
4	Priority List can be opened. (Analysis function can be accessed from this button)	Details are described in Chapter3
5	Graph function can be accessed.	Details are described in Chapter3
6	Database can be terminated.	
7	It can be moved to Download site of “Maps.me” by this button.	

** No. corresponds to the number described in Figure 1-3*

2 Input Method for Inspection (Inspection Function)

2.1 General

In this chapter, general information and input method for the inspection function are stated in detail. Inspection function is used for recording the road disaster scale, location and history to the database server in order to utilize for road disaster prevention and preparation of Short/Medium-term Road Disaster Management Plan. Also, the inspection by the tablet should be implemented in the site by DEU staff after any road disaster occur and detailed information on the road disaster is inputted to database system by tablet directly.

2.1.1 Disaster Hazard List

Disaster Hazard List is basic information for road disaster prevention management. On this list, disaster hazard sites are listed with road name, coordination, kilo-post and priority. In addition, it has the following functions;

- Detailed location of each site can be browsed by the “google map” and “maps.me” buttons. (It should be noted that "google map" button is working on on-line field only and "maps.me" button is working on on-line and off-line field.)
- Disaster Record List of each site can be browsed by the “Record List” button.
- New disaster hazard site can be added to Disaster Hazard List.

The format of Disaster Hazard List is shown in Figure 2-1.

Figure 2-1 Disaster Hazard List

2.1.2 Disaster Record List

On the Disaster Record List, disaster hazard history (inspection history) are listed with disaster date, record date, disaster type and photos. In addition, it has the following functions;

- Disaster Record Sheet of each site can be browsed or inputted by the "Record Sheet" button.
- New disaster record can be added to Disaster Record List by "Add New Disaster Record" button.
- Disaster Record List can be sorted by road disaster types.

The format of Disaster Record List is shown in Figure 2-2.

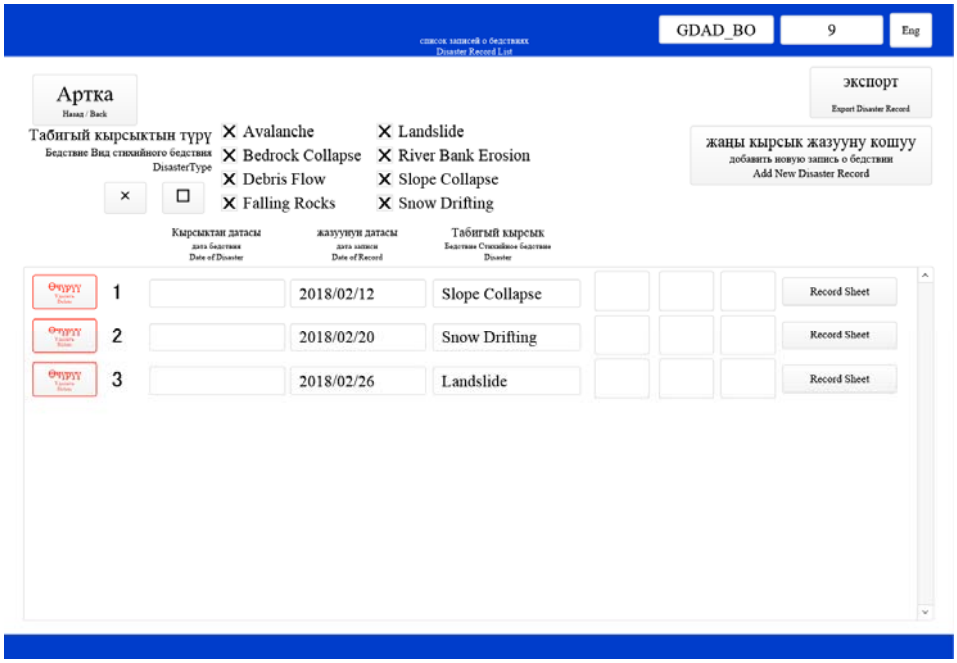


Figure 2-2 Disaster Record List

2.1.3 Disaster Record Sheet

On the Disaster Record Sheet, detailed information shown below can be inputted and transferred to the server by "Submit" button under the internet environmental. The format is shown in Figure 2-3 and the input items of Disaster Record Sheet are followings;

1) Road Name, Kilopost*
2) Date of Disaster and Recording
3) Coordinate of the Site*
4) RD/UADs/DEU*
5) Type of Disaster
6) Damage Range/ Traffic Regulation & Cleaning Time
7) Human/Vehicle Damage
8) Weather Conditions
9) Details of Rock Falling (Maximum and Average Diameter of Rocks)
10) Details of Slope Collapse/Landslide (Damage Range)
11) Details of Avalanche (Damage Length, Max Depth)
12) Details of Snow Drifting (Visibility, Depth)
13) Details of Disaster Recovery (Method, Unit, Quantity, Cost, Date)
14) Photo and Comments
15) Name of the responsible person

