3. Road Condition Data Collection Survey

3.1 Overview

The objectives of pavement condition data collection, using the pavement condition survey vehicle, are to: take pictures of road surface for crack analysis; measure the crossing road profiles for rut; measure the vertical road profiles for IRI; record locations using GPS; and take pictures of forward views.

	· · · · · · · · · · · · · · · · · · ·				
Functions	Performance				
Distance	Accuracy to within $\pm 0.5\%$ for values actually measured by tape				
Cracking	Accuracy to be able to detect any crack of 2 mm or more in width				
Rutting	Accuracy to within ±5mm for values actually measured in the cross-sectional profile graphs				
International Roughness Index, IRI	Devices to measure cross-sectional profiles satisfy the accuracy of Class 2. (complying with the "Handbook for Pavement Survey and Test Methods")				
Road images	Full high-vision CCD cameras (1,920 (w) x 1,080 (h))				
GPS data	Accuracy of point positioning, and measurement of longitude, latitude and altitude				

Table 3.1 Functions and Performance of Road Condition Survey Vehicle

3.2 Personnel

The team has: Leader; Operator 1; Operator 2; Navigator; and Driver. The leader shall have basic IT skills of Windows and MS Excel. Operator 1 handles the forward viewing; Operator 2 handles the road images; the navigator checks the routes.

3.3 Overview of the Road Condition Survey Vehicle

The road condition survey vehicle has the following sensors: front camera, GPS, IMU, Laser Profiler, road cameras, laser displacement sensors. The front camera record front images; GPS records locations; IMU and laser displacement sensor identify longitudinal profile; the road cameras record road images in black and white to identify cracks; the laser profiler records cross section profiles to identify rut depths. On the roof of the vehicle, a solar panel is installed to secure additional power to the on-board equipment.

All the sensors are mounted to the vehicle in a secure way. As the front camera needs to record the front view, the location of the front camera needs to be high enough not to include the front of the vehicle itself. The clearance of vehicle needs to be high enough to have sufficient space between the road surfaces to the laser displacement sensor. The vehicle needs to accommodate five persons: driver; navigator; leader; operator; and worker.



Road Camera(RC)

Laser Displacement Sensor(LDS)

FC: Forward view images; GPS: Location of measurement point; IMU & LDS: Vertical Profiles (IRI); RC: Road surface images (Crack); LP: Crossing Profiles (Rut)

There are two computer monitors and control devices in the vehicle behind the driver seat. The bigger monitor shows the images from the road cameras. The small monitor shows the front view, data and information from GPS, IMU & LDS, and LP. The small monitor also shows the front view.

Figure 3.2 Inside of the Road Condition Survey Vehicle





Figure 3.3 Rear Camera Monitor and Front, GPS, IMU & LDS, LP Monitor

On the back of the vehicle various pieces of equipment are set-up and installed.





Table 3.2	On-board	Equipment
-----------	----------	-----------

Name	Explanation				
Power supply of measurement system	Equipment which supplies stable electric power in order to prevent the malfunction according the output (100V AC) of an inverter to the instability of electric power to each equipment (Main Control Unit, E-SATA HDD, Hub, Monitor).				
Power supply of solar panel	Equipment which transforms the electric power of solar panel into 12V AC electric power. This electric power is automatically supplied to sub-battery at the time of parking.				
E-SATA HDD	The external storage for moving data to the data conversion PC data. Both PC1 and PC2 are equipped with one E-SATA HDD each. After the data collection survey, the data are transferred to the storage.				
Hub	A hub for an interface to build a network with the road surface camera (four sets) and PC2 which are GigE, in order to record the images on PC2.				
GPS receiver	Equipment which receives positioning electric wave to compute longitude, latitude, and altitude from positioning satellites.				
Main Control Unit	Power-source supply is carried out to each equipment (Front Camera, Laser displacement Sensor, IMU, road Camera, Laser Profiler, PCs 1 and 2). The unit calculates distances based on the pulse da to be sent to PC1 and PC2.				
Sub battery	It is the power source (dc-battery) of loading equipment. The battery using the sub-battery charger, it charges automatically and prevents unexpected failure of a dc-battery from the power generation machine with which the vehicle is equipped.				
Inverter	The device transfers power of the sub-battery (12 V direct current) to 100 V alternative current. The AC power is supplied to the equipment after stabilized through the power supply measurement system.				
Sub battery charger	The device supplies the power from vehicle to sub-battery.				
PC1	A PC to record GPS positioning data, travel distance, IMU data, data from Laser Displacement Sensor as it controls the sensors. It records the basic survey data such as starting and ending the survey.				
PC2	A PC for the road camera displaying to the monitor and records the road camera setting such as route, aperture and gain.				

3.4 Method

(1) Preparation of outside vehicle

Remove all the covers on the cameras and sensors and clean the lenses and sensors. Make sure that nuts and bolts are tightened.

(2) Preparation of Survey System

Turn on the power.

Figure 3.5 Main Control Unit Power-On



Check the activation of PC and Main Control Unit (MCU).

Figure 3.6 Main Control Unit Monitor



SHE
12/06/22-17:13:46.078 [MSG:MAN]-PASCD Real Mini Disatnce Version 1.10 12/06/22-17:13:46.078 [MSG:MAN]-Start Service(s) 12/06/22-17:13:46.093 [MSG:MES]-Connect MCU, 12/06/22-17:13:46.343 [MSG:MES]-Idle

If PC and MCU is not connect, turn off power and turn on power. If the connection still cannot be confirmed, please check the slack of the wiring.

Click "Measure."

Main Menu		
Measure		
Distance Calibration		
Setting		
Exit		
	100 12/06/22-17:19:46.078 [MSG:MAN]-PASOD Real Mini Disatnce Version 1.10 12/06/22-17:19:46.078 [MSG:MAN]-Start Service(s) 12/06/22-17:19:46.088 [MSG:MES3-Idle	

Figure 3.7 Selecting the Measure Button

Select "Vietnam" from the list.³

Press "OK."

Figure 3.8 Selecting Appropriate Data

P	ASCO) Real Mini Distance Select							
ſ	PreSe	tting Information							
	No.	Project	Road Kind	Road Code	Road Code	To	Up	Lane	Select Ont
	1	Vietnam	1;高速	0	0.0000	100.0000	1:UP	1	407
							C	ОК	Back

Input the route information: The form has the text boxes to enter:

³ It show an example from the Vietnam project.

Table 3.3	Entering the Data to Text Boxes
-----------	---------------------------------

Text Box	Note		
Project (Project name)	Automatic input		
Date (Measurement date)	Automatic input		
Road kind (Road kind)	Automatic input		
Road Code (Code of measurement route)	Input the 5 digit number		
Distance from to (KP information of measurement route)	Input KP of start and end		
Up Down (Direction of route)	Select from the list (1 UP, 2 Down)		
Lane (Number of lane)	Select from the list		
Operator (Operator)	Select from the list		

The dialogue box show like Figure 3.9

Figure 3.9	Route Information Dialogue Box					
PASCO Real Mini Distance Setting						
Project:	Vietnam					
Date:	2012 / 6 / 22					
Road Kind:	1:高速 💌					
Road Code:	1 0					
Distance From:	0.0000 To 100.0000 km					
UpDown:	1:UP					
Lane:	1					
Operator:						
Read Pro	sset OK Back					

Check the connection with the road data collection devices.

Figure 3.10 Operation State (Green)



The colors indicate the connection conditions.

Table 3.4 Measurement Device Connection Status

Colour	Condition			
Red (Busy)	Not connection			
Yellow (Unsettled)	Search			
Green (Idle)	Connection			
Assurament is possible even "Search" state of the GPS				

Measurement is possible even "Search" state of the GPS If measurement is not connect, turn off power and turn on power

If the connection still cannot be confirmed, please check the slack of the wiring

Set the shutter speed and gain of the camera.

Figure 3.11 Shutter Speed and Gain Control 1



Figure 3.12 Shutter Speed and Gain Control (Enlarged 1)

Gain:	23dB	Vp (Down	Shutter:	1/50 (20.00ms) 🖌 💙	Up Down
	nin 1.1 No Disput Disk Anno (Disput Disput da Tyr Jack Hene (Dis Ko) (Dis	9m800/000 8000. (30 Geb 20 Mon	200100000000 2000000000000000000000000000000000000			

igure 0.10 c	matter opeed and eam	••••••• (=•••• g••• =)
CAMERAI	(3(Sunshine)	
Status:	Idle [2171]	Idle [2171]
Shutter:	1/12500	~
Gain:	+9dB	~
CAMERA2	2,4(Shadow)	
Status:	Idle [2171]	Idle [2171]
Shutter:	1/4000	~
Gain:	+9dB	~

Figure 3.13 Shutter Speed and Gain Control (Enlarged 2)

Switch PC1 and PC2 using the selector when it is necessary.

Figure 3.14 Switching PC1 and PC2



(3) Road Data Collection Survey Procedure

A. Overview

Push the white button of the operation box. Check the translation to state "Ready." Start the measurement by push the white switch of control box.

During measurement,

- Push the green switch of control box to register the kilometer post information.
- Change the camera settings to suit the image of state

End the measurement by hold down the red switch of control box

The road condition survey system need to start before 100m and more of route start. The road condition survey system needs to end more than 100 meters from the end point. When a capacity of HDD is small, the road condition data would not be collected.



Figure 3.15 Operation Sequence of the Buttons

B. Steps to measure the data

Push the white switch of control box to get ready.

Figure 3.16 White Button (Ready)



Check the translation to state "Ready"

Figure 3.17 Confirm the Ready View

244 245 January Day See 0.00m/h (0.01mm/r) 78 rts 295 seedhools/1021	
and the street Notice States and an and an and an and an and	
Anat Union - Des 2010 SSS Realized VSC Realizer 1 - A Dear (U) Law 1 Counter BBY 1997 - Carlos	
And Develop	
Protection of the second	
Sanda (20000) Sanda (20000) Den. 1 Oktor 1	
Berlenter	
the second secon	
A service and a service of the servi	
and all a party later and a without here have been been	
Diese in the	
CALCULATION OF A DESCRIPTION	
Distinguistics and the second se	
A Construction of the second sec	4
Information	
Status Roady Distance: Om Sneed: 0.0km/	h HDD Remain PC1: 785 PC2: 295 Date/2012/06/22/17/22/1
riceatry children of the space of the state	
Device Status:	
Forward View Ready Road View Ready Road Leaser Ready	v SVE Ready IMLE Ready GPS: Ready MCLE Ready
Total Total Total Total Total Total	

Start the data collection survey by pushing the white button of the control box.



Figure 3.18 Pressing the White Button to Start the Measurement

During the survey, push the green button to register the kilometer post information



Figure 3.19 Kilometer Post Recording

Change the camera settings to suit the image of state by controlling the switch as in Figure 3.20. The front camera changes the iris of the lens by lens controller.



The shutter speed and gain of the rear cameras can be changed by change the parameters of the control program.





Figure 3.22 Changing the Shutter Speed and Gain of Rear Cameras (Enlarged View)

CAMERA1	,3(Sunshine)
Status:	Idle [2171] Idle [2171]
Shutter:	1/12500
Gain:	+9dB 🔽
CAMERA	2,4(Shadow)
Status:	Idle [2171] Idle [2171]
Shutter:	1/4000
Gain:	+9dB 🔽

End the survey by hold down the red button.

Figure 3.23 End Road Condition Survey



(4) Check the Survey Data

Select the check box [Replay]. Select the data folder. Replay the data.



Figure 3.24 Check the Survey Data

formation								
Status	Replay MCU: Idle	Distance 1964m Speedt61.8km/h	Date 0000/00/00 00:00 00	Dist Calb 386.996mm	Interval 1500m	m.5000mm	HDD	Remain/29%
oad Camera					CAMERAL3	Sunshine)		
					Status:	Replay [0]		Replay (0)
					Shutter:	112510		
					Gain:			
					GAMERA24	Shadow)		
					Status	Replay [0]		Replay [D]
					Shufter:	12000		
					Gain:			
		79.16 Ø	0 参照	2 🔀	**			
		70.16	一を指定		Four View	× 21		
		D¥DA	TA		(The second			
			E O DATA 20120614 145158	<u>_</u>	(C) Puplay			From
			20120614_145355					
			20120615_134229		Distance: I	ini Lere	thr 0	-Om
			20120622_172212		M	-		
			20120622_172319 3 20120622_172437		Speed 10k	n/h M	Correc	1
			3 20120622_172767	2	Move (m)		Jump	1
			OK	キャンセル	-			
					12/06/22-17	1318234 MSG:MC 1319390 MSG:MC	C]-Game	ra2 Init Sett
					12/06/22-17/	43:20.578 [MSG:MC 43:21.796 [MSG:CC	C]-Game 1]-Idle	a4 Init Setti
					12/06/22-17	4321.843 (MSG/CC 4321.875 (MSG/CC 4321.921 (MSG/CC	2]-idle 3]-idle 4]-idle	
					HACTORES	13:22:437 (MSG:ME	SI-To Idl	-
				100	1			

Figure 3.25 Selecting a Folder

(5) After measurement

A. Continuous Survey

Click "Setting."

