

Training for Snow Disaster Prevention Work

The Project
for
Capacity Development for Road
Disaster Prevention Management
in
the Kyrgyz Republic

May 2018

Purpose of this Training

- 雪害の種類と大まかな特徴を把握した上で、
- 災害防止のための対策工について、日本の対策工とキルギスに適した対策工を知り、
- 適切な対策を実施するための災害の記録方法について学ぶ。

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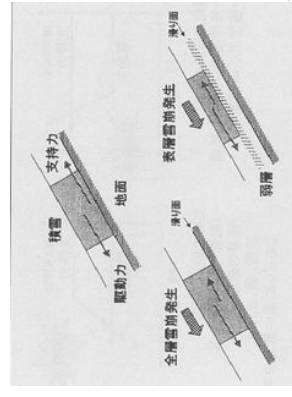
雪崩の基礎知識



BO 226kpの雪崩斜面

雪崩：
雪崩とは斜面に積もった雪が重力の作用によって崩れ落ちる現象。
発生の形から点発生と面発生に、雪質から乾雪と湿雪に、すべり面の位置から表層と全層に区別される。

雪崩の発生：
斜面上積雪の駆動力が支持力を上回ったときに発生する。
・駆動力の増加：
降雪による積雪の増加 など
・支持力の低下：
積雪の内部構造(雪質)の変化
気温の上昇による融雪、降雨 など



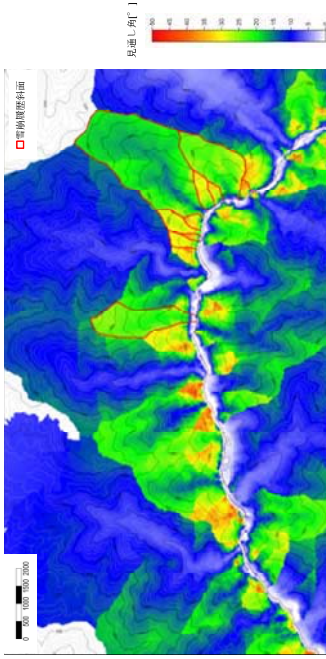
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雪崩の基礎知識

Лавины

雪崩の発生しやすい場所

- ・斜面傾斜35～45°
 - ・積雪の集まりやすい渓流型の斜面
- BO道路では、斜面の規模が大きく、見通し角が20～25°（下図緑～黄色）の斜面で雪崩が道路まで到達している。過去の雪崩発生箇所とともに、類似斜面では雪崩の危険性がある。



BO道路 (DEP9) の道路からの見通し角分布

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雪崩対策～日本の対策施設とコンサルティング

Лавины

対策工：発生源対策が基本

斜面上の積雪の移動を抑止し、雪崩の発生を防ぐ



雪崩予防柵

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雪崩対策～基本的な考え方

Лавины

雪崩は年による再現性のある現象であるため、過去の履歴に基づいて対策することが最も効果的です。そのためには、雪崩が「いつ」「どこで」「どの程度の規模」で発生したのかを記録しておくことが基本となります。

雪崩の規模が大きいため完全に防ぐことは困難ですが、道路への堆積量を減らすことで、交通開放の早期化をはかることができます。

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雪崩対策～日本の対策施設とコンサルティング

Лавины

対策工：待ち受け対策

規模の大きな斜面では発生源対策では効率が悪いため待ち受け対策を実施



スノーシールド

雪崩を斜面下方へ流下させる



防護擁壁

雪崩を止める



減勢工

雪崩の速度を落とす



誘導工

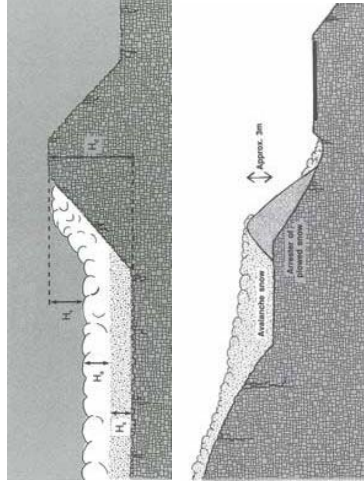
雪崩の方向を変える

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雪崩対策～キルギスで採用可能な対策

Лавины

- 土堤：堤体手前に雪崩を堆積させる。



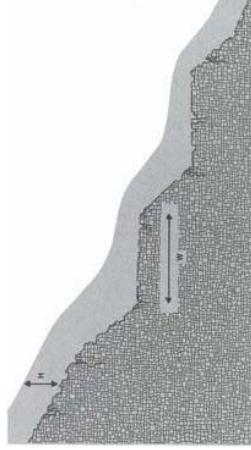
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雪崩対策～キルギスで採用可能な対策

Лавины

- 階段工：雪崩の発生を予防する。雪崩の速度を弱める。



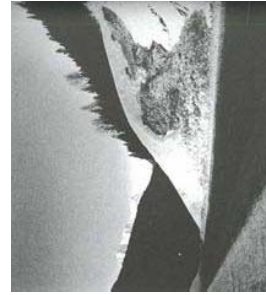
BO道路 223kp

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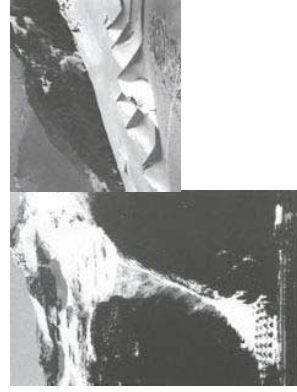
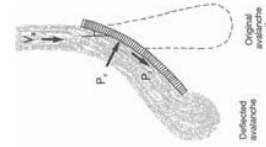
雪崩対策～キルギスで採用可能な対策

Лавины

- その他：雪崩の方向を変える誘導堤、勢いを弱める減勢工など



誘導堤



減勢工 (土塁)

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雪崩の記録から対策区間検討まで

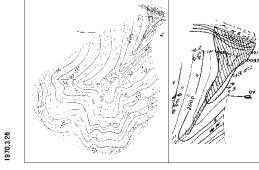
Лавины

- 雪崩履歴の記録
発生した雪崩について以下の項目を記録する

- 雪崩発生日時
- 雪崩位置、到達範囲
道路上への雪崩到達範囲を記録する。記録項目は雪崩の道路上の幅、高さとする。
到達範囲は位置図に整理することが望ましいが、困難な場合は到達範囲両端の写真を撮影するなど到達範囲の両端を記録するよう努める。
- 雪崩による被害
人的被害や車両、構造物の被害や通行止めの実態など雪崩による被害を記録する。
- 雪崩発生時の気象状況
雪崩発生時の天候、積雪深、降雪量、気温について記録する。



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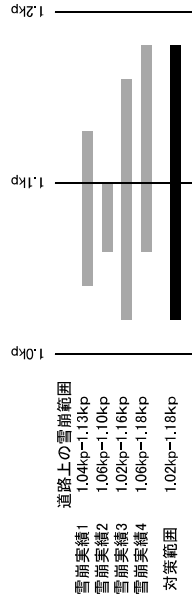


MESの記録

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- ・対策優先度検討
履歴から、交通への影響度(過去の通行止め時間)や雪崩発生回数などを整理し、雪崩対策優先度を定める

- ・対策範囲検討
履歴から対策範囲を決める。過去の全ての雪崩を
含む範囲及び最大高さの雪崩を対象とすることが望
ましい



- ・雪崩は年や場所により再現性のある現象であるため、雪崩の記録を蓄積することで、危険箇所を把握することができる。
- ・蓄積した記録から、交通への影響が大きい箇所を客観的に示すことができる。
- ・対策工の高さや幅を過去の雪崩履歴から決定することができる。
- ・規模が大きな雪崩を完全に防ぐことは難しいが、道路への到達量を減らすことで、交通開放の早期化につながる。
- ・壊れた際には早期復旧を心がけ、壊れても影響の少ない場所に施工する。

- 地吹雪という現象：
 - 強風によって積雪表面の雪が飛び出し、空中を舞いながら飛んでいく現象。場合によっては上空からの降雪を伴うこともある。
 - 移動する雪粒子の影響で、吹きだまり(SnowDrift)や視程障害(Visibility Failure?)が発生し、道路交通に悪影響を及ぼす。

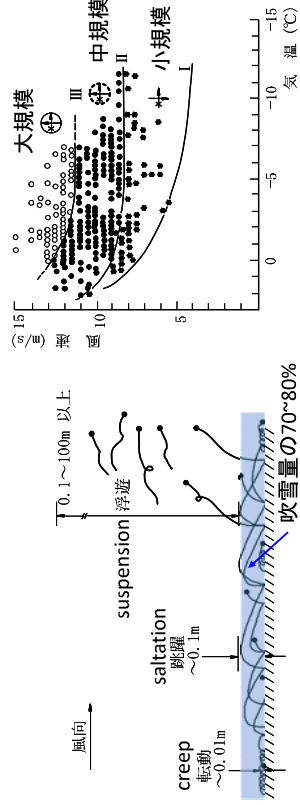


図 地吹雪の形態

図 地吹雪発生条件

- 道路における地吹雪災害というもの：
落石や斜面崩壊、雪崩という道路災害と異なり、一瞬で車両や交通にダメージを与えるものではないが、冬期間に発生する頻度は多く、規模の大きいところでは無視することのできない道路災害である。
【吹きだまり】道路の近くに凹凸の地形や構造物があると、地吹雪によってその後方に雪が急速に積もり、道路上に達すると、車両が走行できなくなる。酷いときは、車両自体が吹きだまりに埋没することがある。
【視程障害】ドライバーの目の高さの地吹雪の雪粒子の量が多くなると、前方が見えなくなり(ひどい場合はホワイトアウトと呼ばれる)交通事故や立ち往生が発生する。



吹きだまりによる道路埋没



視程障害の様子

地吹雪対策～基本的な考え方

Снежные заносы

- 道路上に到達する地吹雪粒子を減らすためのコントロールをすることを基本とする。
- 理想は、道路全体を屋根で囲う「スノーシェルター」だが、延長の長い地吹雪発生区間全体の対策としては非常に高価である。
- ある程度の地吹雪は道路に到達することを許容する対策工（以降で説明する）を設置することが妥当である。
- 対策がない場合に比べてその労力は小さくなるが、引き続き除雪作業によるフォローが必要になる。
- 視程障害に対しては、ホワイトアウトの時でも、ドライバーの視線を誘導して道路の方向を理解させることができる、視線誘導施設も有効である。

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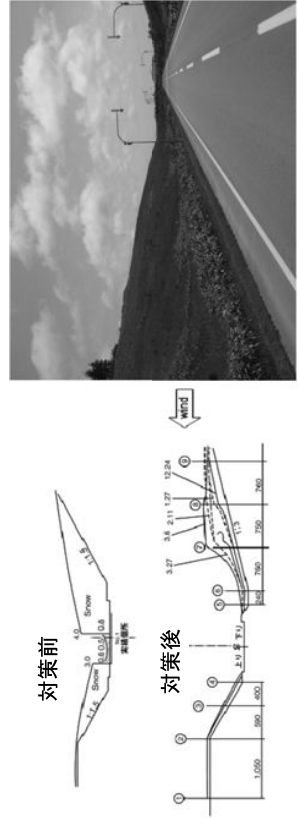
地吹雪対策～日本の対策

Снежные заносы

【道路構造による地吹雪対策】

●防雪切土

切土の角度を緩く(小さく)することで法面上に吹きだまりを形成し道路上に到達させない



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地吹雪対策～日本の対策

Снежные заносы

【日本の地吹雪対策の一覧】

区分	種別	対策工	対策の目的
道路構造	切土による吹雪対策	防雪切土	吹きだまり対策
	盛土による吹雪対策	防雪盛土 緩勾配盛土	吹きだまり対策 吹きだまり・視程障害対策
付帯施設	道路防雪林	標準林	吹きだまり・視程障害対策
		狹帯林	視程障害対策
	防雪柵	吹きだめ柵	吹きだまり対策
		吹き払い柵	吹きだまり・視程障害対策
視程誘導施設	吹き上げ防止柵	吹き上げ防止柵	吹きだまり・視程障害対策
		固定式視線誘導柱	除雪機表示・視線誘導対策
	スノーポール	スノーポール	除雪機表示・視線誘導対策
		視線誘導標	視線誘導対策
大型構造物	吹雪遮蔽	視線誘導樹	視線誘導対策
		道路照明	交通安全施設・視線誘導対策
		スノーシェルター	吹きだまり・視程障害対策

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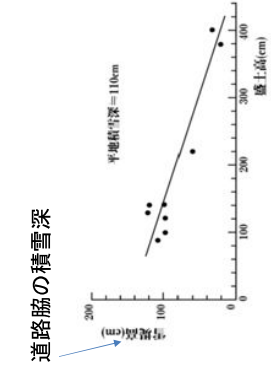
地吹雪対策～日本の対策

Снежные заносы

【道路構造による地吹雪対策】

●防雪盛土

道路を高くすることで、または盛土法面の角度を緩くすることで、道路上の風速を大きくし、雪を吹き払って吹きだまりを作らない。



盛土が高いほど、除雪による道路脇の積雪がなくなり吹きだまりがでない

法面勾配が小さいほど、道路上の渦は小さく風が強くなる

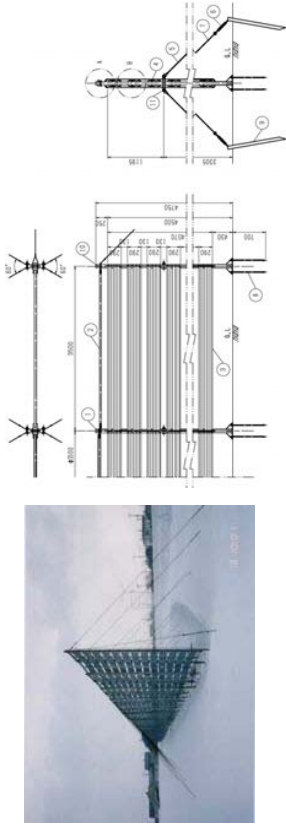
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地吹雪対策～日本の対策

Снежные заносы

●吹きだめ柵

道路の風上側に設置して、柵の前後の風速を弱め吹きだまりを作ることによって道路上の視程障害と吹きだまりを軽減させる。



- 下部に隙間を与え(上の例では40cm程度)、空隙率を30%程度とすることで、柵の前後に大きな吹きだまりを作ることができる。
- ただし、道路から20～30m程度話して設置する必要がある。

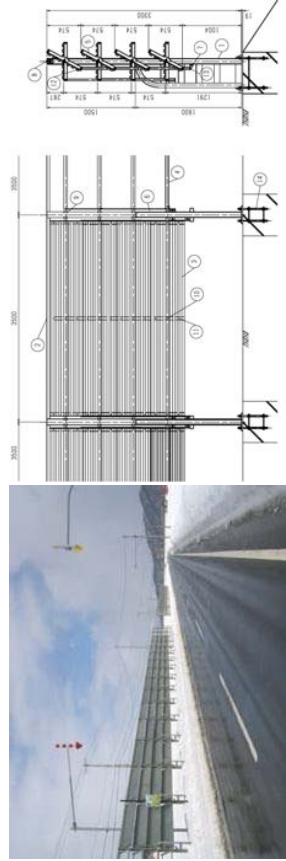
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地吹雪対策～日本の対策

Снежные заносы

●吹き払い柵

防雪プレート斜め下に向けてすることで、気流を路面上で強くすることで、道路上の雪を吹き払うことができる。



- 防雪板は3～4枚程度、その向きは60度程度の角度をつけることが多い。
- 下部の隙間も1m程度あけることがある。ここが埋まると吹き払い効果がなくなり、逆に道路上に吹きだまりができやすい。

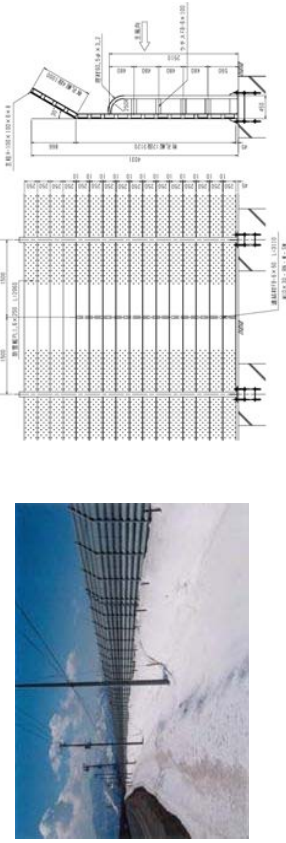
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地吹雪対策～日本の対策

Снежные заносы

●吹き止め柵

吹きだめ柵より柵の高さを大きくし、空隙率を小さくすることで、吹きだまりの大部分を柵の風上側にためるタイプの防雪柵。



- 下部に隙間を与えず、空隙率も0～10%程度とすることで、柵の風上側に大きな吹きだまりを作ることができる。
- 基礎が大きかりになることもあり、吹きだめ柵よりも高価になる。

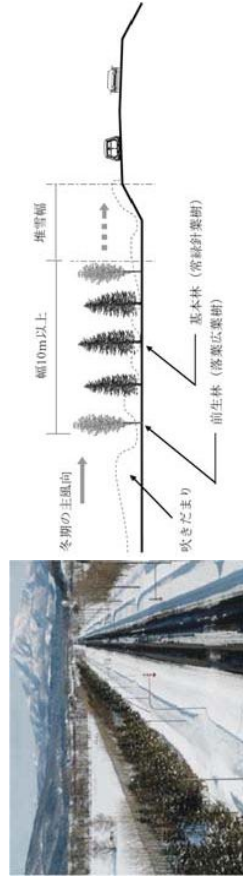
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地吹雪対策～日本の対策

Снежные заносы

●道路防雪林(標準林)

10m～30m程度の幅を持つ、主に針葉樹(コニファー)から形成される林帯が地吹雪から道路を守るものである。



- 林帯用の基盤を造成し、30cm程度の苗木から植栽する必要がある。
- 健全に生育し防雪効果が機能するまで10～15年以上かかるため、防雪柵などを併用するケースが多い。

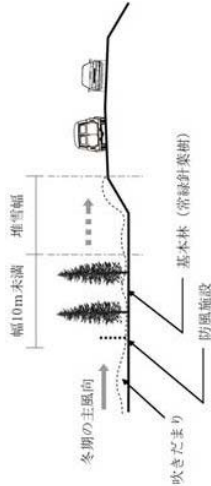
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地吹雪対策～日本の対策

Снежные заносы

● 道路防雪林(狭帯林)

10m程度以下の幅を持つ、針葉樹(コニファー)から形成される林帯で、主に視程障害時の視線誘導対策となる。



- 植樹する用地に限られている場合に採用されることがある。
- 日中の吹雪に対する視認性は極めて良いが、夜間の視程障害時には効かない。

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地吹雪対策～日本の対策

Снежные заносы

Сравнительный анализ систем снегозадержания

Тип системы	Принцип действия	Преимущества	Недостатки	Сфера применения
1. Снегозадерживающие решетки (металлические)	Задерживают снег, позволяя ему таять и стекать.	Высокая эффективность, долговечность.	Высокая стоимость, необходимость регулярного обслуживания.	Автомобильные дороги, трассы.
2. Снегозадерживающие решетки (пластиковые)	Аналогично металлическим, но из пластика.	Легкость, долговечность.	Высокая стоимость, необходимость регулярного обслуживания.	Автомобильные дороги, трассы.
3. Снегозадерживающие решетки (деревянные)	Задерживают снег, позволяя ему таять и стекать.	Низкая стоимость, экологичность.	Низкая долговечность, необходимость регулярного обслуживания.	Автомобильные дороги, трассы.
4. Снегозадерживающие решетки (каменные)	Задерживают снег, позволяя ему таять и стекать.	Высокая долговечность, низкая стоимость.	Высокая стоимость, необходимость регулярного обслуживания.	Автомобильные дороги, трассы.
5. Снегозадерживающие решетки (бетонные)	Задерживают снег, позволяя ему таять и стекать.	Высокая долговечность, низкая стоимость.	Высокая стоимость, необходимость регулярного обслуживания.	Автомобильные дороги, трассы.
6. Снегозадерживающие решетки (асфальтовые)	Задерживают снег, позволяя ему таять и стекать.	Высокая долговечность, низкая стоимость.	Высокая стоимость, необходимость регулярного обслуживания.	Автомобильные дороги, трассы.
7. Снегозадерживающие решетки (поликарбонатные)	Задерживают снег, позволяя ему таять и стекать.	Высокая долговечность, низкая стоимость.	Высокая стоимость, необходимость регулярного обслуживания.	Автомобильные дороги, трассы.
8. Снегозадерживающие решетки (стальные)	Задерживают снег, позволяя ему таять и стекать.	Высокая долговечность, низкая стоимость.	Высокая стоимость, необходимость регулярного обслуживания.	Автомобильные дороги, трассы.
9. Снегозадерживающие решетки (алюминиевые)	Задерживают снег, позволяя ему таять и стекать.	Высокая долговечность, низкая стоимость.	Высокая стоимость, необходимость регулярного обслуживания.	Автомобильные дороги, трассы.
10. Снегозадерживающие решетки (титановые)	Задерживают снег, позволяя ему таять и стекать.	Высокая долговечность, низкая стоимость.	Высокая стоимость, необходимость регулярного обслуживания.	Автомобильные дороги, трассы.