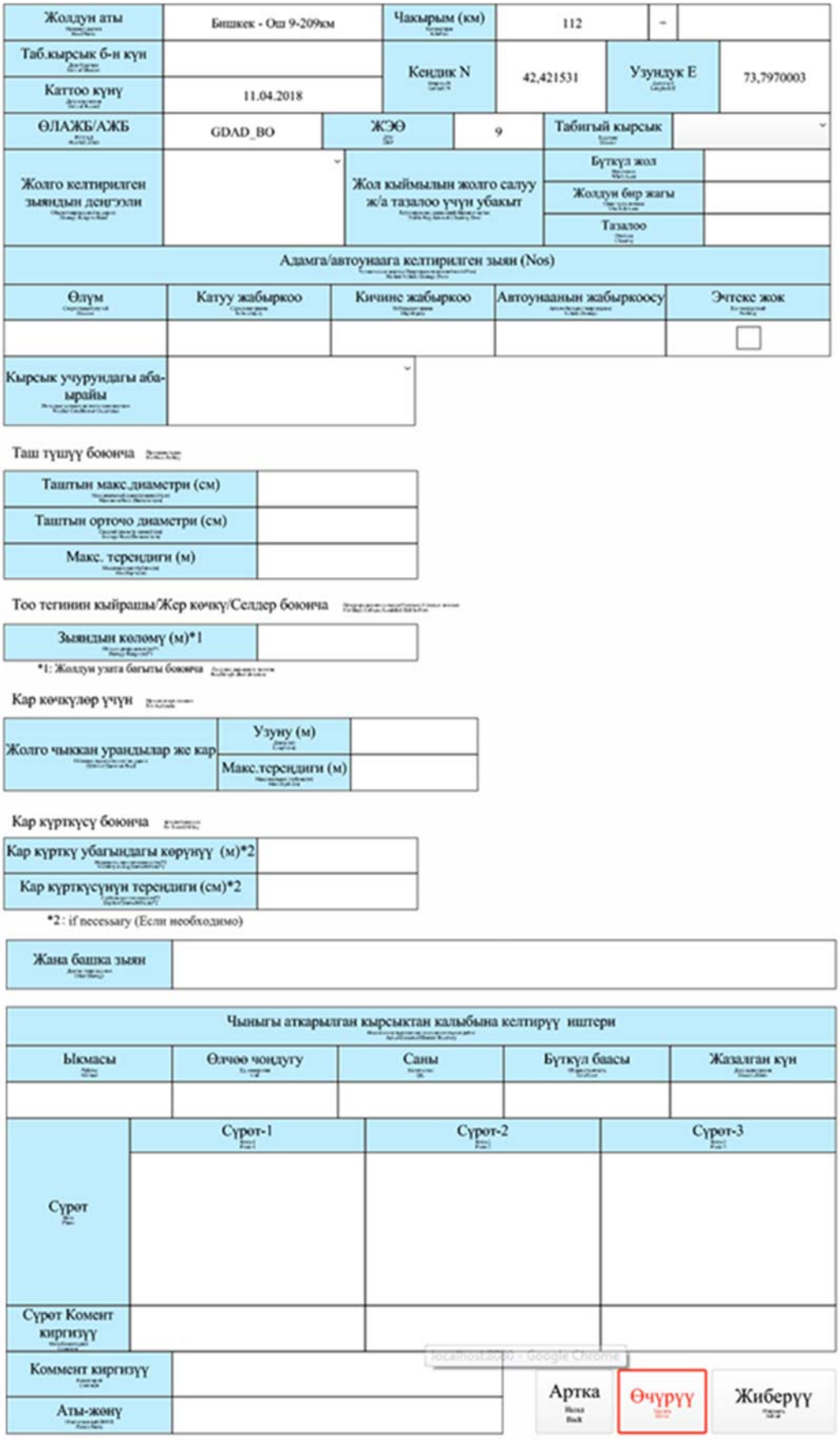


Figure 2-3 Disaster Record Sheet.

2.1.4 Monitoring for Landslide

Monitoring function is to record the displacement of landslide and photo by "Monitoring" button on the Disaster Record List as shown in Figure 2-4. The displacement is measured by the simple extensometer which is introduced by the Project and can be inputted up to 3 units to Monitoring List as shown in Figure 2-5.

Figure 2-4 Monitoring Button on Disaster Record List

Figure 2-5 Monitoring List

2.2 Input Method for Inspection

2.2.1 Disaster Hazard List

Disaster Hazard List is displayed by selecting the road name by No.1 button which is indicated in Figure 2-6. The road name is selected by pulldown system. If you want to browse the Disaster Record List of the site, it can be displayed by the “Record List” button which is indicated as No.5 button in Figure 2-6. Also, existing site data can be deleted by the “Delete” button which is indicated as No.6 button in Figure 2-6.

Figure 2-6 Disaster List Display

2.2.1.1 Adding New Site information

In case of adding new disaster site to Disaster Hazard List, “Adding New Site” button which is indicated as No.5 in Figure 2-6 is selected. And then input sheet for adding new disaster site is open as shown in Figure 2-6. In this sheet, the information such as Road Name, Kilo Post and Disaster Type etc. can be inputted and be registered by the “Submit” button.

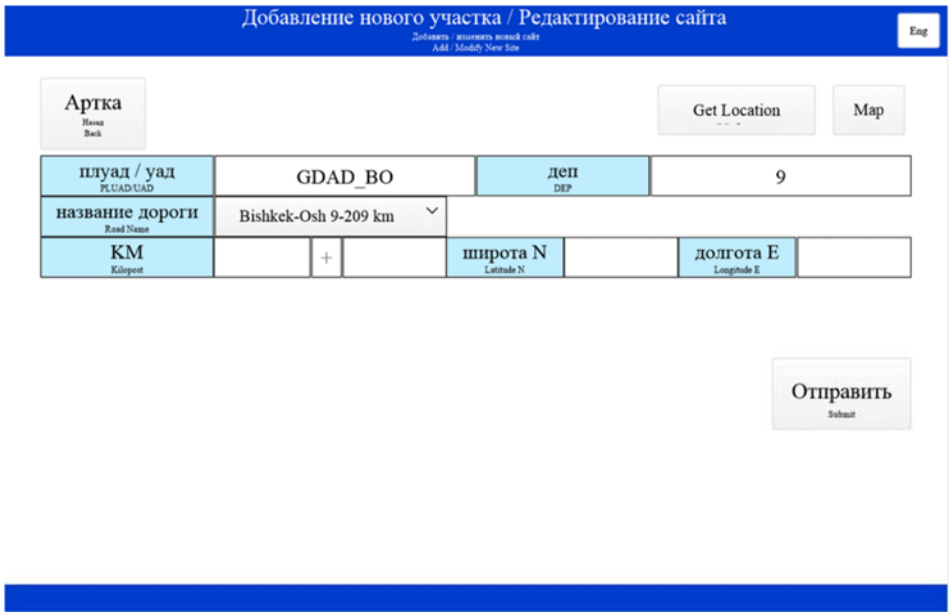


Figure 2-7 Adding of New Site Information

(1) Road Name

Tap the input space of "Road Name", and Road Name can be inputted directly by using keyboard on the tablet.