Figure 3.26 Continuous Survey Setting



d Inform	ation							
Project	Vietnam	Date: 2012/ 6/22	Road Kind: 1:高速	Road Code: 0	Up Down: 1:UP	Lane: 1	Operator: 前田 近邦	Setting
13.6								

Select "Vietnam" from the list.⁴

Click "OK."

⁴ An example from the Vietnam project.

Figure 3.27 Confirming the Setting



Input the route information.

Figure 3.28 Input Route Information

(Million)			
and the second	Um	Press Por 788 102 298 (Martin	concervities a
Seattles -			
Fernert line Contract View	The same to the same	an and a set	
Not many			and a second second
Profet losten dans	TOTAL PARTY BE INC.	All A Down STIP	Constant, ATTE 12.91
1.11	Children was running of art	The second second	within them while one
	Aver (Veters		Complete Comments of Manual Control
1 I II	den: (200) V	· · · · · · · · · · · · · · · · · · ·	00. Dentil Date (
	Theorem 1 11 mary		
the second second	1864 Kee 11.20		
	Dittates Frein (1800) 14	100.0000 %a	
	1000 (11.2		- Wile
TE	time the second		
	Commer ADI 2/11		50KA
taki ing St Cia (Terri)	Ratec		
The second s	- Reval Prepar	(0,) Basi (1,0.4)	JANDI SHOLE
1 Elfreter			
(60) (SET # 106-10	NO	CHEVE THE STATE OF DECKET AND LEEP AND THE DESCRIPTION OF DESCRIPTION OF DESCRIPTION OF DESCRIPTION OF DESCR	1995 61,7102 6,00065 0 1995 61,7102 6,00065 0 1996 7001201 60,7223 001.00700
Contraction (Contraction)		1.08/22-17:32:1.090 Michight-Sound view by 1.08/22-17:32:1.090 Michight-Sound view by 10/02-17:32:1.020 Michight-Sound view bits	Carmad Law Rot Rot Rot and Law Rot J. 4. 4, 508
10. III		philadeline accession with the	
Martenano.		EN IL DI DI BUDD DU PARANE	- Bes

Follow the steps to end the survey.

B. Termination of Data Recording

Copy the survey data to HDD.

Data folder => D: DATA

<image>

Figure 3.29 Copying the Data to Another HDD.

After copying the data, shut down the system and tidy up the tools and equipment.

(6) Tidy up the equipment

Shut down the system.

Figure 3.30 Shutting Down the System



Put the cover to the road camera and laser profiler.



Figure 3.31 Closing the Covers of RC and LP

Close the cover of the laser displacement sensor.

Figure 3.32 Cover of the LDS



Cover the vehicle with the vehicle cover.

4. Pavement Damage Interpretation

4.1 Introduction

The major objective of this process is to interpret the pavement damage conditions. Along with the damage interpretation, kilometer posts and other road structure data are registered. Road width and surface type registrations are other major activities in this process.

4.2 Work Flow

The road surface investigation analysis flow is shown below.



Figure 4.1 Pavement Damage Interpretation Work Flow

4.3 User Interface

The following figure shows the user interface of the system.

Figure 4.2 User Interface Windows and Control Panel



The user interface has the following windows:

Table 4.1	User	Interface	Windows
-----------	------	-----------	---------

Window	Function
Analysis window	Display the road surface images
	To define meshes where cracks exist
Rut window	Display the rut shape
Position window	Display the position of analysis data
	Left Click position window, we can move the any position of data.
Vertical profile window	Display the vertical profile of road
Measurement	Display the Information of measuremaent (Project name, Road
Information	kind, Measurement date,etc)
Forward View window	Display the forward view images
	To enlarge the 'Forward View', double click the forward view
	window.
Control Panel	

The control panel has the information section and button control section.

A	X:2.706m Y	:743.200m All:41	185.250m Width:	:3.80m Longitude	:105.558884 Lat	itude:20.884183
в						
	Wheel J	, ** *	***	***	H ***	Wheel †
С	- Data Input	: Dis	play Size	– Edge Enhand	ce Jump	
) Direct	Select	im 👻	Off	- 0 D	, ▼ m
	Two or M	ore C 👻 🖸 Ca	mera Mode nshine 👻	Gamma	-	Execute
	-Inspect Da	ata List		-		
	No.	Start(m)	End(m)	Distance(m)	Start Point(Move
	000	0.000	743.174	743.174	I	Clear
	001	743.174	41185.250	40442.076	1	
	•				4	Setting
	View	Inspect Start	Output Data	. Output Pic	Config	Back

Figure 4.3 Control Panel in the User Interface

The button control controls the vising locations.

Figure 4.4 Description of Interface

Letter	Function Name	Description
А.	Information	The information section shows the X and Y position and longitude and latitude of cursor and the road width.
B.	Button Control	[Frame Back] [Piece Back] [Stop] [Replay] [Piece Forward] [Frame Forward]
C.	Data Input	Select way of crack Classification
		- Direct : Use the mouse and keyboard
		- Select : Use the mouse only
D.	Display Size	Select the size of road surface image
E.	Camera Mode	Select the camera mode
		- sunshine : setting for sunshine
		- shade : setting for shade
		- compose : mix of sunshine and shade
F.	Edge Enhance	Setting the edge enhance of the road surface images
G.	Gamma	Setting the gamma of the road surface images

Letter	Function	Description	Explanation
H.	Jump		Jump to position of the input number
		Jump 800	Jump to 800m from start of data
		Jump 800	Jump to 800m from start point of analysis area
		Jump +800 - m In Inspect Execute	Jump to 800m from this position
		Jump -800 - In Inspect Execute	Back to 800m form this ^m position
		21785.800 22787.100 8 23790.300 24795.100 25797.200 26802.300 27805.800 28809.700 29813.400	Jump to select list position 8
		In Inspect Execute	

Figure 4.5 Description of Interface (Jump)

4.4 Method

(1) Execute the Interpretation Program

Execute the Analysis Program then choose the route which candidate for analysis.

Execute the [RM_RSIA.exe].

Figure 4.6 Executing [RM_RSIA.exe] Program

Organize 👻 Include in library 👻	Share with 🔻 Burn New folder		
Favorites	Name	Date modified	Туре
💻 Desktop	J old	9/20/2012 10:29 AM	Filei
🙀 Downloads	MANAGEMENT.CFG	7/2/2012 1:56 PM	CFG
💹 Recent Places	MapServer.exe	8/24/2009 1:00 PM	Арр
	ORDER.CFG	7/20/2012 3:01 PM	CFG
📜 Libraries	RM_RSIA.exe	9/19/2012 5:51 PM	App
Documents	 system.ini 	6/14/2012 9:57 AM	Con
J Music	SYSTEM_SETTING.DAT	2/1/2013 3:29 PM	DAT
E Pictures			
Videos			

Left Click [Select Measure Data].

Figure 4.7 Selecting the Observation Mode (Select Measure Data)

Select Measure Data	-
Exit	

Left Click [Browse] to open the output data of the Convert program.

Figure 4.8 Selecting Available Data

ect Data				
Data Folder:				
C#Users#005392#Desktop			Browse	Update
Data				
No. Road Lane Date	Inspected	Foder		
		-	Next	Beel
			Next	васк

Select the folder which reserved as the export data in the convert program.



We can see the folder exported from the Convert Program. Choose one then left click [Next].

C¥R	ealMini_Prac	ctice¥Cor	nvert_output		Browse Update
No	Road	Lane	Date	Inspected	Foder
1	100000	01	2012/05/08 08:43:13	Not Exist	EMD 100000 01 20120508 08/313
2	100000	01	2012/05/08 08:50:17	Fxist	RMD 100000 01 20120508 085017
3	100000	01	2012/05/08 09:09:48	Not Exist	RMD 100000 01 20120508 090948
4	100000	01	2012/05/08 09:15:15	Not Exist	RMD 100000 01 20120508 091515
5	100000	01	2012/05/08 09:20:05	Exist	RMD 100000 01 20120508 092005
6	100000	01	2012/05/08 09:21:23	Exist	RMD 100000 01 20120508 092123
	Ū	J			

Left Click [Next].

Figure 4.11 Confirmation of Data Selection

onii(n) 00 00 1.0 2.0	TolKmJ 0.000 1.000 2.000	Measure(Km) 0.747 0.982 1.012	Total(Km) 0.747 1.728	
00 00 10 20	0.000 1.000 2.000	0.747 0.962	0.747 1.728	10
00 1.0 2.0	1.000 2.000	0.962	1 728	
1.0	2.000	1.012		
2.0		1.010	2,741	
30	3.000	0.999	3,740	
40	4 000	1,007	4 747	
4.0	5.000	0.978	5.725	
5.0	5.000	1.031	6.756	
6.0	7.000	1.000	7.759	
tím) E	nd(m) Dista	more(m) Start Point(m)	End Point(in)	
000 4118	5250 411	185,250 0.0	0.0	
Road We	en Side B'Latt			
	50 60 60 60 60 4118 Post Wit	5.0 5000 6.0 7000 kim) Endim) Diat 000 41(85,250 41) Road Ween Side	50 5000 1031 60 7000 1030 6m Endim Distancor(m) Start Point(m) 000 41165250 41165250 04 Prod Ween-Skie	50 5000 1031 6.756 6.0 7000 1031 6.759 (m) Endfm) Distancor(m) Start Point(m) End Point(m) 000 41165250 41165250 0.0 0.0 Point With 145

(7)Left Click [Config], we can edit the keyboard assign.



Figure 4.12 Configuring the System

Choose the item to display on the analysis window (like a 'Piece line', 'Rut Position') or edit the keyboard assign (like a 'Piece Forward', 'Piece Back').

Figure 4.13 The Form of Configuration

Road				Output	
V Interval 0.5	m Postion	0 Disaply Postion		Item	
H Interval: 0.2	m Position	0 Ceft e C	enter 🕐 Right	Scale Vertical Scale Horizontal Piece Line	
Management Data				Inspect Start Line	
Postion: 0				Road Width Line	
Color				Rut Road Width Line	
Scale Vertical			Select.	Forward View	
Scale Florizontal Scale Text Scale Text Border Piece Line1 Piece Line2		Size	8	Rut Position Mark Line	
Replay					
Repaly.Back: 2	1.0m	Speed: 0.0 s			
				And a second sec	
ronward, Back: 2	1.0m			Key Assign	04
Forward View Offset				*** Piece Back *** Back *** Stop	Wheel [®] Wheel [®] F1
Down: -10.0 m	Up: 0.0	m		*** Replay *** Piece Forward Whee P Back Forward *** Direct input	F2 F3 = F4 F5 F6
Rut				*** Display Size Up	E7
Width: 50mm	Outlier Remi	ove: 0		1 Orack Sunshine 2 Orack Shade	F9 F10
Average: 🗇 Distanc	e 0.0	m @ Count 5		*** Edge Enhance Off	F12
Surface Smoothness				*** Edge Enhance High	3
Width 25mm	- Average	0.5 m		« Gamma Down *** Management:ROAD Asphalt	5 6 7
Sampling Ont}	0			*** Management:ROAD Others *** Management:Structure1 None	- 9 -
				Execute	Back

(2) Defining the Start and the End Point of Interpretation

A. Setting Start and End Positions

Before starting the road damage interpretation, the interpreter needs to define the start and end positions. In this example, use the shadow of the electric line.



Figure 4.14 Defining the Starting Line

Left click [Inspect Start] and move the cursor in the analysis window, a red line appears.

Figure 4.15 Adjusting the Red Line to be the Stating Position



Confirm window appearing and left click [yes (\underline{Y})].

Figure 4.16 Setting the Starting Position



Check the values of red lined shown below.

Figure 4.17 Encoding Section Setting



If an analysis start setup is completed, the analysis section is divided and the line of the "Inspect Data List" is increasing. If it moves to an analysis starting position, the display of a 'Rut Position', 'Management Data' and etc... will appear in an analysis window, and preparation of analysis will be completed. The method of the end position of the analysis is same method of starting position.







Defining the start and the end point, these lines appear in the analysis window.

Figure 4.19 Indicators at Start-End Definition



(3) Defining the Road Width

- A. Examples of Road Width Setting
- 1) Case 1-Two white lines

If two white lines are visible, the road width defines the inner side of a white line.

Figure 4.20 White Lines



The definition of width is not moved when the dashed line is continuing.





2) Case 2-One White Line

If one white line is visible, the road width defines from a line to the maximum width.

Figure 4.22 Road Width Determination without the Right White Line



Figure 4.23 Road Width Determination without the Left White Line



If one white line is visible and another side is unpaved, the road width defines from a line to the end of pavement.

Figure 4.24 Determining the Road Width One Side Paved 1







3) Case 3-No white line

If there is no white line, the road width defines the maximum width. Figure 4.26 Determining the Road Width Without the White Lines 1



If there is no white line and one side or both sides are unpaved, the road width defines the full width of pavement.

Figure 4.27 Determining the Road Width Without the White Lines 2



4) Case 4-A lane increases or decreases

If the number of lane increases or decreases, the connection sections road width defines the maximum width. However, when there is unpaved, the road width defines the full width of pavement.