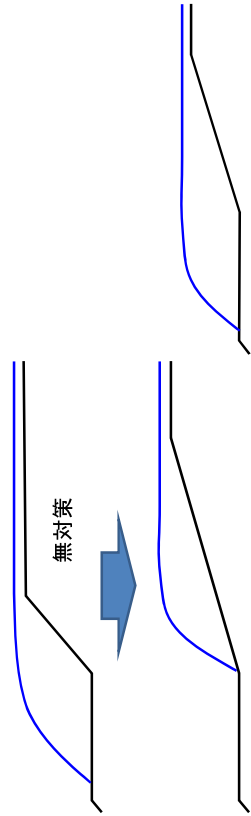
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地吹雪対策～キルギスで採用可能な対策

Снежные заносы

● 防雪切土

- 土工のうち「防雪切土」はコストがそれほどかからないため、十分な規模の防雪切土(勾配1:3程度、法面長さ20m程度以上)であればOK。
- ただし、小規模な切土(高さ5m程度以下)であれば、逆に道路上の吹きだまりや視程障害が悪化する。



○: 十分な規模の防雪切土

×: 緩勾配だが、法面が小さい

30

地吹雪対策～キルギスで採用可能な対策

Снежные заносы

● 吹きだめ柵

- 道路から離すことで万が一倒れても道路に影響がない。
- 柵の規格や道路からの距離が適正であれば、材質や基礎にとらわれないため低コストに抑制でき、防雪効果を期待することができる。



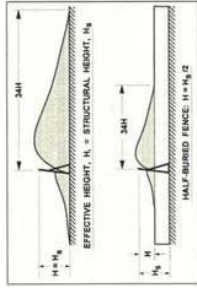
日本で用いている「仮設吹きだめ柵」ワイヤーで固定しているため大がかりな基礎はない。

31

地吹雪対策～キルギスで採用可能な対策

Снежные заносы

- 吹きだめ柵
 - 吹きだめ柵は風上より風下側に大きな吹きだまりを作る(写真)。
 - 柵の規格(高さ・空隙率、下部間隙)によってその大きさが異なる(例は右図)。
 - 現地の吹雪量や積雪深を知り、厳冬期(2月～3月)になっても、吹きだまりが道路に達しない柵の規格・高さを設計すべき。



32

地吹雪対策～キルギスで採用可能な対策

Снежные заносы

- 吹きだめ柵
 - 盗難が懸念される地域では、冬期間だけの仮設が望ましい。
 - モンゴル鉄道では木製柵を用いている。
 - 柵高を低く抑え(左写真)、基礎はうたずにあらかじめ設置されたケーブル(右写真)に冬期間立てかける。
 - 柵が吹きだまりに埋まりそうになったら、その上に更に設置する。



地吹雪の記録から対策区間検討まで

Снежные заносы

- 点検項目
 - 最終的に災害の評価を行い、対策必要区間の選定と優先度を決める際には、「吹雪のポテンシャル」と「吹雪障害データ」を組み合わせて評価することが望ましい(マニュアルp3.40)。
 - 「吹雪ポテンシャル」は、以下の定期点検で路線環境を評価する。
 - 「吹雪障害データ」は、以下の事後点検で、吹きだまりや視程を評価する。

表 地吹雪の点検内容

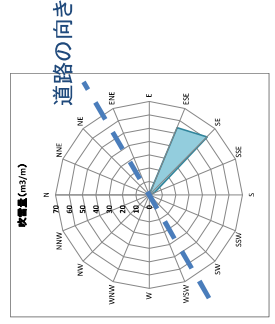
基本フェーズ	点検項目	実施方法
定期点検 (非積雪時)	<ul style="list-style-type: none"> • 道路風上側(即時点では不明の場合もある)で風制が望ましいの地形・積雪状況を確認し、積雪のポテンシャル把握に努める。 • 吹雪の基本的要素である気象条件(吹雪時風速、吹雪頻度など)の情報が作成されていないため、別途、気象観測に頼らざるを得ない。 • 地吹雪発生時または直後に点検を行う。 • 吹きだまりや視程障害の程度を把握し、吹雪風向も確認する。 	<ul style="list-style-type: none"> • 2回/年の点検時に実施。 • 前回と変化がまったときのが記録
事後(緊急)点検 (積雪発生時)	<ul style="list-style-type: none"> • 吹雪発生時または直後に点検を行う。 • 吹きだまりや視程障害の程度を把握し、吹雪風向も確認する。 • ハットローカルカー(ドライブレコーダー)を搭載すると有効なデータが取得できる。 	<ul style="list-style-type: none"> • 地吹雪時に走行可能時に実施。 • 通行止/積雪時に吹きだまり痕を記録

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地吹雪の記録から対策区間検討まで

Снежные заносы

- 定期点検の点検項目
 - ① 気象条件
 - 吹雪風向・吹雪量・積雪深
 - ★これは対策設計時にも必要★
 - ※MOTRで6台保有する計器で観測可
 - ※最低でも現地職員の経験で評価



方位別吹雪量

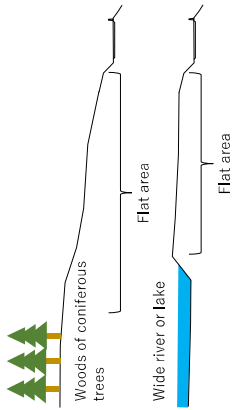


5

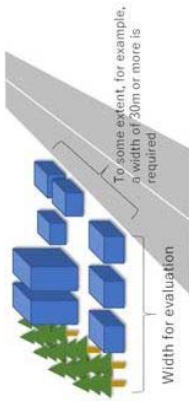
地吹雪の記録から対策区間検討まで

Снежные заносы

- 定期点検の点検項目
- ② 周辺環境
 - 道路周辺の地形 (風上側の平坦地長さ)
 - 植生・建物



平坦地のイメージ



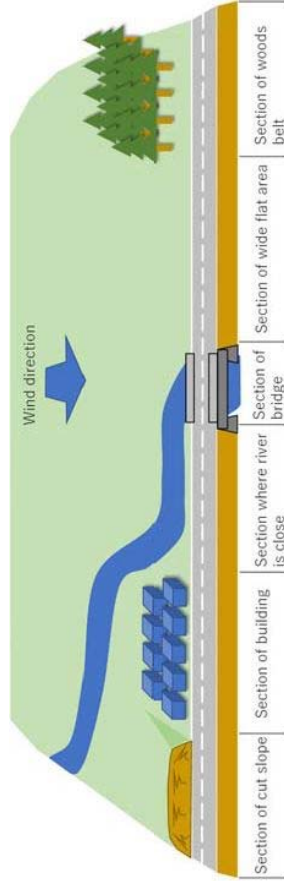
- 道路構造 (盛土・切土・平坦)

36

地吹雪の記録から対策区間検討まで

Снежные заносы

- 定期点検の点検項目
- ③ その他要員
 - 通行止め回数 (平均一冬当たり)
 - 事故・立ち往生回数 (")
 - 除雪難易度合い (")



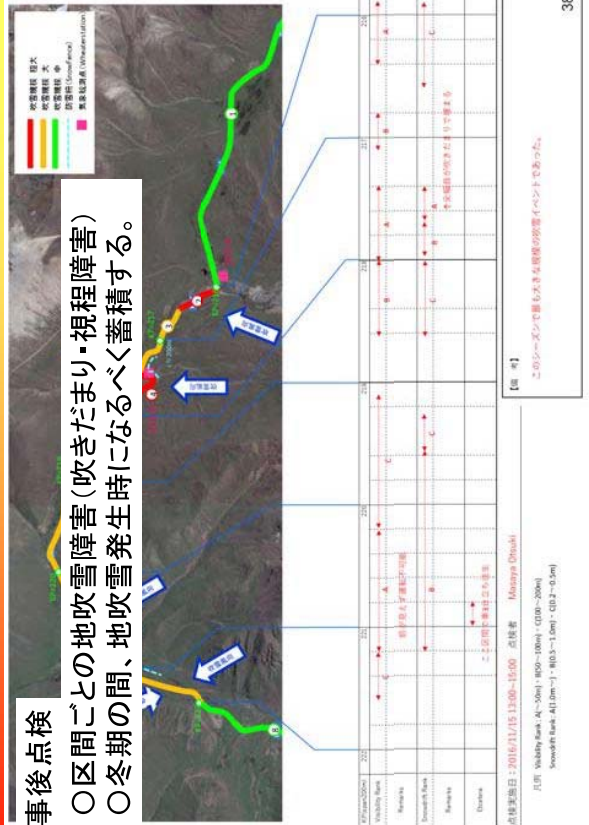
定期点検の点検区間のイメージ図

37

地吹雪の記録から対策区間検討まで

Снежные заносы

- 事後点検
 - 区間ごとの地吹雪障害 (吹きだまり・視程障害)
 - 冬期の間、地吹雪発生時なるべく蓄積する。

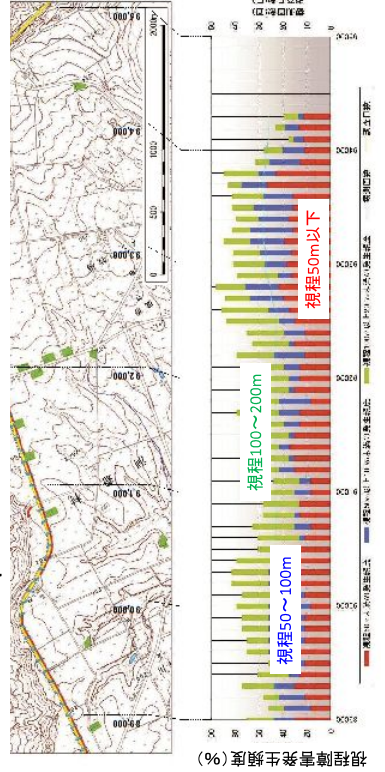


38

地吹雪の記録から対策区間検討まで

Снежные заносы

- 事後点検
 - 蓄積されたデータを区間(あるいは等間隔ピッチ)で積み重ねて以下のような結果が得られる(吹きだまり・視程障害)。
 - 障害発生割合から、その路線・区間の障害ランクを決定 (マニュアルp3.40)



39

雪害対策～キルギスで採用可能な対策

Лавины



<工事費用>

■雪崩対策

階段工(土工) 1.5万円/m³
人力掘削もしくは高所法面掘削機
(1000ソム/m³)

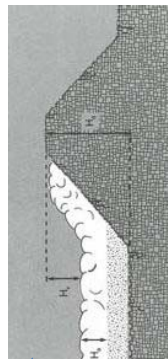
<http://www.lashtock.com/technical/methods.html>



土堰堤(土擁壁)

補強土壁 90万円/m
盛土土堤 20万円/m
ソイルセメント 20万円/m
断面幅が大きくなる

http://www.proteing.co.jp/product_detail.php?keyno=27



■吹雪対策

防雪柵
30万円/m

気象データの解析方法 簡易マニュアル

- MOTRの所有する気象観測機器（2016年にJICAより供与）で観測する気象要素は、気温・風向風速・積雪深であり、基本的に1時間間隔で観測する。
- 観測データは、現地のデータロガーに蓄積されており、定期的なメンテナンス時に、CFカードを用いてデータを回収する。そのときには、データを紛失しないように十分気をつけて、地点を間違えないようにファイル名には地点名と回収年月日をつける。（この作業は別途マニュアルに記載している）
- この観測データを解析し、主に防雪対策の検討を行うときの、吹雪風向（どの方向から吹雪がやってくるのか）と、吹雪量（飛んでくる雪のボリューム）を計算する。
- この簡易マニュアルはその方法について示すものである。

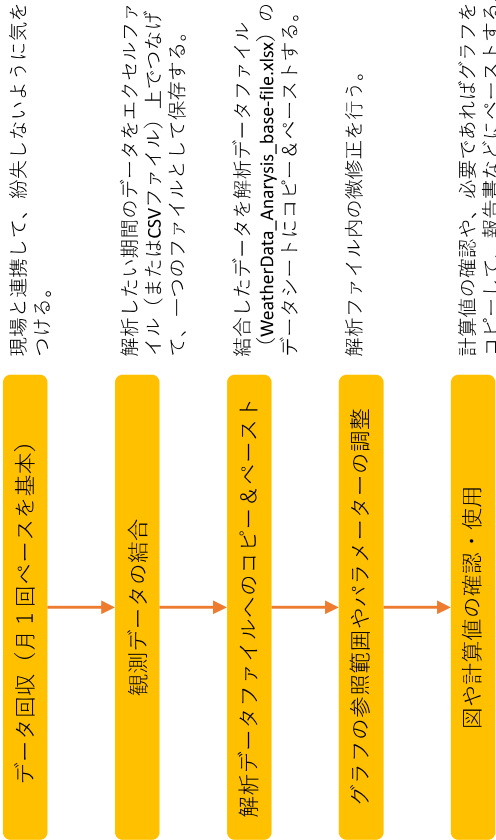
1

観測データの結合

- 以下の回収してきた生データを、古いデータの下にペーストして、つなげていく。
- 最終的には、一つのエクセルファイル（またはCSVファイル）とする。

3

データ処理・解析の流れ



現場と連携して、紛失ないように気をつける。

解析したい期間のデータをエクセルファイル（またはCSVファイル）上でつなげて、一つのファイルとして保存する。

結合したデータを解析データファイル（WeatherData_Analysis_base-file.xlsx）のデータシートにコピー&ペーストする。

解析ファイル内の微修正を行う。

計算値の確認や、必要であればグラフをコピーして、報告書などにペーストする。

2

解析データファイルへのコピー&ペースト

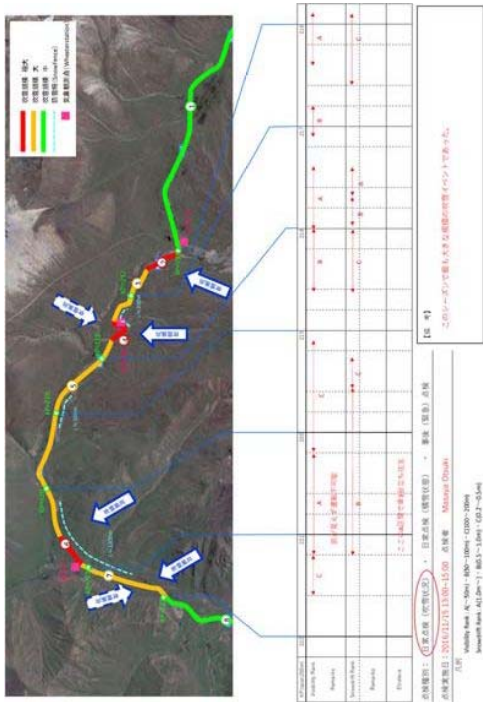
- 結合データを気象観測値の部分のみ（グレー範囲）を観測データファイルへcopy&pasteする。
- 年月日と時間は手入力する。

手入力の際は、エクセルの機能を使い正確に行う。

- この作業で基本的にすべての統計作業が終了する。

4

シート記入例



調査点番号	経緯度	高さ	備考
1	35° 42' 12.34" N	145.00	調査開始点
2	35° 42' 12.34" N	145.00	調査点
3	35° 42' 12.34" N	145.00	調査点
4	35° 42' 12.34" N	145.00	調査点
5	35° 42' 12.34" N	145.00	調査点
6	35° 42' 12.34" N	145.00	調査点
7	35° 42' 12.34" N	145.00	調査点
8	35° 42' 12.34" N	145.00	調査点
9	35° 42' 12.34" N	145.00	調査点
10	35° 42' 12.34" N	145.00	調査終了点

【備考】
このシートで記入した調査点の位置は、必ずしも正確な位置を示しているとは限りません。

調査経路：(1) 調査開始 (2) 調査終了 (3) 調査方向 (4) 調査経路 (5) 調査開始 (6) 調査終了 (7) 調査方向 (8) 調査経路 (9) 調査開始 (10) 調査終了 (11) 調査方向 (12) 調査経路

調査開始点：35° 42' 12.34" N 145.00 高さ：145.00

調査終了点：35° 42' 12.34" N 145.00 高さ：145.00

点群：35° 42' 12.34" N 145.00 高さ：145.00

**THE PROJECT FOR
CAPACITY DEVELOPMENT FOR
ROAD DISASTER PREVENTION MANAGEMENT
IN THE KYRGYZ REPUBLIC**

**Training for Countermeasures Method
against
Debris Flow and Riverbank Erosion**

May 2018

1

Training Program

1. Basic Concept of Training
2. Disaster Occurrence
3. Structural Measures
4. Non-Structural Measures

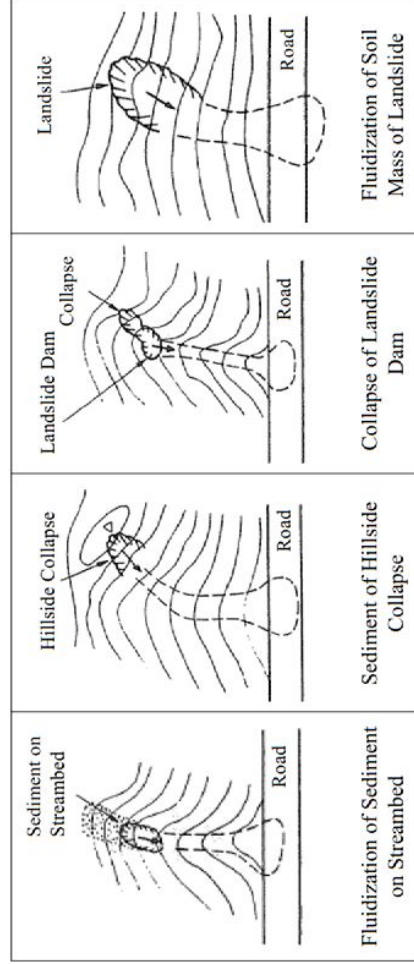
2

1. Basic Concept of Training

- To understand the type of disaster occurrence
- To understand the type of countermeasures against disaster (In consideration of international donor's cooperation in the future, we should understand the all type of countermeasures)
- To study the basic plan of countermeasure work including the cost for budget.

3

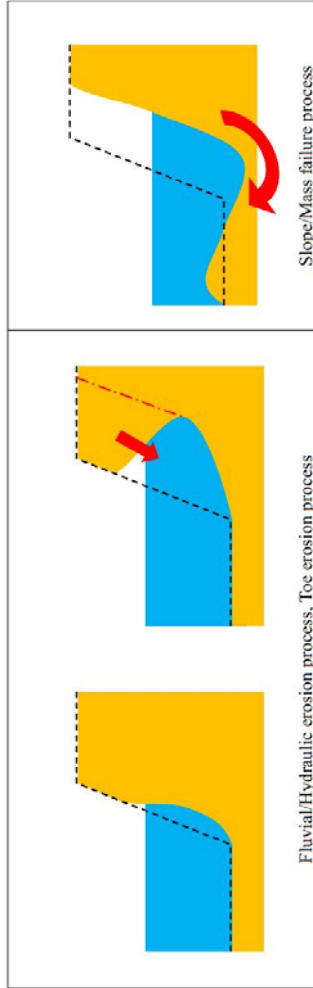
2. Disaster Occurrence



Type of Debris Flow Disaster Occurrence

4

2. Disaster Occurrence



- Fluvial/Hydraulic erosion process, Toe erosion process due to scouring force of river flow
- Slope/Mass failure process due to bank stability (caused by additional embankment, or riverbed scouring, etc.)

Type of Riverbank Erosion Disaster Occurrence

5

3. Structural Measures (Debris Flow)

Major Classification and Type of Countermeasures against Debris Flow

Classification	Type of Countermeasures
Mitigation of Sediment Production	Refer to Countermeasure against Landslide, Collapse and Riverbank Erosion, Sabo Dam
Guiding of Debris Flow	Bridge, Culvert, Causeway, Shed, Tunnel
Capture of Debris Flow	Sabo Dam
Realignment of Road to avoid Debris Flow	Diversion Road

6

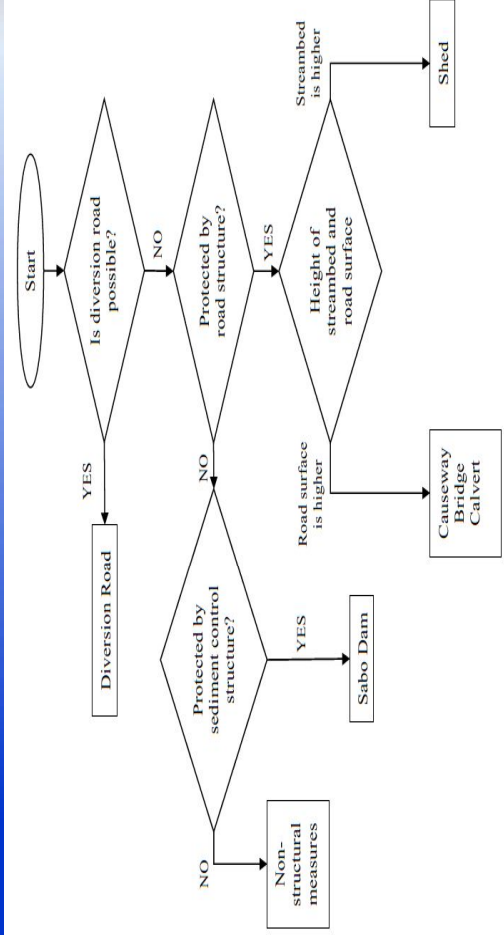
3. Structural Measures (Debris Flow)

<p>Diversion Road (Asphalt Pavement: 2,500 KGS/m², Bridge: 3,000,000 KGS/m)</p>	<p>Bridge (Bridge: 3,000,000 KGS/m)</p>	<p>Culvert (Culvert: 250,000 KGS/m)</p>
<p>Debris Flow Shed (Shed: 3,000,000 KGS/m)</p>	<p>Sabo (Sediment Control) Dams (Dam: 100,000,000 KGS/dam)</p>	<p>Causeway (Concrete Pavement: 3,500 KGS/m²)</p>

Please update the above unit cost by yourself!!

