Road Asset Management Systems

Session 1: Introduction to RAMS

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Agenda

Day 1	Day 2
Session 1 **Introduction to RAMS**	Session 5 **RAMS Action Plan**
Coffee break	Coffee break
Session 2 **RAMS Data Collection**	Session 6 **RAMS Action Plan**
Lunch	Lunch
Session 3 **RAMS Data Management**	Session 7 **RAMS Institutionalization**
Coffee break	Coffee break
Session 4 **RAMS Data Analysis and Planning**	Session 8 **Conclusions and next steps**

Road Asset Management System

Road Asset Management System: Any system that is used to collect, manage and analyze road data for road planning and programming purposes

***Function**: Optimizing the level and the allocation of road funding in relation to medium- and long-term results regarding road conditions and road user costs*

- Determine the network maintenance, repair and upgrading needs
- Define the required budget to address those needs
- Determine how the available budget is best allocated
  - To different roads and networks (class, traffic, etc.)
  - To different treatment types (routine, periodic, rehabilitation, upgrading)
- Based on agreed prioritization criteria
  - Economic (e.g. transport costs, traffic levels)
  - Social (e.g. population, minimum level of access)
- Predict the result of that budget allocation
  - Future road network conditions
  - Future maintenance and rehabilitation costs
- Monitor the road network over time

Network vs Project Planning

- RAMS is a network planning tool
  - Planning for an entire (sub-)network
  - Identify best treatment approaches
  - Determine budget needs and optimize allocations
  - Based on data collected for entire (sub-)network
  - Limited data collection to reduce costs

- Different from project level planning
  - For specific road (section) for which funding has been approved
  - Much higher data requirement
  - Collected only for that specific road (section)
  - Prepare specific designs
  - Determine volumes of works
  - Basis for detailed cost estimates and bidding documents

Benefits of a RAMS

- Optimize the allocation of available funding
  - Improved road network conditions
  - Reduced long-term maintenance and repair costs
  - Increased (economic) benefits for road users

- Improve the justification of maintenance and repair budgets
  - Better identification of network needs and justification of budget requests
  - Demonstration of impacts on network conditions of different budget scenarios

- Regular monitoring of road inventory, conditions and traffic levels

Road Asset Management System

- Data collection
  - Road data (inventory, condition, traffic, etc.)
  - Treatment data (costs, performance, etc.)
  - RAMS without data or with outdated data is useless
- Data management (database)
  - Store data and make it easily accessible
  - Combine different data sets
  - Prepare basic reports - provide statistics for the network
- Data analysis (planning tool)
  - Criteria for prioritization
  - Algorithms for predicting deterioration and costs
  - Recommend priority allocations for available budget
- Other modules
  - Bridge management system
  - Contract management system
  - etc.

Data collection

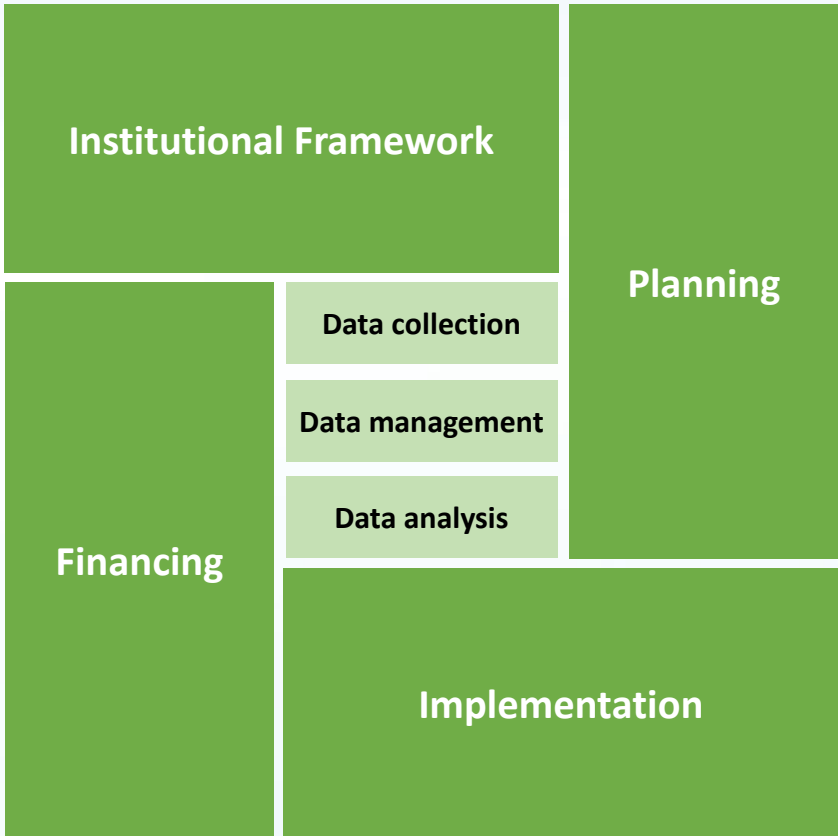
Data management

Data analysis

Road Asset Management System

- The RAMS needs to be integrated into existing systems

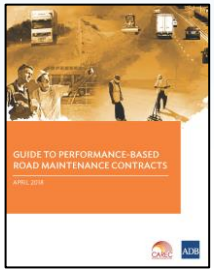
- Institutional framework
  - Resources for RAMS operation
  - Especially data collection
- Planning and budgeting procedures
  - In time for budget preparation
  - Used as basis for budget preparation
- Financing procedures
  - Influence budget levels by predicting results
  - Identify alternative funding options
- Implementation modalities
  - Existing capacity to implement plans
  - Shift to (periodic) maintenance
  - Suitable contracting modalities



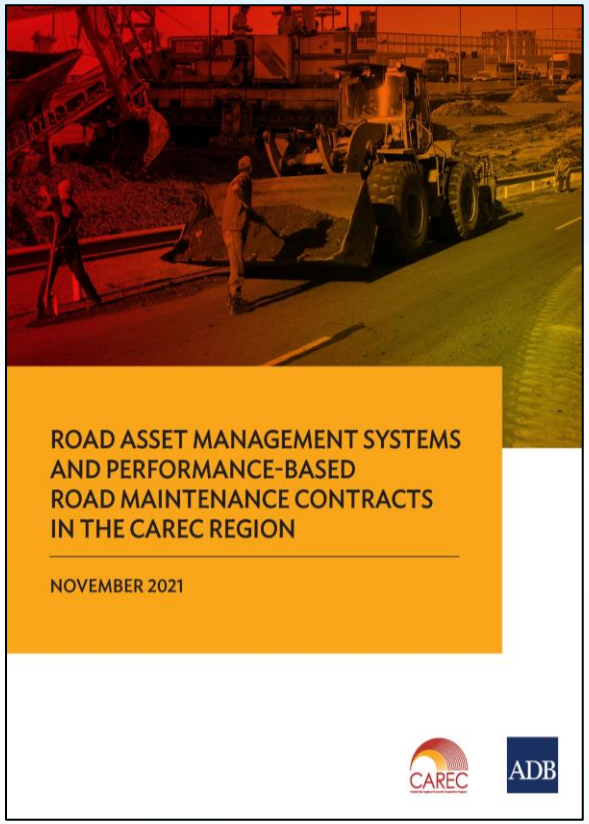
RAMS in the CAREC region

- Update of the current status 2021
  - Road Asset Management Systems (RAMS)
  - Performance-Based Contracting (PBC)

- Earlier publications from 2018

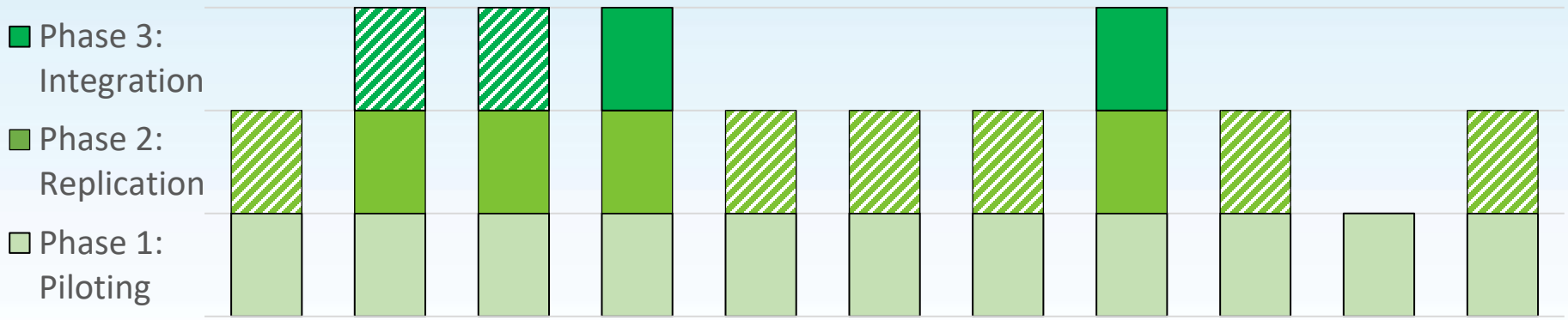


- Complemented by training
  - Tajikistan 2020
  - Afghanistan 2021 (online)
  - Kyrgyz Republic 2021 (online)
  - Mongolia 2022 (ongoing)



https://www.adb.org/publications/road-asset-management-systems-maintenance-contracts-carec

RAMS Status



	AFG	AZE	PRC	GEO	KAZ	KGZ	MON	PAK	TAJ	TKM	UZB
Data collection frequency	Intermittent	Intermittent	Annual	Annual	Intermittent	Intermittent	Intermittent	Annual, outsourced	Starting	Starting	Intermittent
Data collection extent	Partial Network	Network	Network	Network	Partial Network	Partial Network	Partial Network	Network	Partial Network	Partial Network	Partial Network
Database	Being prepared	Yes	Yes	Yes	Yes	Being prepared	Not used	Yes	Being prepared	Limited scope	Being prepared
Data analysis	Being prepared	Intermittent	Most provinces	HDM4	Being prepared	Being prepared	Not used	HDM4	Being prepared	-	Being prepared
Dedicated RAMS unit	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	-	-
RAMS influencing planning	-	Intermittent	Some provinces	Yes	-	-	-	Yes	-	-	-
RAMS influencing financing	-	-	-	Yes	-	-	-	Yes	-	-	-

Continued support

- RAMS development takes time and goes through different phases
  - Piloting
  - Replication
  - Integration

- Each phase easily takes 5 years
  - Throughout the development, the RAMS features will be continuously expanded

- RAMS development requires continued support from development partners
  - More than one project
  - Successive projects and possibly different development partners

RAMS Complexity

- Start simple
  - Avoid overly-costly data collection
  - Avoid overly-complex systems
- Pakistan and Georgia very successful with simple systems
  - Limited data collection
  - Basic databases
  - Off-the-shelf software
- Now they are considering the development of more complex systems with more elaborate data collection

Network coverage

- A RAMS does not necessarily need to cover the entire road network
- Initially focus the RAMS on part of the network
  - Start with the main roads/paved roads/roads with higher traffic volumes
  - Expand to other roads later
- Budgets for low-level roads are often very restricted
  - Benefits of a RAMS for these roads are limited as there is no financing available
- A RAMS can only be used for planning of roads for which data has been collected

Example: Nepal

- Context
  - Rural road network managed at district level – low capacity, strong political influence
  - No network data or database available, no evidence-based planning criteria in use
- Functions
  - Basic inventory, road classification, objective prioritization criteria, visual needs assessment, budget proposal, basic mapping, easy-to-use software
- Simple Excel-based RAMS + Word-based maps (later GIS)
  - Simple inventory (length, surface type, bridges, traffic categories)
  - Prioritization based on multicriteria analysis (population, traffic, connectivity, class)
  - Needs assessment based on visual data
  - Budget allocation module based on prioritization criteria
- Suitability for functions
  - Restructuring in Nepal – many roads managed at Provincial level
  - Larger network of higher level roads
  - Need to move to a more advanced database with more data

Example: Nepal

- Inventory and traffic data

Karnali Pradesh - 2. PROVINCIAL ROAD NETWORK (PRN)