(2) Kilo Post

Tap the input space of "Kilo Post", and Kilo Post can be inputted directly by using keyboard on the tablet.

(3) Disaster Type

Tap the input space of "Disaster Type", and Disaster Type can be selected from the list shown in below.

Falling Rocks/
Bedrock Collapse
Slope Collapse
Landslide
Debris Flow
Avalanche
Snow Drifting
River Bank Erosion

(4) Latitude/Longitude

In the place where the internet communication is available, value of latitude/longitude can be input automatically by tap "Get Location" button as shown in Figure 2-7. In the place where the internet communication is not available, tap the blank space of "Latitude/Longitude" and value of Latitude/Longitude can be inputted directly by using keyboard on the tablet.

(5) RD/UAD

Tap the input space of "RO/UAD", and RO/UAD can be selected from the list shown in below.

RO_No.1
RO_No.2
RO_No.4
RO_No.3
UAD_JAB
UAD_Bishkek_Osh
UAD_Osh_Batken_Isfana
UAD_Biskek_Nayn_Torugart
UAD_Osh_Sary_Tash_Irkeshtam

(6) DEU

Tap the input space of "DEU", and DEU can be selected from the list shown in below.

RO /UAD	RO No.1	RO No.2	RO No.4	RO No.3	UAD JAB	UAD BO	UAD OBI	UAD BNT	UAD OSI
DEU	DEU 1	DEU 8	DEU 3	DEU 6	DEU 12	DEU 5	DEU 2	DEU 32	DEU 16
	DEU 25	DEU 14	DEU 4	DEU 19	DEU 17	DEU 9	DEU 13	DEU 34	DEU 21
	DEU 28	DEU 15	DEU 7	DEU 36	DEU 27	DEU 22	DEU 46	DEU 39	DEU 37
	DEU 40	DEU 18	DEU 10	DEU 47	DEU 31	DEU 23		DEU 41	DEU 44
	DEU 42	DEU 20	DEU 11	DEU 48	DEU 50	DEU 26		DEU 955	DEU 45
	DEU 43	DEU 24	DEU 33		DEU 51	DEU 30		DEU 957	DEU 959
	DEU 954		DEU 35		DEU 52	DEU 38			DEU 960
	DEU 958					DEU 956			

2.2.1.2 Browse of Map Information

Details location data of the site can be browsed by Map Information which are Google Map and Maps.me application based on the coordinate data saved in the site information. It should be noted that "google map" button is working on on-line field only and "maps.me" button is working on on-line and off-line field. Users can select the map application by "Google Map" or "Maps.me" button which is indicated as No.3 and No.4 in Figure 2-6.

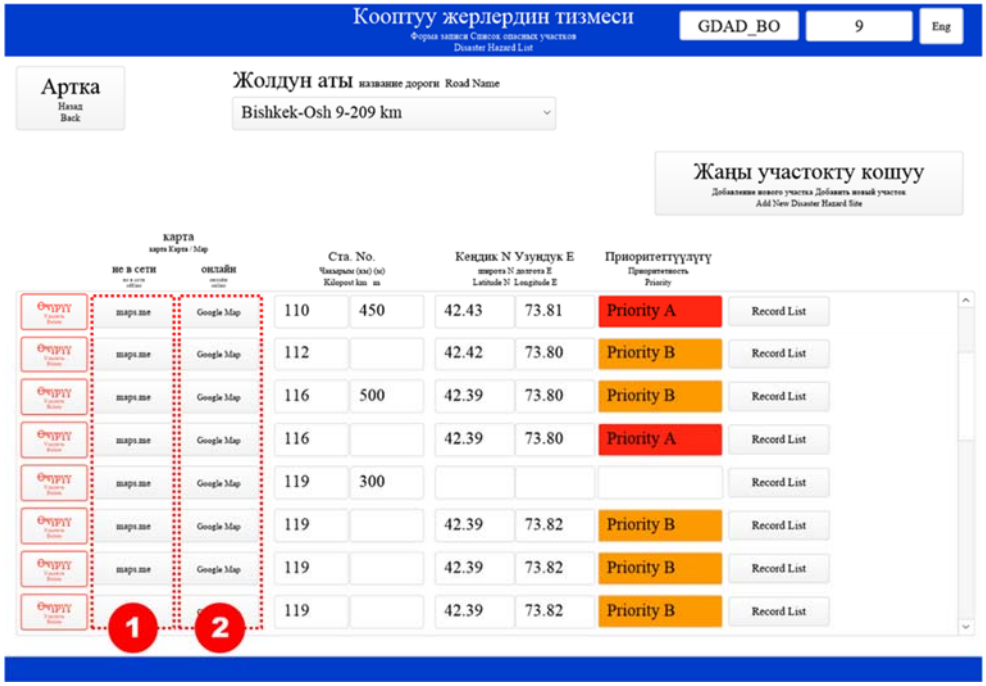


Figure 2-8 Map Information

2.2.2 Disaster Record List

Disaster Record List is displayed by selecting the disaster types by No.1 button which is indicated in Figure 2-9. If you want to browse the Disaster Record Sheet, it can be displayed by the "Record Sheet" button which is indicated as No.3 button in Figure 2-9. Also, existing disaster record data can be deleted by the "Delete" button which is indicated as No.5 button in Figure 2-9.