7

3. Structural Measures (Debris Flow)



8

3. Structural Measures (Debris Flow)

- Bridge, shed and tunnel are applicable in the section which is priority road and has high occurrence rate and large scale of debris flow.
- Debris flow shed is applicable when the streambed is higher than the road surface.
- Culvert or causeway is applicable when the elevation of streambed is almost the same height as the road surface. **Information provision or announcement of debris flow to road user, placement of heavy equipment to promptly remove the debris on the road, and formulation of communication system shall be combined with construction of causeway to mitigate the impact on road traffic.**
- Sabo dam is applicable when it is difficult to mitigate the road disaster by the road structures.
- Non-structural measures are applicable when the road disaster might not be mitigated by structural measures due to the large-scale debris flow, and structural measures cannot be implemented due to budgetary constraints

9

3. Structural Measures (Debris Flow)

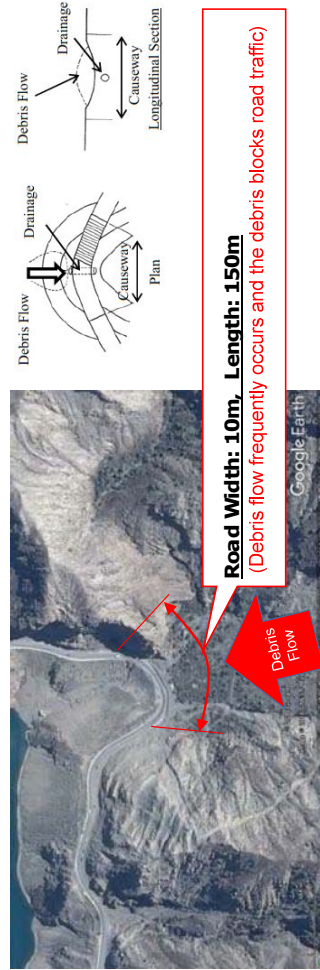
- To plan/design the Diversion Road, Bridge, Culvert, Debris Flow Shed and Sabo Dam (i.e. other than Causeway), **sediment volume/discharge (including sediment yield)** should be estimated.
- On the other hand, the Causeway can be planned/constructed without sediment volume/discharge.
- Causeway were constructed along the road in Kyrgyz. (for example OSI Road in DEU 959).
- However, it should be noted that **Causeway can not prevent debris flow.**



10

3. Structural Measures (Debris Flow)

Example of Rough Cost Estimate for Debris Flow Countermeasures



If Causeway is applied as a countermeasures for debris flow at this area, the rough cost estimate is:

$$\text{Rough Cost} = \text{Quantity} \times \text{Unit Cost}$$

- Area of Causeway: $10\text{m} \times 150\text{m} = 1500\text{m}^2$
- Rough construction cost of Causeway: $1500\text{m}^2 \times 3,500 \text{ KGS/m}^2 = \mathbf{5,250,000 \text{ KGS}}$

11

3. Structural Measures (Riverbank Erosion)

Major Classification and Type of Countermeasures Material against Riverbank Erosion

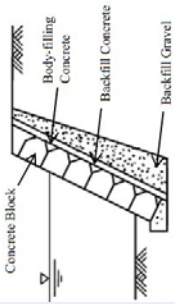
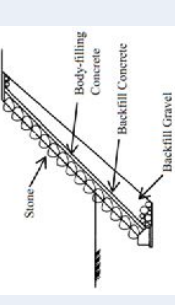
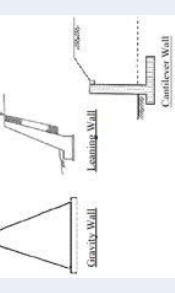
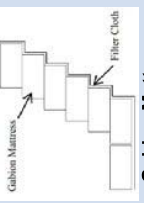
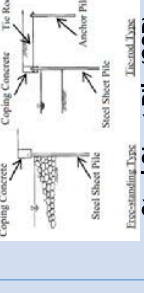
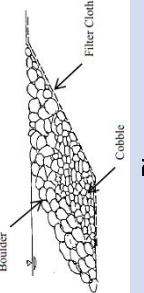
Classification	Type of Countermeasures Material
Revetment	Concrete Block, Wet Stone Masonry, Concrete Retaining Wall, Gabion Mattress, Steel Sheet Pile (SSP), Riprap
Foot Protection	Concrete Block, Gabion Mattress, Stone Bagging Unit, Riprap
Spur Dike	Massive Concrete Block (Overflow Type), Concrete Block (Non-overflow Type), Boulder Riprap

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3. Structural Measures (Riverbank Erosion)

Revetment

Please update the following unit cost by yourself!!

 <p>Concrete Block Body-filling Concrete Backfill Gravel</p>	 <p>Wet Stone Masonry Body-filling Concrete Backfill Gravel</p>	 <p>Concrete Retaining Wall Gravity Wall Leaning Wall Counterfort Wall</p>
<p>Concrete Block (90,000 KGS/m³)</p>	<p>Wet Stone Masonry (75,000 KGS/m³)</p>	<p>Concrete Retaining Wall (120,000~180,000 KGS/m³)</p>
 <p>Gabion Mattress Filter Cloth</p>	 <p>Steel Sheet Pile (SSP) Coping Concrete Tie Rod Anchor Pile Steel Sheet Pile Free-standing Type</p>	 <p>Riprap Boulder Filter Cloth Cobble</p>
<p>Gabion Mattress (72,000 KGS/m³)</p>	<p>Steel Sheet Pile (SSP) (192,000~213,000 KGS/m³)</p>	<p>Riprap (18,000 KGS/m³)</p>

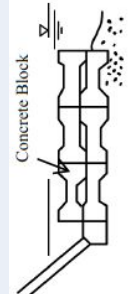
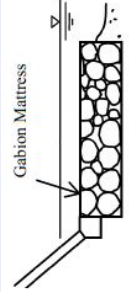

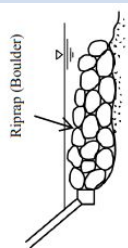
*In the case of 5m in height of revetment

13

3. Structural Measures (Riverbank Erosion)

Foot Protection

Please update the following unit cost by yourself!!

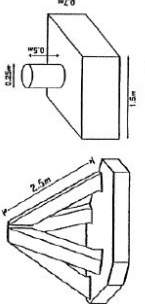
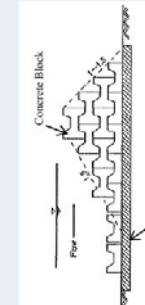
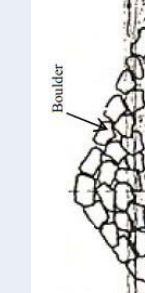
 <p>Concrete Block</p>	 <p>Gabion Mattress</p>	 <p>Stone Bagging Unit</p>
<p>Concrete Block (21,000 KGS/m³)</p>	<p>Gabion Mattress (12,000 KGS/m³)</p>	<p>Stone Bagging Unit (12,000 KGS/m³)</p>
 <p>Riprap (Boulder)</p>		
<p>Riprap (600 KGS/m³)</p>		

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3. Structural Measures (Riverbank Erosion)

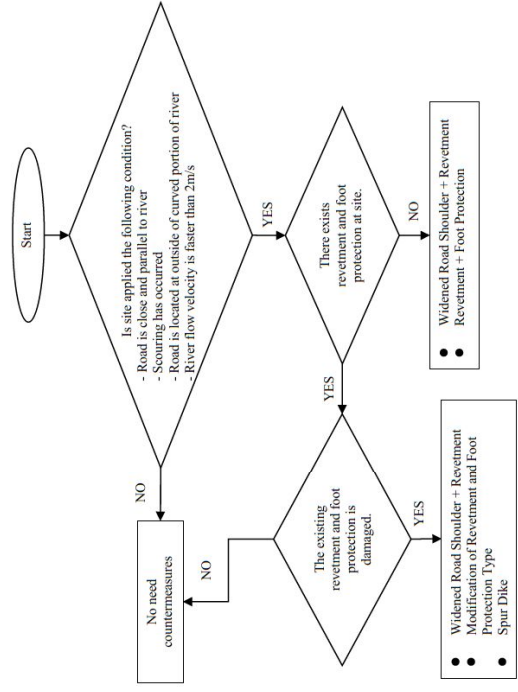
Spur Dike

Please update the following unit cost by yourself!!

 <p>Massive Concrete Block Parasol Type</p>	 <p>Concrete Block Gabion Mattress, Filter Cloth</p>	 <p>Boulder Riprap Filter Cloth</p>
<p>Massive Concrete Block (Permeable Type, Overflow Type) (21,000 KGS/m³)</p>	<p>Concrete Block (Impermeable Type, Non-overflow Type) (21,000 KGS/m³)</p>	<p>Boulder Riprap (Impermeable Type, Non-overflow Type) (600 KGS/m³)</p>

15

3. Structural Measures (Riverbank Erosion)



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3. Structural Measures (Riverbank Erosion)

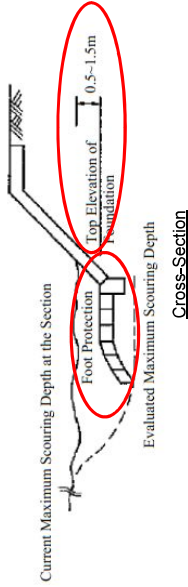
Segment	Durability	Revetment	Foot Protection	Spur Dike
Segment 1 $d_b > 15\text{cm}$ (Riverbed) Gradient: 1/60 ~ 1/1500	High	Wet stone masonry, Concrete block (with backfill concrete), Concrete retaining wall	Concrete block (layered placing), Riprap	Impermeable Type, Non-overflow Type
	Low	Dry stone masonry, Concrete block (without backfill concrete), Connected block by wire		
Segment 1 $2\text{cm} < d_b < 15\text{cm}$ (Riverbed) Gradient: 1/100 ~ 1/400	High	Wet stone masonry, Concrete block (with backfill concrete), Concrete retaining wall	Concrete block (layered placing), Riprap, Gabion mattress, Stone bagging unit, Wooden mattress	Impermeable Type, Non-overflow Type
	Low	Dry stone masonry, Riprap, Gabion mattress, Connected block by wire		
Segment 2-1 $1\text{cm} < d_b < 4\text{cm}$ (Riverbed) Gradient: 1/400 ~ 1/2000	High	Wet stone masonry, Concrete block (with backfill concrete), Concrete retaining wall	Concrete block (layered and random placing), Riprap, Gabion mattress, Stone bagging unit, Wooden mattress	Impermeable Type
	Low	Dry stone masonry, Riprap, Gabion mattress, Connected block by wire		
Segment 2-2 $0.3\text{mm} < d_b < 1\text{cm}$ (Riverbed) Gradient: 1/700 ~ 1/5000	High	Wet stone masonry, Concrete block (with backfill concrete), Concrete retaining wall, Steel Sheet Pile	Concrete block (layered and random placing), Riprap, Gabion mattress, Stone bagging unit, Wooden mattress	Permeable Type
	Low	Dry stone masonry, Riprap, Gabion mattress, Connected block by wire		
Segment 3 $d_b < 0.3\text{cm}$ (Riverbed) Gradient: 1/5000 ~ Level	High	Wet stone masonry, Concrete block (with backfill concrete), Concrete retaining wall, Steel Sheet Pile	Concrete block (random placing), Riprap, Gabion mattress, Stone bagging unit, Wooden mattress	Impermeable Type
	Low	Dry stone masonry, Riprap, Gabion mattress, Connected block by wire		

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3. Structural Measures for Riverbank Erosion

Point of Planning/Design of Riverbank Erosion

- Embedded foundation of revetment (approx. 0.5m ~ 1.5m from riverbed) and Installation of foot protection against erosion.



- Installation of filter cloth to prevent washing out the soil. (for gabion mattress and riprap)

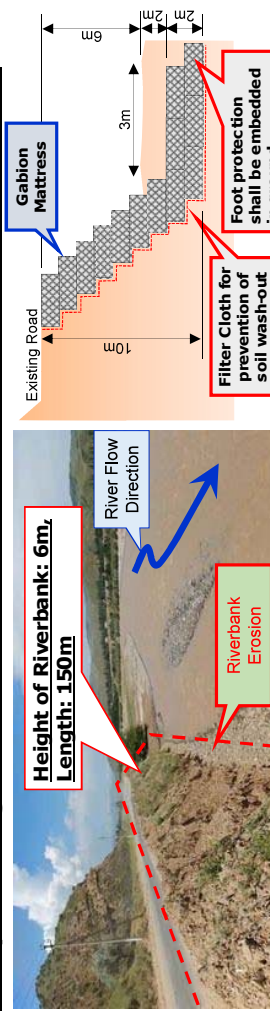
The gap of boulder/stone is larger than the soil particles. Hence, The soil will be washed out by river flow if the filter cloth is not installed.



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3. Structural Measures (Riverbank Erosion)

Example of Rough Cost Estimate for Riverbank Erosion Countermeasures



If Gabion Mattress Revetment and Gabion Mattress Foot Protection is applied as a countermeasures for riverbank erosion at this area, the rough cost estimate is:

$$\text{Rough Cost} = \text{Quantity} \times \text{Unit Cost}$$

- Unit cost of Gabion Mattress Revetment for 5m height: 72,000 KGS/m; thus 10m height is 144,000 KGS/m (=72,000 x 2)
- Rough construction cost of Gabion Mattress Revetment: 150m x 144,000 KGS/m = 21,600,000 KGS
- Volume of Gabion Mattress Foot Protection: 150m (L) x 3m (W) x 2m (D) = 900m³
- Rough construction cost of Gabion Mattress Foot Protection : 900m³ x 12,000 KGS/m³ = 10,800,000 KGS
- Therefore, Total of Gabion Mattress Revetment and Gabion Mattress Foot Protection: 21,600,000 KGS + 10,800,000 KGS = 32,400,000 KGS

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4. Non-Structural Measures

Please update the following cost by yourself!

Road Sign/ Signboard
(60,000 KGS/sheet)

Hazard Map
(2 KGS/sheet)

20

4. Non-Structural Measures



- A car broke down and stop within the section of debris flow along Myrzake- Karakulja- Alaikuu Road (42km point)
- A father and two children got in the car.
- The father got out of the car leaving the children in the car to ask for someone's assistance.
- While the father left the car, debris flow occurred and the children were dead.

If the family recognized the section is debris flow hazardous area by **Road Sign/ Signboard** or **Hazard Map**, the children might not be dead.

Road Sign/Signboard and Hazard Map is not expensive but have possibility of saving people's lives.

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Thank you for your attention!

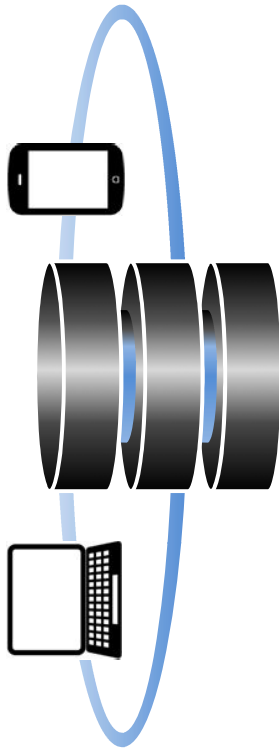
Большое спасибо!

Рахмат!



22

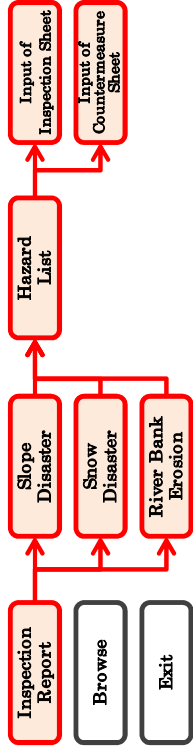
THE PROJECT FOR CAPACITY DEVELOPMENT FOR ROAD DISASTER PREVENTION MANAGEMENT IN THE KYRGYZ REPUBLIC



Development of DATABASE

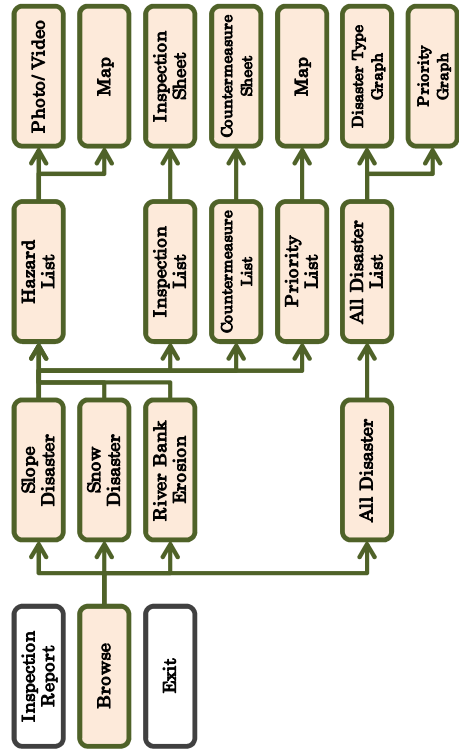
Database Structure

"Inspection Report"



Database Structure

"Browse"



Screen for Top Page

Database for Road Disaster Prevention

In the Top Screen, the following items can be selected;
 [Inspection/Countermeasure Report]
 [Browse]

To browse the Disaster List, Inspection List, Countermeasure List, Priority List, Inspection Sheet and Countermeasure Sheet.

Inspection/
Countermeasure
Report

Browse

Exit

Screen for Inspection/ Countermeasure

If "Inspection Report" is selected, the following screen is opened.

Disaster Type

The disaster of 3 types shown in below can be selected.

Slope Disaster

- Ex. Falling Rock
- Ex. Slope Collapse
- Ex. Debris Flow

Snow Disaster

- Ex. Avalanche
- Ex. Snow Drifting

River Bank Erosion

5

Screen for Inspection/ Countermeasure

If "Slope Disaster" is selected, the following screen is opened.

Slope Disaster Type

Detailed disaster types shown in below can be selected.

Falling Rocks/ Slope Collapse

Bedrock Collapse

Debris Flow

6

Screen for Inspection/ Countermeasure

If "Falling Rocks/Slope Collapse" is selected, the following screen is opened.

Hazard List - Falling Rocks/ Slope Collapse

Disaster List of Falling Rocks/Slope Collapse is shown in the screen.
The Inspection Sheet and Countermeasure Sheet of each disaster area can be selected in the Disaster List.

No.	Disaster	PLUAD/UAD	DEP	Road Name	Kilo Post	Inspection or Countermeasure
1	Falling Rocks/ Slope Collapse	PLUAD xx UAD xx	DEP xx	xx Road	xx ~ xx km	Inspection Sheet Countermeasure Sheet
2	Falling Rocks/ Slope Collapse	PLUAD xx UAD xx	DEP xx	xx Road	xx ~ xx km	Inspection Sheet Countermeasure Sheet
3	Falling Rocks/ Slope Collapse	PLUAD xx UAD xx	DEP xx	xx Road	xx ~ xx km	Inspection Sheet Countermeasure Sheet
4	Falling Rocks/ Slope Collapse	PLUAD xx UAD xx	DEP xx	xx Road	xx ~ xx km	Inspection Sheet Countermeasure Sheet
5	Falling Rocks/ Slope Collapse	PLUAD xx UAD xx	DEP xx	xx Road	xx ~ xx km	Inspection Sheet Countermeasure Sheet
6	Disaster List of Falling Rocks/Slope Collapse is shown in the screen. The Inspection Sheet and Countermeasure Sheet of each disaster area can be selected in the Disaster List.	PLUAD xx UAD xx	DEP xx	xx Road	xx ~ xx km	Inspection Sheet Countermeasure Sheet

7

Screen for Inspection

If "Inspection Sheet" is selected, the following screen is opened.

Inspection Sheet - Falling Rocks/ Slope Collapse

Road Name	Kilo Post	Latitude: N	Longitude: E
Direct Input	Direct Input	Automatic Input	Automatic Input
Date	DEP	PLUAD/UAD	Longtitude: E
Direct Input	Direct Input	Direct Input	Direct Input
Slope Condition (斜面の状況)	Spring (湧水状況)	Vegetation (植生状況)	Slope Height (斜面高さ)
Direct Input	Direct Input	Direct Input	Direct Input
Photo	Photo-1	Photo-2	Photo-3
Direct Input	Direct Input	Direct Input	Direct Input
Comment	Person Name		Submit
Direct Input	Direct Input		Submit

8

Input Screen for Inspection

If "Slope Condition" is selected, the following screen is opened.

Slope Condition

Evaluation	Slope Collapse (Surface Soil)	Falling Rocks (Rocks)
Most Unstable	<ul style="list-style-type: none"> Surface soil layer is thick (more than 50cm) and has been eroded. 	<ul style="list-style-type: none"> Many rocks are conditioned the follows: (1) More than 2/3 of the diameter is outcropped. (2) It can be moved easily in the human power.
Unstable	<ul style="list-style-type: none"> Surface soil layer is thick but it has not been eroded. Surface soil layer is thin and it may have been eroded. 	<ul style="list-style-type: none"> Rocks described in above (1) and (2) are little. The extent of the outcrop is small. It can not be moved in the human power.
Stable	<ul style="list-style-type: none"> Surface soil layer is very thin and displacement of the surface soil layer is little. 	<ul style="list-style-type: none"> Unstable Rocks are little.

Most Unstable

Unstable

Stable

Slope condition is selected based on above table.