#	Road code	Road section	Class	District	Road name	Width	BT	GR	ER	Existing	UC	PL	Total	Provincial priority	Traffic category
						m	km	km	km	km	km	km	km		
							82.47	151.27	913.84	1147.58	-	669.06	1816.64		
1	P60001	A	PH	Surkhet / सुर्खेत	NH58 (H12,Dhuliyabit)-Kalyan	4.50		16.00		**16.00**			**16.00**		T2
2	P60001	B	PH	Surkhet / सुर्खेत	Kalyan-Shivanagar P60002A(F183)	4.50		14.21		**14.21**			**14.21**		T2
3	P60001	C	PH	Surkhet / सुर्खेत	Shivanagar P60002A(F183)-Subhaghat	4.50		3.60		**3.60**			**3.60**		T2
4	P60001	D	PH	Surkhet / सुर्खेत	Subhaghat-Bheri Bridge-NH57(F047)	5.00		0.51		**0.51**			**0.51**		T2
5	P60002	A	PH	Surkhet / सुर्खेत	NH57 (F047,Shahare)-Dailekh Border (Simta, F183)	4.50			2.35	**2.35**			**2.35**		T1
6	P60002	B	PH	Surkhet / सुर्खेत	NH57 (F047,Shahare)-Dailekh Border (Simta, F183)	4.50			26.88	**26.88**			**26.88**		T1
7	P60002	C	PH	Surkhet / सुर्खेत	NH57 (F047,Shahare)-Dailekh Border (Simta, F183)	4.50			22.31	**22.31**			**22.31**		T1
8	P60003	A	PH	Surkhet / सुर्खेत	NH57(F047),Tulasipur - Purandhara - Botechaur	5.50		2.04	12.37	**14.41**			**14.41**		T2
9	P60003	B	PH	Salyan / सल्यान	NH57(F047),Tulasipur - Purandhara - Botechaur	5.50			18.94	**18.94**			**18.94**		T2
10	P60003	C	PH	Salyan / सल्यान	NH57(F047),Tulasipur - Purandhara - Botechaur	5.50			1.76	**1.76**			**1.76**		T2
11	P60003	D	PH	Salyan / सल्यान	NH57(F047),Tulasipur - Purandhara - Botechaur	5.50			1.54	**1.54**			**1.54**		T2
12	P60003	E	PH	Salyan / सल्यान	NH57(F047),Tulasipur - Purandhara - Botechaur	5.50			3.55	**3.55**			**3.55**		T2
13	P60004	A	PH	Surkhet / सुर्खेत	NH58(H12) Ratna Rajmarg-Phalate-Bhurigaun	4.00	8.73			**8.73**			**8.73**		T1
14	P60005	A	PH	Surkhet / सुर्खेत	NH59(F048) Chheda-Ghodaankhe NH58(H13)	4.00			16.33	**16.33**			**16.33**		T1
15	P60006	A	PH	Surkhet / सुर्खेत	NH58(H13) Badichaur-Babiyachaur (Part of F170)	6.00	22								
16	P60006	B	PH	Surkhet / सुर्खेत	Babiyachaur- Gutu (Part of F170)	6.00									
17	P60006	C	PH	Surkhet / सुर्खेत	Gutu-Baijura-Benighat Doti District Border	6.00									
18	P60007	A	PH	Surkhet / सुर्खेत	NH59(F048) Ratanangla-Awalching	4.50	12								
19	P60007	B	PH	Surkhet / सुर्खेत	NH59(F048) Ratanangla-Awalching	4.50	6								
20	P60007	C	PH	Surkhet / सुर्खेत	NH59(F048) Ratanangla-Awalching	4.50									

Karnali Pradesh - 3. TRAFFIC

#	Road code	Road section	Class	District	Road name	Traffic							Traffic category
						Bicycle, motorcycle	Car, SUV, light van, pick-up	Light (mini) truck, tractor	Truck, minibus, bus, tractor+trailer	Total traffic count	Total traffic estimation	Total traffic	
						VPD	VPD	VPD	VPD	VPD	VPD	PCU	
1	P60001	A	PH	Surkhet	NH58 (H12,Dhuliyabit)-Kalyan	88	143	25	39	**295**		**342**	T2
2	P60001	B	PH	Surkhet	Kalyan-Shivanagar P60002A(F183)	105	145	23	35	**308**		**337**	T2
3	P60001	C	PH	Surkhet	Shivanagar P60002A(F183)-	145	25	55	22	**247**		**246**	T2
4	P60001	D	PH	Surkhet	Subhaghat-Bheri Bridge-NH57(F047)	157	31	40	17	**245**		**221**	T2
5	P60002	A	PH	Surkhet	NH57 (F047,Shahare)-Dailekh	85	24	18	8	**135**		**118**	T1
6	P60002	B	PH	Surkhet	NH57 (F047,Shahare)-Dailekh	80	21	16	6	**123**		**103**	T1
7	P60002	C	PH	Surkhet	NH57 (F047,Shahare)-Dailekh	70	16	12	4	**102**		**81**	T1
8	P60003	A	PH	Surkhet	NH57(F047),Tulasipur - Purandhara	92	147	29	41	**309**		**360**	T2
9	P60003	B	PH	Salyan	NH57(F047),Tulasipur - Purandhara	95	149	31	42	**317**		**369**	T2
10	P60003	C	PH	Salyan	NH57(F047),Tulasipur - Purandhara	95	149	31	42	**317**		**369**	T2
11	P60003	D	PH	Salyan	NH57(F047),Tulasipur - Purandhara	101	151	32	44	**328**		**382**	T2
12	P60003	E	PH	Salyan	NH57(F047),Tulasipur - Purandhara	101	151	32	44	**328**		**382**	T2
13	P60004	A	PH	Surkhet	NH58(H12) Ratna Rajmarg-Phalate-	65	22	18	12	**117**		**118**	T1
14	P60005	A	PH	Surkhet	NH59(F048) Chheda-Ghodaankhe	15	4	5	2	**26**		**25**	T1
15	P60006	A	PH	Surkhet	NH58(H13) Badichaur-Babiyachaur	125	51	39	36	**251**		**280**	T2
16	P60006	B	PH	Surkhet	Babiyachaur- Gutu (Part of F170)	130	50	42	30	**252**		**268**	T2
17	P60006	C	PH	Surkhet	Gutu-Baijura-Benighat Doti District	85	25	18	8	**136**		**119**	T1
18	P60007	A	PH	Surkhet	NH59(F048) Ratanangla-Awalching	128	61	15	15	**219**		**193**	T2
19	P60007	B	PH	Surkhet	NH59(F048) Ratanangla-Awalching	130	55	12	12	**209**		**174**	T2
20	P60007	C	PH	Surkhet	NH59(F048) Ratanangla-Awalching	117	52	11	10	**190**		**157**	T2

Example: Nepal

- Prioritization and ranking

Karnali Pradesh - 5. RANKING																
#	Section code	District	Road name	Palika centres connected		Population served		Population unconnected		Traffic category		Road class		Provincial priority		Total	Rank
				15		30		20		20		5		10		100	
				#	Score	#	Score	#	Score	#	Score	#	Score	#	Score	Score	
14	P60005A	Surkhet	NH59(F048) Chheda-Ghodaankhe NH	2	**15.0**	57,471	**30.0**	-	-	T1	-	PH	**5.0**		-	**50.0**	1
79	P60503A	Kalikot	NH58(H13)-Kumalgaun	1	**7.5**	21,366	**11.2**	21,366	**20.0**	T1	-	PR	-		-	**38.7**	2
15	P60006A	Surkhet	NH58(H13) Badichaur-Babiyachaur (	1	**7.5**	30,295	**15.8**	-	-	T2	**6.7**	PH	**5.0**		-	**35.0**	3
80	P60504A	Kalikot	NH58(F172) Sannighat-Phukot-Syuna	2	**15.0**	29,118	**15.2**	-	-	T1	-	PR	-		-	**30.2**	4
25	P60011A	Dailekh	NH58(H13) Sangetada-Chamunda NH	1	**7.5**	33,730	**17.6**	-	-	T1	-	PH	**5.0**		-	**30.1**	5
83	P60505B	Kalikot	Ramnakot-Thirpu	1	**7.5**	15,303	**8.0**	15,303	**14.3**	T1	-	PR	-		-	**29.8**	6
82	P60505A	Kalikot	F172-Jarkot-Ramnakot	2	**15.0**	27,646	**14.4**	-	-	T1	-	PR	-		-	**29.4**	7
18	P60007A	Surkhet	NH59(F048) Ratanangla-Awalching	1	**7.5**	17,275	**9.0**	-	-	T2	**6.7**	PH	**5.0**		-	**28.2**	8
77	P60501A	Kalikot	NH61(H13)-Sukatiya	1	**7.5**	14,080	**7.3**	14,080	**13.2**	T1	-	PR	-		-	**28.0**	9
38	P60017A	Rukum West	H18-Chaurjhari (Bijeshwori)	1	**7.5**	27,438	**14.3**	-	-	T1	-	PH	**5.0**		-	**26.8**	10
93	P60704A	Jajarkot	NH03(H18) Thala- Managhat	1	**7.5**	35,295	**18.4**	-	-	T1	-	PR	-		-	**25.9**	11
42	P60020A	Jajarkot	NH57(F047) - Dalli (Nalgad M)	1	**7.5**	25,597	**13.4**	-	-	T1	-	PH	**5.0**		-	**25.9**	12
24	P60010A	Dailekh	NH58(H13,Tallo Dungeshwor)- Dullu	1	**7.5**	24,972	**13.0**	-	-	T1	-	PH	**5.0**		-	**25.5**	13
67	P60202A	Mugu	Tarapani-Jima/Sorukot	1	**7.5**	12,238	**6.4**	12,238	**11.5**	T1	-	PR	-		-	**25.3**	14
48	P60021E	Dolpa	Triveni-Narku NH57(F047)	2	**15.0**	7,402	**3.9**	-	-	T1	-	PH	**5.0**		-	**23.9**	15
29	P60014A	Dailekh	NH60 Dailekh (Khursanibari)-Naumu	1	**7.5**	20,802	**10.9**	-	-	T1	-	PH	**5.0**		-	**23.4**	16
27	P60013A	Dailekh	NH03 (H18,Bhirkhet) -Kharigaira-Gai	1	**7.5**	19,277	**10.1**	-	-	T1	-	PH	**5.0**		-	**22.6**	17
70	P60303A	Humla	NH58(F172) - Sarkegad	1	**7.5**	9,868	**5.2**	9,868	**9.2**	T1	-	PR	-		-	**21.9**	18
55	P60025A	Humla	NH58(F172) Kawadi-Maila	1	**7.5**	5,964	**3.1**	5,964	**5.6**	T1	-	PH	**5.0**		-	**21.2**	19
101	P60902A	Salyan	NH55(H11)-Dhorchaur	1	**7.5**	24,972	**13.0**	-	-	T1	-	PR	-		-	**20.5**	20

Karnali Pradesh - 4. CONNECTIVITY										
District	Palika code	Palika name	Palika type	Palika centre	Population (2011)	District Centre	1st connecting road	2nd connecting road	3rd connecting road	4th connecting road
Dolpa	60101	Dolpo Buddha	Gaunpalika	Dho	2,126		**CRN**			
Dolpa	60102	She Phoksundo	Gaunpalika	Saldang	3,099		P60101B	P60101A		
Dolpa	60103	Jagadulla	Gaunpalika	Majhgaun	2,273		P60105B	P60105A	P60021E	
Dolpa	60104	Mudkechula	Gaunpalika	Narku	5,129		P60021D	P60021E		
Dolpa	60105	Tripura Sundari	Nagapalika	Tripurakot	10,104		**CRN**			
Dolpa	60106	Thuli Bheri	Nagapalika	Juphal	8,370		P60104A			
Dolpa	60107	Kaike	Gaunpalika	Sahartara Bagar	3,576		**CRN**			
Dolpa	60108	Chharka Tangsong	Gaunpalika	Chharka-3	1,451		P60103A			
Mugu	60201	Mugum karmarong	Gaunpalika	Pulu	5,396		**CRN**			
Mugu	60202	Chhayanath Rara	Nagapalika	**Gamgadhi Bazar**	20,078	x	**CRN**			
Mugu	60203	Soru	Gaunpalika	Jima/Sorukot	12,238		P60202A	P60023A		
Mugu	60204	Khatyad	Gaunpalika	Majhachaur/Rataudi	17,116		P60201A	P60404A		
Humla	60301	Chankheli	Gaunpalika	Piplang	5,517		P60024C			
Humla	60302	Kharpunath	Gaunpalika	Yanchubagar	6,011		P60302A			
Humla	60303	Simkot	Gaunpalika	**Simikot**	11,557	x	**CRN**			
Humla	60304	Namkha	Gaunpalika	Yalwang	3,900		**CRN**			
Humla	60305	Sarkegad	Gaunpalika	Sarkegad	9,868		P60303A			
Humla	60306	Adanchuli	Gaunpalika	Shreengar	7,116		P60305A			
Humla	60307	Tanjakot	Gaunpalika	Maila	5,964		P60025A			
Jumla	60401	Patarasi	Gaunpalika	Dilichaur	14,571		P60402A			
Jumla	60402	Kanaka Sundari	Gaunpalika	Birat	12,977		**CRN**			