Figure 4.28 Schematic Drawing of Lane Number Change



5) Case 5- Passing a Vehicle

If the survey vehicle passes a car, the road width and rut width keep the width of the last session.



Figure 4.29 Passing a Vehicle

B. Setting the Rut Recording Widths

When the width of the road is wider or equal to 3.0 meters, set the rut recording width to 3.0 meter or less. If the width of the road is less than 3.0 meter, then set the rut width equal to the road width.

Road Width $\geq 3.0m \rightarrow Rut$ Width $\leq 3.0m$ (One side max: 1.5m) $< 3.0m \rightarrow = Road$ Width



C. Road Width Setting for Interpretation

Change the [Display Size] 2.7m to 3.3m.



Defining the road width 'Road Width Line (3.8m)' and 'Rut Road Width Line (3.0m)'



Defining the road width Tips

<Crack Road Width>

Table 4.2 Road Width Setting						
		When the mouse cursor looks like this, left and right side road width can change narrow or wide.				
<crack road<="" td=""><td>←→</td><td>When the mouse cursor pushing the Ctrl key looks like this, left and right side road width of 1 sector can change narrow or wide.</td></crack>	←→	When the mouse cursor pushing the Ctrl key looks like this, left and right side road width of 1 sector can change narrow or wide.				
Width>	← →	When the mouse cursor pushing the Shift key looks like this, the road width moved by parallel translation.				
	←→	When the mouse cursor pushing Ctrl + Shift key looks like this, the road width of 1 sector moved by parallel translation.				
- But Bood Width		When the mouse cursor pushing the Alt key looks like this, left and right side rut road width can change narrow or wide.				
	┥┝	When the mouse cursor pushing Alt + Ctrl key looks like this, left and right side rut road width of 1 sector can change narrow or wide.				

Using the mouse, Ctrl and Shift keyboard input.

(4) Crack / Patch / Pothole Interpretation

A. Examples/Cases of Crack/Patch/Pothole

Cracks, patches and potholes are interpreted and classified into thirteen categories. To each category, one key is assigned.

Table 4.3 Key Assignment

No.	KEY	Classification	Explanations
1	Α	Two or More Crack	There are two or more cracks in the mesh
2	S	One Crack	There is one crack in the mesh
3	D	Patching 75%	Patching occupies an area of more than 75% of the mesh
4	F	Patching 25%	Patching occupies an area of more than 25% to less than 75% of the mesh
5	Ζ	Pothole 75%	Pothole occupies an area of more than 75% of the mesh
6	Х	Pothole 25%	Pothole occupies an area of more than 25% to less than 75% of the mesh
7	С	Pothole	Pothole occupies an area of greater than 0% to less than 25% of the mesh
8	Q	Concrete Crack 25cm	Total length of crack in the mesh are more than 25cm to less than 50cm
9	W	Concrete Crack 50cm	Total length of crack in the mesh are more than 50cm to less than 75cm
10	Е	Concrete Crack 75cm	Total length of crack in the mesh are more than 75cm to less than 100cm
11	R	Concrete Crack 100cm	Total length of crack in the mesh are more than 100cm to less than 125cm
12	Т	Concrete Crack 125cm	Total length of crack in the mesh are more than 125cm to less than 150cm
13	Y	Concrete Crack 150cm	Total length of crack in the mesh are more than 150cm

1,2 : Asphalt only3~7 : Asphalt and Concrete8~13 : Concrete only

	$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$, jî
		Backspac
Ctrl	S D F G H J K L ; ,	Return
Shift Z		t]
Caps Lock Alt		Com- Hit Graph

Figure 4.32 Keys Assignment (Graphical Presentation)

The following image show an example of one crack and two or more cracks in one mesh.





One crack is observed.

Figure 4.34 One Crack



Two or more cracks are observed.

Figure 4.35 Two or More Crack



Following examples show the cases of Patching 75% and Patching 25%.

Figure 4.36 Patching 75%, Two or More Cracks, Patching 25% (Example)

			Patchi	ing 75%	
	1.4.5				
		364		Two or more	e Crack
		and i			
Patching	25%				

If there is a crack in the patching, the classification is "One Crack" or "Two or More Crack.". Following examples show: Pothole 75%, Pothole 25%, and Pothole.


Figure 4.37 Pothole - Front View,

The next examples show Concrete Crack 25cm, Concrete Crack 50cm, Concrete Crack 75cm, Concrete Crack 100cm, Concrete Crack 125cm, Concrete Crack 150cm.





B. Cracks/patch/pothole Interpretation

In the crack interpretation, we choose several crack classifications of the road surface. Classification are: 'Two or More Crack', 'One Crack', 'Patching 75%', 'Patching 25%', 'Pot Hole 75%', 'Pot Hole 25%' and 'Pot Hole'.



Figure 4.39 Crack, Patch, Pothole Classification

Several crack Classifications have assigned for a keyboard input. Moving the mouse cursor in the analysis window and input it from the keyboard. \rightarrow Refer the Crack Reference.



Figure 4.40 Example of Crack Recording Operation

(5) Rut Analysis

A. Examples/Cases of Rut

When the road surface is dry, the sensor records the data normally.





When there is puddle, the sensor does not record rut data accurately.



Figure 4.42 Rut (Abnormal Case)

The following image shows a case of deep rut.



B. Rut Interpretation

Green colored line 'Rut Position' in the analysis window appears in the rut window.



Pushing the Ctrl key and left click the mouse can check the rut shape optionally. When the rut shape has a strange feature, change the rut position to the right position.

(6) Road Surface Classification

A. Examples/Cases of Road Surface Types

The following are samples of road surface types: asphalt; concrete; and others.

B. Classify road Surface Classification

Cursor the mouse to the left end of the 'Management Data' area appears "1". Then right click the mouse, appears the small window which can choose the road surface Classification. In an example shown below is Asphalt pavement so choose the 'ROAD: Asphalt'.





(7) Identifying the Kilometer Posts

The road surface marking is seen on the road.



Figure 4.46 Kilometer Post View on Road Image

If you identified the marking on the road surface, set the kilometer post right click the right end of the 'Management Data'.



Figure 4.47 Color Representation of Distance Between the Kilometer Post

Green and blue are used alternatively to show road segments between kilometer posts. For example, the kilometer posts between 49 to 50, green is used, and from 50 to 51, blue is used.

(8) Defining Road Structure

A. Registration of Road Structures

Bridges and tunnels are examples of road structure. Classification of structures (like a bridge, tunnel, etc...) can be defined using from the right to the 2nd of the 'Management Data'. Reference the analysis window and the forward view; choose the Classification of the construction.

Figure 4.48 Defining Road Structures



(9) Output the Data

Input several pieces of information (like a 'Road Kind', 'Road No', 'Sub No', 'Up Down', etc...) in the 'Common Item.'



itput Data		-		-64	1.1		
Common Item							
Road Kind: 0	Road N	o: 6	Sub No:	0 Up Do	wn: 2	Lane Section	n: 1
Lane No: 1	Meas	ure Date: 2	0120824	Operator: Luc	ng Xuan Ngoc	Vehicles: F	RealMini
Coefficient							
Rut X Rate:	0.0000	Rut Y I	Rate: 0.1	0000 Ru	it Count:	40 .	•
Output Item							
Crack	V Ru	it	Smootl	hness 🔽	Fwd View		
Surface	V St	ructure	V Positic	in 📝	All Fwd View	IMU	
ile: NH0060	Jd_132k08505	145k0000					
older: F:¥outpu	t data & imag	e¥NH6					Browse
No.	Data	Start(m)	End(m)	Distance(m)	Start Poi	nt(m) Ei	nd Point(m)
000	0/0	0.0	131.0	131.0		0.0	0.0
V 001 3	/10469	131.0	52471.8	52340.8		0.0	0.0
_							
						Execute.	Back

Check the 'Output Item' and 'Folder', left click [Execute]. Output data will be created to the folder reserved.

Figure 4.50 Outputs in a Folder

rganize Share with Burn	Vew folder				SEE -	- 11	1
Favorites	Name	Date modified	Туре	Size			
🔚 Desktop	B FA_NH00600d_132k08505_145k00030.CSV	2/1/2013 3:27 PM	Microsoft Excel C	1,845 KB			
bownloads	C_NH00600d_132k08505_145k00030.CSV	2/1/2013 3:27 PM	Microsoft Excel C	2,567 KB			
Recent Places	B R_NH00600d_132k08505_145k00030.CSV	2/1/2013 3:27 PM	Microsoft Excel C	32,710 KB			
	RS_NH00600d_132k08505_145k00030.CSV	2/1/2013 3:27 PM	Microsoft Excel €	1,575 KB			
Libraries	KB_NH00600d_132k08505_145k00030.CSV	2/1/2013 3:27 PM	Microsoft Excel C	1,616 KB			
Documents	Z_NH00600d_132k08505_145k00030.CSV	2/1/2013 3:27 PM	Microsoft Excel C	68,999 KB			
J Music	F_NH00600d_132k08505_145k00030.CSV	2/1/2013 3:27 PM	Microsoft Excel C	1,922 KB			
Pictures	S_NH00600d_132k08505_145k00030.CSV	2/1/2013 3:28 PM	Microsoft Excel C.,	102,638 KB			
Videos	I_NH00600d_132k08505_145k00030.CSV	2/1/2013 3:29 PM	Microsoft Excel C	101,305 KB			
Homegroup	Е						
Computer							
Local Disk (C:)							
New Volume (D:)							
⇒ ボリューム (E:)							
Removable Disk (F:)							
🎍 analysis image							
👍 data process							
📙 image for manual							
🔒 output data & image							
🕌 picture							
Network	*						

5. Road Condition Data Integration System

5.1 Final Output

The road condition data processing system is a semi-automatic system to produce the final output of the road condition survey--road surface condition data. Both raw data (csv format) and Excel data (formatted) data will be created.