9

Input Screen for Inspection

Inspection Sheet - Falling Rocks/ Slope Collapse

Read Name	Direct Input	Kilo Post	Direct Input	+	Direct Input
Date	Direct Input	Latitude:N	Automatic Input	Longitude:E	Automatic Input
PLUAD/UAD	Direct Input	DEP	Direct Input		
Slope Condition (斜面の状況)		Spring (湧水状況)			
Vegetation (植生状況)		Slope Height (斜面高さ)			
Photo	Photo-1	Photo-2	Photo-3		
Comment					
Person Name					

Vegetation condition can be selected the follows;
(1) Vegetation is confirmed
(2) Partial vegetation is confirmed
(3) Vegetation is not confirmed

11

Input Screen for Inspection

Inspection Sheet - Falling Rocks/ Slope Collapse

Read Name	Direct Input	Kilo Post	Direct Input	+	Direct Input
Date	Direct Input	Latitude:N	Automatic Input	Longitude:E	Automatic Input
PLUAD/UAD	Direct Input	DEP	Direct Input		
Slope Condition (斜面の状況)		Spring (湧水状況)			
Vegetation (植生状況)		Slope Height (斜面高さ)			
Photo	Photo-1	Photo-2	Photo-3		
Comment					
Person Name					

Spring condition can be selected the follows;
(1) Spring water is confirmed
(2) A little spring water is confirmed
(3) Spring water is not confirmed

10

Input Screen for Inspection

Inspection Sheet - Falling Rocks/ Slope Collapse

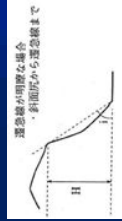
Read Name	Direct Input	Kilo Post	Direct Input	+	Direct Input
Date	Direct Input	Latitude:N	Automatic Input	Longitude:E	Automatic Input
PLUAD/UAD	Direct Input	DEP	Direct Input		
Slope Condition (斜面の状況)		Spring (湧水状況)			
Vegetation (植生状況)		Slope Height (斜面高さ)			
Photo	Photo-1	Photo-2	Photo-3		
Comment					
Person Name					

12

Input Screen for Inspection

If "Slope Gradient" is selected, the following screen is opened.

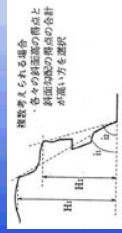
Slope Gradient



$$70^\circ \geq i$$



$$70^\circ > i \geq 45$$



$$45 > i$$

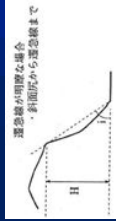
Gradient of the slope is selected from 3 types shown in above.

13

Input Screen for Inspection

If "Slope Height" is selected, the following screen is opened.

Slope Height



Sediment Slope
 $30\text{m} \geq H$

Sediment Slope
 $30\text{m} > H \geq 15\text{m}$

Sediment Slope
 $15\text{m} > H$



Rock Slope
 $50\text{m} \geq H$

Rock Slope
 $50\text{m} > H \geq 30\text{m}$

Rock Slope
 $30\text{m} > H \geq 15\text{m}$

Rock Slope
 $15\text{m} > H$

Height of the slope is selected from 7 types shown in above.

15

Input Screen for Inspection

Inspection Sheet - Falling Rocks/ Slope Collapse

Read Name	Direct Input	Kilo Post	Direct Input	+	Direct Input
Date	Direct Input	Latitude:N	Automatic Input	Longitude:E	Automatic Input
PLUAD/UAD	Direct Input	DEP	Direct Input		
Slope Condition (斜面の状況)		Spring (湧水状況)			
Vegetation (雑生状況)					
Slope Gradient (斜面勾配)		Slope Height (斜面高さ)			
Photo	Photo-1	Photo-2	Photo-3		
Comment					Submit
Person Name					

14

Input Screen for Inspection

Inspection Sheet - Falling Rocks/ Slope Collapse

Read Name	Direct Input	Kilo Post	Direct Input	+	Direct Input
Date	Direct Input	Latitude:N	Automatic Input	Longitude:E	Automatic Input
PLUAD/UAD	Direct Input	DEP	Direct Input		
Slope Condition (斜面の状況)		Spring			
Vegetation (雑生状況)					
Slope Gradient (斜面勾配)		Slope Height (斜面高さ)			
Photo	Photo-1	Photo-2	Photo-3		
Comment					Submit
Person Name					

If this content is selected, transfer to camera mode of Ipad. The picture is saved automatically in this sheet after taking a photo.

16

Screen for Inspection/ Countermeasure

If "Falling Rocks/Slope Collapse" is selected, the following screen is opened.

Disaster List - Falling Rocks/ Slope Collapse

No.	Disaster	PLUAD/UAD	DEP	Road Name	Kilo Post	Inspection or Countermeasure
1	Falling Rocks/ Slope Collapse	PLUAD xx UAD xx	DEP xx	xx Road	xx - xx km	Inspection Sheet Countermeasure Sheet
2	Falling Rocks/ Slope Collapse	PLUAD xx UAD xx	DEP xx	xx Road	xx - xx km	Inspection Sheet Countermeasure Sheet
3	Falling Rocks/ Slope Collapse	PLUAD xx UAD xx	DEP xx	xx Road	xx - xx km	Inspection Sheet Countermeasure Sheet
4	Falling Rocks/ Slope Collapse	PLUAD xx UAD xx	DEP xx	xx Road	xx - xx km	Inspection Sheet Countermeasure Sheet
5	Falling Rocks/ Slope Collapse	PLUAD xx UAD xx	DEP xx	xx Road	xx - xx km	Inspection Sheet Countermeasure Sheet
6	Disaster List of Falling Rocks/Slope Collapse is shown in the screen. The Inspection Sheet and Countermeasure Sheet of each disaster area can be selected in the Disaster List.					

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Screen for Countermeasure Sheet

Countermeasure Sheet - Falling Rocks/ Slope Collapse

Road Name	直接入力	Kilo Post	直接入力	直接入力
Date	直接入力	Latitude:N	自動入力	Longitude:E
PLUAD/UAD	リスト選択	DEP	リスト選択	
Photo (Before Countermeasure assure)	Photo-1	Photo-2	Photo-3	
Photo (After Countermeasure assure)	Photo-1	Photo-2	Photo-3	
Disaster Type				Counter measure
Comment				
Person Name				

Comments are can be input directly.

23

Screen for Countermeasure Sheet

If "Countermeasure Sheet" is selected, the following screen is opened.

Countermeasure Sheet - Falling Rocks/ Slope Collapse

Road Name	直接入力	Kilo Post	直接入力	直接入力
Date	直接入力	Latitude:N	自動入力	Longitude:E
PLUAD/UAD	直接入力	DEP	直接入力	
Photo (Before Countermeasure assure)	Photo-1	Photo-2	Photo-3	
Photo (After Countermeasure assure)	Photo-1	Photo-2	Photo-3	
Disaster Type				Counter measure
Comment				
Person Name				

If this content is selected, transfer to camera mode of Ipad. The picture is saved automatically in this sheet after taking a photo.

22

Browse Screen

Database for Road Disaster Prevention

In the Top Screen, the following items can be selected;
[Inspection/Countermeasure Report]
 To input the Inspection Sheet and Countermeasure Sheet.
[Browse]
 To browse the Disaster List, Inspection List, Countermeasure List, Priority List, Inspection Sheet and Countermeasure Sheet.

Inspection/ Countermeasure Report

Browse

Exit

24

Browse Screen

If "Browse" is selected, the following screen is opened.

Disaster Type

The disaster of 4 types shown in right side can be selected.

25

Browse Screen

If "Falling Rocks/Slope Collapse" is selected, the following screen is opened.

Falling Rocks/ Slope Collapse

The lists of 4 types shown in right side can be selected.

26

Browse Screen

If "Hazard List" is selected, the following screen is opened.

Hazard List - Falling Rocks/ Slope Collapse

No.	Disaster	PLUAD/UAD	DEP	Road Name	Kilo Post	Map	Photo/ Video
1	Falling Rocks/ Slope Collapse	PLUAD xx UAD xx	DEP xx	xx Road	xx - xx km	Map	Photo/ Video
2	Falling Rocks/ Slope Collapse	PLUAD xx UAD xx	DEP xx	xx Road	xx - xx km	Map	Photo/ Video
3	Debris Flow	PLUAD xx UAD xx	DEP xx	xx Road	xx - xx km	Map	Photo/ Video
4	Falling Rocks/ Slope Collapse	PLUAD xx UAD xx	DEP xx	xx Road	xx - xx km	Map	Photo/ Video
5	Debris Flow	PLUAD xx UAD xx	DEP xx	xx Road	xx - xx km	Map	Photo/ Video

The map and photos/videos of each disaster areas can be browsed from the Hazard List.

Save as Excel | Save as PDF

27

Browse Screen

If "Map" is selected, the following screen is opened.

Map (DRAFT)

Map data will be prepared by GIS software.

28

Browse Screen

If "Falling Rocks/Slope Collapse" is selected, the following screen is opened.

Falling Rocks/ Slope Collapse

Hazard List

Inspection List

Countermeasure List

Priority List

The lists of 4 types shown in right side can be selected.

29

Browse Screen

If "Inspection List" is selected, the following screen is opened.

Inspection List - Falling Rocks/ Slope Collapse

No.	Disaster	DEP	Road Name	Kilo Post	Inspection Data	Inspection Sheet
1	Falling Rocks/ Slope Collapse	DEP xx	xx Road	xx - xx km	2016/06/25	Inspection Sheet
2	Falling Rocks/ Slope Collapse	DEP xx	xx Road	xx - xx km	2016/06/25	Inspection Sheet
3	Debris Flow	DEP xx	xx Road	xx - xx km	2016/06/25	Inspection Sheet
4	Falling Rocks/ Slope Collapse	DEP xx	xx Road	xx - xx km	2016/06/25	Inspection Sheet
5	Debris Flow	DEP xx	xx Road	xx - xx km	2016/06/25	Inspection Sheet

The inspection sheet of each disaster areas can be browsed from the Inspection List.

Save as Excel


Save as PDF

30

Browse Screen

If "Inspection Sheet" is selected, the following screen is opened.

Inspection Sheet

Road Name	Bishkek-Osh Road	Kilo Post	xxx	+	xxx
Date	05/06/2016	Latitude: N	xxx	Longitude: E	xxx
PLUAD/UAD	BO-UAD	DEP	DEP30		
Slope Condition (斜面の状況)	Unstable	Spring (湧水状況)	Spring is confirmed		
Vegetation (植生状況)	No Vegetations				
Slope Gradient (斜面勾配)	70 > i	Slope Height (斜面高さ)	Rock Slope 50m > H ≥ 30m		
Photo	Photo-1	Photo-2	Photo-3		
					
Comment	Protection walls are installed along the road. The pocket behind the walls is filled with rocks.				
Person Name					

※above inspection sheet is draft version.

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Browse Screen

If "Falling Rocks/Slope Collapse" is selected, the following screen is opened.

Falling Rocks/ Slope Collapse

Hazard List

Inspection List

Countermeasure List

Priority List

The lists of 4 types shown in right side can be selected.

32

Browse Screen

If "Countermeasure List" is selected, the following screen is opened.

Countermeasure List - Falling Rocks/ Slope Collapse

No.	Disaster	DEP	Road Name	Kilo Post	Countermeasure Data	Photo/ Video
1	Falling Rocks/ Slope Collapse	DEP xx	xx Road	xx ~ xx km	2017/06/23	Countermeasure Sheet
2	Falling Rocks/ Slope Collapse	DEP xx	xx Road	xx ~ xx km	2017/06/23	Inspection Sheet
3	Debris Flow	DEP xx	xx Road	xx ~ xx km	2017/06/23	Inspection Sheet
4	Falling Rocks/ Slope Collapse	DEP xx	xx Road	xx ~ xx km	2017/06/23	Inspection Sheet
5	Debris Flow	DEP xx	xx Road	xx ~ xx km	2017/06/23	Inspection Sheet
6	The countermeasure sheet of each disaster areas can be browsed from the Countermeasure List.					

Save as Excel Save as PDF

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Browse Screen

Countermeasure Sheet - Falling Rocks/ Slope Collapse

Road Name	DEP	Kilo Post	Latitude: N	Longitude: E
Date	DEP	Photo-1	Photo-2	Photo-3
PLUADUAD	DEP	Photo-1	Photo-2	Photo-3
Photo (Before Countermeasure assurance)				
Photo (After Countermeasure assurance)				
Disaster Type				Countermeasure
Comment				
Person Name				

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Browse Screen

If "Falling Rocks/Slope Collapse" is selected, the following screen is opened.

Falling Rocks/ Slope Collapse

The lists of 4 types shown in right side can be selected.

- Hazard List
- Inspection List
- Countermeasure List
- Priority List

Save as Excel Save as PDF

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Browse Screen

If "Priority List" is selected, the following screen is opened.

Priority List - Falling Rocks/ Slope Collapse

No.	Disaster	DEP	Road Name	Kilo Post	Priority
1	Falling Rocks/ Slope Collapse	DEP xx	xx Road	xx ~ xx km	Priority A
2	Falling Rocks/ Slope Collapse	DEP xx	xx Road	xx ~ xx km	Priority B
3	Debris Flow	DEP xx	xx Road	xx ~ xx km	Priority A
4	Falling Rocks/ Slope Collapse	DEP xx	xx Road	xx ~ xx km	Priority A
5	Debris Flow	DEP xx	xx Road	xx ~ xx km	Priority C
6	Debris Flow	DEP xx	xx Road	xx ~ xx km	Priority C

Save as Excel Save as PDF

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1. Database Structure

Disaster List

12:09 Cottonplant_prototype160905 - Список бедствий Disaster List

Бедствие Disaster	PUAD/UAD	DEP	Road Name	Kilopost(km) KipPost(m)	История Службы Инспекции Состояния Дорог Inspection/Countermeasure List
Landslide	UAD_BO	9	Bishkek-Osh	85.5km	История Службы Инспекции Состояния Дорог Inspection/Countermeasure List
Landslide	UAD_BO	9	Bishkek-Osh	86km	История Службы Инспекции Состояния Дорог Inspection/Countermeasure List
Falling Rocks	UAD_BO	9	Bishkek-Osh	92km	История Службы Инспекции Состояния Дорог Inspection/Countermeasure List
Falling Rocks	UAD_BO	9	Bishkek-Osh	93km	История Службы Инспекции Состояния Дорог Inspection/Countermeasure List
Falling Rocks	UAD_BO	9	Bishkek-Osh	96km	История Службы Инспекции Состояния Дорог Inspection/Countermeasure List
Falling Rocks	UAD_BO	9	Bishkek-Osh	97.5km	История Службы Инспекции Состояния Дорог Inspection/Countermeasure List
Falling Rocks	UAD_BO	9	Bishkek-Osh	98km	История Службы Инспекции Состояния Дорог Inspection/Countermeasure List

Назад Back

Добавление нового участка Adding New Site

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1. Database Structure

Inspection List

15:08 Cottonplant_prototype160905 - Inspection/Countermeasure List -Browse-

название дороги Road Name	КМ Kilometer	широта N Latitude N	долгота E Longitude E	73.8693059
Сухие скалы Falling Rocks	UAD_BO	деп DEP	92km	
Уклон откоса Slope Collapse	92km			

Inspection List

1 2 3

Удалить Delete

Inspection Photo

Inspection Person Name

Inspection Date

2016-09-06

Реставрировать Restore

Комментарий Comment

Map

Назад Back

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1. Database Structure

Inspection Sheet for Falling Rocks/Bedrock Collapse

12:09 Cottonplant_prototype160905 - Форма инспекции по камнепадам/ обрушению коренной породы Inspection Sheet for Falling Rocks/Bedrock Collapse

название дороги Road Name	Bishkek-Osh	КМ Kilometer	92km	
Дата инспекции Inspection Date	07.09.2016	широта N Latitude N	42.578258	долгота E Longitude E
73.8693059				
шұлақ / ұяд P1 (UAD/BO)	UAD_BO	деп DEP	9	
Состояние откоса Slope Condition		Состояние разливов воды Condition of Spring Water		
Состояние растительности Condition of Vegetation				
Уклон откоса Slope Condition		Высота откоса Slope Height	Фото-1 Photo 1	Фото-2 Photo 2
			Фото-3 Photo 3	
Фото Photo				
комментарий Comment				
Имя инспектора Person Name				

Назад Back

Отправить Submit

карта Map

7

1. Database Structure

Inspection Sheet for Slope Collapse/Landslide

15:08 Cottonplant_prototype160905 - Форма инспекции по обрушению откоса и оползня Inspection Sheet for Slope Collapse/Landslide Collapse

название дороги Road Name	Bishkek-Osh	КМ Kilometer	85.5km	
Дата инспекции Inspection Date	07.09.2016	широта N Latitude N	42.6138611	долгота E Longitude E
73.8693059				
шұлақ / ұяд P1 (UAD/BO)	UAD_BO	деп DEP	9	
Состояние откоса Slope Condition		Топография		
Состояние разливов воды Condition of Spring Water				
Уклон откоса Slope Condition		Высота откоса Slope Height	Фото-1 Photo 1	Фото-2 Photo 2
			Фото-3 Photo 3	
Фото Photo				
комментарий Comment				
Имя инспектора Person Name				

Назад Back

Отправить Submit

карта Map

8



Database Structure

Inspection Sheet for Avalanche

Форма инспекции по снежным лавинам
Inspection Sheet for Avalanche

название дороги Road Name	Bishkek-Osh	КМ Kilomet	132km	+
Дата инспекции Inspection Date	07.09.2016	широта N Latitude N	долгота E Longitude E	
путь / уезд Road/Region	UAD_BO	деп Region	Уклон откоса Slope (degrees)	9
Глубина суроба Snow Depth				
Состояние растительности Condition of Vegetation				
Азимут откоса Slope Azimuth		Тип откоса Slope Type	Фото-2 Photo 2	Фото-3 Photo 3
Фото Photo				
комментарий Comment				
имя инспектора Person Name		Назад Back	карта Map	Отправить Submit

10



Database Structure

Inspection Sheet for River Bank Erosion

Форма инспекции по размылу откосов и берегов рек
Inspection Sheet for Slope/Riverbank Erosion

название дороги Road Name	Myrzake-Karakulja-Alaikuu	КМ Kilomet	28-4km	+
Дата инспекции Inspection Date	07.09.2016	широта N Latitude N	долгота E Longitude E	
путь / уезд Road/Region	UAD_BO	деп Region	Высота откоса Slope Height	26
Уклон откоса Slope (degrees)			Масштаб эрозии Erosion Scale	
Состояние защитных откосов Condition of River Protection			Высота эрозии на просеку Erosion Height on Road	
Место эрозии на откосе Erosion Location on Slope			Фото-1 Photo 1	Фото-2 Photo 2
Фото Photo				
комментарий Comment				
имя инспектора Person Name		Назад Back	карта Map	Отправить Submit

12



Database Structure

Inspection Sheet for Debris Flow

Форма инспекции по селевым потокам
Inspection Sheet for Debris Flow

название дороги Road Name	Myrzake-Karakulja-Alaikuu	КМ Kilomet	42km	+
Дата инспекции Inspection Date	07.09.2016	широта N Latitude N	долгота E Longitude E	73,708602
путь / уезд Road/Region	UAD_BO	деп Region	Ширина потока на стороне Ширина потока на стороне Ширина потока на стороне Ширина потока на стороне	26
Положение выходов воды со спрямоугольной суроба			Состояние открытого лотка Condition of Open Channel	
Состояние материала русла на суробе суроба			Состояние дренажа на откосе/откосах	
Дренажная труба/кулаверт на откосе/откосах			Фото-1 Photo 1	Фото-2 Photo 2
Фото Photo				
комментарий Comment				
имя инспектора Person Name		Назад Back	карта Map	Отправить Submit

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Database Structure

Inspection Sheet for Snow Drifting

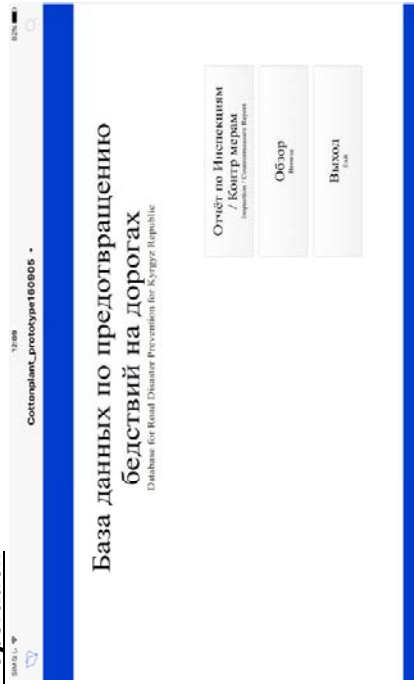
Форма инспекции по снежным заносам
Inspection Sheet for Snow Drifting

название дороги Road Name	Bishkek-Osh	КМ Kilomet	126-129k	+
Дата инспекции Inspection Date	07.09.2016	широта N Latitude N	долгота E Longitude E	
путь / уезд Road/Region	UAD_BO	деп Region	Температура Temperature	9
Глубина суроба Snow Depth			Топография Topography	
Скорость ветра Wind Velocity			Фото-1 Photo 1	Фото-2 Photo 2
Состояние растительности Condition of Vegetation			Фото-3 Photo 3	
Фото Photo				
комментарий Comment				
имя инспектора Person Name		Назад Back	карта Map	Отправить Submit

11

Database Operation for Collection & Input

Database Operation



- To browse Disaster List
- To browse Inspection List & Sheet
- To input the inspection Sheet

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Database Operation for Collection & Input

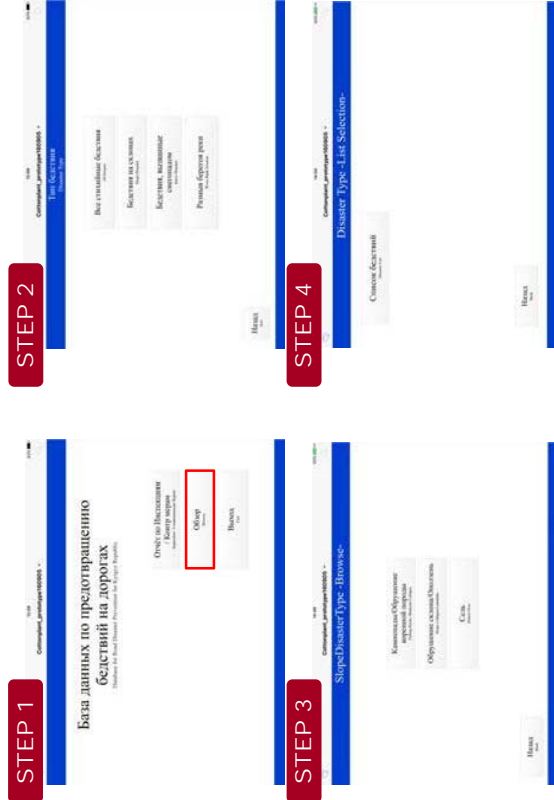
How to Input the Data (Falling Rocks/Bedrock Collapse)