Example: Nepal

- Needs assessment and budgeting

Karnali Pradesh - 6. INVESTMENT NEEDS

#	Rank	Section code	District	Road name	BT km	GR km	ER km	UC/PL km	Width m	Traffic	Construction km 617.88	Rehabilitation km -	Gravelling km 835.27	Black-topping km 109.51	Widening km -	Bridge m 1,881	Cause-way m 30	Box culvert # 36	Pipe culvert # 436	Retaining wall m3 -
14	1	P60005A	Surkhet	NH59(F048) Chheda-Ghodaank	-	-	16.33	-	4.00	T1			27.67							
79	2	P60503A	Kalikot	NH58(H13)-Kumalgaun	-	-	8.64	15.59	4.00	T1	5.38		5.83			80			19	
15	3	P60006A	Surkhet	NH58(H13) Badichaur-Babiyach	22.11	-	-	-	6.00	T2			1.01							
80	4	P60504A	Kalikot	NH58(F172) Sannighat-Phukot-	-	-	11.22	-	4.50	T1			8.97				6		6	
25	5	P60011A	Dailekh	NH58(H13) Sangetada-Chamun	-	-	9.50	-	7.00	T1	29.19									
83	6	P60505B	Kalikot	Ramnakot-Thirpu	-	-	5.10	8.35	4.50	T1	10.79		25.27							
82	7	P60505A	Kalikot	F172-Jarkot-Ramnakot	-	-	1.02	-	4.50	T1			0.51							
18	8	P60007A	Surkhet	NH59(F048) Ratanangla-Awalch	12.90	-	-	-	4.50	T2				35.53						
77	9	P60501A	Kalikot	NH61(H13)-Sukatiya	-	-	3.56	7.75	3.50	T1			6.06			50			18	
38	10	P60017A	Rukum West	H18-Chaurjhari (Bijeshwori)	-	-	1.01	-	4.00	T1	84.12									
93	11	P60704A	Jajarkot	NH03(H18) Thala- Managhat	-	-	1.62	-	3.50	T1										
42	12	P60020A	Jajarkot	NH57(F047) - Dalli (Nalgad M)	-	-	2.78	-	4.50	T1	10.01									
24	13	P60010A	Dailekh	NH58(H13,Tallo Dungeshwor)-	16.76	-	-	-	5.50	T1			35.76			61			16	
67	14	P60202A	Mugu	Tarapani-Jima/Sorukot	-	-	-	10.01	3.75	T1			15.49							
48	15	P60021E	Dolpa	Triveni-Narku NH57(F047)	-	-	9.05	-	3.50	T1			30.80							
29	16	P60014A	Dailekh	NH60 Dailekh (Khursanibari)-N	-	-	16.36	-	4.50	T1	19.19		28.67							
27	17	P60013A	Dailekh	NH03 (H18,Bhirkhet) -Kharigair	-	-	13.18	-	4.00	T1	13.18		15.43			75			26	
70	18	P60303A	Humla	NH58(F172) - Sarkegad	-	-	-	2.58	3.75	T1	-	-	-	-						
55	19	P60025A	Humla	NH58(F172) Kawadi-Maila	-	-	-	4.67	3.75	T1										
101	20	P60902A	Salyan	NH55(H11)-Dhorchaur	-	-	0.51	-	4.00	T1										

Karnali Pradesh - 10. BUDGET ALLOCATION

Financial year			2076/77	2077/78	2078/79	2079/80	2080/81	Estimated annual maintenance cost
Expected PTMP budget			2,828,970,000	2,828,970,000	2,828,970,000	2,828,970,000	2,828,970,000	
Maintenance allocation			226,516,850	226,516,850	226,516,850	226,516,850	226,516,850	226,516,850
Investment allocation			2,602,453,150	2,602,453,150	2,602,453,150	2,602,453,150	2,602,453,150	
Rank	Section code	Cost NPR 16,871,624,293	Investment allocation NPR 2,602,453,150	NPR 2,602,453,150	NPR 2,602,453,150	NPR 2,602,453,150	NPR 2,602,453,150	Main funding source
1	P60005A	44,272,000	44,272,000	-	-	-	-	
2	P60503A	233,139,600	233,139,600	-	-	-	-	
3	P60006A	2,424,000	2,424,000	-	-	-	-	
4	P60504A	22,015,200	22,015,200	-	-	-	-	
5	P60011A	926,296,000	926,296,000	-	-	-	-	
6	P60505B	287,647,200	287,647,200	-	-	-	-	
7	P60505A	1,101,600	1,101,600	-	-	-	-	
8	P60007A	179,071,200	179,071,200	-	-	-	-	
9	P60501A	86,480,800	86,480,800	-	-	-	-	
10	P60017A	1,525,376,000	820,005,550	705,370,450	-	-	-	
11	P60704A	-	-	-	-	-	-	
12	P60020A	204,204,000	-	204,204,000	-	-	-	
13	P60010A	167,481,600	-	167,481,600	-	-	-	
14	P60202A	30,980,000	-	30,980,000	-	-	-	
15	P60021E	57,493,333	-	57,493,333	-	-	-	
16	P60014A	449,962,800	-	449,962,800	-	-	-	
17	P60013A	365,297,067	-	365,297,067	-	-	-	
18	P60303A	-	-	-	-	-	-	
19	P60025A	22,000,000	-	22,000,000	-	-	-	
20	P60902A	-	-	-	-	-	-	

Karnali Pradesh - 11. OUTPUT

Investment needs				
ER km	GR km	BT km	Widen km	Bridge m
617.88	835.27	109.51	-	1,881
Investment output				
ER 456.58	GR 650.05	BT 109.51	Widen -	Bridge 1,725
-	27.67	-	-	-
5.38	5.83	-	-	80
-	1.01	-	-	-
-	8.97	-	-	-
29.19	-	-	-	-
10.79	25.27	-	-	-
-	0.51	-	-	-
-	-	35.53	-	-
-	6.06	-	-	50
84.12	-	-	-	-
-	-	-	-	-
10.01	-	-	-	-
-	35.76	-	-	61
-	15.49	-	-	-
-	30.80	-	-	-
19.19	28.67	-	-	-
13.18	15.43	-	-	75
-	-	-	-	-
-	11.00	-	-	-
-	-	-	-	-

Example: Kyrgyz

- Context
  - Network managed at central level through local units (PLUADS/UADs)
  - Little network data available (currently inventory data being collected)
  - No evidence-based planning criteria in use (currently being introduced)
- Functions
  - Network inventory, prioritization criteria, introduce RAMS, visual + equipment condition assessment, budgeting, linked to mapping, easy-to-use software
- Detailed Excel-based RAMS
  - Detailed road and structure inventory, traffic data
  - Condition categories based on measured data or visual assessments
  - Prioritization and needs assessment based on decision matrix
  - Budget allocation based on ranking
  - Export of data to Google Earth for mapping or RONET for analysis
- Suitability for functions
  - Simple database, but extensive data needs – complicated to use
  - Currently being integrated into web-based RAMS

Example: Kyrgyz

- Inventory, traffic and condition data

N°	Наименование Участка	значение	Номер дорог	Номер Участка	ПЛУАД	ДЭП	Область	Протяж. км	Ширина (м)	Полосы (ко	а/бетон	ц/бетон	ч/гравий	гравий	грунт
1	2	3	4	5	6	7	8	10	14	15	16	17	18	19	20
1	Мырзаке-Карашоро 0-69 км	М	М-066	М-066-01	ГДАД БО	ДЭП-05	Ошская	69			33			36	
2	Жыланды-Ийри-Суу-Чангет 17-52 км	М	М-067	М-067-02	ГДАД БО	ДЭП-05	Ошская	35			17			18	
3	Бишкек-Ош 594-613 км	ЭМ	ЭМ-02	ЭМ-02-06	ГДАД БО	ДЭП-05	Ошская	19			19				
4	Мырзаке-Кара-Кулжа-Алайку 0-8 км	ЭМ	ЭМ-17	ЭМ-17-04	ГДАД БО	ДЭП-05	Ошская	8			8				
5	Суусамыр-Западный-Каракол	М	М-058	М-058-01	ГДАД БО	ДЭП-09	Чуйская	85						85	
6	Толук-Сарыкамыш-Кызыл-Ой	М	М-059	М-059-01	ГДАД БО	ДЭП-09	Чуйская	45						45	
7	Бишкек-Ош 9-209 км	ЭМ	ЭМ-02	ЭМ-02-01	ГДАД БО	ДЭП-09	Чуйская	200	7	2	199.7	0.3			
8	Кочкор-Арал-Тоо-Ашуу 140-224 км	ЭМ	ЭМ-16	ЭМ-16-02	ГДАД БО	ДЭП-09	Чуйская	84			15.6			68.4	
9	Барпы-Ийри-Суу-Узген 0-17 км	М	М-067	М-067-01	ГДАД БО	ДЭП-22	Жалал-Абадская	17			4			13	
10	Сузак-Кара-Даря 0-19 км	М	М-083	М-083-02	ГДАД БО	ДЭП-22	Жалал-Абадская	19			19				
11	Маданият-Майлуу-Суу 0-19 км	М	М-085	М-085-01	ГДАД БО	ДЭП-22	Жалал-Абадская	19			3		16		
12	Подъезд Жалал-Абад-Бекабад-Таможняя 0-11 км	М	М-098	М-098-01	ГДАД БО	ДЭП-22	Жалал-Абадская	11			11				
13	Обход Сузак 0-9км	М	М-099	М-099-01	ГДАД БО	ДЭП-22	Жалал-Абадская	9			9				
14	Бишкек-Ош 488-596 км	ЭМ	ЭМ-02	ЭМ-02-05	ГДАД БО	ДЭП-22	Жалал-Абадская	110			110				
15	Токтогул-Бешташ 0-90 км	М	М-031	М-031-01	ГДАД БО	ДЭП-23	Жалал-Абадская	90			7			83	
16	Торкент-Толук-Сарыкамыш	М	М-059	М-059-02	ГДАД БО	ДЭП-23	Жалал-Абадская	155						155	
17	Бишкек-Ош 209-318 км	ЭМ	ЭМ-02	ЭМ-02-02	ГДАД БО	ДЭП-23	Жалал-Абадская	109			109				
18	Ылайталаа-Гульчо	М	М-074	М-074-01	ГДАД БО	ДЭП-26	Ошская	23						23	