_		10.00		0 1	2	5.0			10	0.0				100		~		400 44
	NORTHERN	AREA RRM12	RRMC238 2		HIGHWAY	2 30	600 30	700-100	343 0	2 2	2 0 1 .	90 AC 2012	7 0 0		<u> </u>	0 0 19	11 3 59 4	130 14
2	NORTHERN	AREA,RRMU2	RRMC238.2	.0.NATIONA	HIGHWAY	2,30	.700.30.	800.100.	330.0		2.D.1.	AC.2012	.7.0.0).N.N.	0.0,0. 0.0.0.	0.21	12.2.13	
3	NORTHERN	AREA, RRMU2	RRMC238.2	. NATIONA	HIGHWAY	2,30	.800.30.	900.100.	338.0		2.D.1.	AC.2012	.7.0.0	.n.n.	n.n.n.	0.25	15.2.58.4	
4	NORTHERN	AREA, RRMU2	RRMC238.2	.0.NATIONA	HIGHWAY	2,30	.900.31.	0.30.103	.2	2.2.0	1.AC.	2012.7.	ń.ń.n.	.ó.n.ó	.0.0.2	1.13	2.56.4	
5	NORTHERN	AREA, RRMU2	RRMC238.2	. NATIONA	HIGHWAY	2,31	.0.31.10	0.100.33	2.0	. 2.2.).1.AC	.2012.7	.0.0.0	.n.n.	ń.n.ń.	24.15	i.1.81 4	
6	NORTHERN	AREA, RRMU2	RRMC238.2	.O.NATIONA	HIGHWAY	2,31	.100.31.	200.100.	340.0		2.D.1.	AC.2012	.7.0.0	1.0.0.	0.0.0.	0.28	16.2.49	
7	NORTHERN	AREA .RRMU2	RRMC238.2	. O. NATIONA	HIGHWAY	2.31	.200.31.	280.80.2	72.8.	12.	2.D.1.	AC.2012	.7.0.0	i.n.n.	n.n.n.	0.27	19.3.19.11/	N . 🕶
8	NORTHERN	AREA, RRMU2	RRMC238.2	.O.NATIONA	HIGHWAY	2,31	.280.31.	285.5.17	.6.R.	.2.2.1).1.AC	.2012.7	.0.0.0	1.0.0.	n.n.n.	21.19	1.1.72.THAN	H GIA Brg. 4
9	NORTHERN	AREA, RRMU2	RRMC238.2	.O.NATIONA	L HIGHWAY	2,31	,285,31,	300,15,5	2.4.	2 . 2 . [.1.AC	2012.7	.0.0.0).O.O.	0.0.0.	48,22	.2.28	
10	NORTHERN	AREA, RRMU2	RRMC238.2	,0,NATIONA	L HIGHWAY	2,31	,300,31,	400,100,	339.0		2.D.1.	AC,2012	.7.0.0	0.0.0.	0.0.0.	0,35	20,1.86,.4	
11	NORTHERN	AREA.RRMU2	RRMC238.2	.0.NATIONA	L HIGHWAY	2,31	.400.31.	500,100,	325.0	2.	2.D.1.	AC.2012	.7.0.1	.0.0.	0.0.0.	1,24	17.2.07	
12	NORTHERN	AREA,RRMU2	RRMC238,2	,0,NATIONA	L HIGHWAY	2,31	,500,31,	600,100,	342.0	,,I,,2	2,D,1	,AĊ,201	2,7,0.	.ò,o.ò	,0.0,0	.0,33	8,18,2.25,0	/N,↔
13	NORTHERN	AREA.RRMU2	RRMC238.2	.0.NATIONA	L HIGHWAY	2,31	.600.31.	700,100,	350.0	2.3	2.D.1.	AC.2012	.7.0.0),0.0,	0.0.0.	0.27	18.2.00	
14	,NORTHERN	AREA,RRMU2	RRMC238,2	,0,NATIONA	L HIGHWAY	2,31	,700,31,	800,100,	343.0	, , , ,2,2	2,D,1,	AC,2012	,7,0.0),0.0,	0.0,0.	0,27	20,2.47,,4	
15	,NORTHERN	AREA,RRMU2	RRMC238,2	,0,NATIONA	L HIGHWAY	2,31	,800,31,	900,100,	322.0	, , , , 2 , 2	2,D,1,	AC,2012	,7,2.8	3,0.0,	0.0,2.	8,22	16,1.94,,4	
16	,NORTHERN	AREA,RRMU2	RRMC238,2	,0,NATIONA	L HIGHWAY	2,31	,900,31,	1000,100	1,341.0),,I,,S	2,2,D,	1,AC,20	12,7,0).0,0.	0,0.0,	0.0,2	27,19,2.24,	U/N,∉
17	,NORTHERN	AREA,RRMU2	RRMC238,2	,0,NATIONA	L HIGHWAY	2,31	,1000,32	,0,80,27	3.6,,	,,2,2,[),1,AC	,2012,7	,0.6,0).0,0.	0,0.6,	28,19	9,2.15,,4	
18	,NORTHERN	AREA,RRMU2	RRMC238,2	,0,NATIONA	L HIGH₩AY	2,32	,0,32,10	0,100,34	16.0,,	,,2,2,[),1,AC	,2012,7	,0.0,0).0,0.	0,0.0,	26,1	7,2.89,,4	
19	,NORTHERN	AREA,RRMU2	RRMC238,2	,0,NATIONA	L HIGHWAY	2,32	,100,32,	200,100,	348.0	,,I,,2	,2,D,1	,AC,201	2,7,0	.0,0.0	,0.0,0	.0,25	5,16,6.16,U	/N,∉
20	,NORTHERN	AREA,RRMU2	RRMC238,2	,0,NATIONA	∟ HIGH₩AY	2,32	,200,32,	300,100,	338.0	,,,,2,2	2,D,1,	AC,2012	,7,2.8	3,0.0,	0.0,2.	8,25	19,2.61,,4	
21	,NORTHERN	AREA,RRMU2	RRMC238,2	,0,NATIONA	L HIGH₩AY	2,32	,300,32,	400,100,	336.0	,,,,2,2	2,D,1,	AC,2012	,7,0.0),0.0,	0.0,0.	0,27	17,2.20,,4	
22	,NORTHERN	AREA,RRMU2	RRMC238,2	,0,NATIONA	∟ HIGH₩AY	2,32	,400,32,	500,100,	339.0	,,,,2,2	2,D,1,	AC,2012	,7,0.0),0.0,	0.0,0.	0,24	17,2.53,,4	
23	,NORTHERN	AREA,RRMU2	RRMC238,2	,0,NATIONA	∟ HIGH₩AY	2,32	,500,32,	600,100,	351.0	, , , ,2,2	2,D,1,	AC,2012	,7,1.1	,0.0,	0.0,1.	1,24	16,2.72,,4	
24	,NORTHERN	AREA,RRMU2	RRMC238,2	,0,NATIONA	L HIGHWAY	2,32	,600,32,	700,100,	346.0	,,I,,2	,2,D,1	,AC,201	2,7,0	.0,0.0	,0.0,0	.0,28	8,19,2.07,0	/N,4
25	,NORTHERN	AREA,RRMU2	RRMC238,2	,0,NATIONA	∟ HIGH₩AY	2,32	,700,32,	800,100,	340.0	,,,,2,2	2,D,1,	AC,2012	,7,0.0),0.0,	0.0,0.	0,26	.16,2.31,,4	
26	,NORTHERN	AREA,RRMU2	RRMC238,2	,0,NATIONA	L HIGHWAY	2,32	,800,32,	900,100,	330.0	, , , ,2 ,2	2,D,1,	AC,2012	,7,0.0),0.0,	0.0,0.	0,24	12,3.76,,4	
27	,NORTHERN	AREA,RRMU2	RRMC238,2	,0,NATIONA	∟ HIGH₩AY	2,32	,900,33,	0,45,168	1.3,,R/	4,,2,2	,D,1,A	2,2012,	7,1.9,	,0.0,0	.0,1.9	,26,	5,3.97,U/N	, 4
28	,NORTHERN	AREA,RRMU2	RRMC238,2	,0,NATIONA	L HIGHWAY	2,33	,0,33,10	0,100,34	2.0,,	,,2,2,[),1,AC	,2012,7	,0.0,0).0,0.	0,0.0,	26,10	3,3.73,,∉	
29	,NORTHERN	AREA,RRMU2	RRMC238,2	,0,NATIONA	L HIGHWAY	2,33	,100,33,	200,100,	342.0	, , , ,2 ,2	2,D,1,	AC,2012	,7,0.0),0.0,	0.0,0.	0,27	15,3.55,,4	
30	,NORTHERN	AREA,RRMUZ	RRMC238,2	,U,NATIONA	L HIGHWAY	2,33	,200,33,	300,100,	344.0	, RC,	2,2,D,	1,AC,ZU	12,7,0	1.0,0.	0,0.0,	0.0,2	7,14,7.20,	U/N,∉
31	,NORTHERN	AREA,RRMUZ	RRMC238,2	,U,NATIONA	L HIGHWAY	2,33	,300,33,	400,100,	352.0	, , , , , , , , , ,	2,D,1,	AC,2012	,/,U.U	,0.0,	0.0,0.	0,23	15,2.20,,4	
32	,NORTHERN	AREA,RRMUZ	RRMC238,2	,U,NATIONA	L HIGHWAY	2,33	,400,33,	500,100,	371.0	,,,,Z,	2,D,1,	40,2012	,/,3.L	1,0.0,	0.0,3.	0,21	13,2.60,,4	
33	,NURTHERN	AREA, RRMUZ	RRMC238,2	,U,NATIONA	L HIGHWAY	2,33	,500,33,	6UU,IUU,	357.0	,,,, <u>Z</u> ,	2,U,I,	40,2012	,/,U.U	,0.0,	0.0,0.	0,28	14,2.49,,4	
34	,NURTHERN	AREA,RRMUZ	RRMCZ38,Z	,U,NATIONA	L HIGHWAY	2,33	,600,33,	/UU,IUU,	367.0	,,,,Z,	2,U,I,	40,2012	,/,U.U	1,0.0,	0.0,0.	0,25	14,3.51,,4	. A
35	,NURTHERN	AREA, KRMUZ	RRMC238,2	,U,NATIONA	L HIGHWAT	2,33	,700,33,	800,100,	376.0	,,KA,,)	2,Z,U,	1,AC,ZU	12,7,0	.0,0.	0,0.0,	0.0,2	9,16,2.98,	U/N,4
30	NUNTHERN	AREA, KRMUZ	RKMUZ38,Z	,U,NATIONA	L HIGHWAT	2,33	,800,34,	0,90,3Z4 0 100 35	1.9,,,	, Z, Z, U	, I , AU ,:	2012,7,	1.8,0.	.0,0.0	,1.0,Z	9,10	4.00,,4	
37	NORTHERN	AREA, KKMUZ	NKM0238,2	,U,NATIONA	L HIGHWAT	2,34	100 24	0,100,30 200 100	3.0,,	,,2,2,1), ,AU	,2012,7	,0.5,0		0, 0.5, 0.0	24,10	10 0 40	
20	NORTHERN	AREA,RRMUZ	DDW0230,2	, U, NATIONA	L HIGHWAT	2,34	200 24	200,100, 900 100	304-0	,,,,,,,,,,	2,0,1,1 2 D 1	AC,2012	7 0 0),U.U,) 0 0	0.0,0. 0 0 0	0,24	10,2.42,,4	
39	NOBTLEDN	ADEA DOMUS	DDW0000 0	, U, NATIONA	L DIGUNAT	2,34	,200,34, 200,24	300,100, 400 100	222.0	,,,,2,,	2,0,1,1 2 D 1	AC,2012	7 4 0),U.U,) 0 0	0.0,0.	0,20	18 2 20	
40	NOBTLEDN	ADEA DOMIN	DDW0030,2	0 NATIONA	L ALIGHTAT	2,34	,300,34, ANN 94	400,100, 500 100	007-U	,,,,,,,,,,	2 D 1	10,2012	7 1 0),U.U, 2 A A	0.0,4.	0,20	10 2 24	
41	MODIFIERN	ADEA DDMI12	DDMC230,2	0 NATIONA	L HIGHWAY	2,34	500 34	800,100, 800 100	227 0	,,,,2,2	2 D 1	NC 2012	7 0 0	.,0.0,) n n	0.0,1.	0.28	17 2 20 4	
43	NORTHERN	AREA RRMU2	RRMC238 2	O NATIONA	HIGHWAY	2,34	600,34,	700,100,	352 0	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	2 D 1	AC 2012	7 28	6 N N	0.0,0.	8.6 9	1 21 2 46	4
44	NORTHERN	AREA .RRMU2	RRMC238 2	.O.NATIONA	HIGHWAY	2.34	.700.34	800.100	337.0		2.D.1	AC.2012	.7.26	3.0.0	.0.0.2	6.3	9.24.2.40	اله
45	NORTHERN	AREA, RRMU2	.RRMC238.2	.0.NATIONA	HIGHWAY	2.34	.800.34.	900.100.	339.0		2.0.1.	AC.2012	.7.5.9	1.0.0.	0.0.5.	9.27	18.2.49	,.

Figure 5.1 Road Surface Condition Data (Raw Data - Example) -- the Final Output

5.2 Data Used

To create the final outputs, following data are necessary:

Table 5.1	Data Requi	red to Produc	ce Road Surfa	ce Condition Data
	Dutu Noyun	cu to i rouu		CC COntaition Data

File Name	Туре	Process Produced	Description	Note
0001	Road Management Data	Field Reconnaissance	Jurisdiction and	
			Corporation	
0003	Road Management Data	Field Reconnaissance	Distances between	
			kilometer posts	
0004E	Road Management Data	Field Reconnaissance	Overlapping management	English
0004VN	Road Management Data	Field Reconnaissance	Overlapping management	Vietnamese
0005	Road Management Data	Field Reconnaissance	Station Number note	
0101	Road Management Data	Field Reconnaissance	Lane structure	
0104E	Road Management Data	Field Reconnaissance	Road structure	English
0104VN	Road Management Data	Field Reconnaissance	Road structure	Vietnamese
0105E	Road Management Data	Field Reconnaissance	Intersection	English
0105VN	Road Management Data	Field Reconnaissance	Intersection	Vietnamese
0201E	Road Management Data	Field Reconnaissance	Impassable segment	
0201VN	Road Management Data	Field Reconnaissance	Impassable segment	
commonE	Common Data	Data Processing		English
commonVN	Common Data	Data Processing		Vietnamese
C_NH00100D_000k00010_051k00000.CSV	Crack Data	Analysis		This data use for data process
R_NH00100D_000k00010_051k00000.CSV	Rut volume Data	Analysis		This data use for data process
S_NH00100D_000k00010_051k00000.CSV	Profile Data	Analysis		This data use for data process

Data to be used are from the processes of Field Reconnaissance and Pavement Damage Interpretation. The common data are prepared in this process of data integration.

(1) Common Data

The common data has two data codes: 02 and 03. The data structures of data codes 02 and 03 are expressed in Table 5.2 and Table 5.3.

Table 5.2	Geographical Area,	Jurisdiction,	Management	Company	(Data	Code 02	2)
-----------	--------------------	---------------	------------	---------	-------	---------	----

Data Code		Geographical Area		luvicolio+ion			Management Company								[De	so	cri	pt	ior	ı				
1		3		5		7			10															59	
0	2	0	1	0	0	0	0	0	Ν	0	т	н	Е	R	Ν		А	R	Е	А					
0	2	0	1	1	0	0	0	0	R	R	М	U	2												ļ
0	2	0	1	1	0	2	2	2	R	R	М	С	2	2	2										

 Table 5.3
 Route Number, Branch Number, Route Name (Data Code 03)

	Data Code	Condition Acco	deographical Area	Blank		Route Number		Ducach Minahau	Dranch inumber																C)e:	sc	rip	tio	n												
	1	3			6			9		11																																110
0	3	0	1		0	0	1	0	0	Ν	А	т	I	0	Ν	А	L	н	I	G	н	W	A	Υ		1																
0	3	0	1		0	0	1	0	1	s	0	U	т	н	Е	R	Ν	R	I	Ν	G		R	0	Α	D		3	Т	С)	С	А	υ	1	D	Α	с				
C	3	0	1		0	0	2	0	0	R	R	м	С	2	2	2																										

Use the codes in Table 5.4 to express the geographical areas.