Road Name	1	Kilo Post	2	+	2
Date	3	Latitude:N	4	Longitude:E	4
PLUAD/UAD	5	DEP	6		
Slope Condition (斜面の状況)	7	Terrian (地形)	8		
Spring (湧水状況)	9				
Slope Gradient (斜面勾配)	10	Slope Height (斜面高さ)	11		
Photo	Photo-1		Photo-2		Photo-3
	13		13		13
Comment	14				
Person Name	15				

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Database Operation for Collection & Input

Database System (Data Browsing)



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Database Operation for Collection & Input

How to Input the Data (Slope Collapse/Landslide)

Road Name	1	Kilo Post	2	+	2
Date	3	Latitude:N	4	Longitude:E	4
PLUAD/UAD	5	DEP	6		
Slope Condition (斜面の状況)	7	Terrian (地形)	8		
Spring (湧水状況)	9				
Slope Gradient (斜面勾配)	10	Slope Height (斜面高さ)	11		
Photo	Photo-1		Photo-2		Photo-3
	13		13		13
Comment	14				
Person Name	15				

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Database Operation for Collection & Input

How to Input the Data (Debris Flow)

Raad Name	1	Kilo Post	2	+	2
Date	3	Latitude:N	4	Longitude:E	4
PLUAD/UAD	5	DEP	6		
Area of Basin (流域面積)	7	Maximum Gradient of River Bed (最急溪流勾配)	8		
Vegetation on Slope (斜面上の植生状況)	9				
Cracks/Sliding Cliff (亀裂/滑り崖)	10	History of Debris Flow (土石流の履歴)	11		
Photo	Photo-1		Photo-2		Photo-3
	13		13		13
Comment	14				
Person Name	15				

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Database Operation for Collection & Input

How to Input the Data (Avalanche)

Raad Name	1	Kilo Post	2	+	2
Date	3	Latitude:N	4	Longitude:E	4
PLUAD/UAD	5	DEP	5		
Snow Depth (積雪深)	7	Slope Gradient (斜面勾配)	8		
Vegetation (植生状況)	9				
Slope Azimuth (斜面方位)	10	Slope Type (斜面の種類)	11		
Photo	Photo-1		Photo-2		Photo-3
	13		13		13
Comment	14				
Person Name	15				

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Database Operation for Collection & Input

How to Input the Data (Snow Drifting)

Raad Name	1	Kilo Post	2	+	2
Date	3	Latitude:N	4	Longitude:E	4
PLUAD/UAD	5	DEP	6		
Snow Depth (積雪深)	7	Temperature (気温)	8		
Wind Velocity (風速)	9				
Vegetation (植生状況)	10	Terrain (地形)	11		
Photo	Photo-1		Photo-2		Photo-3
	13		13		13
Comment	14				
Person Name	15				

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Database Operation for Collection & Input

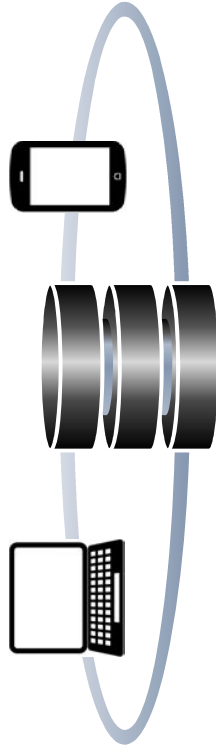
How to Input the Data (River Bank Erosion)

Raad Name	1	Kilo Post	2	+	2
Date	3	Latitude:N	4	Longitude:E	4
PLUAD/UAD	5	DEP	6		
Slope Gradient	7	Slope Height	8		
Condition of Slope Protection	9	Scale of Erosion	10		
Place of Erosion on Slope	11	Influence on Carriage Way by Erosion	12		
Photo	Photo-1		Photo-2		Photo-3
	13		13		13
Comment	14				
Person Name	15				

20

THE PROJECT FOR CAPACITY DEVELOPMENT FOR ROAD DISASTER PREVENTION MANAGEMENT IN THE KYRGYZ REPUBLIC

Introduction of Relational Database



Kou IBAYASHI

National Institute of Technology, JAPAN, Nagaoka College



1

Abstract of This Seminar

1. Simple database example
2. "Relationship" and relational database
3. Structure of Road disaster prevention system in Kyrgyz
4. "Database" is "Mass of tables"
5. Relational database software
6. Introduction of "FileMaker" series

1. Simple Database Example

Simple database example 1: Address Book

Given Name	Family Name	Address	Phone
Shinzo	Abe	2-3-1, Nagatacho, Chiyoda-ku, Tokyo, Japan	+81-3-35381-0101
Donald	Trump	1600 Pennsylvania Avenue, NW Washington D.C., U.S.	+1-202-456-1414
François	Hollande	55 Rue du Faubourg Saint-Honoré, 75008 Paris, France	+33-1-42-92-81-400
Theresa	May	10 Downing Street, City of Westminster, London, GB	+44-20-7925-0918
Angela	Merkel	Willy-Brandt-Strasse 1, 10557 Berlin, Germany	+49-30-18272720
Matteo	Renzi	Piazza del Quirinale, 00187 Roma, Italy	+39-06-46991
Justin	Trudeau	80 Wellington Street, Ottawa, Canada	+1-613-941-6900

Caution : This is not my friend list.

1. Simple Database Example

Simple database example 2: Cash Book

DATE	DESCRIPTION	WITHDRAWALS	DEPOSIT	BALANCE
1/10/2016	sushi restaurant	\$10.00		\$595.00
3/10/2016	mobile phone charge	\$53.00		\$542.00
8/10/2016	aeon supermarket	\$38.00		\$504.00
13/10/2016	iPhone 7s 256GB	\$500.00		\$4.00
17/10/2016	salary		\$300.00	\$304.00
20/10/2016	daiso	\$6.00		\$298.00

1. Simple Database Example

Bridge inventory and inspection data sample

Bridge Name	Road Category	Province	Village/Commune	SS_Material	SS_Type	a01	a02	a03
Reay srok	Provincial	Kandal	Kan say	Concrete	Slab girder	No Damage	No Damage	No Damage
Prek Tmey	Provincial	Kandal	Kompong Svay	Concrete	Slab girder	No Damage	No Damage	No Damage
Prek iteam	Provincial	Kandal	Sray proteal	Concrete	Girder	No Damage	Damaged	No Damage
Pnom Prek Bridge	Provincial	Kandal	Trey sla	Concrete	Slab girder	No Damage	No Damage	No Damage
Prek Pan Bridge	Provincial	Kandal		Concrete	Slab girder	No Damage	No Damage	No Damage
Balat Chhang Bridge	Provincial	Kandal	Troysla	Concrete	Girder	No Damage	No Damage	No Damage
Prek Klauk	Provincial	Kandal	Troysla	Concrete	Girder	Damaged	Damaged	No Damage
Wat Toulslangkai	Provincial	Kandal	Kompongkong	Concrete	Slab girder	No Damage	No Damage	No Damage
Prek	Provincial	Kandal	Chroux takeo 2	Concrete	Slab girder	No Damage	No Damage	No Damage
Prekchhach	Provincial	Kandal	Chroux takeo3	Concrete	Slab girder	No Damage	No Damage	No Damage
Prek Kompongdar	Provincial	Kandal	Chroy takeo4	Concrete	Girder	No Damage	No Damage	No Damage
Prek kongros	Provincial	Kandal	Chroy takeo4	Concrete	Slab girder	Damaged	Damaged	No Damage
Prek kongroun	Provincial	Kandal	Chrus takeo	Concrete	Slab girder	No Damage	No Damage	No Damage
Prek vykem	Provincial	Kandal	Chroux takeo5	Concrete	Girder	No Damage	No Damage	No Damage
Kong bin	Provincial	Kandal	Chroy takeo5	Concrete	Slab girder	No Damage	No Damage	No Damage
Prek oach vor teang	Provincial	Kandal	Chroy takeo5	Concrete	Slab girder	No Damage	No Damage	No Damage
Prek te peung	Provincial	Kandal	Chroy takeo7	Concrete	Slab girder	No Damage	No Damage	No Damage
Prey ahroov	National	Kumpong Chhambang	Prey ahroov	Concrete	Girder	Damaged	Damaged	No Damage
Kror Sang Dous Leng	National	Kumpong Chhambang	Kror Sang Dous Leng	Concrete	Girder	No Damage	No Damage	No Damage
O Ta Maung	National	Kumpong Chhambang	Lor Peang	Concrete	Girder	No Damage	No Damage	No Damage
Toul Krapous	National	Kumpong Chhambang	Toul Krapous	Concrete	Girder	No Damage	No Damage	Damaged
Tang Prech	Provincial	Kumpong Chhambang	Tang Prech	Concrete	Girder	No Damage	No Damage	No Damage
Cha Biong	National	Kumpong Chhambang	Cha Biong	Concrete	Girder	No Damage	Damaged	No Damage
Kilong Po Pok	National	Kumpong Chhambang	Klonhik Po Pok	Concrete	Girder	No Damage	No Damage	No Damage

1. Simple Database Example

Database of spreadsheet style

Bridge inspection database example

Name	City	Construction Year	Length [m]	Evaluation	Inspection Year
Tower Bridge	London, UK	1894	244	C	2010
Golden Gate	San Francisco, USA	1937	2737	B	2010
Akashi Kaikyo	Kobe, Japan	1998	3911	A	2010
...

1. Simple Database Example

Where should I input next inspection data ?

Name	City	Construction Year	Length [m]	Evaluation	Inspection Year
Tower Bridge	London, UK	1894	244	C	2010
Golden Gate	San Francisco, USA	1937	2737	B	2010
Akashi Kaikyo	Kobe, Japan	1998	3911	A	2010
Tower Bridge	London, UK	1894	244	D	2015
Tower Bridge	UK	1894	244	D	2020
Golden Gate	San Francisco, Japan	1937	2737	B	2015
Tower Bridge	London, UK	1894	22244	E	2025

- with low clarification
- change data ? incorrect data? which is exact data?

1. Simple Database Example

Standard method of Database :
Separate "Bridge Data" from "Inspection Data"

Bridge Data

Bridge ID	Name	City	Construction Year	Length [m]
0001	Tower Bridge	London, UK	1894	244
0002	Golden Gate	San Francisco, USA	1937	2737
0003	Akashi Kaikyo	Kobe, Japan	1998	3911
...

Inspection Data

Bridge ID	Evaluation	Inspection Year
0001	C	2010
0002	B	2010
0003	A	2010
...



unique ID

Refer to "Bridge Data"

1. Simple Database Example

If inspection data added ...

Bridge ID	Name	City	Construction Year	Length [m]
0001	Tower Bridge	London, UK	1894	244
0002	Golden Gate	San Francisco, USA	1937	2737
0003	Akashi Kaikyo	Kobe, Japan	1998	3911
...

Inspection Data

Bridge ID	Evaluation	Inspection Year
0001	C	2010
0002	B	2010
0003	A	2010
0001	D	2015
0001	D	2020
0002	B	2015
0001	E	2025

with no confusion !

1. Simple Database Example

Separate "Bridge Data" from "Inspection Data"

Bridge Data

Bridge ID	Name	City	Construction Year	Length [m]
0001	Tower Bridge	London, UK	1894	244
0002	Golden Gate	San Francisco, USA	1937	2737
0003	Akashi Kaikyo	Kobe, Japan	1998	3911
...

Inspection Data

Bridge ID	Evaluation	Inspection Year
0001	C	2010
0002	B	2010
0003	A	2010
0001	D	2015
0001	D	2020
0002	B	2015
0001	E	2025

- Relationship with unique key
- Refer to each data

1. Simple Database Example

Data referred each

Bridge Data

Bridge ID	Name	City	Construction Year	Length [m]
0001	Tower Bridge	London, UK	1894	244
0002	Golden Gate	San Francisco, USA	1937	2737
0003	Akashi Kaikyo	Kobe, Japan	1998	3911
...

Inspection Data

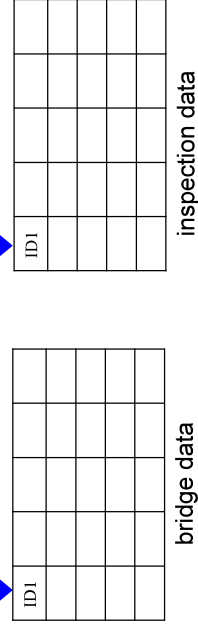
Bridge ID	Evaluation	Inspection Year
0001	C	2010
0002	B	2010
0003	A	2010
0001	D	2015
0001	D	2020
0002	B	2015
0001	E	2025

Inspection data → viewing bridge name, construction year, etc.
 Bridge data → number of inspection data, all evaluation, etc.

2. "Relationship" and Relational Database

Relational database

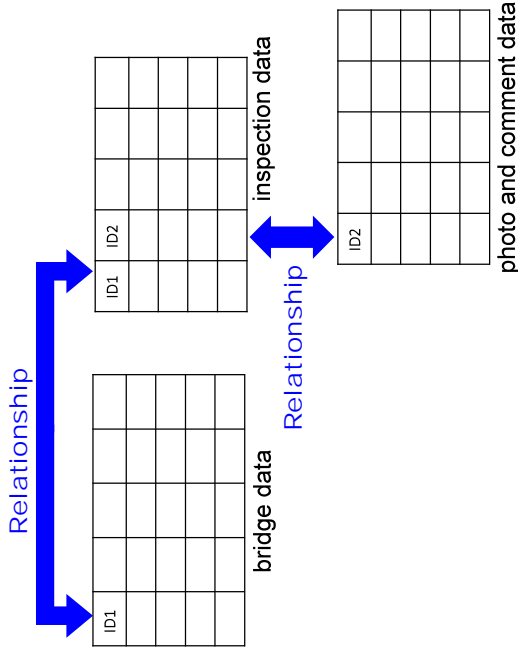
Relationship



- Relationship with unique key (unique ID)
- Reference each other

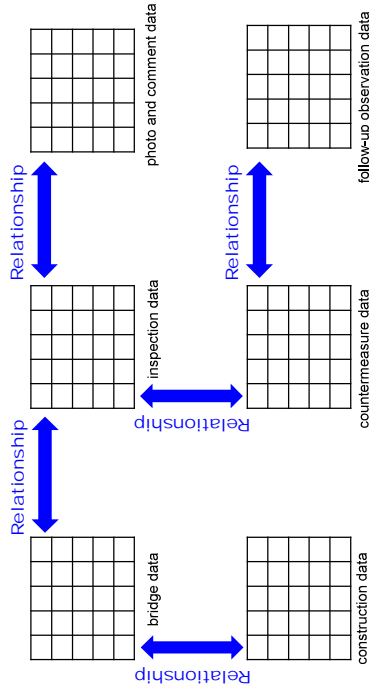
2. "Relationship" and Relational Database

Relational database: 2 unique key relationships



2. "Relationship" and Relational Database

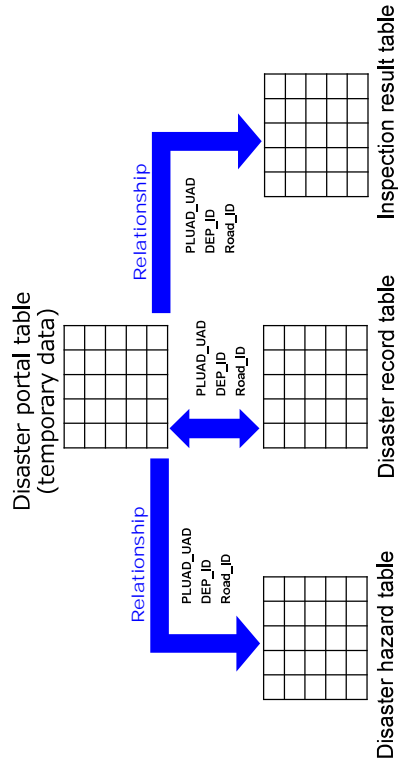
Complexed relational database



Reference each other in complexed database

2. "Relationship" and Relational Database

Internal structure of "road disaster prevention database in Kyrgyz"



Reference each other with same "PLUAD_UAD" and "DEP_ID" and "Road_ID"

2. "Relationship" and Relational Database

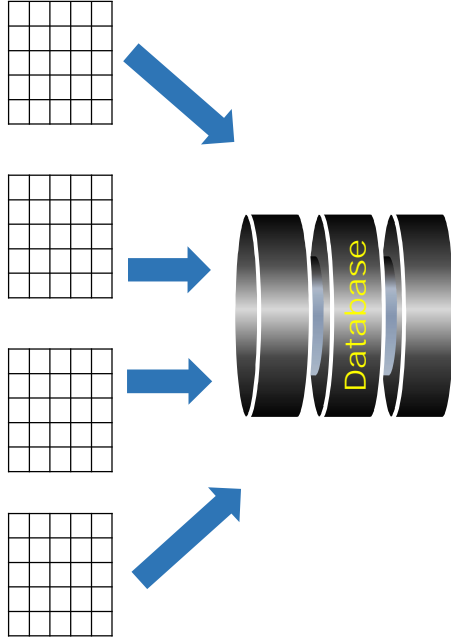
Relational database

- A relational database is a digital database whose organization is based on the relational model of data, as proposed by E.F. Codd in 1970.
- This model organizes data into one or more tables (or "relations") of rows and columns, with a **unique key** for each row.
- Generally, each entity type described in a database has its own table, the rows representing instances of that type of entity and the columns representing values attributed to that instance. Because each row in a table has its own **unique key**, rows in a table can be linked to rows in other tables by storing the unique key of the row to which it should be.

Sources: Wikipedia

2. "Relationship" and Relational Database

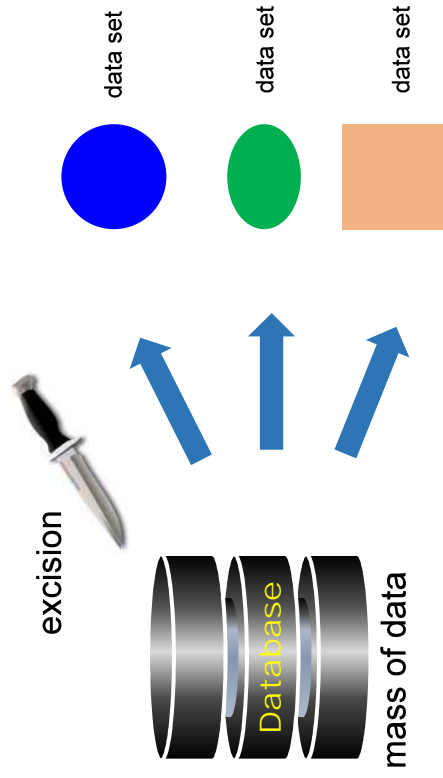
Image of relational database



(I think) mass of spread sheet type data

2. "Relationship" and Relational Database

Image of database



extraction useful data set with needs

5. Relational Database Software

Relational database management system (Database Software)

Free softwares

- MySQL, OpenOffice.org Base, PostgreSQL ...

Commercial softwares

- FileMaker, Microsoft Access, Microsoft SQL Server, Oracle Database, ...

SQL

from wikipedia

- SQL (Structured Query Language) is a special-purpose programming language designed for managing data held in a relational database management system (RDBMS), or for stream processing in a relational data stream management system (RDSMS).

But SQL is very difficult to understand (I think).

5. Relational Database Software

FileMaker



FileMaker.

- FileMaker Pro is a cross-platform relational database application from FileMaker Inc., formerly Claris, a subsidiary of Apple Inc.

- It integrates a database engine with a graphical user interface (GUI) and security features, allowing users to modify the database by dragging new elements into layouts, screens, or forms.

Sources: Wikipedia

6. Introduction of FileMaker Series

FileMaker



Current version:

- FileMaker Pro 16
... to make system solution for Windows PC / Mac
- FileMaker Pro Advanced 16
... for professional developers, Windows PC / Mac
- FileMaker Server 16
... for hosting database Windows server / Mac
- FileMaker Go 16
... for iPhone and iPad (player function only)

Sources: Wikipedia

6. Introduction of FileMaker Series

FileMaker Pro "Table view" image ...



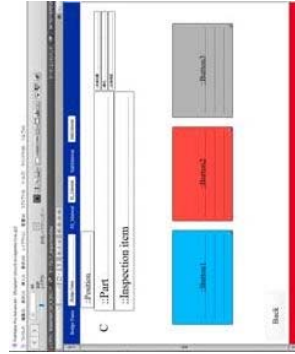
FileMaker (Table View)

Microsoft Excel

Data stored and calculated like Microsoft Excel view

6. Introduction of FileMaker Series

FileMaker Pro "Layout mode" image...