N°	участок	значение	ПЛУАД	ДЕП	Дата ВОС	От Км	До Км	Тип покрытия (АБ/ ЦБ/ ШПО/ЧГ/ ГР)	Ширина покрытия (м)	Растрескивание	Тип трещины	Ямы	Колейность	Ямочный ремонт	Разрушение кромки покрытия	Тип покрытия обочины	Общая ширина обочины (м)	Расстояние от покрытия до обочины (м)	Состояние обочины (Х/У/ П/ ОП)	ИРИ Направление 1	ИРИ Направление 2	ИРИ Среднее	класс ИРИ
ЭМ-07	Бишкек - Торугарт 0-32 км	ЭМ	ПЛУАД-1	ДЭП-958	05/12/2014	6.0	7.0	АБ	24	1	ПП	0	0	1	0.0	ГР	2	1	Х		3.3	3.3	1
ЭМ-07	Бишкек - Торугарт 0-32 км	ЭМ	ПЛУАД-1	ДЭП-958	05/12/2014	7.0	8.0	АБ	24	1	ПП	0	0	1	0.0	ГР	2	1	Х		3.8	3.8	1
ЭМ-07	Бишкек - Торугарт 0-32 км	ЭМ	ПЛУАД-1	ДЭП-958	05/12/2014	8.0	9.0	АБ	24	1	ПП	0	0	1	0.0	ГР	2	1	Х		4.2	4.2	2
ЭМ-02	Бишкек-Ош 318-427 км	ЭМ	ГДАД БО	ДЭП-30	29/09/2014	323.0	324.0	АБ	18	0		0	0	0	0.0	ГР	6	1	Х				
ЭМ-02	Бишкек-Ош 318-427 км	ЭМ	ГДАД БО	ДЭП-30	29/09/2014	324.0	325.0	АБ	18	0		0	0	0	0.0	ГР	6	1	Х				
ЭМ-02	Бишкек-Ош 318-427 км	ЭМ	ГДАД БО	ДЭП-30	29/09/2014	352.0	353.0	АБ	16	1	ПР	1	1	1	0.0	ГР	3	1	Х				
ЭМ-02	Бишкек-Ош 318-427 км	ЭМ	ГДАД БО	ДЭП-30	29/09/2014	353.0	354.0	АБ	16	1	ПР	1	1	1	0.0	ГР	3	1	Х				
ЭМ-02	Бишкек-Ош 318-427 км	ЭМ	ГДАД БО	ДЭП-30	29/09/2014	354.0	355.0	АБ	16	1	ПР	1	1	1	0.0	ГР	3	1	Х				
ЭМ-02	Бишкек-Ош 318-427 км	ЭМ	ГДАД БО	ДЭП-30	29/09/2014	355.0	356.0	АБ	16	1	ПР	1	1	1	0.0	ГР	3	1	Х				
ЭМ-02	Бишкек-Ош 318-427 км	ЭМ	ГДАД БО	ДЭП-30	29/09/2014	356.0	357.0	АБ	16	1	ПР	1	1	1	0.0	ГР	3	1	Х				
ЭМ-02	Бишкек-Ош 318-427 км	ЭМ	ГДАД БО	ДЭП-30	29/09/2014	357.0	358.0	АБ	16	1	ПР	1	1	1	0.0	ГР	3	1	Х				
ЭМ-02	Бишкек-Ош 318-427 км	ЭМ	ГДАД БО	ДЭП-30	29/09/2014	358.0	359.0	АБ	16	1	ПР	1	1	1	0.0	ГР	3	1	Х				
ЭМ-02	Бишкек-Ош 318-427 км	ЭМ	ГДАД БО	ДЭП-30	29/09/2014	359.0	360.0	АБ	16	1	ПР	1	1	1	0.0	ГР	3	1	Х				
ЭМ-06	Балыкчы - Ананьево - Каракол 40-156 км	ЭМ	ПЛУАД-4	ДЭП-07	08/10/2014	97.0	98.0	ШПО	15	1	С	0	0	0	0.0	ГР	3	0	Х				
ЭМ-06	Балыкчы - Ананьево - Каракол 40-156 км	ЭМ	ПЛУАД-4	ДЭП-07	08/10/2014	98.0	98.5	ШПО	15	1	С	1	0	0	0.0	ГР	3	0	Х				
ЭМ-06	Балыкчы - Ананьево - Каракол 0-40 км	ЭМ	ПЛУАД-4	ДЭП-10	30/10/2014	20.0	21.0	АБ	15	1	ПР	1	1	1	5.5	ГР	3	1	х	6.3		6.3	3
ЭМ-06	Балыкчы - Ананьево - Каракол 0-40 км	ЭМ	ПЛУАД-4	ДЭП-10	30/10/2014	21.0	22.0	ШПО	15	1	ПР	2	2	2	3.5	ГР	3	1	х	5.7		5.7	3
ЭМ-07	Бишкек - Торугарт 32-82 км	ЭМ	ПЛУАД-1	ДЭП-954	05/12/2014	54.5	55.0	АБ	15	1	ПП	0	0	2	2.0	ГР	3	2	У	4.2		4.2	2
ЭМ-07	Бишкек - Торугарт 32-82 км	ЭМ	ПЛУАД-1	ДЭП-954	05/12/2014	55.0	56.0	АБ	15	1	ПП	0	0	2	2.0	ГР	3	2	У	3.5		3.5	1
ЭМ-07	Бишкек - Торугарт 32-82 км	ЭМ	ПЛУАД-1	ДЭП-954	05/12/2014	56.0	57.0	АБ	15	1	ПП	0	0	2	2.0	ГР	3	2	У	3.1		3.1	1
ЭМ-07	Бишкек - Торугарт 32-82 км	ЭМ	ПЛУАД-1	ДЭП-954	05/12/2014	57.0	58.0	АБ	15	1	ПП	0	0	2	2.0	ГР	3	2	У	2.9		2.9	1
ЭМ-07	Бишкек - Торугарт 32-82 км	ЭМ	ПЛУАД-1	ДЭП-954	05/12/2014	58.0	59.0	АБ	15	1	ПП	0	0	2	2.0	ГР	3	2	У	4.1		4.1	2
ЭМ-07	Бишкек - Торугарт 32-82 км	ЭМ	ПЛУАД-1	ДЭП-954	05/12/2014	59.0	59.7	АБ	15	1	ПП	0	0	2	2.0	ГР	3	2	У	3.9		3.9	1
ЭМ-07	Бишкек - Торугарт 32-82 км	ЭМ	ПЛУАД-1	ДЭП-954	05/12/2014	65.5	66.0	АБ	15	2	ПП	0	0	1	0.0	ГР	4	2	Х	2.7	3.6	3.1	1
ЭМ-07	Бишкек - Торугарт 32-82 км	ЭМ	ПЛУАД-1	ДЭП-954	05/12/2014	66.0	67.0	АБ	15	2	ПП	0	0	1	0.0	ГР	4	2	Х	3.1	3.5	3.3	1
ЭМ-07	Бишкек - Торугарт 32-82 км	ЭМ	ПЛУАД-1	ДЭП-954	05/12/2014	67.0	68.0	АБ	15	2	ПП	0	0	1	0.0	ГР	4	2	Х	3.3	3.9	3.6	1
ЭМ-07	Бишкек - Торугарт 32-82 км	ЭМ	ПЛУАД-1	ДЭП-954	05/12/2014	68.0	69.0	АБ	15	2	ПП	0	0	1	0.0	ГР	4	2	Х	2.7	3.1	2.9	1

Example: Kyrgyz

- Decision matrix and work programming

Решения о работах в зависимости от состояния

		Колея	0-1			2			3		
Инт-ть дв. (СГС	Трещины	Ямы	IRI: 0-1	IRI: 2	IRI: 3-4	IRI: 0-1	IRI: 2	IRI: 3-4	IRI: 0-1	IRI: 2	IRI: 3-4
		0 - 1	СОД	СОД	МР	СОД	СОД	МР	МР	РЕК1	РЕК1
		2	ЯР	ЯР	МР	ЯР	ЯР	МР	ПИ	РЕК1	РЕК1
	0-1	3	ЯР	ЯР	МР	ЯР	МР	МР	ПИ	РЕК1	РЕК1
		0 - 1	ЗТ	ШПО	Ф308	ШПО	ШПО	Ф308	РЕК1	РЕК1	РЕК1
		2	ШПО	ШПО	Ф308	ШПО	Ф304	Ф308	РЕК1	РЕК1	РЕК1
	2 - 3	3	ШПО	ШПО	Ф308	Ф304	Ф306	Ф308	РЕК1	РЕК1	РЕК1
		0 - 1	ШПО	ШПО	ПИ	ШПО	Ф304	ПИ	РЕК1	РЕК1	РЕК1
		2	ШПО	Ф304	ПИ	Ф304	Ф306	ПИ	РЕК1	РЕК1	РЕК1
< 1000	4	3	РЕК1	РЕК1	РЕК1	РЕК1	РЕК1	РЕК1	РЕК1	РЕК1	РЕК1
		0 - 1	СОД	СОД	МР	СОД	ШПО	АБ08	МР	РЕК2	РЕК2
		2	ЯР	ЯР	АБ08	МР	МР	АБ08	ПИ	РЕК2	РЕК2
	0-1	3	ЯР	ЯР	АБ08	МР	АБ08	АБ08	ПИ	РЕК2	РЕК2
		0 - 1	ЗТ	ДШПО	АБ08	ШПО	АБ04	АБ08	РЕК2	РЕК2	РЕК2
		2	ШПО	Ф304	АБ11	Ф304	АБ08	АБ11	РЕК2	РЕК2	РЕК2
	2 - 3	3	Ф304	АБ08	АБ11	АБ08	АБ11	АБ11	РЕК2	РЕК2	РЕК2
		0 - 1	ШПО	Ф304	АБ11	Ф304	АБ08	АБ11	РЕК2	РЕК2	РЕК2
		2	Ф304	АБ08	РЕК2	АБ08	АБ11	РЕК2	РЕК2	РЕК2	РЕК2
1000-3000	4	3	РЕК2	РЕК2	РЕК2	РЕК2	РЕК2	РЕК2	РЕК2	РЕК2	РЕК2
		0 - 1	СОД	СОД	МР	СОД	ШПО	АБ11	МР	РЕК3	РЕК3
		2	ЯР	ЯР	АБ11	МР	МР	АБ11	ПИ	РЕК3	РЕК3
	0-1	3	ЯР	ЯР	АБ11	МР	АБ11	АБ11	ПИ	РЕК3	РЕК3
		0 - 1	ЗТ	АБ04	АБ11	ШПО	АБ04	А			
		2	ШПО	Ф304	АБ13	Ф304	АБ11	А			
	2 - 3	3	Ф304	АБ11	АБ13	АБ11	АБ13	А			
		0 - 1	ШПО	Ф304	АБ13	Ф304	АБ11	А			
		2	Ф304	АБ11	РЕК3	АБ11	АБ13	Р			
>3000	4	3	РЕК3	РЕК3	РЕК3	РЕК3	РЕК3	Р			