Table 5.4 Geographical

Geographical Area	Code
Northern Area	01
Northern Middle Area	02
Southern Middle Area	03
Southern Area	04

The common data are created from the two tables. The codes used in the common data come from the following two tables. The jurisdiction code shall be selected and encoded from the following list.

Table 5.5 Jurisdiction Classification

Jurisdiction	Code
RRMU2	10
RRMU4	20
RRMU5	30
RRMU7	40
Province	50
Company	60
Under construction	70

The three-digit codes are entered from the following list.

Jerre	
Management Company	Code
RRMC222	222
RRMC224	224
RRMC226	226
RRMC232	232
RRMC234	234
RRMC236	236
RRMC238	238
RRMC240	240
RRMC242	242
RRMC244	244
RRMC248	248
Other	999

Table 5.6 Management Corporation Codes

A commonE file is created as in the following example.

Figure 5.2 commonE (An Example)

		10	20	30	40	50	60
1	02 1	0 ONorthern	Årea∉				
- 2	02 1	10 ORRMU24					
3	02 1	10222RRMC222					
- 4	02 1	10224RRMC224					
- 5	02 1	10226RRMC226					
6	02 1	10232RRMC2324					
- 7	02 1	10234RRMC234					
8	02 1	10236RRMC2364	1				
9	02 1	10238RRMC2384					
10	02 1	10240RRMC240	L				
11	02 1	10242RRMC242					
12	02 1	10244RRMC244					
13	02 1	10248RRMC248					
14	02 1	109990ther#					
15	02 1	150 OProvince	4				
16	02 1	509990ther#					
17	02 1	60 OCompany∉					
18	02 1	609990ther 4					
19	02 1	170 - OUnder Co	nstruction≁				
20	02 1	1709990ther 4					
21	02 2	20 ONorthern	Middle Area				
22	02 3	3 O OSouthern	Middle Area				
23	02 4	40 OSouthern	Area↔				
24	03 1	l 1 ONationa	.I Highway 1∉				
25	03 1	l 1 1Souther	n Ring Road 3	} to Cau	Dau≁		
26	03 1	2 ONationa	l Highway 2∉				
27	03 1	l 3 ONationa	. Highway 3₽				

(2) Field Reconnaissance Data

The outputs of the management data have been discussed in 2.5(6)Preparation of Road Management Data . The files required are summarized in Table 5.7.⁵

Table 5.7	Management Data Fil	65
		CS

File Name	Description	Note
0001	Jurisdiction and Corporation	
0003	Distances between kilometer posts	
0004E	Overlap	English
0004VN	Overlap	Vietnamese
0005	Station No note	
0101	Lane structure	
0104E	Road structure	English
0104VN	Road structure	Vietnamese
0105E	Intersection	English
0105VN	Intersection	Vietnamese
0201E	Impassable segment	
0201VN	Impassable segment	

(3) Analysis Data

The following three csv files are data examples of IRI, rut depths and cracks.

				-	
No	Field	No	Field	No	Field
1	Road Classification	12	Road Surface Type	23	Vehicle
2	Route Number	13	Structure1	24	Name of Leader
3	Branch Number	14	Structure2	25	Longitude (from)
4	Inbound, Outbound	15	Structure3	26	Latitude (from)
5	Lane Classification	16	Displacement meter 1	27	Altitude (from)
6	Lane Number	17	Displacement meter 2	28	Longitude (to)
7	Analysis (from)	18	Displacement meter 3	29	Latitude (to)
8	Analysis (to)	19	Flatness	30	Altitude (to)
9	Length (from)	20	Displacement Volume	31	GPS Flag
10	Length (to)	21	Profile	32	Managed Station Number
11	Surveyed Year, Month, Day	22	Analysis Segment Length	33	Management Number

Table 5.8 Profile Data, IRI Data Structure

⁵ Vietnamese files are included, since this manual is based on an Vietnamese project.

10.	14.7	2			-				144,000	X0.30	0/6/071	9_051k000	R.Covin	Advancett.						-21-	*I ¥
100	1600	liber	Print P	+ (9 ¹ 0)	Farma	an 3	mių į	-	100	Geve	N99M									~ G	
PV.	X CH	(industry)	- 18	A	5 x =	-	. R.	1	Post geads Q		likin			+		1	3-3	1	2 Junoilu El rei -	" 2T A	
94.02	B	/ U -	21	59 -	A- 5		医子	5 3	Meneral	nial-	\$	· · ·	14.27	Conuell (ANI SIMI	Cell.	Burf Diam	Tamm	di time -	Status Final	6-
Giraban	6.4		T tam		1		Man	-				there .	-	a de la competencia de la comp	Shin	Councie.	240			1	
	447.	1	1.		8.	T	M		34	0		p	0		4	1	100	ý.	-10		
109368		10935	8 109	RG 20	0121002	-	L.	0	0	-	0	0	0		5.4718	-6.17037	-11.6422	10	RealMini	Do Hong Phone	106.7
109361		1093	b 1093	1 20	0121002		1	0.	0		0	0	0		5.1833	0.42683	11.8099	10	RealMint	Do Hong Phone	106.71
109307	- 6	10936.	1 1,0934	1.7 20	1121002		L	n.	D		п	a	0		5.7887	-6.28837	-11.5771	10	RealMint	Do Hong Phone	106.7
Cotrol		10036	Z 10954	5.5 20	0121002		1.	0	0		Ú.	.0	0		5.19104	-0.5118	11.7028	10	RealMini	Do Hong Phone	105.74
109354		10936	a 10936	5.0 20	121002		£	a.	0		n	0	n'		E\$080.7	-6,68067	-11.771	10	RealMini	Do Hong Phone	106.7
109365		10936.	4 1093	\$5 20	0121002		1	D	U		0	0	0		4.99268	-6,79362	-11.7865	10	RealMitti	Do Bong Phone	106.745
109566	1	10995	5 10934	1.8 20	121007		4.	16	D		n .	U	.0		4.90721	6.7307)	11:6379	10	Realbaini	Do Hinng Phone	106.7
105367		10936	6 109.0	5.7 28	0121002		1	36	- 0		п	Ū.	8	-	4.82788	-0.61828	-11.6462	10	RealMini	Do Hong Phone	106.74
109368	X	10936	7 10934	3.8 20	5001566		2	0	0		0	0	0		4,76683	-6.8488	11.6156	10	RealMini	Do Hong Phone	106.7
1033800	1	10936.	5 10931	1,9 26	0121002		1	8	.0		0	0	0		4.72/117	-0.82335	-11.5505	10	Neath(in)	Do Hong Phone	106.7
109170	1	10936	9 109	37 20	1121002		È	0	0		0	ö	D-		4.69055	6.84871	11.5898	10	BealMini	Do Hong Phone	106.7
101171	4	1093	7 1093	71 20	121002		1	η.	n		ő.	ō	0	-	4,86921	-6.79581	11.465	10	RealMini	Do Hong Phone	106.7/
109372	1	10937.	1 1093	7.2 20	1121002		1.	12	10		0.	e	õ	- 0	4.67329	6.68313	11.3634	10	RealMini	Do Hong Phone	106.7-
109571	4	10937	2 1093	7,3 20	121002		1	÷.	0		0	0	0		1.66445	-6,54141	-11.2279	10	RealMini	Do Hang Phone	106.7
109374	(10937.	3 1093	7.4 20	3121002		i.	0	0		0	10	0		4.7/1276	6.63225	11.335	10	RealMint	On Hong Phone	106.7
105275	5	10937.	4 1093	7.5 20	1221002		1	0	0		0	0	0	4	4.73238	-0,45251	-11.2210	10	SealMini	Do Hung Phone	106.7
109370	1	10937	5 1093	1.6 20	2121002		1	0	0		0	0	0		4.79126	-6.3453	11.1366	10	Regitatini	Dó Hong Phong	106.20
108577		10937.	6 1093	7.7 20	121002		1	0	0		Ð.	0	0		4.65229	-6.23942	-11.0918	10	RealMint	Do Hong Phone	106.7
109378	5	10937	7 1093	7.8 20	121002		1	0	0		0	9	0		4.91943	6.29619	11.2156	- 10	BealMini	Do Hong Phong	106.7
109379		10937.	\$ 1093	7.9 20	121002		1	0	0		9	Q	0		4.38962	-6.21145	-11.2011	10	RealMini	Do Nong Phone	105.7
109530		10957	9 309	35 20	9121002		1.	-10	.0		D	0	-0		5.07507	0.15602	11.2311	10	RealMini	Do Hong Phone	106.7-
109361		1093	8 1093	3.1 20	121002		1	0	0		0	0	0		5.17578	6.11644	-11.2922	10	RealMint	Do Hong Phone	105.74
109382	4	10938	1 10931	1.1 20	3121002		1	4	11		ų.	0	0		5 2948	6.13725	11.4321	10	RoitMini	Do Hong Phone	105.7-
109383	×.	10935	2 10931	1.1 20	0321002		Ľ	0	0		0	0	0		5.43218	-6.11051	-11.5126	10	RealMini	Do Hong Phone	106.7
109384		10938	2 1093	3.4 20	121002		1	0	- 0		0	0	0		5.57251	6,10961	35.6821	10	RealMini	Do Roog Phone	106.7
10/2103		10933	4 1093	15 28	121002 Lkp0000	12	1	ñ	n		R	0	ni.	pri-	5,77684	-6,11396	-11.8237	10	RealMini	fin Hans Phone	106,71
Dinek ch	rangi Li	ic.																1 INT	1 1 1000	(H)	F

Figure 5.3 IRI Data (from Road Surface Condition Data Interpretation and Encoding)

Table 5.9 shows the rut depth data structure.

No	Field	No	Field	No	Field
1	Road Classification	26	Y5	51	Y17
2	Route Number	27	X6	52	X18
3	Branch Number	28	Y6	53	Y18
4	Inbound Outbound	29	X7	54	X19
5	Lane Classification	30	Y7	55	Y19
6	Lane Number	31	X8	56	X20
7	Analysis (from)	32	Y8	57	Y20
8	Analysis (to)	33	X8	-	-
9	Length (from)	34	X9	-	-
10	Length (to)	35	Y9	-	-
11	Surveyed Year Month Date	36	X10	175	X80
12	Surface Classification	37	Y10	176	Y80
13	Structure 1	38	X11	177	Analysis Method
14	Structure 2	39	Y11	178	Analysis Segment Distance
15	Structure 3	40	X12	179	Vehicle
16	Rut depth	41	Y12	180	Leader
17	X1	42	X13	181	Longitude (from)
18	Y1	43	Y13	182	Latitude (from)
19	X2	44	X14	183	Altitude (from)
20	Y2	45	Y14	184	Longitude (to)
21	X3	46	X15	185	Latitude (to)
22	Y3	47	Y15	186	Altitude (to)
23	X4	48	X16	187	GPS Flag
24	Y4	49	Y16	188	Management Kilometer Post
25	X5	50	X17	189	Management number

Table 5.0	Rut Denth	Data	Structure
1 able 5.9	Rui Depin	Dala	Siluciule

An example of rut depth data is shown in Figure 5.4.

Figure 5.4 Rut Depth Data (from Road Data Analysis)