FileMaker (Layout mode)

Microsoft PowerPoint

Layout is modified like Microsoft PowerPoint view

6. Introduction of FileMaker Series

Advantage of FileMaker software

- Control with GUI (Graphical User Interface), Easy to use
- No necessity of SQL language
- Cross platform
 - Windows and Mac ... "FileMaker Pro"
 - iPad and iPhone ... "FileMaker Go"
- Easy to distribution software for iPad
(No necessity of Apple's AppStore judge)



End

Introduction of Relational Database for road disaster prevention system in Kyrgyz

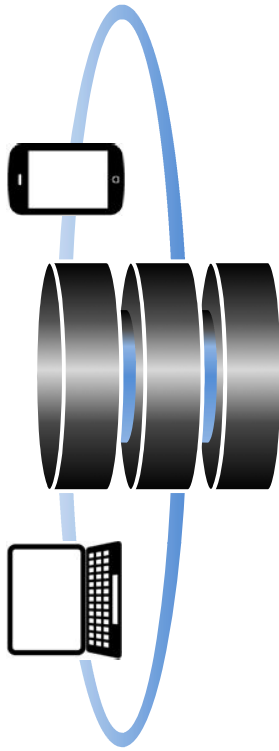
Kou IBAYASHI

National Institute of Technology JAPAN,
Nagaoka College



THE PROJECT FOR CAPACITY DEVELOPMENT FOR ROAD DISASTER PREVENTION MANAGEMENT IN THE KYRGYZ REPUBLIC

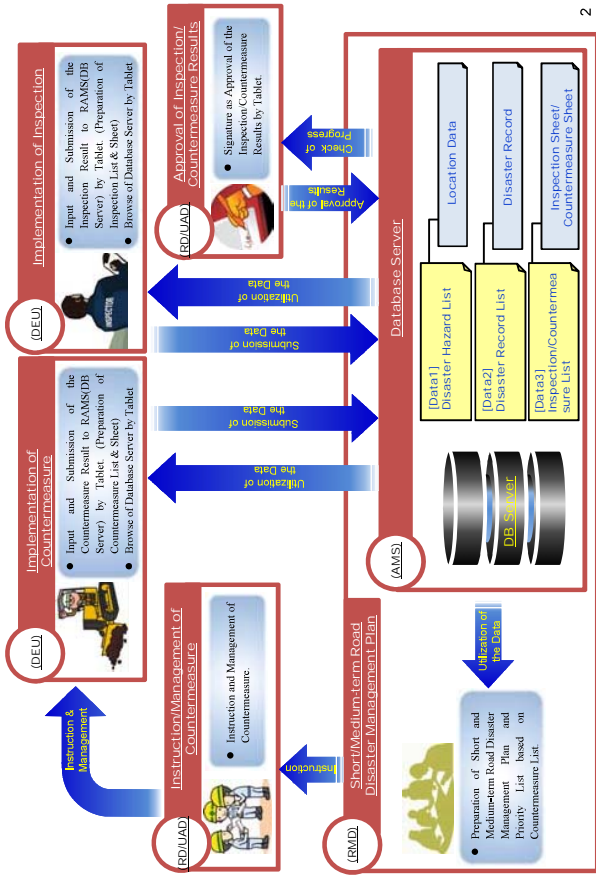
Database Seminar for Data Collection & Input



August 2017

1

Database Operation Flow



2

Database System



3

This list is to store the information on Disaster Place. User can browse the information regarding to Disaster Place. When new disaster risk place or disaster place are confirmed, User can add new disaster location.

This list is to store the disaster history (Record Sheet). User can browse the information regarding to the disaster history. When disasters occur near the road, User can add new record by Record Sheet.

This list is to store the Inspection and Countermeasure data (Inspection/Countermeasure Sheet). User can browse the information regarding to the inspection and countermeasure. When the inspection and countermeasure are done, User can add new information by Inspection/Countermeasure Sheet.

4

Disaster Hazard List

14:55 Cottonplant2_201708 (MOTR-Server.local) Add / Modify New Site

Назад Back

Добавление нового участка / Редактирование сайта

Get Location Value Map

путь / код Road Name	GDAD_BO	деп DEP	0
название дороги Road Name	Башкес - Ош 9-209км		
км Kilometers	110	широта N Latitude N	42.433744
Ступиное Бедствие Disaster	Таш тушуу		долгота E Longitude E
			73.8074115

Отправить Submit

5

Disaster Record List

15:00 Cottonplant2_201708 (MOTR-Server.local) Disaster Record List

Назад Back

название дороги Road Name

Башкес - Ош 318-428

Бедствие Disaster Type

Борюн
 Жер көчкү
 Жээк эрозиясы
 Кар көчкү
 Сел
 Таш тушуу
 Тоо бетинин кыйрашы
 Тоо тегинин кыйрашы

Ст. №. Кыйраштын No. Collapse

Бедствие Disaster

широта N Latitude N

долгота E Longitude E

Стампа Print

Көчүрө

Экспорт Export Disaster Record

Add New Disaster Record

6

Inspection/ Countermeasure List

14:58 Cottonplant2_201708 (MOTR-Server.local) Inspections/Countermeasure List

Назад Back

Испекция/Список контрмер Inspection/Countermeasure List

Испекция контрмер

km	м	Испекция Фото Inspection Photo	комментарий Comment	Дата инспекции Inspection Date	Испекция инспектора Inspection User
358			Объем паводка в 2014 году велик. На данный момент его уровень значительно ниже.	2016.09.19	Бекеш Калмушов
391			Контрмер предельно высока, контрмеры не выполнены.	2016.09.19	Бекеш Калмушов
500			В лобовые стекла водители могут попасть камни.	2016.09.20	Бекеш Калмушов
397			При сильном ветре, жидкостями, ледяными осадками происходит...	2016.09.20	Бекеш Калмушов
500					
398					

Контрмера Countermeasure

Контрмера Countermeasure

Контрмера Countermeasure

Контрмера Countermeasure

Новая инспекция New Inspection

Кар көчкү

Новая инспекция New Inspection

前へ 次へ 終了

7

Record Sheet

14:59 Cottonplant2_201708 (MOTR-Server.local) Форма записи Record Sheet

Назад Back

Испекция контрмер

Название дороги Road Name	Башкес - Ош 318-428	км столб km post	+
Дата Date	2017.08.15	Широта N Latitude N	42.870567
ПУАД/ДУАД Road Name	GDAD_BO	ДЭП DEP	30
Степень повреждения дороги Road Damage	Регулировка движения и время расчистки	Регулировка движения и время расчистки	Регулировка движения и время расчистки
Смертельный случай Fatal	Человеческий/автомобильный ущерб (кол-во) Human/Automobile Damage (Count)	повреждение автомобиля Damage	Ничего
Состояние погоды при возникновении стихии Weather at Disaster	Серьезное повреждение Serious Damage	повреждение пешеходов Pedestrian Damage	Ничего
Грязь или снег на дороге Mud or Snow on Road	Длина (m) Length (m)	Макс глубина (м) Max Depth (m)	Глубина заноса (см)*1 Depth of Roadblock (cm)*1
Метод Method	Фактическое выполнение по восстановлению последствий Actual Completion of Restoration of Consequences	Единица Unit	Общая стоимость Total Cost
	Объем Qty.	Дата выполнения Completed Date	Фото-3 Photo-3
	Общая стоимость Total Cost	Дата выполнения Completed Date	Фото-2 Photo-2
	Общая стоимость Total Cost	Дата выполнения Completed Date	Фото-1 Photo-1
	Общая стоимость Total Cost	Дата выполнения Completed Date	Фото-3 Photo-3

*1 - if necessary (if necessary)

8

Inspection/ Countermeasure Sheet

15:00 Cottonplant2_201708 (MOTR-Server.local) • 86%
 Форма инспекции по камнепадам/ обрушению коренной породы
 Countermeasure Sheet for Falling Rocks/Bedrock Collapse

название дороги Road Name: Бышкес - Ош 318-428 КМ 409 + 500
 Дата инспекции Inspection Date: 2016/09/19 ширина N Latitude N: 41.554200 долгота E Longitude E: 72.508872
 плуад / уад PLUAD/ UAD: GDAD_BO деп DEP: 30 Фото-1 Photo 1 Фото-2 Photo 2 Фото-3 Photo 3

Фото Inspection Photo

Контрмера Countermeasure: Едириная стоимость Unit Cost

Объем Volume: Общая цена Total Price

Тип стихии Disaster Type: Камнепад Bedrock Material

Комментарии Comment: Камнепад произошел

Имя ответственного Person Name

Назад Back Карта Map Отправить Submit

9

Introduction of DB Activities

Disaster Inspection Data (As of October 2016)

UAD	DEP	Falling Rock/Bedrock Follapse	Slope Collapse/Landslide	Debris Flow	Avalanche	Snow Drifting	River Bank Erosion	Total
	DEP9	11	2	0	2	1	0	16
BO-UAD	DEP23	0	0	0	3	0	0	3
	DEP26	0	0	0	0	0	0	0
	DEP30	0	0	0	0	0	0	0
PLUAD6	DEP50	0	0	0	0	0	0	0
OSI-UAD	DEP959	0	0	0	0	0	0	0
Total		11	2	0	5	1	0	19

10

Introduction of DB Activities

Disaster Inspection Data (As of March 2017)

UAD	DEP	Falling Rock/Bedrock Follapse	Slope Collapse/Landslide	Debris Flow	Avalanche	Snow Drifting	River Bank Erosion	Total
	DEP9	11	2	0	2	1	0	16
BO-UAD	DEP23	0	0	0	3	0	0	3
	DEP26	7	0	5	2	0	5	19
	DEP30	12	1	3	0	0	0	16
PLUAD6	DEP50	5	13	4	1	1	7	31
OSI-UAD	DEP959	7	7	14	2	0	3	33
Total		42	23	26	10	2	15	118

11

Introduction of DB Activities

Disaster Inspection Data (As of August 2017)

UAD	DEP	Falling Rock/Bedrock Follapse	Slope Collapse/Landslide	Debris Flow	Avalanche	Snow Drifting	River Bank Erosion	Total
	DEP9	11	2	0	2	1	0	16
BO-UAD	DEP23	0	0	0	3	0	0	3
	DEP26	7	0	5	18	0	5	35
	DEP30	12	1	3	0	0	0	16
PLUAD6	DEP50	5	13	4	1	1	7	31
OSI-UAD	DEP959	7	7	14	2	0	3	33
Total		42	23	26	26	2	15	134

12



Introduction of DB Activities

Date	Seminar/Training etc.	Venue	Participants	Contents
July 7th	Seminar/Training	OSI-UAD	Abdyrashym kyzy Aigerim(RMD) Junusov Toktogul(UAD-OSI) Saparov Nurgazy(UAD-OSI) Kadyrov Mansuridin(UAD-OSI) Ayishebaev Onurbek(DEF26) Kasymov Baatyrbek(DEF16) Ibragimov Ganijan(DEF959) Diyarov Nurmanbek(DEF960)	Database Input (Inspection) Training on Database Input Mini Exam for Input
July 10th	Training	Project Team Office	Kalvgulov Belek (DEF30)	Database Input (Inspection) Training on Database Input Mini Exam for Input
July 11th	Software Install/ Training	AMS	Abdyrashym kyzy Aigerim(RMD)	FileMaker Server Install Training on Operation of FileMaker Server
July 17th	Seminar/Training	Project Team Office	Matisakov Nursultan(RMD) Shekeev Azat(RMD) Kidirmishev Temirbek(RMD) Kuluev Nurbek(BO-UAD)	Database Input (Inspection) Training on Database Input Mini Exam for Input
July 24th	Training	Project Team Office	Berdikulov Abdykalyk (PLUAD6)	Database Input (Inspection) Training on Database Input Mini Exam for Input

13



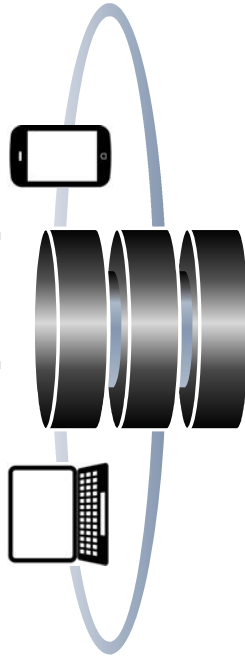
Introduction of DB Activities



14

THE PROJECT FOR CAPACITY DEVELOPMENT FOR ROAD DISASTER PREVENTION MANAGEMENT IN THE KYRGYZ REPUBLIC

Bridge & Tunnel Database Training
for Data Input and Operations



May 2018

1

Training Program

1. Purpose of Training
2. Outline of Bridge & Tunnel Database System
3. FileMaker Software Functionality
4. Database Structure
5. Input Method of Bridge Inspection
6. Browse System
7. Practical Test of Input Method and Browsing
8. Certificate Award

2

1. Purpose of Training

- To understand the DB system structure and function
- To learn the operation flow of the Database System
- To learn input method for “Passport Data” and “Inspection Sheet”

3

2. Outline of Bridge & Tunnel Database System

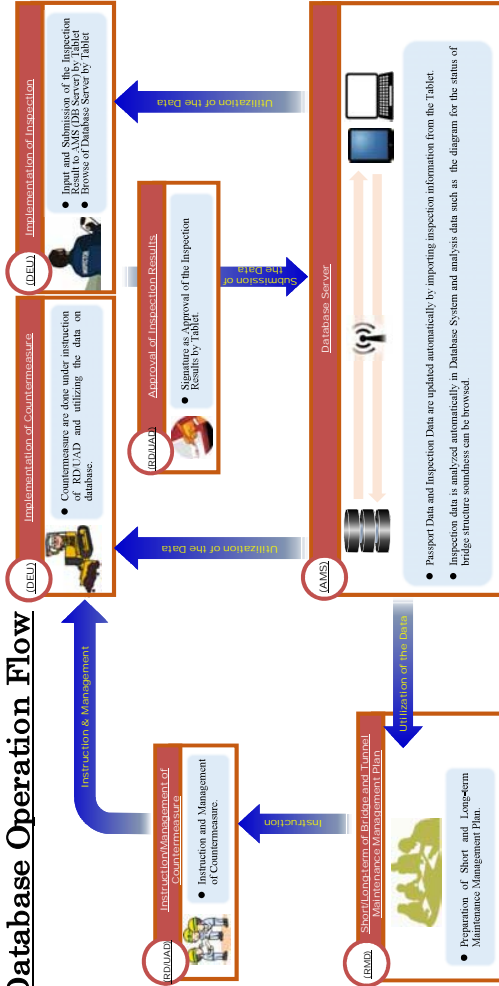
What is Bridge and Tunnel Database System?

- Bridge and Tunnel Database System was developed by the Project for Capacity Development for Maintenance Management of Bridges and Tunnels in 2013 to 2016.
- Database System developed by FileMaker software and Excel File can manage the passport data of bridge/tunnel and inspection data of bridge.
- The data is managed by AMS (Asset Management Section) in RMD (Road Maintenance Department).
- The database system was improved by the Project so that the inspection data is transferred automatically to the server by the tablet.

4

2. Outline of Bridge & Tunnel Database System

Database Operation Flow



5

2. Outline of Bridge & Tunnel Database System

Database Equipment



6

3. FileMaker Software Functionality

Necessary Software

- FileMaker Pro (Windows & Mac OS)
<http://www.filemaker.com/products/filemaker-pro/>
- FileMaker Go (iPad & iPhone)
<http://www.filemaker.com/products/filemaker-go/>
- FileMaker Server
<http://www.filemaker.com/products/filemaker-server/>



Advantages of FileMaker Software

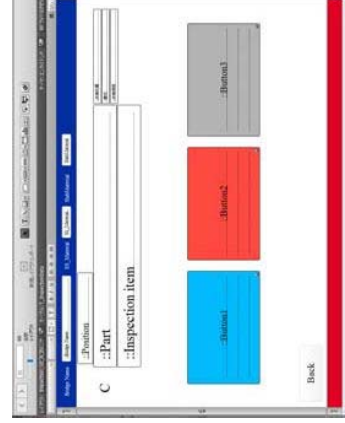
- No need to learn a specific programming language (SQL language only)
- Easy to create database system
- Easy to install software for iPad (Unnecessary of Apple's AppStore judge)

7

3. FileMaker Software Functionality

Standard Function

FileMaker Pro "Layout mode" image...
Layout is modified like Microsoft PowerPoint view....



FileMaker (Layout mode)

Microsoft PowerPoint

8

3. FileMaker Software Functionality

FileMaker Network Operation

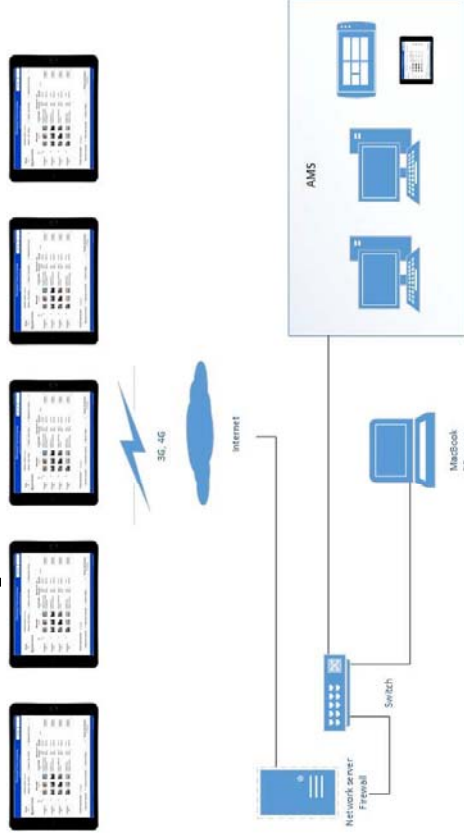


- Mobility
- Development
- Integration
- Security
- Scalability



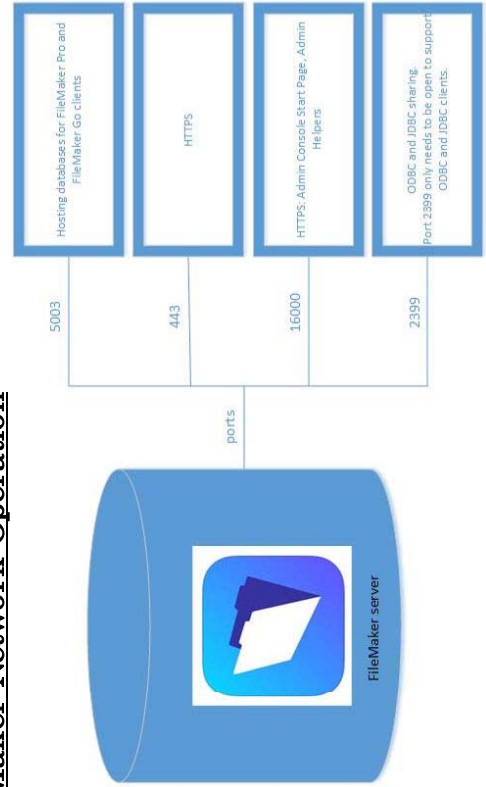
3. FileMaker Software Functionality

FileMaker Network Operation



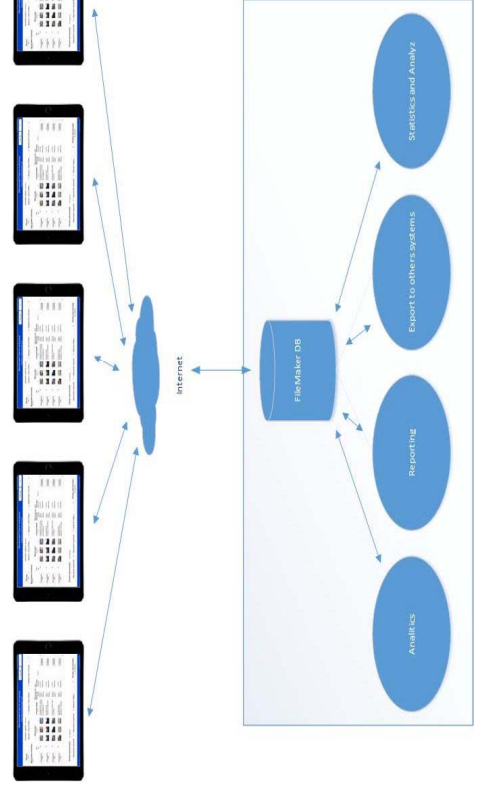
3. FileMaker Software Functionality

FileMaker Network Operation



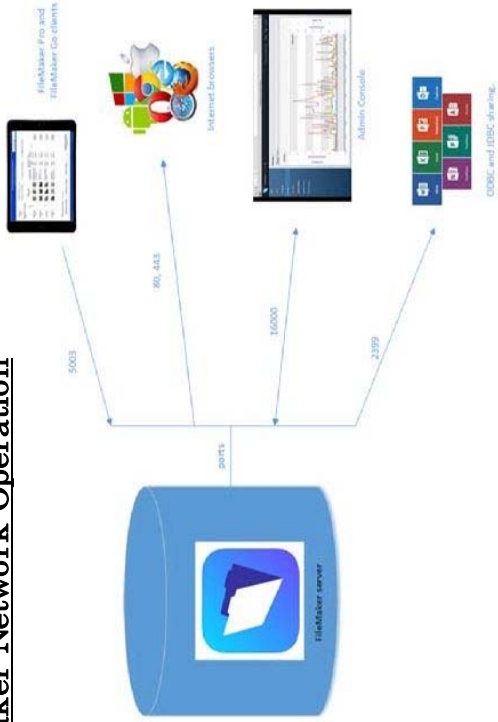
3. FileMaker Software Functionality

FileMaker Network Operation



3. FileMaker Software Functionality

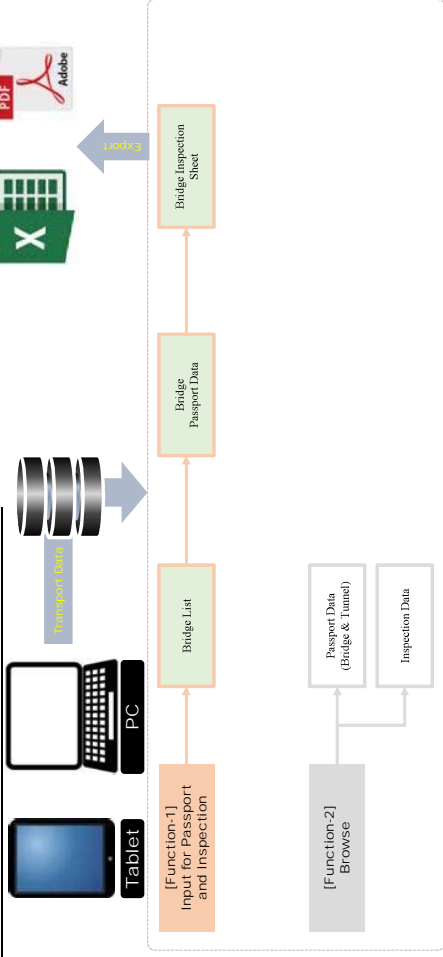
FileMaker Network Operation



13

4. Database Structure

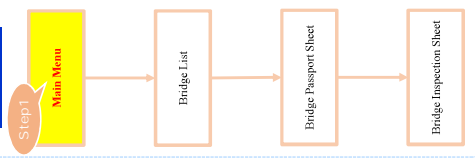
Outline of Database Structure



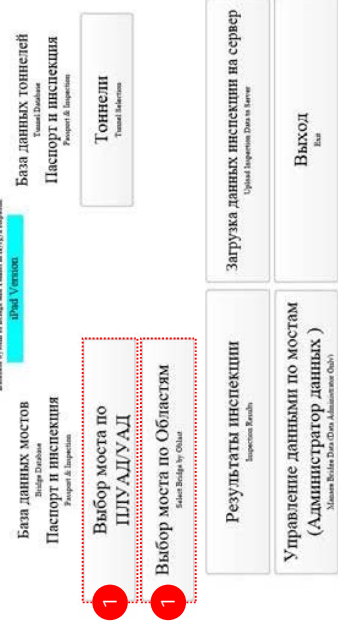
14

5. Input Method for Bridge Inspection

Training Step



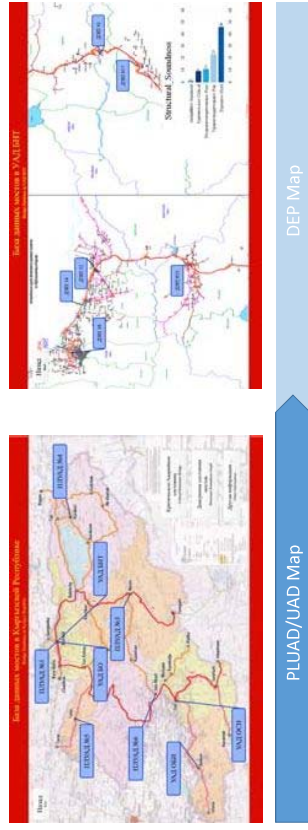
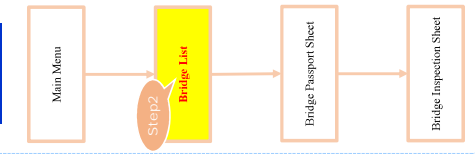
Система базы данных мостов и тоннелей в Кыргызской Республике