Программа работ

№	участок	значени	ПЛУАД	ДЕП	От Км	До Км	Протяж. км	Индекс серьез-ности	Функцио-нальный индек	Индекс приоритет-ности	Предла-гаемые работ	Зат-рат
ЭМ-02	Ош-Исфана 179-280 км	ЭМ	УАД ОБИ	ДЭП-02	218	219	1	18	15	270	РЕК2	560
ЭМ-02	Ош-Исфана 75-179 км	ЭМ	УАД ОБИ	ДЭП-46	101	102	1	17	15	255	РЕК2	640
ЭМ-02	Ош-Исфана 75-179 км	ЭМ	УАД ОБИ	ДЭП-46	100	101	1	16	15	240	РЕК2	640
ЭМ-02	Ош-Исфана 75-179 км	ЭМ	УАД ОБИ	ДЭП-46	102	103	1	16	15	240	РЕК2	640
ЭМ-02	Ош-Исфана 30-75 км	ЭМ	УАД ОСИ	ДЭП-37	48	49	1	15	16	240	РЕК3	612
ЭМ-02	Ош-Исфана 30-75 км	ЭМ	УАД ОСИ	ДЭП-37	49	50	1	15	16	240	РЕК3	612
ЭМ-02	Ош-Исфана 30-75 км	ЭМ	УАД ОСИ	ДЭП-37	50	51	1	15	16	240	РЕК3	612
ЭМ-02	Ош-Исфана 179-280 км	ЭМ	УАД ОБИ	ДЭП-02	229	230	1	16	15	240	РЕК2	440
ЭМ-02	Ош-Исфана 75-179 км	ЭМ	УАД ОБИ	ДЭП-46	97	98	1	16	15	240	АБ11	196
ЭМ-02	Ош-Исфана 280-403 км	ЭМ	УАД ОБИ	ДЭП-13	356	357	1	15	15	225	РЕК3	714
ЭМ-02	Ош-Исфана 75-179 км	ЭМ	УАД ОБИ	ДЭП-46	96	97	1	15	15	225	АБ11	196
ЭМ-02	Ош-Исфана 75-179 км	ЭМ	УАД ОБИ	ДЭП-46	98	99	1	15	15	225	АБ11	196
ЭМ-02	Ош-Исфана 179-280 км	ЭМ	УАД ОБИ	ДЭП-02	228	229	1	15	15	225	АБ11	147
ЭМ-02	Ош-Исфана 179-280 км	ЭМ	УАД ОБИ	ДЭП-02	230	231	1	15	15	225	АБ11	147
ЭМ-02	Ош-Исфана 30-75 км	ЭМ	УАД ОСИ	ДЭП-37	51	52	1	14	16	224	РЕК3	816
ЭМ-02	Ош-Исфана 30-75 км	ЭМ	УАД ОСИ	ДЭП-37	46	47	1	14	16	224	РЕК3	612
ЭМ-02	Ош-Исфана 30-75 км	ЭМ	УАД ОСИ	ДЭП-37	47	48	1	14	16	224	РЕК3	612
ЭМ-02	Ош-Исфана 30-75 км	ЭМ	УАД ОСИ	ДЭП-37	62	63	1	14	15	210	РЕК3	816
ЭМ-02	Ош-Исфана 30-75 км	ЭМ	УАД ОСИ	ДЭП-37	63	64	1	14	15	210	РЕК3	816
ЭМ-02	Ош-Исфана 30-75 км	ЭМ	УАД ОСИ	ДЭП-37	64	65	1	14	15	210	РЕК3	816
ЭМ-02	Ош-Исфана 30-75 км	ЭМ	УАД ОСИ	ДЭП-37	66	67	1	14	15	210	РЕК3	816
ЭМ-02	Ош-Исфана 30-75 км	ЭМ	УАД ОСИ	ДЭП-37	72	73	1	14	15	210	РЕК3	816
ЭМ-02	Балыкчы - Боконбаево - Каракол 0-60 км	ЭМ	ПЛУАД-4	ДЭП-10	41	42	1	15	14	210	РЕК3	714
ЭМ-02	Балыкчы - Боконбаево - Каракол 0-60 км	ЭМ	ПЛУАД-4	ДЭП-10	42	43	1	15	14	210	РЕК3	714
ЭМ-02	Ош-Исфана 75-179 км	ЭМ	УАД ОБИ	ДЭП-46	103	104	1	14	15	210	РЕК2	640
ЭМ-02	Ош-Исфана 30-75 км	ЭМ	УАД ОСИ	ДЭП-37	73	74	1	14	15	210	АБ11	196
ЭМ-02	Ош-Исфана 30-75 км	ЭМ	УАД ОСИ	ДЭП-37	44	45	1	13	16	208	РЕК3	816
ЭМ-02	Ош-Исфана 30-75 км	ЭМ	УАД ОСИ	ДЭП-37	54	55	1	13	16	208	РЕК3	612

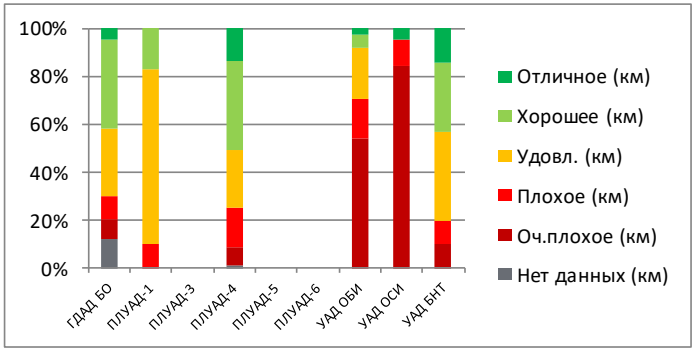
Example: Kyrgyz

- Standard reports for monitoring

Результаты состояния сети с твердым покрытием в плане визуально заметного разрушения

СУДА Кыргызстан

По Плуадам



	Отличное (км)	Хорошее (км)	Удовл. (км)	Плохое (км)	Оч.плохое (км)	Нет данных (км)
ГДАД БО	20.0	153.0	119.0	39.0	34.0	52.0
ПЛУАД-1	0.0	13.0	55.2	7.8	0.0	0.0
ПЛУАД-3	0.0	0.0	0.0	0.0	0.0	0.0
ПЛУАД-4	60.5	159.0	105.2	71.4	34.4	4.0
ПЛУАД-5	0.0	0.0	0.0	0.0	0.0	0.0
ПЛУАД-6	0.0	0.0	0.0	0.0	0.0	0.0
УАД ОБИ	5.0	9.0	36.0	29.0	92.0	0.0
УАД ОСИ	2.0	0.0	0.0	5.0	38.0	0.0
УАД БНТ	17.0	34.5	44.0	12.0	12.0	0.0

По участкам

ПЛУАД	ДЭП	Участок	Отличное (км)	Хорошее (км)	Удовл. (км)	Плохое (км)	Оч.плохое (км)	Нет данных (км)	Среднее разрушение	Среднее IRI	Максимальное IRI
ГДАД БО	ДЭП-09	Бишкек-Ош 9-209 км	8.0	53.0	33.0	19.0	34.0	52.0	31.80	2.74	5.60
ГДАД БО	ДЭП-23	Бишкек-Ош 209-318 км	6.0	87.0	12.0	1.0	0.0	0.0	6.75		
ГДАД БО	ДЭП-30	Бишкек-Ош 318-427 км	6.0	13.0	74.0	19.0	0.0	0.0	20.58		
ПЛУАД-1	ДЭП-954	Бишкек - Торугарт 32-82 км	0.0	0.0	43.8	5.8	0.0	0.0	26.75	3.48	4.91
ПЛУАД-1	ДЭП-958	Бишкек - Торугарт 0-32 км	0.0	13.0	11.4	2.0	0.0	0.0	18.75	4.10	7.13
ПЛУАД-4	ДЭП-03	Балыкчы - Боконбаево - Каракол 124-150 км	8.0	15.0	3.0	1.0	0.0	0.0	7.96	3.88	5.56
ПЛУАД-4	ДЭП-04	Балыкчы - Ананьево - Каракол 156-207 км	13.7	11.0	8.9	17.4	0.0	0.0	20.19	4.15	5.61
ПЛУАД-4	ДЭП-07	Балыкчы - Ананьево - Каракол 40-156 км	16.8	99.1	0.6	0.0	0.0	0.0	5.15	4.24	6.50
ПЛУАД-4	ДЭП-10	Балыкчы - Ананьево - Каракол 0-40 км	0.0	0.0	28.0	2.0	5.0	0.0	33.14	4.88	6.32
ПЛУАД-4	ДЭП-10	Балыкчы - Боконбаево - Каракол 0-60 км	8.0	1.0	28.0	7.0	16.0	0.0	32.33	4.56	7.20
ПЛУАД-4	ДЭП-33	Балыкчы - Боконбаево - Каракол 60-124 км	14.0	2.0	17.0	21.0	6.0	4.0	28.00	3.99	9.28
ПЛУАД-4	ДЭП-35	Балыкчы - Ананьево - Каракол 207-218 км	0.0	5.9	1.7	1.0	2.4	0.0	25.50	4.65	6.28
ПЛУАД-4	ДЭП-35	Балыкчы - Боконбаева - Каракол 150-220 км	0.0	25.0	18.0	22.0	5.0	0.0	28.00	4.16	7.18

Example: Kyrgyz

- Export to RONET

Данные для RONET

Протяженность дорожной сети в пересчете на двухполосный эквивалент (км)

Международные
Цементобетон

Состояние (IRI) / Инт-ть дв-я (СГСИД)	Оч.хор. 2	Хорошее 4	Удовл. 5.5	Плохое 7	Оч.Плохое 13	Всего
Инт-ть дв- <300	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 300-1000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 1000-3000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 3000-10000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- >10000	0.0	0.0	0.0	0.0	0.0	0.0
Всего	0.0	0.0	0.0	0.0	0.0	0.0

Международные
Асфальтовая смесь

Состояние (IRI) / Инт-ть дв-я (СГСИД)	Оч.хор. 2	Хорошее 4	Удовл. 5.5	Плохое 7	Оч.Плохое 13	Всего
Инт-ть дв- <300	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 300-1000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 1000-3000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 3000-10000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- >10000	0.0	749.0	0.0	0.0	0.0	749.0
Всего	0.0	749.0	0.0	0.0	0.0	749.0

Международные
ШПО

Состояние (IRI) / Инт-ть дв-я (СГСИД)	Оч.хор. 2	Хорошее 4	Удовл. 5.5	Плохое 7	Оч.Плохое 13	Всего
Инт-ть дв- <300	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 300-1000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 1000-3000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 3000-10000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- >10000	0.0	0.0	0.0	0.0	0.0	0.0
Всего	0.0	0.0	0.0	0.0	0.0	0.0

Государственные
Цементобетон

Состояние (IRI) / Инт-ть дв-я (СГСИД)	Оч.хор. 2	Хорошее 4	Удовл. 5.5	Плохое 7	Оч.Плохое 13	Всего
Инт-ть дв- <300	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 300-1000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 1000-3000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 3000-10000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- >10000	0.0	0.0	0.0	0.0	0.0	0.0
Всего	0.0	0.0	0.0	0.0	0.0	0.0

Государственные
Асфальтовая смесь

Состояние (IRI) / Инт-ть дв-я (СГСИД)	Оч.хор. 2	Хорошее 4	Удовл. 5.5	Плохое 7	Оч.Плохое 13	Всего
Инт-ть дв- <300	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 300-1000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 1000-3000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 3000-10000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- >10000	0.0	0.0	0.0	0.0	0.0	0.0
Всего	0.0	0.0	0.0	0.0	0.0	0.0

Государственные
ШПО

Состояние (IRI) / Инт-ть дв-я (СГСИД)	Оч.хор. 2	Хорошее 4	Удовл. 5.5	Плохое 7	Оч.Плохое 13	Всего
Инт-ть дв- <300	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 300-1000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 1000-3000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- 3000-10000	0.0	0.0	0.0	0.0	0.0	0.0
Инт-ть дв- >10000	0.0	0.0	0.0	0.0	0.0	0.0
Всего	0.0	0.0	0.0	0.0	0.0	0.0

Местные
Цементобетон

Состояние (IRI) / Инт-ть дв-я (СГСИД)	Оч.хор. 3	Хорошее 5	Удовл. 7	Плохое 9	Оч.Плохое 13	Всего
Инт-ть дв- <300						0.0
Инт-ть дв- 300-1000						0.0
Инт-ть дв- 1000-3000						0.0
Инт-ть дв- 3000-10000						0.0
Инт-ть дв- >10000						0.0
Всего	0.0	0.0	0.0	0.0	0.0	0.0

Местные
Асфальтовая смесь

Состояние (IRI) / Инт-ть дв-я (СГСИД)	Оч.хор. 3	Хорошее 5	Удовл. 7	Плохое 9	Оч.Плохое 13	Всего
Инт-ть дв- <300						0.0
Инт-ть дв- 300-1000						0.0
Инт-ть дв- 1000-3000						0.0
Инт-ть дв- 3000-10000						0.0
Инт-ть дв- >10000						0.0
Всего	0.0	0.0	0.0	0.0	0.0	0.0

Местные
ШПО

Состояние (IRI) / Инт-ть дв-я (СГСИД)	Оч.хор. 3	Хорошее 5	Удовл. 7	Плохое 9	Оч.Плохое 13	Всего
Инт-ть дв- <300						0.0
Инт-ть дв- 300-1000						0.0
Инт-ть дв- 1000-3000						0.0
Инт-ть дв- 3000-10000						0.0
Инт-ть дв- >10000						0.0
Всего	0.0	0.0	0.0	0.0	0.0	0.0

Областные
Цементобетон

Состояние (IRI) / Инт-ть дв-я (СГСИД)	Оч.хор. 3	Хорошее 5	Удовл. 7	Плохое 9	Оч.Плохое 13	Всего
Инт-ть дв- <300						0.0
Инт-ть дв- 300-1000						0.0
Инт-ть дв- 1000-3000						0.0
Инт-ть дв- 3000-10000						0.0
Инт-ть дв- >10000						0.0
Всего	0.0	0.0	0.0	0.0	0.0	0.0