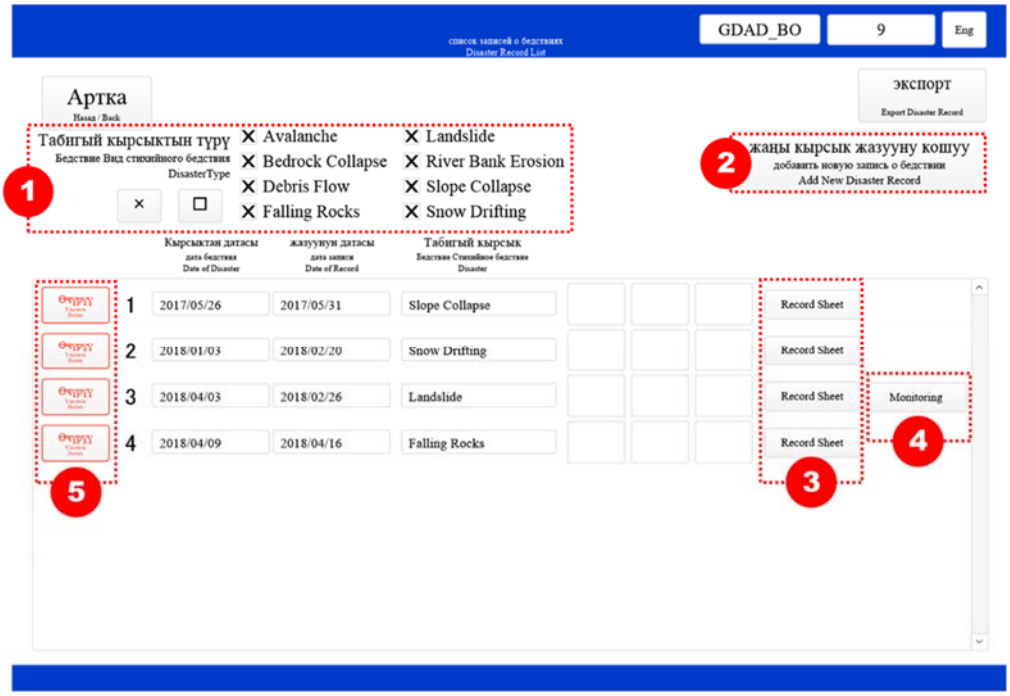


Figure 2-9 Disaster record List

2.2.2.1 Adding New Disaster Record

In case of adding new disaster record to Disaster Record List, "Add New Disaster Sheet" button which is indicated as No.2 in Figure 2-9 is selected. And then Disaster Record Sheet is opened. Details of the input method of Disaster Record Sheet is described in Chapter 2.2.3.

2.2.2.2 Monitoring Function for Landslide

In case of monitoring of the displacement for landslide, "Monitoring" button which is indicated as No.4 in Figure 2-9 is selected. And then Monitoring Sheet shown in Figure 2-10 is opened. If you want to add the new monitoring data to the list, "Add Monitoring Data" button which is indicated as No.1 in Figure 2-10 is selected. And then, new data is added to the list automatically and users can input the items directly. By the "Data Monitoring Data Graph" button, time series graph shown in Figure 2-11 can be confirmed. Also, existing monitoring data can be deleted by the "Delete" button which is indicated as No.3 button in Figure 2-10.

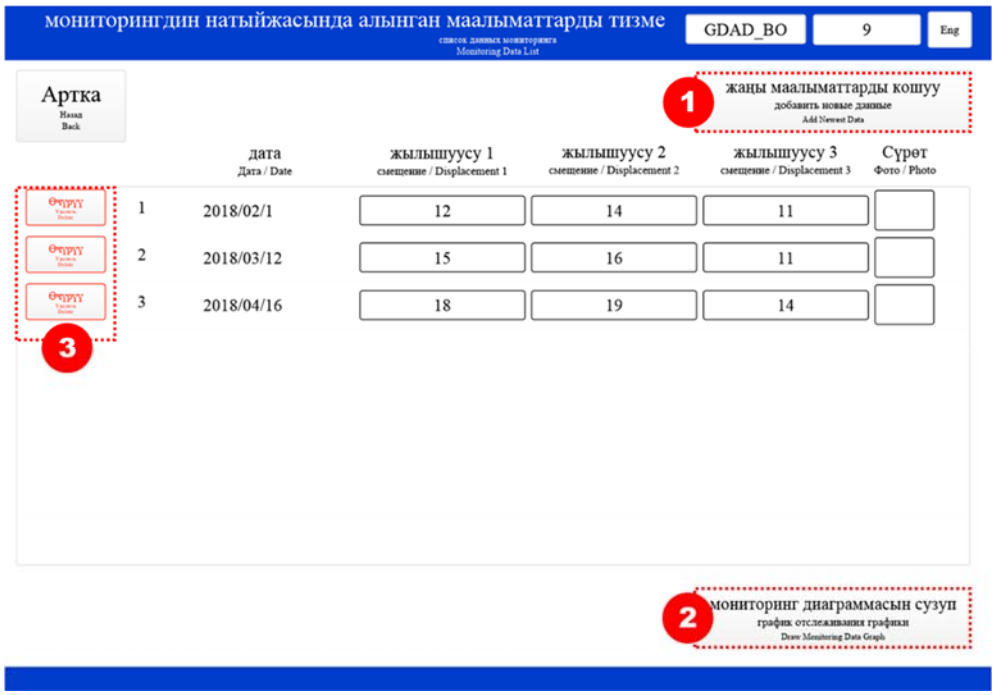


Figure 2-10 Monitoring Sheet

Figure 2-11 Monitoring Graph

(1) Date

The date is inputted automatically when you add the new monitoring data. If you want to change the date, you can change directly by click of date space.

(2) Displacement

Displacement can be inputted directly.