de -	NAME A	anner.	PAGE LA	varal if	million	line of	Review	-	illevia	1004H												
15	Cakbri		- 11	· A' a'	* -	*	3w	ter i tel		General	1.2	2.4	P.12	-	4	1	ł.		∑ AutoSi ⊇ hri=	25	A	
3	B /	Щ÷	5207.	N. 4-	8.3	31 (家)	¥ 30.4	erge ä. Ce	1041.2	3. 2	1.19	21 100	naranina Pratema	at 136b	- Stateart	10.64	Selete.	sound)	2 Clear	Stiffer T	FINE &	
iumit -	1.1	-	les .	-	11 C	494		_		1.0.00	11:	-	V-91122	state!	119403		THE.	_	112 12	subury:	1-10-100	
1			冠	0	9	E.	UE:	iii iii		him	4				M	1.74	ť	1	(p)	0	8	
	0	1	ō	2	B			0	Ø.	ō	I	2012100	a -	1	6	-3	1	0	2.3	0	0	
-	0	L	0	2		1 3		0	0	G10	2	2012100	2	1	0			0	4.9	0	0	
	0	1	0	2		1 1		a.	0	2	7	2012100	2	1	0.	- 64	ŝ	0	5.6	0	- 41	
	0	1	e	2				0	u	3	4	2012100	2	1	ŏ.		j	0	4	0	0.	
	0	1	n	2		i i		0	ar.	4	5	2012100	2	-1	0	ñ	1	a'	3:9	a	a	
	0	1	0	2				0	a.	5	6	2012100	2	1	0		1	0	2.2	0	0	
	0	1	0	2	9			0	8	6	2	2012100	2	1	0		1	8	7.1	0	U.	
	0	1	-0	2.				0	0.	.7	8	2012100	2	1	0:	- 14	1	0	10.7	0	0	
	0	1	a	2		1 1		0	0.	8	3	2012100	2	1	0		1	0	4.3	0	. 0	
	0	11	0	2.		1 1		17	10:		10	2012100	3	.1	0	1	1	0.	8.7	0	- 6	
	0	1	0	2	3	1 1		0	0	10	11	2012100	2	1	0	- 16	3	0	3.5	0	0	
	0	1	-0.	2		1 1		4	10	11	12	2012300	2	1	0.	- 14	2	10.	2.9	0	0	
	0	1.5	0	2		1		D.	0	12	13	2012100	2	1	0	14	1	0	4.9	0	0	
	0	1	0	2		1 1		0	e	23	14	2012100	2	1	0		1	0	5,6	0	. U	
	0	1	0	2				0	a.	34	15	2012100	2.	1	0)	0.	2.9	0	0	
	0	1	0	2	1	1		0	0	25	16	2012100	2	1	0	- 3	1	0	2,6	0	0	
	0	1	Q	2		1		Ū.	.9	36	17	2017100	2	1	0	3	1	0	\$.1	8	11	
	0	1	в	2		()		D	a.	37	18	2012100	2	-1	8		1	0	9.9	0	0	
	0	1		2		1		0	.0	.18	19	2012100	2	-1	0.	4	2	0.	2.4	0	0	
	0	- K.	0	2				0	0	18	20	2012100	2	1	0	1	1	0	5.8	0	0	
	0	1	0	2	- 3	1 3		0	0	20	21	2012100	21	1	0	- 3	1	0	- 4	0	đ	
	0	1	9	2	1	1		0	.0	Z3	22	2012100	2.	1	0	3	2	0	6.3	0	9	
	0	1	¢	2	1	1 3		0	0	22	- 23	2012100	2	.1	0.	4	1	0	5.1	0	. 0	
	0	1	10	2		1 1		0	0	23	24	2017100	2	1	0.	3)	0	4.8	5	-82	
	0	- 3	0	2		1		D	Ø	24	25	2012100	2	1	Ø.	1	1	8	8.9	0	0	
ander!	.0	1	0	2	1			0	0	25	26	2012100	2	1	0		2	1	4.4	0	.0	1

Table 5.10 shows the crack data structure.

Table 5 10	Crack Data Structure
1 able 5.10	

No	Field	No	Field
1	Road Classification	36	Reserve
2	Route Number	37	Residual Acquisition Unit: Pothole 75-100%
3	Branch Number	38	Residual Acquisition Unit: Pothole 25-75%
4	Inbound, Outbound	39	Residual Acquisition Unit: Pothole 0-25%
5	Lane Classification	40	Residual Acquisition Unit: Asphalt Two or more cracks
6	Lane Number	41	Residual Acquisition Unit: Asphalt Linear Crack
7	Analysis (from)	42	Residual Acquisition Unit: Concrete Crack Length 150cm
8	Analysis (to)	43	Residual Acquisition Unit: Concrete Crack Length 125cm
9	Length (from)	44	Residual Acquisition Unit: Concrete Crack Length 100cm
10	Length (to)	45	Residual Acquisition Unit: Concrete Crack Length 75cm
11	Survey Year, Month, Date	46	Residual Acquisition Unit: Concrete Crack Length 50cm
12	Analysis Lane Width	47	Residual Acquisition Unit: Concrete Crack Length25cm
13	Road Surface Classification	48	Residual Acquisition Unit: Patching 75-100%
14	Structure1	49	Residual Acquisition Unit: Patching 25-75%
15	Structure2	50	Reserve
16	Structure3	51	Reserve
17	Pothole 75-100%	52	Reserve
18	Pothole 25-75%	53	Reserve
19	Pothole 0-25%	54	Reserve
20	Asphalt: Two or More Cracks	55	Reserve
21	Asphalt: Linear Crack	56	Reserve
22	Concrete: Crack Length150cm	57	Mesh size
23	Concrete: Crack Length125cm	58	Analysis Segment Length
24	Concrete: Crack Length100cm	59	Survey Vehicle
25	Concrete: Crack Length75cm	60	Name of Leader (Road Condition Survey)
26	Concrete: Crack Length50cm	61	Longitude (from)
27	Concrete: Crack Length25cm	62	Latitude (from)
28	Patching 75-100%	63	Altitude (from)
29	Patching 25-75%	64	Longitude (to)
30	Reserve	65	Latitude (to)
31	Reserve	66	Altitude (to)
32	Reserve	67	GPS Flag
33	Reserve	68	Management Kilometer Post
34	Reserve	69	Management Number
35	Reserve		

An example crack data from the results of the road data analysis is shown Figure 5.5.

Re	this int	Immi .	Pépe 1	epoid 1	Formiller	(fina		en tien	(Prive	elumer									¥ 🔁 =
	CMDI		- 11	· A A		1 10	97.C	Wrap fee	0	General					1	7	E kutošum	27	AL .
1014	7 10 Z	и -	1000	3.7			常保	·道sterge &	Centel, =	\$ 2.55	1 22 23	Condition Formatte	inal Conton mp.* ax Tátor	it Cell # = Styles =:	Insed Ge	lete Format	21381-	Sort.4	- Select -
用读单()	1.0	10	0.000		6		(and the second se			· (iù=	ei		Style-		11	HU	1000	ALC: NO	104000
100			0	n	-1			- (B)	11	-ti	11	κ .	11	M	N.	0	E 9	a -	ñ
	0	1	0	2		1	1	0	0	0	5 201	21002	3,798	1	0	0	a.	0	0
	0	1				4	#1:	0	0	8	10 201	21002	3.798	- 1	0	0	G	- 6	0
	0	1	0	2		1	1	0	.0	10	15 201	21002	5.798	1	0	0.	0	0	0
	0	1	0	. 2		1	1	0	0	15	20 201	21002	3,798	- 1	.0	8	0	0	0
	0	3	6	2		1	1	n	0	20	25 201	23002	3.798	-1	0	Ø	a	Ð	a
	0	1	e	2		I	1	0	0	25	30 201	21002	\$,798	1.	0	0	¢.,	0	0
	0	1	0			1	1	Q.	0	30	35 202	21002	3.798	- 10	0	a	0	0	0
	0	1	0	2		1	1	0	0	35	40 201	21002	\$,798	1	.0	0	0	0	0
	0	1	0	2		1	1	0	0	40	45 203	21002	3.798	1.	0	0	0	0	0
	0	32		- 2		1	1	0	U	45	50 201	21002	3.798	3	0	0.	α.	0	0
	0	1	0.	2		1	1	0	0	50	55 201	21002	3.798	1	0	0	0	0	0
	0	1	0	2		1	1	0	0	55	60 201	21002	1.798	1	0	σ	0	0	0
	0	1	0			1	1	. 0	0	60	65 201	21002	3.798	- E.	.0	0.	0	- 0	0
	0	1	0			ź	1	. 10	0	65	70 201	21092	3.798	1	0	0	0	0	0
	0	1	p.	2		1	I	n di	n	70	75 201	21002	3.798	1	0	0	9	0	0
	0	1	0			1	1	10	0	75	80 291	21002	3,798	1	0	0	0	Ð	0
	0	3	6			4	1	0	0	80	85 201	21002	3.658		0	0	G	0	0
	0	12	0	2		£	1	0	.0	85	90 201	21002	\$.858	1	0	0	0	Q.	0
	0	1	0	. 2		1	1	Ø	0	50	95-201	21002	3.658	1	0	5	0	0	0
	0	3	0	2		1	1	D	ð	25	190 201	21002	3:658	-1	0	σ	a	n	a
	0	A.	0	2		1	1	0	0	109	105 201	21002	3.658	1	0	ŵ.	0	0.0	0
	0	1	0	.2		1	1	Q.	0	305	110 201	23002	3.658	1	0	a	0	0	0
	0	1	0	2		1	1	4	0	230	115 201	23,002	3.658	1	0	0	0	-0	0
	0	1	0	2		1	1	0	0	115	120 202	21002	3.658	- F.	0	0	0	0	
	0	3.	0	2		1	1	0	U	120	125 201	21002	3.658	1	0	0.	0	0	0
	0	11.	100 6		GATU -		()	0	.0	125.	130 203	21002	3.658	1	.0	18	0	. 0	0

Figure 5.5 Crack Data (from Road Surface Condition Data Interpretation and Encoding)

5.3 Preparatory Work

(1) Enabling the Macro Function in Excel

The system requires the MACRO function of MS-Excel. It is necessary to enable MACRO.

Set the Macro Setting to "Disable all macros with notification." If Excel 2003 is used, go to the menu bar. Select Tools, Macro, Security.

Figure 5.6 Enabling Excel Macro

Trusted Publishers	Macro Settings
Trusted Locations Trusted Documents Add-ins	 Disable all macros without notification Disable all macros with notification Disable all macros except digitally signed macros
ActiveX Settings	Enable all macros (not recommended; potentially dangerous code can run)
Macro Settings	Developer Macro Settings
Protected View Message Bar External Content File Block Settings Privacy Options	☐ Trust access to the <u>V</u> BA project object model

(2) Folder Setting

An folder setting example is shown in Figure 5.7. Create a work folder with an appropriate project name. Copy the MC_V_EN-utf8.xls file directly under the work folder. Copy provided elib folder directly under the work folder. Store the road management data from field

reconnaissance to the kanri folder. The pavement damage interpretation data and other recorded data are stored by scene.



5.4 Method (Program Used)

The system uses the Notepad application to show dialogues. In order to continue, end the Notepad application.

(1) Program Interface

The Process sheet of MC_V_EN -utf8.xls looks like the following figure. The buttons are linked to the



Figure 5.8 The Interface of the Data Preparation System

(2) Operation Flow

The general sequence of operation is as in the following flow chart.





(3) Parameter Setting

The program starts by opening the MC_V_EN -utf8.xls file. The system shows the following dialogue.



Microsoft Excel	:
First of all, Check parameter property then click [Parameters] button!	
σκ	

Click OK and continue.

i iyui	e J. IT Taranneter J	etup internace				
	and the second se	MC_V_EN_UTF-8.xls [Compatibili	ity Mode] - Microsoft Excel			
File Home Insert	Page Layout Formulas Data Re	eview View Developer				v 😮 🖬 🛱 💥
C12 • 🤄	f _x					v
A	B	C	D	E	F	G
1 (!Attention!) Yellow	cells are etitable; blue cells are	locked.	Devementaria			
2 Customer code	1		i arametera			
3 <process environment<="" td=""><td>Information></td><td><management data="" file="" name=""></management></td><td></td><td></td><td></td><td></td></process>	Information>	<management data="" file="" name=""></management>				
4 Program folder	D:¥RoadCalc¥	Management office data	Distance between Kilopost			
5 Management Data folder	E:¥RoadData¥NH00000¥D01¥	0001	0003			
6 Data process folder	E:¥RoadData¥NH00000¥D01¥					
7 <the paramete<="" process="" td=""><td>r of the road property:Evaluation len</td><td>gth></td><td></td><td></td><td>Abnormal valu</td><td>e check(Rutting)</td></the>	r of the road property:Evaluation len	gth>			Abnormal valu	e check(Rutting)
8 Crack	100	More concevity than standard of correction value(mm)	More convex than standard of correction value(mm)	Rutting correction value(mm)	mm or more	A difference with the last data
9 Rutting	100	100	100	200	100	50
10 IRI	100					
11						
12						
H + H Process Paramet	ers Header 🖓) × []
Ready 🔄					田田 1009	

Figure 5.11 Parameter Setup Interface

The enlarged view with corresponding number for explanation is shown in the following table.

Table 5.11 The Inter	rface (Enlarged View)					
[1] Customer code	1					
[2] <process environment="" inf<="" td=""><td>formation></td><td>[3]<management data file name></management </td><td></td><td></td><td></td><td></td></process>	formation>	[3] <management data file name></management 				
[2-1]Program folder	D: \RoadCalc\	[3-1] Management office data	[3-2] Distance between Kilopost			
[2-1] Management Data folder	E: \RoadData\NH00000\D01\	0001	0003			
[2-3] Data process folder	E: \RoadData\NH00000\D01\					
[4] <the of<="" parameter="" process="" td=""><td>of the road property: Evaluation</td><td>length></td><td></td><td></td><td>Abnormal va (Rutting)</td><td>alue check</td></the>	of the road property: Evaluation	length>			Abnormal va (Rutting)	alue check
[4 1]Crack	100	[5-1] More concavity than standard of	[5-2]More convex than standard of	[5-3]Rutting	mm or	A differend

[4-1]Crack	100	concavity than standard of correction value(mm)	convex than standard of correction value(mm)	[5-3]Rutting correction value(mm)	mm or more	A difference with the last data
[4-2] Rutting	100	100	100	200	100	50
[4-3] IRI	100					

The program would run with the default parameter setting. If it is necessary, the values can be adjusted.

[1] Customer code

> The customer code can be set according to a customer management system of an organization.

[2] Process Environment Information

> Prepare the working environment, and parameters are entered. According to the work environment, following folders shall be specified.

- [2-1] Program folder: Set a path of working folder.
- [2-2] Management Data folder: Set a path of the management data folder. Intermediate working files are stored.
- [2-3] Data process folder: Set a path where the Analysis Output files are stored. Intermediate working files are stored.
- [3] Management data file name

The following two road management data need to correspond to the survey segments of the analysis output files.