Областные
Асфальтовая смесь

Состояние (IRI) / Инт-ть дв-я (СГСИД)	Оч.хор. 3	Хорошее 5	Удовл. 7	Плохое 9	Оч.Плохое 13	Всего
Инт-ть дв- <300						0.0
Инт-ть дв- 300-1000						0.0
Инт-ть дв- 1000-3000						0.0
Инт-ть дв- 3000-10000						0.0
Инт-ть дв- >10000						0.0
Всего	0.0	0.0	0.0	0.0	0.0	0.0

Областные
ШПО

Состояние (IRI) / Инт-ть дв-я (СГСИД)	Оч.хор. 3	Хорошее 5	Удовл. 7	Плохое 9	Оч.Плохое 13	Всего
Инт-ть дв- <300						0.0
Инт-ть дв- 300-1000						0.0
Инт-ть дв- 1000-3000						0.0
Инт-ть дв- 3000-10000						0.0
Инт-ть дв- >10000						0.0
Всего	0.0	0.0	0.0	0.0	0.0	0.0

Городские
Цементобетон

Состояние (IRI) / Инт-ть дв-я (СГСИД)	Оч.хор. 3	Хорошее 5	Удовл. 7	Плохое 9	Оч.Плохое 13	Всего
Инт-ть дв- <300						0.0
Инт-ть дв- 300-1000						0.0
Инт-ть дв- 1000-3000						0.0
Инт-ть дв- 3000-10000						0.0
Инт-ть дв- >10000						0.0
Всего	0.0	0.0	0.0	0.0	0.0	0.0

Городские
Асфальтовая смесь

Состояние (IRI) / Инт-ть дв-я (СГСИД)	Оч.хор. 3	Хорошее 5	Удовл. 7	Плохое 9	Оч.Плохое 13	Всего
Инт-ть дв- <300						0.0
Инт-ть дв- 300-1000						0.0
Инт-ть дв- 1000-3000						0.0
Инт-ть дв- 3000-10000						0.0
Инт-ть дв- >10000						0.0
Всего	0.0	0.0	0.0	0.0	0.0	0.0

Городские
ШПО

Состояние (IRI) / Инт-ть дв-я (СГСИД)	Оч.хор. 3	Хорошее 5	Удовл. 7	Плохое 9	Оч.Плохое 13	Всего
Инт-ть дв- <300						0.0
Инт-ть дв- 300-1000						0.0
Инт-ть дв- 1000-3000						0.0
Инт-ть дв- 3000-10000						0.0
Инт-ть дв- >10000						0.0
Всего	0.0	0.0	0.0	0.0	0.0	0.0