(3) Photo

When you click the photo space, camera function is executed automatically. After taking a photo, it is saved to the Monitoring automatically.

2.2.3 Disaster Record Sheet

The Disaster Record Sheet format is shown in Figure 2-3. The input method of that is below.

(1) Road Name, Kilo Post, Longitude, Latitude, RD/UADs, DEU

Information on Road Name, Kilo Post, Longitude, Latitude, RD/UADs, DEU is inputted automatically based on the site information.

(2) Date of Disaster and Record

Date of disaster and record are inputted manually by calendar system.

(3) Disaster Type

Disaster types are selected from among “Falling Rock”, “Slope Collapse”, “Bedrock Collapse”, “Landslide”, “Snow Drifting”, “Avalanche” and “Debris Flow” by pulldown system.

(4) Damage Range to Road

The damage range to road is selected from among “Full Lane”, “One Side Lane” and “Without Traffic Regulation” by pulldown system.

(5) Traffic Regulation and Cleaning Time

The information on traffic regulation and cleaning time are inputted manually. If one side lane of whole lane of the road is closed by the disaster, closing time is inputted to “one side lane” or “whole lane” space. Cleaning time to recover the damage of the disaster is inputted to “Cleaning” space.

(6) Human/Vehicle Damage

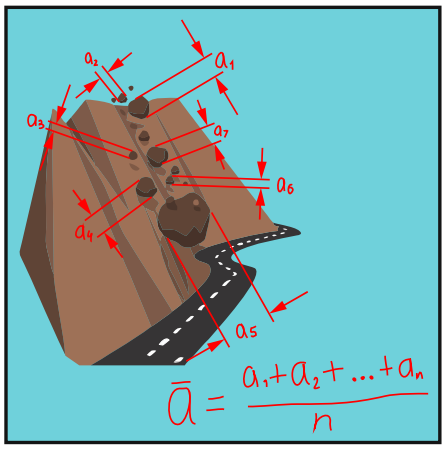
The number of decease, serious injury, slight injury and vehicle damage are inputted manually. If there is no damage against humans and vehicles, “Nothing” space is checked.

(7) Weather Condition at Occurrence

Weather condition at occurrence is selected from among “After Rain”, “Snow Melt”, “Snow Cover”, “Dry Snow”, Snow Drifting” and “Other” by pulldown system.

(8) Rock Falling

Detailed information of rock falling which are “Maximum Rock Diameter” and “Average Rock Diameter” is inputted with reference to Figure 2-12.



<Average Rock Diameter>

<Maximum Rock Diameter>

Figure 2-12 Average and Maximum Rock Diameter

(9) Slope Collapse/Landslide/Debris Flow

Damage range of slope collapse, landslide and debris flow is inputted with reference to Figure 2-13.

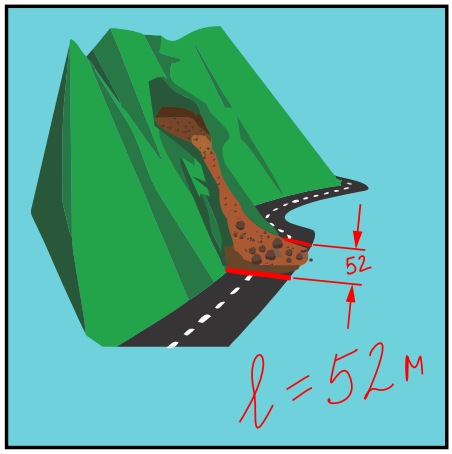


Figure 2-13 Damage Range

(10) Avalanche

Detailed information of avalanche which are “Length” and “Max Depth” is inputted with reference to Figure 2-14.

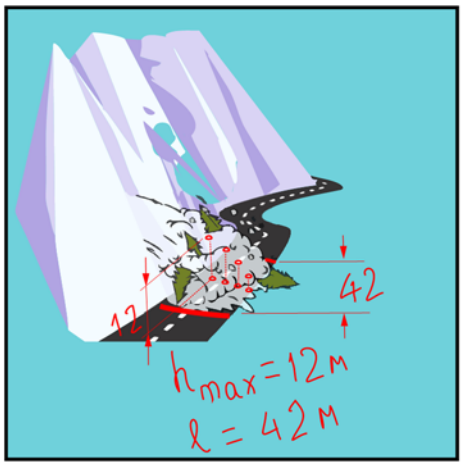


Figure 2-14 Length and Max Depth

(11) Snow Drifting

Detailed information of snow drigting which are “Visibility during Snow Drifting” and “Depth of Snow Drifting” is inputted with reference to Figure 2-15.

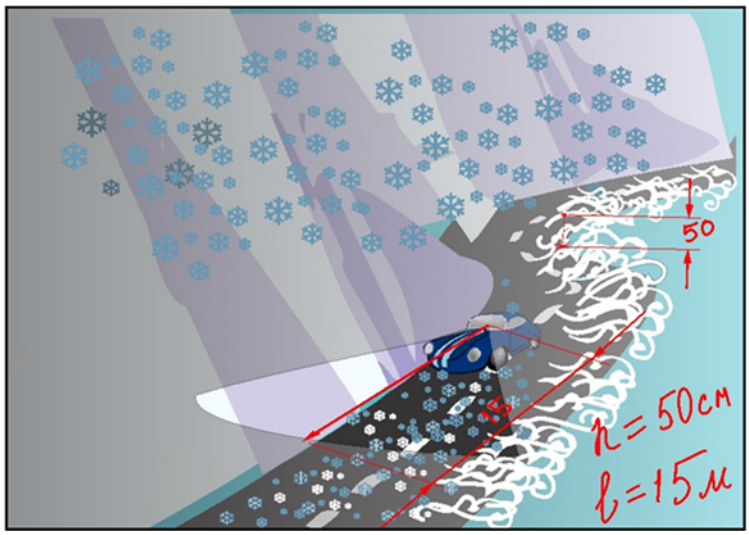


Figure 2-15 Visibility during Snow Drifting and Depth of Snow Drifting

(12) Other Damage

If other damage such as collapse of guardrail or road sign is found, the information can be inputted manually.