- [3-1] Management Office data file: Set the road management data "0001" –the file nametargeted for processing. [3-2] Distance between Kilopost: Set the road management data "0003" – the file name- targeted for processing.
- [4] The process parameter of the road property: Setting the Evaluation length

The evaluation lengths of surface condition data for [4-1] Crack, [4-2] Rut depth, [4-3] IRI are set based on the requirement of the pavement surface condition data to be prepared. The unit shall be the same for all conditions. In the example, the values are 100 meter.

[5] Adjustment condition setting (Setting the automatic adjustment processing conditions)

The adjustment value for setting abnormal value of rut depth volume can be set by setting the following three values: [5-1] More concavity than standard of correction value (mm); [5-2] More convex than standard of correction value (mm); and [5-3] Rutting correction value (mm). If the more strict condition needs to be applied, smaller values need to be set. In this example values 100 mm, 100 mm and 200 mm are set for the three adjustment (correction) values.

[6] Rut depth abnormal value check condition setting

Two values are set to identify abnormal rut depth values. When the conditions set are satisfied, the values are identified as abnormal. When more strict conditions are needed, smaller values need to be set. The example shows 100 mm and 50 mm for the rut depth value and the value of difference, respectively.

- [6-1] mm or more: A rut depth value at some location
- [6-2] A difference with last data: A difference of the rut depths between the one and one before.
- [7] After setting all the parameters, press the Parameter button. The view is changed to the Processing sheet.

(4) kanri.file Preparation

The road management data (0001, 0003, 0004, 0005, 0101, 0102, 0104) are integrated to prepare kanri.file. To prepare the kanri.file, use "1. Making Management file-1."

Figure 5.12 kanri.file Preparation



The following message box appears. A dialogue box appears, and ask if the process is to be proceeded. Click yes.

Run "2.Making Management file-2" by pressing the button.

The following output appears. Check if the length is equal to the processing route length.

5			,	3
	159545	161000	1485	
0248	1485			
0248	1000			
0248	1005			
0248	1000			
0248	1000			
0248	1005			
0248	1115			
0240	1005			
0240	995			
0248	1005			
0248	550	12180		_
		ROUTE=	12180	1
		SUM-	19100	1
		SOM-	12100	

Figure 5.13 Check the Survey Route Length

After confirming the length, close Notepad.

Check if each file is merged. The following case is OK.

Figure 5.14 Road Management Data Merged

	•			•	•	
Ļ		<u> </u>		89.00	2011-02	
i	<005>	MERGE	START			
	<052>	MERGE	START			
	(05.0)	NEDOE	END			
	<058>	MERGE	START. END			
1			2142			

The following output is an example of an error. Check the original road management data, if an error is found.

Figure 5.15 An Example of Road Management Data Not Merged

	K005>	MERGE START	
	??	MERGE START	
	<058>	END MERGE START	
		END	
I			

(5) Crack File Preparation

Create a crack file from the analysis output by pressing the buttons 3.1 and 3.2.



Figure 5.16 Crack Data File Preparation

Press the "3_1. Crack data check" button. The following case does not have an error.

Figure 5.17 Confirmation of Error



Following dialogue appears.

Figure 5.18 Checking 062

Mier	osoft Excel 🔀
Ple	ease check '062'
Π	OK
	OK

Click "OK" and continue.

Consistencies between the road-surface-classification file "062" created and the road structure files (0101, 0104, 0105) shall be checked.

Press "3_2. Crack data make" after the consistency checking.

Product S. 19 Vinct 2 Commining the Data Pitch 771/00/mmmet are used and the end of	
Check the route length and total length are equal. Figure 5.20 Confirming the Target Processing Length	Confirm the data pitch; the normal value is 1.0.
ROUTE : 101 2 1 159545 161030 59 161000 163005 62 163000 166005 65 166000 167115 66 167000 168005 67 168000 169115 68 189000 169395 - 170000 171005 70 171000 171550 ROUTE LENGTH = 12180 TOTAL LENGTH = 12180	
An Example of an Error	

re 5.19 vrmcr2... Confirming the Data Pitch

The following case is an example of an error on the crack data preparation.

The line 2: The surface is recorded as concrete is interpreted as asphalt.

The lines 3 and 4: The survey length in the analysis has more than $\pm 1\%$ discrepancy against the road management data. If this is the case the data on distances between kilometer posts or the analysis data need to be reviewed and corrected.

Figure 5.21 An Example of Error in Crack Data - the vrmcr1

```
101 2 KP= 170
ata check)
                  Route=
                                                   Section.S-E=
                                                                      985.0
                                                                                 990.0
                                                                                           Ros
  101 2 17000000 17100000
101 2 17100000 17100550
                                      section length= 1005
section length= 550
                                                                    data length=
                                                                                      995
                                                                    data length=
                                                                                      565
rack-data-amount :
                           2438
```

(6) Rutting Data File Preparation

Press the 4. Rutting data check button to prepare the rutting data file.

Figure 5.22	Rutting	Data	Prenaration
I Iguie J.ZZ	Ruthing	υαια	FIEPAIALIULI

Menu	of proce	essing of	the road	property	data			Pleas
Making	the manage	ement data	to make th	e road prop	erty data 🚽		1	
1. M Managem	aking ent file-1		•	2. M Managem	aking ent file-2			
	processing	road prope	rty data	,				
	3_1. Crack check 3_2. Crack Make	k data	4. Rutting chec	g data k	5.	IRI data ch	eck	
[Da	ata check a	and edit(Whe	en error oc	curs, edit a	nd re-chec	Ŕ	

Confirm that there is no error in the process.

 $\overline{\alpha}$

Figure 5.23 Error Message

check => rd: 100 mm or more, A difference with the last data : 50 mm or more 2769 Average Method rd-data amount :

Confirm the data pitch for every segment between kilometer posts. If the pitches are significantly different, check the analysis data or the data on the kilometer post distances, and make necessary correction.

Figure 5.24 Confirmation of Data Pitch

Confirm that the processing length is right.

ROUTE :	101 2 1			Confirm if the	e lengths are		
	101 2 1 159545 161000 163000 166000 168000 169000 170000 170000 171000 ROUT	161030 59 163005 62 166005 65 167115 66 188005 67 189015 68 18995 - 171005 70 171550 TE LENGTH =	12180 12180	equal			

The following example is a case of error in the rutting data.

The lines from 2 to 10: An independent crack volume is more than 100 mm and the depth is 50 mm or more than the rutting depth locating before.

The line 11: The survey length in the analysis has more than $\pm 1\%$ discrepancy against the road management data. If this is the case the data on distances between kilometer posts or the analysis data need to be reviewed and corrected.



(7) IRI Preparation

IRI file is prepared from the analysis outputs. Press "5.IRI data check" and run the program.



Figure 5.27 IRI Data Check Operation

Press "5.IRI data check" and run the program. The Notepad shows the following data.

Figure 5.28 IRI Data Check Image

	무너진	30107	0 7000	ΔD/	
101 2 1 kp=	159 545				
101 2 1 kp=	161 0				
101 2 1 kp=	162 0				
101 2 1 kp=	163 0				
101 2 1 kp=	164 0				
101 2 1 kp=	165 0				
101 2 1 kp=	166 0				
101 2 1 kp=	167 0				
101 2 1 kp=	168 0				
101 2169000001700	10000 s	ection	length=	995	data amount= 1007
101 2 1 kp=	169 0				
101 2 1 kp=	170 0				
101 2 1 kp=	171 0				
IRI-data amount : 12	1890				

Confirm the pitch of IRI in every distance between the kilometer posts. When the pitch is significantly different, the analysis data or the distance data between the kilometer posts shall be corrected.

Figure 5.29 Confirmation of the Data Pitch

Confirm the length of processing.



(8) Integrating the Three Files

Integrate the three files prepared in the processes (4), (5) and (6) to prepare the romen file.

Menu of processing of	the road property data	Please execute data
Making the management data	to make the road property data	
1. Making Management file-1	2. Making Management file−2	
Processing road proper		
3_1. Crack data check	4. Rutting data check 5. IRI data check	
3_2. Crack data		
Make		
↓		
Data check	and edit(When error occurs, edit and re-check)	
	6 Data combine (CR + RD)	
	7. Data combine <cr +="" iri="" rd=""></cr>	
	8. Converting combined data	
		12
·		
	↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓ ↓	
	9. Convert to PASCO CSV form 10. 0	Output xls file

Figure 5.31 romen File Preparation

Press "6.Data combine <CR+RD>" and run the program to combine the crack and rutting data. Check the text file message to confirm there is no error.

Figure 5.32 Combining the Crack and Rut Data



Press "7.Data combine <CR+RD+SV>" to combine the combined data, crack and rut, and IRI. Check the text message to confirm there is no error.

Figure 5.33 Confirm No Error

********* merge end ok ********	3	****** *****	merge merge	start end	cr + ok	87 ******* ******
---------------------------------	---	-----------------	----------------	--------------	------------	----------------------

Press the "8.Converting combine data" to run the program. To the combined file with the three types of road condition data--crack, rut and IRI data--the basic data (geographical areas etc.) are combined.

0	0 0				
route 16 37 68 80	101 2 1 161000 5 163000 6 166000 6 167100 6	161030 5 163005 6 166005 6 167115 6	> > >	161000 163000 166000 167000	
91 102 112 124	168000 6 169000 6 169900 169900 171000 7	168005 6 169015 6 169995 171005 7	> > >	168000 169000 170000 171000	

Figure 5.34 Adding the Management Data to the Combined File

An Example of an Error

Following is an example of data integration error.

There are road segment data errors between: the data elements of crack and rut depth; or crack + rut depth and IRI. When this type or error occurred, the road management data or road structure data need to be reviewed and the data need to be corrected if necessary.

Figure 5.35 An Example of Data Integration



This is the end of processing one-scene. The process from the parameter setting shall be repeated and applied to all the scenes for all the routes.

(9) Dummy romen File Processing

When there is a segment that does not have the digital data or where the survey vehicle could not enter to capture the digital data, special treatment will be necessary. If this is the case, create dummy-romen data. If there is no such segment, skip this process of "Dummy romen File Processing."

Go back to the parameter setting and set necessary parameters and prepare a kanri.file. After the kanri.file is prepared, create the Dummy romen file by pressing 11. Making Management file-3."

Please	execute data process following number
	Making the dummy data
2	11. Making Management file-3
5. IRI data check	
t and re-check)	
RI>	
	12 Convert to PASCO CSV format
rm. 10. Output xls file	

Figure 5.36 Dummy romen File Preparation

As in the other operation, the parameters need to be set up. The kanri file needs to be prepared, also. Press the button, 11. Making Management File-3. Check the correct length.



Figure 5.37 Targeted Road Length Confirmation

Press "12.Convert to PASCO CSV format" to generate the csv file for the road segments that has not no digital data.

```
Figure 5.39 Road Surface Condition Data Output (CSV)
```

1 10236 1 10236	10011 -1 -1 10021 -1 -1	0 10 0 10	10 -1 10 -1	-10000000 - -10000000 -	-1 -1 -1 -1	-1 -1 -1 -1 -1 -1 -1 -1	-1 -1 -1 -1 -1 -1 -100 -1 -1 -1 -1 -1 -1 -100	-1 -1 -1 -1	-1 -1	-1 -1 -1 -1	-1 ^

(10) The romen File Integration

The romen files have been prepared by scene. The process integrates all the romen files created by scene. To integrate the files, press "8. Converting combine data."



Figure 5.40 The romen File Integration

(11) Road Surface Condition Data File (CSV files) Preparation

Now the all the romen files by scene were integrated. The integrated file is ready to be converted to output in the csv file format.



Press "9. Convert to PASCO CSV format" to create the following files.



Figure 5.42 Final Output - Pavement Condition Data - Unformatted

(12) Pavement Road Surface Condition Data File (Excel file) Preparation

Press the "10.Output.xls file" button and run the macro program. An Excel file is produced. Name the file according to the file name standards.