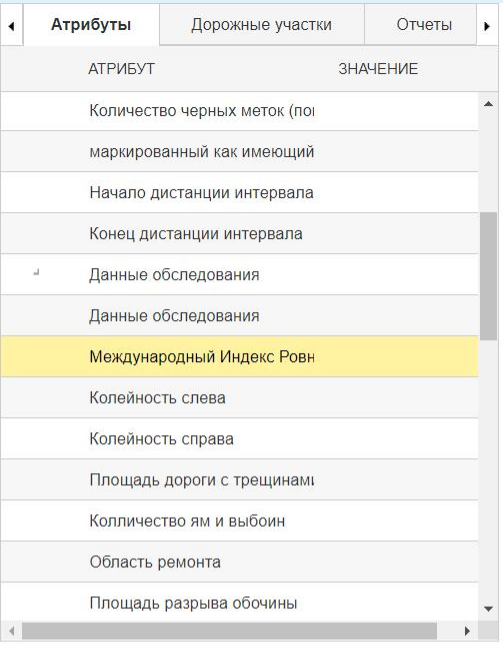
Бетон Всего
0.0

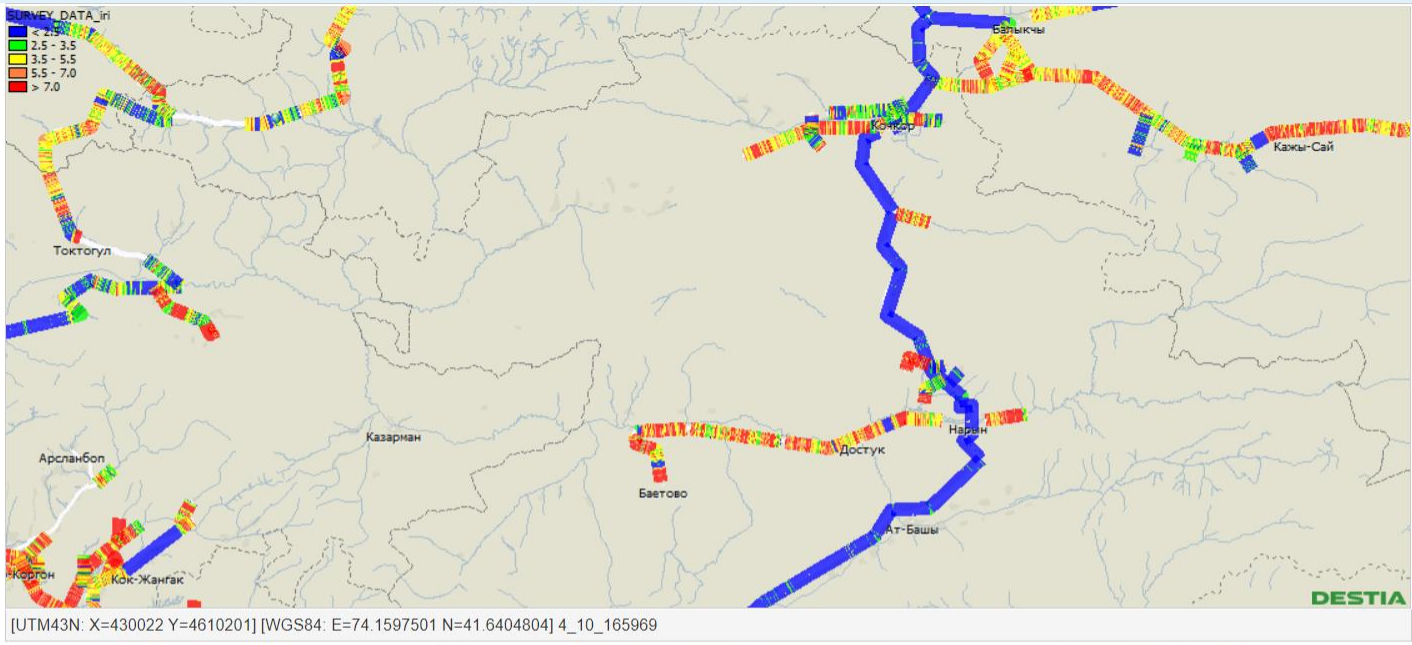
Asphalt Всего
749.0

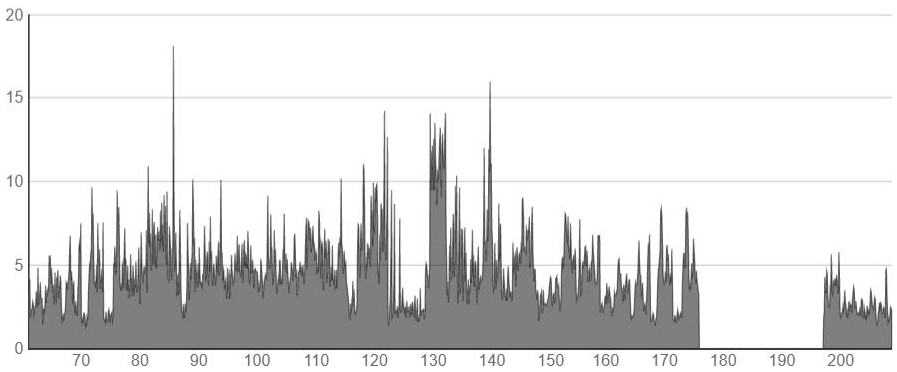
ШПО Всего
0.0

Example: Kyrgyz

- Currently web-based RAMS being developed



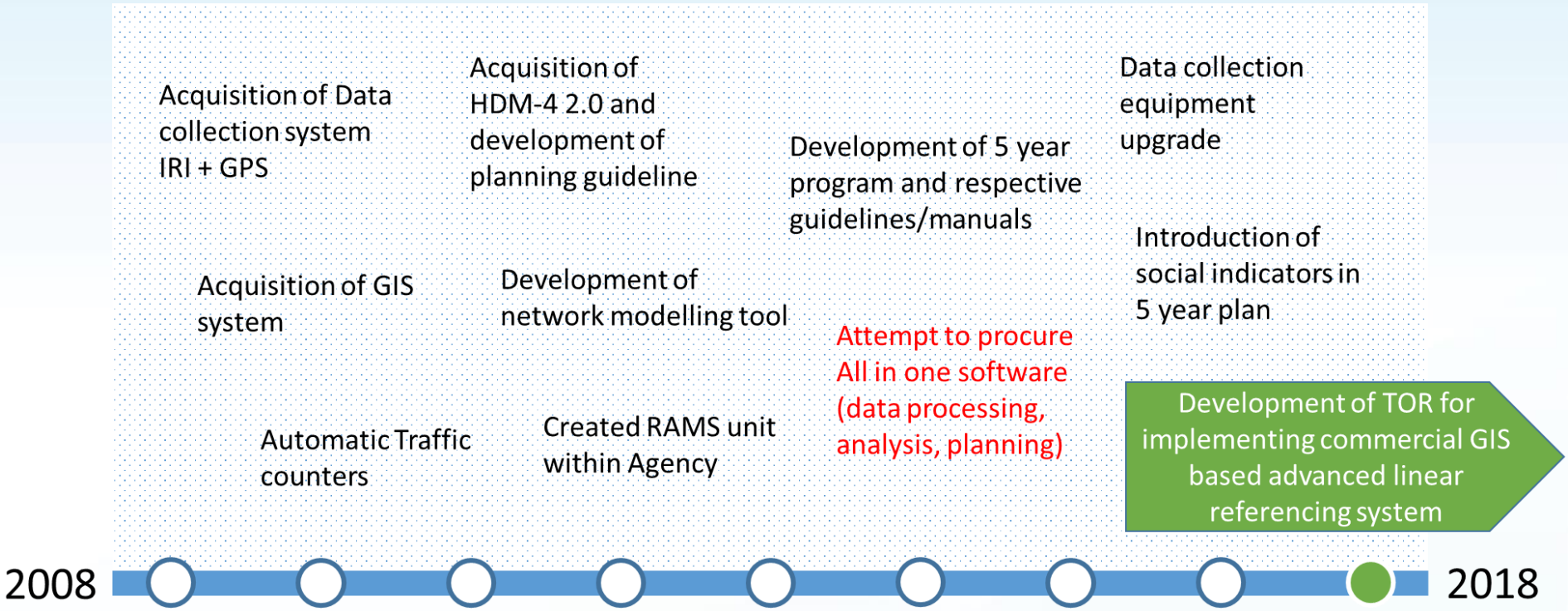




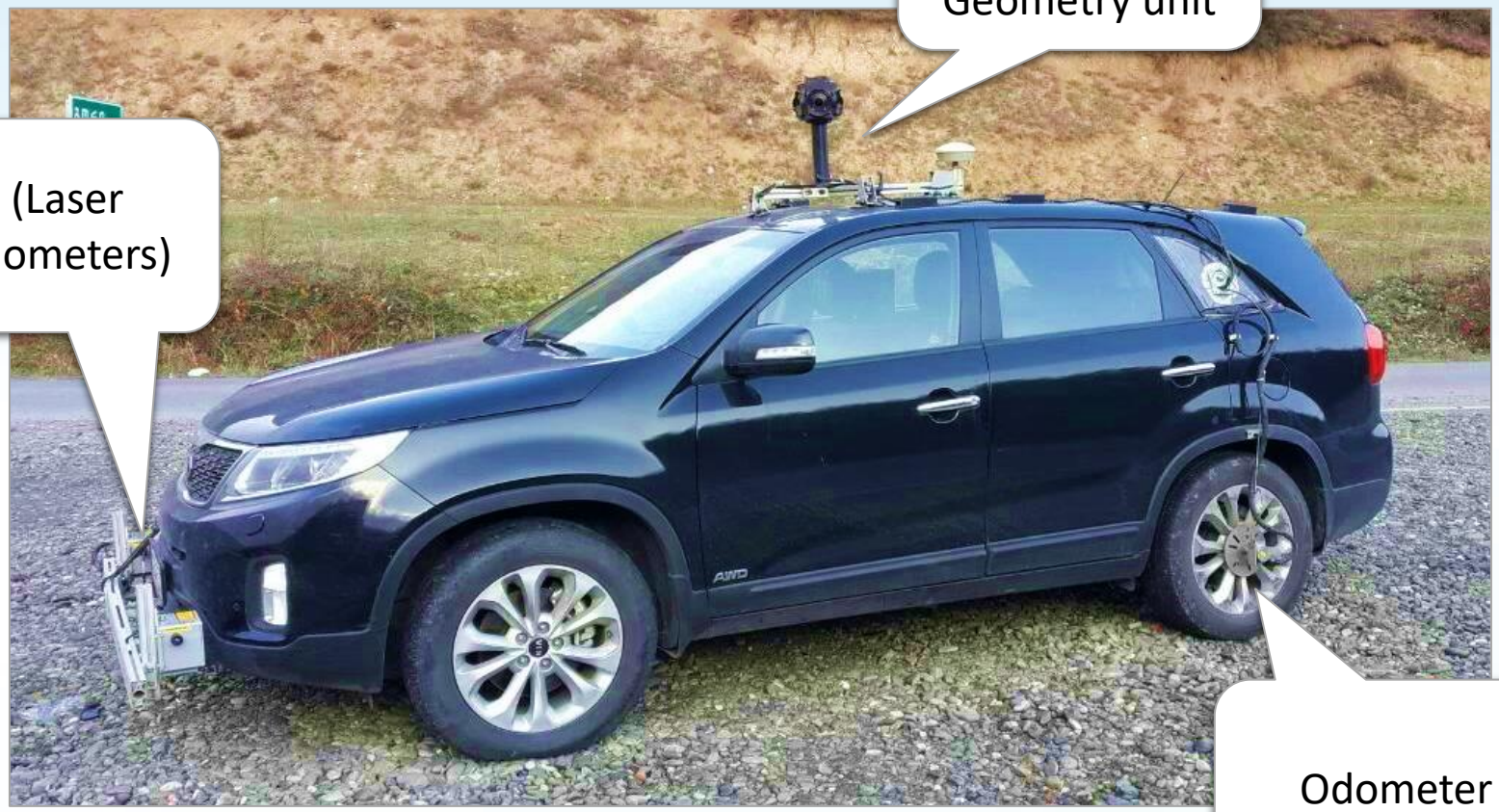
Example: Georgia

- Context
  - Network managed at central level through Roads Department
  - Large move towards evidence-based planning
- Functions
  - Network inventory, prioritization criteria, introduce RAMS, equipment condition assessment, budgeting, linked to mapping, off-the-shelf software (support)
- ArcGIS-based RAMS
  - Basic road and structure inventory, traffic data
  - Condition categories based on measured data
  - Prioritization of treatments using HDM4
  - Budget allocation based on HDM4 results and other criteria
  - Status and plans presented on maps
- Suitability for functions
  - Five-year maintenance and rehabilitation plans updated annually
  - Basic data collection using ROMDAS – plans to expand (safety, passportization)
  - Data only accessible to trained users, not remotely accessible

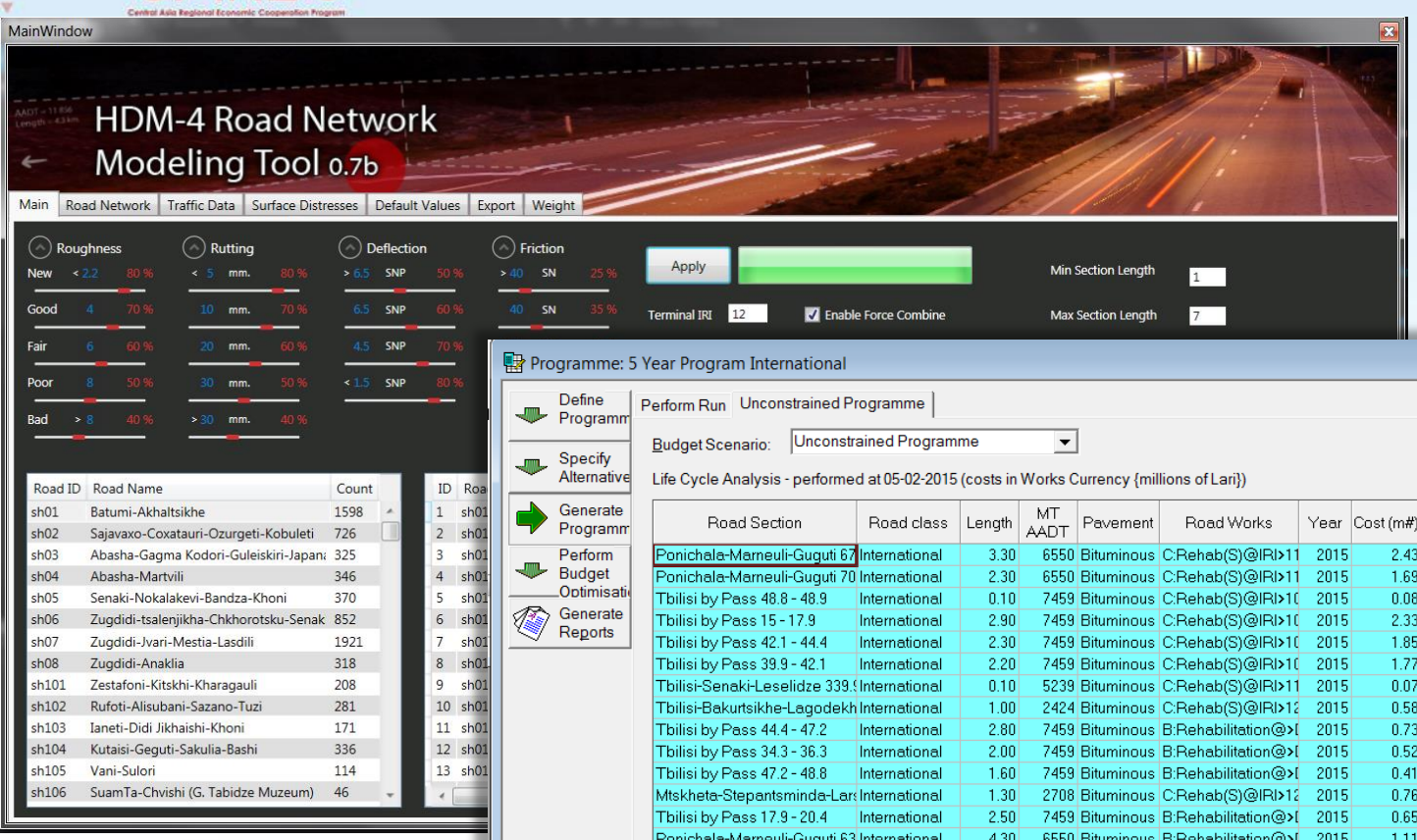
Example: Georgia

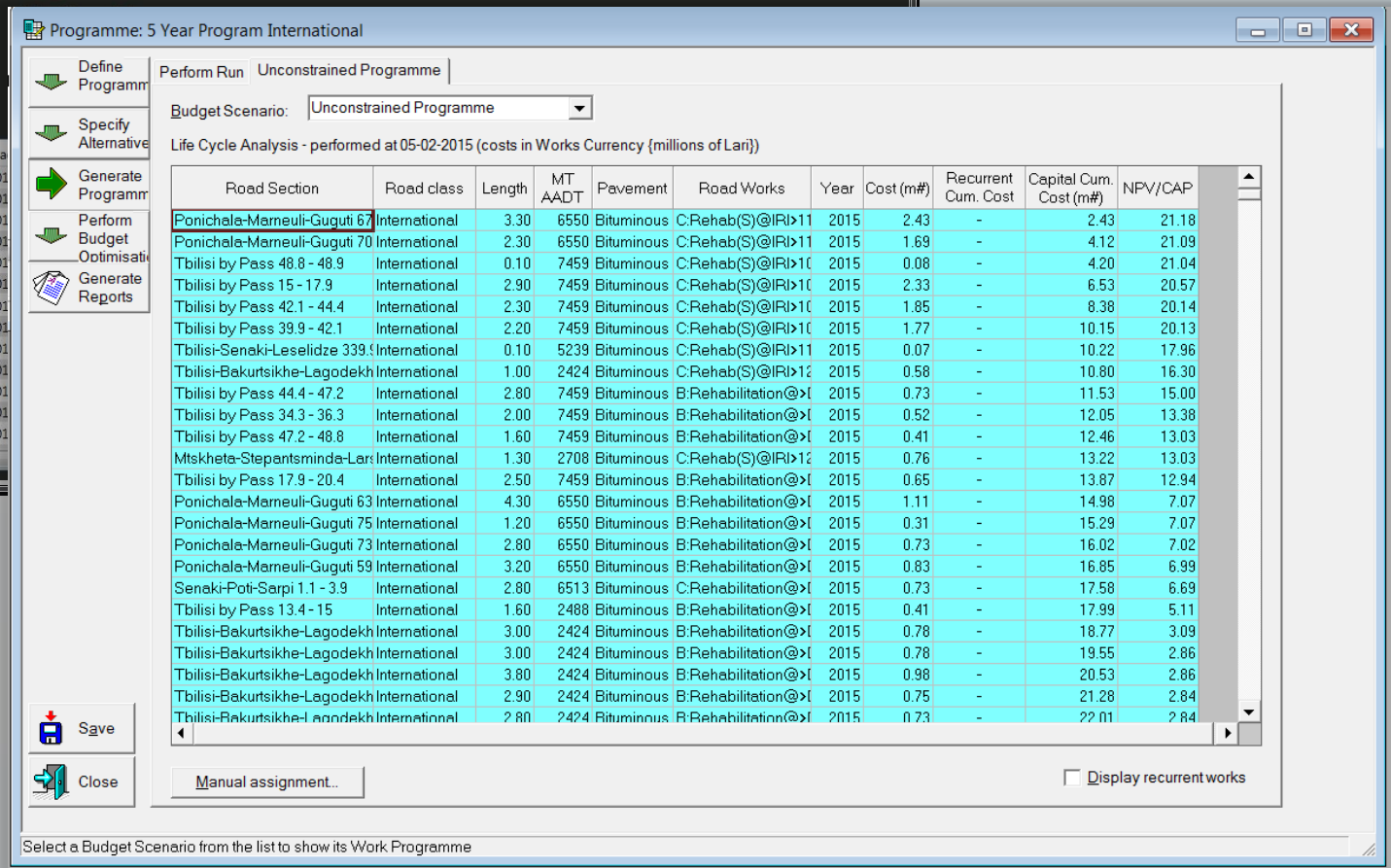


Example: Georgia



Example: Georgia





Example: Georgia

- HDM4 results for basis for planning
- Other criteria also applied
  - Difficulties getting objective data
- Final plan 80% in line with HDM4 results

Rehabilitation of: Sh37 Sadakhlo-Tsopi-Askhepi secondary road km3-km8 Section

Project Description

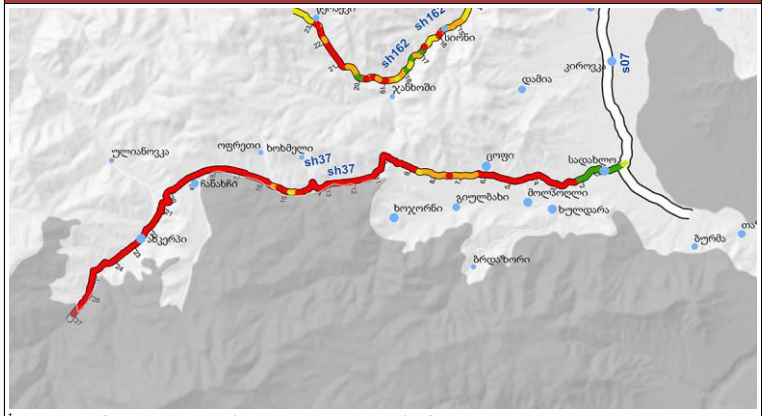
Following road section is part of rolling program for year 2018, section connects international road S07 Marneuli-Sadakhlo to Armenia border and provides access to social services to more than 1500 people. Road is considered importan in terms of Agriculture as well as providing minimum standard of mobility and integration.