(13) Actual Executed Disaster Recovery

The information on actual executed disaster recovery works which are “Method”, “Unit”, “Quantity”, Total Cost” and “Executed Date” is inputted manually.

(14) Photo and Comment

When you click the photo space, camera function is executed automatically. After taking photos, these are saved automatically. Also, comments of photos are inputted manually

(15) Comment

Comment regarding to the disaster is inputted manually.

(16) Person Name

Inspector name is inputted manually.

3 Analysis Method

3.1 Priority List

Priority levels of the site shown in Figure 3-1 are displayed on Priority List. The priority levels are divided into 3 types (Priority A, Priority B and Priority C). They are decided in consideration of risk of the disaster by RMD.

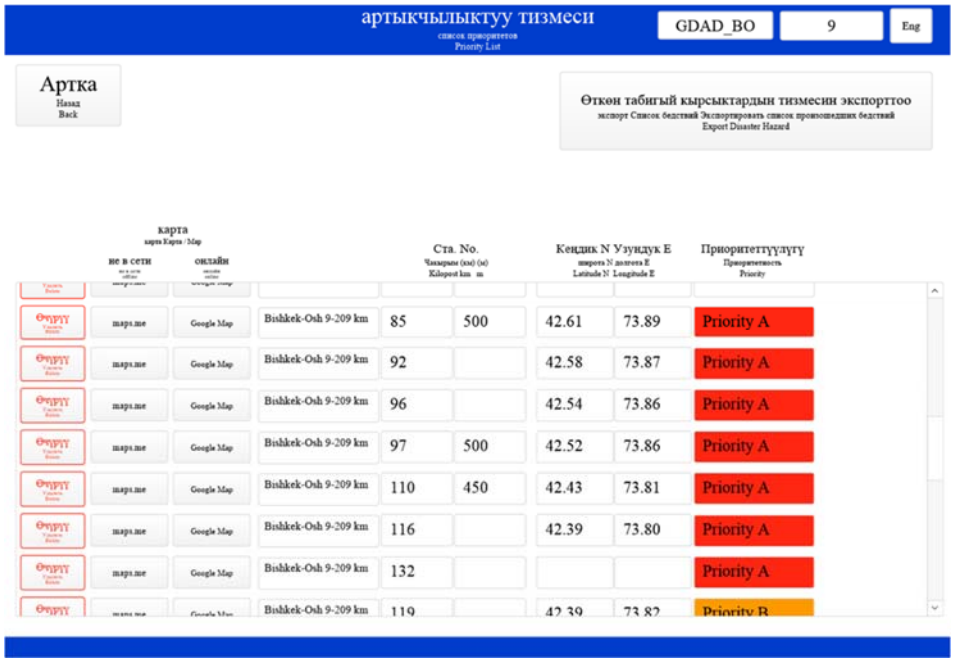


Figure 3-1 Priority List

3.2 Graph Function

Several types of graphs regarding to the road disaster data, which are “Priority Graph”, “Disaster Graph”, “Priority List by DEUs” and “Number of Falling Rock and Avalanche per DEUs”, can be browsed by graph function as shown in Figure 3-2.

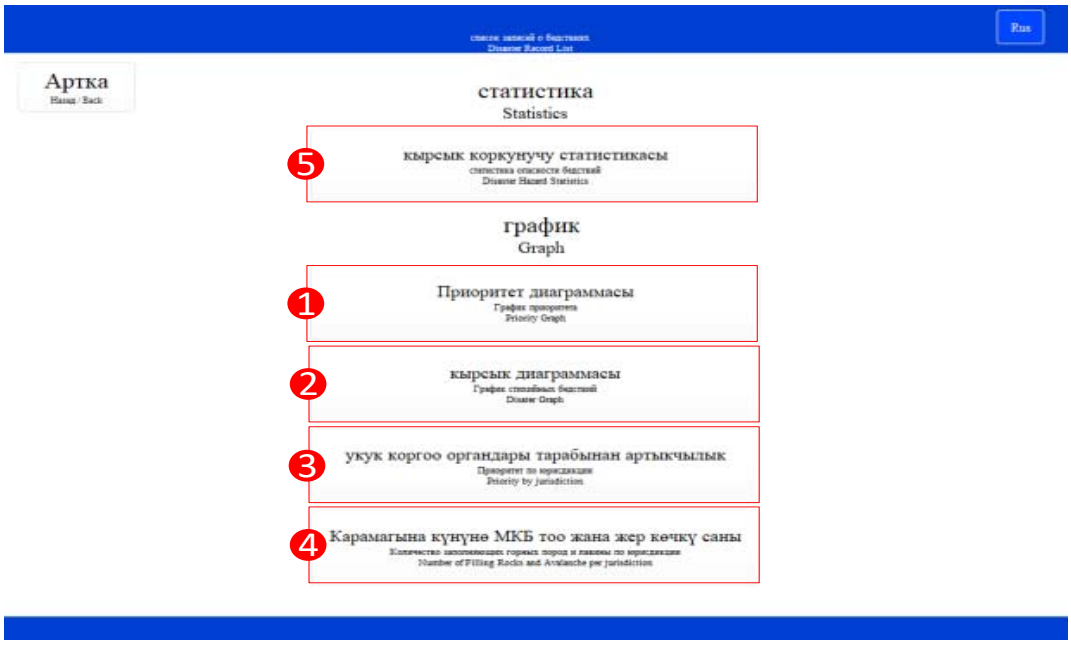


Figure 3-2 Graph Options

3.2.1 Priority Graph

Priority Graph can be browsed by “Priority Graph” button which is indicated as No.1 in Figure 3-2. The ratio and number by priority can be confirmed by this graph shown in Figure 3-3.