15

5. Input Method for Bridge Inspection

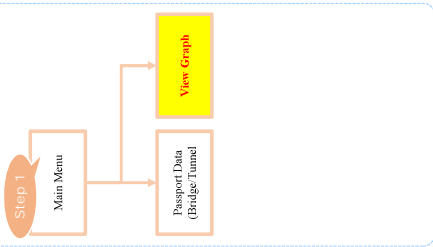
Training Step



16

6. Browse System (Other Information)

Training Step



Сайт системы «Паспорт мостов и тоннелей Украины»

1. Картинка текущего компонента системы на территории Украины

2. Карта системы мостов и тоннелей Украины

3. Справка по типу сооружения

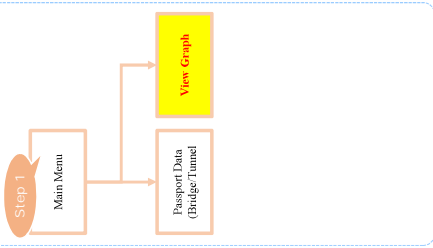
4. Справка по типу системы

Other Information Menu

26

6. Browse System (Other Information)

Training Step



1. Картинка текущего компонента системы на территории Украины

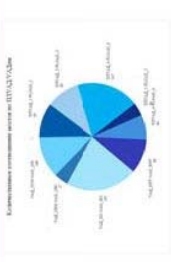
2. Карта системы мостов и тоннелей Украины

3. Справка по типу сооружения

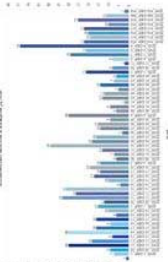
4. Справка по типу системы

Other Information Menu

Number of Bridge by DEPs 26

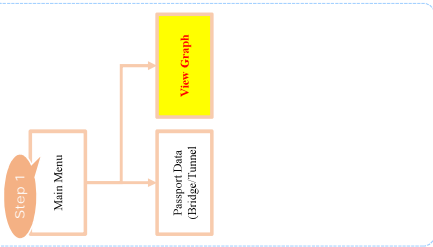


Component Ratio by PLUAD/UAD



6. Browse System (Other Information)

Training Step



Сайт системы «Паспорт мостов и тоннелей Украины»

1. Картинка текущего компонента системы на территории Украины

2. Карта системы мостов и тоннелей Украины

3. Справка по типу сооружения

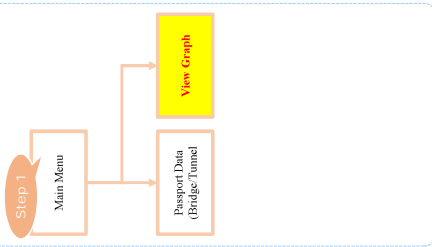
4. Справка по типу системы

Other Information Menu

26

6. Browse System (Other Information)

Training Step



Справка по типу сооружения

Число мостов

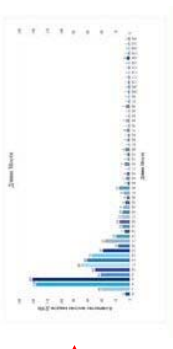
1. Картинка текущего компонента системы на территории Украины

2. Карта системы мостов и тоннелей Украины

3. Справка по типу сооружения

4. Справка по типу системы

Bridge Number by Construction Year

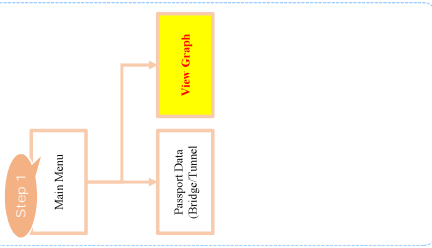


Other Information Menu

Bridge Number by Length 27

6. Browse System (Other Information)

Training Step



1. Картинка текущего компонента системы на территории Украины

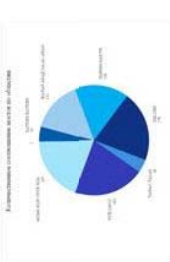
2. Карта системы мостов и тоннелей Украины

3. Справка по типу сооружения

4. Справка по типу системы

Other Information Menu

Component Ratio by Oblast



28

7. Practical Training for Input Method

Practice-1

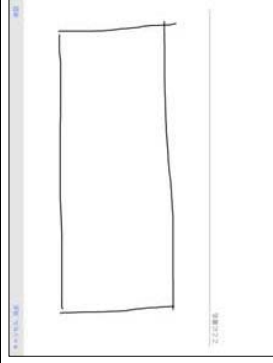
Input the following information to Inspection Sheet of bridge by tablet

Task1:To take 1 photo and save it

Task2:To draw the illustration shown in right

Task3:To input “Girder” as structural element

Task4:To input “It is necessary to report the bridge” to comment space



29



Fin.....

Thank You for Attending to Training!!!!

31



7. Practical Training for Browsing

Practice-2

Browse the following passport data.

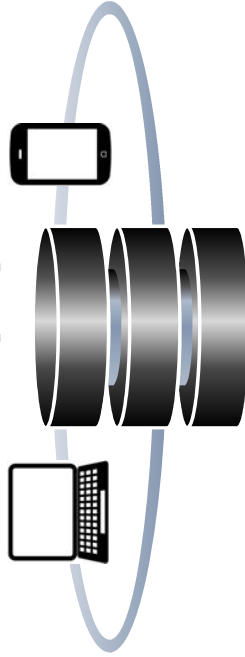
Task1:Bridge Passport (UAD-OSI, DEP960, Osh-Sarytash- Irkeshtam 204km)

Task2:Tunnel Passport (Tunnel No.3)

30

THE PROJECT FOR CAPACITY DEVELOPMENT FOR ROAD DISASTER PREVENTION MANAGEMENT IN THE KYRGYZ REPUBLIC

Database Training
for Data Input Operations



April 2018

1

Training Program

1. Purpose of Training
2. Outline of Database System for Road Disaster
3. FileMaker Software Functionality
4. Database Structure
5. Input Method of Inspection
6. Data Analysis
7. Practical Training on Input Method
8. Practical Test of Input Method
9. Certificate Award

2

1. Purpose of Training

- To understand the DB system structure and function of “Inspection Function” and “Analysis Function”
- To learn the operation flow of Database System
- To learn input method for “Disaster Hazard List”, “Disaster Record List” and “Disaster Record Sheet”

3

2. Outline of Database for Road Disaster

What is Road Disaster Database System?

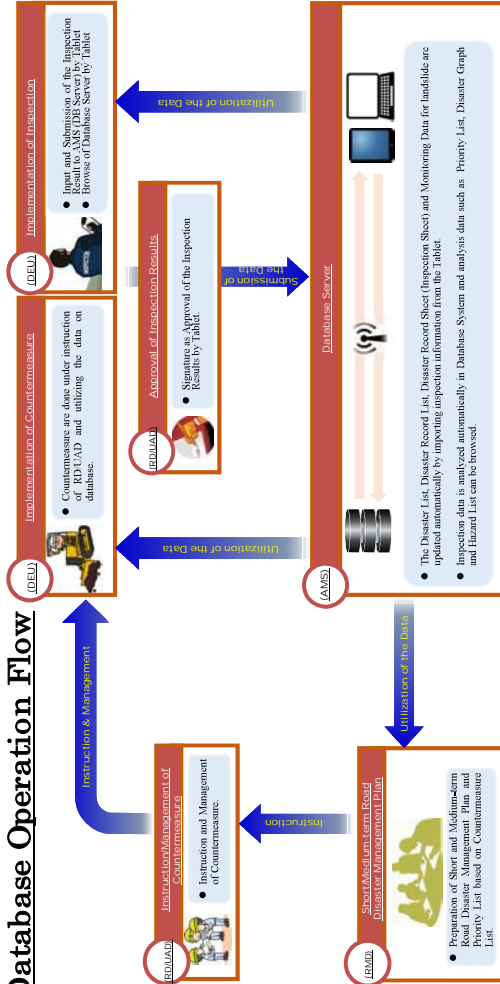
- Database System developed by FileMaker software can manage various data on road disaster such as Falling Rock and Avalanche in Kyrgyzstan. *
- Data is stored in Database Server managed by AMS (Asset Management Section) in RMD (Road Maintenance Department).
- Data is updated by inspection by DEU using the tablet.
- Data is utilized to make a management plan for road disaster and to determine disaster prone area.

* Target area of this project is international/national road along Bishkek-Osh road. This system is expected to utilize whole land of Kyrgyz

4

2. Outline of Database for Road Disaster

Database Operation Flow



5

2. Outline of Database for Road Disaster

Database Equipment



6

3. FileMaker Software Functionality

Necessary Software

- FileMaker Pro (Windows & Mac OS)
<http://www.filemaker.com/products/filemaker-pro/>
- FileMaker Go (iPad & iPhone)
<http://www.filemaker.com/products/filemaker-go/>
- FileMaker Server
<http://www.filemaker.com/products/filemaker-server/>



Advantages of FileMaker Software

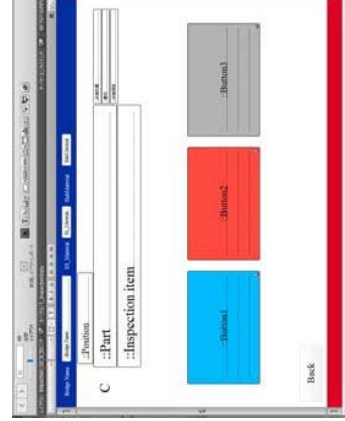
- No need to learn a specific programming language (SQL language only)
- Easy to create database system
- Easy to install software for iPad (Unnecessary of Apple's AppStore judge)

7

3. FileMaker Software Functionality

Standard Function

FileMaker Pro "Layout mode" image...
Layout is modified like Microsoft PowerPoint view....



FileMaker (Layout mode)

Microsoft PowerPoint

8

3. FileMaker Software Functionality

FileMaker Network Operation

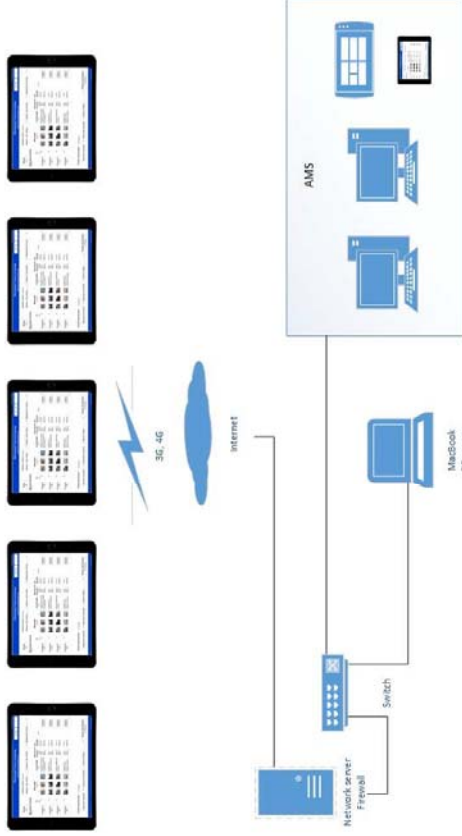


- Mobility
- Development
- Integration
- Security
- Scalability



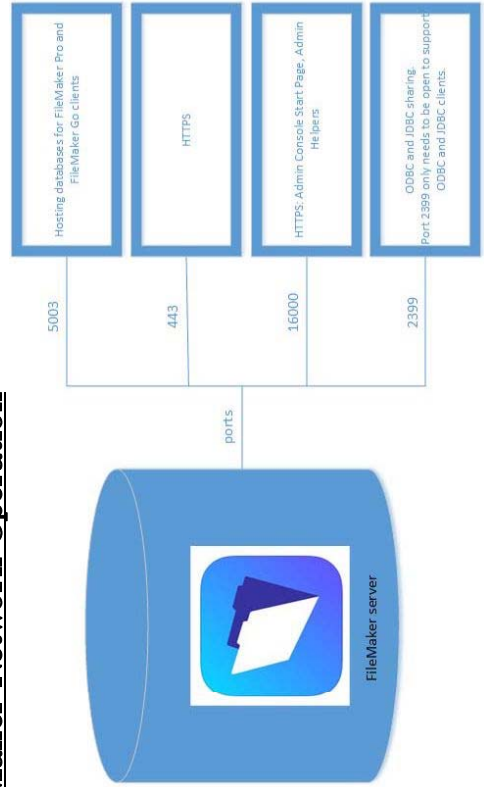
3. FileMaker Software Functionality

FileMaker Network Operation



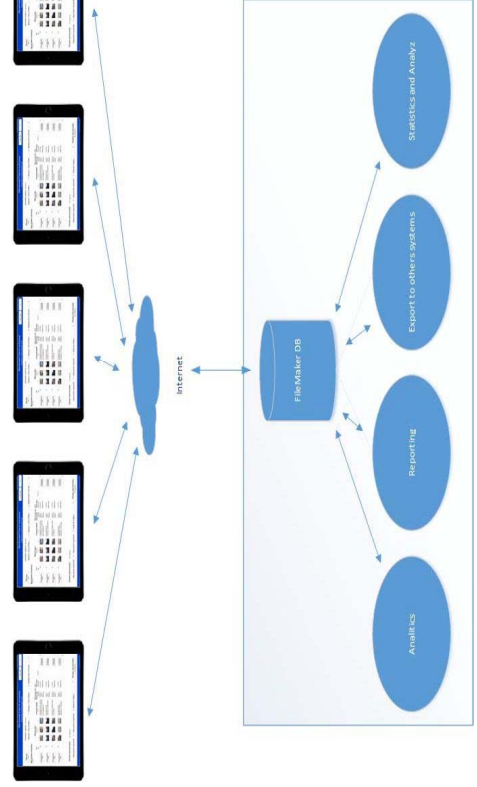
3. FileMaker Software Functionality

FileMaker Network Operation



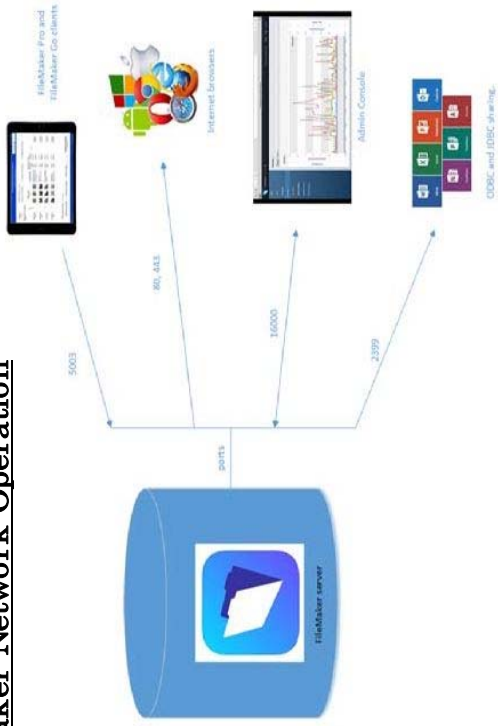
3. FileMaker Software Functionality

FileMaker Network Operation



3. FileMaker Software Functionality

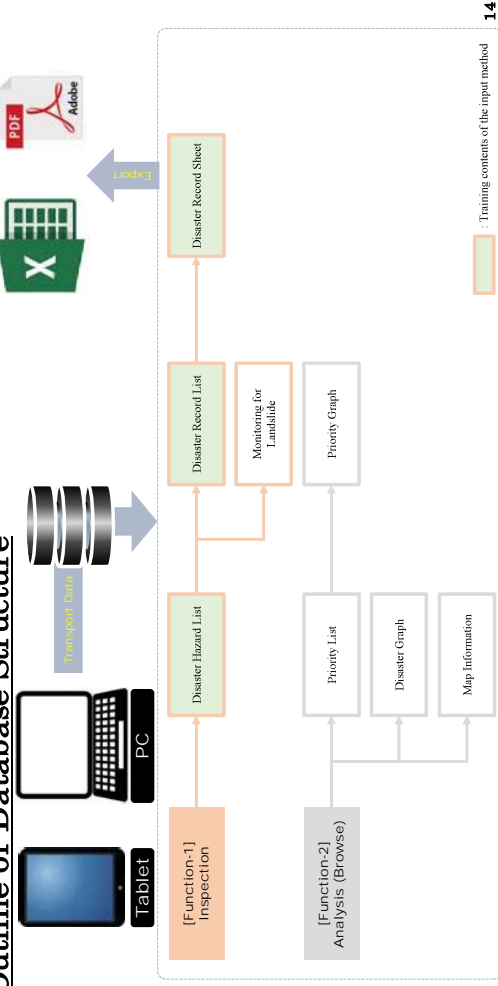
FileMaker Network Operation



13

4. Database Structure

Outline of Database Structure



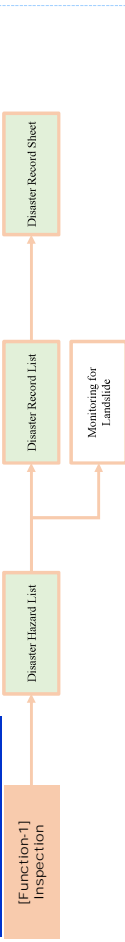
14

3. FileMaker Software Functionality

4. Database Structure

Function for Inspection

Main Structure for Inspection



Disaster Hazard List
The function is to list the disaster hazard area. New location of disaster hazard area can be added/deleted.

Disaster Record List
The function is to list the inspection history of specific. The contents of disaster record sheet in the past can be browse and new disaster record sheet can be created.

Disaster Record Sheet
The function to record the information on the disaster site such as location, disaster type and damage scale. Disaster Record Sheet is created by inspection after disaster.

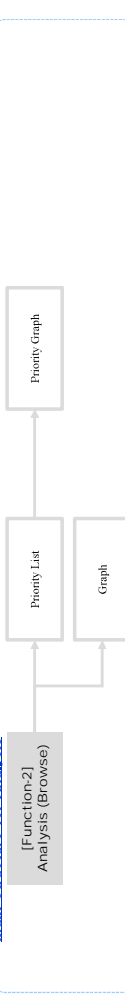
Monitoring
This is a function specialized for landslide monitoring. The amount of displacement of landslide can be recorded. Record data is displayed in a time series graph.

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4. Database Structure

Function for Analysis

Main Structure for Analysis



Priority List
The function is to list the priority of disaster hazard area for countermeasure.

Priority Graph
Ratio of each priority can be confirmed by the graph.

Graph
Number or ratio of disaster hazard area of each disaster type can be confirmed by the graph.