Utilization		Class	Economic Indicators (mln. Gel) / Road Works			
Traffic (AADT)	250	1	Total Capital Cost	3.0	Pavement structure	n/a
Heavy Vehicles (%)	2.5		NPV	0.14	Bridge/Culvert/structure	n/a
[1]Condition	10.91	4	NPV/Cost Ratio	0.03	Traffic Safety	n/a
[2]Population Density	227	4	Cost/Pop. Ratio	0.002	Environment	n/a

Socio Economic Impact Assesment

Objective	Indicator	Unit
Enhanced National Connectivity	Part of Secondary Road connecting two international roads.	N
Enhanced Regional Connectivity	Distance from the centre of section to closest city centre.	34km
Enhanced economic activities	Number of registered businesses in the district where the section is located.	347
Population	Number of people living within 2km buffer along the road section.	1520
Education	Number of schools within 2 km buffer along the road section.	7
Tourism	Number of attraction within 2 km buffer along the road section.	2
Poverty	Percentage of people receiving government support within district where road section is located.	n/a
Life Line Road	The road is the only possibility for connecting the village to outside world.	y

Project Area Map



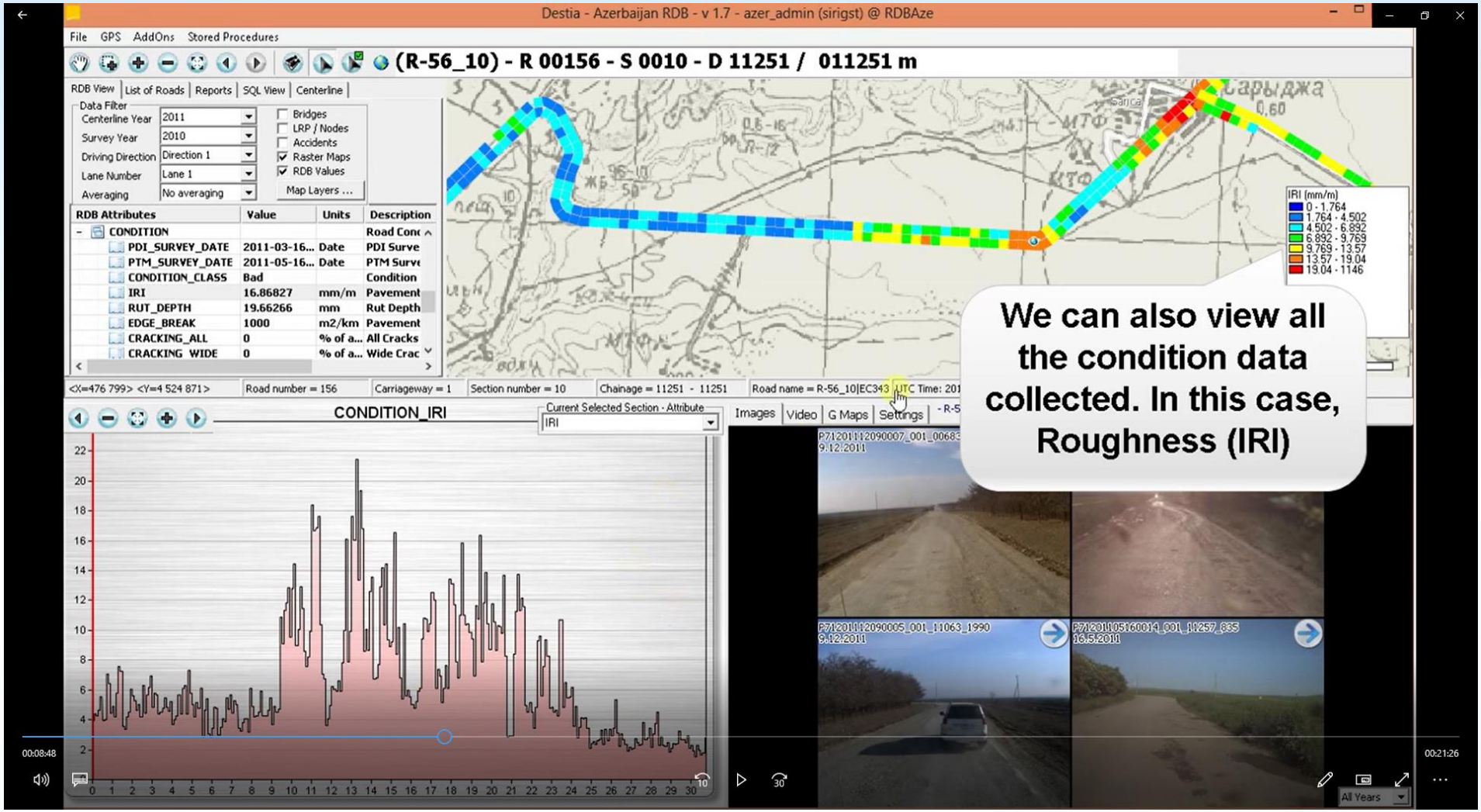
[1]Description of Condition Classes (Good, Fair; poor and Bad) is found in Chapter 4, section 1.1

[2]Number of persons/2km buffer from the homogenous section divided by section length

Example: Azerbaijan

- Context
  - 17,755 km roads managed by AAYDA
  - RAMS and data collection with WB support since 2010 - $12 million
  - Earlier attempt in 2003 was not successful – system not used
- Functions
  - Update and further develop existing database, collect data for 13,000 km, develop planning systems
- Integrated RAMS
  - Extensive data collection for 13,500 km as part of development
  - Custom-made database (inventory, traffic, condition, video, photo, GIS, etc.)
  - Export to HDM4 for further analysis
- Suitability for functions
  - Very comprehensive system
  - Very high data needs - $10 million for data collection
  - System reportedly not fully utilized

Example: Azerbaijan



https://www.youtube.com/watch?v=ncJ1lUZywRE

RAMS Action Program

- What we want to achieve in next 5-10 years (by year)
  - Data collection
  - Data management
  - Data analysis
  - Integration into the Institutional Framework
  - Integration into the Planning Procedures
  - Integration into the Financing System
  - Integration into the Implementation Modalities

- What this will cost (funding, staff, equipment)
- How this will be funded
- Who will lead/coordinate this
- What support is required from development partners

Example: Timor-Leste

	2020	2021	2022	2023	2024
Data collection	• Road data (inventory, condition and traffic) collected for all national and municipal roads (2,250km/$400,000/WB) • Road data (inventory, condition and traffic) collected for all core rural roads (1,975km/R4D)	• Bridge data collected (inventory and condition) for all national and municipal roads ($50,000/ADB) • Road condition data collected for national roads (500km/$10,000/DRBFC)	• Road condition data collected for national and municipal roads (1,000km/$15,000/DRBFC)	• Road + bridge inventory data collected for improved road segments (500km/$20,000/DRBFC) • Traffic data collected for important road links (500km/$5,000/DRBFC) • Road condition data collected for national, municipal and rural roads (1,500km/$20,000/DRBFC)	• Road condition data collected for national, municipal and rural roads (1,500km/$20,000/DRBFC)
Data management	• Data processed and entered into RAMS (DRBFC with WB/R4D support)	• Data processed and entered into RAMS (DRBFC with ADB support)	• Data processed and entered into RAMS (DRBFC with ADB support)	• Data processed and entered into RAMS (DRBFC with ADB support)	• Data processed and entered into RAMS (DRBFC)
Data analysis and planning	• Initial data analysis for national and municipal roads (WB using HDM-4) • Data analysis for updating Rural Road Master Plan (R4D)	• RAMS used as basis for 2022 budget request (DRBFC with ADB support) • Publish Annual Report 2020 (DRBFC)	• RAMS used as basis for 2023 budget request (DRBFC with ADB support) • Publish Annual Report 2021 (DRBFC)	• RAMS used in preparation of FYP 2024-2028 (DRBFC with ADB support) • RAMS used as basis for 2024 budget request (DRBFC with ADB support) • Publish Annual Report 2022 (DRBFC)	• RAMS used as basis for 2025 budget request (DRBFC) • Publish Annual Report 2023 (DRBFC)
RAMS Unit	• RAMS Unit created and staffed (DRBFC) • RAMS unit trained in data collection and processing (WB/R4D)	• Funding allocated to RAMS Unit ($20,000 OGE or RMF) • On-the-job training RAMS unit in data collection and processing (ADB) • RAMS unit trained in data analysis (ADB) • PD+MD trained in planning using RAMS (ADB)	• Funding allocated to RAMS Unit ($25,000 OGE or RMF) • On-the-job training of RAMS unit and PD+MD in RAMS operation (ADB)	• Funding allocated to RAMS Unit ($55,000 OGE or RMF) • On-the-job training of RAMS unit and PD+MD in RAMS operation (ADB) • Training of RAMS unit and PD+MD in FYP preparation (ADB)	• Funding allocated to RAMS Unit ($30,000 OGE or RMF)

Example: Tajikistan (draft)

	2020	2021	2022	2023	2024
Road Asset Management System	• Road survey equipment procured • RAMS equipment and software procured	• Data collection carried out for at least 1,000 km of international roads • RAMS database and GIS mapping developed • HDM4 analysis carried out	• Data for remaining international roads collected • RAMS database and GIS mapping reviewed • HDM4 analysis carried out	• Data for republican roads collected • HDM4 analysis carried out	• Condition data for at least 80% of international roads repeated • HDM4 analysis carried out
Institutional Framework	• RAMS task force identified	• RAMS task force members trained in data collection, management and analysis	• RAMS unit created and staffed • Budget for data collection allocated	• Budget for data collection allocated	• Budget for data collection allocated
Planning	• Detailed analysis of current planning procedures carried out	• Procedures for RAMS integration in planning and budget allocation agreed • 5-year rolling maintenance investment plan prepared	• RAMS results used as basis for budget request and allocation • 5-year rolling maintenance investment plan prepared	• RAMS results used as basis for maintenance plan • 5-year rolling maintenance investment plan prepared • Road network statistics published annually	• RAMS results used as basis for maintenance plan • 5-year rolling maintenance investment plan prepared • Road network statistics published annually
Financing		• Detailed analysis of maintenance funding needs and road user charges carried out • Tolling system developed and potential road sections for tolling identified	• Introduction of road user charges agreed with MOF • Required legislation for tolling pilots in place	• Agreed road user charges introduced • Tolling pilots initiated in at least two locations	• Road maintenance funding increased to at least 0.25% of GDP
Implemen-tation	• Detailed review of PBM pilots	• Identification of suitable locations for expanded PBM contracts including periodic maintenance	• Incorporation of best practices and periodic maintenance into PBM bidding documents • Procurement of new PBM contracts		• Mid-term review of new PBM contracts

Example: Tajikistan (final - sample)

- Issued through Presidential Decree #706 in December 2020

Objective	Activity	Year	Responsible entities	Funding source
Establishment of sustainable RAMS in Tajikistan	1. Establishment of a Task Force consisted of minimum 3 existing staff (road engineer, economist and IT specialist) in the MoT designated for establishment of RAMS	2021	MoT	MoT budget and other sources in line with acting legislation
Collection of accurate data on road condition and production of annual reports on road conditions based on RAMS	6. Complete a survey and collect the data on the road inventory, condition and traffic: • for 2000 km of international roads in year 1; • for the entire international roads and part of republican roads (5,500 km) in year 2; • for the entire international roads and republican roads as well as part of the local roads (14,000km) in year 3.	2021-2023	MoT in collaboration with consultant and development partners	Foreign investment and other sources in line with acting legislation
Establishment of new database and application of advanced data processing and management system	10. Development and testing of improved database (or new database) for road network assessment, entry and processing of data collected during the survey	2021	MoT in collaboration with consultant and development partners	Foreign investment and other sources in line with acting legislation
Ensure clear data analysis and planning of works for road maintenance	13. Preparation of rolling 3-year program and annual work plan for international and republican roads, as well as for selected portion of the local roads	2022-2023	MoT in collaboration with consultants	Foreign investment and other sources in line with acting legislation
Improvement of the road maintenance financing mechanism	18. Establish a dedicated Road Maintenance Fund using a modality that is appropriate to Tajikistan	2024	MoT, MoF, MEDT	Foreign investment and other sources in line with acting legislation