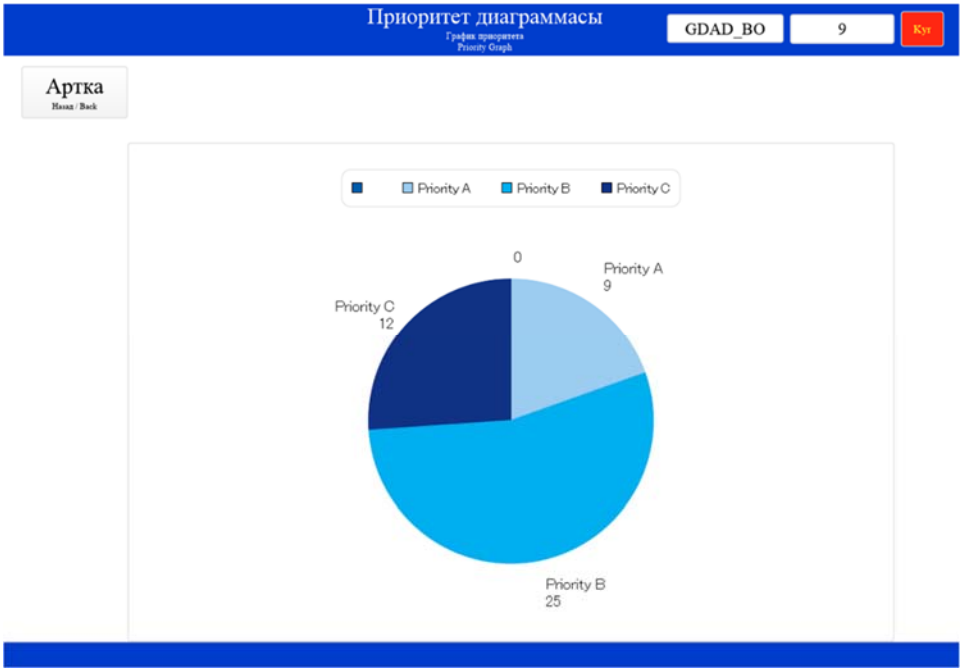


Figure 3-3 Priority Graph

3.2.2 Disaster Graph

Disaster Graph can be browsed by “Disaster Graph” button which is indicated as No.2 in Figure 3-2. The number of disaster types can be confirmed by this graph shown in Figure 3-4.

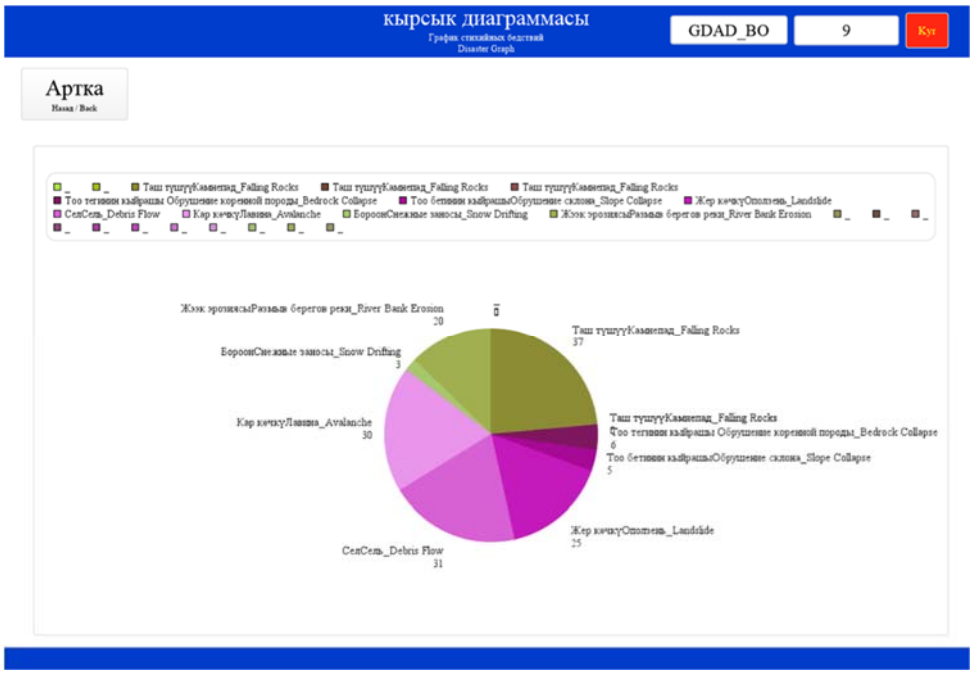


Figure 3-4 Disaster Graph

3.2.3 Priority Histogram by Units

Priority Histogram by units can be browsed by “Priority Histogram” button which is indicated as No.3 in Figure 3-2. The number of priorities by RD/UADs can be confirmed by this histogram shown in Figure 3-5.