16

5. Input Method for Inspection

Training Step

Step 1



Жол кырсыктарын алдын алуу боюнча маалымат базасы

База данных по предотвращению бедствий на дорогах
Database for Road Disaster Prevention for Kyrgyz Republic

Step 1: Select RD/UAD that manages the place where disaster occurred
Step 2: Push the "Disaster Hazard List"

17

5. Input Method for Inspection

Training Step

Step 2



Step 3: Push the "Record List" that you want to add "Disaster Record Sheet"

18

5. Input Method for Inspection

Training Step

Step 3



Step 4: Push the "Record Sheet"

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5. Input Method for Inspection

Training Step

Step 4

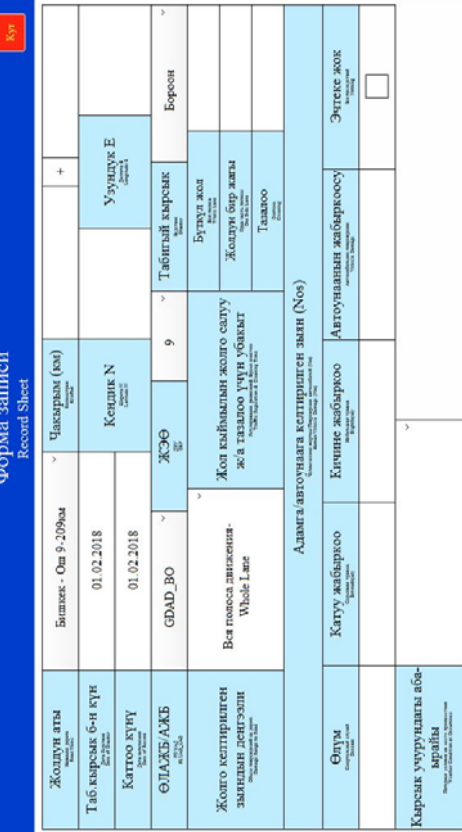


20

5. Input Method for Inspection

Training Step

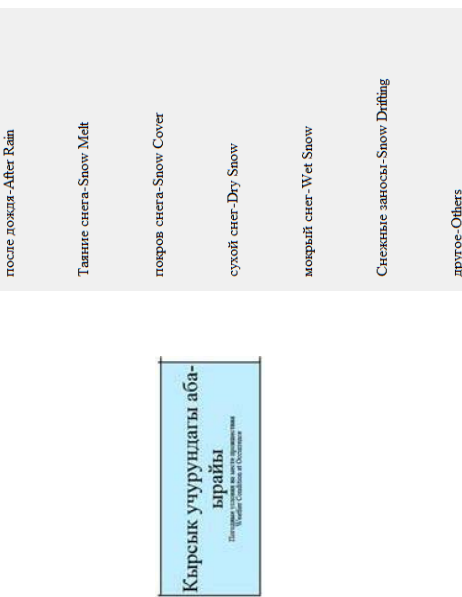
Форма записи Record Sheet			
Жолдун аты Road Name	Билдик - Ош 9-2090а	Чакырмак (км) Distance (km)	+
Таб.кырсак б-н күнү Date of inspection	01.02.2018	Кездик N Section N	Уулуңку Е
Каттоо күнү Survey date	01.02.2018	ЖЭӨ Road No.	Бороон
ӨЛЖБ/АЖБ Road No.	GDAD_BO	9	Табигый кырсык Natural Hazard
Жоло кетпирген зындын деңгээли Road width	Вся полоса движения Whole Lane	Жол кыйылын жоло салуу ж/а тазалоо учун убакыт Road repair and cleaning time	Бурду жол Жолду бур жагы Tarmac Road
Адамга автоунаага кептирилген зыян (Nos)			
Өлүм Fatal	Катуу жабыркоо Severe Injury	Кичине жабыркоо Minor Injury	Автоунаанын жабыркоосу Vehicle Damage
Эчтеке жок None			
Кырсык учурундагы абалы Condition during hazard			



5. Input Method for Inspection

Training Step

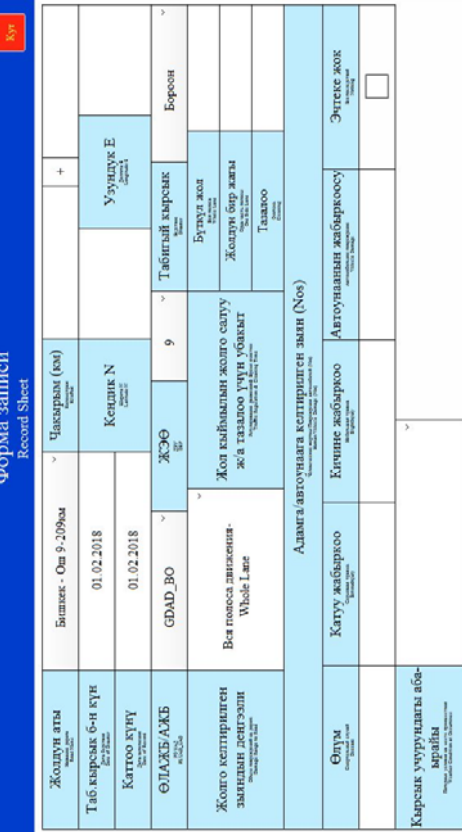
Кырсык учурундагы абалы Condition during Hazard	
после дождя-After Rain	
Таянне снега-Snow Melt	
покров снега-Snow Cover	
сухой снег-Dry Snow	
мокраяй снег-Wet Snow	
Снежные заносы-Snow Drifting	
другое-Others	



5. Input Method for Inspection

Training Step

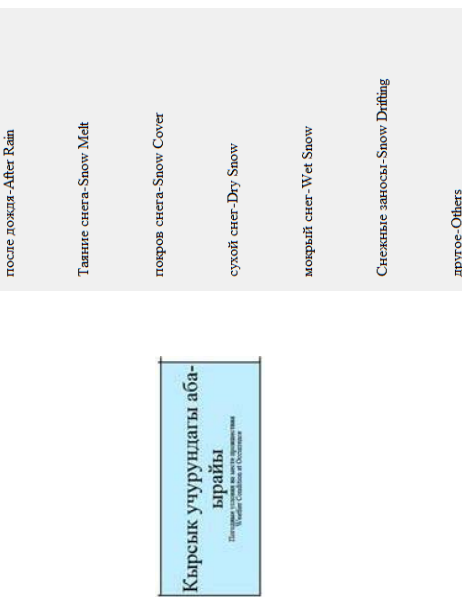
Таш түшүү боюнча Falling Rock	Таштын макс. диаметри (см) Maximum diameter of falling rock (cm)	b
Таштын орточо диаметри (см) Average diameter of falling rock (cm)	Макс. тереңдиги (м) Maximum depth (m)	a



5. Input Method for Inspection

Training Step

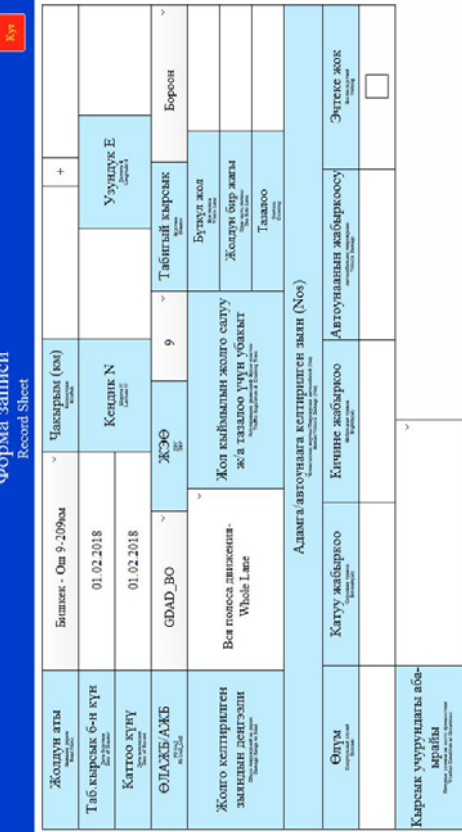
Тоо тегинин кыйрашы/Жер көчкү/Селдер боюнча Landslide/Earthquake/Debris Flow	Зыянын көлөмү (м)*1 Scale of damage (m)*1	ℓ
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5. Input Method for Inspection

Training Step

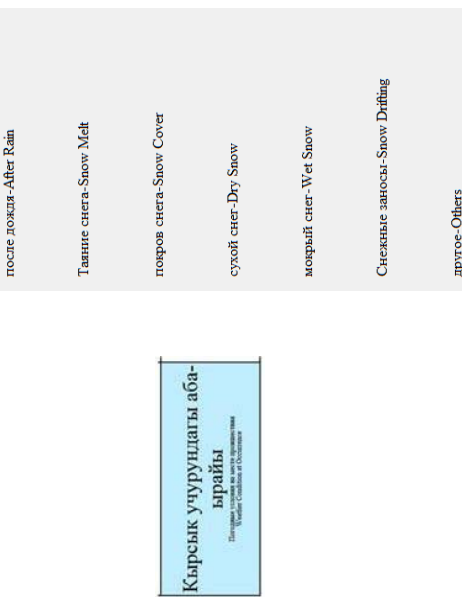
Таш түшүү боюнча Falling Rock	Таштын макс. диаметри (см) Maximum diameter of falling rock (cm)	b
Таштын орточо диаметри (см) Average diameter of falling rock (cm)	Макс. тереңдиги (м) Maximum depth (m)	a



5. Input Method for Inspection

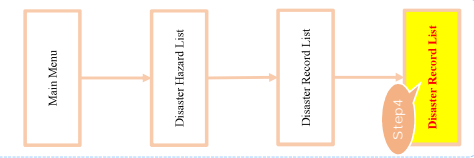
Training Step

Тоо тегинин кыйрашы/Жер көчкү/Селдер боюнча Landslide/Earthquake/Debris Flow	Зыянын көлөмү (м)*1 Scale of damage (m)*1	ℓ
---	--	---



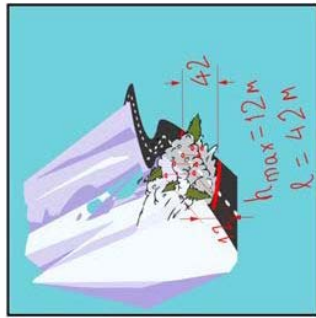
5. Input Method for Inspection

Training Step



Кар көчүлөр үчүн
For Avalanches

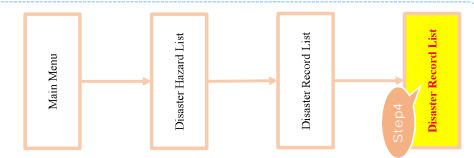
Жолго чыккан урандылар же кар Сынамдардын санына негизинде Based on the number of samples	Узуну (м) Length (m)	l
Макс. тереңдиги (м) Maximum depth (m)		h_{max}



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5. Input Method for Inspection

Training Step

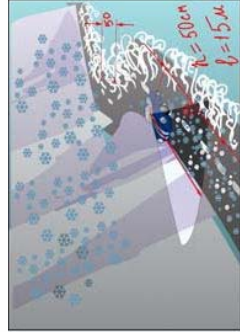


Кар күргүсү боюнча
For Landslides

Кар күргүсү боюнча Сынамдардын санына негизинде Based on the number of samples	Кар күргүсү убагындагы көрүнүү (м)*2	l
Кар күргүсүнүн тереңдиги (см)*2 Depth of landslide (cm)*2		h

*2: if necessary (Если необходимо)

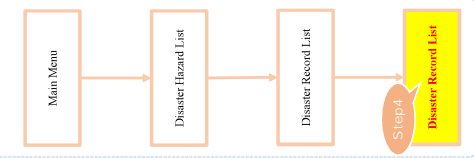
Жаңа башка зым
New cable



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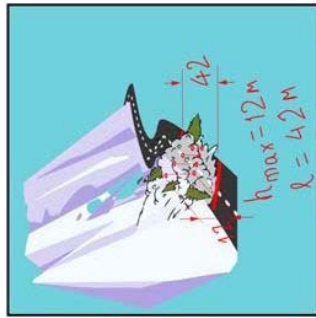
5. Input Method for Inspection

Training Step



Кар көчүлөр үчүн
For Avalanches

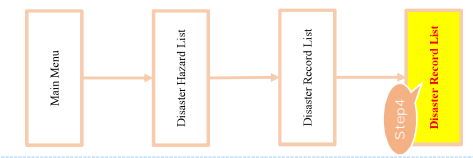
Жолго чыккан урандылар же кар Сынамдардын санына негизинде Based on the number of samples	Узуну (м) Length (m)	l
Макс. тереңдиги (м) Maximum depth (m)		h_{max}



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5. Input Method for Inspection

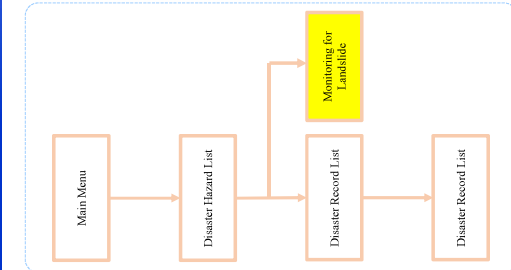
Training Step



Бөлөмөсү	Өткөөл чөккү	Сыны	Бүткүл өлөмү	Чыныгы аткарылган карымаган калыбына келтирүү иштери	Жаалаган күч
Сүрөт	Сүрөт-1	Сүрөт-2	Сүрөт-3		
Сүрөт Комент киргизүү					
Коментар киргизүү					
Ады-жөнү					
Date: 04/17/2017					
Арка	Өнүрүү	Жибөрүү			

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5. Input Method for Inspection



Арка	Жолдун аты	Кыргызстандын Республикасынын Жергиликтүү Ички Иштер Бююгу	ГДАД_ВО	9	Энг
Жаңы участка куруу	Бишкек-Ош 9-209 km	Кыргыз Республикасынын Жергиликтүү Ички Иштер Бююгу			
Сы. No	Сы. No	Сы. No	Сы. No	Сы. No	Сы. No
110	112	116	116	116	116
450	500	500	500	500	500
40.00	42.43	42.39	42.39	42.39	42.39
73.81	73.80	73.80	73.80	73.80	73.80
Priority A	Priority B	Priority B	Priority A	Priority A	Priority A
Monitoring	Monitoring	Monitoring	Monitoring	Monitoring	Monitoring

Steps: Push the "Monitoring" button where you want to add information on landslide.

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5. Input Method for Inspection

мониторингиндиги натыйжасында алынган маалыматтарды тизмэ

Артка
Back

GDAD_BO 9 Eng

жаны маалыматтарды кошуу
add new data

мониторингдин тарыхына киргизүү
view history of measurements

№	дата Date	жылжышуу 1 сметтөө Displacement 1	жылжышуу 2 сметтөө Displacement 2	жылжышуу 3 сметтөө Displacement 3	Сурет Photo
1	04.04.2018	10	20	10	
2	05.04.2018	10	5	15	
3	05.04.2018	5	10	10	

Inspections and measurements list

Viewing the history of measurements

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5. Input Method for Inspection

мониторингиндиги натыйжасында алынган маалыматтарды тизмэ

Артка
Back

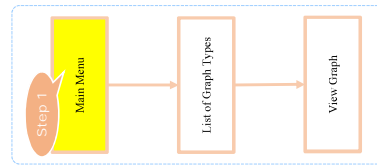
GDAD_BO 9 Eng

жылжышуу / сметиөө / Displacement

Graphically showed measurements

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6. Data analysis



Жол кырсыктарын алдын алуу боюнча
маалымат базасы
База ланых по предотвращению бедствий на дорогах
Database for Road Disaster Prevention for Kyrgyz Republic

ОУЛАК/АКС
Road No.

GDAD_BO 9 Eng

ТИЛ
Language

Коштуу жерлердин тизмеси
Disaster Hazard List

арыкчылыктуу тизмеси
Disaster Types

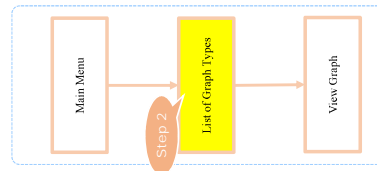
График
Graph

Чыгуу
Back

Click on the "Graph" button to go to the page for selecting the type of graphic

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6. Data analysis



Артка
Back

GDAD_BO 9 Eng

Приоритет диаграммасы
Priority Graph

Кыргыз Республикасынын
Түбөлүк-Көзөмөл
Disaster Quantity Diagram

Disaster Types

Disaster Types

Priority Graph

Disaster Quantity Diagram

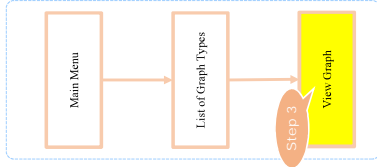
The diagram of the distribution of sites by priority in UAD / RD section

The diagram of the distribution of disaster types in UAD / RD section

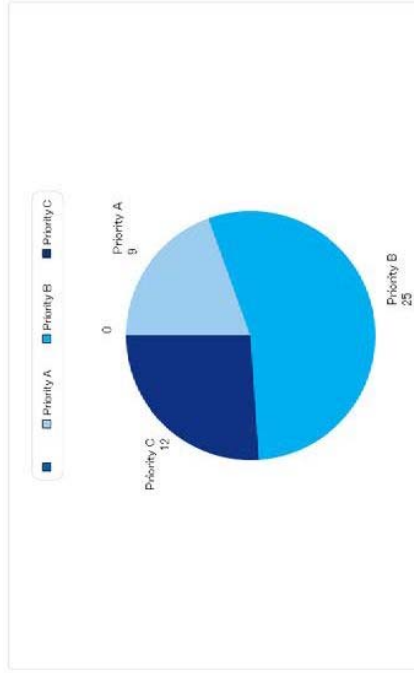
Click on the button of the graph you are interested in.

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6. Data analysis

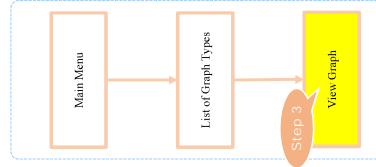


Priority Graphic

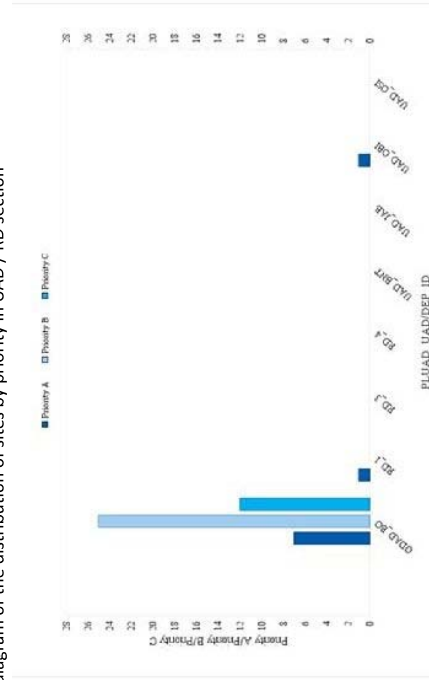


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6. Data analysis

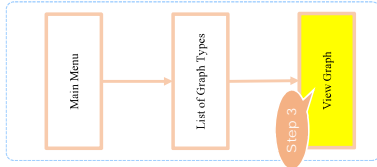


The diagram of the distribution of sites by priority in UAD / RD section

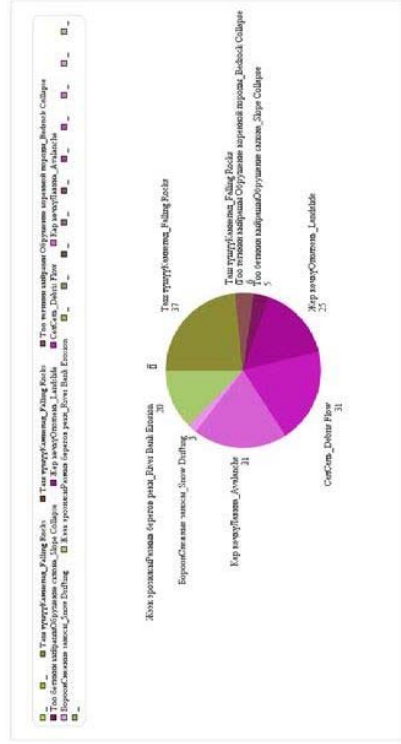


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6. Data analysis

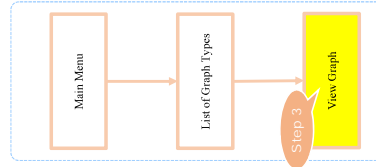


Disaster Quantity Diagram

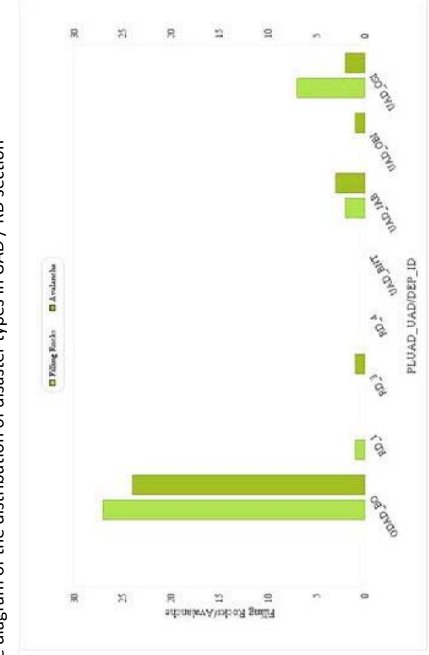


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6. Data analysis



The diagram of the distribution of disaster types in UAD / RD section



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7. Practical Training for Input Method

Practice

Landslide was occurred on Bishkek-Osh Road (110km+450m) with below condition. Input this situation to Disaster Record Sheet.

Disaster Date: 20.02.2018
Record Data: 21.02.2018
Damage Range to Road: Все полосы
Traffic Regulation and Cleaning: 4 часа
Human/Vehicle Damage: Nothing
Weather Condition at Occurrence: Snow melt
Damage range: 22 m
Other damage: Power lane pole has been inclined

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8. Practical Test for Input Method

Practice

Falling Rock was occurred on Bishkek-Osh Road (120km+550m) with below condition. Input this situation to Disaster Record Sheet.

Disaster Date: 20.02.2018
Record Data: 21.02.2018
Damage Range to Road: Все полосы
Traffic Regulation and Cleaning: 4 часа
Human/Vehicle Damage: Nothing
Weather Condition at Occurrence: Snow melt
Damage range: 22 m
Other damage: Power lane pole has been inclined

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9. Certificate Awards



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Fin.....

Thank You for Attending to Training!!!!

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