L. MARSON	NERGER																								
	1	T	1	1		. An	÷	Pro .						and a	1				100	anie (2	int:		-	1	
Sergelymick, Ame	-	Company	in a	Brack Nucley	terrine.	100		n.	ing:	14	-	-		1 1	40	1.2	10		Typicia Gay Sala Firsting	No.	tree .	Europe Dees	1 1	#	× .
CONTRACTOR OF	125209	13562999	1	0	NATIONAL IDSHWAY 5	0	t	1 10	31			-			5 4	-			inter				140	1	NOT SUBVEY SIG ESTEN
COLUMN TWO	NUMBER OF	LOCHT		0	NATIONAL HOOMSATIN	0	id i	10 10	- Pe	340.2			-	-	10	145	2015 10	7			- 0	n		100	1111001110
STREET.	REDECTO	\$2,50,0985		0	NATIONAL HIGHWAY D	0 1	20	0. 385	100		-			-	10	TAR	:201 10	- 0	16	N	0	10	- 1	1.14	
ONTHERE'S	ARSet00	\$2060940	1	0	SATIONAL IDODINAT &	0.4	60	4 346	105	12-				3	20	LAC	3842 16	- 6	16	- 44	- 14	10		2.01	
STREET SC	RENE	FENCTRY			NATIONAL HIGHWAY	2 1	8		Ling					- 2	20	(AC	3062 10	- 38	. 6		- 11	- 11		1.00	
REALES	RESEUR	REMICORY		0	NATIONAL BOBWAT O		00	1 10	145	128				-	10	INT	2752 15	1	¢		-		1	24	
CRIPERS.	REMON	23.362.000		0	CATIONAL HOOMWAY O		64	1 60	100	157	-			-	in l	TAF	3012 10		¢.	-	-	10		7.95	
CRITICALS.	RENCE	ERMCORD	1	0	CATRONAL HOORGAY &	4 4	64	1 760	100	- 111	-		-	3	10	IAT	.5552 10	4	0		6	14	-	114	
OFFICES.	TEMU	RRS(0)40	1	V	& VAMAGRE TROPPERATE	61 1	N	8 850	1.00	354	-		1	-	100	IAT	-5515 10	- 3	0	1		-18	14	0.88	
RITERS	MANU?	12362399	1	0	KATIONAL INCIDENT'S	0 5	10	3 600	TOI	367	-		-	1	10	LAT	3962 10	2	0		0	- 21	11	230	
Thurs	USC?	82360399	1	1 0	ATDINAL ROOMBAT N	0 5	~	1 0	100	.373	-	-	-	2	10	IAT	1013 10	- +		-	- 1	11	-	2.41	· · · · ·
Strings	ABARUN .	EE.MC 199	1		CATIONAL REGITEAVE	1	1	1 100	191	118	-	-	-	2	10	TAF	1072 10	-	0		- 0	11		1.0	
CRIMEN.	SUNCE	REMC1990	-		NATIONAL IDORWAT I	1 1	00	2 28	191	340	-		-	1	10	TAC	2012 10	- 1	- 0	- 0	0	IJ	-	- 10	
ATHERN	13MUP	ERMOND.	1	1	NATIONAL INCOMENTS	1 2	50	1 348	100	333	-	-		-	10	1 AC	2012 10	3	0	4	- 1	19	-	3.15	
THERN	R.See	ERMICORE	1	6	NATIONAL INCREMENTS	1 5	60	495	100	351			-	3	10	HAC	5002 10	3	.6	- 0	- 6	12		1.57	
COTHERS.	KINUF	1000-		0	DIATIONAL HOHWAY P	1 3	01	1 10	100	140	-		-		in l	LAC	1002 10	-	-		- 0	- 11	- 1	. 225	
CATRONY.	RENO	MANCHER.		0	VATIONAL HIGHWAY	1.1	-	1 60	100	-100	-			1	in l	INT	10000 14	- 1	- 10		- 1	11	- 1	2.10	
ATRAL.	KRANCY	REACTIVE		0	NATIONAL HONWATE	1 4	8	1 36	100		-	-	-		10	LAC	1381 10	-0	0	4	0	- id	-	201	1
CETHERS	RENTER	REACHER		3	NATIONAL RESIDENTS	1 1	5a	1 441	160	19				7	ite	HAT	1013 10	2	6	- 0	- 6	11	1.1	1.00	
SSTREET.	RENTON	RENCHIN		0	NATIONAL HIGHWAY	1 3		1 100	1.50	11				3	10	IAC	3052 16		. 6			. 54	1.11	3.9	
ARTHUR !!	REMUT	RENCHT		0	CATIONAL HIGHWAY	1.	00	1 1009	100	10				3	20.	IAE	3062 10	- 1	6		-	18	- 11	34	1
OWTHERS	REMOR	ER.MCORD	1		CATIONAL HOOMEAN &	1 10	64	2 2	-10	11:	-		-		10	IAC	-1012 10	3	0	1	0	- 11	1.3	3.55	
States -	COMENT OF COMENT	ER.MC.UND	1		CATRONAL HOOMWAY &	1		2 10	1.00	10	-			1	10	iAr	303 16	5			-	T	1	111	
COTHERS	18,040.9	RRACTINE	1	0	CATRONAL HOOMERY 6	2.4	20	2 308	1.00	+43				7	10	140	-3902 (0	- à	0	1	0	- 21	- 11	- 238	
ORTHERS	NUMBER	\$\$2000990			KATSONAL HOOTHWAY &	1 3	21	5 346	100	141	-	-	-	1	1p	The	5515 10	0	6			56	- 10	1.14	
RINTERS	MACT N	12362299	1		NATIONAL BOORDAND		00	2 +10	100	3,0	-	-	-	1	10	145	3002 10	- 1	0	-	-	n	- 1	1.98	
APRIL 1	ADMUS	12.365999	1	0	KATIONAL HOURAT &	1 4	m	3 50	100	340	1			1	10	LAS	3812 10	- 1	0	- 6	- 1	13	1	2.01	
SATISTS.	NUMBER OF BRIDE	IENCIN		0	NATIONAL ROOMEAU D	3 5	8	2 80	100	jilo	-		-		10	IME	362 16	3	0		0	- 18	- 35	1.11	
ATSERN.	LENU?	IR.MCHIC		0	SATIONAL IDGIEVAT		98	2 108	100	193				1	20	IAC	382 10	2			-	11	.93	1.0	
CERTHER	225410	10.000	1	1	CATRONAL INCOMENTA		-	2 1.01	10	114.7	-	-	-	-	in l	ilize	100010		-	-	-	- 14	-	1.41	

Figure 5.43 Final Output - Road Surface Condition Data - Formatted

Forms
٦

Form_FR01_Equipment Check List

	Equipment Check List								
	Field Reconnaissance								
<u>№</u> 1 2 3 4 5 6	Check item Whiteboard Hard hat Safty vest Paintbrush Paint Bucket Deterstele bergenet	Check	Remarks						
7 8 9 10 11 12 12	Retractable tape measure Walking measure Traffic guide device Safty cone Field note Daily activity report		Stick, flag or equivalent						
13 14 15 16 17 18	Venicle inspection sneet Laptop computer Route map Pen(s) Work gloves Digital camera								
<u>19</u> 20	Cellphone Trip Meter								
<u>h</u> <u>S</u>	hspection date : / / nspektion name : Survey Route : emark R :								

Form_FR02_Vehicle Inspection





Administration Unit									Route_Name Page			age									
FR	Date	te			Name				RCS Date					,	Name						
1.13.	Date	0)uthour	nd									Inhound	0.0.	Date				Nume	·	
S	tructure		Surface					Kilometer				1_1	Surface	St	ructure			Remarks			Positon
Start	End	Code	Type	5 4	3	2 1	Distance		Distance	12	3 4	5	Type	Start	End	Code		Romanio			
				T	- î					Ti	i						KP Exist ?	Yes		No	R C I
		-	-	-	1	1					1 '	1				1	TRI EXIOC :	100	,	110	
	+				· +	_		0 9			<u>' </u>	•									
				L •	1'	1		1 8		L '	1'	L									
	1				1			2 7	1							1					
				-	1						1										
	+	-						3 0				_				┫╌╴╶					
								4 5													
		1-1			. 1			5 4			. 1		I – – I			Γ-					
	1	+			Ι,	۲,		6 2	 	1.	١,	l				╆───					
	+	•			, I	1				4 !	, I					┥	+				
					ι,			7 2	L		!	L			L	L _					
					, I	1	l	8 1		1	, I	.				1					
	1				۰,	١,		9 0	1	1	۱ ₁	1	r I			1	t				
		-		┢╋	T			<u> </u>				r				-		V		N	
		_		1	· .						' ₁						KP Exist ?	Yes	; •	No	RCL
					1	1		0 9			1	L									
	T			1	<u>'</u> 1		i — — — —	1 8		1	' i	•				1 - 1					
					1 '	1				<u> </u>	1'	1	+								
				1	· +			2 /		-	<u> </u>	•									
	\bot	. L _	L	.	1.			3 6			1		L			⊥	l				
	T	- T -			1			4 5			1					1	[
								5 4													
	+	•			.			5 4								4					
					Ι.			6 3			Ι.										
					. !			7 2			, I										
		7	1 1		١.,	1		8 1			۱,	1	11								
	+				, I	1				+	, I					+	+				
		_			<u> </u>	1		9.0		+	<u> </u>	Ц	┝──┤					1			
					<u>ا</u> ا					<u> </u>	1 ¹						KP Exist ?	Yes	•	No	RCL
				1	'			0 9		11	' ।	1	I T			1					
	<u>†</u>	• – –			1	1		1 0	1	1'	i '	1	F I			1	†				
			┨ ─ ─ `		· +	-				1 +	1	•									
	4	.		L -	1'	+		2 7		<u> </u> '_	L '		⊢			4	+				
				11	1	·		36		11	·	•				1					
	T				1			4 5			1					1	T				
			ł – – ·		1				+		1	-	1								
	+		┝					5 4								┥					
								63	L		. I	_									
					Ι,			7 2			Ι.		T	_		1		_	_	_	
	1	+	├ ────		. 1			Q 1	 	11	, †					<u> </u>					
	+	-		L .	۱.,	Ι,	. -			+ .	۱.	1				┥	+				
	1		1					0 0													

Form_FR04_Field Note

Daily Activity Report															
									measurement item : Craking • Rutting depth • IRI • Forward view						
								Nan	ne : ①	2	3	(4)	(5)	6	(7)
date	survey	Route	wathar	road	s	urvey section	m		surve	y period			mileage	- -	driver's
	detail	number	wether	surface	start	end	difference	start	end	work hour	rest hour	start	end	difference	name
/															
/														+	
													-		

Form_FR05_Daily Activity Record

Appendices

_

Geographic	Jurisdiction	Management	English	Vietnamese
Area Code	Code	Company	-	
		Code		
1	0	0	Northern Area	Miền Bắc
1	10	0	RRMU2	Khu Quản Lý Đường Bộ 2
1	10	222	RRMC222	Công Ty 222
1	10	224	RRMC224	Công Ty 224
1	10	226	RRMC226	Công Ty 226
1	10	232	RRMC232	Công Ty 232
1	10	234	RRMC234	Công Ty 234
1	10	236	RRMC236	Công Ty 236
1	10	238	RRMC238	Công Ty 238
1	10	240	RRMC240	Công Ty 240
1	10	242	RRMC242	Công Ty 242
1	10	244	RRMC244	Công Ty 244
1	10	248	RRMC248	Công Ty 248
1	10	999	Other	Khác
1	50	0	Province	Tỉnh
1	50	999	Other	Khác
1	60	0	Company	Công ty
1	60	999	Other	Khác
1	70	0	Under Construction	Đang xây dựng
1	70	999	Other	Khác
2	0	0	Northern Middle Area	Bắc Trung Bộ
3	0	0	Southern Middle Area	Nam Trung Bộ
4	0	0	Southern Area	Miền Nam

App.1 Jurisdiction and Management Company (English, Vietnamese)

App. 2 Route Names

Route Number	Branch	English	Vietnamese
1	0	National Highway 1	Quốc Lộ 1
1	1	Southern Ring Road 3 to Cau Dau	Đường Vành Đai 3 Phía Nam tới Cầu Dậu
2	0	National Highway 2	Quốc Lộ 2
3	0	National Highway 3	Quốc Lộ 3
3	1	National Highway 3B	Quốc Lộ 3B
3	2	National Highway 3 (The old road branch)	Quốc Lộ 3 (Đường nhánh cũ)
4	0	National Highway 4E	Quốc Lộ 4E
5	0	National Highway 5	Quốc Lộ 5
6	0	National Highway 6	Quốc Lộ 6
6	1	National Highway 6-1 (The old bypass road)	Đường Vòng Tránh 6-1
6	2	National Highway 6-2 (The old bypass road)	Đường Vòng Tránh 6-2
6	3	National Highway 6-3 (The old bypass road)	Đường Vòng Tránh 6-3
10	0	National Highway 10	Quốc Lộ 10
10	1	Connecting National Highway 1 with Ninh Phuc Port	Đoạn nối QL1 với Cảng Ninh Phúc
15	0	National Highway 15	Quốc Lộ 15
18	0	National Highway 18	Quốc Lộ 18
18	1	Route Noi Bai - Bac Ninh	Tuyến Nội Bài - Bắc Ninh
21	0	Ho Chi Minh Route	Đường HCM
37	0	National Highway 37	Quốc Lộ 37
38	0	National Highway 38	Quốc Lộ 38
38	1	National Highway 38B	Quốc Lộ 38B
43	0	National Highway 43	Quốc Lộ 43
70	0	National Highway 70	Quốc Lộ 70
279	0	National Highway 279	Quốc Lộ 279

App. 3 Input Data

Data Code	Code	English	Vietnamese
0104	В	Bridge	Cầu
0104	Т	Tunnel	Hầm
0104	R	Rock Shed	" Hầm " phòng đá lăn
0104	0	Other	Khác
0105		U/N (UnKnown)	Chưa xác định
0201	1	Not Survey (No Entry)	Không khảo sát (không vào được)
0201	2	Not Survey (Other)	Không Khảo sát (các lý do khác)