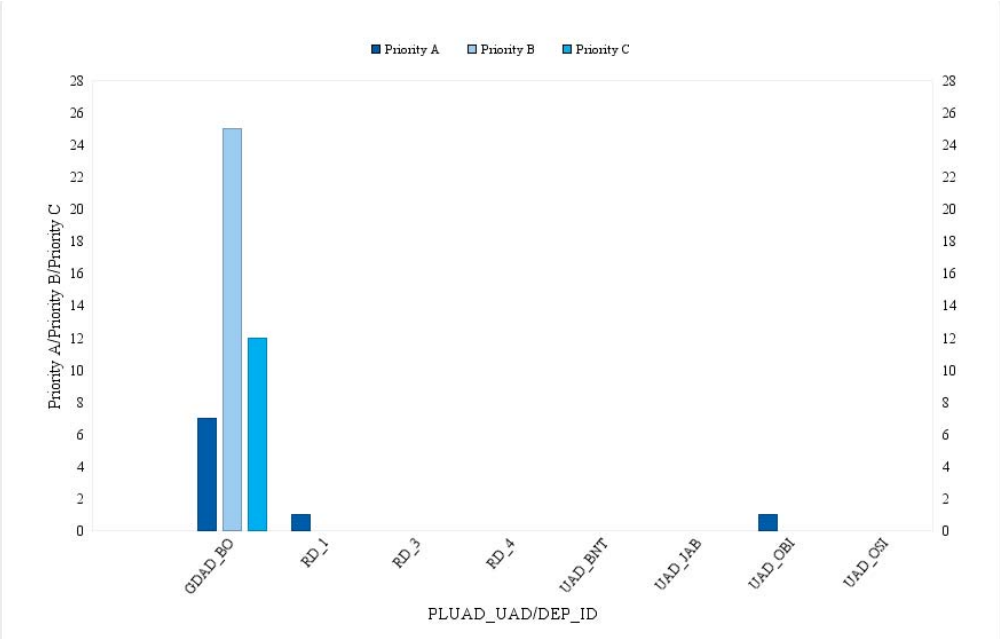


Figure 3-5 Priority Histogram by Units

3.2.4 Number of Road Disaster by RDs/UADs

Histogram Number of Road Disaster by RDs/UADs can be browsed by “Number of Filling Rocks and Avalanche per jurisdiction” button which is indicated as No.4 in Figure 3-2. The number of road disasters by RD/UADs can be confirmed by this histogram shown in Figure 3-6.

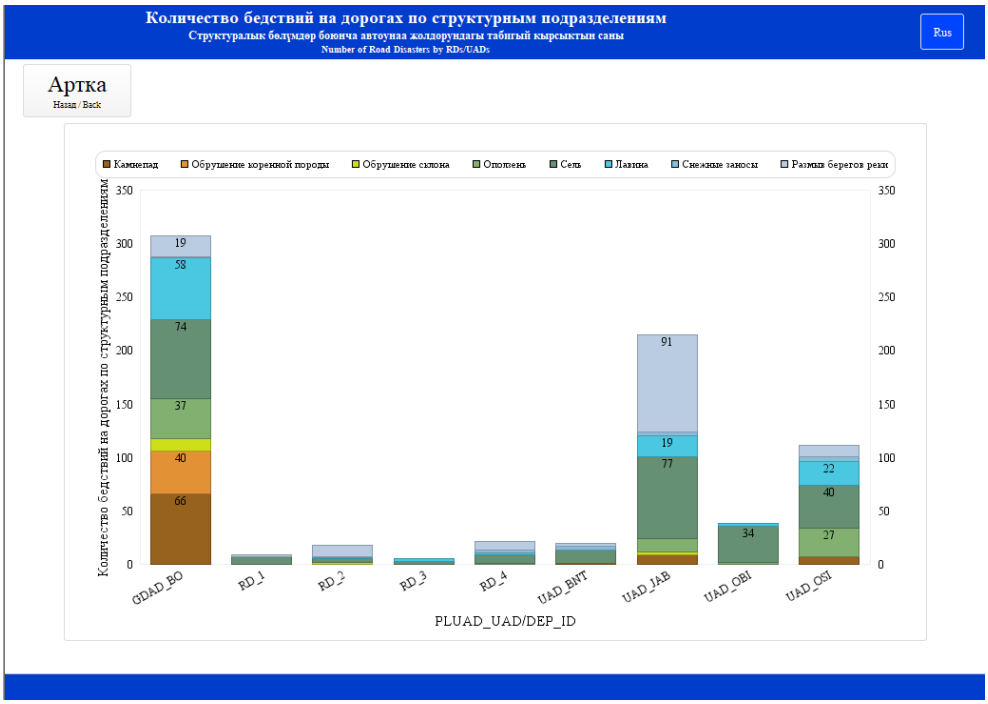


Figure 3-6 Histogram Number of Road Disaster by RDs/UADs

3.2.5 Disaster Hazard Statistics

Data of disaster hazard statistics can be browsed by “Disaster Hazard Statistics” button which is indicated as No.5 in Figure 3-2. Disaster Hazard Statistics can be confirmed by table shown in Figure 3-7 Disaster Hazard Statistics.

Артка
Назад / Back

Excel

RD_UADs	DEUs	Falling Rocks	Bedrock Collapse	Slope Collapse	Landslide	Debris Flow	Avalanche	Snow Drifting	River Bank Erosion
RD_2	18	0	0	0	0	0	1	1	2
RD_2	20								
RD_2	24	0	0	0	0	0	0	0	3
RD_4	3	0	0	0	0	6	2	2	0
RD_4	4								
RD_4	7								
RD_4	10	0	0	0	0	2	0	0	1
RD_4	11	0	0	0	0	0	0	0	1
RD_4	33	0	0	0	0	0	0	0	2
RD_4	35	0	0	0	1	0	0	0	4
RD_3	6								
RD_3	19	0	0	0	0	2	0	0	0
RD_3	36	0	0	0	0	0	2	2	0
RD_3	48								
RD_3	47	0	0	0	0	1	0	0	0
UAD_JAB	12	0	0	0	0	38	0	0	23
UAD_JAB	17	0	0	0	1	15	0	0	22
UAD_JAB	27	0	0	0	0	3	18	18	8
UAD_JAB	31	0	0	0	4	1	0	0	7
UAD_JAB	50	9	0	3	4	11	1	1	14
UAD_JAB	51	0	0	0	0	6	0	0	2
UAD_JAB	52	0	0	0	3	3	0	0	15
UAD_BNT	32	1	0	0	0	5	0	0	2

Figure 3-7 Disaster Hazard Statistics